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LVIII

TRACK ELEVATION OF THE ST. CHARLES AIR LINE.

By H. W. PARKHURST, Mem. W. S. E.

(*Read November 9, 1898*)

The St. Charles Air Line Railroad extends from the Illinois Central tracks to the west side of the South Branch of the Chicago river, and is located between Fifteenth and Sixteenth streets, in the city of Chicago. It was originally built as a straight line, with the exception of the curve at the east end connecting it to the Illinois Central tracks. In its course, it crossed at grade, Indiana, Michigan and Wabash avenues, State, Dearborn and Clark streets, and the network of tracks between Clark street and the South Branch of the river. It was, therefore, of great importance to the traffic of the city streets to have this double track road elevated, and not less important was it to reduce the complications of the grade crossings between the several railroads east of Clark street.

The earliest plans for the elevation of the St. Charles Air Line were made in June, 1895, and for two and one-half years the matter was under discussion between the owners of the St. Charles Air Line Road, the city authorities, and the representatives of the railroads interested in the crossings west of Clark street. Plan after plan was formulated, discussed and rejected, and numerous conferences were held between the city officials and the managing officers of the various railroads.

Finally an ordinance, which was practically agreed to by all companies, was passed by the City Council May 17th, 1897, was approved by the Mayor May 22d following, and within the specified time, the same was accepted by the railroad companies interested.

The St. Charles Air Line is owned by four companies,—the Illinois Central, the Chicago, Burlington & Quincy, the Chicago & Northwestern, and the Michigan Central railroads, each having an undivided one-quarter interest. West of Clark street the railroads interested were the six tenant companies of the Chicago & Western Indiana, the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Lake Shore & Michigan Southern, and, indirectly, the Chicago & Alton Company.

The crossings between the tracks of these several companies constituted one of the most complicated network of tracks within the city limits. It was thought that no solution of the problem would be satisfactory which retained the existing grade crossings between these railroad tracks. One solution was suggested, which, by depressing certain tracks, raising another set to a compara-

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Fig. 543. View Between two Retaining Walls, I. C. R. R.

Fig. 544. Track Looking East from Indiana Ave.

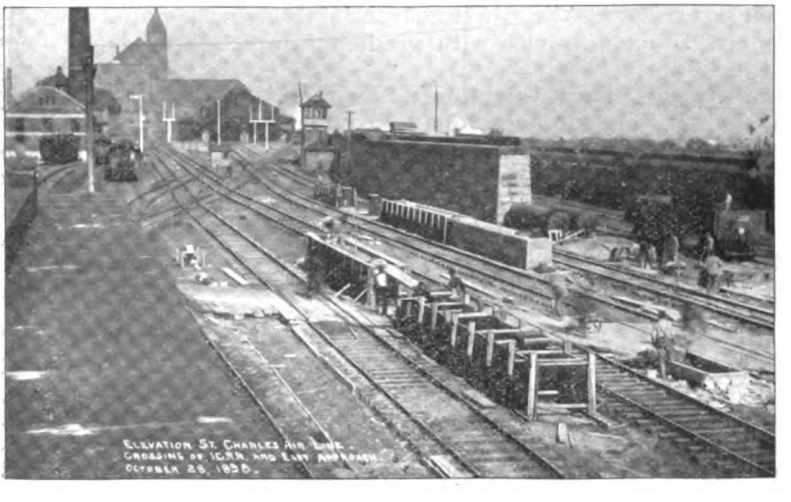

Fig. 545. East Abutment.

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tively slight elevation, and the third set of tracks to a very high elevation, did away with all of the grade crossings between railroads; but this introduced such extraordinarily steep grades into the St. Charles Air Line and Chicago, Madison & Northern connections, that it was deemed impracticable. The plan finally adopted depresses the tracks of the Western Indiana and Santa Fe railroads, so that no street or railroad grade crossings exist for these tracks. The St. Charles Air Line and the Rock Island and Lake Shore tracks are raised to a uniform level, and the grade crossings formerly existing between the tracks of these companies are still maintained.

The elevation of the St. Charles Air Line tracks was, therefore, no simple problem, involving, as it did, material changes in the tracks used daily by more than a dozen other railroads.

In connection with the elevation of the St. Charles Air Line, the Illinois Central Company has also constructed an eastern approach to the same, shown in Figs. 543, 544 and 545. This is built entirely on ground belonging to the Illinois Central Company. As now being executed, the plan provides for viaducts carrying the St. Charles Air Line across the several streets between the Lake and the South Branch of the river, without any depression of any street up to Clark street. The situation at Clark street is somewhat complicated. As originally located, the St. Charles Air Line crossed Clark street only a few feet south of the crossing of the Santa Fe and Western Indiana tracks. In order to remove all grade crossings from Clark street (which was one of the prime factors in the problem of track elevation), the St. Charles Air Line has been diverted to the south, while the Western Indiana and Santa Fe tracks have been moved to the north. The St. Charles Air Line tracks have been elevated, the other tracks depressed, and Clark street passes under the Air Line tracks and over the Santa Fe and Western Indiana tracks with gradients not exceeding five per cent.

It was realized that the interests involved in the work west of Clark street were too numerous and complicated to be handled by a representative of any one railroad company. This work was, therefore, placed under the charge of an Advisory Board of Engineers, with Major G.W. Vaughn, resident engineer, in charge. The work east of Clark street has been handled by the regular organization of the Illinois Central Railroad, in the interest of the four owners of the St. Charles Air Line, the writer being in immediate charge of all details of the work.

After making comparative estimates of the cost of constructing elevated tracks on steel superstructure throughout, or of building them on embankments constructed between retaining walls with steel superstructure only across streets and alleys, it was determined to adopt the latter plan of construction, and proposals were received for the masonry work involved. Bids were made

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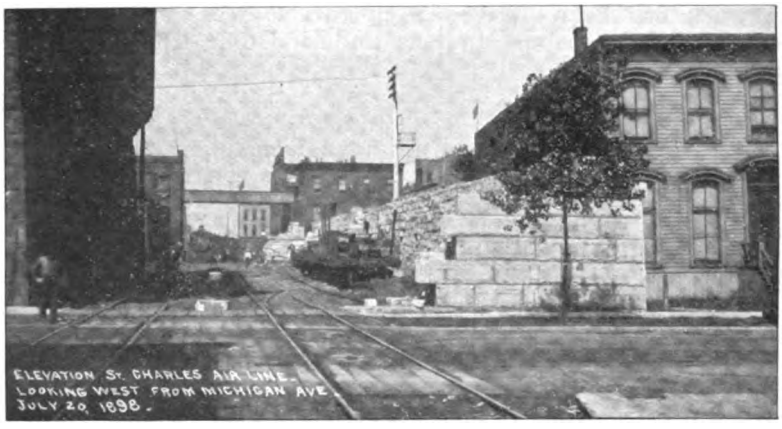

Fig. 546. Looking West from Michigan Avenue.

Fig. 547. Looking West from Indiana Avenue.

for concrete, rubble, and cut stone retaining walls, abutments, etc. As favorable proposals were made for constructing the various street abutments of first-class bridge masonry, (Figs. 546 and 547) and the retaining walls of second-class coursed ashlar, backed with derrick rubble (Figs. 547 and 548), a contract was finally made for work of the latter character. Including the concrete foundations, there are about thirty-five thousand yards of masonry of all kinds in the work. The stone for

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the work has been derived from two sources, the sandstone quarry at Williamsport, Indiana, and sandstone from the Berea quarries near Cleveland, Ohio. While these differ from each other in color—the Williamsport stone being a buff, and the Cleveland stone being of a grayish blue—there is little difference in the quality of the stone. Pains have been taken to use stone of the same kind for the opposite abutments at street or railroad crossings.

Stone has been laid by three different styles of derricks:

1st. Traveling derricks, illustrated in Figs. 543, 546 and 547, and in 548, each having two derricks mounted on a framework, built wide and high enough to span two tracks, and allow trains to pass under them.

2d. Stationary or stiff-legged derricks, which are illustrated in Fig. 544.

3d. A car derrick, which is illustrated in Fig. 549.

The general plan of carrying on this masonry work was as follows: The original tracks of the St. Charles Air Line lay generally on the southerly side of the strip of land belonging to the proprietors. This made it feasible to put in short sidings along the northerly side of the main tracks, adjacent to the site of the north retaining walls, Fig. 546. It should be added here that these retaining walls are constructed along the extreme borders of the property owned by the Air Line proprietors, which is a tier of lots from fifty to fifty-two feet in width, extending from Dearborn street to the alley between Michigan and Indiana avenues. East of this point a curved strip forty feet wide, located on a twelve-degree curve, was the available territory owned by the proprietors, and west of Dearborn street, a strip thirty feet wide was the original right of way, which was increased by the purchase of property on the south side of the same and east of Clark street for the diversion of the St. Charles Air Line. West of Clark street some exchange of territory was arranged for with the Lake Shore and Rock Island railroad companies, so that the necessary diversion of the Air Line might be made. Owing to the location of the main tracks on the southerly side of the right of way, it was feasible to construct the north retaining wall in certain of the blocks without interfering with the operation of the road. (See Fig. 546) As fast as sections of this wall were completed, together with the adjacent ends of abutments at the several streets and alleys which were crossed by the Air Line, a trestle work was constructed to carry an elevated track on the extreme north line of the Air Line property. (See Figs. 549 and 550.) This was completed to a connection with an elevated track over Clark street, without stopping the traffic on the southerly of the two original tracks on the surface of the ground. At the same time certain sections of the south retaining wall had been constructed, and the foundation for the greater portion of the southerly wall had been put in. The traffic was then changed to the elevated

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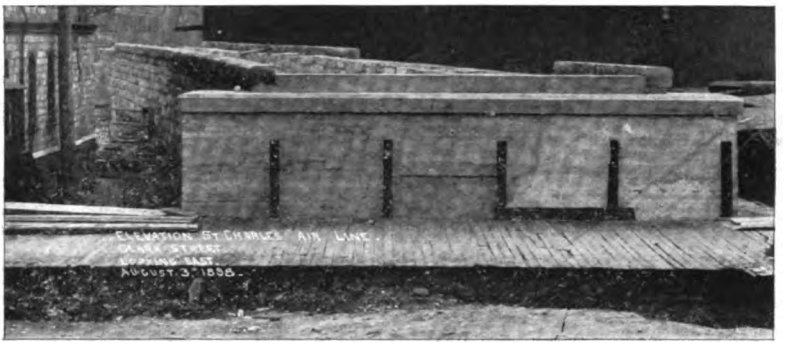

Fig. 548. Concrete Abutment at Clark Street.

Fig. 549. Looking West from Michigan Avenue.

track, and is now being operated over the same, while the remaining sections of the south retaining wall and the unfinished portions of the street and alley abutments are being completed. In handling this portion of the work, the abutments at State street were completed first, and through travel on the low grade track was cut off. Switch connections, however, were maintained from the east and from the west up to the back sides of the abutments at State street. The remaining sections of retaining wall are now being completed, working both east and west from State street.

As soon as the trestle work was constructed along the north side of the Air Line, the work of filling was begun. Slag has been used for this purpose. It has been received in the ordinary

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gondola cars, and also in side-dumping cars; and very shortly after the elevated track was put in operation for the business of the Air Line, the space underneath this track was entirely filled with slag, and, from time to time, the stringers and caps have been removed from the trestle work, the filling has been widened out, an additional track has been laid in two of the blocks and the filling is nearly completed in the same. It is proposed to continue this method of carrying on the filling until its completion.

The east approach to the St. Charles Air Line is an embankment on a one per cent grade, about two thousand feet long, built between masonry retaining walls and terminating in an abutment about one hundred and twenty feet long on the east side of the Illinois Central main and suburban tracks. The work on this approach is illustrated in Figs. 543, 544 and 545. Fig. 545 shows the east abutment, and Fig. 543 shows a view between the two retaining walls after the slag filling has been partially made, with the same traveling derrick in the distance. This approach is wide enough for two tracks.

Access is had to the elevated tracks of the St. Charles Air Line west of Indiana avenue by means of an incline, starting at the Illinois Central suburban tracks and rising with a grade of 2.85 per cent to the east side of Indiana avenue. For this section of the elevation there will be three tracks, two having the full elevation and connecting with the two tracks on the east approach by means of the bridge over the main and suburban tracks of the Illinois Central Railroad, (Fig. 545) the third track being the inclined track already referred to (Fig. 544). The two main tracks, already referred to, will separate into four tracks just east of Michigan avenue, and four tracks will be carried over all streets and alleys to the west side of Dearborn street. At this point the four tracks will converge into two tracks, and these two tracks will extend across Clark street, across the Lake Shore and Rock Island Railroads and to and across the St. Charles Air Line bridge over the South Branch of the river.

At its western end the St. Charles Air Line crosses the South Branch of the Chicago river by means of a double track draw, about three hundred feet long. This draw has been raised and tilted on a grade approximating one per cent in order to connect the elevated tracks in the vicinity of Clark street with the Chicago, Burlington & Quincy and the Northwestern tracks on the west side of the river. Fig. 551 shows the draw standing on its protection during the process of elevating. This was done entirely by means of jacks placed under the panel points and under the center and the turntable rim. The turntable rim and track were tied together by means of suspension bolts; the track, wheels, etc., were elevated entirely clear of the masonry, being raised about five feet at first, and then a temporary timber support was put in. Meantime the west approach to the draw

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Fig. 550. Looking West from Wabash Avenue.

Fig. 551. Raising Draw Span across Chicago River.

was graded up in a temporary way and timber work was put in to support the ends of the draw, when swung. A timber curb was built up under the turntable track. In this condition the draw was operated for several weeks, while such portions of the center pier and the abutments on each side of the river were built, the raising of the masonry being done by constructing concrete work in sections, the timber work being moved and rebuilt as was necessary in order to permit construction of the masonry. The

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draw span rests upon the turntable by means of six castings. The bearing on the center pin was originally designed as a rocking bearing. Hence, in order to tilt the draw to the required grade, it was only necessary to make new castings, having such differences in thickness as would conform to the proper grade. Certain floor beam and stringer connections which were attached to the turntable drum, had also to be cut loose and readjusted and again riveted up, After operating the draw as stated, on its temporary wooden bearings for several weeks, it was again swung into line up and down stream, raised the additional amount (about fifteen inches), required to bring the center to the true line of the grade. It was tilted by the operation of jack screws; lowering at one end and raising at the other; the weight was taken off the turntable drum, and the new castings were inserted. Meantime the masonry of the abutments was completed to the proper grade, the masonry underneath the center bearing on the center pier was built up, as was also the concrete around the outer edge of the pier underneath the wheel track. After allowing this to set for two or three days, the draw was turned and the bearings at the ends were placed, and the connections of the floor beams and track stringers are now being adjusted at the center, so that the draw will be ready for operation tonight.

The general style of superstructure across the streets is illustrated in Fig. 552, which gives merely a cross-section of one girder

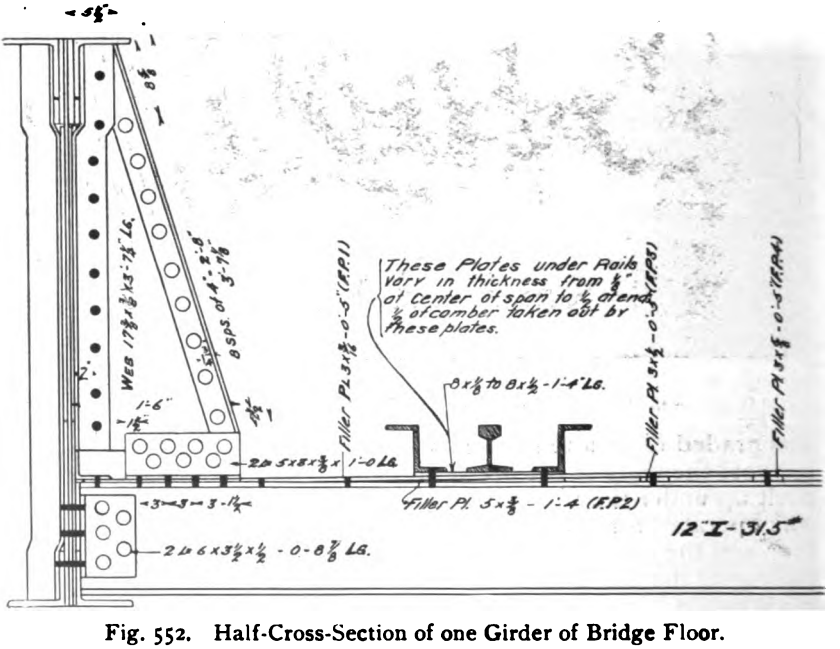

Fig. 552. Half-Cross-Section of one Girder of Bridge Floor.

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and a portion of the floor. Posts are erected at the curb lines of the several streets, dividing the spans across these streets into three portions. There are independent girders over the streets and sidewalks, which are, however, riveted to a common post, standing at the curb lines. In most cases the girders over the sidewalks, as well as those over the alleys, are of deck construction. The girders over the streets are through girders with shallow floors. The floors are made of 12-inch I-beams. spaced generally, 12-in. center to center, covered with a ⅜-inch plate, carrying the rails on special short plates and having Z-bar guard rails on each side of each rail.

A complete system of gutters and down-spouts is constructed to receive the drainage from the floors and to take the same to the gutters in the streets. All streets and alleys will be re-paved. Catch basins will be placed in all gutters and sewer connections provided. A tile drain has been laid along the base of each retaining wall and connections are made through the foundations of the abutments to the street sewers, thus taking care of all water which might otherwise accumulate between the retaining walls.

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