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STORAGE DAM AT EUGENIA FALLS

PLANT AND METHODS EMPLOYED IN THE CONSTRUCTION OF THE CONCRETE-STEEL SECTION OF DAM ON BEAVER RIVER FOR THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

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IN estimating the cost of carrying out any construction project two factors of the greatest importance are the time in which the work must be completed and the plant to be employed. These two factors are practically analogous, as, of course, the capacity of the plant governs the time required. If the capacity of any unit is not as great as was estimated, moreover, there is a grave probability that the other units of plant may be delayed in employment, and while their capacity may be as large as estimated, they may be unable to carry the extra load occasioned by the delay of some one unit, and the whole schedule of operations may therefore be completely disorganized. As the "overhead" charges, such as superintendence, maintenance of plant, etc., are all based on the estimated duration of the work, they immediately start to increase as a relative percentage of the other work, and the contractor's estimate of profit is possibly absorbed in the process.

In the old days of contracting when manual labor was largely employed, there was less liability for an error in judgment with regard to the time and cost, as the forces employed were much less complex, and more laborers could be easily added or more work could be produced by better management from a given number of men. In modern contracting, however, when the plant is once installed the time and expense of replacing any units which may fall below their estimated capacity will in all probability eat up the profit and possibly more, so that it is of great importance that first calculations be on the safe side, and a considerable margin be allowed for contingencies.

With the above preamble, the writer begs to call attention to a contract for the construction of a concrete-steel dam of the Ambursen type for the Hydro-Electric Power Commission of Ontario, which is now nearing completion. The work is located at Eugenia Falls, Ontario, about eighty-five miles west of Toronto, and about thirty miles east of Owen Sound, the site of the dam being about seven miles from the railroad. The dam will furnish storage for a power development on the Beaver River, which is being constructed and will be operated by the Hydro-Electric Power Commission. The total length of the structure is approximately 1,900 feet, of which 1,260 feet is Ambursen section and 640 feet is earth embankment with concrete corewall about equally divided at both ends. The Ambursen section is approximately 51 feet high from bottom of cut-off to top of crest at the highest section; the total concrete required for the entire work being about 10,000 cu. yds., practically all of which is in comparatively thin reinforced sections, and distributed over a large area. The stripping of the site involved about 14,000 cu. yds. of earth excavation and about 2,500 cu. yds. of rock, principally in the cut-off trench, which is in a stratified and seamy limestone and which has an average depth of about ten feet.

The contract for the construction of this dam was closed with the Ambursen Hydraulic Construction Company of Canada, Limited, in the latter part of June of the present year, and the company guaranteed to complete the dam to within fifteen feet of the crest by December 25th of this year, so that water from the spring freshet of 1915 could be stored for power purposes, the entire dam to be completed by July 1st, 1915. The work was undertaken on a unit price basis with liquidated damages for non-completion to the elevation noted previously at the date specified. The latter stipulation required that the dam should be entirely completed with the exception of about 2,000 cu. yds. of concrete in the top lift in a period of about six months from the receipt of authority to proceed, and it was obvious that in order to accomplish this result it was very necessary not to overestimate the plant capacity.

In a general way the following plant and methods formed the basis of the estimate: A Bucyrus traction steam shovel of ⅞ cu. yd. dipper capacity for earth excavation, equipped with 1-yard capacity dump wagons; air drills of the Holman hand-hammer type for the rock excavation; a 1-yard capacity Smith mixer; a cableway of five tons capacity and about 1,325 ft. clear span of our own design, for distributing concrete and handling forms, and Dowd 1-yard capacity controllable bottom dump buckets for concrete. A guy derrick equipped with a three-drum 8-in. x 12-in. Beatty engine, with Dake swinger operating a 1-yard Hayward orange peel bucket, dredged gravel from a pit adjoining the dam, which was