

16½ feet clearance for all overhead bridges within the electric zone, extending 16 miles from the Grand Central Station, in the city of New York.

Electric traction within limits for such large centres of traffic as Montreal and Toronto, with hydro-electric energy abundant or soon to be, is easily within the range of probability in the not distant future. Smoke abatement alone points in this direction. With accompanying cutting down of vertical clearance requirement to 17 ft. or less, or even if 18 ft., this would at once put an entirely different aspect on the vexed question of grade separation.

It is submitted that with conditions as they are, and the more so with regard to the future, 20 ft., 13½ ft. for car and 6½ ft. for man, is a reasonable vertical clearance. It has been shown that 13½ ft. covers the height to running board of all but a very small percentage of freight cars now in use and that cars higher than 14 ft. to running board, i.e., higher than 14 ft. 6 in. "over all" or top of brake rod, can only, to a limited extent, traverse beyond their home railways. That higher cars will be economical or practicable is as little probable as that the gauge of railways will be widened or their entire structure changed. For a vertical clearance requirement greater than 21 ft. (14 ft. plus 7 ft.), there can, in any event, be no conceivable rational need.

In the United States there is no federal law fixing vertical clearance for bridges over railways. A number of States deal with the question. In Massachusetts there is a special Grade Crossing Commission. The minimum clearance required by this commission is in general 18 ft. Connecticut and Rhode Island also specify 18 ft. In New York the Public Service Commission has charge of grade crossing regulation. While this commission requires 21 ft. clearance where practically many lower bridges are built throughout of the State, some as low as 16½ ft., as partly already spoken of, New Hampshire, Ohio, and Indiana requires 21 ft. The only States requiring more are Illinois and Vermont where 22 ft. is specified and exception made where this height is not practicable. In all other states there is no statute or regulation as far as has been ascertained, and height is not practicable. In all other States there is no 22 ft.

In Canada the Dominion Railway Act of 1904 specifies a minimum clearance of 22 ft. 6 in. above rail level for bridges over railways, with no deviation except by leave of the Board of Railway Commissioners. The board has allowed that the term "rail level" may be interpreted "base of rail," but has allowed no further deviation in any case.

RAILWAY SIGNALLING.*

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On single track, as we have seen above, the block stations will correspond to the passing track locations, there is no good reason why there should be any intermediate stations, as should two trains meet at an intermediate block station one or other of these trains must back up. In the location of Automatic signals on single track, the blocks would still be determined by the passing tracks, the only necessity for any intermediate locations would be to provide

for following movements. Diagram No. 6 shows the location of signals, not providing for a following movement. Signal No. 4 blocks through to signal No. 8, No. 7 to No. 3. A train moving in the direction of the arrow from A, would set signal No. 7 at stop when it reached a spot somewhere in advance of No. 4, and hold it against any trains moving in the opposite direction, until it had reached the passing track at B, signal No. 4 going to the stop position when it had

