

versed in the different types of construction and will be able to get the best results with the materials with which he must work. He will be able to advise and assist the contractor in developing new and more up-to-date construction, and guard him against taking too many chances. He will, from his training, more carefully look after the details of construction, such as drainage, grades, fills and crowns of the finished roadway, all of which at the present time are given too little consideration by contractors. In case of apparent failure of the work his training will teach him to look for the real cause and not blame it haphazardly upon the new type of construction or on the binding material, such as has been too often the case.

It does not cost a contractor any more to lay high-grade, first-class work than it does to put in careless and unsatisfactory work; in fact, the cost of inefficiency and carelessness in running a great many of the contractors' plants throughout the country would more than offset the cost of turning out uniform and high-grade pavements. The properly trained highway engineer will see these different points and by actual demonstration show the contractor where he can lower his maintenance cost and at the same time give better satisfaction to the officials and property owners. By his work he will eventually be a big factor in eliminating the now too well recognized combination of politics and graft in paving and roadway construction.

Already a number of the most successful and prominent contractors in the country are employing men trained in highway construction and have found it both wise and economical to have these men in their organization to pass upon and keep uniform all details of construction which have heretofore been left to the superintendent and plant foreman.

There is another potent reason why contractors will require the services of highway engineers. It is the fact that on account of the severe competition and rapid development of the road and paving industry, material companies are continually putting out new products and changing the old. It is only fair to state that most of these material companies are doing their utmost to turn out the best possible material for the money. They are, without question, giving valuable co-operation to engineers and chemists in order to get the most suitable materials for the different types of construction and are continually studying and overcoming the problem of paving and road building. However, even in view of these facts, it is a big advantage for any contractor to have in his organization a highway engineer who will study the different traffic, climatic and other conditions under which the pavements or road will be subjected, and then be able to judge those materials which are most likely to prove suitable for the work. He will also be able to advise regarding the proper handling of these different materials, or at least to look for and properly receive expert advice regarding them.

There are few bituminous materials on the market to-day that require the same treatment at the plant in order to get the best results at the lowest possible cost; in fact, numerous failures can be cited where the cause was due to the handling of different materials at the paving plant in the same manner.

While the highway engineer in the contractors' organization will likely find his work for some time confined to estimating and to the actual construction, he will in time prove a valuable asset in the promotion work

There will be many obstacles to overcome by the highway engineer entering such a field. He will have to proceed with his new ideas and methods in a slow but sure way and use his technical knowledge in a practical and efficient manner, but if he has received a proper academic training he cannot help but be of value to the contractor, and will find each year an increased demand for his services. It would be well if universities and engineering colleges consider the advisability of incorporating a three-hour-year course devoted to highway engineering in their undergraduate courses in civil engineering in order that engineering graduates may have a broad general knowledge of that important field.

A LARGE POWER STATION.

Work has been started on the hydro-electric power station of the Cedar Rapids Manufacturing and Power Company, Montreal, Que., which, when completed, will be the largest in the Dominion of Canada. Its initial rating will be about 100,000 horse-power, and later on this will be increased to 160,000 horse-power. The site is at Cedar Rapids, in the St. Lawrence River, about 30 miles above Montreal.

The plant will be 663 ft. long and 130 ft. wide, and will be built as a part of the dam. The intakes will be of the scroll or involute type. Orders have been placed by the Cedar Rapids Company for the generating equipment. This includes twelve 10,800 horse-power waterwheels, which are to operate at 56 r.p.m. under a head of 30 ft., and will be the largest ever built. There will also be three 1,500 horse-power exciter units, which will operate under the same head as 150 r.p.m. Twelve generators are to be connected to the waterwheels.

The design of the turbines possess an interesting feature in the arrangement for carrying the weight of the generator rotor and the moving parts of the turbine on a thrust bearing above the generator instead of below, as is often done. The waterwheel contract includes the turbine complete, the shaft running through the turbine and generator, the thrust-bearing support or truss to be located above the generator, also the thrust bearing complete. The weight of the generator will be taken through cast-iron supporting barrels through the turbine to the foundation below. The main units will be of the single-runner, vertical-shaft type, and will be installed in wheel chambers of spiral shape formed in the concrete foundations of the power house. The exciters will be of the same type, but smaller in size. The runners for these wheels will be an enlargement of a model runner, which, under test at Holyoke, gave an efficiency of 90 per cent.

About 100,000 yds. of concrete work and 2,000,000 yds. of rock and earth excavating will be necessary. It is expected that the plant will be finished in October, 1914.

INTERNATIONAL CONGRESS OF MINING.

One of the largest of the great scientific and industrial congresses is to be held in London in the early part of June, 1915. This is the sixth international congress of mining, metallurgy, applied mechanics, and practical geology. These congresses take place at intervals of five years, and the last, which was brilliantly successful, was held at Düsseldorf in 1910, previous congresses having been held in Paris and Liège. The attendance at the Düsseldorf congress was more than 2,000, and it is anticipated that the attendance in London in 1915 will be equally large.