

The Canadian Engineer

A weekly paper for engineers and engineering-contractors

RAILWAY TRANSPORTATION PROBLEMS OF THE FUTURE

PRECEDENTS OF PIONEER RAILROADING OVERTURNED BY NEW FACTORS—THE QUESTION OF GRADES A HANDICAP TO CO-OPERATION—SYSTEM OF GRADE PROFILE ANALYSIS IN NEED OF REVISION—ELECTRIC TRACTION SHOULD NOT BE DELAYED.

By J. GRANT MACGREGOR, C.E., Mem. Can. Soc. C.E.

Chief Engineer, The Alberta Central Railway Company.

THE building of so many transcontinental lines across the Dominion, and the opening up of new inland and ocean waterways for the transportation of the produce of the country may be regarded as the dawn of a new era in the history of railway transportation.

The rapidity of the pace set by competitive lines is in a measure responsible for the state of bewilderment in which the country now finds itself when confronted with the most important railway building and transportation problems of the age. The situation has been the subject of much controversy both among members of the engineering profession and those concerned financially in the economics of present-day railway construction and operation. Precedents based on past experience in pioneer railroading have been disregarded, and the researches and life work of the greatest authorities on railway economics have been found antiquated when compared with the progress of recent events.

There is also a decided lack of harmony between different departments of the various railways in regard to the advantage of the present practice of building railways with long stretches of low ruling grade, all of which tend to unnerve the engineer who may have placed too much faith in the adaptability of old and well-known rules to modern conditions.

The question that now arises is, to what extent are the conditions changed that require a departure from well-known rules and practice in railroad building. The two greatest factors that have entered into, and hold sway in all problems of railway engineering and operation since the invention of steam, are those of "Tractive Power" and "Train Resistance," and as long as the law of gravitation exists we shall have at least one of them to contend with. In considering the other factors, the development of steam tractive power and its application to overcoming train resistance, we find that no great strides have recently been made whereby increased efficiency in the hauling power of locomotives should bring about a change in the conditions affecting grade and alignment. Until closer co-operation is instituted between the operating and engineering departments of the various railways very little will be accomplished in the way of building railways on a basis by which the best results can be obtained in

their operation. Too frequently is advantage taken of a new line with low grades as an accessory for the use of old or obsolete engines whereby a saving can be effected to the operating department at the expense of the construction department.

If by constructing railways with lower ruling grades a solution is not obtained to the problem of hauling heavier train loads with present engine efficiency, then a step has been taken in the wrong direction, which is not at all unlikely. The solution, however, will not be found in any further development of the increased weight of the present unit of steam tractive power. More likely it shall be found where a greater number of units are used whether of steam, electrical or oil gas propulsion, whereby the load to be hauled can be increased to a proportion consistent with the proper train unit for minimum cost of operation.

But, to return to the question of the value of lower ruling grades, it should not be necessary at the present time to make a strong plea for their use wherever they can be introduced at a reasonable cost. The fact that millions are being spent annually by the various trunk lines on grade reduction should be sufficient evidence that the movement has got beyond the experimental stage. The wisdom of such a course is apparent from the beneficial results obtained in the way of increased revenue and lower cost of operation. The changes and modifications of grade profile designed to produce the beneficial results obtained have invariably been based on well-known rules in railway location and data obtained from experiments of the actual performance of trains under the conditions sought. If there should be any uncertainty about the continuous performance or endurance of certain classes of locomotives on long stretches of low ruling grades the sooner the value of such a factor is taken into account the better. In the meantime, are we to assume that the defect is of a mechanical nature and that, until such time as it can be removed the grade profile should be modified to provide suitable resting places for the recuperation of the "old horse"?

Under present conditions what is most urgently required is a more definite system of grade profile analysis, by which the proper amount of tractive power can be as-