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## THE GILBERT ELEVATED RAILWAY.

In continuation of our promised series of articles on the means of rapid transit adopted in New York City (the first of which, on the New York Elevated Railway, appeared in our issue of January 12), we this week place before our readers engravings and a detailed description of the manner of construction of the new aerial line, known as the Gilbert Elevated Railway. Viewed simply as an engineering work, this structure does not present features of special originality or ingenuity. It is little more than an iron bridge as lightly built as is compatible with due strength, and entirely devoid of anything which would lead it to be regarded as ornamental. On the contrary, the reverse object, of making it as unobtrusive as possible, seems to have been sought—a questionable measure, under the circumstances, we think, for the obscuring of the lower stories of property in the narrow streets was inevitable, according to the essentials of the plan, and in the form of a light, gracefully arched structure along wide thoroughfares, it would have been much more pleasing to the eye. As it is now, the aspect strikes one indifferently, either as that of an interminable bridge, or as an immensely long tunnel, according to the position from which the observer takes his view.

Neither do we present this railway in detail to our readers from any conviction that it is a work of major public

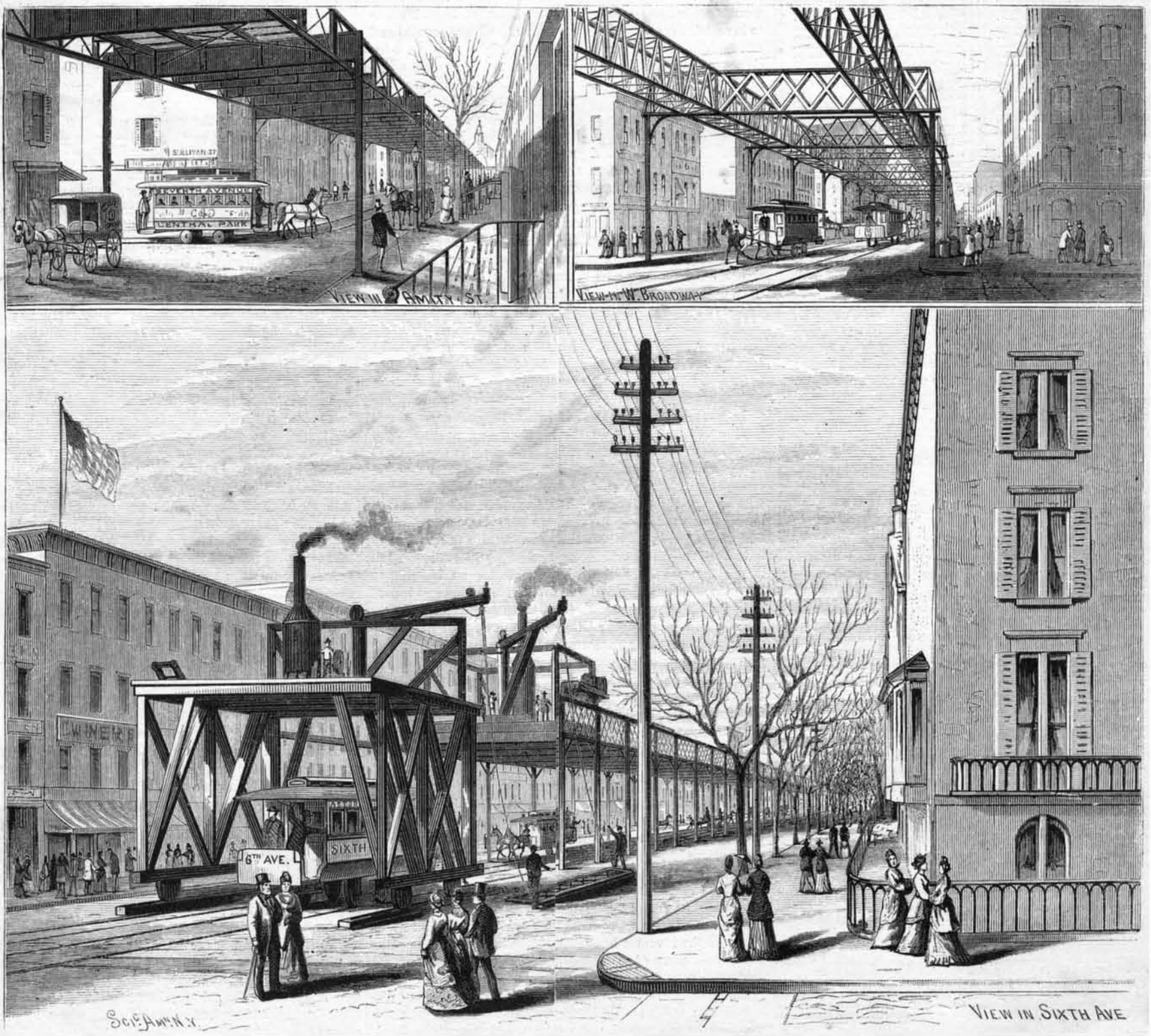
benefit. On the contrary, while almost any system of rapid transit is likely to supply public wants in some good measure, yet we have always regarded the elevated railway conducted through streets as one of the least advantageous modes of meeting the need. Aerial lines led through the blocks are for many reasons—the chief of which is the imperative necessity which we believe exists in a great growing city like the metropolis of keeping the thoroughfares, the arteries of business traffic, unimpeded—greatly to be preferred, and the advantages of subterranean routes have been fully demonstrated to exceed those of all other projects. But the elevated system, having found public favor, is now an accomplished fact. It exists; it is a new undertaking, an interesting subject for examination and comment, and hence we present it. The engravings on our initial page exhibit it in Sixth avenue, where it is least objectionable as directly affecting property; and in two of the smaller streets, where, as can plainly be seen, it acts as a screen to light and air, and in consequence has reacted disastrously on the value of the real estate in its vicinity. As regards the circumstances attending its inception, it will suffice to say that the plan came into competition with many other ones—several of which were better—which were proposed with the same object; that the Act incorporating the Gilbert Elevated Railway Company (so named after the

projector of the system, Dr. Rufus H. Gilbert) was passed by the New York Legislature on June 17, 1872. Work was begun in March, 1876, but the injured property-owners and others stopped it by appeals to the courts until last October, when the final decisions, which we noted at the time, were rendered, injunctions were dissolved, and active operations were resumed.

The distinctive features of the project are that the railway tracks are supported by two rows of columns above the middle of the street, thus carrying the tracks as far as possible from the buildings on either side. The sustaining columns are connected by lattice girders, which will interfere little with vision, and will admit also of the ties being removed for repairs. At certain times of the day the travel will be mainly one way, so that if a car should break down, the obstruction may be moved upon the least used track and taken to a siding without interfering long with travel.

The stations will be built of corrugated iron, and at intervals of half a mile, and usually at the intersections of cross streets. The platform will be covered, and long enough to load and unload four or five cars at a time, because the exchange of passengers must be made in half a minute. The locomotive engines will be of special design, weighing not less than fifteen tons. The speed will be

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from thirty to forty miles per hour. It is computed that 100,000 persons can be carried in eighteen hours. The length of the road will be 22 miles, including both sides of the city.

The engravings on the front page represent the mode of construction and the different structures on Sixth avenue, West 3d street, and West Broadway. The structure on West Broadway is termed a deck structure, and is lighter in appearance than the others. On Sixth avenue the columns are in line with the longitudinal truss, and the transverse girders are latticed in the center, but on West 3d street the longitudinal trusses set inside about four feet from the columns, and the transverse girders are plate. For the construction of the Gilbert Elevated Railway there are three different contracts with three manufacturing iron companies, namely, the Keystone Bridge Company, of Pittsburgh, Pa., the Edgemoor Iron Company, of Wilmington, Del., and Messrs. Clarke, Reeves & Co., of Phoenixville, Pa.

The mode of constructing the permanent way by using portable derricks, as shown in the engraving on the front page, was devised by Dr. Gilbert. The forward or leading derrick, that moves on the street in advance of the work, has strong wooden frames, well trussed, and a platform between the frames, placed at a height that allows the horse cars to pass under, and thus does not stop or even obstruct travel. On the platform are a portable steam engine and boiler which give power for operating the crane used for hoisting material. As the permanent way is advanced, another derrick follows, and thus by means of these two portable derricks, the one leading on the street and the other following on the railroad, the heavy girders and truss work are lifted and easily adjusted to their places.

Fig. 1 represents a section of the railway as it will be built on Sixth avenue. P P are the vertical wrought iron columns or foundations; A is the upper chord and B the lower chord. Between these are the panel posts and truss work, the whole forming a longitudinal truss between the two columns. The distance from center to center of the numerous columns necessarily varies, but it may be stated at about 43 feet. The foundation and bed plate for each column are massive and durable, and are put down in the following

manner: An excavation between five and six feet in depth and six feet square is first made, and at the bottom of this is laid hydraulic mortar 4 inches in thickness. On this are placed two flat blue stones not less than 5 inches in thickness and having not less than a superficial area of six feet.

Four holes in these stones are cut for the reception of holding-down bolts. Brick masonry is built up near the level of the sidewalk. This brick work is 4 feet square at the top, and is all laid in hydraulic cement. The cast iron bed plate weighing about 1,200 pounds is then put down and secured by bolts 2 inches diameter and about 3 feet 7 1/2 inches long. The washers for the heads of the bolts, which are upset 2 1/4 inches diameter and 1 1/2 inch thick, are 7 inches square. Height of bed plate is 15 inches by 3 feet 2 inches square at bottom. The bottom of the wrought iron column is bolted to the upper surface, 21 inches square, of this cast iron bed plate by eight bolts 1 1/2 inch diameter. The whole is filled in with cement and brick. The vertical columns consist of two 12-inch wrought-iron channel bars and two 12 inch plates riveted to the channel plates. Four pieces of angle iron bars and a plate are fastened to the foot of the column joint and made water tight. The upper part or top of the column is fitted with such plates, angle irons and brackets as are necessary to secure the girders to them and to each other.

Reference being again made to Figs. 1 and 2, showing a longitudinal girder and an enlarged view of column, the following details will be intelligible:

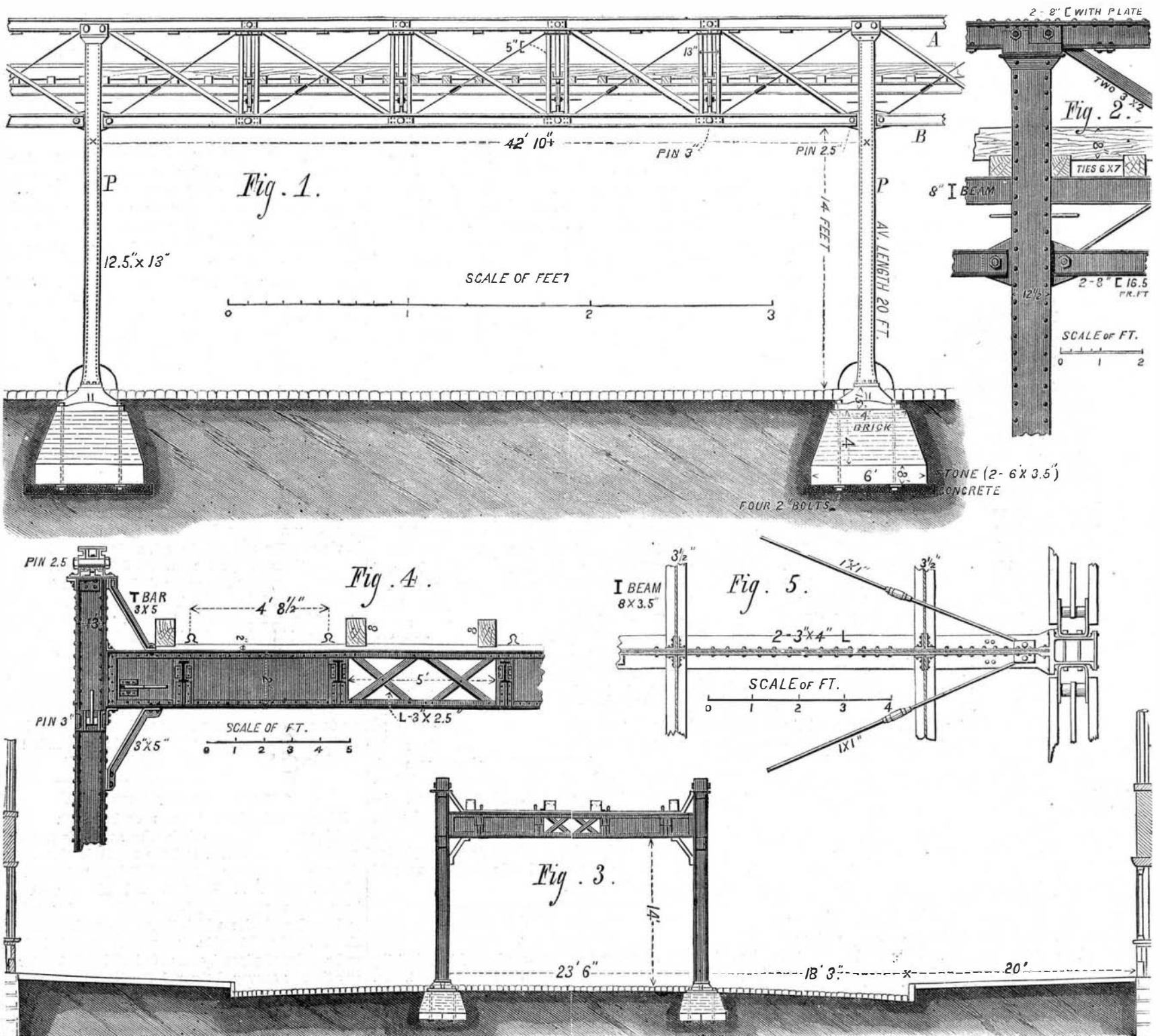
The longitudinal girders are pin-connected trusses 6 feet 2 inches deep and about 5 1/2 feet vertically from center to center of pins. The upper chord is made up of two channel bars 8 inches deep united by a plate 12 inches wide firmly riveted thereto. The lower chord consists of two channel bars 8 inches deep. Panel posts are of two channel bars 5 inches by 2 1/8 inches by 5/8 inch. Pins 3 inches diameter, and nuts at each end. Main ties are of two bars 3 inches by 2 inches. Counter ties 1 inch square. There are four sets of track stringers of rolled I beams, 8 inches by 4 inches, weighing 66 pounds to the yard, and fastened to the cross girders and floor beams by angle irons at each end. Placed on these are the wooden cross ties of yellow pine, 6 by 7 inches

by 8 1/2 feet long. From center to center of ties is 24 inches. The steel rails weigh 56 lbs. per yard; guard rails, 7" by 8" of Georgia pine, are securely fastened to the cross ties outside of each rail for safety in case of derailment. The whole structure is stiffened permanently by diagonal braces in each panel. Fig. 3 represents a transverse view of a section on Sixth avenue, by which with Figs. 4 and 5 the arrangement and form of the transverse lattice girders forming the floor beams will be understood. These are 24 inches deep and 7/8 inch thick. The top chord is of two bars of angle iron 3 inches by 4 inches. The bottom chord is of two angle irons 3 inches by 4 inches. The distance between from center to center of columns transversely is 23 feet 6 inches.

The route of the Gilbert Elevated Railway will be as follows:—

Commencing on the south shore of Harlem River at Kingsbridge, thence along River street to Eighth avenue; thence along Eighth avenue to One hundred and tenth street; thence along One hundred and tenth street to Ninth avenue; thence along Ninth avenue to Fifty-third street; thence along Fifty-third street to Sixth avenue; thence along Sixth avenue to W. 3d street; thence along W. 3d street to South Fifth avenue; thence along South Fifth avenue to Canal street; thence crossing Canal street into West Broadway; thence along West Broadway to Chambers street; thence across Chambers street into College Place; thence along College Place to Murray street; thence along Murray street to Church street; thence along Church street to New Church street; thence along New Church street to and across Morris street; thence through private property to Bowling Green; thence around Bowling Green into Beaver street; thence along Beaver street to Pearl street; thence along Pearl street and New Bowery to Division street; thence along Division street to Allen street; thence along Allen street and First avenue to Twenty-third street; thence along Twenty-third street to Second avenue; thence along Second avenue to Harlem river; thence along River street to Eighth avenue. Also a connecting line through and along Chambers street from West Broadway to Chatham street; thence through Chatham street to Division street.

Also an extension from the junction at Fifty-third street through and along Sixth avenue to Fifty-ninth street.



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