

NEW MEXICO

Abandoned Mine Lands

Project Manual
Including Plans and Specifications
for Construction of

ALLISON EMERGENCY PROJECT - PHASE III

Allison, McKinley County, New Mexico

PROJECT NO.
EMNRD-MMD-2017-02

AUTHORIZED BY:

ABANDONED MINE LAND PROGRAM
MINING and MINERALS DIVISION
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
STATE OF NEW MEXICO

(with reclamation fees paid by the New Mexico Coal Industry)


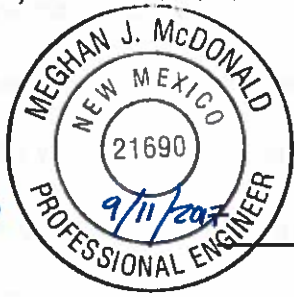

September 2017



00002 – CERTIFICATE PAGE

PROJECT NAME: Allison Emergency Project - Phase III
LOCATION: Allison, McKinley County, New Mexico
PROJECT NUMBER: EMNRD-MMD-2017-02
ENGINEER OF RECORD: Meghan J. McDonald, P.E.
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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.

		21690
_____ Meghan J. McDonald, P.E. (Project Engineer)		License No.
		9/11/2017
_____ Authorized Representative/Title Energy, Minerals and Natural Resources Department		Date

Susana Martinez, Governor

All questions about the meaning or intent of these documents shall be submitted only to the Engineer of Record, stated above, in writing.

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The following sections list the figures, statutes, and tables that are referenced in the Specifications and are incorporated herein by reference as if set out in their entirety.

I. FIGURES

The following figures may be found as an attachment:

- Figure 1: Title Sheet
- Figure 2: Site Location Map
- Figure 3: Geotechnical Borehole Location Map
- Figure 4: Cross Section
- Figure 5: Bulkhead Grouting Plan
- Figure 6: Compaction Grouting Plan

II. STATUTES

The following statutes may be referenced in the text:

- NMSA 1978, §§ 13-1-28 through 199: Procurement Code
- NMSA 1978, §§ 13- 4-1 through 30: Public Works Contracts
- NMSA 1978, §§ 13- 4-31 through 43: Subcontractors Fair Practices Act
- NMSA 1978, §§ 41-4-1 through 27: Tort Claims Act
- NMSA 1978, §§ 52-1-1 through 70: Workers' Compensation Act
- NMSA 1978, §§ 69-25B-1 through 12: Abandoned Mine Reclamation Act
- NMSA 1978, §§ 74-13-1, *et seq.*: Recycling and Illegal Dumping Act
- NMSA 1978, §§ 76-10-11 through 22: New Mexico Seed Law

III. TABLES

The following tables are referenced in the text:

- Table 1:** Seed Mix Table

IV. APPENDICES

The following appendices are referenced in the text:

- Appendix A:** Allison Phase II Emergency Project Geotechnical Investigation Report by Golder Associates Inc.

00130 – MANDATORY PRE-BI MEETING

A Mandatory Pre-Bid Meeting will be held as follows: **Mandatory**

DATE: **Friday September 22, 2017**

TIME: **11:30 AM**

LOCATION: **Intersection of Allison Road and Coronado Boulevard**
Allison, NM 87301

Take I-40 exit 20 toward Highway 491 in Gallup, New Mexico. Proceed north on Highway 491 and take first left at W Maloney Avenue. Travel west on W Maloney Avenue for 1.7 miles past the Wal-Mart until it intersects with Allison Road. Turn north on Allison Road and travel 0.3 miles to intersection of Allison Road and Coronado Boulevard. The meeting will be held at the locked gate next to the vacant field.

POINT OF CONTACT: Meghan J. McDonald, P.E.
Mobile Phone: (505) 629-9872
Meghan.McDonald@state.nm.us

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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.

01010 – SUMMARY OF WORK

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

Project Location

The Allison Emergency Project - Phase III is located near the intersection of Coronado Boulevard and Allison Road in the unincorporated community of Allison near Gallup, New Mexico, Section 18 of Township 15 North, Range 18 West (Figure 1). The project area is located within a privately-owned vacant field and in the backyards of private residences.

Project Description and Background

The AML Program, in partnership with the U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement (OSMRE), is responding to abate hazardous conditions caused by open subsidence features above an abandoned underground coal mine in Allison, New Mexico.

The existing subsidence features are located within a privately-owned vacant field and in the backyards of private residences. The subsidence features opened in 2016 and consist of a sinkhole approximately 30 feet long, 20 feet wide, and 4 feet deep; ground cracks greater than 36 inches wide; and piping holes (Figure 2).

Historical records show that the Allison Mine, a room and pillar underground coal mine, was operated from 1893 to 1939. With the room and pillar mining method, coal is mined in sections or “rooms” and some coal is left in place as “pillars” to support the ground above the mine. Two coal seams of the Gibson Coal Member were mined at Allison: the No.1 seam at an approximate depth of 85-95 feet and the No.2 seam at an approximate depth of 150-160 feet. The No. 1 seam appears to be the only coal seam mined at the location of the open subsidence features. The approximate location of the underground mine workings as determined from

historic records and project geotechnical investigations is shown on Figure 3.

The AML Program has performed work at the Allison site in the past. A drilling and grouting project was completed in the 1980's to stabilize residential structures experiencing what appeared to be mine-related foundation settlement. In 2016, the AML Program completed a Phase I Emergency Project to safeguard a 90-foot long, 45-foot wide, 20-foot deep sinkhole that suddenly opened near the backyards of residential structures. This sinkhole was located immediately east of the current onsite sinkhole (Figure 2).

The Phase I geotechnical investigation concluded that the sinkhole was likely caused by deterioration of underground mine workings below the sinkhole footprint; subsidence of alluvial soil above the mine workings; and erosion of alluvial soil into the underground mine workings. Phase I Emergency Project construction work consisted of excavation and removal of loose soil and debris from the original sinkhole, backfilling with rubblized concrete followed by a soil cover, and earthwork to reestablish the path of an existing drainage channel over the backfilled sinkhole. Reports from the Phase I Emergency Project may be obtained by contacting the AML Program Project Engineer.

Within several months after completion of the Phase I Emergency Project work, new subsidence features appeared at the project site. The AML Program contracted Golder Associates Inc. in February 2017 to perform a Phase II geotechnical investigation, assess subsurface conditions at the site, and provide recommendations for construction. Geotechnical borehole locations from the Phase II investigation are shown on Figure 3, and a subsurface cross section developed from the results is shown on Figure 4. The Phase II geotechnical investigation and report was completed in July 2017. The report is included in these Specifications as Appendix A.

Scope of Work

The AML Program developed the construction scope of work for the Phase III Emergency Project based on current conditions at the project site, historical mining information, and information obtained during the Phase I Emergency Project and Phase II Geotechnical Investigation. This scope of work is subject to change based on actual conditions encountered in the field. Scope modifications shall be initiated by the Project Engineer in writing. The Contractor shall not modify the project scope without prior written approval by the Project Engineer.

The Contractor shall complete the following tasks. **Construction sequence is critical for this project, and the Contractor shall perform the tasks in the following order:**

- 1) Mobilization (lump sum): Mobilize and demobilize all equipment, fees, fuel, insurance, bonding, labor, plans, permits, creation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), personnel, supervision and transportation to assemble, drive, operate, place, position, provide security measures for, and transport equipment, field

offices, fuel, implements, machinery, materials, and support facilities to and at the job site in conformance with the Project Manager's directives and the project Specifications. All trash, refuse, and waste shall be removed from the project site and disposed of accordingly, including drill cuttings and excess materials from drilling and grouting operations. All disturbed areas shall be restored to pre-construction condition as determined by the Project Engineer. 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. The cost for this task shall not exceed 10% of the total base bid.

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. Submit a draft of the HASP to the Project Engineer for review and comment at least two weeks prior to mobilization. Submit a final version of the HASP to the Project Engineer one week prior to beginning work on the project site. A copy of the final HASP shall be kept on-site by the Contractor for the duration of the work.

- 2) Remove Existing Safety Fence and Section of Damaged Residential Fence (lump sum): remove approximately 1,200 linear feet of existing high-density polyethylene (HDPE) high-visibility safety fence, fence posts, and gates surrounding the existing sinkhole. Remove a section of damaged residential fence. Dispose of material at an appropriately licensed landfill or recycling facility.
- 3) Site Clearing and Grubbing (3 acres): Clear and grub vegetation and debris as required for equipment access and equipment staging, estimated as approximately three acres. Dispose of cleared and grubbed material at an appropriate licensed landfill or green waste facility. On-site scrap metal that is owned by the private landowner will be identified by the Project Manager. The Contractor shall relocate the scrap metal to a location determined by the Project Manager.
- 4) Construct Bulkhead in Mine Workings (2,700 linear feet of drilling and casing, 520 cubic yards of grout): Establish a 72-foot-long bulkhead in the mine drift using fourteen (14) primary drilled and cased boreholes and up to thirteen (13) secondary drilled and cased boreholes to grout the partially collapsed and filled underground mine workings. Boreholes shall be spaced on an approximate 10 foot by 10 foot grid and shall be drilled to at an approximate depth of 85 to 95 feet below the ground surface. Bulkhead grout hole locations are shown on Figure 5. Approximately 2,700 linear feet of drilling and casing will be required for this task. The estimated volume of grout to construct the bulkhead is 520 cubic yards (CY) (400 CY + 30% contingency).

Boreholes shall be drilled through the mine workings horizon (as determined by the on-

site engineer at each hole location) and five feet into the floor below the workings. Casing shall initially be set three feet above the final depth of the hole for the initial grout stage. After grouting the initial stage, the casing will be pulled up in three foot intervals for each successive stage. The Contractor shall continue to increment grout stages until the casing is at least five feet above the mine workings. Contractor should note that timbers were used to support the mine workings and that pieces of wood were recovered during the exploratory core drilling; Contractor should expect to encounter timbers in various states of degradation during drilling. Grouting shall be within the limits indicated on the project plans to meet the acceptance criteria presented in Section 03020 of these Specifications.

The actual number and spacing of grout borings may be modified by the Project Engineer depending on conditions encountered during the work.

- 5) Excavate Loose Soil within Sinkhole (lump sum): Excavate loose soil from the base and sidewalls of the 30 feet long, 20 feet wide, and 4 feet deep sinkhole to an approximate depth of 15 feet below existing grades. Soil to be excavated is classified as OSHA Type C. Maximum allowable side slopes (Horizontal: Vertical) shall be 1½ H: 1V. All excavation work shall be consistent with OSHA 29 CFR 1926 Subpart P regulations. After excavation, the bottom of the sinkhole shall be compacted as practicable using an excavator bucket or similar. Excavated soil may be stockpiled for later use as backfill or topsoil substitute.
- 6) Excavate Ground Cracks and Piping Holes (800 linear feet): Excavate approximately 800 (625+ 28% contingency) linear feet (measured in plan view) of soil from ground cracks and piping holes to an approximate depth of 6 to 15 feet below existing grades, and to the satisfaction of the Project Engineer. Excavated soil may be stockpiled for later use as backfill or topsoil substitute. All excavation work shall be monitored by an archaeologist contracted through the AML Program.
- 7) Backfill Sinkhole, Ground Cracks, and Piping Holes (1300 cubic yards): Backfill the excavated sinkhole, ground cracks, and piping holes with approximately 1300 CY (1000 CY +30% contingency) of on-site soils obtained during excavation. If on-site soil quantities are insufficient for backfill to pre-existing grades, imported non-organic general fill may be used after approval by the Project Engineer. The fill source shall be identified and imported by the Contractor. Backfill shall be placed at a maximum two foot lifts (loose measure) and compacted to at least 85% maximum dry density (ASTM D698).
- 8) Compaction Grout Loose Soils (11,900 linear feet of drilling and casing, 2,700 cubic yards of grout): Compaction grout the loose/soft soils above the mine workings and around sinkhole, on an approximate 12 foot by 12 foot grid, at grout intervals from 20 to 100 feet below the ground surface (may vary per hole, as determined by the on-site engineer). The grouted interval within each hole will vary from 40 feet to 80 feet thick

due to the variable thickness of the alluvium and depth to bedrock. The work will begin in the area of the sinkholes (Zone 1) after the excavating and backfilling tasks (Tasks 4, 5, and 6) have been completed. The residential areas (Zone 2) will be completed next, and the non-residential areas to the north and south of the sinkholes (Zone 3) will be the final area of compaction grout work. The work areas and zones are shown on Figure 6. The full areal extent of compaction grouting will be determined by the on-site engineer based on soil stiffness and grout take during the drilling and grouting process. It is estimated that up to 170 holes and 2250 to 2700 CY of grout will be needed to complete the work in all zones.

The Contractor shall be prepared to drill angled borings due to physical site constraints. Approximately 20 feet of rubblized concrete fill was previously used to backfill a sinkhole approximately 90 feet long by 45 feet wide by 20 feet deep during the Emergency Phase I project. The approximate location of the backfilled sinkhole is shown on Figures 2 and 3. The rubblized concrete is generally 12 to 36 inches in diameter and contains reinforcing steel. The Contractor shall be prepared to advance borings through this material, or drill angled borings to place grout below the backfill while avoiding drilling through the fill material.

The actual number and spacing of grout borings, and the depth of grouting, may be modified by the Project Engineer depending on conditions encountered during the work.

- 9) Re-establish Drainage Channel (lump sum): Re-establish positive drainage in approximately 280 linear feet (220 linear feet + 30% contingency) of the existing drainage channel. Perform earthwork to establish pre-existing drainage channel and berm geometry. Reconstruct approximately 80 linear feet (60 linear feet + 30% contingency) of earthen berm adjacent to the drainage channel with 145 CY (110 CY + 30% contingency) of fill.

Native onsite soils excavated for this project may be used for earthwork. If on-site soil quantities are insufficient for backfill, imported non-organic general fill may be used after approval by the Project Engineer. Request for approval of imported backfill material shall be submitted a minimum of one week prior to importing the material to the site. The fill source shall be identified and imported by the Contractor. Excess soil remaining after earthwork is completed shall be spread uniformly at areas designated by the Project Manager. Fill shall be placed at a maximum one foot lifts (loose measure) and compacted to at least 90% maximum dry density (ASTM D698). All excavation work shall be monitored by an archaeologist contracted through the AML Program.

- 10) Construct Section of Permanent Fence (100 linear feet): Construct approximately 100 linear feet of chain-link fence along a residential property line adjacent to the drainage channel. Tie into an existing chain-link fence to either side of the property. The chain-link fence shall be six (6) feet tall and fence posts shall be spaced every 10 feet. All fencing shall meet the requirements of the project Specifications.

- 11) Seedbed Preparation, Seeding, and Mulching (3 acres): Prepare topsoil cover to establish a seed bed, seed, and mulch. All materials and methods shall comply with the project Specifications.

01011 – SUMMARY OF PROJECT AND CONSTRUCTION ACCESS

The project consist of drilling, grouting, and earthwork to safeguard hazards caused by on-site subsidence features which are dangerous to the public at large.

Surface disturbance caused by the project’s activities shall be minimized to the maximum extent practicable. The Contractor shall use the access paths as delineated by AML staff and shall avoid all marked archaeological avoidance areas.

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

01012 – AVOIDANCE AREAS FOR PRESERVATION OF CULTURAL RESOURCES

The Contractor shall avoid all cultural 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.

Avoidance areas extend up to 50 feet (15 meters) from the designated cultural resources, unless otherwise indicated and except where these limits are logistically impracticable to complete construction activities. Where it is infeasible to complete construction activities, avoidance area distances and access may be adjusted, in coordination with AML cultural resource staff, to accommodate construction activities. The Contractor shall also coordinate with the Project Manager and AML cultural resource staff for access routes to be taken around designated avoidance areas to construction work sites. Disturbance adjacent to designated avoidance areas shall be minimized as practicable.

The Project Manager or Project Engineer may designate additional avoidance areas as deemed necessary. No construction disturbances including excavation, fill, stockpiling of construction materials, staging, etc. shall take place within designated avoidance areas.

When the Contractor is working near designated avoidance areas and where construction access routes pass next to these locations, the Contractor shall place four-foot high, temporary, high-visibility barrier fencing (Hi-Vis, ADPI, or equivalent) around the features. Barrier fencing shall be removed upon completion of work.

The Contractor shall bear all direct, indirect, and consequential costs of mitigation or repairs due to unauthorized damage caused by the Contractor’s operations to cultural resources within designated avoidance areas. 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. Moving, removal or collecting of archaeological or historic materials or biological specimens from the project area or vicinity is prohibited. If the Contractor encounters a previously unidentified archaeological site, historic site, artifacts, or species listed as or proposed to be listed as threatened or endangered, the Contractor shall terminate all operation in that immediate area (100 foot radius, 30 meters) until the archaeological or biological preservation agencies have been notified and had the opportunity to assess the discovery 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.

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.

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:

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.

I. 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 price 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, creation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), personnel, supervision and transportation to assemble, drive, operate, place, position, provide security measures for, and transport equipment, field offices, fuel, implements, machinery, materials, 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 within the project area.

B. Remove Existing Safety Fence and Section of Damaged Residential Fence

Payment for removing the existing safety fence, safety gates, and a section of damaged residential fencing will be made at the lump sum price bid therefor in the Bid Form. This price shall include all costs associated with completing the work in accordance with the Specifications. This work shall include removal of the existing HDPE temporary fence, fence posts, and gates; removal of a section of damaged residential fencing; backfill at extracted fence post locations; disposal of fencing material at an appropriately licensed landfill or recycling at an appropriately licensed recycling center; materials and installation of a new chain link fence, including fence post driving and fence tying; and including all equipment, labor, material, and

supervision costs necessary to complete the work associated with this bid item according to the Specifications

C. Excavate Loose Soil Within Sinkhole

Payment for excavating loose soil within the existing sinkhole will be made at the lump sum price bid therefor in the Bid Form. This price shall include all work necessary to complete the excavation in accordance with the Specifications. This work shall include the tasks necessary to access the sinkhole; excavation, transportation, and stockpiling of excavated material; and including all equipment, labor, material, and supervision costs necessary to complete excavation according to the Specifications. This item does not include clearing and grubbing which is included on a separate bid item.

D. Reestablish Drainage Channel

Payment for reestablishing the drainage channel will be made at the lump sum price bid listed in the Bid Form. This price shall include all work necessary to reestablish the drainage channel within the project limits in accordance with the Specifications. This work shall include the tasks necessary to access the drainage channel, including clearing as necessary; all earthwork including excavation, transportation of material, backfilling, and compaction; and including all equipment, labor, material, and supervision costs necessary to complete the work associated with this bid item according to the Specifications.

II. Unit Prices

The methods of measurement and the basis of payment of unit prices as outlined in the Bid Form are as follows:

A. Site Clearing and Grubbing

Measurement for payment for clearing and grubbing will be made by the acre cleared and grubbed. Payment for this item will be made at the unit price per acre bid listed in the Bid Form. This price shall include all work necessary for site access, equipment used for clearing and grubbing, removal of vegetation and on-site debris, disposal of cleared and grubbed material at an appropriately licensed landfill or green waste facility, and all labor, material and supervision costs necessary to perform the work associated with this bid item.

B. Construct Bulkhead in Mine Workings: Drilling and Casing

Measurement for payment for drilling and casing to construct a bulkhead in mine workings will be made by the linear foot drilled and cased. Payment for this item will be made at the unit price per linear foot listed in the Bid Form. This price shall include all work necessary to complete drilling and casing in preparation for bulkhead construction in accordance with the

drawings and Specifications, including site access and preparation, layout of grout injection locations and installation of the grout casings required under the Contractor-proposed grout injection point layout scheme, vertical and angled drilling as required, installation of casing, pulling of casing after construction is complete, materials including casing, water, and all equipment, labor, material and supervision costs necessary to perform the work associated with this bid item. This item does not include grout which is covered under a different bid item.

C. Construct Bulkhead in Mine Workings: Grouting

Measurement for payment for grouting to construct a bulkhead in mine workings will be made by the cubic yard of grout installed. Payment for this item will be made at the unit price per cubic yard listed in the Bid Form. This price shall include all work necessary to inject grout for bulkhead construction in accordance with the drawings and Specifications, including site access and preparation; materials including grout (including all fine aggregate, fines, cementitious material, and water), grout injection equipment, flush and waste water runoff controls; monitoring grout injection rates, pumping pressures, grout takes, and surface ground movement; materials testing; and all equipment, labor, material and supervision costs necessary to perform the work associated with this bid item. This item does not include drilling and casing which is covered under a different bid item.

D. Excavate Ground Cracks and Piping Holes

Measurement for payment to excavate ground cracks and piping holes will be made by the linear foot (measured in plan-view) of excavation performed. This price shall include all work necessary to complete the excavation in accordance with the Specifications. This work shall include the tasks necessary to access the ground cracks and piping holes; excavation, transportation, and stockpiling of excavated material; and including all equipment, labor, material, and supervision costs necessary to complete excavation according to the Specifications. This item does not include clearing and grubbing which is included on a separate bid item.

E. Backfill Sinkhole, Ground Cracks, and Piping Holes

Measurement for payment to backfill the excavated sinkhole, ground cracks, and piping holes will be made by the cubic yard of backfill performed. This price shall include all work necessary to complete backfilling in accordance with the Specifications. This work shall include the tasks necessary to access the sinkhole, ground cracks, and piping holes; importing of general fill material to the site as required; transportation, backfilling, and compaction of backfilled material; and including all equipment, labor, material (including on-site backfill material and imported backfill material, as required), and supervision costs necessary to complete backfill according to the Specifications. This item does not include excavation, clearing or grubbing which is included as separate bid items.

F. Compaction Grout Loose Soils: Drilling and Casing

Measurement for payment for drilling and casing to compaction grout loose soils will be made by the linear foot drilled and cased. Payment for this item will be made at the unit price per linear foot listed in the Bid Form. This price shall include all work necessary to complete drilling and casing in preparation for compaction grouting in accordance with the drawings and Specifications, including site access and preparation, layout of grout injection locations and installation of the grout casings required under the Contractor-proposed grout injection point layout scheme, vertical and angled drilling as required, installation of casing, pulling of casing after construction is complete, materials including casing, water, and all equipment, labor, material and supervision costs necessary to perform the work associated with this bid item. This item does not include grout which is covered under a different bid item.

G. Compaction Grout Loose Soils: Grouting

Measurement for payment for grouting to compaction grout loose soils will be made by the cubic yard of grout installed. Payment for this item will be made at the unit price per cubic yard listed in the Bid Form. This price shall include all work necessary to inject compaction grout in accordance with the drawings and Specifications, including site access and preparation; materials including grout (including all fine aggregate, fines, cementitious material, and water), grout injection equipment, flush and waste water runoff controls; monitoring grout injection rates, pumping pressures, grout takes, and surface ground movement; materials testing; and all equipment, labor, material and supervision costs necessary to perform the work associated with this bid item. This item does not include drilling and casing which is covered under a different bid item.

H. Construct Section of Permanent Fence

Measurement for payment for constructing a section of permanent fencing will be made per linear foot, as measured in the field.

Payment for construction of a permanent fence will be made at the unit price bid therefor in the Bid Form. This price shall include all costs associated with completing the work in accordance with the Specifications. This work shall include materials and installation of a new chain link fence, including fence post driving and fence tying; tying the newly-constructed fence into adjacent residential fencing; and including all equipment, labor, material, and supervision costs necessary to complete the work associated with this bid item according to the Specifications.

I. Seedbed Preparation, Seeding, and Mulching

Measurement for payment for seedbed preparation, seeding and mulching will be made by the acre, as measured in the field, parallel to the prepared, seeded, and mulched surface using methods acceptable to the Project Engineer.

Payment for seedbed preparation, seeding, and mulching will be made at the unit price bid therefor in the Bid Form. This price shall include soil preparation including tilling, topdressing, incorporating specified soil amendments, and seeding, staging bales, mulching, and all equipment, labor, material and supervision costs necessary to complete installation, of all areas disturbed by construction activities.

Disturbed areas include on-site borrow areas, backfilled areas, temporary access routes and obliterated roads, areas occupied by the Contractor for office, plant sites, equipment parking, haul roads, closed access trails, stockpile and storage areas, service areas and areas stripped of native covering.

01030 – ALTERNATES

Whenever equipment or materials are specified or described in the Specifications 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 the 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 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 he they have any 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 - Duties, Responsibilities and Limitations of Authority of the Project Manager

A. General

The Project Manager is the EMNRD employee who monitors construction, who acts as directed by and under the supervision of the Project Engineer, and who will confer with the Project Engineer regarding project actions. The Project Manager's dealings in matters pertaining to the on-site work shall in general be only with the Project Engineer and the Contractor, and dealings with subcontractors shall only be through or with the full knowledge of the Contractor. Written communication with EMNRD will be through or as directed by the Project Engineer.

B. Duties and Responsibilities.

The Project Manager will:

1. Schedules: Review the progress schedule prepared by the Contractor and consult with the Project Engineer concerning acceptability.
2. Conferences: Attend preconstruction conferences, progress meetings, job conferences as required in consultation with the Project Engineer, and other project related meetings.
3. Liaison: Serve as the Project Engineer's liaison with the Contractor, working principally through the Contractor's superintendent and assist the superintendent in

understanding the intent of the Contract Documents.

4. Shop Drawings and Samples:

- a. Receive and record date of receipt of shop drawings and samples, receive samples that are furnished at the site by the Contractor, and notify the Project Engineer of their availability for examination.
- b. Advise the Project Engineer and the Contractor or its superintendent immediately of the commencement of any work requiring a shop drawing or sample submission if the Project Engineer has not accepted the submission.

5. Review of Work, Rejection of Defective Work, Inspections and Tests:

- a. Conduct on-site observations of the work in progress to assist the Project Engineer in determining if the work is proceeding in accordance with the Contract Documents, and that completed work will conform to the Contract Documents.
- b. Report to the Project Engineer whenever the Project Manager believes that any work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or does not meet the requirements of any inspections, tests or approvals required to be made, or has been damaged prior to final payment; and advise the Project Engineer when the Project Manager believes work should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.
- c. Verify that tests, equipment and systems startups and operating and maintenance instructions are conducted as required by the Contract Documents and in presence of the required personnel, and that the Contractor maintains adequate records thereof; observe, record and report to the Project Engineer appropriate details relative to the test procedures and startups.
- d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to the Project Engineer.

6. Interpretation of Contract Documents: Transmit to Contractor the Project Engineer's clarifications and interpretations of the Contract Documents.

7. Modifications: Consider and evaluate the Contractor's suggestions for modifications in drawings or Specifications and report them with recommendations to the Project Engineer.

8. Records:
 - a. Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and samples submissions, reproductions of original Contract Documents including all addenda, change orders, field orders, additional drawings issued subsequent to the execution of the Contract, the Project Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.
 - b. Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions, list of visiting officials and representatives of manufacturers, fabricators, suppliers and distributors, daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures. Send copies to the Project Engineer.
 - c. Record names, addresses and telephone numbers of all the Contractors, subcontractors and major suppliers of materials and equipment.
9. Reports:
 - a. Furnish the Project Engineer periodic reports as required of progress of the work and the Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions.
 - b. Consult with the Project Engineer in advance of scheduled major tests, inspections or start of important phases of the work.
 - c. Report immediately to the Project Engineer upon the occurrence of any accident.
10. Payment Requisitions: Review Applications for Payment with the Contractor for compliance with the established procedure for their submission and forward them with recommendations to the Project Engineer, noting particularly their relation to the schedule of values, work completed and materials and equipment delivered at the site but not incorporated in the work.
11. Certificates, Maintenance and Operation manuals: During the course of the work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by the Contractor are applicable to the items actually installed; and deliver this material to the Project Engineer for review prior to final acceptance of the work.
12. Completion:
 - a. Before the Contractor issues written certification to the Project Engineer that the

- project is complete, submit to the Contractor a pre-final list of observed items requiring completion or correction.
- b. Conduct final inspection in the company of the Project Engineer and the Contractor and prepare a final list of items to be completed or corrected.
 - c. Verify that all items on final list have been completed or corrected and make recommendations to the Project Engineer concerning acceptance.
- C. Limitations of Authority.

Except upon written instructions of the Project Engineer and notification to the Contractor, the Project Manager:

- A. Shall not authorize any deviation from the Contract Documents or approve any substitute materials or equipment.
- B. Shall not exceed limitations on the Project Engineer's authority as set forth in the Contract Documents.
- C. Shall not undertake any of the responsibilities of the Contractor, subcontractors or the Contractor's superintendent, or expedite the work.
- D. Shall not issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.
- E. Shall not issue directions as to safety precautions and programs in connection with the work.
- F. Shall not participate in specialized field or laboratory test, unless such is specifically called for in the Contract Documents.
- G. Shall not receive any materials, supplies, equipment, etc. on behalf of the Contractor.

01043 – 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.

01044 – 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.

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:

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| 1. AASHTO | American Association of State Highway and Transportation Officials |
| 2. ACI | American Concrete Institute |
| 3. AML | Abandoned Mine Land Program of MMD |
| 4. ANSI | American National Standards Institute |
| 5. ASTM | American Society for Testing and Materials |
| 6. AWS | American Welding Society |
| 7. CRSI | Concrete Reinforcing Steel Institute |
| 8. EMNRD | Energy, Minerals, and Natural Resources Department (state) |
| 9. MMD | Mining and Minerals Division of EMNRD |
| 10. OSMRE | Office of Surface Mining, Reclamation, and Enforcement (federal) |
| 11. SAE | Society of Automotive Engineers |

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):

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| 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. |

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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. compaction grout A material blend of fine aggregate, fines, cementitious material and water to achieve a pumpable, viscous grout of a low slump to enable pumping at high pressure and remain intact after injection. Material components can include sand, silt, clay, cement, ground slag, flyash, water and other ingredients. Strength of grout is designed only to be greater than existing strengthened soil conditions.
 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. slope An inclined mine entrance from the surface.
19. stope An excavation in which ore has been excavated in a series of steps.
20. stull A timber prop set between the walls of a stope, or supporting the mine roof.
21. subsidence A sinking down of a part of the earth's crust.
22. talus A heap of coarse rock waste at the foot of a cliff.
23. tipple Originally the place where the mine cars were tipped and emptied of their coal, 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.
24. 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.

01135 - HAZARDOUS AND CONFINED AREA PROCEDURES

This project requires construction work in, around, and over open subsidence features (sinkholes, ground cracks and holes) associated with abandoned underground mine workings. Additional hazardous and unprotected openings to mine workings (shafts, adits, slopes) may be present at the project site and 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 submit documentation of an established Occupational Health and Safety Program to the Project Engineer prior to bidding on the project.

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 Occupational Safety and Health Administration (OSHA) standards and 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. The Contractor shall submit a draft of the HASP to

the Project Engineer for review and comment. The Contractor shall finalize the HASP and submit a final copy to the Project Engineer prior to beginning work on the project site.

The Contractor shall be responsible for thoroughly investigating the site conditions and scheduling equipment, equipment operations, personnel, and safety procedures to prevent accidents and injuries. The Contractor shall follow appropriate procedures in accordance with Occupational Safety and Health Administration (OSHA) regulations. The Contractor shall designate a site safety officer for each shift. The site safety officer shall be present on-site while work is performed. The site safety officer shall be CPR/First Aid trained and certified and shall conduct daily safety tailgate meetings at the start of each shift. Safety incidents shall be reported to the Project Manager as soon as is practicable.

The Contractor shall monitor for the presence of hazardous gasses and low oxygen levels when drilling into underground mine workings. At a minimum, the Contractor shall monitor levels of oxygen (O₂), carbon monoxide (CO), hydrogen sulfide (H₂S), and lower explosive limit (LEL). Proper ventilation shall be provided by the Contractor as required. The Contractor shall review with workers and personnel under their supervision the use of hazardous chemicals or materials, electrical power, or internal combustion engines in areas that may have toxic gasses and low oxygen levels for safety precautions and procedures.

The Contractor is fully responsible for construction safety and shall keep the Project Manager informed of the Contractor's 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 and workings can allow carbon dioxide (CO₂), carbon monoxide (CO), methane (CH₄), hydrogen sulfide (H₂S), or radon gas to accumulate. These gases are treacherous inside mine openings and workings and even experienced miners have been killed or harmed by entering or drilling into areas containing them. Carbon monoxide cannot be readily detected and is lethal in very small amounts. The Contractor shall follow the following and other appropriate hazardous bad air procedures.

The Contractor shall use a multi-gas meter to monitor for bad air during drilling activities and at top of open boreholes. The multi-gas meter shall be a Honeywell MicroRAE meter or equivalent. The meter shall continuously monitor oxygen (O₂), carbon monoxide (CO), hydrogen sulfide (H₂S), and lower explosive limit (LEL) levels and have an audible warning signal. Monitoring shall be continuously performed during drilling activities, and the monitor shall be placed at worker breathing levels. Monitoring shall also be performed at the beginning, middle, and end of each shift at top of open boreholes. If multi-meters detect unsafe gas levels or low oxygen levels, all personnel shall withdraw from the working area and contact the Site Safety Officer and Project Manager. Work shall not resume until the Site Safety Officer evaluates site safety conditions and clears the area for work.

II. Subsidence Feature Cave-In

The edges of subsidence features (sinkholes, ground cracks, ground holes) contain loose soil and/or fractured and weathered rock that can quickly give way. With the additional weight and vibration of construction machinery, workers, and backfilling operations near the subsidence feature openings, the area around the features can slide into the opening, along with nearby machinery and workers. The Contractor shall determine a safe minimum set-back distance between equipment/personnel and subsidence features. This distance shall be communicated to all personnel on-site and shall be strictly enforced by the Contractor.

The walls of the subsidence features are largely composed of loose silty to clayey soils and present a serious risk for sidewall collapse. No workers or personnel shall enter subsidence features. All work shall be performed from above subsidence features, and the Contractor shall follow appropriate cave-in protection procedures.

III. Falling

Subsidence features and nearby abandoned mine shafts, stopes, and winzes present serious falling hazards. These features are deep enough that anyone that falls down them can be badly injured or killed. Rescue operations of a fallen person can also be extremely hazardous.

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.

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 C.F.R., Part 702799. Additionally, any release of toxic substances (leaks, spills, etc.) greater than the reportable quantity established by 40 C.F.R., 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. The Project Manager, the Project Engineer, the Contractor, the Contractor's superintendent, and other persons as appropriate shall be present at the conference. 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. The Contractor shall keep the Project Manager and Project Engineer well informed of the schedule of work throughout the life of the project.

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. Requests for schedule deviations shall be submitted in writing to the Project Manager for review and approval.

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 and 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.

01340 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

The Contractor shall submit shop drawings, product data, and samples as required in the Specifications. A project submittal cover sheet shall be completed by the Contractor and attached to the front of all Submittals. 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, correction and resubmission, and final review. Shorter periods for 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 thereon 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, that the Contractor has coordinated the subject of the submittal with other portions of the Work, and that the Contractor 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

The Contractor may provide periodic construction photographs in electronic format 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 test type and frequency are included in the Specifications. 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 ten working days after receipt via certified mail or e-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. All heavy equipment shall be washed with a high pressure washer to remove any possible noxious weed seed prior to arrival in the project area. 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. The facility shall be installed on the project site in a location removed from the immediate contract work area. The facility shall be locked to prevent unauthorized access during the times work is not conducted. 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.

Before beginning work, the Contractor shall 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 the branch collar to remove broken limbs where minor damage has occurred.

II. Wildlife Protection

At or before the mandatory pre-construction conference, the Contractor shall submit a construction schedule, which must include anticipated dates of closures for specific mine features, in accordance with Section 01310. Pending review of this schedule by AML Program staff, the AML Program Project Engineer will provide authorization to proceed on the closure of mine features that require wildlife protection measures, to include but not limited to: netting, tarping and/or smoke bombing. It is the Contractor's responsibility to obtain this authorization as soon as possible. Pending approval of this schedule, any deviations shall be coordinated with AML Program staff a minimum of seven working days before closure of the feature. The Contractor's failure to follow this procedure may result in project suspension at the Contractor's expense until AML Program staff can evaluate the situation and coordinate with the necessary federal and/or state regulatory agencies.

Birds

Because construction is scheduled to commence during the migratory bird season (March 15 to September 15), a preconstruction nesting bird survey is required. Contractor shall contact the AML Program Project Engineer at least one month prior to commencement of construction to coordinate this survey. The Contractor shall comply with the requirements of the Migratory Bird Treaty Act, the U.S. Fish and Wildlife Service (USFWS), and shall not cause harm or harassment to migratory birds.

If occupied nests are found, they must be avoided until the young have fledged. If nest avoidance is not feasible and relocation must occur, the project shall be placed on suspension while the AML Program coordinates with USFWS for a permit. If the USFWS denies the relocation permit request, the project suspension shall continue until after the migratory bird nesting seasons ends, or after all young have left nest.

Other Wildlife

Should other wildlife not previously identified and requiring protection measures be observed within the project boundaries and/or impacted by project actions, the Contractor shall

comply with any instruction provided by the AML Program Project Engineer. This could include but is not limited to a temporary suspension of work while the AML program staff evaluates the situation and coordinates with the necessary federal and/or state regulatory agencies coordinate with the necessary federal and/or state regulatory agencies.

All area wildlife, including bats and owls, that may use the mine features are protected, and this hazard abatement effort shall not adversely affect them. Harming or disturbing wildlife is prohibited.

01535 - PROTECTION OF INSTALLED WORK

The Contractor shall protect installed work and control traffic in the immediate area to prevent damage from subsequent operations.

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.

01550 – ACCESS ROADS, PARKING AREAS AND STAGING AREAS

Surface disturbance caused by the project's activities shall be minimized to the maximum extent practicable. 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. The Project Engineer will identify a staging and parking area during the mandatory pre-bid meeting which shall be used by the Contractor for all storage needs. Trips to and from the staging area and work sites shall be minimized to the maximum extent practicable.

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 trucks equipped with spray bars 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.

01563 – EROSION AND SEDIMENT CONTROL

The following sections describe the erosion and sediment control to be performed under this contract.

The Contractor shall take measures to control erosion and subsequent sediment carried off the project sites and access roads due to construction activities. These controls shall be included in the Storm Water Pollution Prevention Plan (SWPPP) to be developed by the Contractor in accordance guidelines given by the U.S. Environmental Protection Agency. Sediment control measures shall be placed wherever soil disturbed by construction could erode and be carried beyond the limits of construction. These areas include areas disturbed by construction activities, temporary access and haul roads, and temporary earth stockpiles.

Erosion and sediment control measures shall be placed as grading and earthmoving operations progress. The operation shall not progress at a distance further than the distance that sediment control installations can be placed by the end of daily operations. Areas of surface disturbance shall be kept to a practicable minimum.

Unless temporarily demobilized from the project area due to specified seasonal limitations, the Contractor shall inspect the erosion and sediment control features at least biweekly and within 24 hours of each rainfall. The Contractor shall repair any erosion and sediment control feature within seven days following the inspection during which damage is noted or following notification by the Project Manager that repairs are required. Repairs shall be

initiated within 24 hours of damage occurring to erosion control features that could result in a discharge of sediment into a stream, arroyo or water impoundment.

All erosion and sediment control measures shall be maintained by cleaning or replacement as needed, or as directed by the Project Manager. These measures shall be fully effective for the purpose intended until permanent erosion control measures are in place and operational. Temporary erosion and sediment control features shall remain in place after construction operations are completed, unless otherwise designated in the contract, and shall be maintained until the date of final acceptance of 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.

Examples of resources and procedures might be:

1. Maintain adequate fire extinguishers, water tanks, sprayers, and other equipment at the work site that would enable personnel to immediately extinguish any accidental ignition.
2. Have personnel observe the work area while welders or cutters are operating (welders or cutters cannot see where the sparks are falling when under welding/cutting hoods).

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

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. 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.

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 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 (Section 00001). 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.

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. The Project Manager and Project Engineer shall review the records for completeness. All records requested by the Project Manager and Project Engineer must be received before project closeout.

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. 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

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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

Debris consisting of barbed wire, fence posts, empty drums, metal, and trash shall be removed as directed by the Project Manager and shall be properly disposed of at the Contractor's expense at an appropriate licensed landfill or recycling facility. All specified or established avoidance areas marked by AML Staff shall be avoided.

02100 – SITE PREPARATION

02110 - SITE CLEARING AND GRUBBING

This work shall consist of clearing, grubbing, trimming, removing and disposing of vegetation and debris as required for equipment access and equipment staging, in accordance with these Specifications. This work shall also include the preservation from damage or defacement of all vegetation and items designated to remain.

The Contractor shall mark the limits of areas to be cleared and grubbed by means of stakes, flags, or other suitable methods. The Contractor shall notify the AML Program or its agent(s) at least 5 days prior to any clearing and grubbing operations within such limits. No clearing and grubbing shall begin without the authorization of the AML Program or its agent(s).

Within construction limits for earthwork, all surface debris, roots, stumps, trees, and other objectionable protruding obstructions shall be cleared with the Project Manager's concurrence. Any voids or holes in the subgrade resulting from the removal of unsuitable materials shall be backfilled and compacted in accordance with the Specifications. Cleared and grubbed material shall be disposed at an appropriately licensed landfill or green waste facility.

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

The Contractor shall reestablish positive drainage in approximately 280 linear feet (220 linear feet + 30% contingency) of the existing drainage channel and grade to establish pre-existing drainage channel geometry. Regrading shall be performed on project areas outside of the drainage channel to establish original contours. Grading shall not direct storm water onto residential areas, identified cultural resource or endangered plant areas.

02220 - EXCAVATING, BACKFILLING, AND COMPACTING

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

02222 - EXCAVATION

Loose soils at subsidence features (sinkhole, ground cracks, and piping holes) shall be excavated as follows:

Sinkhole: The Contractor shall excavate loose soil from the base and sidewalls of the 30 feet long, 20 feet wide, and 4 feet deep sinkhole to an approximate depth of 15 feet below existing grades. Soils to be excavated are classified as Type C, maximum allowable side slopes (Horizontal: Vertical) shall be 1½ H: 1V; all excavation work shall be consistent with OSHA 29 CFR 1926 Subpart P regulations. After excavation, the bottom of the sinkhole shall be compacted as practicable using an excavator bucket or similar. Excavated soil may be stockpiled for later use as backfill.

Ground Cracks and Piping Holes: Excavate approximately 800 (625+ 28% contingency) linear feet of ground cracks and piping holes to an approximate depth of 6 to 15 feet below existing grades, and to the satisfaction of the Project Engineer. Excavated soil may be stockpiled for later use as backfill.

The Contractor shall consider the hazardous project conditions when selecting excavation equipment. Excavation equipment shall be sized to achieve the specified minimum excavation depth while maintaining a safe setback distance from open mine and subsidence features. A representative of the AML Program shall be present for all excavations performed at the project site.

The Contractor is responsible for design, construction, and safety of all excavations. It is the Contractor's responsibility to assess the actual ground conditions in the field at the time of construction and to make its own interpretation of the OSHA soil/rock type for design of the excavation and trench slopes.

All excavation work shall be monitored by an archaeologist contracted through the AML Program.

02223 – SUBGRADE PREPARATION

After all clearing, grubbing, grading, and excavation operations are complete, exposed subgrade soils in areas to receive fill should be scarified to a minimum depth of 8 inches, moisture conditioned, and compacted in accordance with the recommendations presented below. Moisture conditioning of subgrade soils, as well as fill soils, may include drying of soils or the addition of water.

02224 – BACKFILL AND COMPACTION

Backfill the excavated sinkhole, ground cracks, and piping holes with approximately 1300 CY (1000 CY +30% contingency) of on-site soils obtained during excavation. If on-site soil quantities are insufficient for backfill to pre-existing grades, imported non-organic general fill may be used after approval by the Project Engineer. The fill source shall be identified and imported by the Contractor. Backfill shall be placed at a maximum two foot lifts (loose measure) and compacted to at least 85% maximum dry density (ASTM D698).

Backfill equipment shall be sized to reach the bottom of excavated subsidence features while maintaining a safe setback distance from the subsidence features. Backfill within subsidence features shall be compacted using the bottom of the excavator bucket to the satisfaction of the Project Engineer. Backfill near the existing ground surface shall be accomplished using multiple passes of heavy equipment. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that vibrations do not damage nearby structures or underground mine voids.

02225 – ADDITIONAL EARTHWORK

Perform earthwork to establish pre-existing drainage channel geometry. Reconstruct approximately 80 linear feet (60 linear feet + 30% contingency) of earthen berm adjacent to the drainage channel 145 CY (110 CY + 30 % contingency). Native onsite soils excavated for this project may be used for earthwork. If on-site soil quantities are insufficient for backfill, imported non-organic general fill may be used after approval by the Project Engineer. The fill source shall be identified and imported by the Contractor. Excess soil remaining after earthwork is completed shall be spread uniformly at areas designated by the Project Manager. Fill shall be placed at a maximum one foot lifts (loose measure) and compacted to at least 90% maximum dry density (ASTM D698).

02226 – BACKFILL MATERIAL

Backfill material shall consist of native on-site soils excavated from existing subsidence features. The fill material should be free of frozen soil, root mat material, organic and deleterious

matter, and rock particles larger than 1 inch and large pieces of cemented soils. Some blending of soils and removal of debris may be required to achieve a uniform soil consistency.

If additional imported fill soils are required, the Contractor shall identify the fill source and ensure that federal and state regulations are met when obtaining fill. The Contractor shall notify the Project Engineer of the material source prior to delivery to the project. The Project Engineer may reject fill sources, or specific areas within fill sources, due to failure to inadequacy of the material or due to environmental, social, or cultural concerns. If the Project Engineer determines that the material source does not meet project requirements, the Contractor shall identify another source that will provide acceptable materials. Imported fill material shall consist of non-organic, general fill soils free of deleterious materials and shall be similar to on-site soils.

Surplus soil left over at the completion of project earthwork shall be spread uniformly in areas designated by the Project Engineer.

02270 – SLOPE PROTECTION AND EROSION CONTROL

The Contractor shall take measures to control erosion and subsequent sediment carried off the project sites and access roads due to construction activities. These controls shall be included in the Storm Water Pollution Prevention Plan (SWPPP) to be developed by the Contractor in accordance guidelines given by the U.S. Environmental Protection Agency. Sediment control measures shall be placed wherever soil disturbed by construction could erode and be carried beyond the limits of construction. These areas include areas disturbed by construction activities, temporary access and haul roads, and temporary earth stockpiles.

Erosion and sediment control measures shall be placed as grading and earthmoving operations progress. The operation shall not progress at a distance further than the distance that sediment control installations can be placed by the end of daily operations. Areas of surface disturbance shall be kept to a practicable minimum.

Unless temporarily demobilized from the project area due to specified seasonal limitations, the Contractor shall inspect the erosion and sediment control features at least biweekly and within 24 hours of each rainfall. The Contractor shall repair any erosion and sediment control feature within seven days following the inspection during which damage is noted or following notification by the Project Manager that repairs are required. Repairs shall be initiated within 24 hours of damage occurring to erosion control features that could result in a discharge of sediment into a stream, arroyo or water impoundment.

All erosion and sediment control measures shall be maintained by cleaning or replacement as needed, or as directed by the Project Manager. These measures shall be fully effective for the purpose intended until permanent erosion control measures are in place and operational. Temporary erosion and sediment control features shall remain in place after

construction operations are completed, unless otherwise designated in the contract, and shall be maintained until the date of final acceptance of the project.

02800 - SITE IMPROVEMENTS

Cattle guards, curbs, fences, gates, gutters, sidewalks, 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

The following section describes fencing construction to be performed under this contract.

The Contractor shall remove approximately 1,200 linear feet of existing high-density polyethylene (HDPE) high-visibility safety fence, fence posts, and gates surrounding the sinkhole and tension cracks and dispose of the material at an appropriately licensed landfill or recycling facility. The location of the existing safety fence is shown on Figure 2.

The Contractor shall construct approximately 100 linear feet of chain-link fence along a residential property line adjacent to the drainage channel. The chain-link fence shall be 6 feet tall with a post spacing no greater than 10 feet.

Fencing 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. CHAIN LINK FENCE

Post shall be tubular galvanized steel. Tubular posts, braces, and top rails shall conform with the requirements of ASTM A 120 for galvanized standard weight pipe, except that the pipe

shall not be threaded nor subjected to hydrostatic test. The galvanizing shall conform to the requirements of AASHTO M 111 (ASTM A 123).

Post tops, stretcher bars, hardware and other required fittings shall be of commercial quality steel or malleable iron, and the galvanizing shall conform with the requirements of ASTM A 153.

Tie wires for fastening chain link fence to posts and rails shall be 9 gauge and galvanized. Galvanized steel or non-corrosive metal bands or fasteners may be used in lieu of tie wires when approved by the Project Engineer. Aluminum tie wires will not be accepted.

Compression braces shall conform with the same requirements as top rails. Tension truss rods shall be not less than 3/8 inch round galvanized rods with drop-forged turnbuckles or other approved tension device.

Chain link fabric shall conform to the requirements of AASHTO M 181 or Commercial Standard 246 published by the U.S. Department of Commerce. Unless otherwise provided, the wire shall be No. 9 gauge galvanized wire and the fabric shall be 2 inch mesh.

Corner posts shall be 3 inches O.D. with a minimum weight of 5.8 lb. per ft. Line posts shall be 2-1/2 inches O.D. with a minimum weight of 3.66 lb. per ft. Top rail and braces shall be 1-5/8 inches O.D. with a minimum weight of 2.27 lb. per ft.

At the option of the Contractor, posts, rails, braces, and gate framing members may be pipe conforming to ASTM A 120, and coated with a minimum of 1.8 ounces of zinc per square foot or vinyl-bonded pre-galvanized steel chain link fabric and fence components according to U.S. Government Specifications RR-F-191J/GEN. (See Table 410.3.3.8 for Fence Piping Dimensions and Weights.)

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 breaks in a run of fencing are required or at intersections with existing fences, appropriate adjustment in post spacing shall be made to conform to the requirements for the type of closure indicated.

Concrete set posts: The Contractor shall excavate holes in firm, undisturbed or compacted soil. Holes shall have diameter 4 times greater than outside dimension of post, and depths approximately six inches deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36 inches below surface when in firm, undisturbed or compacted soil. Place concrete around posts in a continuous pour. Trowel finish around post and slope to direct water away from posts.

The Contractor shall install temporary guys or braces as may be required to hold the posts in proper position until such time as the concrete for footings has set sufficiently to hold the posts. Unless otherwise permitted by the Project Engineer, no materials shall be installed on posts or strain placed on guys and bracing set in concrete until 4 days have elapsed from the time of placing of the concrete. The tops of all posts shall be set to the required depth and alignment. Cutting of the tops of posts shall be allowed only with the approval of the Project Engineer. Fencing shall be firmly attached to the posts and braced. All wire shall be stretched taut and be installed to the required elevations.

Posts shall be spaced at not more than 10 foot intervals. The intervals shall be measured from center to center of post. All posts shall be set in concrete footings conforming with Specifications. Chain link fabric shall not be attached to posts until the concrete footings have completely set. Pull posts shall be line posts braced to adjacent line posts as shown on the plans. Pull posts shall be spaced at intervals not to exceed 500 feet. End posts shall be not less than 2.875 inches in outside diameter and braced in the same manner as corner posts. Braced tension rods or cables, hardware, and appurtenances shall be installed per manufacturer's recommendations.

Chain link fabric shall be stretched by mechanical stretcher or other device designed for such use. Stretching by motor vehicle will not be permitted.

02900 - LANDSCAPING

The following sections describe reclamation (soil preparation, revegetation, and mulching) to be performed under this contract.

02910 - BACKGROUND

The Allison project site is situated within an area of deep, fine-grained soils that are readily eroded and easily compacted to bulk densities that limit plant rooting. Previous site work has created areas of deep compaction and disrupted vegetative cover. The Contractor shall reclaim the area enclosed by the high-visibility safety fence, areas compacted by vehicle traffic during construction, and where vegetation has been disturbed by current or past project work.

Approximately 3 acres shall be reclaimed. The Contractor shall prepare disturbed areas for seeding, apply seed at the specified depth, achieve seed-to-soil contact acceptable to the Project Engineer, and mulch the seeded area to reduce evaporation rates and daytime soil temperatures to improve plant establishment.

To improve plant establishment, the Contractor shall prepare the seedbed as described in the project Specifications before seeding. To prevent soil compaction, the Contractor shall minimize vehicular traffic across reclaimed areas when soil is moist below the surface.

02920 - SOIL PREPARATION

The Contractor shall prepare a seedbed by grading and contouring disturbed soil surfaces, spreading stockpiled on-site surface soils as topdressing over imported fill (if applicable), and deeply ripping compacted areas specified by the Project Manager to promote root growth. The prepared seedbed shall have a roughened surface to provide microsites for seedling establishment and to reduce sheet erosion. While more surface roughness is desirable, the degree of roughening may be limited by the depth of topdressing and seeding method. A shallow topdressing depth shall preclude severe roughening. Accurate drill seeding may be hindered by severe roughening.

Topdressing. A suitable topdressing consisting of on-site surface soils shall be stockpiled on-site and applied over imported fill used on site. Topdressing thickness shall be a minimum of six inches. Before topdressing is applied, the imported fill surface shall be raked, disced or lightly ripped from two to four inches deep just before topdressing is applied to promote water infiltration across the topdressing/imported fill boundary.

Decompaction. Any compacted or trafficked areas large enough to permit the operation of decompaction equipment shall be ripped to a minimum depth of 12 inches. Compacted or trafficked areas shall also be cross-ripped if ripping tines are spaced more than 12 inches apart. Ripping or deep discing shall not be performed when soil conditions are wet. Decompaction efforts should leave the soil in a roughened state that is suitable to receive seed. Traffic across ripped areas must be limited to reclamation equipment only. Service vehicles, pickup trucks or other vehicles not used for reclamation shall be prohibited from driving across ripped areas.

Any areas that are too small to operate motorized equipment shall be hand-raked to create a seedbed.

02933 - SEEDING

Seeding and mulching operations shall closely follow soil preparation work and shall be timed to coincide with peak seasonal rainfall. The following conditions require additional delays or steps before seeding.

- Prepared soil surfaces that are “fluffy” because of particle disaggregation and dry conditions: with this soil condition, seed may easily be placed too deeply to germinate.
- Prepared soil surfaces are dried and form a hard surface “crust”: this condition will prevent seed germination.

Prepared soil is wet or saturated: this soil condition leaves the seedbed susceptible to compaction caused by seeding equipment.

Timing

Seeding shall be accomplished after November 1, unless written permission is issued by the Project Engineer to allow seeding before or after these dates. Seeding must not occur when

the soil is too wet, “fluffy”, or if surface crusting is present. When the soil is wet beneath the surface, seeding must be deferred until soil is less susceptible to compaction. When the seedbed is “fluffy” it must be allowed to settle with time or precipitation. Crusted soil must be lightly disced, harrowed or raked to break up the crust. If crusting occurs, the Contractor shall apply gypsum at a rate of one ton per acre (1 ton/acre) to the prepared soils to prevent further crusting. The Project Manager shall inspect the prepared soil surface prior to seeding and mulching to assess these conditions.

Seed Species and Mixtures

To assure the AML Program that the seed purchased will perform as expected, the Contractor shall provide seed that is certified weed free and contain the specified varieties listed in the seed mix (see Table 1, below). For species with unnamed varieties, the Contractor shall obtain seed sourced from a location that is adapted to the climate and soil in which it is being planted; that is, within about three hundred miles south, about two hundred miles north, or from an elevation difference within 1,000 feet of the Allison site. If some species or varieties are unavailable, substitutions are allowed only after consultation with the Project Engineer.

Seeding Methods

The seed shall be drilled, broadcast, or hydroseeded. Soil and topography favor seed drilling. A seed drill accurately places seed at the proper depth, that for most species, is ¼ to ½ inches deep. Hand broadcast, hand-operated rotary, or hydroseeding methods are appropriate when the access is limited or the small size of individual seeded areas prevent the use of a drill seeder. Any seeding equipment must have a metering device to regulate seed application rates.

For any broadcast seeding, the Contractor shall mix two parts of rice hulls (by volume), or another bulking agent approved by the Project Engineer, to one part seed mix before spreading seed. Bulking agents improve seeding uniformity and prevent fluffy seed from bridging. Broadcast seeders shall be set to meter the appropriate seed coverage per acre.

To ensure accurate meter settings, a calibration run shall be conducted before drill or broadcast seeding using only rice hulls in the hopper(s). A calibration run is not required for hydroseeding. Calibration can be performed on a weight or volume basis of seed used in the delineated calibration area. Quantities of rice hulls can be tracked before-and-after by measuring rice hulls within the hopper or by collecting hulls from plastic sheeting spread out before the calibration run. A swath of ground at least 50 feet long shall serve as a calibration run to measure quantities of rice hulls and spread pattern. Calibration results within 25% error of the targeted seeding rate are acceptable.

For seeding by hand or hand-operated rotary broadcast seeder, multiple passes across a seeded area are permissible to ensure uniform seed distribution. Broadcast seeding or hydroseeding shall not be conducted when wind velocities prohibit accurate seed distribution.

Broadcast seeding shall be followed by hand raking or with a mechanical or manual harrowing device or drag chain to cover seed with ¼ to ½ inch of soil.

If hydroseeding equipment is used, the Contractor may use a tackifier but no or limited hydromulch (less than 0.25 tons/acre). All seeded areas, regardless of seeding method, shall be mulched with the material specified in Section 02940 (below).

Seeding Rates

Seeding rates are given in Table 1 as Pure Live Seed (PLS). Since a seed mix provided by a vendor will always contain extraneous material and some seed that will not germinate, PLS is an adjustment to ensure a correct seeding rate. To deliver a pound of PLS, the seed vendor will provide a mix that will usually contain more than a pound of seed, sometimes much more. The Contractor shall adjust seeding rates to account for this difference as well as any seed bulking agents (rice hulls) at seeding time. PLS is calculated by multiplying the percent total germination by the percent purity and dividing by one hundred (100):

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

The amount of seed purchased shall account for seeding method, losses during application, and a factor to allow for areas needing seed beyond the estimated 3 acres. According to AML Program estimates, the seed mix specified in Table 1 should provide approximately 50 PLS (seed count) per square foot of seeded area. To spread seed at this rate, the seed mix shall contain 10.3 lbs PLS for each acre. **For broadcast or hydroseeding methods, this rate should be increased by an additional 50%.** The Contractor shall purchase 15% more of the seed mix than specified to account for losses due to any re-calibration, metering errors during seeding, or additional areas needing seed beyond what has been estimated. The area to be seeded is estimated at 0.7 acres, so the amount of seed to be purchased shall be:

$$3 \text{ acres} \times 10.3 \text{ lbs PLS/acre} \times (1 + 15\%) \text{ extra} = 35.5 \text{ lbs PLS (drill method)}$$

or

$$35.5 \times 1.5 = 53.5 \text{ lbs PLS (broadcast, hydroseed methods)}$$

The approved seed mix is as follows:

**Table I – SEED MIX
Allison Emergency Project – Phase III**

<u>No.</u>	<u>Species</u>	<u>Scientific Name</u>	<u>Bulk Seed/lb.</u>	<u>PLS/ft²</u>	<u>Application Rate PLS lbs./acre*¹</u>
Grasses, 50%					
1.	alkali sacaton	<i>Sporobolus aeroides</i>	1,758,000	6.7	0.1
2.	bluebunch wheatgrass	<i>Pseudoroegneria spicata</i> (P-7 or Goldar varieties)	140,000	3.7	0.8
3.	western wheatgrass	<i>Pascopyrum smithii</i> (Arriba or Rodan varieties)	110,000	3.7	1.0
4.	galleta	<i>Pleuraphis jamesii</i>	159,000	3.7	0.7
5.	Indian ricegrass	<i>Achnatherum hymenoides</i>	235,000	3.7	0.5
6.	bottlebrush squirreltail	<i>Elymus elymoides</i>	192,000	3.7	0.6
Forbs, 15%					
7.	desert globemallow	<i>Sphaeralcea ambigua</i>	500,000	7.5	0.5
Shrubs, 35%					
8.	wolfberry	<i>Lycium andersonii</i>	592,000	3.9	0.2
9.	rubber rabbitbrush	<i>Ericameria nauseosa</i>	400,000	3.9	0.3
10.	black greasewood	<i>Sarcobatus vermiculatus</i>	245,000	3.9	0.5
11.	four-wing saltbush	<i>Atriplex canescens</i>	52,000	1.9	1.1
12.	winterfat	<i>Krascheninnikovia lanata</i>	123,000	3.9	1.0
Total			50	50	10.3

*1 The listed application rate is for drill seeding. For broadcast or hydroseeding increase the listed application rate by 50%.

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 or Project Engineer before seeding. Upon delivery of seed from the vendor, the Contractor shall keep seed dry, out of the sun, and below 100 degrees Fahrenheit until the seed is used.

Completion

If the Contractor is scheduled to close the project outside of the specified seeding window, and seeding is the only incomplete task, the Contractor shall complete only seed bed preparation and 75 percent of the lump sum bid price for the seeding task will be withheld. The job shall be held open to complete seeding during the next available seeding window, as

approved by the Project Engineer, and the remainder of the bid price will be paid upon completion and acceptance of seeding and mulching. The seeding task will not be considered complete until mulch applied to the seeded surface is approved by the Project Engineer (see section 02940 “Mulching” below).

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.

02940 – MULCHING

Mulch shall be applied by the Contractor to all seeded areas immediately after seeds are spread to provide a ground cover that reduces surface evaporation and provides shade for germination and plant establishment. The Contractor shall apply mulch to all seeded areas. The mulch type shall be WoodStraw[®] ECM made by Forest Concepts, or an approved equivalent. This material does not require tacking. WoodStraw[®] must be stored in a dry location prior to use, unless applied with a straw blower (see below).

The mulch shall be spread uniformly over the prepared area. Materials may be spread by hand or with a commercial straw blower. WoodStraw[®] materials are laborious to spread evenly by hand, but clumping is unacceptable. A blower may be used to speed up the application, though some equipment modification is required to reduce WoodStraw[®] shattering. All but one of the flail tines within the blower must be removed. Also, since WoodStraw[®] is more pliable and less prone to shattering if wet, bales should be thoroughly soaked with water the day before intended use.

The rate of WoodStraw[®] application shall be 150 regular size bales per acre, to provide 50% surface cover. For the seeded area of 3 acres, 450 regular size bales would be sufficient. A calibration of application to achieve the correct rate must be performed with a bale of WoodStraw[®] across a defined area, as approved by the Project Manager. For example, at the rate of 450 bales of WoodStraw[®] for 3 acres, the calibration using a single bale, applied across an area:

$$3 \text{ acres}/450 \text{ bales} * 43,560 \text{ sq. feet/acre} = 290 \text{ sq. feet, or about } 17 \text{ feet} \times 17 \text{ feet}$$

The Contractor shall protect and care for seeded and mulched 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.

02990 SUBMITTALS

Complete data and Specifications for the fencing materials, seed, mulch and other accessories shall be submitted in accordance with the procedure set forth in Section 01340.

Information for proposed imported fill shall also be submitted to the Project Engineer for review and approval.

END OF DIVISION 2

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DIVISION 3 – COMPACTION GROUTING

This work shall consist of compaction grouting to stabilize underground mine workings and loose subsurface soils.

03001 – GENERAL REQUIREMENTS

I. Introduction

Compaction grouting involves the injection of a low-slump, mortar-like grout (under high pressure) to compact and displace the adjacent soils. The grout does not penetrate soil pores but displaces the subsurface soils by forming a homogeneous grout bulb near the grout casing tip.

II. Intent

The intent of the compaction grouting specified herein is to:

- A. Create a plug in the underground mine workings underlying the disturbed ground.
- B. Provide ground improvement 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 Aggregates ¹ |
| 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. Compaction Grouting Sequence and Scope

Compaction grouting work shall be performed in the sequence specified in Section 01010. The compaction grouting tasks are repeated below:

- A. Construct Bulkhead in Mine Workings: Establish a 72-foot-long bulkhead in the mine drift using fourteen (14) primary drilled and cased boreholes and up to thirteen (13) secondary drilled and cased boreholes, on an approximate 10 foot by 10 foot grid to grout the partially collapsed and filled underground mine workings, at an approximate depth of 85 to 95 feet below the ground surface. Bulkhead grout hole locations are shown on Figure 5. Approximately 2,700 linear feet of drilling and casing will be required for this task. It is estimated that the volume of grout to construct the bulkhead will be 520 cubic yards (CY) (400 CY + 30% contingency).

Boreholes shall be drilled through the mine workings horizon (as determined by the on-site engineer at each hole location) and five feet into the floor below the workings. Casing shall initially be set three feet above the final depth of the hole for the initial grout stage. After grouting the initial stage, the casing will be pulled up three feet for each successive stage; grout stages shall continue to when the casing is at least five feet above the mine workings. Contractor should note that timbers were used to support the mine workings and that pieces of wood were recovered during the exploratory core drilling; Contractor should expect to encounter timbers in various states of degradation during drilling. Grouting shall be within the limits indicated on the project plans to meet the acceptance criteria presented in Section 03020 of these Specifications.

The actual number and spacing of grout borings may be modified by the Project Engineer depending on conditions encountered during the work.

- B. Compaction Grout Loose Soils: Compaction grout the loose/soft soils above the mine workings and around sinkhole, on an approximate 12 foot by 12 foot grid, at depths from 20 to 100 feet below the ground surface (as determined by the on-site engineer at the hole location). Staged hole grout lengths will vary from 40 feet to 90 feet due to the variable depth of the alluvium, rock contact within the work area. The work will begin in the area of the sinkholes (Zone 1) after the excavating and backfilling tasks (Tasks 4, 5, and 6) have been completed. The residential areas (Zone 2) will be completed next, and the non-residential areas to the north and south of the sinkholes (Zone 3) will be the final area of compaction grout work. The work areas and zones are shown on Figure 6. The extent of the compaction grouting will be determined by the stiffness of the soils observed during drilling and the grout take and controlled by the on-site engineer. It is estimated that up to 170 holes and 2250 to 2700 CY of grout will be needed to

complete the work in all zones.

The Contractor shall be prepared to drill angled borings due to physical site constraints. Approximately 20 feet of rubblized concrete fill was previously used to backfill a sinkhole approximately 90 feet long by 45 feet wide by 20 feet deep during the Emergency Phase I project. The approximate location of the backfilled sinkhole is shown on Figures 2 and 3. The rubblized concrete is generally 12 to 36 inches in diameter and contains reinforcing steel. The Contractor shall be prepared to advance borings through this material, or drill angled borings to place grout below the backfill while avoiding drilling through the fill material.

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 compaction grout.
- d. Monitor surface ground movements during compaction grouting operations.
- e. Follow compaction grouting sequence of operations.
- f. Implement site environmental and safety controls including grout contact, flush and waste water runoff controls.

The actual number and spacing of grout borings, and the depth of grouting, may be modified by the Project Engineer depending on conditions encountered during the work.

V. Quality Assurance

- A. The compaction grouting program, including installation of grout casing, shall be performed by a specialist grouting Contractor with at least ten years of documented experience in compaction grouting and/or 2 similar mine subsidence/backfill projects within the last 5 years.
- B. The Contractor shall provide experienced management, supervisory and key personnel as required to implement the compaction grouting program, as follows:
 1. The Contractor's project manager shall have at least five years of continuous experience in compaction grouting.
 2. The Contractor's superintendent shall have at least five years of experience in compaction grouting.
 3. As detailed in Section 03990 of these Specifications, the Contractor shall provide:

- a. Evidence of previous compaction 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 – GROUTING EQUIPMENT AND MATERIALS

I. Grouting Equipment

- A. The Contractor shall supply equipment capable of advancing the grout casing through overburden, soils and other natural obstructions to the specified depth or as required to meet the project objectives.
- B. The Contractor shall supply all equipment required to operate a compaction grouting system capable of supplying the specified grout at variable pressures, measured at the pump, up to 700 psi (4825 kPa) and at rates of 0.5 to 12 cubic feet (0 to 0.34 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 measure
1. Continuous grout pressure close to the top of the injection casing.
 2. Flow rate of grout.
 3. Volume of grout injected.
- E. The Contractor shall supply and install structural monitoring equipment in accordance with Section 3.03 of these Specifications.
- 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. 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 more than 6 inch slump with a 0 percent bleed, and a stiffening time of greater than four hours.

D. 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.

03020 – 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. Compaction Grouting

A. The grout shall be injected at a stage depth until one of the following occurs (adjustments to criteria 1 to 3 can be submitted for consideration in the

Contractor's work plan):

1. Grout flow ceases at a header pressure reading of 500 psi (4824 kPa).
2. Measurable surface ground heave is observed (displacement of ground surface of greater than 1/8 inch during a grout stage).
3. An injected grout volume equal to 25 percent of the soil volume being treated by that injection stage is reached.
4. A maximum cumulative heave of 1 inch is observed.

B. Compaction grouting shall be sequenced so that grouting does not take place within 10 feet of locations grouted within the previous 12 hours.

C. As compaction grouting is completed at each location, the Contractor shall completely fill the grout hole to the ground surface.

III. Field Quality Control

A. All compaction grouting shall be performed under the inspection of the FQCR.

B. Monitoring and logging of compaction 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 yard 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. Layout of grout injection points shall be by the Contractor and checked by the FQCR.

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

G. The Contractor shall monitor open holes for the flow of grout. 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. The Contractor shall also cease pumping grout if heaving of the ground surface is observed.

H. After completion of the compaction grouting program, the monitoring system and grout casing will be removed and all holes will be filled and patched.

IV. Testing and Inspection

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

V. 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. 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, and grout waste and wash water.

E. 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.

F. 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:

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 03011 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) or less achieved. If the Contractor intends to deviate from the gradation provided in Section 03011 of this specification, it shall submit, with the bid, evidence of satisfactory use of the proposed material from past projects with similar soil 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 3.02 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, grout casing installation, compaction 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 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

END OF SPECIFICATIONS