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June 23, 1975

COVERING MINE SHAFTS

We are submitting three different schemes with unit prices for different conditions at the various locations.

SCHEME 1.

At both Alaska and South Wilkes-Barre, the perimeter beams at the top of the shafts seem to be good enough to support adjacent prestressed box beams. With the prestressed beams situated in such a manner, the finished surface could be used in any manner, that is, parking, floor for construction, drive way, or for any other purpose. Of course, the cover could be removed at any time for access using a lifting crane. An access manhole could be provided but we feel that such a manhole encourages vandalism. It will not be necessary to anchor the prestressed beams to the existing perimeter beams because the dead weight of the beams is sufficient to provide force enough against any movement.

ALASKA

At the Alaska location there were only a few places where we could inspect the top perimeter beams, but when the entire top cover is removed along with the steel headframe and cage area, the remainder of the perimeter beams might show deterioration and in this event, provisions should be made in the contract to remove the old concrete and replace it with new reinforced concrete. Our estimate for the removal of the old concrete would be \$60.00 per cubic yard, and its replacement with new concrete with an approximate by 4" rectangle reinforced cast in place reinforced concrete beam including the reinforcing would be \$275.00 per cubic yard. The dimensions you have shown on the shaft are inside dimensions, and the beams should bear to the outside of the perimeter beams in each direction. The prices shown below include neoprene 60 diameter bearing pads, with continuous neoprene sponge

Sheet 2 of 4

rubber at the outside edges of the beams to prevent the intrusion of water or foreign materials.

Removal of steel and cages.....	\$12,000.00
1280 sq. ft. supply and erect prestressed beams.....	\$23,620.00
Slope earth around shaft to provide drainage.....	\$ 4,160.00

TOTAL \$39,780.00

SOUTH WILKES-BARRE

The perimeter beams at the top of the shaft seem to be in excellent condition and are adequate to carry the adjacent box beams to close the shaft. The brick building on the North side of the shaft surrounding approximately half the shaft should be removed. The final grade of the top of the shaft cover would be approximately 6 feet above the sidewalk elevation. The brick building must be demolished carefully so that the debris will fall to the outside so the shaft will be as clean as it is at the present time.

Removal of brick building.....	\$16,700.00
1080 sq. ft. prestressed beams fabricated & erected.....	\$36,200.00
Slope for drainage.....	\$ 7,200.00

Total \$60,100.00

DIAMOND TRIPP # 1

At this location a large portion of the shaft was covered at a previous time with a light covering and the remainder of the shaft is enclosed by a small brick building so that none of the top shaft perimeter beams could be inspected and neither could the condition of the shaft be examined. The officials of the Department explained that they contemplate slushing the mined areas north of the shaft to prepare the area either for housing or an industrial site. There is a possibility that should the shaft be backfilled that the movement of mine water adjacent to the shaft would cause continued subsidence in the backfilled shaft area or cause the mine water to surface elsewhere as it does in the Girardville area. Access to the shaft could provide a proper location should pumping be required at a later date. Again covering the shaft with prestressed beams would eliminate a hazard, be a permanent solution, and they could be removed at anytime necessary. It would certainly be a more costly solution than a backfill but it better meets all the required conditions. This would certainly be a Department decision.

Sheet 3 of 4

The demolition work required at this location would be about half that necessary at the South Wilkes-Barre location, and while the shaft area is approximately the same, this site would require approximately \$8,000.00 less than South Wilkes-Barre. This estimate is predicated on the perimeter beams at the shaft being in a satisfactory condition to support the prestressed beams.

SCHEME 2.

WADESVILLE

At this location on the West side of St. Clair borough, the ground below the perimeter beams subsided and two large portions of the perimeter beams are jammed in the top of the shaft opening. It will be necessary to remove the debris. In this scheme, after the debris is removed a temporary platform of precast hollow core concrete would be used as a closure over the shaft to prevent the entrance of any debris entering the shaft, then excavate approximately 7' wider from the top of the rock at the shaft for the entire height of the slope on the four sides of the shaft, the top of the rock would be cleaned around the perimeter of the shaft. Timber 8" x 8" would then be placed around the perimeter of the shaft and adjusted level using a cement grout. The area back of the beams would be cast using reinforced concrete. If the rock is not firm we would need cast a reinforced concrete beam approximately 2' x 4' in sections. After the concrete is cured, the concrete bearing pads would be placed and the neoprene sponge at the extremities of the beams, and then the prestressed beams would be lowered into place. The temporary hollow core cover would be removed progressively as the larger prestressed beams are lowered into place. The shear keys of the adjacent box beams would then be grouted to assure that no head of water be accumulated from ground water there would be two 3" drainage holes at different locations in the beams. To prevent blockage of the drainage holes, a waterproofing membrane directly on top of the beams, then 2' of 2B stone, then roofing paper on top of the stone to prevent the intrusion of the earth backfill, and than backfill with the surrounding earth backfill to a proper contour for both drainage and appearance should the owner of the shaft ever want access to the shaft, he would remove the backfill to the beams, and remove the beams. To close the shaft again, he could replace the same beams and backfill. This method is shown on drawing sheet 1 of 3.

Estimate of Scheme 1 - Wadesville

Mobilize.....	\$ 9,000.00
Remove concrete debris.....	\$ 6,000.00
Place temp. hollow core -1080 sq. ft. @ 5.00.....	\$ 5,400.00
Excavate.....	\$17,000.00
1700 sq. ft. wood timber & concrete.....	\$11,000.00
Place prestressed beams.....1700#.....	\$59,285.00
Backfill.....	\$ 8,750.00

TOTAL \$116,435.00

Sheet 4 of 4

If the rock at the top of the shaft is seamed and pitching toward the shaft, then 10 foot deep dowels should be drilled into the rock and grouted. These dowels in place would cost about \$28.00 each. Then a grade beam should be placed on top of the rock around the perimeter of the shaft as shown on sheet 2 of 3 of the drawings at a cost as shown on the first pages of this estimate.

SCHEME #3.

WADESVILLE

Our investigation of the cost of this scheme shows that it is far more expensive than Scheme #2 for Wadesville and should only be used where the rock adjacent to the shaft has no bearing capacity, or where the rock stands at 90° and is very seamy.

We found that the present day drilling costs for a 12" hole is \$15.00 per foot, and for larger diameters it jumps rapidly to \$40.00 per foot. We estimated roughly that the piling should be at 3'-0" centers for 12" and temporary casing should be used in soil down to the rock elevation. The 12" casing approximates \$14.00 per foot then it will require no less than \$8.50 per foot for longitudinal and spiral reinforcing, concrete, and pic strands for post-tensioning. Should we be unable to extract the casing as the concrete is poured the piling cost per foot would be \$15.00 + \$14.00 + \$8.00 = \$37.00 per foot.

The total piling would be-

$$\frac{((180 = 70) + 1) \times 30}{3} = 5040'$$

Piling Cost	5040 x 37.00	= \$186,840.00
Grade Beams	$\frac{500 \times 4}{27} \times 275.00$	= 20,625.00
Beams & Erection		= 250,000.00
Excavation		= 25,000.00
Backfill		= 5,000.00
Mobilize		= 9,000.00
Remove Debris		= 6,000.00

ROUGH TOTAL \$502,465.00