

CONTRACT SPECIFICATIONS

SCOPE OF WORK

The Department of Environmental Protection (“Department”), Bureau of Abandoned Mine Reclamation, requires a Contractor to drill and install approximately 25 mine pool monitoring wells over a two-year period for a deep mine pool monitoring project, located in the Bituminous Coal Region with projects originating from the Cambria Office, Investigation Section. Contractor shall furnish all labor, technical assistance, equipment, tools and material necessary to perform the contract tasks.

Contractor shall drill 25 proposed rotary boreholes, installing casing and completing boreholes, primarily for mine pool monitoring purposes.

When requested by the Department, Contractor shall provide a completely mobilized rotary drilling rig on a project site within 14 days of being notified to proceed.

Contractor shall mobilize the drilling rig to the work site together with all necessary supporting equipment to create access to individual drilling locations and drill test borings that may range from approximately 50 to 300 feet in depth, with an approximate average depth of 125 feet. Contractor shall install casing pipe and perform required reclamation.

Contractor shall drill overburden materials and bedrock to determine subsurface conditions, installing casing pipe and completing each boring as a permanent monitoring well. The bedrock may be fractured and caved due to underground mining. While drilling, Contractor may encounter shallow groundwater conditions and mine voids connected to the pressurized mine pool.

Contractor shall advance 25 borings sufficient in diameter to accommodate three-inch inside diameter (I.D.) PVC pipe. Contractor shall advance proposed borings through overburden, bedrock, fractured bedrock, coal and mined coal (voids), into a targeted mine void, and then developed/completed as a mine pool monitor well. For all borings, the required three-inch I.D. PVC casing pipe will be grouted in-place as specified.

Contractor shall equip each completed well at the surface with either a nominal four-inch diameter steel well guard with a threaded cap, cemented in-place, or an optional flush-mounted, watertight monitor well cover. **The Department shall provide the steel well guard assembly, along with the cap and the flush-mount cover.**

Contractor shall remove all equipment and seal all abandoned boreholes. Contractor shall ensure that the restoration and the seeding of the surface is to a condition equal to or better than that existing prior to the start of project work.

Due to the nature of the work, it may be necessary to slightly modify the tasks at the work site while the work is being conducted. Such modifications may include:

- Relocation of boreholes,
- Deletion of boreholes,
- Addition of boreholes,
- Variation of the depth of individual boreholes,
- Variation of the cased depth of individual boreholes,
- Completion requirements for individual monitor well boreholes.

Contractor shall furnish all necessary labor, material and equipment and perform all the required work and labor in an expeditious, substantial and workman-like manner as determined by the Department.

Any questions regarding the Specifications must be directed to Scot May at 814.472.1712. Any questions concerning the contracting or bidding process must be directed to Angela Vermeulin at 814.472.1808.

SPECIFICATION NO. 1: MOBILIZATION AND DEMOBILIZATION

1.1 SCOPE

The work covered by this Specification consists of the delivery to the work site of all equipment, material and supplies, acquisition of any permits, removal from the site of all equipment after the completion of work and restoration of the site and final inspection by the Department.

1.2 PROCEDURE

Mobilization consists of the delivery to the work site of all equipment, material and supplies to be furnished by the Contractor, the complete assembly in satisfactory working order of all equipment on the job, and the satisfactory storage at the site of all such materials and supplies. Moving between boreholes and set-ups at borehole locations included under this Contract will be incidental to the other appropriate pay items and no separate payment will be made.

Demobilization consists of the removal of all equipment from a project site, the clean-up and the restoration of any damaged areas to as good or better condition than that which existed prior to the commencement of work. This work will include reseeding of areas designated by the Department.

All equipment and methods to be used by the Contractor are subject to written approval by the Department. However, approval of the equipment will not be construed as approval of the Contractor's methods or performance of the required work. Contractor shall furnish any additional or "special" equipment necessary to obtain the desired end results.

Contractor, at its expense, shall obtain all permits, of whatever nature, necessary for the completion of this work, and Contractor shall comply with all existing laws, ordinances, rules and regulations relating to its operations. The Department or its designated representative shall obtain any Consents for Right of Entry from property owners.

Contractor shall make every effort to minimize damage incidental to site access and the drilling operations. Contractor shall make maximum use of existing roads and lanes for access. Where it is necessary to deviate from roads and lanes, Contractor shall deviate by one track, at a location causing the least damage.

Contractor is liable to the property owners for any damage to vegetation, crops or property, irrespective of whether the damage was caused by negligence or was an unavoidable consequence of drilling operations. The Department shall consult with property owners prior to moving equipment to the drilling location.

If boring locations are adjacent to streets, Contractor shall maintain traffic control at all times.

1.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, will be made on the basis of a complete unit, but only to the extent directed by the Department.

The Department shall pay Contractor at the Contract Lump Sum Price bid for "Mobilization and Demobilization," which price and payment constitutes full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete these items of work.

Mobilization must be paid in the amount of 40% of the Lump Sum Price bid following complete mobilization at the work site.

Demobilization must be paid in the amount of 60% of the Lump Sum Price bid following complete demobilization from the work site.

SPECIFICATION NO. 2: BULLDOZER MOBILIZATION AND DEMOBILIZATION

2.1 SCOPE

The work covered by this Specification consists of mobilizing and demobilizing a bulldozer. Access to most of the boreholes will need short access routes built to borehole locations off existing rights-of-way.

2.2 PROCEDURE

The Department shall authorize Contractor to mobilize and demobilize a bulldozer, JD 650, equal size or larger with dozer blade, for the construction of access routes, development of drilling sites, moving of the drill rig into and out of position and regrading after drilling operations.

2.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, will be made on the basis of a complete unit, but only to the extent directed by the Department.

The Department shall pay Contractor at the Contract Unit Price bid per Contract Item, "Bulldozer Mobilization and Demobilization," which price and payment constitutes full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.

Mobilization must be paid in the amount of 40% of the unit price bid following complete mobilization.

Demobilization must be paid in the amount of 60% of the unit price bid following complete demobilization.

SPECIFICATION NO. 3: BULLDOZER WITH OPERATOR

3.1 SCOPE

The work covered by this Specification consists of operating a bulldozer. When necessary for ingress, egress or drilling, the Department shall authorize Contractor's use of a bulldozer.

3.2 PROCEDURE

Contractor shall utilize a bulldozer, John Deere JD 650, equal size or larger with dozer blade and operator for access as necessary to carry on drilling activities.

3.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, will be made on an hourly basis for actual operation of the equipment, but only to the extent directed by the Department.

The Department shall pay Contractor at the Contract Unit Price bid per hour for Contract Item, "Bulldozer with Operator." The payment must be divided no finer than by one-half hour increments, which price and payment will constitute full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.

SPECIFICATION NO. 4: DRILLING ROTARY BOREHOLES

4.1 SCOPE

The work covered by this Specification consists of furnishing all labor, material, equipment, supplies and all necessary incidentals required to drill boreholes through unconsolidated overburden material, rock and mined coal beds.

A. Boring Locations

Contractor shall perform boring work at locations within the boundaries of the properties shown on provided boring plans. The Department shall locate all boring sites in the field and shall furnish the surface elevations of each borehole. Contractor shall notify Pennsylvania One Call to ascertain the location of utilities from the appropriate utility companies and to verify all measurements to ensure that all borings are made at locations that will not interfere with or harm existing surface or subsurface utilities. Contractor shall notify the Department when a conflict occurs. Contractor is liable for any damage to existing utilities resulting from their operations.

B. Equipment and Supplies

Contractor shall drill all boreholes using non-percussion rotary drills for softer formations, percussion rotary drills (e.g., air rotary with DTH or top hammer) for harder rock, or tri-cone bits for loose or mixed soils, each selected for efficient material removal based on geological conditions.

Contractor shall drill at locations shown on the provided project drawings or as designated by the Department, using all necessary gauges and accessories to produce complete and continuous boreholes with a sufficient diameter for six-inch overburden surface casing, allowing for the installation of three-inch I.D. PVC casing pipe to the specified depth. Contractor shall select the drilling methods and equipment, subject to written approval by the Department.

Contractor shall include in its supplies for borehole drilling all casing, drill rods, bits, piping, pumps, water, tools, power and all other items required for satisfactory performance of required work. Bits must be the proper kind for the type of rock being drilled. The rock section to be drilled may include significantly caved and broken strata due to underground mining and subsidence.

All equipment and methods to be used by the Contractor are subject to written approval by the Department. However, approval of the equipment may not be construed as approval of Contractor's methods or performance of the required work. Contractor shall furnish any additional or special equipment necessary to meet this contract's requirements.

Contractor shall provide a secure, firm and level work platform at each borehole location. Contractor may not offset borings from the locations shown on the boring layout sketch without approval of the Department.

Contractor shall provide compressed air or water necessary for the drilling activity at its sole expense. The Department shall not make a separate payment to Contractor for obtaining water.

4.2 PROCEDURE

Contractor shall perform all work under the direction of the Department. Contractor shall make borings into soil, refuse, overburden, bedrock, fractured bedrock, coal and mined coal beds (voids). The purpose of penetrating the subsurface is to ascertain the depth and thickness of subsurface strata, to provide samples of soil, refuse, rock and coal material and to determine mine pool elevation. Sampling of soil, refuse, overburden, rock and coal materials must only be by recovery of cuttings if and when directed by the Department. Determination of groundwater or mine pool elevation will be by electronic tape performed by the Department.

Contractor shall equip the drill rig with dust controls to reduce the amount of dust discharged to the atmosphere. Contractor shall maintain the dust controls to ensure they are in proper working condition throughout a project.

Contractor shall equip the drill rig to handle high quantities of formation water including pressurized mine water. Contractor shall prevent all cuttings and water from the borings from migrating from the drilling site. It is anticipated that in some borings, groundwater will be encountered in the first few feet of drilling.

Contractor shall drill 25 boreholes with sufficient diameter to accommodate three-inch I.D. PVC casing pipe through bedrock, fractured bedrock and mine voids to a depth designated by the Department.

Contractor shall develop completed borings as mine pool monitoring wells. A three-inch I.D. PVC casing pipe will be grouted in-place and finished with a nominal four-inch steel well guard (including threaded cap, which the Department shall supply) also grouted in-place (see sketches for details) or an optional flush-mounted, watertight monitor well cover (if needed, the Department shall provide).

In the event the walls of the borehole begin to cave or barrel prior to installing of the casing, Contractor shall stabilize the borehole wall by the method of its choosing and at its sole expense, provided it meets the written approval of the Department. A six-inch I.D. protective casing may be necessary to stabilize the borehole in challenging geological conditions or to provide a larger annular space for effective grouting, thereby ensuring the integrity and longevity of the well. This casing also serves to meet safety and regulatory requirements when additional structural support is required.

If drilling does not encounter solid bedrock to anchor the casing, Contractor shall support the casing by a method of its choosing to prevent movement of the casing down the hole and its sole expense, provided it meets the approval of the Department.

Contractor shall drill plumb and stable boreholes. Appropriate measures such as use of temporary overburden casing and drill stem stabilizers may be required to achieve this goal. In drilling rock (including fractured and broken rock), Contractor shall operate its drills at such speeds, feeds and pressures as will ensure maximum information collection and borehole verticality. Whenever voids or soft spot zones are encountered, Contractor shall limit the rotation of the drill to determine the nature and thickness of the void by restricting down-pressure and observing the action of the rig. Since the function of the drilling includes determination of the thickness, orientation, extent and spacing of mined zones, Contractor shall exercise particular care in recording circulation losses, rod drops and other unusual drilling experiences, which, supplementing the borehole record, will yield information pertaining to the nature and extent of mining.

If Contractor fails to comply with the foregoing procedure, when ample warning of unusual subsurface conditions has been received in advance, the Department may require re-drilling, at the Contractor's expense, of any boring from which drilling information is unsatisfactory.

The depths of the individual boreholes are an estimate and can range from approximately 50 feet to 300 feet, with an approximate average depth of 125 feet. The termination depth of all boreholes is at the discretion of the Department. Contractor shall account for cost adjustments for boreholes that are significantly deeper or shallower than the average depth. Contractor shall drill at locations shown on the Drawings or as designated by the Department.

4.3 DELIVERY OF RECORDS

Contractor shall furnish, to the Department, the following records for each borehole within the following time constraints:

- A. One pencil copy of each boring log, not later than 48 hours after the completion of each borehole.
- B. Two typed copies or electronic copies (PDF or similar format) of each borehole log not later than 21 days after completion of all the boreholes. Each log must provide pertinent information such as, but not limited to:
 1. Project name and contract number, borehole number, location of borehole, ground elevation, total depth of borehole, time-date of starting, time-date of completion, driller's name and logger's name.
 2. Depth of unconsolidated material (top of bedrock).
 3. Air loss or loss of returns.
 4. Rock types (description of cuttings).

5. Measured void or caved and broken zone.
6. Depth to each water bearing zone.
7. Blown yield in GPM.
8. Linear feet, size, type of casing.
9. Depth of groundwater or mine pool during drilling and (where possible) after 24 hours.
10. Notes, remarks or information on pertinent incidents during drilling operations.
11. Copies of any other records kept by the Contractor, which in opinion of the Department, will aid in the interpretation of the borings at any time requested during the contract.

The Department shall not pay Contractor for delivery of logs because logs are included in the Contract Item, "Drilling Rotary Boreholes".

4.4 SEALING ABANDONDED BOREHOLES

At the direction of the Department, Contractor shall seal abandoned boreholes as follows:

1. Upon completion and acceptance of the borehole, Contractor shall seal the entire depth of the abandoned boring.
2. Contractor shall place grout mix on top of the plug to a point selected by the Department. In the event that significant quantities of water are encountered, Contractor shall set the plug below the aquifer and build the seal from that elevation.
3. Depending on the borehole stability, the temporary overburden casing (when used) must be partially or totally withdrawn, and the cement or concrete plug must be allowed to set for 24 hours. Contractor shall use additives to accelerate the curing period when approved by the Department. Contractor shall stem the borehole to within 12 inches, depending on land use as determined by the Department, of the surface with sand, gravel or refuse material.
4. In the event the temporary overburden casing (when used) cannot be recovered, Contractor shall cut off 12 inches below the ground surface, depending on the land use, and shall seal the borehole as indicated in the immediately preceding sealing steps 1 - 3.
5. Contractor must fill the top 12 inches of the borehole, depending on land use, with topsoil or pavement material equivalent to the existing topsoil or pavement material at the surface.
6. Contractor must restore the surface to as good as or better than the original condition.
7. The cost of sealing boreholes will be incidental to other Contract Items and the Department shall not make separate payment to Contractor.

8. Contractor shall use the Tremie grouting method to grout all boreholes. The grout mix must meet project specifications. Contractor shall monitor the grouting process and inspect the boreholes post-grouting, with remedial action required at no additional cost if necessary.

4.5 ABANDONED BORINGS

Except with the prior written permission of the Department, Contractor shall not abandon or complete any boring, or remove any casing or drilling equipment, without first affording the Department the opportunity to obtain the position and the depth of the boring to abandonment or completion and secure water level readings and samples of the material already penetrated and any other information that the Department may require.

The Department shall not make payment for any boring that has been abandoned by the Contractor before reaching the depth, elevation or condition specified, unless the Department approves and accepts the boring as being completed. Contractor must seal at its own expense any boring abandoned by the Contractor without the Department's approval. The Department may, but is not required to, accept a boring which fails to reach the required depth due to an unusual obstruction, which, in the Department's opinion, Contractor could not reasonably have been anticipated.

4.6 INSPECTIONS

Contractor shall at all times allow the Department to inspect its work. If any imperfect work is performed at any time as determined by the Department, Contractor shall remedy the defects at its sole expense and to the full satisfaction of the Department. Contractor may not perform any drilling, set-up, restoration, or field testing except in the presence of an inspector or Department, unless specific permission has been granted to the contrary. The presence of an inspector, or the keeping of separate drilling records by the Department, does not relieve Contractor of the responsibility to complete work specified in the Contract.

4.7 MEASUREMENT AND PAYMENT

Contractor shall perform measurements, when accepted and approved by the Department, for non-percussion or percussion rotary drilling of the diameter specified based on the linear feet of holes drilled and accepted by the Department, but only to the extent directed by the Department.

- A. The Department shall make payment at the Contract Unit Price bid per linear foot for Contract Item, "Drilling Rotary Boreholes to Accommodate Three-Inch Schedule 40 Nominal Casing Pipe," which price and payment will constitute full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.
- B. The Department shall make payment at the Contract Unit Price bid per linear foot for Contract Item, "Drilling Rotary Boreholes to Accommodate Six-Inch Schedule 40 Nominal Casing Pipe," which price and payment will constitute full

compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.

C. The Department shall make payment at the Contract Unit Price for the item "Borehole Abandonment," which will constitute full compensation for all labor, materials, equipment, supplies and incidentals required to satisfactorily complete this work.

SPECIFICATION NO. 5: FURNISHING AND INSTALLING PVC WELL CASING PIPE

5.1 SCOPE

The work covered by this Specification consists of providing all labor, material, equipment and incidentals required to furnish and install three-inch I.D. PVC well casing pipe, including completion as a mine pool monitor well. The Department shall perform all monitoring.

5.2 PROCEDURE

Contractor shall furnish and install new Schedule 40 PVC three-inch I.D. well casing pipe. The pipe must rest on the bottom of the borehole and the bottom five feet of pipe must have three rows of one-inch diameter holes spaced a maximum of six inches apart. The top of the three-inch plastic casing must not be more than six inches lower than the top of the steel outer casing. The Department shall approve all casing pipe before it is installed in the borehole. Contractor shall install the casing pipe in the borehole to the required depth with a surface stickup of three feet. Contractor shall securely grout all casing pipes left in place using a tremie pipe and completed as a groundwater monitor well.

Contractor shall grout the plastic pipe in place to the ground surface using the following procedure: Contractor shall install a metal grout basket on the casing at a depth of approximately ten feet above the roof of the mine (top of the mine void). Contractor shall not use a rubber fernco as a grout basket. Contractor shall add approximately five feet of time release bentonite pellets on top of the grout basket. Prior to grouting, Contractor shall give the pellets enough time to activate according to the manufacturer's specifications. Contractor shall place grout using tremie pipe. Depending upon the depth of the hole, Contractor may be required to complete grouting in stages as directed by the Department.

Contractor shall not place any surface standpipe above the ground surface if completing the well with a flush mounted well guard.

Contractor shall place grout under pressure and ensure that it is composed of a mixture of Portland Cement and bentonite. Contractor shall mix bentonite with the cement at a ratio of 3.0 – 5.0 pounds per sack of cement (assuming 94 lb. cement sacks) and combine it with six and one-half (6.5) gallons of water. The cement must meet the requirements of ASTM 150, Type II for sulfate resistance. Contractor may be directed by the Department

to use centralizers if deemed necessary by the Department to ensure the casing is properly sealed.

Contractor's cost of grouting shall be incidental to the "Furnishing and Installing PVC Well Casing Pipe." Contractor shall record the total length and type of casing installed and depth to the bottom of the casing below the surface in the drilling log.

5.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, for three-inch I.D. casing pipe, will be made based on the linear feet of casing pipe of the diameter and type specified, furnished, installed, left in place, grouted and completed as a groundwater monitor well, but only to the extent directed by the Department.

The Department shall pay Contractor at the Contract Unit Price bid per linear foot for Contract Item, "Furnishing and Installing PVC Well Casing Pipe, Three-Inch," which price and payment will constitute full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.

SPECIFICATION NO. 6: FURNISHING AND INSTALLING OVERBURDEN CASING PIPE

6.1 SCOPE

The work covered by this Specification consists of providing all labor, material, equipment and incidentals required to furnish and install six-inch I.D. overburden casing pipe into the boreholes.

6.2 PROCEDURE

Contractor shall furnish and install new plastic casing pipe in all boreholes, which must be used for monitoring purposes. Plastic casing pipe must be Schedule 40 with threaded flush-joint couplings. The Department shall specify casing pipe size and type and shall approve all casing pipe before Contractor may install it in the boreholes.

Contractor shall install six-inch inside diameter overburden casing pipe, as specified, in the boreholes from the surface through the unconsolidated overburden to a point five feet into solid rock strata. Contractor shall set the casing pipe and seal it tightly with cement grout before continuing the drilling of the boreholes through the rock strata unless otherwise directed by the Department.

If the rock strata, in which the casing pipe is installed, is found to be of a friable nature, Contractor shall be required to extend the depth limit for installing casing pipe to a point satisfactory to the Department.

Contractor shall include the cost of anchoring borehole casing pipe to overburden casing pipe, by welding or grouting, and of making an airtight seal in the price per linear foot for the specified diameter borehole casing pipe as listed in the Contract Unit Price.

Contractor shall cover all boreholes designated by the Department as suitable for flushing or monitoring use at the surface with a threaded metal or plastic plug or cap as provided by the Department.

6.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, for casing pipe will be made based on the linear feet of casing pipe of the diameter and type specified furnished and installed, but only to the extent directed by the Department.

The Department shall make payment to Contractor at the Contract Unit Price bid per linear foot for Contract Item, "Furnishing and Installing Overburden Casing Pipe, Six Inch," which price and payment will constitute full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work.

SPECIFICATION NO. 7: STAND-BY TIME

7.1 SCOPE

The work item covered by this Specification addresses any delays in drilling in which a drill rig and crew is ordered by the Department to stand idle.

7.2 PROCEDURE

When the Contractor is ordered by the Department to delay the drilling of any borings, the Department shall reimburse the Contractor for any such delays providing that the delays are the sole responsibility of the Department, and the delays are more than one-half hour in duration.

The Department may not use stand-by time for payment to the Contractor for delays caused by equipment breakdown and malfunctions or for delays caused by non-availability of necessary equipment and supplies. Contractor is responsible for these delays that are incidental to other items of work for which no additional compensation will be allowed. The Department shall not pay Contractor for any payment for stand-by time for items of equipment other than complete drill rig and crew in full operating condition.

Contractor must ensure that a crew consists of a driller and helper. If any delay does occur, the Department shall record it daily with dates and times directed to be idle.

7.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, will be made on the basis of the hours a drill rig and crew is ordered to stand idle, but only to the extent directed by the Department.

The Department shall make payment to Contractor at the Contract Unit Price bid Per Hour for “Stand-by Time” and will be divided no finer than one-half hour increments, which price and payment constitutes full compensation for the delay of a drill rig and crew.

SPECIFICATION NO. 8: RESTORATION

8.1 SCOPE

The work covered under this Specification consists of providing all labor, material, equipment and other incidentals necessary to restore the area surrounding a borehole and the access to a borehole to a condition equal to or better than that which existed prior to the start of work. The Department in its discretion may require Contractor to perform work included in this Specification.

8.2 PROCEDURE

In the case of a borehole located on private property, restoration includes, but is not limited to, repairing, or replacing any sidewalks, fences, lawns, seeding and access road and other improvements to the property which may have been damaged or removed because of the work, but only to the extent directed, approved and accepted by the Department.

In the case of a borehole located on paved surfaces (driveways, streets, roads, alleys) where damage is limited to a borehole drilled through the paved surface, restoration includes, but is not limited to, patching the borehole with the same pavement material and cleanup of the site, but only to the extent directed, approved and accepted by the Department.

8.3 MEASUREMENT AND PAYMENT

Measurement, when accepted and approved, for restoration at the specified locations, will be made based on each borehole restored, but only to the extent directed, approved and accepted by the Department.

The Department shall make payment to Contractor at the Contract Unit Price bid per each borehole for Contract Item, “Restoration,” which price and payment will constitute full compensation for furnishing all labor, material, equipment, supplies and all necessary incidentals required to satisfactorily complete this item of work. The Department shall not make any payment to Contractor for restoration that has not been directed, approved and accepted by the Department.