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**PART 1 - GENERAL**

**1.1 DESCRIPTION**

A. Work Included

Work under this SECTION covers requirements for materials, tools, equipment, and services necessary to complete the filling of shafts for this project. The work shall include, but is not necessarily limited to, completion of the following work:

1. Excavation
2. Conveyance
3. Placement of materials
4. Grouting
5. Discharging water
6. Site grading

**1.2 QUALITY ASSURANCE**

- A. Contractor shall use adequate numbers of skilled workers who are thoroughly trained and experienced in necessary crafts and who are completely familiar with specified requirements and methods needed for proper performance of work of this SECTION.
- B. Contractor shall use equipment adequate in size, capacity, and numbers to accomplish work in a timely manner.
- C. Contractor shall comply with requirements of governmental agencies having jurisdiction and with directives of Engineer and Division.

**1.3 JOB CONDITIONS**

- A. Any known shaft openings have been identified on the Plan Sheets. Unknown shafts, not shown on the plans may be discovered during construction. Contractor should recognize that additional unidentified openings may be encountered at the site.
- B. The Project site is situated in an area where underground coal mining was conducted. There is a possibility that mine drifts or additional shaft openings are present on site. Contractor shall exercise reasonable caution in recognition of this potential hazard. Contractor should also recognize that the soil around the shaft may be very unstable.

**1.3 SUBMITTALS**

- A. Weight tickets and/or shipping tickets for Rubble Fill Material and Granular Backfill Material delivered to site.

**1.4 SITE DISTURBANCES**

- A. Contractor shall take precautions, so equipment and vehicles do not unnecessarily disturb or damage existing grading or other site improvements.
- B. Contractor shall repair any damaged haul roads.

**PART 2 - PRODUCTS**

**2.1 FILL MATERIALS**

A. Rubble

Rubble shall consist of fragments of rock or masonry crumbled by natural or manmade forces. The size of the rubble shall be angular and equal to or larger than IDOT Item 4130.04, Erosion Stone (a nominal six (6) inch mixture). The maximum size will depend on the size of the shaft opening, placement method, and other factors.

B. Granular Backfill Material

Granular backfill material shall consist of a well-graded material similar to IDOT Type 4120.

C. Select Borrow Material

Select Borrow Material shall consist of cohesive material that will support vegetation.

**2.2 SITE MARKER**

A. A site marker will be placed adjacent to the closed shaft and shall include the following:

1. A steel pipe to be filled with concrete that is at least six (6) feet long and four (4) inches in diameter.
2. A brass plate inscribed with the year erected and the project name, along with the name and phone number of the Division (515-281-4246). The brass plate shall be one (1) inch wide by six (6) inches long.
3. A steel line t-post that is at least seven (7) feet long.

**PART 3 - EXECUTION**

**3.1 SURFACE CONDITIONS**

- A. Contractor shall examine areas and conditions under which work of this SECTION will be performed. Contractor shall correct conditions detrimental to timely and proper completion of work and cannot proceed until unsatisfactory conditions are corrected.

**3.2 CARE OF WATER**

- A. Contractor shall provide and maintain at all times during construction, ample means and devices with which to promptly remove and dispose of all water from every source entering the excavation as is necessary to complete the work. Contractor shall dewater as is necessary to allow for proper performance of the backfill that will reduce future subsidence. All water shall be neutralized as needed and discharged to approved drains or channels in accordance with NPDES requirements. These standards are specified in SECTION 02210 NEUTRALIZATION AND DISCHARGING OF ACID IMPOUNDMENTS.

### 3.4 EXCAVATION

- A. Contractor shall excavate materials encountered within limits of work that will allow for safety, placement of machinery, and fill placement.
- B. Contractor shall excavate around the entrance of the shafts as is needed to allow for placement of fill materials and as shown on the Plans. In general, the excavation should extend to the bottom of the entrance such that the bottom width is two (2) feet wider than the existing opening.

### 3.5 FILL PLACEMENT AND COMPACTION

- A. Contractor shall place Rubble Fill Material in the shaft to the depth from the surface as shown on the plans in such a manner as to avoid displacing materials located in the walls of the shaft. This may require the use of a conveyor or tremie to place the material. Other methods approved by Engineer may be used.
- B. Contractor shall place the rubble fill material within the excavation so that the material extends at least one (1) foot above the estimated mine roof and no more than four (4) feet from final grade, or as otherwise directed by the Engineer. The material shall be compacted every five (5) feet of material placement using the bucket of the excavator when practical.
- C. Contractor shall place a minimum of two (2) feet of Granular Backfill above the mixture of Rubble Fill Material, or as otherwise shown on the Plans or as directed by Engineer. Where possible, the Granular Backfill shall be compacted in place for every two (2) feet of material placed with the flat portion of the bucket of a hoe or similar equipment.
- D. Contractor shall place a minimum of two (2) feet of Select Borrow Material above the Granular Backfill Material or as otherwise shown on the plans or directed by Engineer. Contractor shall overfill the area a minimum of one (1) foot or as otherwise shown on the plans to allow for settlement. Contractor shall shape the final grade so that surface water is directed away from the abandoned mine shafts.

### 3.6 PLACEMENT OF SITE MARKER

- A. The permanent site marker shall be installed at the center of the shaft, and buried so that one (1) foot of the pipe is showing. The pipe shall be filled with grout or concrete. The brass plate shall be bent ninety degrees (90°), two (2) inches from each end to form a "U" shape. The ends shall then be forced into the fresh concrete so that the inscription is showing and the inscription will be flush with the concrete and the top of the pipe. A seven (7) foot steel t-post shall be installed within one (1) foot of the permanent site marker such that around two (2) feet is embedded in the ground.

### 3.6 MEASUREMENT AND PAYMENT

Construction cost of work included in this SECTION of the Construction Specifications shall be included in Contractor's unit prices set forth in Proposal and Schedule of Prices (Document C) for work items described below. The unit price for each of these items shall include its pro rata share of overhead so that sum of products obtained by multiplying unit prices so set forth by amount of work actually constructed, measured as described herein, shall constitute full payment to Contractor for performance of work included in this SECTION.

Measurement and payment for each work item in this SECTION shall be in accordance with following:

- A. *Fill Material, Rubble:* The unit price, to the nearest one tenth (0.1) ton, as determined by weight tickets, and shall include all materials and work required for installation of the Rubble in conformance with the details and dimensions shown on the Plans and Specifications and as approved by Engineer.
- B. *Fill Material, Granular Backfill Material:* The unit price, to the nearest one hundredth (0.01) ton, as determined by weight tickets, and shall include all materials and work required for installation of the Granular Backfill Material in conformance with the details and dimensions shown on the Plans and Specifications or as approved by Engineer.
- C. *Fill Material, Select Borrow:* The lump sum price shall include materials and work necessary for construction of Fill Material from Select Borrow which will include discharging water, fill placement and grading.
- D. *Site Marker:* The unit price shall include the cost of all materials and labor to install the site marker, including, the steel pipe, brass marker, concrete to fill the pipe, and steel t-posts adjacent to the marker.
- E. *Summary:* Proposal Bid Items applicable to work covered by this SECTION are as follows:

<u>Description</u>	<u>Unit</u>
Fill Material, Rubble	Ton
Fill Material, Granular Backfill	Ton
Fill Material, Select Borrow	Lump Sum
Site Marker	Each

**END OF SECTION 02230**