PAYMENT PROVISIONS FOR SHOTCRETE AS SEEN BY THE OWNER

By FRANK L. LYNCH

The Washington Metropolitan Area Transit Authority (WMATA) officially came into existence in February 1967 after the District of Columbia, Maryland, and Virginia joined in a compact pursuant to Federal creative legislation signed the previous November to build a regional rapid rail transit system called METRO (1, 2).

"Because of the Authority's origin, the sensitive nature of the compact among the several sovereign jurisdictions, Federal financing of two-thirds of the costs, and the resultant surveillance by the General Accounting Office over staff operations, the Authority's procurement practices follow closely Federal Regulations adapted to WMATA's needs. This is an important point and is the foundation of contractual relations between the Authority as the owner and its construction contractors (2)."

Of the 98 miles (157 kilometers) in the Adopted Regional System, approximately 47 miles (75 kilometers) are subway, including 15 miles (24 kilometers) of single and twin rock tunnels. The rock tunnels are in the north-south Rockville Line, approaches to and under the Potomac River, and the north end of the Glenmont Line (2).

Metro's first rock tunnel construction began in mid-1970 with a 4000 feet (1290 meters), double track section extending along Connecticut Avenue from Dupont Circle to Rock Creek Park. Three additional sections were begun in 1971 including Dupont Circle and Rosslyn Stations, and tunnels beneath the Potomac River to Rosslyn in Virginia.

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Another section began in April 1973 extending the tunnels from Rock Creek along Connecticut Avenue to Yuma Street with subsequent sections from the Yuma Street connector tunnels up Wisconsin Avenue through Tenley Circle, Friendship Heights, Bethesda, the Medical Center and finally portalling out at the Beltway I-495. Beginning next year 7 stations will be under construction requiring deep rock excavation methods, with shotcrete incorporated into the permanent support system.

Since the early contracts of six years ago, we have attempted to reduce the contractual difficulties by revising the contract specifications. Experience in administration and management of Metro construction contracts, studies and recommendations by consultants, and input from construction contractors have all lead to a continuing evolution of those contract clauses which are highly sensitive to the contractual relationships between the Authority and the contractors.

In the beginning there was a general lack of experience in the Authority with rock tunnel construction and certainly in the use of shotcrete. This inexperience naturally affected the formulation of the bidding documents. Because we are addressing shotcrete this evening, formulation of shotcrete specifications and more specifically the payment provisions as originally specified, promoted waste and cost overruns totaling in the millions of dollars. Even the basic requirement of providing reasonably accurate quantity estimates of shotcrete was lacking.

Large overruns due to overbreak, rebound and changes in tunnel support methods necessitated that the Authority take a real good look at its then present specifications. Payment for shotcrete was based
on the number of cubic yards shot through the nozzle with the owner paying for (1) filling any overbreak areas behind the steel ribs; (2) rebound of any magnitude; and (3) the contract required shotcrete lining. If the shotcrete quantity was inaccurate ± 15% of the original bid amount, the variation of estimated quantities contract provision dictated that negotiations could be requested by either the contractor or owner to arrive at an equitable settlement for the added or reduced cost. Essentially, the owner was shouldering the entire risk and picking up the entire tab for the cost. This situation obviously provided little incentive to the contractor to be as cost conscious as possible.

The Authority then proceeded to evaluate various means of providing equitable payment for shotcrete and at the same time sharing the risk of the work with the contractor. This review led to a decision to have shotcrete included in the price per linear foot of tunnel or station constructed. The price would include excavation, temporary support, structural steel permanent support, drainage system, permanent lining, grouting and shotcrete. Initially there were complaints of shifting the risk fully to the contractor. Subsequent bidding and construction indicate significantly improved blasting procedures have been incorporated by the contractors with less overbreak and shotcrete required to perform the work. On jobs where excessive rebound has occurred the contractor thus has the incentive to employ the best nozzlemen and utilize the best shotcrete application procedures.

One contractor has gone so far as to set up a shotcrete school for his employees on the jobsite prior to placing shotcrete. The Resident Engineer's staff was invited to attend with the result of
having personnel better qualified and more interested in their work.

Tonight the contractor's position has been that payment through the nozzle is fair if good nozzlemen are used, rebound measurements are taken, reasonable strengths are required and mutual trust between the parties exists. The "ifs" of his statement are however usually intangible and with the exception of requiring reasonable strengths, I as the owner would rather share the risk of these intangibles with the contractor. We are closely evaluating our shotcrete strength requirements and hope to have in the near future an updated position on shotcrete strengths.

In closing I must say that as an owner's representative, there is no desire to impose unreasonable risks on the contractor. If the linear foot method of payment is in fact causing financial losses to your operations, I'd like to hear from you personally. We want you to make a profit on work well done, because frankly, if you are good we want you back again.

Thank you for the opportunity to present my views.

REFERENCES

(1) Public Law 89-774, 79 Stat 663, signed November 6, 1966.