

of national defence the government should own the railways. In order to make these facilities for transportation most effective for the carriage of troops, subsistence, munitions and the raw materials for the manufacture of munitions the carriage of all other commodities, even though they pay higher rates of conveyance, must be relegated to a place of secondary importance. But when the railways are left in private hands the tendency is to take first that traffic which will pay the higher rates. Moreover, when, as in the case of the Canadian Pacific Railway, a large block of shares is owned by German or other foreign stockholders, there is great danger that the foreign influence may be so strong as to dictate the policy of the road, and thus the efforts toward using the railway for national purposes may be rendered nugatory or partially unavailing. The example of the state-owned and operated railways of Germany in aiding the mobilization of soldiers and supplies along the various fronts, and the example of England in assuming control of her railways during this emergency, have given additional emphasis to the need of having the railways completely devoted to the promotion of the national, as opposed to the private, interests.

Finally, it has been said that roads like the Grand Trunk Pacific and National Transcontinental have been intended to further primarily the interests of colonization in the great West. Settlers will no longer go, as in early years, where there are no transportation facilities. Railways must be put through in advance of or synchronously with settlement and as this project of settlement of men upon the land is for the national development, the railways designed to advance this project should also be national. Private capital does not like to invest in an enterprise of this nature in which years must elapse before the road obtains sufficient traffic to pay the operating charges, to say nothing about profits. This is exactly the condition confronting the roads above mentioned. The National Transcontinental is owned and is being operated by the government, and the chairman of the board of directors of the Grand Trunk Railway Company has requested the government to take over the Grand Trunk Pacific. It is known that the National Transcontinental line passes through a stretch of country which is as yet in its infancy so far as the capacity of furnishing traffic is concerned; the settlements along the route are widely scattered and years may elapse before a sufficient amount of tonnage can be provided to make the railway pay.

Much the same may be said of the Grand Trunk Pacific; a long stretch of the road is put through undeveloped territory and as there are no lateral lines to act as great feeders for the main line it may be a few years before adequate traffic can be obtained to pay reasonable returns on the capital invested. It is in connection with such enterprises, therefore, that public aid and support can be reasonably invoked. If private capital is averse to adventuring itself in this kind of investment without having the backing of the government to assure the financial soundness of the business, it would seem as if the government might appropriately take complete control of this enterprise without reference to private capital at all.

The government, being a permanent institution, can afford to wait for a long time before receiving financial returns from such a venture; in time, with the growth of the traffic of a developing territory, the roads which at first were unremunerative would be found to yield ample revenues, and then the government could be rewarded for the great advances made by it in the earlier years. But this contrasts strongly with the conditions attending the

investment of private capital, which, if it do not receive immediate and ample returns, will prefer to seek more profitable forms of investment.

[NOTE:—The above article is the first of a series of three. In his second article, Mr. Jackman will discuss the disadvantages of government ownership of Canadian railroads. In the third article he will review suggested remedies for existing difficulties. This series will be of particular interest to those who read W. F. Tye's suggested remedy, published in *The Canadian Engineer* for February 1st, 8th and 15th, 1917, and Sir Thomas Tait's article in the April 12th, 1917, issue of *The Canadian Engineer*. Engineers will naturally place more credence in the theories advanced by Messrs. Tye and Tait, who are experienced railroad engineers and thoroughly familiar with conditions in Canada, but the opinions of Mr. Jackman, expressed from the economic viewpoint alone, will no doubt be of interest and value to those who have followed the whole discussion.—EDITOR.]

"HYDRO" STRUCTURAL MATERIALS LABORATORY.

A structural materials department has been organized in the laboratory of the Hydro-Electric Power Commission of Ontario. The laboratory building is on Strachan Avenue, where the whole testing work of the Commission is centralized. In the structural materials department are conducted all non-electrical tests. The equipment at present includes apparatus for testing cement and for making some tests on concrete aggregates and mortars. There is under consideration, however, the installation of a compression testing machine of 200,000 pounds capacity and a Universal machine of 50,000 pounds capacity. These will enable the laboratory to make tensile, compression and bending tests over a wide range.

The tests on cement include all the physical tests required by the standard specifications for Portland cement adopted by the American and Canadian Societies of Civil Engineers, and by the American Society for Testing Materials. The equipment includes a complete set of Tyler sieves from $\frac{1}{4}$ mesh to 200 mesh, also a 100 and 200-mesh sieve specially calibrated by the Bureau of Standards for making check tests on fineness, a Vicat and a Gilmore apparatus for determining time setting, specific gravity flask, tensile testing machine, a set of briquette moulds and storage basins, balance, a moist closet, etc. Equipment is also available for making some of the standard tests on sand and aggregates, but this is not yet complete.

Considerable experimental work is being done in connection with tests and test equipment for the concrete work on the proposed generating station at Niagara. This is to determine a standard method of procedure in the testing of sand, mortars and aggregates. The importance of testing work of this nature is now universally recognized.

Other test work done by this laboratory includes galvanizing tests on line construction material received in the storehouse, tests on paints, varnishes, wood preservatives, etc. This work is expanding as the needs of the Commission enlarge and will be an important part of the testing service rendered by the laboratories.

Work has been commenced upon the construction of a storage reservoir of ample dimensions for furnishing the city of Pachuca, Mexico, and its neighbouring villages with an ample supply of pure water—something that is greatly needed.