

Changes in Gradients, and Temporary Structures, on the National Transcontinental Railway.

There has been considerable discussion in the daily press and at political meetings in regard to changes said to have been made in the N.T.R. construction by the present commission. A return presented to the House of Commons recently, giving the official correspondence on the subject, will prove of general interest to engineers, contractors, etc.

The correspondence opened with the following letter from E. J. Chamberlin, President, Grand Trunk Pacific Ry., to R. W. Leonard, Commissioner, National Transcontinental Ry., July 16, 1912:—

"I learn from our engineers that the standard of work on the portion of the N.T.R. between Lake Superior Jet. and Cochrane, which was at the outset adopted and has so far been complied with, is being departed from, and that instead of 0.4 grades and permanent structures, you have authorized grades up to 1% and the erection of temporary wooden structures. In regard to this, I would call your attention to clause 7 of the agreement of July 29, 1903, which provides that the construction of the Eastern Division shall be done according to the specifications approved by the company and shall be subject to the joint supervision, inspection and acceptance of our Chief Engineer and the Chief Engineer of the Commission. I beg to say that if this work is done in accordance with what I understand to be your recent instructions, it will not be in compliance with the agreement, nor satisfactory to this company, and cannot be accepted."

The Commissioner of the N.T.R. replied to Mr. Chamberlin on July 19, 1912, as follows:—"I find, on going over the profiles, that there are many places where a large expenditure may be saved and the line actually improved for operating purposes, and the time of completion considerably shortened, without in the least affecting the hauling capacity of locomotives, by making certain modifications, and I have given instructions to make such modifications accordingly. I am quite satisfied that the interests of the G.T. Pacific and the Government are identical in this matter, and I noted on my recent trip west that the modifications referred to are in accord with the practice of the G.T.P.R. Co. on the portions of the National Transcontinental Ry. built by that company, namely, from Winnipeg west, and from Fort William to Lake Superior Jet."

"In regard to wooden trestles, I may say that your engineers must be aware that it is absolutely necessary to put in wooden structures in some cases where the foundations are such that heavier structures, or solid embankments, cannot be constructed at present. There are points along the line where much money has been uselessly expended in futile attempts to make solid embankments, only, finally, to have to put in wooden structures, and I notice that the construction of such wooden trestles has been the practice of the G.T.P.R. on the portions of the N.T.R. above mentioned."

"I have carefully perused clause 7 of the agreement of July 29, 1903, and I fail to notice in this, or in any other agreement or act relating to the construction of the Eastern Division of the N.T.R. any provision relating to the gradients to which the line shall be built, or the nature of the structures, but it may be of satisfaction to you to have your Chief Engineer, or Assistant Chief Engineer, discuss with our Chief Engineer any proposed changes, and report to you in regard to same. It

is not necessary for me to state that this Commission welcomes any criticism or assistance from your able staff of engineers on any or all matters affecting the economical construction and operation of the road."

Mr. Chamberlin wrote again to Mr. Leonard on July 23, 1912:—"I have yours of July 19, regarding changes in grade on the N.T.R., and note the reasons you offer for the modifications contemplated. Aside altogether from this company's strict rights, to which I called attention in my letter of the 18th inst. to you, I would ask you to furnish me with profiles showing the changes proposed, so that I may consider their effect. You will, I think, agree that it would be in the interests of both the Commission and this company that no work in connection with any changes of grade should be proceeded with until our approval has been given, and I would ask you to issue instructions to this effect. On receipt of the profiles, I will let you have my views with as little delay as possible."

Mr. Leonard replied to Mr. Chamberlin on Aug. 2, 1912, as follows:—"I beg to acknowledge receipt of your letter of July 23, expressing your apprehensions regarding the modifications referred to in my letter of the 18th ult. I note you refer to your company's 'strict rights,' to which you also referred in yours of the 18th ult., for which reference I can find no authority in the various acts and agreements relating to the construction of the Eastern Division."

"You have apparently been misinformed in regard to the reported changes in grade, as no change whatever in any of the ruling grades has been contemplated, but merely such trifles as slight local sags in the grades across soft swamps, which will not in any way affect the hauling capacity of locomotives, and which, if found desirable to lift out in the future for any unforeseen reason, can be effected more cheaply than at present contract prices, and will make a more solid road bed than is being made under similar circumstances today by using the peat for embankments."

"I suggested in my letter of July 19 that your Chief Engineer, or Assistant Chief Engineer, discuss with our Chief Engineer any proposed changes and report to you in regard to same, because, you will see from the above, these are simply details too trifling to occupy either your attention or mine, and the suggestion in my letter of July 19 should be quite sufficient for your purposes, or perhaps it would be still simpler and quite as efficient for you to get your information through your district engineers, after consultation with the district engineers of the Commission, in the usual way."

On Nov. 21, 1912, Mr. Leonard wrote to the Minister of Railways as follows:—"In reference to the charges made in the newspapers that the gradients on the N.T.R. have been injuriously altered, I beg to point out, that the only change in gradients made by the Commission since Sept. 30, 1911, was to allow a few sags to remain, where there have been subsidences and across soft muskegs, which it would be inadvisable, from an engineering point of view, to fill at present, to be operated temporarily or permanently as velocity grades. The presence of such sags in the railway does not injuriously affect the economical operation of the road. The same trains, carrying the same loads, making the same time, with the same expense and the same degree of safety and comfort, can be han-

dled over a road in which such sags, or velocity grades, exist as on a road of the same ruling gradient in which there are no such sags or velocity grades."

"By introducing these sags, all of which are well within velocity grade limitation, the Commission will: 1. Save a large amount of money in the construction of the railway; 2. Expedite the completion of the road; 3. Should it become advisable, for any unforeseen reason in the future, to eliminate these sags, it can be done at one half the cost that the present contract prices call for; 4. In one case it has been found necessary to raise the grade in a cutting, the material in which is so soft and wet that it is impracticable to construct a line on the original grades, and in this instance the grade has been kept well within the limits of velocity grade practice, and the gradient can be reduced at any time, if it should ever be found desirable, by filling in the lower portion with suitable material; 5. The consensus of opinion of the following engineers, who have been in the employ of the Commission for years, in their sworn testimony before the Commission investigating the construction of the N.T.R., is that velocity grades are not only unobjectionable, but might have been introduced permanently into the railway, and would have greatly reduced the cost of the road:—G. Grant, Chief Engineer; C. O. Foss, District Engineer, District A.; A. E. Doucet, District Engineer, District B.; A. G. Macfarlane, District Engineer, District F.; G. L. Mattice, Assistant District Engineer, District D.; J. W. Porter, Assistant District Engineer, District B.; A. N. Molesworth, ex District Engineer, District C. & D.; H. L. Bucke, Division Engineer, District D. & F."

"I find that the gradients on which the original Quebec bridge was partially built were 1% on either side, and the new bridge will necessarily be built to the same grades. I also find that the gradient approaching the Quebec bridge from the east side, including the Chaudiere bridge, was 1%, which cannot be altered. In New Brunswick I find in the middle of a division a grade 13 miles long of 1.10% against east bound traffic, and in Quebec, in the middle of another division, 11 miles of 1.10% grade against west bound traffic, each of which will limit the hauling capacity of locomotives over these divisions to the same extent as if the whole division had been located on these grades."

"I am sending, herewith, for your information, five blue print profiles, showing all the changes in gradients which have been effected since Sept., 1911."

"Mr. Grant's evidence is not yet in type, but from conversation I have had with him, which is confirmed by Mr. Staunton, I know his views to be as above stated."

The return states that there have been no departures from original instructions, as regards curves and bridges or other permanent structures."

In connection with the foregoing it will be of interest to note what W. F. Tye said in his recent presidential address before the Canadian Society of Civil Engineers, and which is given in full in this issue. His remarks on momentum grades will be found on pg. 107.

It was reported at a meeting of the Public Accounts Committee of the Manitoba Legislature, Jan. 5, that the amount of taxes paid to the Province by the C.P.R. was \$100,000, and by the Canadian Northern Ry. \$40,000. The Railway Taxation Act provides that 2% on the gross earnings of railways be levied, and a resolution asking the government to enforce the act in the case of the C.P.R. and the C.N.R. was lost on the casting vote of the chairman.