DUTIES OF A YOUNG ENGINEER ON THE CONSTRUCTION OF A HYDRO-ELECTRIC PLANT*

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LET us assume that a group of financiers, becoming interested in a water power project, have engaged an engineer to investigate and report upon the feasibility of its development. The investigation has proceeded along two lines—the physical and the financial. The engineer has sent a party to the site to ascertain the available head and make the surveys necessary to determine the most suitable type of development and estimate the cost. He has collected and studied all the available data on the flow of the stream, area of watershed, runoff, etc., much of which is found in the bulletins of the Department of the Interior. From these data he has made his preliminary drawings and estimated the cost of development per horse power.

The most important part of the financial investigation is a survey of the power market. The investigator has tabulated the amount and cost of power used by the industries and utilities of the surrounding cities and towns; he has tabulated the population and from past records estimated the future growth. He has also investigated raw materials and resources that could be developed, as well

Bird's-Eye View of Development, Cedars Rapids Mfg. & Power Co.

as new industries that might be attracted by the advent of cheap and abundant power.

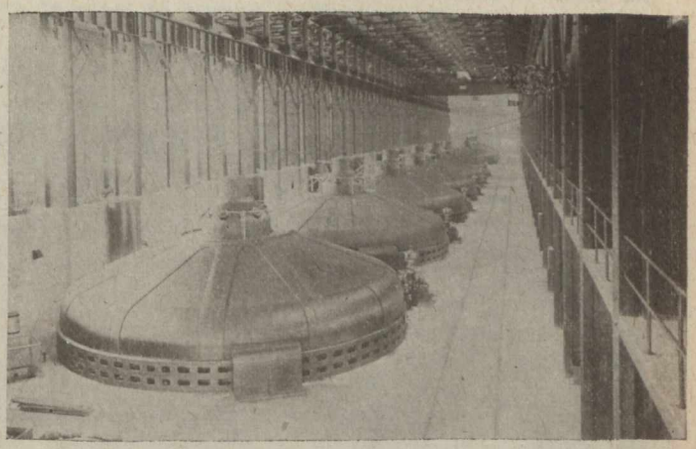
The report being favorable, the bankers decide that it will be a profitable investment and form a company which will proceed with the development. Officers and directors are elected, money raised by bond and stock issues, and an engineer with a broad experience in the design and construction of hydro-electric developments is retained.

We cannot here enter into a discussion of the design of the plant and placing of contracts, which is done in the main office and receives the personal attention of the engineer, but shall confine our discussion to the field work.

There are two general ways of handling construction: (1) Force account, by which the work is done by the company's own forces; and (2) contract, by which the work is done by an outside concern under the supervision of the company's engineers. We shall assume for the purposes of discussion that the work will be done by the former method.

The field organization will be headed by a resident engineer or manager of works and associated with him will be assistant engineers, superintendents, accountants, timekeepers, stenographers, etc.

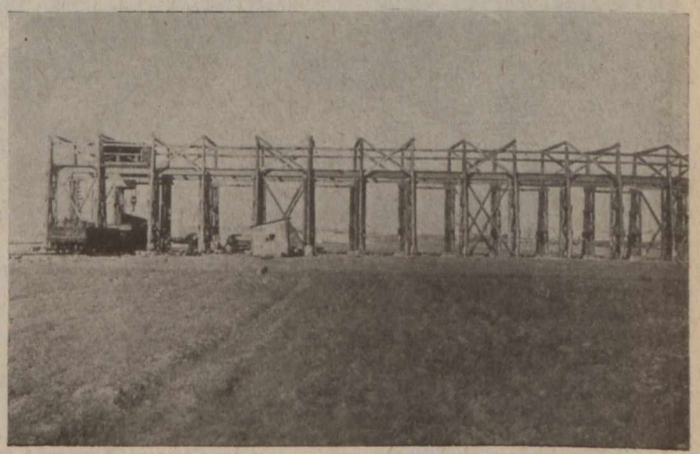
Oftentimes the site of the work is situated many miles from a railroad and the first work which confronts the engineer is the building of substantial roads of a suitable character to sustain heavy loads and continuous service during the construction period. During the early stages of the Great Western Power Co.'s development on the Feather River, California, transportation was a very serious problem, as all supplies had to be teamed twenty miles over the mountains. Later when the Western Pacific Railroad was in operation, matters were greatly simplified by the use of



Interior of Powerhouse, Cedars Rapids Mfg. & Power Co.

a cableway crossing the river, which transported materials from the railway to the work.

The layout of camps and design of buildings for housing the forces, field office, shops, storehouses, hospitals, etc., will constitute the pioneer work of the field draftsman. The technical press of late has published a great deal concerning the construction of cantonments. The construction camp is laid out on similar lines, with the same class of buildings, only on a much smaller scale. The same attention is paid to securing an adequate supply of pure water and its protection from possible contamination. Every precaution is taken to have the camp sanitary, for it is recognized that much of the success of the work depends upon the well-being and comfort of the working force. Many engineers make the mistake of huddling the buildings into a small space



Crane Runway for Handling and Storing Heavy Machinery, Cedars Rapids Mfg. & Power Co.

close to the work. Better results are attained by keeping the different classes of the organization and nationalities of labor widely separated. Sometimes permanent houses for the operators are built and occupied by the married engineers and superintendents. Every natural feature should be taken advantage of in order that the camp may be made attractive and homelike.

Before river work is started, the cofferdams are designed by the draughtsmen. Drawings should be made of any cofferdam of importance, as they facilitate construction and form a permanent record. There are many kinds and types and

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