

Considering main trunk lines, the Pennsylvania Railroad, Baltimore and Ohio, Erie, Lehigh Valley, Great Northern, and a number of others, *i.e.*, as far as known, with a small percentage of cars having dimensions not ascertained, among the latter the Grand Trunk and Canadian Pacific Railways, have either none or less than one-quarter of one per cent. of freight cars over 13½ ft. to running board.

The Master Car Builders' Association, whose rules and standards are adopted by railways on the North American continent generally and are recognized by the Board of Railway Commissioners for Canada, has not fixed a standard for box car dimensions, but adopted in 1904, as recommended practice, a height of 12 ft. ¾ in. to eaves, equivalent to less than 13 ft. height to running board. High standard cars are such as the Grand Trunk Pacific Series 300000—310824, 13 ft. 4 in., and the Canadian Pacific new steel frame box car Series 130000—132998, 13 ft. 4¾ in. The highest regular Canadian Pacific freight cars are 13 ft. 6 in. to running board and this may be said of most of the main trunk lines of railways. The highest Pennsylvania Railroad freight cars are 13 ft. 4 in.

Limits of car dimensions are fixed by clearance outlines on the various railways. A composite clearance limit diagram for ninety railways,* including all Canadian Trunk lines, has a height of 14 ft. 6 in., limiting "over all" height of cars to this figure and practically limiting height of top of running board of freight cars to 14 ft. In the St. Clair tunnel, Grand Trunk Railway, the clearance height at width of 3 ft. is 14 ft. It is true that on many divisions or branches of the lines considered, the clearance is somewhat greater than shown in the composite diagram referred to, while on the other hand, it is less on a number of main lines, and on many branch lines.

An empty freight car 14 ft. high will on 5 ft. (out to out of rails) transverse base not resist a 30 lb. wind pressure when standing alone.

The limit of grade, approaching crossings, can for railways be taken as between 0.5 of one per cent. and 1 per cent. For city streets a grade of 5 per cent. is in most cases extreme and it should be so for main country highways. A preferable maximum grade for roads is 4 per cent., and 3 per cent. is materially better. This works out as follows:

Five per cent. grade 20x2=40 ft. length of approaches for every vertical foot of clearance.

*Railroad Age Gazette.