00002 – CERTIFICATION PAGE

PROJECT NAME: **COUNTY ROAD A-25 SUBSIDENCE MITIGATION AND MINE SAFEGUARDING PROJECT**

LOCATION: **COLFAX COUNTY**

PROJECT NUMBER: **EMNRD-MMD-2023-03**

AML PROJECT ENGINEER: **YENY MAESTAS**
Mining and Minerals Division
State of New Mexico, Energy, Minerals and Natural Resources Department
1220 South St. Francis Drive Santa Fe, New Mexico 87505
Telephone 505.469.6678

The technical material and data contained in the specifications were prepared under the supervision and direction of the undersigned, whose seal as a Professional Engineer (P.E.), licensed to practice in the State of New Mexico, is affixed below.

Cameron J. Twing, P.E.

18526
License No.

Authorized Representative/Title
Energy, Minerals and
Natural Resources Department

Date

Michelle Lujan Grisham, Governor

All questions about the meaning or intent of these documents shall be submitted only to the General Services Department, State Purchasing Division Procurement Specialist, in writing.

APPENDIX B
SPECIFICATIONS

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SPECIFICATIONS

Please Note – Use of Brand Name Specifications: Use of any brand name herein is for the purpose of describing the standard of quality, performance, and characteristics desired and is not intended to limit or restrict competition.

DIVISION 1 – GENERAL REQUIREMENTS

The following sections describe the general requirements of this project. References to Sheet Numbers, refer to the design drawings, which are included in this Project Manual.

01010 – SUMMARY OF WORK

The County Road A-25 Subsidence Mitigation and Mine Safeguarding Project is located approximately 9 miles northeast of Raton in Colfax County, New Mexico. There are several small subsidence features found in the travelled way of County Road A-25 (A-25) and three known abandoned mine adits near A-25 (Sheet 3 and 4). The project area is undermined by the Turner-Urtado Mine and the Denton Mine. The Turner-Urtado Mine shows a portion of the mine workings below the subsidence features along A-25, and the Denton Mine workings explored through a known abandoned mine adit undermine A-25 (Sheet 3). A-25 is an unpaved road with steep grades and switchbacks. The road surface is exposed bedrock in some locations, and dirt with a gravel overlay in others. The site is steeply sloped and rocky with dense stands of scrub-oak, making access to areas adjacent to A-25 difficult. The project area (Sheet 2) is on partially on private land and partially on State of New Mexico land

This project involves drilling and grouting in underground voids to prevent further subsidence of A-25;. installation of water bars upgradient of the subsidence features; installation of bat-compatible closures in 3 open adits; and surface restoration and re-seeding of disturbed areas. The project will include the following work:

- There are four subsidence features within the travelled way of A-25 suggesting that the road alignment has mine related voids underneath. Closure of the subsidence features and providing additional support to A-25 will include:
    - Construct Support Pillars in Mine Workings: Establish support pillars in the encountered mine workings using forty-two (42) drilled boreholes, with a spacing of 10 to 20 feet, on center, near the subsidence features and approximate known mine workings, and 30 feet, on center, along the remaining road segments. Drilling will occur along approximately 750 feet of the A-25 road alignment to support the partially collapsed underground mine workings, at approximate depths ranging from 20 to 100 feet below the ground surface. Proposed drill hole locations are shown on Sheets 4 and 5. The goal of the drilling and grouting work is to address the A-25 subsidence features, map voids under the road alignment, and to support those voids with grout pillars to stop additional subsidence and stabilize the road.

- The amount of drilled boreholes that are expected to encounter rubble or void space due to the room and pillar design of the mine is unknown at this time due to uncertainty about the exact position and orientation of the mine workings. Boreholes that do not encounter rubble or void space will not require casing or support grout. Approximately 3,000 linear feet of drilling is expected, and approximately 1,400 linear feet of casing will be required for this task. It is estimated that the volume of grout to construct the pillars will be approximately 460 cubic yards (CY) (355 CY + 30% contingency).

- Boreholes shall be drilled through the mine workings horizon (as determined by the Engineer at each bore hole location) and five feet into the floor below the workings. Casing shall initially be set three feet above the mine floor of each hole (as determined by the Engineer) for the initial grout stage. Each grouting stage is considered complete after reaching the pressure cut off, volume cut off, other listed cut off condition, or if determined complete by the Engineer. After grouting the initial stage, the casing will be pulled up three feet for each successive stage; grout stages shall continue to a point when the casing is at least five feet above the mine workings or rubble. When a hole has met the criteria for the completion of grouting, the casing shall be removed, gravity fed grout will be used to backfill the hole to the appropriate depth from surface, and imported base course material shall be used to fill the remaining hole space to restore the hole to appropriate surface conditions. Surface restorations cover the surface expression of the drill hole and are not meant to address A-25 as a whole. The Contractor shall note that timbers were used to support the mine workings and that pieces of wood may be recovered during drilling. The Contractor shall expect to encounter timbers in various states of degradation. Grouting shall be within the limits indicated on the project plans to meet the acceptance criteria presented in Section 03020 of these Specifications.

- The bore holes and support pillars will be constructed as shown on Sheet 6.

- There are three open adits of concern in the A-25 subsidence area. Adits A-1 and A-2 are associated with the Turner-Urtado mine, and adit A-3 is associated with the Denton mine. Closure of these adits will include:

  - Over-excavation using a mini-excavator to expose surrounding competent material. The opening will then be prepared for the appropriate Corrugated Steel Pipe (CMP) culvert size where a maximum of 6 in. of head room is found between the top of the culvert and the top of the adit ceiling. A 24 inch CMP culvert and bat gate closure is planned for both A-2 and A-3, and a 36 inch CMP culvert bat gate closure is planned for A-1.

  - The area between the culvert and adit walls will be filled with a non-shrink grout, and to the outside, a grouted rock bulkhead will be constructed around the perimeter of the culvert, conforming to the excavated adit opening.

  - The culvert will be installed into the adit opening as far as possible while maintaining minimum protrusion from the entrance. An 18 to 20 ft section of CMP culvert will be installed in each of the closures. An octagonal bat gate, constructed

with 3/8 in. by 4 in. steel plate will be installed into the mouth of the culvert through slots cut in the CMP. Construction details for the 24-inch and 36-inch bat-compatible closures can be found on Sheets 8 and 9 respectively.

- Three water bars will be installed across the A-25 road alignment to divert runoff water into the roadside ditch. The water bars will be constructed as depicted in Sheet 7, and at the locations shown on Sheet 5. Construction for these structures will take place after all adjacent drilling and grouting work is completed.
- The Contractor will hand seed and mulch disturbed areas associated with the access routes work areas for the open mine adits, A-1, A-2, and A-3. The A-25 road surface, including staging areas on the road surface, will not be seeded and mulched. In total 0.5 acres are expected to be seeded and mulched. A mix of native seeds will be used for reseeding, and a local woody mulch that is weed-free certified will be used to stabilize the ground surface.

Table I, below, lists the mine features where safeguard improvements will be made along with approximate size of openings needing filling, the estimated amount of material needed to make the improvement, and an indication of the type of work to be accomplished.

Demobilization shall be conducted in such a manner to ensure that the Contractor leaves all project areas in as good or better condition than before disturbance.

TABLE I
PROJECT SUMMARY INCLUDING APPROXIMATE MINE OPENING DIMENSIONS AND MINE FILL VOLUME ESTIMATES

The approximate mine opening dimensions and mine fill volume estimates are provided only for the information of the Potential Bidder. The Abandoned Mine Land Program makes absolutely no guarantee of their accuracy or precision. Volume estimates are of the material that may be required to fill the mine cavities and adjacent areas as indicated, including an allowance for shrinkage, irregularities and known underground mine voids. All mine features are irregular in shape. Estimates of mine fill volumes are generally not indicated at structural closures; excavation, fill and other earthmoving activities there are considered incidental to the work. Mine fill volume estimates are indicated at those structural closures with significant volumes of earthwork required.

To comply with wildlife restrictions, construction is limited to certain periods of the year. Should construction activities take place during the **migratory bird nesting season (February 15 - September 15)**, a pre-construction nesting bird survey will be completed by the AML Program or representatives of the AML Program to locate any active nest that would need to be avoided. This survey should be conducted no more than 10 days prior to the start of construction. If occupied nests are found, they must be avoided until the young have fledged to comply with the requirements of the MBTA.

As it is likely the project area supports winter bat hibernation use, it is recommended to **avoid** any construction activities between **December 1 – February 28**. If any work is required within those specified periods, written permission from the Project Engineer will be required before work can commence.

AML FEATURE NUMBER	TYPE OF MINE FEATURE	APPRX. DIMENSIONS (FEET)	QNTY / VOLUME	WORK REQUIRED / COMMENTS
Subsidence Areas and the A-25 Road Alignment	Subsidence Features and Underground Mine Workings	See Drawing Sheet 3	210 Lin ft	Alluvial drilling operations.
			2,730 Lin ft	Rotary drilling operations.
			460 YD^3	Grouting operations to inject support grout.
Feature A-1	Open Adit	3 ft by 3 ft Opening,	Up to 20 Lin ft	Over excavate opening and install a 36 inch CMP culvert with a bat gate assembly.
		Open to mine workings to	10 YD^3	Fill the space between the opening and culvert with unclassified common fill
			5 YD^3	Cap unclassified common fill material with 12 inch thick rock plating
Feature A-2	Open Adit	1 ft by 1 ft Opening,	Up to 18 Lin ft	Over excavate opening and install a 24 inch CMP culvert with a bat gate assembly
		Open to mine workings		
			7 YD^3	Fill the space between the opening and culvert with unclassified common fill
			5 YD^3	Cap unclassified common fill material with rock plating that is at least 12 inches thick
Feature A-3	Open Adit	3 ft by 3 ft opening	Up to 18 Lin ft	Over excavate opening and install a 24 inch CMP culvert with a bat gate assembly
		Open to mine workings		Fill the space between the opening and culvert with
			10 YD^3	unclassified common fill
			5 YD^3	Cap unclassified common fill material with 12 inch thick rock plating
Site-wide	Not Applicable			Clear / improve access routes.
			½ Acre	Application of mulch and seed mix on disturbed areas
			3 Structures	Water bar installations across road width

01011 – SUMMARY OF PROJECT AND CONSTRUCTION ACCESS

The project site consists of subsidence due to historic underground mining along Colfax County Road A-25. During investigation of the subsidence features 3 dangerous open mine adits were also discovered. Mine features to be safeguarded in this project and the methods and time restrictions for safeguarding are summarized in Table I.

To the maximum extent practicable, construction access is limited to County Road A-25, existing jeep trails, existing haul roads, and hiking trails, except as otherwise shown, specified, or allowed by the Engineer. Feature access may require improvements and the use of small off-road vehicles such as utility terrain vehicles.

The Contractor shall be responsible for thoroughly investigating site conditions and scheduling their equipment, equipment operations, personnel, and safety procedures to prevent accidents and injuries.

01012 – AVOIDANCE AREAS FOR PRESERVATION OF CULTURAL AND BIOLOGICAL RESOURCES

The Contractor shall avoid designated cultural and biological resources. The Contractor shall avoid any activities outside of the designated areas of disturbance. Additionally, existing mine features and interpretive displays shall not be removed or damaged as a result of the work. Access routes and methods to construction areas shall be coordinated with the Project Manager prior to mobilizing to targeted mine features. No construction disturbances (including excavation, fill and stockpiling of construction materials) or moving of artifacts shall take place unless directly specified in design documents. Avoidance zones within the designated disturbance area shall extend to five meters (16.4 feet) from the existing mine features structures, except where construction is indicated within this zone in which case the disturbance within the avoidance zone shall be minimized as practicable. The Project Manager or Project Engineer may designate special avoidance areas.

Wherever the Contractor is working with equipment near designated avoidance features and avoidance areas and wherever construction access routes pass next to these features, the Contractor shall place four-foot high, temporary, high-visibility barrier fencing (Hi-Vis, ADPI, or equivalent) around the features. The Contractor shall provide a submittal for the barrier fencing to be used prior to installation. Barrier fencing shall be removed upon completion of work. An exception to this requirement may be during performing rock clearing from in front of mine entrances and clearing pedestrian approaches.

The Contractor shall bear all direct, indirect, and consequential costs of repairs due to unauthorized damage caused by the Contractor’s operations to cultural and biological resources to be avoided. These costs shall include but are not limited to fees and charges of engineers, attorneys, and other professionals, made necessary thereby.

The Contractor shall cooperate fully to preserve archaeological and historic artifacts and any threatened or endangered species found within the project area. If the Contractor encounters a

previously uninventoried archaeological site, historic site, or species listed as or proposed to be listed as threatened or endangered, the Contractor shall terminate all further operation in that immediate area until the archaeological or biological preservation agencies have had the opportunity to survey the site. This termination shall not preclude continuation of work in other areas nor shall it entitle the Contractor to additional payment in any form, other than an extension of time, unless the Contractor is substantially precluded from working on the entire project.

If construction occurs within the migratory bird nesting season (February 15 to September 15), a preconstruction migratory bird survey will be required. If needed, the AML Program will contract an outside consulting firm to perform the bird survey within 10 days to the start of construction. The Contractor shall contact the AML Program Project Engineer at least one month prior to commencement of construction to coordinate this survey or three weeks prior to Notice to Proceed. Failure by the Contractor to timely coordinate a preconstruction migratory bird survey may impact the Contractor's schedule and no additional time or compensation will be granted. Following receipt of NTP, the Contractor shall be responsible for maintaining nest free conditions in construction-impacted areas. The Contractor shall comply with the requirements of the Migratory Bird Treaty Act (MBTA), the United States Fish and Wildlife Service (USFWS), and shall not cause harm or harassment to migratory birds.

If occupied nests are found, the AML Program will coordinate with the New Mexico Game and Fish Department and USFWS to determine the appropriate exclusion buffer. This exclusion buffer will remain until after the juvenile birds have fledged (flown from the nest).

The project area may support winter bat hibernation use, it is recommended to avoid any construction activities between December 1 – February 28. If any work is required within those specified periods and cannot be rescheduled, written permission from the Project Engineer will be required before work can commence.

01015 – CONTRACTOR'S USE OF THE PREMISES

The Contractor shall take reasonable measures to avoid traffic conflicts between vehicles of the Contractor's employees and private citizens and to avoid overloading of any driveways, roads and streets. The Contractor shall limit the access of equipment and trucks to the project site and provide protection for any improvements over which trucks and equipment must pass to reach the job site. If heavy equipment operated on wet or soft roads causes excessive rutting, the damage shall be repaired by grading the road upon completion of the work.

01025 – MEASUREMENT AND PAYMENT

The measurement for payment is as defined below. Payment shall be made based on the applicable unit or lump sum price bid therefor in the Bid Form. The estimated quantities of materials and work required to complete the project are approximations only and are given as a basis for calculation upon which the contract award will be determined. All estimated quantities could vary considerably and will depend on the actual conditions encountered at the time the work is performed. AML reserves the right to decrease or increase any or all of the quantities of materials or work as may be deemed necessary during the project.

01027 – APPLICATIONS FOR PAYMENT

All Applications for Payment for work performed under this contract shall whenever practicable, first be reviewed by the Project Manager before being submitted to:

Yeny Maestas.
Mining and Minerals Division
Energy, Minerals, and Natural Resources Department
State of New Mexico
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

All Applications for Payment shall include appropriate backup, such as daily reports, load counts, etc. Contract amount equals total base bid plus gross receipts tax.

01028 – PRICES

The following subsections describe the lump sum and unit prices to be paid under this contract.

Lump Sum Prices

The basis of payment of lump sum prices as outlined in the Bid Form is as follows:

A. Mobilization

Payment for Mobilization will be made at the lump sum prices bid therefor in the Bid Form but shall not exceed 10% of the total base bid. It is the intent of this specification to provide for the Contractor to receive 100% of the mobilization bid item by the time the Contractor has completed ten percent of the total original contract amount less mobilization. Total original contract amount less mobilization shall mean the total amount bid as compensation for the contract, excluding gross receipts tax, less the amount bid for mobilization. For lesser amounts of work completed (less than 10%), the Contractor shall receive a prorated portion of the mobilization.

In addition, payment for Mobilization will not be made until the Project Engineer's approval of an adequate performance. An "adequate performance" will be satisfied when the Contractor has shown the ability to successfully perform the required tasks of this project as outlined in these Specifications to the satisfaction of the Project Engineer. In case of any weather delays, compensation for additional Mobilization will not be made.

Payment for Mobilization shall include all equipment, fees, fuel, insurance, labor, permits, personnel, supervision and transportation to assemble, drive, operate, place, position, provide security measures for, and transport equipment, field offices, fuel, implements, machinery, materials, temporary sanitary facilities, and support facilities to and at the job site in conformance with the Project Manager's directives and these Specifications. This amount shall include complete

Mobilization no matter how often equipment is transported to individual sites within the project area.

Mobilization shall also include preparation of an Occupational Safety and Health Administration (OSHA) compliant Health and Safety Plan (HASP) detailing the site-specific hazards and safety precautions associated with site work. The HASP shall include a list of responsible persons, hazard identification, hazard controls and safe practices, emergency and accident response, employee training requirements, chemical safety data sheets (SDS), and communication information and procedures.

Mobilization shall also include providing materials for animal exclusion as defined in the beginning of Division 2 – Sitework.

Mobilization shall also include preparation of any other required pre-construction submittals as specified in this manual.

B. Culvert Bat Gate Closure Features

Payment for completing the fabrication and installation of culvert bat gate closures at mine features A-1, A-2, and A-3 will be made at the lump sum price shown in the Bid Form for each respective feature. These prices shall include all work necessary to complete the culvert bat gate closures in accordance with the drawings and specifications. This work shall include the tasks necessary to access the mine features, including clearing as necessary; temporary removal of fencing if necessary; preparation of feature for backfilling; fabrication of bat gat assembly; placement of corrugated steel pipe with bat gate for mine adit; placement and compaction of unclassified fill material; placement of rock plating around the feature; grading/land forming of backfill; reinstalling fence where temporarily removed if necessary; and includes all equipment, labor, material, and supervision costs necessary to complete culvert bat gate closure construction

Unit Rate Prices.

A. Drilling Operations

Payment for alluvial and rotary drilling will be made at the respective linear foot price shown in the Bid Form. This price shall include all work necessary to complete drilling operations in accordance with the drawings and specifications. This work shall include the tasks necessary to setup on a bore hole location; case the upper portion of a hole to prevent any unconsolidated materials present from sloughing into the hole (alluvial drilling only); provide incremental cuttings samples; drill to the necessary depths for each hole (rotary drilling only); and includes all equipment, labor, material, and supervision costs necessary to complete construction.

B. Grout Injection Pipe

Payment for work associated with the grout injection pipe shall be made at the linear foot price shown in the Bid Form. This price shall include all work necessary to complete the installation and removal of grout injection pipe in accordance with the drawings and specifications.

This work shall include the tasks necessary to install the grout injection pipe; ensure the pipe is clear of any obstructions; remove the injection pipe after grout injection is completed; wash out the injection pipe to ensure no grout is allowed to build up on the equipment; and includes all equipment, labor, material, and supervision costs necessary to complete construction.

C. Pump Set Up

Payment for pump set ups shall be made per feature at the price shown in the Bid Form. This price shall include all work necessary to set up for grout injection on each hole in accordance with the drawings and specifications. This work shall include the tasks necessary to move all necessary equipment to the new location; set the casing to the appropriate first stage depth; set up all grout flow monitoring equipment; set up all ground level monitoring equipment; and includes all equipment, labor, material, and supervision costs necessary to complete construction.

D. Backfill, and Surface Restorations

Payment for backfill and surface restoration work shall be made per feature at the price shown in the Bid Form. This price shall include all work necessary to backfill and restore the surface conditions of a completed hole in accordance with the drawings and specifications. This work shall include the tasks necessary to gravity feed backfill grout into the open, completed holes to the appropriate depth; fill and compact the remaining hole space with base course material; and includes all equipment, labor, material, and supervision costs necessary to complete construction.

E. Pillar Support Grout

Payment for pillar support grout work shall be made per cubic yard of grout injected at the price shown in the Bid Form. This price shall include all work necessary to inject support grout in accordance with the drawings and specifications. This work shall include the tasks necessary to inject grout at the appropriate depths and pressures; monitor pressure, pumping rates, and the volume of grout injected; monitor for ground movement; complete all necessary grout material testing; and includes all equipment, labor, material, and supervision costs necessary to complete construction.

F. Water Bar Installation

Payment for water bar installation work shall be made per feature installed at the price shown in the Bid Form. This price shall include all work necessary to construct a water bar feature in accordance with the drawings and specifications. This work shall include the tasks necessary to perform all excavation, backfill, and compaction as necessary; distribute base course material; and includes all equipment, labor, material, and supervision costs necessary to complete construction.

G. Reseeding of Disturbed Areas

The unit of measurement for payment for seeding will be per square foot, as measured in the field, parallel to the seeded surface using methods acceptable to the Engineer. Payment for

seeding will be made at the unit price of the Contractor's bid on the Bid Form multiplied by the number of units installed. This price shall include soil preparation; raking topdressing; incorporating specified soil amendments; mulch; seeding by broadcasting; and includes all equipment, labor, material and supervision costs necessary to complete installation, of all areas disturbed by construction activities.

Any surface disturbance areas of the project not on the A-25 road surface must be seeded/revegetated. Disturbed areas may include but are not limited to: filled areas; temporary access routes and obliterated roads; areas used for office (as necessary) and sanitation units; equipment parking; closed access trails; stockpile and storage areas; and service areas.

01030 – ALTERNATES

Whenever equipment or materials are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier, the naming of the item is intended to establish the type, function, and quality required. Unless the name is followed by words indicating that no substitution is permitted, the Project Engineer may accept equipment or materials of other suppliers if the Contractor submits sufficient information to allow for adequate determination that the equipment or materials proposed are equivalent or equal to that named.

01035 – MODIFICATION PROCEDURES

The following section describes procedures for making modifications to the contract by change orders. Modifications may involve changes in contract sum, contract time, and scope.

01036 – CHANGE ORDER PROCEDURES

The Contractor shall submit a request for any changes in the work under this contract, in writing, to the Project Engineer. No changes in work or quantities shown shall be authorized until a properly executed Change Order has been issued by MMD. Any work performed outside the original quantities or scope of work, before the issuance of a properly executed Change Order, shall be at the Contractor's risk.

The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be based on written notice delivered to the Project Engineer within fifteen working days of the occurrence of the event causing the claim. The extent of the claim with supporting data shall be included unless the Project Engineer allows additional time to ascertain more accurate data. The Project Engineer shall determine all claims for adjustment in the Contract Time. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order. The Contract Time will be extended in an amount equal to time lost due to delays beyond the control of the Contractor if a claim is made therefore as provided above. Such delays shall include, but may not be restricted to, acts or neglect beyond the Contractor's control, epidemics, fires, floods, labor disputes, abnormal weather conditions, or acts of nature. In the event delays in construction occur due to weather, the conditions as outlined above will be in effect. If the Contractor leaves the project area due to a weather delay, the Contractor shall be responsible

for assuring that all areas are left in a clean and safe condition as approved and directed by the Project Manager. In case of any weather delays, compensation for additional Mobilization or Demobilization will not be made.

01040 – COORDINATION

The following sections define the parties responsible for coordination of the contract work at the project and job site levels.

01041 - PROJECT COORDINATION

The Project Engineer will send the Contractor Notices to Proceed, Change Orders, other contract documents, and approvals on Applications for Payment. The Project Manager or Project Engineer may issue a Suspension of Work Notice if there is reasonable basis to believe that the Contractor is violating any condition or term of the contract or specifications, or that violations of health and safety standards will occur unless such notice is issued. No work shall proceed until the Suspension of Work Notice has been vacated.

01042 – MECHANICAL AND ELECTRICAL COORDINATION

The Contractor shall be responsible for the coordination of all mechanical and electrical aspects of the contract work. This includes overseeing of the general operation and maintenance of that equipment.

01043 – JOB SITE ADMINISTRATION

The Contractor shall be responsible for the administration of the contract work at the job site. This includes assuring that all equipment and materials used for the contract work meet the required specifications set forth and that all work is performed in a timely and orderly manner. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs concerning the work. The Contractor shall designate a full time on-site superintendent or authorized representative who shall be present or can be contacted readily during project working hours. This person shall represent the Contractor in dealing with the Project Manager and shall insure adherence to these specifications and any other directives.

01050 – FIELD ENGINEERING

The Contractor shall be responsible for locating and avoiding all underground utilities at the contract work site. If damage to the utilities occurs during the contract work, the damage shall be repaired at the Contractor's expense.

The Contractor shall also be responsible for the proper setting of all construction staking. The Contractor shall provide engineering surveys for construction to establish reference points that are necessary to enable the Work to proceed. The Contractor shall be responsible for surveying and laying out the Work, shall protect and preserve any established reference points, and shall

make no changes or relocations without the prior written approval of the Project Engineer. The Contractor shall report to the Project Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations. The Contractor shall replace and accurately relocate all reference points so destroyed, lost, or moved. When it becomes necessary in the construction of public works, to remove or obliterate any triangulation station, bench mark, corner monument, stake, witness mark, or other reference mark, it shall be the duty of the Contractor in charge of the work to cause to be established by a New Mexico registered land surveyor one or more permanent reference marks which shall be plainly marked as witness corners or reference marks, as near as practicable to the original mark, and to record a map, field notes, or both, with the county clerk and county surveyor of the county wherein located, showing clearly the position of the marks established with reference to the position of the original work. The surveys or measurements made to connect the reference marks with the original mark shall be of at least the same order of precision as the original survey. The developed data shall be certified by a licensed surveyor and submitted to the AML.

01060 – REGULATORY REQUIREMENTS

The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority which in any manner affect those engaged or employed on the work or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees and shall protect and indemnify the State of New Mexico and its representatives against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or any employees. The Contractor shall procure all permits and licenses, pay all charges, fees, royalties, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

01090 – REFERENCES

Reference to standard specifications, manuals, or codes of any technical association, organization, or society, or to laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, laws, or regulation in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the Contractor.

01092 - ABBREVIATIONS

The following is an explanation of the abbreviations that may be used in the contract documents:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AML	Abandoned Mine Land Program of MMD

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATSA	American Traffic Services Association
AWS	American Welding Society
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CPR	cardiopulmonary resuscitation
CRSI	Concrete Reinforcing Steel Institute
EMNRD	Energy, Minerals, and Natural Resources Department (state)
FQCR	Field Quality Control Representative
H_2S	hydrogen sulfide
HASP	Health and Safety Plan
MBTA	Migratory Bird Treaty Act
MMD	Mining and Minerals Division of EMNRD
NMAC	New Mexico Administrative Code
NMSA	New Mexico Statutes Annotated
NTP	notice to proceed
OSHA	Occupational Safety and Health Administration
OSMRE	Office of Surface Mining, Reclamation, and Enforcement (federal)
PLS	Pure Live Seed
SAE	Society of Automotive Engineers
SDS	Safety data sheet
USFWS	United States Fish and Wildlife Service

01094 – DEFINITIONS

The following is a definition of the terms that may be used in the contract documents (source: A Dictionary of Mining, Mineral, and Related Terms, Paul W. Thrush, Bureau of Mines, Department of the Interior, Washington, D.C., 1968):

1. adit — A horizontal or nearly horizontal passage driven from the surface for the working or dewatering of a mine.
2. back — The roof or upper part in any underground mining cavity.
3. cribbing — The close setting of timber supports when shaft sinking through loose ground.
4. collar — Timbering or concrete around the mouth or top of a shaft; the junction of a mine shaft and the surface.
5. decline — See “incline”.
6. drift — A horizontal passage underground.
7. entry — A haulage road, gangway, or airway to the surface.
8. Field quality control representative (FQCR) — The individual given specific quality inspection tasks by the AML Program identified in the project Specifications.
9. gob pile — A pile of heap mine refuse on the surface.

10. incline	A shaft not vertical; usually on the dip of a vein.
11. lagging	Planks, slabs, or small timbers placed over the caps or behind the posts of the timbering, not to carry the main weight, but to form a ceiling or a wall, preventing fragments or rock from falling through.
12. lining	The brick, concrete, cast iron, or steel casing placed around a tunnel or shaft as a support.
13. loading chute	A three-sided tray for loading or for transfer of material from one transport unit to another.
14. portal	Any entrance to a mine.
15. red dog	Material of a reddish color resulting from the combustion of shale and other mine waste dumps on the surface.
16. shaft	An excavation of limited area compared with its depth, made for finding or mining ore or coal, raising water, ore, rock, or coal, hoisting and lowering personnel and material, or ventilating underground workings.
17. spoil	The overburden or on-ore material removed in gaining access to the ore or mineral material in surface mining.
18. stope	An excavation in which ore has been excavated in a series of steps.
19. stull	A timber prop set between the walls of a stope, or supporting the mine roof.
20. subsidence	A sinking down of a part of the earth's crust.
21. talus	A heap of coarse rock waste at the foot of a cliff.
22. tipple	Originally the place where the mine cars were tipped and emptied of their ore, and still used in that sense, although now more generally applied to the surface structures of a mine, including the preparation plant and loading tracks.
23. winze	Interior mine shaft.

01100 – SPECIAL PROJECT PROCEDURES

The following section describes special procedures for alteration, preservation, security, hazardous materials, and other types of projects demanding unique procedures. Safety procedures and methods for all underground work inside abandoned mine entries shall be in accordance with the "New Mexico Mine Safety Code for All Mines," published by the New Mexico Institute of Mining & Technology, State Inspector of Mines, Bureau of Mine Inspection, P.O. Box W105, Socorro, NM 87801, 1.505.835.5460.

01135 - HAZARDOUS AND CONFINED AREA PROCEDURES

This project requires construction work in, around, and over hazardous and unprotected highwalls, mine shafts, stopes, adits, and other openings which may be open to the surface or hidden from view by vegetation, trash, debris, or thin and unstable layers of surface materials or rock. The Contractor shall be responsible for thoroughly investigating the site conditions and scheduling the Contractor's equipment, equipment operations, personnel, and safety procedures to prevent accidents and injuries.

Before entry, the Contractor shall review safety procedures with all persons entering the mine. At least one standby person shall remain outside the mine during entry by others. The standby person(s), whenever possible someone who is trained in CPR and mine rescue procedures, shall have access to first aid, appropriate rescue equipment, and a vehicle and shall know where the nearest telephone / cell service for emergency calls is found. A communication system shall be established between the person(s) working inside the mine and the standby person(s) outside.

All persons entering the mine opening shall wear appropriate clothing and carry appropriate gear, including, as required for the conditions present, harnesses, head, hand and foot protection, life lines, respirators or self-contained breathing apparatuses, and other special equipment. Proper ventilation and adequate lighting at the workplace inside the mine entry shall be provided. The Contractor shall review with their workers and personnel the use of hazardous chemicals or materials, electrical power, or internal combustion engines inside mine entries for safety precautions and procedures.

The Contractor is fully responsible for construction safety and shall keep the Project Manager informed of his hazardous area safety procedures. Following is a discussion of some common abandoned mine hazards and appropriate procedures to be followed.

I. Bad Air

Miners use the term "bad air" to describe an atmosphere that will not support life. The poor air circulation in some mine openings can allow carbon dioxide (CO_2), carbon monoxide (CO), methane, hydrogen sulfide (H_2S), or radon gas to accumulate. These gases are treacherous inside mine openings and even experienced miners have been killed or harmed by entering areas containing them. CO (product of combustion) cannot be readily detected and is lethal in very small amounts. The Contractor shall follow the following and other appropriate hazardous bad air procedures.

An oxygen meter shall be used to test air before and while any personnel work inside a mine opening. The oxygen meter shall be a National Mine Service (NMS) OX231 oxygen meter or equivalent. The oxygen meter shall continuously monitor oxygen levels and have an audible warning signal. If the oxygen level falls below 19 percent, all personnel shall withdraw from the working area in the mine until the oxygen content increases to safe levels.

Any remedy for increasing oxygen content of the working area or providing ventilation from the surface shall be determined in consultation with the Project Manager.

Adit Cave-ins

Cave-ins are a danger in any abandoned mine. Disturbances such as vibrations caused by walking, speaking, blasting, hammering, percussion drilling, or construction equipment may cause a cave-in inside an inactive mine. The Contractor shall follow appropriate adit cave-in protection procedures, including scaling and barring of loose rock before beginning work in an area, shoring of decayed or weak timber framing, and shoring, jacking, or rock bolting of materials in the back (roof) and sides of the adits.

Collar Cave-ins

The collar or top of a shaft, stope, or subsidence often contains decomposed rock, decayed timbers, and other conditions that allow for rapid disintegration at the opening. With the additional weight and vibration of construction machinery, workers, and backfilling operations near the mine opening, the area around the collar can slide into the opening, along with nearby machinery and laborers. Backfilling operations can tear loose cribbing or lining in a shaft leading to collapse at the collar. The Contractor shall follow appropriate collar cave-in protection procedures.

Falling

Because a shaft or stope has little light, the feeling of height and normal reaction to "pull back" is not evident to most persons. Many abandoned mine shafts, stopes, and winzes are deep enough to cause injury or death to persons entering these features. Rescue operations of a fallen person can also be extremely hazardous.

Work above the highwall also presents fall hazards including unstable edges, poor footing, and/or trip hazards.

The Contractor shall follow appropriate hazardous fall protection procedures. This includes proper lighting, barricades, fences, personal fall arrest systems, guardrails, covers, safety net systems, safety monitoring systems, and other protection as suitable for the conditions. Fall protection shall be in accordance with OSHA regulations regarding construction fall protection (OSHA 29 CFR Subpart M). These regulations establish a six-foot threshold for the height at which fall protection is required, require employers to provide training for each employee who might be exposed to a fall hazard, and prohibit the use of body belts for fall protection and the use of non-locking snap hooks.

Loose Rock

The highwall is a dominant feature at the site and consists of vertical to near-vertical faces of weathered amphibolite and granite. The height of the highwall is variable, and the size of rock that could fall is expected to vary from small to many cubic feet in size. Any falling rock has the potential to injure or kill, and there is no way to predict when a rock fall will occur. Certain construction activities may promote rock fall including those that require vibration, shock, or removing material that may be supporting loose rocks. The Contractor shall require head protection and implement measures to protect workers (e.g. shields, scaling loose rocks, etc.)

A mineshaft or open stope will weather in much the same way as a cliff. Loose rocks are always found on timbers or on the walls. A small rock that falls a sufficient distance can penetrate a person's skull. The Contractor shall follow appropriate hazardous loose rock protection procedures, including scaling of loose rock, construction of shields, and wearing of head protection.

01170 - INDUSTRIAL WASTES AND TOXIC SUBSTANCES

The Contractor shall comply with all applicable laws and regulations existing or hereafter enacted or promulgated regarding industrial wastes and toxic substances. In any event, the Contractor shall comply with the Toxic Substances Control Act of 1976, as amended (15 U.S.C. 2601, et seq.) regarding any toxic substances that are used, generated by or stored at the project site. See 40 CFR, Part 702799. Additionally, any release of toxic substances (leaks, spills, etc.) greater than the reportable quantity established by 40 CFR, Part 117, shall be reported as required by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Section 102b. A copy of any report required or requested by any federal agency or state government because of a reportable release or spill of any toxic substances shall be furnished to the Project Engineer concurrent with the filing of the reports to the involved federal agency or state government.

01200 – PROJECT MEETINGS

The following sections describe the required project meetings that the Contractor is expected to attend.

01210 - PRECONSTRUCTION CONFERENCES

Before starting work at the site, a conference will be held to review the construction schedules; to establish procedures for handling documents, drawings, other submissions, and for processing Applications for Payment; and to establish a working understanding between the parties as to the nature of the project. Present at the conference will be the Project Manager, the Project Engineer, the Contractor, the Contractor's superintendent, and other persons as appropriate. The Contractor shall present a progress schedule at the preconstruction conference as specified in Section 01310 below and a fire prevention and awareness plan as specified in Section 01565 below.

01220 - PROGRESS MEETINGS

Progress meetings may be held during construction for purposes of scheduling and coordination of work. Throughout the life of the project, the Contractor shall keep the Project Manager and Project Engineer well informed of the schedule of work.

01300 – SUBMITTALS

The following sections describe the required documents and reports to be submitted by the Contractor during the contract work.

01310 - PROGRESS SCHEDULES

The Contractor shall provide a detailed progress schedule to be followed in completing the work. This schedule shall be submitted in writing at the preconstruction conference and shall show the anticipated time required by the Contractor to complete each item of work in the Bid Form. Schedules may be prepared as a horizontal bar chart with a separate bar for each major portion of work or operation, identifying the first workday of each week.

01320 - PROGRESS REPORTS

The Contractor shall submit written accurate daily progress reports to the Project Manager. The reports shall include but are not limited to work accomplished, quantities of unit price bid items installed, including load tickets as appropriate, records of any complaints including corrective actions taken, records of visitors to the site, and records of any personal injury or property damage incidents. The Contractor's authorized representative shall meet the Project Manager a minimum of once each week to verify and sign-off on all payable units of work performed during that week. The authorized representatives from both parties shall be designated at the start of the project during the preconstruction conference.

01330 – HEALTH AND SAFETY PLAN

The Contractor shall prepare a Health and Safety Plan (HASP) detailing the site-specific hazards and safety precautions associated with site work. The HASP shall comply with OSHA standards and shall include a list of responsible persons, hazard identification, hazard controls and safe practices, emergency and accident response, employee training requirements, SDS, and communication information and procedures.

The HASP shall also describe hazards related to the COVID-19 Pandemic. The HASP shall include the Contractor's Infections Disease Preparedness and Response Plan, which shall include:

- Where, how, and to what sources of Covid-19 site personnel might be exposed.
- Non-occupational risk factors at home and in community settings.
- Workers' individual risk factors (e.g., older age; presence of chronic medical conditions, including immunocompromising conditions; pregnancy).
- Controls necessary to address these risks.
- Basic infection prevention measures.
- Policies and procedures for prompt identification and isolation of sick people.
- Workplace controls for reducing the risk of Covid-19 spread in the workplace.

Additional information and safety resources related to COVID-19 can be found on OSHA's website: https://www.osha.gov/SLTC/covid-19/

Contractor shall follow New Mexico Department of Health Public Health Orders, Executive Orders, and COVID safe practices for construction. Additional information maybe be found on the New Mexico Department of Health Coronavirus Disease 2019 webpage at https://cv.nmhealth.org/.

The Contractor shall submit a draft of the HASP to the Project Engineer for review and comment a minimum of one month before mobilization to the site. The Contractor shall finalize the HASP and submit a final copy to the Project Engineer prior to beginning work on the project site.

01340 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

The Contractor shall submit shop drawings, product data, and samples as required in the specifications. Submittals shall be organized such that each submittal covers items in no more than one specification section. The Contractor shall allow a minimum of 14 calendar days for the Project Engineer's review; shorter periods for Project Engineer's review will not be acceptable. The Contractor shall allow acceptable time for the entire review process including transmittal, initial Project Engineer's review, correction and resubmission, final review, and distribution.

Engineering data and shop drawings covering all equipment and fabricated materials shall be submitted to the Project Engineer for review and comments. These data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorages, and supports required; and performance characteristics and dimensions needed for installation and correlation with other materials and equipment. Data submitted shall include drawings showing essential details of any changes proposed by the Contractor.

It shall be the duty of the Contractor to check all data and shop drawings for completeness before submittal for Project Engineer's review. Each drawing or data sheet shall have indicated there on the proposed use of the item as it pertains to the Work. Catalog cuts, pages, or copies submitted for review shall have items proposed for use in the Work clearly marked and identified. The current catalog number, date, and revision and drawing number (if applicable) shall be included.

Deviations from the drawings or specifications shall be identified on each submittal and shall be referenced in the Contractor's transmittal letter. The submittal for such deviations shall also include details of changes proposed and modifications required for all affected portions of the Work.

Shop drawings and other review data shall be submitted to the Project Engineer only from the Contractor.

The Contractor's submittal of shop drawings and other review material shall represent that the Contractor has reviewed the details and requirements of the Contract Documents, has coordinated the subject of the submittal with other portions of the Work, and has verified dimensions, quantities, construction details, materials, and installation criteria, as applicable for

the Work. The Contractor shall accept full responsibility for the completeness of each submittal and, for re-submittals, verify that exceptions noted on the previous submittal have been accounted for.

Any requirement for more than one resubmission or delay in obtaining Project Engineer's review of submittals will not entitle the Contractor to an extension of Contract Time unless authorized by Change Order.

The Project Engineer's review of drawings and data submitted by the Contractor will cover only general conformity to the drawings and specifications, external connections, and dimensions that affect the plans and layout. The Project Engineer's disposition of submittals will not constitute a blanket approval of all dimensions, quantities, and details of the material, equipment, or item shown. Regardless of the corrections made in, or disposition given to, such drawings and data by the Project Engineer, the Contractor shall be responsible for the accuracy of such drawings and data and for their conformity and compliance with the contract documents.

No work shall be performed in connection with the fabrication or manufacture of materials and equipment, nor shall any material, accessory, or appurtenance be purchased until the drawings and data therefor have been reviewed.

Four copies of each drawing and necessary data shall be submitted to the Project Engineer. Each drawing or data sheet shall be clearly marked as instructed above. Submittals will be accepted only from the Contractor.

When the drawings and data are returned NOT APPROVED or RETURNED FOR CORRECTION, corrections shall be made as noted by the Project Engineer and four corrected copies resubmitted as instructed above.

When drawings and data are returned marked NO EXCEPTIONS NOTED, EXCEPTIONS NOTED, or RECORD COPY, no additional copies need be submitted.

The Project Engineer will return two copies with comments to the Contractor. The Contractor shall send additional copies with the original submittal if the Contractor requires more than two copies.

All drawings and data, after final processing by the Project Engineer, shall become a part of the contract documents and the work shown or described thereby shall be performed in conformity therewith unless otherwise required by the Project Engineer.

01380 - CONSTRUCTION PHOTOGRAPHS

At the request of the AML Program, the Contractor shall provide routine periodic construction photographs to support Applications for Payment and to supplement Project Record Documents.

01400 – QUALITY CONTROL

The following sections outline the duties, responsibilities, and qualifications of inspectors, testing laboratories, and the Contractor's quality control requirements required to perform the contract work.

01405 - CONTRACT QUALITY CONTROL

The Contractor shall be responsible for the maintenance of quality control throughout the period of the contract work. This includes making periodic spot checks to assure that equipment, materials, and construction quality, meet the contract specifications.

01410 - TESTING LABORATORY SERVICES

Independent commercial testing laboratories shall perform all tests required by the contract documents to determine compliance with the specifications. The testing laboratories shall be acceptable to the Project Engineer. The laboratories shall be in the regular business of testing services in accordance with the specifications for which tests are required, and shall be staffed with trained and experienced technicians, equipped properly, and fully qualified to perform the specified tests in accordance with reference standards.

All testing services for tests of materials required by the contract documents shall be the responsibility of the Contractor. The Project Engineer shall review all sources of materials before delivery of the materials to the job site. Before the performance of any testing, the Contractor shall obtain the concurrence of the Project Engineer for the laboratory or laboratories selected by the Contractor.

The Contractor shall require the producer or manufacturer of materials, for which the specifications require inspection or testing services during the production or manufacturing process, to arrange for and pay an independent organization to perform the specified services.

The Project Manager will determine the exact time and location of field sampling and testing. The Project Manager or Project Engineer may require additional sampling and testing as necessary to assure that materials conform to the contract documents. The Contractor shall pay the costs of any retesting or re-sampling required when initial tests or samples fail to meet the specified requirements.

Written reports of tests furnished by the Contractor for the Project Engineer's review shall be submitted in conformance to the procedures set forth in Section 01340.

01500 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

The following sections specify the types of construction facilities and temporary controls the Contractor shall provide for completion of the contract work.

01505 - MOBILIZATION

The Contractor shall furnish and mobilize all specified construction facilities, temporary controls, equipment, labor, materials, power, supervision, and supplies to the site and commence work within 30 working days after receipt via certified mail of the Notice to Proceed. Mobilization includes everything necessary to complete the required contract work. The Contractor shall inform the Project Manager of plans and schedules to move all equipment, machinery, and supplies to the job site. The Contractor shall locate and position the staging area including field offices, parking, storage, and support facilities as directed and approved by the Project Manager. All equipment and machinery shall be moved onto the job site in conformance with previously approved plans and schedules. It is the Contractor's responsibility to arrange for storage facilities for equipment and materials. City, state, federal, or other public or private property shall not be used as temporary storage or parking areas for any equipment or materials unless written clearance is obtained by the Contractor from the appropriate public officials or private individuals. The Contractor must be prepared to move all necessary equipment to each construction site within the project area. This movement of equipment shall be at the Contractor's expense and should be covered under Bid Item No. 1, Mobilization, on the Bid Form.

01510 - TEMPORARY UTILITIES

The following sections describe temporary utilities, controls, facilities, and construction aids required during construction. They include requirements for installation, maintenance, and removal.

01516 - Temporary Sanitary Facilities

The Contractor shall provide temporary sanitation facilities during the contract work, and made available to MMD personnel. The facility shall be installed on the project site in a location removed from the immediate contract work area. Sanitation facilities (portable toilet units) shall include a handwash station. Sanitation unit(s) shall be staked down to prevent tipping from high winds. The facility shall be locked to prevent unauthorized access during the times work is not conducted.

Sanitation facilities shall be maintained and serviced at least twice a month, unless more frequent service is necessary. The Contractor shall remove the facility upon completion of the contract work and restore the area.

01530 – BARRIERS AND Enclosures

The Contractor shall provide barricades with blinking markers for all equipment on roadways and pedestrian walkways. The barricades shall be no less than twenty feet from the front and rear of any equipment in the described rights-of-way. Traffic control devices shall be in substantial conformance with the American Traffic Services Association (ATSA) Guide for Work Area Traffic Control. The Contractor shall remove the barricades upon completion of the contract work.

01533 - Tree, Plant and Wildlife Protection

I. Tree and Plant Protection

Environmental disturbance shall be kept to a practical minimum.

In steep areas and around vegetation, the Contractor shall, before beginning work, discuss the planned extent and nature of disturbance with the Project Manager. Existing plants and trees shall be protected from damage or injury resulting from the Contractor's operations. Damaged trees and shrubs shall be trimmed to remove broken limbs where minor damage has occurred. Where directed by the Project Manager, cut or scarred surfaces of trees or shrubs shall be treated with a heavy coat of a tree sealant approved by the Project Manager.

II. Wildlife Protection

All area wildlife, including bats and owls, that may use the mine features are protected, and this safeguard project shall not adversely affect them. Refer to Table I for designated periods of the year where work restrictions shall be implemented to protect wildlife. Shooting at and chasing wildlife is prohibited.

At or before the preconstruction conference, the Contractor shall submit a construction schedule, which includes anticipated dates of closure of specified mine features, in accordance with Section 01310. Based on this schedule the AML biological staff will give authorization to proceed on closure of the mine features that require netting, tarping, or smoke bombing to exclude animals before closure. It is solely the Contractor's responsibility to obtain this authorization. Normally a minimum of one week written notice of the dates of closure is needed from the Contractor to the AML biological staff. After approval of the schedule, any need for changes shall be coordinated with the AML biological staff a minimum of 48 hours before closure of the features. The Contractor's failure to follow this procedure may result in stoppage of the construction activity at the Contractor’s expense until the biological staff can reschedule netting and tarping of the specified features.

The Contractor shall aid AML staff in using smoke bombs to expel remaining bats or other animals before backfilling or closing a mine feature, in covering the entrances of designated mine features with tarps or other barricades after the animals have exited and in removing the barricades following closure. The Contractor shall provide sufficient numbers and sizes of tarps, polyethylene sheets or other satisfactory covers for this purpose.

All mine openings, except those whose workings can be fully visually checked by the Project Manager and those which are safeguarded by the construction of bat closures, airflow closures or high-strength steel mesh, shall be tarped or netted before closure and require agreement on the dates of closure

During construction of bat closures, the Contractor shall schedule activities so the bats can readily pass through the partially completed closures from one hour before sunset until sunrise. In

addition, during construction of bat closures at shafts, the Contractor shall take positive measures to reduce the rock and other material that drop into those mine features.

Internal combustion engines, including those used on air compressors, shall be placed such that exhaust from the engine is not drawn into the mine openings.

01535 - PROTECTION OF INSTALLED WORK

The Contractor shall protect installed work and control traffic in the immediate area to prevent damage from subsequent operations. Installed work includes existing safeguard measures (gates, adit closures, vents, etc.) and interpretive signs/infrastructure.

01540 – SECURITY

The Contractor shall act to assure the protection of the contract work and equipment at the contract work site. The Contractor shall furnish, install, and maintain safety fences around any hazardous or high-voltage equipment at the site for the duration of the project. Where appropriate, the Contractor shall restrict access to the project site by barricading access roads during off-hours and by posting "No Admittance" and "Hard Hat Area" signs.

The Contractor shall be responsible for the safety and security of equipment and materials. The Contractor may not claim damages or hold the State of New Mexico, the property owner, the property custodian, or the design engineer responsible for stolen, damaged, or vandalized materials and/or equipment. The work site will be accessible to the public during the construction period and fencing the entire site for security purposes is not practical.

Temporary fencing shall be placed around active work areas during off-hours.

01550 – ACCESS ROADS AND PARKING AREAS

Unless otherwise indicated, all Contractor personnel and equipment shall enter and leave the project site via existing roads and trails. Upon the regrading, recontouring, or reclamation of any part of the site, further vehicular use shall be limited to that necessary to complete operations. Any access routes that are determined by the Project Manager to be maintained throughout the project duration shall be left in as good or better condition than the condition before the start of the project. Existing roads and trails shall be used whenever possible.

Equipment shall be "walked" or operated cross-country to travel to work sites where roads do not exist. The Contractor shall advise the Project Manager and obtain prior approval every time any road blading, clearing, or dozing is required for access. Topdressing shall be stripped and stockpiled before blading as directed by the Project Manager. All unspecified roads, trails, or travel routes shall be regraded to approximate original contours, reclaimed, and revegetated, as necessary, in conformance with the specifications at no additional cost to EMNRD. Where directed by the Project Manager, the Contractor shall build earthen berms to discourage vehicular traffic and to control erosion on closed temporary construction access roads.

01560 – TEMPORARY CONTROLS

The Contractor shall take all reasonable steps to reduce any inconvenience and disruption to the public because of this project. The Contractor shall provide the following temporary controls for the duration of the contract work.

01561 - CONSTRUCTION CLEANING

The Contractor shall keep the contract work area, equipment, and adjacent areas free from spillages of construction and maintenance materials during the contract work. The Contractor shall also provide for the containment of solid debris created by unpackaging construction materials and waste from meals consumed at the contract work site. The Contractor shall assure the cleanup and removal of all spillages and solid debris to an approved disposal site at the end of each contract workday.

01562 - DUST CONTROL

The Contractor shall take all necessary measures to control dust emanations from the construction equipment. The Contractor shall assure that the equipment used in the contract work is fitted with all standard dust control devices. To maintain the health and safety of project personnel, dust control measures at this site shall comply with all local, state, and federal health and safety regulations. The Contractor shall be prepared to begin dust control measures anytime at the request of the Project Manager. Water for dust control shall be distributed in sufficient quantity and at proper times by water truck(s) equipped with spray bars, cannons, and hoses (of sufficient lengths) approved by the Project Manager. The quantity of water required and the frequency of watering shall be dependent upon the weather and the site's surface conditions and may vary throughout the project duration.

There is no source of water on site for dust suppression. The contractor shall be responsible for identifying a source for water and providing dust suppression at no additional cost to the project.

01564 - NOISE CONTROL

The Contractor shall assure that all equipment used in the contract work is fitted with standard noise suppression devices.

01565 - Fire Prevention and Safety Awareness

The Contractor shall develop an emergency plan that will outline precautionary measures and identify initial attack resources and procedures in case of a fire incident. This plan will be submitted to the Project Manager at the Pre-Construction meeting. The Project Manager will then provide feedback about the plan. The Contractor shall provide the fire emergency plan to all individuals working on this project.

Examples of precautionary measures might be:

1. Inspect all motorized and mechanized equipment to insure mufflers and spark arresters are operating properly.

2. Insure personnel are properly trained on the safe use of welding torches, arc welders, generators, saws, power grinders, chainsaws, and other tools and are also familiar with the potential of this equipment to create hot sparks and ignite fires.

3. Avoid welding or cutting in areas next to and above flammable materials or during windy conditions. This would pertain to materials inside the mine as well as outside the mine. Welding shall not take place within 25 feet of polyurethane foam during application. After its application, welding shall not take place above it without first covering the surface with at least 6" of fill material.

Examples of resources and procedures might be:

1. Implement a Hot Work Permit process to be issued for each hot work event.

2. Maintain adequate fire extinguishers, water tanks, sprayers, and other equipment at the work site that would enable personnel to immediately extinguish any accidental ignition.

3. Have personnel observe the work area while welders are operating (welders cannot see where the sparks are falling when the welder is under the welding hood).

4. Assign an individual to be responsible for the area being "safe" (no hot sparks, iron is cold) before leaving the work site.

5. Develop an emergency notification procedure in case the fire incident is or appears to be reaching an out-of-control status.

The Contractor shall obey all fire restrictions declared by the landowner(s) or adjoining property management agencies (i.e. University of New Mexico, U.S. Forest Service, and/or Bureau of Land Management).

01566 – PUBLIC SAFETY

Efforts to protect visitors from injury due to execution of the work shall be taken wherever practical. Examples of procedures that shall be followed include:

1. Use of caution signage.
2. Maintaining cleared unimpeded access to upper parking area.
3. Maintaining at least one cleared pedestrian access route to primary mine features at all times.
4. Securing of unused materials and equipment.
5. Cordon off active work areas using flagging (12-inch by 9-inch orange triangles, minimum) and/or construction fencing.

01570 – TRAFFIC REGULATION

The Contractor shall take the following measures for regulation of traffic at the contract work site.

01572 – FLAGGERS

The Contractor shall post flaggers during the off-loading and on-loading of equipment or materials in roadways at the contract work site access road entrance and/or during cleaning of the highway surface. The flaggers shall halt traffic during the off-loading or on-loading process or direct traffic to an alternate route.

01574 - HAUL ROUTES

The Contractor shall consult with the authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access. Any damage to the site access road from driving on wet/muddy surface shall be repaired at the end of the project, or as directed to maintain public access to the site.

01580 – PROJECT IDENTIFICATION AND SIGNS

At least one temporary project sign shall be furnished and erected by the Contractor at the most convenient point of public access to the project site. The proposed sign location, message content, and font size shall be preapproved by contractor submittal, including sign mockup, prior to installation. The project identification sign shall be installed within ten working days after the receipt via certified mail of the Notice to Proceed or within five days after the Contractor initially mobilizes to the project site, whichever comes first. The sign is to be a minimum of four feet by eight feet by three quarter inch (4' x 8' x 3/4") exterior grade plywood and is to give the project title, project number, and other data within the box on the Title Page of this document. Exterior quality paint in contrasting colors shall be used. The Contractor shall remove sign, framing, supports, and foundations at completion of Project and restore the area. The costs connected to the construction, painting, erection, and later removal of the sign should be covered under Bid Item No. 1, Mobilization, on the Bid Form.

Sample of Sign:

[PROJECT TITLE]

[Nearest Municipality], [County], New Mexico

PROJECT NO. EMNRD-MMD-####-##

PLEASE PARDON THE INCONVENIENCE WE ARE PERFORMING MINE RECLAMATION SERVICES

PLEASE AVOID AREAS IMPACTED BY WORK ACTIVITIES

WORK AUTHORIZED BY:

ABANDONED MINE LAND PROGRAM, MINING AND MINERALS DIVISION

ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT STATE OF NEW MEXICO

EMNRD PROJECT MANAGER: ####### CONTRACTOR: ###########
CONTACT NUMBER: (505) ###-#### CONTACT NUMBER: (###) ###-####

01590 – FIELD OFFICES AND SHEDS

Portable or mobile buildings, or buildings constructed with floors raised above ground, may be provided by the Contractor in locations approved by the Project Manager and the landowner. At completion of work, the Contractor shall remove all buildings, foundations, utility services, and debris and restore areas.

01600 – MATERIALS AND EQUIPMENT

All materials and equipment required to complete the work shall be as specified. Any substitution to the specified products requires prior approval by the Project Engineer.

01700 – CONTRACT CLOSEOUT

The following sections specify the duties and responsibilities of the Contractor to close out the contract.

01701 - CONTRACT CLOSEOUT PROCEDURES

When work is completed, the Contractor shall submit project record documents to the Project Manager.

01702 - FINAL Inspection

Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, the Project Engineer will make a final inspection with the Project Manager and Contractor and will notify the Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. The Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

01710 - FINAL CLEANING

After completion of all work, the Contractor shall demobilize and remove all equipment, materials, spills, supplies, and trash from the project site and shall reclaim all areas disturbed by the Contractor's activities. Unless otherwise specified, developed, maintained roads that existed before commencement of the Contractor's activities need not be reclaimed, but must be left in a condition equal to or better than what existed before the Contractor's activities began. Fences, gates, plants, sod, and other surface materials disrupted by these operations shall be replaced or restored to original or better conditions immediately upon completion of work at the site. This shall include sweeping or cleaning the asphalt pavement on the highway if mud or soil is tracked onto the asphalt from the site access road. Other damage to private or public property shall be immediately repaired. All such cleanup, repair, or replacement work shall be done at the Contractor's expense and to the satisfaction of the Project Manager pending approval of the appropriate public officials and property owners. Payment for Demobilization should be covered under Bid Item No. 1, Mobilization, on the Bid Form.

01720 – PROJECT RECORD DOCUMENTS

The Contractor shall prepare final Project Record Documents providing information regarding all aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive site measurement, investigation, and examination. At Contract closeout, the Contractor shall deliver Project Record Documents and samples under provisions of Section 01701.

END OF DIVISION 1

DIVISION 2 – SITEWORK

The following sections describe the sitework to be performed under this contract.

02050 – DEMOLITION

The following section describes selective demolition to be performed under this contract.

02070 - SELECTIVE DEMOLITION

The open mine adits may require the removal of debris such as boards, signs, timbers, wire, temporary fencing, etcetera. Salvageable materials (e.g. T-posts and temporary chain link fencing) shall be neatly stacked on the site, while trash shall be properly disposed of at the Contractor's expense at an appropriate licensed landfill. All fasteners shall be removed from the lumber and timbers. All specified or established avoidance areas shall be avoided and the recommendations of the archaeological report and the State Historic Preservation Office (SHPO) will be followed.

Other debris that may cause bridging of backfill material or otherwise interfere with construction shall be removed as directed by the Project Manager.

02100 – SITE PREPARATION

02110 - SITE CLEARING

This work shall consist of trimming, removing, and disposing of vegetation and debris in accordance with these specifications, except those items designated to remain. This work shall also include the preservation from damage or defacement of all vegetation and items designated to remain.

Trimming shall consist of pruning low-hanging branches from trees and shrubs designated to remain to provide enough clearance for construction activities. Removal shall consist of cutting vegetation flush with the ground surface and the satisfactory disposal of trees, brush, and any other vegetation. The Contractor shall perform selective tree and shrub removal and trimming only in designated work areas as shown on the drawings.

The Contractor shall remove vegetation outside of the migratory bird nesting season (February 15-September 15). If any vegetation is to be removed during the migratory bird nest season, the Contractor shall contact the Project Manager four weeks prior to the removal to allow for completion of a migratory bird survey.

Within construction limits for borrowing backfill material, all surface debris, roots, stumps, trees, and other objectionable protruding obstructions shall be cleared with the Project Manager's concurrence.

All vegetation from trimming and removal operations shall be spread along and adjacent to the disturbed area as practicable and as designated by the Project Manager.

02200 – EARTHWORK

The following sections describe the earthwork to be performed under this contract.

02210 - GRADING

The following sections describe the grading to be performed under this contract.

02211 - ROUGH GRADING

Unless otherwise specified or indicated, all cut and fill slopes shall be rough graded so that slopes are not steeper than three horizontals to one vertical (3h:1v) in earth, two horizontals to one vertical (2h:1v) in incompetent rock and very rocky soils, and one half horizontal to one vertical (0.5h:1v) in competent rock. Where specified and as directed by the Project Manager, the Contractor shall grade sites and construct drainage ditches around safeguarded mine features to divert storm water away from those features.

Where cut slopes in competent rock are steeper than one and a half horizontal to one vertical (1.5h:1v), the maximum uninterrupted vertical height of the slopes shall be no more than ten feet. A series of slopes, each at between one half horizontal to one vertical (0.5h:1v) and one and a half horizontal to one vertical (1.5h:1v), may be constructed in competent rock if horizontal benches or terraces a minimum of six feet wide, within slopes of at least 4 percent, are built at a vertical spacing of no more than ten feet.

02212 - DECOMPACTION

Before construction demobilization and following the need for any construction access to each mine feature, the Contractor shall decompact areas compacted by construction activity, including temporary work areas and access trails, and staging, storage and parking areas. Areas where more than four feet of overburden material has been removed shall also be decompacted. Decompaction shall be performed to the satisfaction of the Project Manager.

Where bedrock is exposed at the surface, such decompaction will not be required. Decompaction methods shall be effective at reducing soil density to a minimum depth of twelve inches (except where bedrock is closer to the surface) and shall be accomplished without inverting the soil layers. Where practicable, ripping shall be done along the contour. Alternatives to ripping or auguring for decompaction shall be acceptable to the Project Engineer.

02216 - ACCESS ROAD/Route Closures

Before construction demobilization and following the need for any construction access to the Features A-1, A-2, and A-3, the Contractor shall close temporary construction access

roads/routes as specified and as directed by the Project Manager. The Contractor shall outslope the road surface and remove all berms along the outer edge of the road. By grading material toward the cut bank, the Contractor shall take care not to spill graded material over the fill slope. The outslope shall be enough to divert water over the bank at approximately four to eight percent.

The Contractor shall construct berms and cross-ditches as directed by the Project Manager, to restrict vehicular access and control erosion.

In addition, cross-drains shall be located to divert water where the road traverses a ridge, above and below road junctions, above steep incurves to prevent bank cutting and to keep road surface water from entering a draw, below sharp incurves to prevent water from a draw from coursing down the road, and below seeps and springs.

Construction access routes with minimal disturbance shall be raked out to the satisfaction of the Project Manager and seeded as specified in Section 02900 – Landscaping.

02220 - EXCAVATING, BACKFILLING, AND COMPACTING

The following sections describe the excavating, backfilling, and compacting to be performed under this contract.

02222 - EXCAVATION

The Contractor shall overexcavate, as necessary, the open mine adits that may be partially closed, by mucking out the debris, earth, and rock partially plugging them. Before removing any backfill, the Contractor shall discuss with the Project Manager where material shall be excavated, and shall obtain the Project Manager's approval of the excavation plan.

I. Feature A-1 – Open Mine Adit

The open mine adit shall be excavated to clear all existing soil and rubble from the entrance to at least 18 feet into the adit as measured from the opening in accordance with Sheet 9. Excavated material shall be stockpiled near the feature for reuse as either rock plating or unclassified common fill as appropriate after placing the 18 ft long, 24 inch diameter CSP culvert and bat gate into the opening.

Feature A-2 – Open Mine Adit

The open mine adit shall be excavated to clear all existing soil and rubble from the entrance to at least 20 feet into the adit as measured from the opening in accordance with Sheet 8. Excavated material shall be stockpiled near the feature for reuse as either rock plating or unclassified common fill as appropriate after placing the 20 ft long, 36 inch diameter CSP culvert and bat gate into the opening. Feature A-3 – Open Mine Adit

The open mine adit shall be excavated to clear all existing soil and rubble from the entrance to at least 20 feet into the adit as measured from the opening in accordance with Sheet 9. Excavated material shall be stockpiled near the feature for reuse as either rock plating or unclassified common fill as appropriate after placing the 20 ft long, 36 inch diameter CSP culvert and bate gate into the opening.

Salvaged topsoil shall be stockpiled near the respective feature and within the designated disturbance area.

Safety Note: The Contractor shall inspect each of the open mine adit features prior to mobilizing equipment to the features. Underground mine workings extend away from the features into the slope. The mine workings are voids that extend away from the hole and present risks of further collapse under the weight and vibration of equipment operation. The Contractor shall avoid placing equipment, personnel, or other resources over mine openings.

02223 - BACKFILLING OF MINE OPENINGS

I. This work shall consist of backfilling the mine features with specified engineered fill material or salvaged topsoil or excavated materials as designated in the specifications or as directed by the Project Manager. General

All backfill material shall be free of snow, ice, frozen lumps, logs, timbers, significant amounts of woody or vegetative debris, other deleterious materials and materials of such size and shape that they may bridge the opening being filled.

Hand backfilling is an option if the site is difficult for equipment access or too steep to operate equipment safely.

II. Materials

Contractor shall provide a submittal for all imported fill materials before delivery to the site. The Project Manager may request a sample of the material in addition to product data.

1. Imported Granular Fill: naturally occurring granular material free from wood vegetation, or other deleterious matter. Fill shall contain sufficient sand or filler to permit compaction. Unallowed material includes well sorted sands and gravels, very fine sand, shale, clayey soil, contaminated soil, or soil that will not support plant growth.

2. Riprap: Angular rock or stone free of seams, fractures, and coatings; and of such characteristics that will not disintegrate when subject to the action of flowing water. The minimum specific gravity of the stone shall be 2.65 as determined in accordance with ASTM C127, latest edition. The maximum resistance to abrasion shall be fifty (50) percent determined in accordance with the requirements of ASTM C535, latest

edition. The riprap shall have a maximum to minimum dimension ratio not more than 3:1. Allowable gradations shall be:

Maximum dimension (inches)	% Smaller
12	100
9	50-70
6	35-55
3	10

3. Water: Soil conditioning shall be performed using uncontaminated water provided by the Contractor. There is no source of water available on site or in the immediate vicinity of the site. Sourcing and transportation of water shall be the responsibility of the Contractor at no additional cost to the unit price provided for executing safeguard construction.

III. Final Layer of Fill

Wherever practicable, the final eight- to twelve-inch layer of the fill at mine openings shall be soil of comparable quality to the undisturbed soil surrounding the backfilled feature. Only use native sources of soil that are excavated from the feature being worked on. No borrow source is available on site.

02224 - BORROW

Except as otherwise noted or allowed by the Project Manager, the Contractor shall not use any material from within the mine area for borrow with the exception of material that is removed as part of the over excavation of open mine adits A-1, A-2, or A-3.

02229 - COMPACTION

Fill shall be constructed in compacted layers of uniform thickness. Soil shall be conditioned with water to improve compaction. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain relative compaction.

The loose thickness of each layer of fill material before compacting shall not exceed 8 inches, except as approved by the Project Manager. Any rock greater than 4 inches in any dimension shall be removed from the fill material prior to compaction. No large rocks shall be left in contact with the vent pipe, natural rock surfaces (e.g., highwall or adit surfaces), or other new or relic infrastructure.

Material used for fill shall be compacted whenever possible using multiple passes with a rammer/jumping jack compactor. Hand tampers may be used to achieve compaction at Features A-1, A-2, and A-3, where mechanical equipment will not fit (e.g., inside the open mine adits). The fill shall obtain a compaction density not less than what the equipment can reasonably obtain to

the satisfaction of the Project Manager. Wheel rolling to achieve compaction is prohibited to prevent damage to nearby structures or collapse of underground mine voids.

02600 – PIPED UTILITY MATERIALS

The following sections describe piped utility materials to be installed under this Contract.

02613 - CORRUGATED METAL PIPE

Corrugated metal pipe (CMP) and connectors shall be made from galvanized steel in conformance with the applicable requirements of AASHTO M218 or ASTM A929. The pipe shall be manufactured and inspected in conformance with the requirements of AASHTO M36 and as hereinafter specified. The size of the pipes required shall be nominal 36 inch diameter for A-1 and A-3, and nominal 24-inch diameter for A-2. Nominal diameter or dimensions as referred to in AASHTO M36 shall be defined as the minimum inside dimension of the pipe.

Materials for corrugated metal pipe and appurtenances shall be as specified in AASHTO M36. Pipe in which the seams indicate slippage or unraveling will be rejected. Sawed ends and vent notches on pipes will be permitted provided all burrs are removed. Spelter coating damaged by welding or fabrication shall be repaired and recoated in accordance with AASHTO M36.

Unless otherwise indicated, corrugated steel pipe shall be Type I and consist of 14- or 16-gauge galvanized steel pipe with helical corrugations. The pipe shall be new, free of rust, gaps in seams, holes in the wall, and deformations that reduce the inside diameter by more than two inches.

Bands for connecting helically corrugated pipe shall conform to the requirements of AASHTO M36. Coupling bands shall be a minimum of 18 gauge and made of the same base metal and coating as the pipe. Coupling bands shall lap equally on each of the pipes being connected to form a tightly closed joint after installation. Flange bands will not be permitted.

Any alterations to the CMP necessary for the attachment of the bat gate assembly must be made prior to the installation of the CMP into open mine adit A-1, A-2, or A-3.

The pipe shall be placed horizontally between 2% and 10% slope in the adits at Features A-1, A-2, and A-3. Pipe shall be inspected before any unclassified common fill is placed between the walls of the adit opening and the CMP culvert. Any pipe found out of alignment, unduly settled, damaged, or otherwise placed in such a way that is inconsistent with Sheet 9 for A-1 and A-3 or Sheet 8 for A-2 shall be taken up and reset or replaced.

Submittal approval for corrugated metal pipe and appurtenances is required before delivery.

02700 - GROUT

This section specifies grouting only as indicated in bat gate closure drawings.

02710-GROUT MATERIALS

Non-shrink grout	Quikrete “Non-Shrink General Purpose Grout”, L&M Construction Chemicals “Crystex” or “Premier” or “Duragrout”, Master Builders "Masterflow 713 Plus” or “Masterflow 928” or “Set Grout”, Euclid “Hi-Flow Grout” or “N-S Grout”, "Five Star Grout", or approved equivalent , meeting the requirements of ASTM C1107, Grade C
Water	Clean and free from deleterious substances

02720- NON-SHRINK GROUT

The Contractor shall verify all bat gate dimensions prior to grouting the space between the bat gate assembly and culvert.

Non-shrink grout shall be furnished factory premixed so only water is added at the job site. Grout shall be mixed in a mechanical mixer. No more water shall be used than is necessary to produce a flowable grout. The grout shall meet strength requirements of f'c = 5,000 psi.

Grout shall be placed in strict accordance with the manufacturer’s directions so all spaces and cavities are filled without voids. Forms shall be provided where structural components will not confine the grout. The grout shall be finished smooth in all locations where the edge of the grout will be exposed to view after it has reached its initial set.

Non-shrink grout shall be protected against rapid loss of moisture by covering with wet rags or polyethylene sheets. After edge finishing is completed, the grout shall be wet cured for at least seven days. Alternatives to 7 days of wet curing shall be submitted to the Project Engineer for review.

02800 - SITE IMPROVEMENTS

Cattle guards, fences, gates, and other road or street improvements destroyed, removed, or damaged during construction shall be replaced with the same type and dimensions of units removed and shall be equal to and consistent with the undisturbed portions of the improvements existing before the project.

02830 - FENCES

Fencing Specifications shall conform to the requirements set forth in AASHTO M181, the New Mexico Standard for Public Works Construction, Section 410 and NMSA 1978, Sections 77-16-1 through 77-16-18, as modified below.

I. General

The Contractor shall submit one test certificate each to the Project Engineer certifying that the fencing materials conform to the requirements herein provided. When the locations of manufacturing plants allow, the plants may be inspected for compliance with specified manufacturing methods and material samples will be obtained for laboratory testing for compliance with material quality requirements. This can be the basis for acceptance of manufacturing lots as to quality. All materials will be subject to inspection for acceptance as to condition to check for compliance before or during incorporation of materials in the work. All fences shall be installed in the locations specified and as directed by the Project Manager.

II. Wire Fence

This work shall consist of the construction of fence in substantial compliance with the specifications, lines and grades shown on the plans or established by the Project Engineer.

A. Wire

All fences shall consist of six wires spaced as indicated.

Barbed wire shall conform to ASTM A121 Class 1 or 3 coating and shall consist of two strands of nominal 12 gauge (0.099-inch) coated diameter wire with either 2-point, fourteen gauge (0.080-inch) diameter barbs spaced approximately four inches apart or 4-point, 14 gauge (0.080-inch) barbs spaced approximately five inches apart. The shape of barbs may be flat, half-round, or round. Instead of galvanizing, the wire may be coated with aluminum alloy at the rate of not less than 0.30 ounces per square foot of wire surface and the barbs at the rate of not less than 0.25 ounces per square foot of wire surface.

Tie wires for fastening barbed wire to steel posts shall be not less than thirteen gauge (0.109-inch) coated diameter and galvanized conforming to ASTM A1 12. Eleven gauge (0.120-inch) coated diameter or heavier wire fasteners or metal clamps may be used instead of tie wires when approved in advance by the Project Engineer.

Stays for wire fences shall be not less than 9 gauge (0.142-inch) coated diameter galvanized wire conforming with ASTM A1 16 and of length and spacing shown on the plans.

B. Brace Panels and Posts

Intermediate brace, gate brace and corner panels shall be prefabricated assemblies, "Easy Fence" by D-C Industries (Blackfoot, ID, 208.782.1177) or approved equivalent, which require no concrete footings. They shall be installed following the manufacturer's recommendations.

Line posts shall be metal. All posts shall be of the type, size and length shown on the plans and as herein provided.

Metal posts shall be fabricated from rail, billet, or commercial grade steel conforming to ASTM A702 and shall be galvanized or painted green as required. All metal posts throughout the project shall be either galvanized or painted the same color green. Galvanizing shall conform to ASTM A123. When painted green, the posts shall be cleaned of all loose scale before finishing and painted with one or more coats of weather resistant, air baking or drying, green paint or enamel.

Metal line posts shall consist of heavy-duty steel spaced sixteen and one half feet apart. Metal line posts shall have a minimum weight of 1.33 pounds per foot exclusive of anchor plates. A minus tolerance not to exceed 5 percent of the minimum weight of each post will be permitted. A plus tolerance of two inches and a minus tolerance of one inch in the length of each post will be permitted. Metal line posts may be I-beam, T-beam, U-beam, Y-beam, or H-column section.

Line posts shall be provided with corrugations, lugs, ribs, or notches spaced approximately one inch on centers to engage the required fence wire in designated spaces. Posts with punched tabs to be crimped around the wire will not be accepted. Anchor plates shall be an area of not less than eighteen square inches, shall weigh not less than 0.67 pound each and shall be securely welded, bradded, swaged, or riveted to each line post in a way that prevents displacement when the posts are driven.

C. Fittings

All fittings, hardware and appurtenances for fences shall be commercial quality steel, malleable iron, or wrought iron and shall be galvanized in accordance with the requirements of ASTM A153. Fittings shall be black PVC-coated with ultraviolet-resistant coating.

III. Construction

The Contractor shall perform such clearing and grubbing as may be necessary to construct the fence to the required grade and alignment. At locations where fence runs are completed, appropriate adjustment in post spacing shall be made to conform to the requirements for the type of closure indicated.

The tops of all posts shall be set to the required depth and alignment. Cutting off the tops of posts shall be allowed only with the approval of the Project Manager and under the conditions specified. Wire or fencing of the size and type required shall be firmly attached to the posts and braced in the manner indicated. All wire shall be stretched tautly and shall be installed to the required elevations.

Wire fences shall be constructed in conformity with the details and at locations shown on the plans or staked by the Project Manager. All posts shall be set plumb and to the depth and spacing shown on the plans. Excavations for footings and anchors shall be to dimensions shown on plans or established by the Project Engineer. Metal line posts may be driven. Posthole backfill shall be placed in thin layers and each layer solidly compacted. Posts set in rock shall be placed as directed by the Project Manager.

Mechanical stretcher or other device designated for such use shall stretch fence wire and welded wire fabric. Stretching by motor vehicle will not be permitted. The length between pull posts shall not exceed nine hundred ninety feet for barbed wire fence.

Intermediate braces shall be placed at intervals not to exceed nine hundred ninety feet and shall be spaced evenly between corner posts.

Corner posts and braces shall be placed at appropriate fence angles or bends.

Fence materials of the same manufacturer, type, or process, conforming to the specifications and details shown on the plans, shall be used throughout the work unless otherwise authorized in writing by the Project Engineer.

Contractor personnel shall follow site safety requirements and use of personal protective equipment. Installation of fencing within 10 feet of the top edge of the highwall or near vertical slope shall be executed while wearing and maintaining fall protection equipment.

02840 – BASE COURSE

This Work consists of removing, hauling, processing, and placing existing Base Course material.

I. Materials, General
   A. Base Course consists of one (1) or more of the following:
   B. Crushed stone;
   C. Crushed or screened gravel;
   D. Sand;

Base Course does not contain organic matter or other Deleterious Materials, including silt and clay balls.

II. Aggregate Acceptance

The Base Course acceptance will be based on periodic random samples. Unless the Contract specifies otherwise, combine the aggregate Materials in proportions that produce a homogeneous composite blend in accordance with Table II, “Type I Base Course Gradation Band.”

Table II
Type I Base Course Gradation Band

Sieve size	% passing
1.0 inch	100
¾ inch	80-100
No. 4	30-60
No. 10	20-45
No. 200	3.0-10.0

Ensure that at least 50% of the Materials retained on or above the No. 4 sieve have at least two (2) Fractured Faces when evaluated in accordance with AASHTO T-335, "Determining the Percentage of Fracture in Course Aggregate". Provide Base Course from a material source with a maximum AI of 35 when calculated in accordance with Section 901, "QUALITY CONTROL/QUALITY ASSURANCE (QC/QA)," a maximum LL of 25, and a maximum PI of 6. Determine the AI for the untreated natural aggregate source.

III. Construction Requirements

A. Mixing and Placing

Mix the Base Course Material to a homogenous mixture. Place maximum six (6) inches (compacted) lifts, unless specified otherwise. Do not place on frozen Subgrade. Compact Base Course to at least 96% of maximum density with wheel rolling to the acceptance of the Engineer.

B. Removing and Processing Base Course

Minimize contamination of Base Course Material when removing it from the Roadway.

C. Acceptance

Base Course Materials will be accepted based on samples taken in accordance with minimum testing requirements after placement but before compaction. Acceptance will be in accordance with Section 02840. If necessary, re-work the Base Course until all requirements are met.

IV. Method of Measurement

The cubic yardage of the Base Course used will be based on the amount delivered. No additional payment shall be made for stockpiled or excess material. Where not all delivered Base Course Materials are used, the cubic yardage shall be determined based on the road area covered and depth of coverage.

V. Basis of Payment

The accepted quantities of Base Course will be paid as determined in the Acceptance section of Section 02840.

Pay Item	Pay Unit
Imported Base Course	Cubic Yard

02890 - FEATURE IDENTIFICATION MARKERS

The Contractor shall install identification markers at Features SUB-1, SUB-2, and F9. The identification markers shall be installed in at locations shown on the plans or as specified by the Project Manager.

I. Materials

A. Marker Caps

The caps will be bronze or other alloy typical of markers typically used by professional surveyors. The markers will be provided by the Project Manager with feature information already engraved on the surface.

B. Steel Pipe

The pipe shall be 3 ½-inch (4-inch outer diameter) schedule 40 galvanized steel pipe. Pipe shall be manufactured using steel conforming to the requirements of ASTM A1008/A1008M and A1011/A1011M.

C. Fill Sand

Clean sand shall be used to fill voids in the pipe. The sand shall be clean, well sorted, sand that can be poured into the pipe and fill the pipe without bridging or forming voids. Suitable material shall be Quikrete® Premium Play Sand or equivalent.

D. Cement Grout

Cement grout shall be high strength, non-metallic, and non-shrink, compliant with ASTM C1107. Grout shall be premixed, so only water is added at the job site. Acceptable material shall be Quikrete® non-shrink precision grout, or equivalent. Water shall be provided by the Contractor.

II. Construction

The locations of the makers are shown in the plans; however, locations may be changed in the field by the Project Manager.

Steel pipe shall be placed vertically and plumb in granular fill material. The pipe lengths shall be a minimum of 4 feet. The pipe shall have a minimum of 6 inches and a maximum of 12

inches exposed above grade. Once placed, the interior void of the pipe may be filled with sand to within 6 inches of the top of the pipe. A minimum of 6 inches from the top of the pipe shall filled with hydrated non-shrink grout. The grout shall be hydrated such that it has just reached flowable characteristics, but not excessively. Ensure that there are no cavities or voids in the pipe during grouting. The provided marker cap shall be embedded in the grout. The marker shall be covered during curing if inclement weather is forecasted.

If site conditions prevent installation of the marker caps in the steel pipe, the Contractor shall obtain alternate installation instructions from the Project Manager. Alternate considerations may include drilling and grouting the caps in undisturbed, competent rock or concrete at or immediately adjacent to the feature.

02900 - LANDSCAPING

The following sections describe revegetation to be performed under this contract. Revegetation shall be required at features A-1, A-2, and A-3, the overland access routes to features A-1, A-2, and A-3, and at areas disturbed during construction and as specified by the AML Project Manager.

02920 – SOIL PREPARATION / SURFACE ROUGHENING

Prior to seedbed preparation, the Contractor shall grade all disturbed areas as described, decompact those areas specified above, and roughen the surface as specified below.

On slopes up to 1.5h:1v, the soil surface in areas to be seeded shall be prepared to be continuously rough and hummocky. This shall be accomplished by using an excavator bucket, or other acceptable methods that produce similar results, to create small pockets and furrows to trap water and create favorable microclimates for plant growth.

After roughening, seed shall be broadcast or hydroseeded as specified below. In areas with extremely dry and loose soil, the Project Manager may require the Contractor to wait until the soil has settled before seeding.

Large and small boulders may be left exposed on site prior to seeding, either singly or in groupings that blend with the natural surroundings, as directed by the Project Manager. The Project Manager may require that additional boulders be placed on site to enhance visual variation and provide wildlife habitat.

Unless the soil is severely compacted or as otherwise noted, soil preparation will not be required for discontinuous, isolated areas of disturbance less than 0.05 acres (approximately 2,500 square feet or 50 feet by 50 feet).

The extent of seedbed preparation shall not exceed the area on which the entire seeding operation can be applied. Seed shall be applied before soil surface crusting occurs. Loss of seed and fertilizer due to erosion shall be prevented from occurring. If crusting or erosion occurs, the entire area affected shall be reworked beginning with seedbed preparation.

02921 - TOPDRESSING

As specified, on construction sites, mined areas, and other critical areas where the existing surface material is either chemically or physically unsuited to support adequate vegetation, the best available soil material as determined by the Project Manager shall be evenly spread on the surface in sufficient depths to maintain plant growth. Available topdressing in all areas to be disturbed shall be set aside prior to deeper soil disturbance for excavation, mine feature backfilling and access road blading.

Topdressing shall be applied generally along the contour, but if hazardous conditions arise, the application may be in another direction. In all cases, placement shall be such that erosion is kept to a minimum. All topdressed slopes shall be prepared by surface roughening before planting to reduce erosion.

02930 - GRASSES

The following section describes the seeding to be conducted under this contract.

02933 - SEEDING

Following completion of seedbed preparation, the Contractor shall seed areas according to the Specifications and as follows:

I. Seeding Time

Seeding shall be accomplished between June 15 and August 31 of each year, unless specific permission in writing is issued by the Project Engineer to allow seeding before or after these dates. Seeding shall not be done when the soil is too wet, too dry, or otherwise untillable as determined by the Project Manager.

II. Seed Species and Mixtures

To assure AML that the seed purchased shall exhibit the characteristics associated with the given variety, and that it is genetically pure, the Contractor shall provide certified seed of named varieties. For the unnamed varieties, the seed shall be obtained by the contractor from the closest available source adapted to the climate and soil. The percentage of each species comprising seed mixtures for application is outlined below. The mixture is to be used for revegetation of areas defined above in Section 02920. Seed species and varieties, which are well adapted to the soil, climate, and topography of the disturbed areas, shall be used in revegetation and are discussed below.

III. Seeding Methods

A. Broadcasting

The seed shall be broadcast. When broadcast seeding, passes shall be made over the site to be seeded such that an even distribution of seed is obtained. Broadcast seeding shall take place immediately following the completion of final soil preparation.

Broadcast seeding shall not be conducted when wind velocities would prohibit an even seed distribution as determined by the Project Manager. Broadcast seeding shall be followed by hand raking, manual use of a drag chain, or sweeping with sturdy tree or shrub branches to cover seed.

This shall be done over the entire seeded area but shall not be so extreme as to reduce the extent of soil relief.

Broadcast seeding of large areas shall be done using hand-operated "cyclone-type" mechanical seeders. All seeding equipment used shall be equipped with a metering device and set to the appropriate seeding rate.

Broadcast seeding of small areas of disturbance, less than 0.05 acres (approximately 2500 square feet or 50 feet by 50 feet) may be done by hand scattering and raking to ensure seeds are not exposed on the soil surface.

After completion of the broadcast seeding and seed covering, organic debris such as logs, tree stumps and grubbed vegetation shall be randomly redistributed across the sites. This shall be done at the Project Manager's direction for the purpose of creating visual variation, ground shading, and production of wildlife habitat. Care shall be taken to avoid leveling the soil surface.

B. Completion

If the Contractor is scheduled to close the project outside the specified seeding time when seeding is the only incomplete item, the Contractor shall complete only seed bed preparation and 75 percent of the lump sum bid price for seeding will be retained. Then the job shall be held open for seeding during the next seeding season with the remainder of the bid price being paid upon completion and acceptance of seeding.

If all of the work required by the contract, except seeding, is completed before seeding is accomplished because of seasonal limitations, partial acceptance of the work will be made with final acceptance delayed until seeding has been accomplished in accordance with these specifications. Liquidated damages will not be assessed against the Contractor during the interim period between the dates of partial acceptance and final acceptance if such delay is the result of seasonal limitations.

C. Seeding Rates

Seeding rates are given in Table II. Pure Live Seed (PLS) expresses seed quality. PLS is a percentage of pure, viable seed in a particular lot of seed. PLS is calculated by multiplying the percent total germination by the percent purity and dividing by one hundred (100):

$$\text{Percent PLS} = \frac{\text{Purity x Germination}}{100}$$

TABLE III
SEED MIX

Class	Plant Species (Common Name/*Scientific Name*)	Pure Live Seed (pounds per acre)
Graminoid	Western Wheatgrass (*Pascopyrum smithii*)	5.60
	Arizona Fescue (Festuca arizonica)	1.60
	Indian Ricegrass (Achnatherum hymenoides)	0.80
	Alkali Sacaton (Sporobolus airoides)	0.20
	Sand Dropseed (Sporobolus cryptandrus)	0.10
	Green Needlegrass (Nassella viridula)	0.76
Forb	Blue Flax (Linum perenne)	0.40
	Western Yarrow (Achillea millefolium var. occidentalis)	0.10
	Rocky Mountain Penstemon (Penstemon strictus)	0.10
	Yellow Prairie Coneflower (Ratibida columnifera)	0.10
	Purple Prairie Clover (Dalea purpureum var. Purpureum)	0.10

All seed shall comply with NMSA 1978, Sections 76-10-11 through -22 and 21.18.4 NMAC, Seed Standards and Classifications. Invoices or bag labels showing purity and germination for all seed shall be provided to the Project Manager before seeding.

The Contractor shall protect and care for seeded areas until final acceptance of the work and shall repair all damage to seeded areas caused by pedestrian or vehicular traffic at no additional cost to EMNRD.

02940 – MULCHING

The Contractor shall apply mulch to all seedbed areas. Mulching will not be permitted when the wind velocity exceeds fifteen miles per hour. The mulch type shall be coarse bark and/or

wood chips or chunks, pecan shells, or approved equivalent. Materials shall be wind resistant. No more than 15 percent, by loose volume, shall pass through a 0.25-inch sieve. The mulch shall not contain resin, tannin, or other compounds in quantities that would be detrimental to plant life. Sawdust or materials with noxious seed or plants will not be acceptable. Chipped, but uncomposted, yard waste will not be acceptable unless the material is certified to be free of weed seed. Plant trimmings generated from onsite activities may be shredded and used for mulch; however, deliberately trimming vegetation for the sole purpose of making mulch is not allowed.

The mulch shall be spread uniformly over the prepared area either by hand or with a mechanical mulch spreader. Mulch shall be applied by the Contractor to all seeded areas immediately after seeds are planted to provide suitable surface litter for improvement of moisture conditions and to reduce the potential for damaging erosion or soil blowing which might occur before or during plant establishment.

The rate of application of woody mulch shall be 140 to 160 cubic yards per acre (approximately 1-inch thick after spreading).

02955 – SALVAGE OF NATIVE PLANTS

Before any area is disturbed for access, borrow, fill or other construction activities, the Contractor, accompanied by the AML Project Manager, shall thoroughly scout the area for native plant species. All significant plants shall be marked by the Project Manager and avoided by the Contractor wherever practicable. Of those that need to be disturbed, the Contractor shall salvage those that can be replanted, as the Project Manager directs and as specified below. Species that shall be salvaged include prickly pears (*Opuntia spp.*) and other cactus species, including pincushion types.

Plants to be salvaged shall be dug from the soil before earthmoving operations, preserving as many roots and as much of the soil around the roots as practicable. The south side of the plant and the soil line shall be marked with paint or marking crayons. When transplanted the plant shall be placed in the same orientation it was exposed to before harvesting.

Cactus and other salvaged plants shall be planted as soon as possible but no more than one week after harvest.

Salvaged plants shall be placed into nearby uncompacted native soil, preferably in areas that have been disturbed by construction activities and along closed access roads.

Any transplanted plants shall be watered in at the time of planting; no further watering is required. Larger specimens shall be staked as necessary as determined by the Project Manager.

02990 - SUBMITTALS

Complete data and specifications for the following items shall be submitted in accordance with the procedure set forth in Section 01340:

- Materials:

  - Fill materials
  - Scoria
  - Corrugated metal pipe
  - Fencing and accessories
  - Signs
  - Signposts
  - Sign fasteners
  - Identification Markers
  - Seed mix
  - Mulch
- Excavation Plan (Section 02222)
- Shop Drawings
  - Signs

END OF DIVISION 2

DIVISION 3 – DRILLING AND GROUTING

03001 – GENERAL REQUIREMENTS

I. Introduction

Drilling and grouting involves the injection of a low-slump, mortar-like grout into encountered void space to form support pillars that contact the mine floor and intact rock above. The grout will not be pushed out to fill all available void space but supports the mine roof by forming a homogeneous grout pillar or cone that contacts intact rock above.

II. Intent

The intent of the compaction grouting specified herein is to:

A. Create pillars in the underground mine workings to support the overlying rock7.

B. Provide support and mitigate future subsidence issues along the A-25 road alignment within the limits indicated on the plans.

III. Standards and References

The most recent version of the following testing methods or standards may be employed:

1. ASTM C33 Standard Specification for Concrete Aggregates

2. ASTM C94 Standard Specification for Ready-Mixed Concrete

3. ASTM C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates1

4. ASTM C143 Test Method for Slump of Portland Cement Concrete

5. ASTM C150 Compliance Standard for Portland Cement

6. ASTM C494 Standard Specification for Chemical Admixtures for Concrete

7. ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

8. ASTM D698 Standard Proctor Compaction Test

Reference documents as provided to the Contractor shall include:

1. Project Specifications.

2. Project drawings.

3. Project geotechnical investigation report.

4. Contract documents.

IV. Drilling and Grouting Sequence and Scope

Drilling and grouting work shall be performed as specified in Section 01010. The drilling and grouting tasks are repeated below:

Construct Support Pillars in Mine Workings: Establish support pillars in the encountered mine workings using forty-two (42) drilled boreholes, with a spacing of 10 to 20 feet, on center, near the subsidence features and approximate known mine workings and 30 feet, on center, along the remaining road segments. Drilling will occur along approximately 750 feet of the A-25 road alignment to support the partially collapsed underground mine workings, at approximate depths ranging from 20 to 100 feet below the ground surface. Proposed drill hole locations are shown on Sheets 4 and 5. The goal of the drilling and grouting work is to address the A-25 subsidence features, map voids under the road alignment, and to support those voids with grout pillars to stop additional subsidence and stabilize the road.

The amount of drilled boreholes that are expected to encounter rubble or void space due to the room and pillar design of the mine is unknown at this time due to uncertainty about the exact position and orientation of the mine workings. Boreholes that do not encounter rubble or void space will not require casing or support grout. Approximately 3,000 linear feet of drilling is expected, and approximately 1,400 linear feet of casing will be required for this task. It is estimated that the volume of grout to construct the pillars will be approximately 460 cubic yards (CY) (355 CY + 30% contingency).

Boreholes shall be drilled through the mine workings horizon (as determined by the Engineer at each bore hole location) and five feet into the floor below the workings. Casing shall initially be set three feet above the mine floor of each hole (as determined by the Engineer) for the initial grout stage. Each grouting stage is considered complete after hitting the pressure cut off, or if determined complete by the Engineer. After grouting the initial stage, the casing will be pulled up three feet for each successive stage; grout stages shall continue to a point when the casing is at least five feet above the mine workings or rubble. When a hole has met the criteria for the completion of grouting, the casing shall be removed, gravity fed grout will be used to backfill the hole to the appropriate depth from surface, and imported base course material shall be used to fill the remaining hole space to restore the hole to appropriate surface conditions. The Contractor shall note that timbers were used to support the mine workings and that pieces of wood may be recovered during drilling. The Contractor shall expect to encounter timbers in various states of degradation. Grouting shall be within the limits indicated on the project plans to meet the acceptance criteria presented in Section 03030 of these Specifications.

In connection with the compaction grouting program, as shown on the drawings, the Contractor shall provide all labor, materials, water and equipment to accomplish the following items of work:

a. Implement ground movement monitoring system.

b. Install and remove grout casing.

c. Furnish and inject support grout.

d. Monitor surface ground movements during grouting operations.

e. Implement site environmental and safety controls including grout contact, flush and wastewater runoff controls.

V. Quality Assurance

A. The drilling and grouting program, including installation of grout casing, shall be performed by a specialist grouting Contractor with at least ten years of documented experience in void fill grouting and/or two similar mine subsidence/backfill projects within the last five years.

B. The Contractor shall provide experienced management, supervisory and key personnel as required to implement the drilling and grouting program, as follows:

1. The Contractor’s project manager shall have at least five years of continuous experience in drilling and grouting.

2. The Contractor’s superintendent shall have at least five years of experience in drilling and grouting.

3. As detailed in Section 03990 of these Specifications, the Contractor shall provide:

a. Evidence of previous drilling and grouting project experience.

b. Evidence of management, supervisory and key personnel experience.

C. The Contractor shall ensure that procedures and documentation conform to these Specifications.

03010 – DRILLING EQUIPMENT

I. Drilling Equipment

A. The Contractor shall supply drilling equipment capable of drilling efficiently through various subsurface conditions to the depths necessary to meet the project objectives. The drilling equipment must be capable of drilling to a minimum depth of 200 feet. The drilling equipment shall be capable of air rotary drilling or another method approved by the Project Engineer.

B. The drilling equipment must be capable of drilling holes with a large enough diameter to accommodate the necessary grout casing. The hole diameter must allow for the installation and lifting of casing with relative ease.

C. Any alluvial casing used shall be of a large enough diameter to accommodate the necessary grout casing.

D. The drilling equipment used shall be capable of returning cuttings by air circulation at 5 foot increments.

E. The Contractor shall keep enough drill steel on site to avoid slowing down operations should some drill steel be lost downhole.

03020 – GROUTING EQUIPMENT AND MATERIALS

I. Grouting Equipment

A. The Contractor shall supply equipment capable of advancing the grout casing to the specified depth or as required to meet the project objectives.

B. The Contractor shall supply all equipment required to operate a grouting system capable of supplying the specified grout at variable pressures, measured at the pump, up to 400 psi (2758 kPa) and at rates of 0.5 to 9 cubic feet (0 to 0.25 cubic meters) per minute, as required to suit the application.

C. The mixer shall be a continuous auger type to ensure complete uniform mixing of the materials used and shall be of sufficient capacity to continuously provide the pumping unit with mixed grout at its normal pumping rate. The mixer must be capable of volumetrically proportioning the grout materials. Ready mixed grout is also acceptable with an approved mix design.

D. The Contractor shall provide gauges or other instrumentation (measuring devices) to continuously measure and record:

1. Grout pressure at or close to the top of the injection casing.

2. Flow rate of grout.

3. Volume of grout injected.

E. The Contractor shall supply and implement ground surface movement monitoring equipment whenever grouting is taking place.

F. An adequate communication system shall be maintained between the pumping and batching plant and the injection location.

II. Casing

A. Casing and connections shall be steel casing of adequate strength to maintain the hole and to withstand the required jacking and pumping pressures. The casing shall be at least 2.0 inches (50 mm) inside diameter in order to adequately handle the specified low slump material without plugging. All casing shall be flush joint threaded or a single piece tubing to provide a smooth inner wall and unobstructed inside diameter. It shall be the Contractor's responsibility to install casing that does not detrimentally impact the grouting procedure.

B. The Contractor shall keep enough casing on site to avoid slowing down operations should some be lost downhole.

C. Casing shall be installed such that grout material will not travel in the annulus area between the casing and adjacent ground and escape at the surface when pumped.

III. Grout Materials

A. Portland Cement (ASTM C150)

B. Fine aggregate shall be sand with a fines content (percent passing No. 200 sieve) of not less than 10 percent and not more than 30 percent. Natural fines may be supplemented with fly/ash, slag cement, bentonite, or aggregate washings.

C. Proportions of the mixture shall be required to achieve a pumpable mix with not less than 3 inch and not more than 6 inch (75 to 150 mm) slump with a 0 percent bleed, and a stiffening time of greater than four hours. The requested slump shall be determined by the Engineer for each individual grout bore hole based on the downhole conditions. Open void space shall use a lower slump, down to 3 inch, and rubble shall use a higher slump, up to 6 inch.

D. The 28-day compressive strength of the grout will not be less than 1,000 psi (6895 kPa).

E. Upon discharge into the pump hopper or holding tank, the grout must be continuously agitated. Mixed grout may not be held in the agitator for more than 1.5 hours unless a set retarder, approved by the AML Program's representative, is used.

F. The Contractor shall not use grout for injection as support grout if more than 2 hours have passed since it was batched (or since water was mixed in with cement).

03030 – EXECUTION

I. Site Examination and Schedule

A. Prior to submitting a bid price for the compaction grouting, the Contractor shall conduct a site inspection.

II. Drilling

A. The plans show drill hole spacing at every 10 feet, every 20 feet, or every 30 feet by zone depending on the existing subsidence area, and existing mine map (Sheet 4). The drill hole spacing shown on the plans may be adjusted by the Engineer based on the subsurface conditions encountered. The Engineer may adjust the boring locations to better predict void spaces based on how the void findings correspond to the mine map. The Engineer may adjust the boring locations to ensure adequate protection of the active subsidence area. Drill hole locations may be added or eliminated.

B. If the material encountered at the surface before bedrock may slough into the hole, the Contractor shall use alluvial casing to the necessary depth to keep the hole open. This will be considered alluvial drilling and the length of alluvial drilling is determined by the length of alluvial casing installed. Alluvial casing shall not be installed in bedrock. If the Contractor is unable to remove alluvial casing from a hole it shall be cut off at least 18 inches below the surface before the hole receives a surface restoration.

C. The Contractor shall provide cuttings samples via air return at 5 foot increments from the ground surface through the full depth of the hole, or until circulation is lost. Every effort should be made to ensure that the cuttings samples are representative of the 5 foot increment they are collected for.

D. The downhole conditions encountered by drill holes shall be categorized by the Engineer as:

1. Abandoned – the drill hole was not drilled to completion.

2. Pillar – the drill hole encountered and intact section of the target coal seam.

3. Void fill – the drill hole encountered rubble or open void space.

    a. Drill holes categorized as void fill will require support grout.

E. The Contractor shall drill a minimum of 5 feet below the mine floor for each hole as called by the Engineer. The Contractor's experienced driller may be asked to provide their opinion on the depth to the mine floor, as well as their opinion on the depth to rubble, void space, and/or the top of the coal seam as it applies to each hole drilled. The cuttings encountered and continued return of cuttings throughout the hole will also be considered by the on-site engineer when evaluating drill holes.

F. The Contractor shall provide a drill hole cover for each completed hole. A cover will remain in place over any open hole whenever possible until the hole is backfilled.

III. Grouting

A. The Contractor shall inject support grout for holes categorized as void fill by the Engineer.

B. The support grout shall be injected at a stage depth until one of the following occurs (adjustments to criteria 1 and 2 can be submitted for consideration in the Contractor's work plan):

1. The header pressure reaches a reading of 400 psi (2758 kPa) if the depth to injection is 45 feet or greater, 275 psi (1896 kPa) if the depth is between 45 feet and 35 feet, or 250 psi (1724 kPa) if the depth to injection is 35 feet or less.

2. 20 CY of support grout has been injected at that stage depth.

3. Measurable surface ground heave is observed (displacement of ground surface of greater than 1/8 inch).

4. Grout is returned up the annulus.

If criteria 2 or 3 is met, grouting for the hole is considered complete. If the grouting stage completed is 5 or more feet over the top of mine workings or rubble, grouting for the hole is considered complete. If the disturbance, open void or rubble zone, reaches the surface, as with the subsidence features, the grouting stages will continue until the hole is considered complete by meeting refusal criteria 2 or 3, if the on-site engineer considers the hole completed, or if the last injection stage depth completed is within 5 feet of the surface,

C. If, for any reason, the Contractor is unable to complete support grouting for a hole before that hole considered complete by meeting the refusal criteria or by the determination of the Engineer, the hole will be offset by 5 to 10 feet as directed by the on-site engineer and re-drilled.

D. A ground movement monitoring system must be in place for each hole requiring support grout for the duration of grout injection. The ground movement monitoring system shall be a laser level system with at least 3 reflectors accurate to a hundredth of a foot (0.01 feet) and all stations within 50 feet of the injection point, or a different system approved by the Engineer. The Contractor shall additionally visually monitor the area for any signs of ground heave.

E. The Contractor shall ensure the implementation operation of measuring and recording equipment for the duration of grout injection at each hole requiring the support grout. The equipment must accurately measure and record real time data for the grout pressure at or near the wellhead, the flow rate of grout, and the total volume of grout injected per hole.

F. Grouting will not take place within 10 feet of locations grouted within the previous 12 hours.

G. As support grouting is completed at each location, the Contractor shall backfill the hole with grout. All boreholes, including those that did not encounter void space and therefore did not require support grout, shall be backfilled with grout. Grout used as backfill may be gravity fed without casing.

H. Surface restorations for each hole will be determined based on the surrounding road surface conditions. If the road surface is bedrock, the Contractor shall backfill the holes with grout to 4 inches from the ground surface and backfill and compact the remaining 4 inches with appropriate base course material up to the ground surface. If the road surface is gravel, the Contractor shall backfill the holes with grout to the level of bedrock or to a maximum of 18 inches from the ground surface and backfill and compact the remaining distance to ground surface, a maximum of 18 inches, with appropriate base course material up to the ground surface.

IV. Field Quality Control

A. All support grouting shall be performed under the inspection of the Field Quality Control Representative (FQCR).

B. Monitoring and logging of support grouting operations for the production work shall be done by the FQCR.

C. The FQCR will perform slump tests of grout and take measurements of grout mix quantities to verify the Contractor’s grout mix, as follows:

1. Slump tests will be performed:

   a. at any change in mix design, or

   b. at least twice during each grout shift, or

   c. once for every 30 cubic yards of grout injected

2. Grout mix proportions will be checked at least once daily.

3. Grout mix specific gravity will be tested using a mud balance on each batch.

D. The FQCR will require the Contractor to cast minimum size 3 inch by 6 inch (75 mm by 150 mm) grout test cylinders for strength testing. One set of four cylinders or molds will be cast for each day of grouting operations.

E. As detailed in Section 03990, daily records shall be maintained by the Contractor and submitted to the AML Program's representative.

F. The Contractor shall monitor open and connected holes for the flow of grout if any are available. If the FQCR observes a significant quantity of grout is leaking outside of the grouting area, the Contractor may be asked to stop pumping and allow the grout to set up. Before resuming pumping, the Contractor may need to be thickened and/or have a reduced setup time.

G. After completion of the grouting program, the monitoring system and grout casing will be removed, and all holes will be backfilled and receive an appropriate surface restoration.

V. Testing and Inspection

A. Monitoring and logging of grouting operations for production work shall be done by the Contractor and observed and documented by the FQCR.

VI. Restrictions

A. The Contractor shall be responsible for obtaining any State and municipal permits (if required) and conforming to all State and local regulations.

B. The Contractor shall avoid all cultural and biological resources designated by AML cultural resources staff including those discovered during construction. The Contractor shall avoid these areas with all equipment, vehicles, foot traffic, and any other ground surface disturbing activities.

C. The Contractor will be responsible for the delineation of all above and below ground utilities and obstructions.

D. The Contractor shall be responsible for the disposal of all waste materials generated during construction; including, but not limited to, drill cuttings, grout waste, and wash water.

E. The contractor shall be responsible for protecting and preserving borehole location markers throughout the drilling and grouting activities until the holes have both received surface restorations and their locations have been recorded by the on-site engineer.

F. The Contractor shall take reasonable measures to avoid traffic conflicts between vehicles of the Contractor's employees and private citizens and to avoid overloading of any driveways, roads and streets. The Contractor shall limit the access of equipment and trucks to the project site and provide protection for any improvements over which trucks and equipment must pass to reach the job site.

G. Hours of construction shall be between 7:00 AM and 7:00 PM.

03990 – SUBMITTALS

The following shall be submitted to the Project Engineer by the Contractor with the bid documents:

1. A list of at least two previously completed mine subsidence/backfill projects of similar scope within the last 5 years. The list shall include a description of the project, relative size, and contact person with phone number.

The following shall be submitted to the Project Engineer by the Contractor two (2) weeks prior to the start of work:

1. Resumes of the management, supervisory, and key personnel, for approval by the Project Engineer.

2. A ground movement monitoring plan, as detailed in Section 03020 of these Specifications.

3. A mix design for the project indicating sources and types of grout materials, with volumetric proportions, and field test data from previous projects indicating compressive strength, and slump of 3 to 6 inches (75 to 150 mm) achieved. If the Contractor intends to deviate from the gradation provided in Section 03020 of this specification, it shall submit, with the bid, evidence of satisfactory use of the proposed material from past projects with similar conditions.
4. Work procedures and control criteria (including volumes and pressure for each stage).

5. A general Work Procedures Plan outlining the spacing, location, depth and quantity

of grout to achieve the specified criteria detailed in Section 03030 of this specification.

6. The Contractor's proposed QA/QC & Testing Program, including qualifications for the testing laboratories, examples of testing and reporting forms, etc.

The following shall be submitted to the AML Program's representative by the Contractor during the work:

1. Accurate daily records of weather conditions, all hours worked, drilling footage, drill hole categorizations, grout casing installation, grouting quantities, including stage data, volume, pressure and depth for each grout location.

2. A weekly summary of work completed and construction progress, QA/QC activities and test results, problems and resolutions, meetings and discussions held, incidents/accidents/health and safety issues, and construction cost estimate.

3. Any change in the predetermined drilling or grouting program necessitated by a change in the subsurface conditions.

Submittals shall be made in accordance with the procedure set forth in Section 01340.

END OF DIVISION 3

DIVISION 5 – METALS

The following section specifies all items fabricated from metal shapes and all wrought or cast metal items. Fabricated metal items that are detailed in the contract documents but not mentioned specifically herein shall be fabricated in accordance with the applicable requirements of this section. This section excludes signs and signposts (see Section 02840).

05010 – METAL MATERIALS

All materials shall be new and undamaged and shall conform to pertinent ASTM or other industry standard specifications including the following

I. Steel

Shapes, Plates, and Bars	ASTM A588 or A242 (weathering)
Structural Tubing	ASTM A847 or ASTM A606, (weathering)
Grating	ASTM A606, Type 4 (weathering) or AISI 304/316 (stainless steel)
Bolts and Nuts	ASTM F593 and F594, (stainless steel grade 18.8 or 316) or ASTM A325, Type 3 (weathering) and A563, grade C3 or DH3 (weathering)
Flat Washers	ANSI B27.2, of the same material as bolts and nuts

The mine bat gates shall be fabricated from high strength (F_y=50,000 psi), self-weathering, low alloy, atmospheric corrosion resistant steel as specified above.

05030 – METAL FINISHES

Specified hereunder are shop-applied coatings. It is the intent of these specifications to use atmospheric corrosion resistant structural steel (weathering steel), grating and appurtenances to the fullest extent practicable. This section specifies the required shop coatings for metal services where it is not practicable to use a corrosion resistant material.

05031 – SHOP COATING

I. Materials

Unless otherwise authorized, shop applied prime coatings shall be:

Zinc-rich Urethane Primer Tnemec "90-97 Tneme-Zinc" or DuPont "Imron 62 ZF", or approved equivalent.

For repair of hot-dip galvanized surfaces and to rustproof welds, field applied coatings shall be:

Cold Galvanizing Compound Z.R.C. Cold Galvanizing Compound, or approved equivalent.

II. Cleaning

Surfaces shall be dry and of a proper temperature when coated, and free of grease, oil, dirt, dust, grit, rust, loose mill scale, weld flux, slag, weld spatter, or other objectionable substances. Articles to be galvanized shall be pickled before galvanizing. All other ferrous metal surfaces shall be cleaned by high power wire brushing or blasting. Welds shall be scraped, chipped, and brushed as necessary to remove all weld spatter.

III. Galvanizing

All galvanizing shall be done after fabrication by the hot-dip process in conformity with requirements of ASTM A123, A153 and A385.

IV. Steel

Unless otherwise specified and if such an occasion shall occur, all ungalvanized structural and miscellaneous steel shall be given an anticorrosion prime coat in the shop after fabrication. Steel surfaces shall be prime coated as soon as practicable after cleaning. All painting shall be done in a heated structure if the outside air temperature is below 50 degrees Fahrenheit. Steel shall not be moved or handled until the shop coat is dry and hard.

Plates, shapes, and bars of weathering steel shall not be shop of field primed or painted, except as noted.

V. Aluminum

All surfaces of aluminum that will be in contact with concrete, mortar, or dissimilar metals shall be given a heavy coat of coal tar paint.

VI. Other Surfaces

No shop coating will be required for zinc-coated steel, stainless steel, or brass surfaces.

VI. Film Thickness

The dry film thickness of the shop coating shall be at least 2.5 mils for the zinc-rich urethane primer.

05500 – METAL FABRICATIONS

Structural steel and miscellaneous metals shall be fabricated in accordance with drawings that are a part of the contract documents. The Contractor shall verify all dimensions prior to fabrication.

Structural steel and miscellaneous metal shall be stored on blocking so that no metal touches the ground and water cannot collect thereon. The material shall be protected against bending under its own weight or superimposed loads. Care shall be taken in handling steel and miscellaneous metals to avoid unsightly gouges and scrapes.

The Contractor shall make adequate provisions for all erection loads and for sufficient temporary bracing to maintain the structure safe, plumb and in true alignment until completion of erection and installation of necessary permanent bracing.

Before assembly, surfaces to be in contact with each other shall be thoroughly cleaned. All parts shall be assembled accurately as shown on the drawings. Light drifting will be permitted to draw parts together, but drifting to match unfair holes will not be permitted. Any enlargement of holes necessary to make connections in the field shall be done by reaming with twist drills. Enlarging holes by burning is absolutely prohibited.

After erection, all welds, abrasions, and surfaces not shop-primed, except surfaces to be in contact with concrete, shall be primed, unless the steel is weathering steel. The primer shall be consistent with the shop prime coat.

Weathering steel shall be kept as clean and free as possible from mud, grease, oil, paint, concrete or mortar splatter, and other foreign substances to minimize on-the-job cleaning. Paint or crayon identification marks shall be made in locations not visible on the finished structure; otherwise, these marks must be removed from the visible surfaces during the final cleaning operation. Objectionable substances on weathering steel, especially on highly visible exterior surfaces and including mill scale on the surfaces visible from the mine opening, shall be removed by solvents, high-speed power brushing, scraping, sand or grit blast cleaning, or other suitable methods. Surfaces of welds shall be given special treatment by scraping and wire brushing as necessary to remove all slag and weld spatter. Tools that produce excessive roughness shall not be used.

Welders certified in accordance with American Welding Society (AWS) specifications for the intended work shall do all welding. A copy of certifications shall be furnished to the Project Engineer. All welding shall be consistent with the requirements of AWS D1.1, "Structural Welding Code," including adequate edge preparation and preheating and the selection of proper flux (when applicable).

For weathering steel, the use of properly dried, low-hydrogen electrodes and fluxes are specified by the AWS and shall be used. The capping runs of multi-run fillet and butt welds shall have strength, corrosion resistance, and weathered appearance similar to that of the base metal by use of appropriate alloy electrodes for the final two exposed top layers with the weld composition

for weathering steel matching the base metal. Conventional electrodes may be used for the body of such welds. Conventional electrodes may also be used for butt welds with a single run each side and for single run fillet welds of up to 5/16-inch leg length be welded to eliminate surfaces on which moisture accumulation can occur and joints shall be tight to so that moisture cannot enter between plies of material. All joints in weathering steel, including fillet welds, shall be continuously welded to avoid moisture and corrosion traps such as crevices.

Where feasible, welding and fabrication shall be executed off site and finished product mobilized to the site for installation.

The Contractor shall use caution when installing or fabricating metal works in mine openings so that no foreign materials or equipment are dropped into the mine (salvage may not be possible). Also, "bad air" is not anticipated hazard at the A-25 Site, but it is the Contractor's responsibility to execute the work in accordance with their Site-Specific Health and Safety Plan. Air monitoring should be performed as needed.

05990 – SUBMITTALS

- Complete data, detailed drawings, and setting or erection drawings covering all structural and miscellaneous metal items, including bolts and nuts, shall be submitted in accordance with the procedure set forth in Section 01340
- A detailed description of welding processes to be utilized (including electrode classification)
- AWS welding certifications

END OF DIVISION 5

END OF APPENDIX B