himself is not entitled to any salary. In the case of a firm being the contractor, the head of that firm should receive no salary; but if any of the juniors devote their time exclusively to the job, it would be legitimate to allow them reasonable salaries, equivalent to what would have to be paid to regular assistants. All such matters, however, should be stipulated in the contract.

In order to determine, after the entire job is finished, the amount due the contractor, the actual quantities of materials recorded are to be multiplied by the unit prices named in the contract, and to the sum of these is to be added the value of all unclassified work (usually denominated "extras"); then from the sum is to be subtracted the lump sum named by the bidder and incorporated in the contract. The ratio which this difference (either a positive or a negative quantity) bears to the said lump sum named by the contractor in bidding is to be figured and adopted in the employment of the diagram of "corrective ratios" for the said difference.

Application of Corrective Ratio

There are two reasons for applying this corrective ratio. First: in the case where the actual quantities of materials exceed the estimated ones of the specifications, it would be
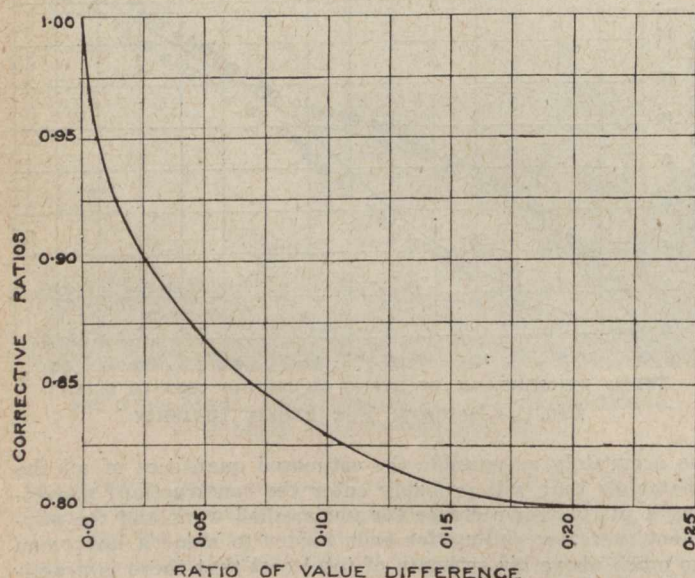

FIG. 2—DIAGRAM OF CORRECTIVE RATIOS

hardly fair to the client to apply to the excess those unit prices which produce his tentative limiting expenditure. Second: in the case where the actual quantities of materials are less than the estimated ones, it would be unjust to the contractor to use the high unit prices on the diminution quantities, not only because of the great difference between these and the unit actual-costs, but also for the reason that the total overhead charges would be about the same for the estimated total quantities as for the diminished amounts.

In the corrective-ratio diagram it will be noticed, that, after the ratio of value difference (due to increase or diminution of quantities of materials) reaches 0.2, the "corrective ratio" remains constant at 0.8, which corresponds approximately to actual cost conditions. The object of this is to provide that the contractor shall not be too much benefited by an abnormal increase in quantities, nor, on the other hand, shall he obtain too much advantage because of an abnormal diminution thereof.

To utilize the corrective-ratio diagram, look on the line of abscissae for the ratio of cost difference, pass vertically upward to the curve (or right line, as the case may be), then horizontally to the extreme left vertical, which will indicate the corrective ratio required. Next multiply the previously computed difference by this corrective ratio and add the result to or subtract it from the limit stipulated in the contract. The result will be the corrected limit, from which must be subtracted the total cost so as to determine

the amount of profit to be divided between the contractor and the client, as per the profit diagram.

In order to show the *modus operandi* of this method of profit-sharing, let us assume the following case, in which the estimated quantities are exceeded.

Lump-sum limit tendered $1,700,000
Value of total work done per unit-price
    list and clause re unclassified work 1,855,000
Total cost of work 1,575,500
Difference = $1,855,000−$1,700,000 = $155,000.
Ratio of difference = $155,000÷$1,700,000 = 0.091.
From Fig. 2 we find the "corrective ratio" to be 0.833; then the corrected difference = $155,000×0.833 = $129,115.
Corrected limit = $1,700,000+$129,115 = $1,829,115.
Profit = $1,829,115−$1,575,500 = $253,615.
Percentage of total profit = $25,361,500÷$1,575,500 = 16.1

From Fig 1, we find the division of this profit to be as follows:—
Contractor 9.4%
Client 6.7%
Total payment to contractor
  = 109.4×$1,575,500 = $1,723,597.
Now let us investigate a case in which there is a diminution in the estimated quantities of materials.
Lump-sum limit tendered $1,700,000
Value of total work done per unit-price
    list and clause re unclassified work 1,615,000
Total cost of work 1,310,000
Difference = $1,700,000−$1,615,000 = $85,000.
Ratio of difference = $85,000÷$1,700,000 = 0.05.
From Fig. 2 we find the "corrective ratio" to be 0.87, then the corrected difference = $85,000×0.87 = $73,950.
Corrected limit = $1,700,000−$73,950 = $1,626,050.
Profit = $1,626,050−$1,310,000 = $316,050.
Percentage of total profit = $31,605,000÷$1,310,000 = 24.1.

From Fig. 1, we find the division of profit to be as follows:—
Contractor 12.05%
Client 12.05%
Total payment to contractor
  = 1.1205×$1,310,000 = $1,467,855.

Advantages

The advantages of this method of contract-letting are as follows:—

First.—While it is true that the client at the outset does not know exactly what the work is going to cost him, he is positive that it will *not* cost him more than a certain amount, provided that his engineer's estimate of quantities of materials is about right, as, generally speaking, it certainly ought to be.

Second.—The client has the satisfaction of feeling that, even if, in his opinion, the limit bid by the contractor is excessive, and that the profit on the job in consequence, will be too large, the said profit will be shared between them on a fifty-fifty basis.

Third.—All the advantages of competitive bidding are retained by this method of tendering, because all that a bidder has to do is to name a limiting lump sum with certain unit prices, and to make sure that the latter, when properly applied to the quantities of materials given in the specifications, will produce a total value equal to the said limiting lump sum. All bids will be upon exactly the same basis, no modification of the stipulated method of tendering being permitted, hence the selection of the bidder will be governed solely by the lowest lump sum named, provided, of course, that the one tendering it possesses the necessary experience, capital, plant, and general reputation for doing good and satisfactory work.

Fourth.—The contractor, if he was not too keen in bidding, knows that there is almost no chance whatsoever of his losing money on the job, and that the harder and the more intelligently he works the greater will be his profit.

Fifth.—The division of total profit given in the profit diagram is eminently equitable, in that, when the amount is small, nearly all of it goes to the contractor, and, as it augments, a continually increasing proportion of it goes to