overcome the stresses, which consequently necessitates more material, thereby increasing the cost and weight of the car body for a given capacity. I would estimate the increased light weight of a car of 60,000 lbs. capacity, strengthened in all its parts proportionately for the increased volume as required by the recent standard adopted, to be not more than 1,500 lbs., and its original cost over that of an ordinary 35 ft. car of 60,000 lbs. capacity to be less than $35, so that these items of cost and dead weight are more than overcome by the increased advantages previously mentioned, and is an item not worthy of serious consideration.

Another point worthy of consideration is, the necessary alteration in the usual design of side cornice and the design of the door cap, made compulsory by the requirement to construct a car which does not exceed a width of 9 ft. 7⅜ in. at the eaves, and the height from the top of the rails to the eaves not more than 12 ft. 6¾ in. These dimensions do not interfere so much with those railways which adopt the double board roof as they do with the railways using the inside metal roof. It would also appear to be a matter of necessity to return to the use of the discarded brake step on account of the limited height for the brake staff.

I trust that these various points have been brought forward in such a manner that a full and free discussion may ensue.

The paper was discussed as follows:

S. S. UNDERWOOD, chief draughtsman, car department, G.T.R.--The subject of this standard box car is not a new one, as we all know, but there some new features to be considered. We have been given the dimensions of this car inside, as 36 ft. in length, 8½ ft. in height, and 8 ft. from the floor to the under side of carline, as the standard dimensions that have been adopted by the A.R.A., with but one dissenting vote, and that was the New York, New Haven & Hartford Rd. Its objections were based, as I understand it, principally on account of its lower clearances, and the opinion expressed that in order to get the 8 ft. height inside the car the floor would have to be lowered below the standard of 48 ins. above the rail. I think it was Mr. Merrill, 1st Vice-President of the N.Y., N.H. & H.R., who stated in a letter last Oct. to the Secretary of the American Railway Association, that his road could take a car that was 10 ft. wide, at 12½ ft. above the rail, and thus the N.Y., N.H. & H.R., if my information is correct, could take a car 9 ft. 10 in. wide, at 12½ ft. above the rail. I think it is entirely practicable and possible to build a car of these dimensions: For instance, we will say that the floor is 4 ft. above the rail, add 8 ft. for inside clearance, and using 7 x 4 in. top plate, with under side of carline 3 in. above bottom of plate, this will give us 12 ft. 4 in. from rail to top of top plate, making an allowance of ⅜ in. for the slope of the roof below the top of plate, this making 12 ft. 3⅞ in. above the rail, not taking into consideration the thickness of the various roofs that might be used. I think we can safely keep within the 12 ft. 6¾ in. limit, as recommended by the Master Car Builders' Association pamphlet, as 3 in. should be ample allowance for roof. As far as the brake staff which they have limited to 14 ft., is concerned, I see no reason why we should not be able to keep within this limit, and make the brake staff to these dimensions. The Pennsylvania R.R., which first dissented at the 8 ft. inside height, and which afterwards withdrew its objections and gave an affirmative vote, also stated that a car could not be run over its line safely that exceeded 9 ft. 10 in. in width, at 12 ft. 3 in., which was afterwards changed to 9 ft. 7 in., at 12 ft. 7 in. from the rail. In order to get this, in building its new 100,000 lbs. box cars, I understand it has lowered the floor to 42½ in. from the rail. If all other lines would do the same, it would necessitate the lowering of the platforms all over the country, which will entail a very large expense to all the railways. I think the better way is to preserve the standards now in use as far as possible, even if one or two individuals are compelled to go to the expense of extending their clearances. The American Railway Association adopted the inside dimensions, after two years' deliberation, and we will concede that its reason for doing so was well founded, and by the best advice obtainable. It says that in determining the standard "it is believed to be better to make it 36 ft., as that length has been endorsed by the master car builders as one economic in operation, and as most of the new cars now built are of that length," notwithstanding that the sum total of all the 36 ft. cars, as compared with 34 ft. cars, is about 1 to 5½, i.e., there are 71,000 36 ft. cars, and 386,000 34 ft. cars now in existence. The M. C. B. Association has been asked to define the outside dimensions that will embody the inside measurements as adopted by the American Railway Association and provide a safe clearance without damage to the standard car. As far as the height is concerned, I do not see how there will be any great difficulty in getting within the limit as recommended. The M. C. B. Association has issued a pamphlet, in which it recommends the width over eaves to be not over 9 ft. 7⅜ in., at 12 ft. 6¾ above rail. In recommending these dimensions I do not think the members took properly into consideration the door hood. We can get these dimensions easily over the eaves without taking into consideration this door hood; however, if we are to conform to our present mode of construction, by letting the eaves extend ¾ in. over the hood, as we now block it out, we cannot possibly build a car to 9 ft. 7⅜ in. over eaves. For instance, the car inside would be 8 ft. 6 in. in the clear; now, allowing 1⅛ in. for lining of the car, and the same for outside sheathing, with 2½ in. post, which I think is as light as we can safely make them, you will see the outside width would be 9 ft. 2¼ in., add ¼ inch for metal door facing, 2 in. for the door, ¼ for the hanger, and ¼ for the hood clearance, you will have 9 ft. 7¾ in. If you use a wooden hood covering, it would be at least ¾ in. in thickness; this would add another 1½ in. and your overhang for roof would be not less than 1 in. more, making in all 9 ft. 10¼ in. This we could reduce to some extent by using the straight metal hood covering. I think this construction would be well within the safety limit if we kept the height of the eaves down to 12½ ft. above the top of rail, otherwise we will have to do as some of the other roads are doing at present, i.e., form a pressed metal door hood that has an off-set at the top extending under the eaves, which has ½ in. or less overlap, the metal coming straight down as close to the top of the door hanger brackets as possible, then being thrown out and down again, so as to clear door brackets and protect top of roof itself. This construction is unsightly, to say the least, and I think will be expensive to maintain.

PRESIDENT WILLIAMS: I understand your figures pertain to the double boarded roof?

S. S. UNDERWOOD: Yes, not only to the double-boarded, but to all roofs, as I make an allowance of 3 in. above top of plate for same. If they keep the floor down to 48 in. from the rail, they should be able to get the roof within the limit recommended. The M. C. B. Association has recommended that the width be 9 ft. 7⅜ in., and they get it in this way—the width between the lining is 8½ ft., thickness of lining 1⅝ in., thickness of siding 1⅝ in., thickness of posts and braces 6 in., air space between fascia boards 1 in.,