PAYMENT PROVISION AS SEEN BY THE OWNER

Discussion by Richard A. Kaden*

The authors for all the papers presented in Session V, PAYMENT PROVISIONS, are to be congratulated on the content of their papers and on their challenge to solve a practical problem that faces both the contractor and owner. Dollars is the name of the game and a fare and equitable price is the goal of all specifications without additional costs for disputes and claims. I feel that there is an alternate to Mr. Lynch's suggestion of a line item, say, "Tunneling by the Lineal Foot." In addition, this proposal provides the contractor with adequate compensation for material costs due to extensive overruns when unknown conditions are encountered, thus eliminating a degree of risk. In the past I have used the following method successfully from the standpoint of the owner for a variety of types of construction and submit it now for your consideration.

The Special Provisions for our Government contracts provide the following paragraphs:

VARIATIONS IN ESTIMATED QUANTITIES - SUBDIVIDED ITEMS (1965 DEC OCE)

This clause is applicable only to the items listed herein.

(a) In order to permit the contractor to distribute his indirect costs properly to Items Nos. ________, these items have been subdivided into two or more sub-items. All the contractor's indirect costs for each of these items will be

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included in the bid price for the first sub-item listed under the respective item. Variation from the estimated quantity in the actual work performed under any second or subsequent sub-item or elimination of all work under such a second or subsequent sub-item will not be the basis for an adjustment in contract unit price.

(b) If the parties fail to agree upon the adjustment to be made, the dispute shall be determined as provided in CLAUSE: DISPUTES of the GENERAL PROVISIONS. (ECI 7-671.7)

Reference: 7-671.7 Variations in Estimated Quantities - Subdivided Items.

(a) The clause may be used only in contracts for foundation excavation, grouting, subsurface exploration, and the like in which all of the items of work are estimated quantities, the extent of the work is necessarily determined as the work progresses, and material variations from prior estimates of quantities may be anticipated. Each item shall be listed in sub-paragraph (a) and shall be divided into two or more subdivisions in the Bidding Schedule. The first subdivision will reflect the minimum quantity of work that can be expected to be accomplished under the item and the following subdivisions will reflect additional increments of work sufficient to include the total quantity reasonably anticipated. When it is not practicable to specify any reasonably expected minimum quantity of work under an item, the first sub-item should only be mobilization and demobilization of the plant required for the
particular class of work, with the following sub-items reflecting the quantities of each type of work, which may or may not be required.

This procedure allows the designer to group related items of work under a single collective description such as shown below.

**EXAMPLES**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Estimated Unit Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>Foundation Drilling and Grouting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Mobilization and Demobilization for Drilling and Grouting</td>
<td>1 Job</td>
<td>Sum</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>b. Drilling Grout Holes</td>
<td>Lin. Ft.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>c. Drilling Drain Holes</td>
<td>Lin. Ft.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>d. Placing Grout</td>
<td>Bag</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>e. Connections to Grout Holes</td>
<td>Each</td>
<td>$ 5.00</td>
<td>$800.00</td>
<td></td>
</tr>
</tbody>
</table>

**OR**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Estimated Quantity</th>
<th>Unit</th>
<th>Estimated Unit Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1*</td>
<td>Rock Slope Stabilization Using Conventional and Steel Fiber Shotcrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a. Mobilization, Preparatory Work, and Demobilization</td>
<td>1 Job</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>b. Rock Bolts</td>
<td>Ea.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>c. Wire Fabric Reinforcement</td>
<td>S.Y.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>d. Shotcrete Placed on Wire Fabric</td>
<td>S.Y.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>e. Steel Fibrous Shotcrete</td>
<td>S.Y.</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>f. Steel Fibers for Shotcrete</td>
<td>CWT</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>g. Portland Cement</td>
<td>CWT</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
<tr>
<td></td>
<td>h. Accelerator Admixture</td>
<td>CWT</td>
<td>$_______</td>
<td>$_______</td>
<td>$_______</td>
</tr>
</tbody>
</table>

*NOTE: The items may be described for types of excavation, types of final linings, architectural items, etc.*
Now consider the mechanics of how the approach of a multiple-split item is administered. The Special Provisions state "...All the contractor's indirect costs for this item will be included in the bid price for the first sub-item listed under the respective item...." Thus, line item la. will include a lump-sum cost for the work described, plus all indirect costs for the remaining sub-items. This accomplishes two things: (1) it provides the contractors with payment for the Item No. la. work, and (2) it provides early money for indirect costs on subsequent sub-items, and thus supplements the contractors cash flow. The Special Provisions go on to state "...Variation from the estimated quantity in the actual work performed under any second or subsequent sub-item or elimination of all work under such a second or subsequent sub-item will not be the basis for an adjustment in the contract unit price...."

The next consideration is the "Measurement and Payment" section. Standard wording for Item No. la., and a subsequent item for shotcrete may be as follows.

**MEASUREMENT AND PAYMENT.**

a. Mobilization, preparatory work, and demobilization will be measured for payment as a lump-sum item (job). Payment will be made at the applicable contract lump-sum price for Item No. la., "Mobilization, preparatory work, and demobilization," which price and payment shall be full compensation for mobilization and demobilization of equipment for installation of rock bolts, placing shotcrete, and as required for performance of work required under this contract. All cost of scaling
required for safety or preparation of rock surface for shot-
creting including removal and disposal of scaled materials and
rockfall material, will be paid for as incidental to Item No.
1a. Removal of existing fencing shall be performed as prepar-
atory work and will be paid for as incidental to Item No. 1a.
Fencing material shall become the property of the contractor
and shall be completely removed from the site. Sixty percent
of the applicable contract lump-sum price will be paid follow-
ning completion of moving onto the site, completion of agreement with
railroad (including indemnification), complete assembly in work-
ing order at the site of all equipment necessary to perform the
required stabilization of rock slopes, and completion of pre-
paratory work prior to work of installation of rock bolts. The
remaining 10, 15, 25, or 40 percent of the contract lump-sum
will be paid when all equipment has been removed from the site,
restoration of the site has been approved, and demobilization
is completed.
b. Rock bolts........
c. Wire fabric reinforcement........
d. Shotcrete placed on wire fabric will be measured for payment
as the number of square yards of slope satisfactorily covered
with shotcrete in accordance with the specifications. The area
will be measured on a plane surface parallel to the average
finished shotcreted surface. Payment will be made at the appli-
cable price per square yard for Item No. 1d., "Shotcrete placed
on wire fabric," which price and payment shall be full compensation for furnishing all equipment, labor, and materials to place conventional shotcrete, excepting cement to be measured for payment separately.

In closing, I wish to stress two thoughts. First, payment of shotcrete by the square yard may be made as respective sub-items with varying depth ranges, i.e., 2-1/2 inches to less than 5 inches, and 5 inches and more. Secondly, the theoretical shape or average plane of the surface to be covered with shotcrete must be defined in the Measurement and Payment section in order to establish a meeting of minds for the required contract work.
Commentary on Discussion by Mr. Richard A. Kaden

Mr. Kaden's proposal to utilize subdivided items under the Variations in Estimated Quantities clause in lieu of the "tunneling by lineal foot" method of payment is not satisfactory from my point of view. The purpose in specifying payment for shotcrete in the lineal foot of tunnel excavated is to assure a sharing of the risk for the work required. Mr. Kaden's method as in the unit price method simply pays the contractor for all work done without having some assurance that overbreak was controlled, rebound was minimized and well qualified nozzlemen were used.

I see no difference basically with the square yard method of measurement for shotcrete as compared to the per lineal foot method. The contractor applies the quantity necessary to satisfy the design thickness in either method; therefore either would be acceptable.