

should be in a position to order their replacement by acceptable men. Order at all times should be obtainable upon direction of the engineer, and the Contractor should be required to so conduct himself and his employees that the interests of other Contractors will not be prejudicially affected.

But while these powers of direction should be secured to the engineer, it is possible to go too far in this respect. Beyond a certain degree of control the Contractor ceases to be an independent Contractor at all, and becomes merely the agent of the Owner. The latter then becomes responsible for the acts of the Contractor, who is under these conditions nothing more than the Owner's "other self." A typical clause of a specification, quoted by Mr. Daniel J. Hauer in the Journal of the American Society of Engineering Contractors for December, 1910, which confers on the engineer powers transforming the Contractor into the agent of the Owner is as follows:—

"The engineer shall have entire charge of all forces employed under this contract, and shall direct their work and disposition, and shall order such forces increased or diminished as he shall deem expedient."

(7) **Alterations.**—The right to make such alterations or modifications in the plans or specifications as may appear desirable should be conferred on the engineer by the contract. It does not follow that these changes should be executed by the Contractor without extra charge, however, or that they should be considered as covered by the original contract. The limit of magnitude of alterations permissible without involving a modification of the contract should, therefore, be specified.

Where the changes are slight and do not necessitate a very much longer time for the execution of the work as a whole than was originally contemplated, it should be possible for the engineer to order changes, granting to the Contractor, where he thinks proper, extra remuneration or extension of time. If the changes are only of a trifling nature, not involving increased cost or additional time for execution, it should be permissible for the engineer to secure them without any extras or extension of time. In no case should the Contractor be allowed to make a claim for anticipated profits in case of a reduction in the amount of work.

In case extensive alterations are necessary, such, for example, as the relocation of a line of railway through new country, the Contractor should be entitled to demand a change in the contract or a supplementary contract to cover the new conditions. Likewise, if projected changes involve a change in the value of the work of over a certain percentage of the original tender price, the old contract should be altered. Large changes in quantities sometimes affect the unit prices for which work may be done to such an extent that a new contract would be the only fair method of dealing with the situation.

(8) **Extra Work.**—Any excess of the quantity of work as actually executed over the work as defined in the plans and specifications is called extra work. Such work is usually paid for at certain prices stipulated by the Contractor in his tender or fixed by the engineer in the specifications or notice to bidders. In case the work is reduced in quantity it is customary to specify that the Contractor's remuneration shall be diminished in accordance with the reduction in quantities and the unit prices for extras, or perhaps these prices reduced by 10 or 15 per cent.

Perhaps no single consideration pertaining to construction contracts is more provocative of disputes and

litigation than the question of extras. The Contractor who has bid too low endeavors to the utmost of his ability to establish claims for extras in the effort to extricate himself from imminent financial loss. As a sort of safeguard against a possible error in his tender the Contractor will, if permitted, name high unit prices for extras, which, while not taken into account in comparing the tenders, may stand him in good stead if he is successful in establishing extras. The practice of the engineer fixing the extras is thus calculated to materially reduce the cost of the work.

In addition to this precaution, the engineer needs to exercise great care in framing all the clauses of the specifications which have any bearing on the question of extras. As a necessary condition to the consideration of any claim for extras, the Contractor should be required to show the written authority of the engineer. It should be distinctly understood in this connection that assent to alterations by the engineer does not constitute a sanction for extras. Some engineers, with good reason, require claims for extras to be presented monthly, so that the question may be investigated while the matter is fresh in mind, and perhaps before the work is rendered wholly inaccessible. Remuneration for extras must be determined by the engineer on the basis of the measured quantities and the prices fixed in the contract. The engineer should not be allowed to fix the prices of extras, since such procedure is illegal. Any work not foreseen in the list of extras inserted in the contract should be covered by Force and Material Account. In this way the Contractor is assured of the cost plus a fair profit, and the engineer may in a measure control the cost by requiring accurate account of the time of workmen and quantities of materials put into such special work.

(9) **Duration of Contract.**—In most contracts time is declared to be of the essence of the agreement, which signifies that there must be a prescribed time for commencement, a time for completion, and perhaps also a specified rate of progress. Without the latter it is difficult for the Owner to cancel the contract on the ground of slowness in the prosecution of the work, since this would only be possible by proving that the Contractor could not by any human means finish on time—manifestly a difficult thing to do. The effect of unusually adverse weather conditions, alterations and delays on the time of completion should be definitely covered. Slight alterations, not entailing extra work, should not entitle the Contractor to an extension of time unless the engineer judges such to be warranted. Where the Owner suspends or delays the work, it may be only common justice to not only grant an extension of time equal to the delay, but some extra allowance or compensation for the loss attending the tie-up of the Contractor's plant and organization during the delay, and for the interference with subsequent work to be undertaken by the Contractor.

(10) **Powers of the Engineer.**—If the Owner is to be assured of reasonable progress and despatch in the work, there must be one individual in supreme control, and that person the engineer. Questions of a purely business character might be satisfactorily settled by others, but all matters involving technical details should be subject to the final decision of the engineer in charge, who, for convenience, is usually the engineer who prepared the plans and specifications. Only an engineer, or his representatives, should, for example, be allowed to interpret the plans and specifications, or to pass on questions of measurement, classification or quality, or to make alterations or order extras. No one but an engineer should be given the power of general direction