

ment of porcelain insulators of new type, held in compression only, has been designed to fulfil the conditions.

The construction of the steel towers was started in May, 1917, as soon as the freshets were over, and the northern tower, of which a photograph is presented herewith, is now completed. The concrete work was done by day labor under the direction of H. G. Huber, superintendent of the Shawinigan Water and Power Co. The structural steel was fabricated and erected by the Canadian Bridge Co., Limited, of Walkerville, Ont.

The towers are 350 ft. high, which is approximately the same height as the main posts of the Quebec Bridge, this great height being necessary in order to get the desired clearance above water level.

Four concrete piers, sunk in caissons, form the footings for each tower. These piers are cylindrical, 11 ft. in diameter and 65 ft. deep, 40 ft. of which is below river bottom. Above the water level the piers are tied together by concrete struts, forming a square 60 ft. x 60 ft.

Active work will begin at an early date on the construction of the southern tower, and it is planned to complete the whole work during the coming summer.

### SCHEDULE OF CHARGES FOR ENGINEERING SERVICES

**R**ECENTLY Edmund T. Perkins addressed a meeting of the Illinois Society of Engineers and submitted the following schedule as a suggestion of what should constitute reasonable compensation for engineering services:—

The various services rendered are classified as follows, and are generally charged for on a percentage basis, except surveying which should be per diem: Reconnaissance, preliminary reports, surveying, plans and specifications, details, supervision and progress estimates, superintendence, alterations, professional advice, consultation, court work or arbitration.

Reconnaissance work is necessary when no data, or incomplete data, have been secured, and is preliminary to general planning of project and securing of data.

Preliminary reports are made when the necessary data on which the report is based have been secured of such detail and accuracy as to permit of proper advice being given or design made.

Surveying covers every class of field work which is not a part of reconnaissance work. It includes all location lines for roads, canals, railroads, etc., all level lines, all sinking of wells or experimental work, besides all classes of land surveying and land subdivision, and compensation therefor should be on a salary or per diem basis with expenses paid.

Plans and specifications are required as the basis for letting of contracts or for the information of the owner, employer or consulting engineer, and afford a full description of the work. They are implied by the necessities of the work even when not required by the owner, and include an estimate of the cost of the work. Plans, when adopted and approved, must be so endorsed by both owner and engineer.

Details are not always an essential of the construction work, and the rate charged, therefore, is flexible, varying with the amount of detail work.

Supervision and the making of progress estimates should always be required, that the engineer responsible

for the plans and specifications should be satisfied, by personal inspection that the specifications are fully complied with and satisfactory progress made. When superintendence is paid for, as defined in the next section, there is no additional charge for supervision.

Superintendence of construction must be had by a superintendent mutually acceptable to owner and engineer. The schedule rate for superintendence applies when the engineer who has designed and planned the work, or his assistant, superintends construction. All other employees than such assistant or assistants are to be paid by the owner.

Alterations may be required at any time by the owner, or become necessary by reason of unforeseen conditions or changes in the size of projects. The schedule rate applies to such alterations as may be required by the owner—alterations becoming necessary by reason of unforeseen conditions or accidents are covered by percentage charges on the aggregate costs.

Professional advice is always charged for according to interests involved, charges being based on value of services rendered, not on time required in arriving at conclusions or opinions.

Consultation with engineers who have made certain branches of professional work a specialty may be requested by the engineer having general charge of the work, or may be required by the owner. Charges for consultation work being based on value of services rendered, not on time required in arriving at conclusion or opinion.

Court work as an expert or as arbitrator in settlement of controversies, condemnation proceedings, etc., in the interest of the owner, is entitled to additional pay at a rate to be agreed upon.

Schedule rates cover compensation only for engineering services; that is, the services of the engineer and his engineer assistants.

All expenses incurred for materials, blue prints, or for transportation, hire of helpers, rodmen, chainmen, teamsters, conveyances, and living expenses when away from regular place of business, are a separate and additional charge against the owner, as is a reasonable charge for general office expenses.

Time of payment is according to agreement; but usually is arranged on the basis of a preliminary payment, or retainer, and an advance for travelling or other expenses aside from services; and further payments on account, if the commission extends over considerable time.

Final pay for preliminary reports is due upon presentation of report.

Final pay for reconnaissance work is due upon completion of same.

Pay for supervision or superintendence becomes due on progress estimates made for payments to contractors, or, if work is done by day labor, on monthly appraisements of work done.

All percentages are computed on the contract price or actual cost of work.

When construction covered by plans and specifications is not carried out, pay for these plans and specifications is due upon completion of the estimate of cost of work.

The several items of payment on the percentage basis become due from time to time when the class of service has been rendered.

Per diem rates apply to an 8-hour day. Extra time is charged for on a basis of  $1\frac{1}{2}$  time on week days, and twice time on Sundays and legal holidays.