

The general plan is to raise the tracks about 20 feet above old grade, on fill between retaining wall or with turfed slopes where there is room. Street crossings made by steel or iron arch bridges, or stone arches. All floors solid, elevated structure to carry four tracks.

Total cost, \$3,500,000, of which railway pays 55 per cent., length  $4\frac{1}{2}$  miles.

This is a clear case of railway elevation with down grades at each end to connect with present grades.

Readville, Dedham and W. Roxbury Improvement, Railroad Gazette, Vol. 30, p. 574.

Length, about 7 miles.

All grade crossings abolished.

Cost divided as follows:—55 per cent. to the railways; 18 per cent. to the State;  $13\frac{1}{2}$  per cent. each to towns of Hyde Park and Dedham.

Readville is a small village, and tracks were raised and roads altered to suit convenience of railway.

#### **Boston and Providence Extension.**

Railroad Gazette, Vol. 31, p. 838, 856.

Partly depressed and partly elevated. A large portion of this line is on artificial ground. The Boston and Albany (Boston and Worcester) line built in 1833 was for a long distance surrounded by the water of the bay on both sides and the surrounding submerged flats have been gradually filled in as the city grew. The ground being of this nature the foundations of all retaining walls, bridges, piers, and reconstructed buildings had to be made on piles.

**Buffalo, N.Y.** Population, 1890, 255,664; 1900, 352,587. Railroad Gazette, Vol. 24, p. 328; Journal Association of Engineering Societies, Vol. 10, p. 422.

There were more than 330 grade crossings in the city each having from 1 to 4 tracks, and one having 13 tracks.

In 1887, Thos. Spencer, Engineer to State Commission, recommended certain work whereby the tracks were to be elevated at interior points and depressed elsewhere, but as this plan was not sufficiently comprehensive, the question was next taken up by a commission of engineers composed of Col. H. Flad, State Engineer Jno. Bogart, G. W. McNulty, A. M. Wellington, Geo. E. Mann, Walker Katti and C. W. Buckholz.

This commission reported in 1888 dealing with 37 crossings, and recommended overhead bridges, elevation of tracks within some cases depression of roadways and the closing of some crossings and diversion of traffic to other crossings. Grades of approaches not to exceed 4 per cent. Minimum clearance for overhead bridges 16 feet and for subways 12 feet.

In 1892 a report was made by E. L. Corthell, of Chicago, and A. W. Locke, recommending the abolition of 76 grade crossings mostly by lowering the streets and raising the tracks.

It is recommended that the streets be maintained at their full width, and the railroads provided with means of passing at full speed to and from their stations, that but few streets be closed, and that the present ruling grades for streets in the various sections of the city should not be increased and that 3 per cent. be the maximum grade.

The report also says, "When sidings are not too numerous it will sometimes be found to be cheapest to raise or lower the tracks rather than to confine the change altogether to the streets. In cities the latter plan is apt to entail large expense for damages done to adjoining states, while as a general thing, damages for changes in the grade of the railroad cannot be recovered by adjoining owners.

**Brockton, Mass.** Population, 1900, 40,063. From Journal Association of Engineering Societies, Vol. 14, p. 420.

Population, 30,000. Area, 20 square miles. Date of report, September 21st, 1892.

Town is rectangular in shape approaching a square through the centre of which runs the Old Colony Road.

Within the city limits are three stations with freight yards and houses:—Montello, Brockton and Campbells, as in most manufacturing towns, the growth has been along the line of the railway; gradually streets have been laid out across the tracks, all at grade, and public ways, so that at the present time there are eleven crossings at grade over which the public have rights. The freight yard at Brockton is at present in the centre of the city, and over which freight cars have to be shifted across the principal streets.

When the grade crossing law was passed in 1890, Brockton was the first city to take advantage of it. After long discussion an agreement was reached in June, 1893, to raise the grade of railway through the centre of the city 12 feet, and to depress through Campbells about 8 feet. The plans as finally adopted were:—

The grade of the railways to be raised for 9,000 feet with a maximum rise of 15 feet, and to be lowered for 5,100 feet with a maximum lowering of 12 feet. All stations to be double with a main station on the west side of the tracks, and a waiting station on the east track with subways under the tracks connecting the two stations. The changes decided upon require 7 arches over streets, 2 arches over streams, 4 subways for pedestrians, 2 plate girders over streets, and 8 highway bridges over the railroad.

The main freight yard at Brockton covers about 40 acres, and will be 24 feet below grade of tracks as raised, and will be approached by switchback with about 800 feet of tail track with grades ranging from 1.2 per cent. to 0.4 per cent. All streets will have to be changed more or less to get under or over the tracks in many cases involving other streets, and necessitating changes in water and gas pipes.

The cost to be divided as follows:—Railway Company, 65 per cent.; State, 25 per cent.; city, 10 per cent.

#### **Chicago.**

The 40th Street Track Elevation of the Chicago Junction, Railroad Gazette, Vol. 44, p. 243.

The Chicago Junction is a switching road, the chief function of which is to handle the Union Stock Yard business.

The 40th Street line runs east to connection with the Illinois Central on the lake front and crosses the Lake Shore and Michigan Southern, the Chicago, Rock Island and Pacific, the Pittsburg, Ft. Wayne and Chicago, and the Chicago and Western Indiana, all of which secure connection to the Stock Yards through it. Built some 30 years ago it is now in a closely-built section of the city occupying the larger part of the thoroughfare from which it takes its name.

In doing the work of separation of grades, the Chicago Junction, under agreement with the South Side Elevated, built extra lines on 40th Street, which they will lease to the elevated road.

The elevation of the 40th Street line extends from the Lake Shore to Union Street two blocks from the Stock Yards, where it swings southward to enter the yard.

Commencing at the east end of the Illinois Central, where there are some team tracks the grade rises to Drexell Boulevard with two tracks as far as Wentworth Avenue; four tracks from Wentworth Avenue to Butler, and six tracks from Butler to Stock Yards.

The line generally is built with solid embankments between retaining walls, and has bridges with solid ballasted floors.

The line passes over the Lake Shore and the Rock Island tracks which are already elevated (the grades approaching the crossing being 1.3 per cent., and the clearance 18 feet), and passes under the P. F. W. & C., and the Western Indiana which have been elevated. There appear to be 25 subways for street crossings. From there it falls on a 1.3 per cent. grade to pass under the P. F. W. & C., and the Western Indiana which have been elevated.

Twenty-five streets appear to be crossed by these tracks at subways.

#### **Chicago.**

Engineering News, Vol. 43, p. 24, January 11th, 1900.