

but from the other fellow's point of view. I am quite willing to admit the words "firmly tamped for its entire length" may be misleading. It would be better to say tamped for its entire length in such a way as to give, as nearly as possible, uniform support, having regard to the distribution of the load, that is, tamped hard under the rail and for a distance of say 18 inches each way, from edge of rail base, and outer ends tamped more firmly than at centre of track. I have not entirely overlooked the principles of the bending moment you refer to, and agree with you that the moment is greater under the rail for a 10' tie than for an 8' tie, but it is less at the centre for the longer tie. Ties are more apt to break at the centre than under the rail, when frost is coming out, and that is about the only place and time good ties ever break, therefore, the lessening of the moment at centre should be an improvement. I have used 10 ft. and 12 ft. ties, with excellent results, over bogs and places where track could not be kept in surface or line with 8 ft. ties, and have never known a long tie to break under such circumstances. Does not this indicate that the bending moments in the tie may not be as important as providing an increased area of foundation for the immensely increased weights of recent years. Your illustration of turning the tie upside down, supported on the rails, and assuming load uniformly distributed, certainly facilitates calculation of the stresses, but unfortunately we know the load is not uniformly distributed, hence calculations based on that assumption are inconclusive. In any case, they only refer to the strength of the tie and not to its effectiveness in providing, as nearly as possible uniform minimum unit pressures on the ballast. I will in turn make a suggestion to illustrate my point of view. Assume that the ties are sawn straight through in the centre and the spreading of the track taken care of by steel the rods bolted to the rails. Would not the outer ends of 8 ft. ties be immediately crushed into the ballast and the inner ends be cocked up? Would this happen if ties were of equal length each side of rail, and if not, does it not prove that lengthening the ties is not altogether folly?

I shall be glad to hear further from you on the whole question, and hope you will raise as many points as possible.

Yours truly,

D. MACPHERSON.

GRAND TRUNK RAILWAY SYSTEM.

Office of the Chief Engineer,

Mr. D. MacPherson, July 31st, 1911.
Chairman Tie Committee,
Canadian Society of Civil Engineers.

DEAR SIR,

I have read with interest the letter from Mr. J. G. Sullivan, under date of July 20th, addressed to you upon the subject of ties, and your circular letter to the Committee.

The matter seems to have been well studied from a mathematical point of view, yet without reaching a unanimous conclusion.

I intend, therefore, in this letter to discuss it purely from practical conclusions derived from experience and observation.

Upon first class rock ballasted track with embankments and ballast, old and well settled, there is but little trouble with ties breaking.

Upon good gravel track, well maintained, the breakage under the rail is more frequent than breakage in the centre of the track, except in the case of centre bound track.

Upon unballasted or earth surfaces track, the breakage is about evenly divided; if there is any difference, I believe the breakage under the rail is in excess.

In the above three cases, I am considering track laid with the ordinary sized tie, 6" x 8" x 8' long.

Would not the above indicate that so far as strength is concerned, the extension of an 8' tie beyond the rail is already as long as it should be to balance the stress upon the middle of the tie?

Upon all track, the primary object to be attained is drainage, and any type of construction which retards the drainage, injures the track and places a greater physical stress upon the ties.

In the Southern States of the United States many years ago, where ballast was scarce, rains plenty and track bad, a road running from Memphis, Tenn., to Little Rock, Ark., tried the experiment of

using ties 9' long. After a few years their use was abandoned as being a detriment to the track on account of the retarding of the drainage, and the company returned to the use of ties 8' long.

Other roads in the northern parts of the United States have used 9' ties, but so far as I know, their use has been discontinued, and only in some instances have the roads adopted as their standard ties 8' 6" in length.

In view of the above facts, I believe that the maximum length of the tie should not exceed 8' 6", and that a tie 8' long will answer all purposes for modern traffic, and enable the maintenance departments of railroads to maintain first class track. I believe, however, that ties 6" thick are not sufficiently strong, and that ties for main line traffic should be 7" thick by at least 8" wide, but that in no case should they be more than 10" wide.

Yours truly,

H. G. KELLEY.

Montreal, Que., August 9th, 1911.

Mr. D. MacPherson,

Chairman of Tie Committee, Canadian Society of Civil Engineers.
Ottawa, Ont.

DEAR SIR,

In your circular letter to the Committee on Ties, you suggest that the Committee confine the work of this year entirely in the effort to determine what, in its opinion, are the best dimensions for ties for standard trunk line railway.

I think the Committee will agree that the ordinary tie, 6" x 8" x 8' in length, with, as generally spaced, 22" centres, does not give sufficient bearing for the rolling stock now in use.

To add to this bearing surface, shall we increase the length of the tie, as suggested in your report to the Society last season, or adopt some other conclusions?

Evidently, there is a diversity of opinion as to the actual theoretical length of a tie for a safe load, and there will doubtless be a further discussion on that subject.

Personally, I think the increased length suggested is hardly justified by past experience. Several railways in the United States at one time called for ties 9' in length, but I do not know of any using that length at the present time. The Pennsylvania Railway and the New York Central, with some of its allied lines, are calling for ties 7" x 7" x 8' 6" in length. Would not this indicate, in a measure at least, that ties even 9' in length were undesirable, either on account of additional cost, or difficulty in procuring them.

In my opinion a 10' tie, aside from the difficulty in procuring it, and the additional cost, (which would be almost prohibitive), has other disadvantages, among which are increased breakage over the shorter tie, retarded drainage and additional ballast required.

Personally, I believe that ties should not be less than 7" in thickness, 8" on face, and 8' or 8' 6" in length; that they should be laid with 20" centres, 20 to a 33' rail length.

Ties are so spaced on several railways at the present time. With this number of ties of the dimensions named, and with proper ballast, I believe that first class track can be maintained.

Very truly yours,

H. A. WOODS.

CANADIAN PACIFIC RAILWAY COMPANY.

Montreal, October 7th, 1911.

D. MacPherson, Esq.,

Assistant Chief Engineer, N. T. Ry.,
Ottawa.

DEAR SIR,

Replying to your circular letter of October 2nd, to the Tie Committee of the Canadian Society of Civil Engineers.

I regret that I will not be able to attend the meeting on the 14th instant. I desire, however, to put myself on record as being opposed to making ties more than 8 ft. in length.

Yours truly,

F. P. GUTELIUS.