"The 14th Ave. Sewer and 60th St. Sewer Tunnel Work, Brooklyn, N. Y.,"
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THE 14TH AVE. SEWER AND 60TH ST. SEWER TUNNEL WORK, BROOKLYN, N. Y.

An interesting piece of sewer work, involving the construction of 2,100 ft. of 66-in., 1,052 ft. of 72-in., and 1,840 ft. of 78-in. brick sewer, and 3,870 ft. of brick sewer tunnel 13½ ft. in diameter, which is now in progress in Brooklyn, N. Y., is illustrated in the accompanying cuts. This new sewer is designed to drain the Flatbush, Bay Ridge and South Brooklyn sections of the city, and when completed will include an extension to an outlet into New York Bay, beside the work itemized above. Briefly described, the 66-in., 72-in. and 78-in. brick sewer will extend along 14th Ave., from 41st St. to 60th St. At 60th St. the 13½-ft. tunnel section begins, and extends along 60th St. to and along Fort Hamilton Ave. to 62nd St. The proposed extension will run from the present 62nd St. terminus to an outlet into the bay at the foot of 64th St. The contract for this extension will be awarded as soon as the present work is completed.

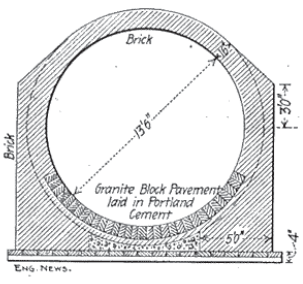

Fig. 1. Section of Sewer Masonry in Open-Cut Tunnel, 60th St. Sewer Tunnel, Brooklyn, N. Y.

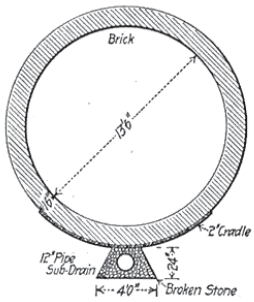

Fig. 2. Section of Sewer Masonry in Subterranean Tunnel, 60th St. Sewer Tunnel, Brooklyn, N. Y.

The present work, comprising the 14th Ave. and 60th St. sewers, is chiefly interesting because of the tunnel work along 60th St. This comprises 170 ft. of open-cut tunnel and 3,700 ft. of subterranean tunnel through fine sand at a depth of from 40 ft. to 60 ft. beneath the surface. Fig. 1 is a section of the sewer in open-cut, and Fig. 2 a section in tunnel proper. The only other structural feature of the sewer which is enough beyond the ordinary to deserve mention is the deep manhole construction shown by Fig. 3. There will be six of these manholes, all located on the tunnel portion of the work. The masonry sections for the 66-in., 72-in. and 78-in. brick sewers resemble in outline and construction the open-cut tunnel section shown in Fig. 1, except that there is no granite pavement, and that only one layer of foundation boards are used.

The material penetrated by the 60th St. tunnel is fine sand, carrying considerable water; it will not stand up during excavation, but is hardly unstable enough to be classed as quicksand. As carried out, the subterranean portion was constructed in advance of the open-cut portion, so that the entire excavation has been prosecuted from three shafts, one located near each end and one at an intermediate point. At shaft No. 3, near the beginning of the tunnel section, the heading was driven in one direction only, but at shafts No. 1 and No. 2, two headings were worked, one in each direction. All of the excavation had to be very carefully and thoroughly strutted to hold back the fine sand, and it was also found necessary to leave a considerable portion of the timber in place behind the completed lining. Fig. 4 shows the general construction of the full-section strutting.

The tunnel is excavated by driving a drift 6 ft. wide and 7 ft. high at the bottom and center of the section, and almost simultaneously a heading 8 ft. wide and 7 ft. high at the center and top of the section. The chief purpose of the primary drift is to drain the material, and to facilitate this a tile subdrain is laid about 2 ft. below the bottom of the invert, and is left in place. The heading and drift are carried about 50 ft. ahead of the full section work. As fast as they are driven they are strutted. The strutting in both galleries is composed of transverse frames, consisting of a sill, a cap and two batter posts, which carry longitudinal poling boards at both top and sides. The front end strutting consists of bulkhead boards held against the face by horizontal struts extending back to the forward cross-frame or to an inclined raker strut.

The section is enlarged from the heading by excavating on each side, the radial struts, roof bars and segmental braces being inserted one after another, and the excavation carried on under transverse poling boards, as clearly shown by Fig. 4. When the lining is built the radial struts, plate timber and posts are removed, but all the other timbering is left in place, and such interstices as may exist behind the lining are filled with concrete. The lining masonry calls for no particular mention, except possibly to observe that the invert arch is built on a cradle of lagging boards, as indicated by the broken lines in Fig. 4. The only difficulty of the work lies in the construction of the strutting, and this requires simply that care be taken to keep the excavation tightly lagged to prevent the inflow of sand. So far no accidents have occurred, and with a few exceptions natural ventilation has been sufficient to keep the excavation in reasonably good condition for work.

The tunnel was designed and is being built under the direction of Mr. Henry R. Asserson, Chief Engineer of Sewers for the Borough of Brooklyn, Mr. James McGrath being the Assistant Engineer in charge. The general contractors for the whole sewer work are O'Brien, Sheehan & Co., and Mulloy, Coogan & Sexton are the subcontractors for the tunnel work.

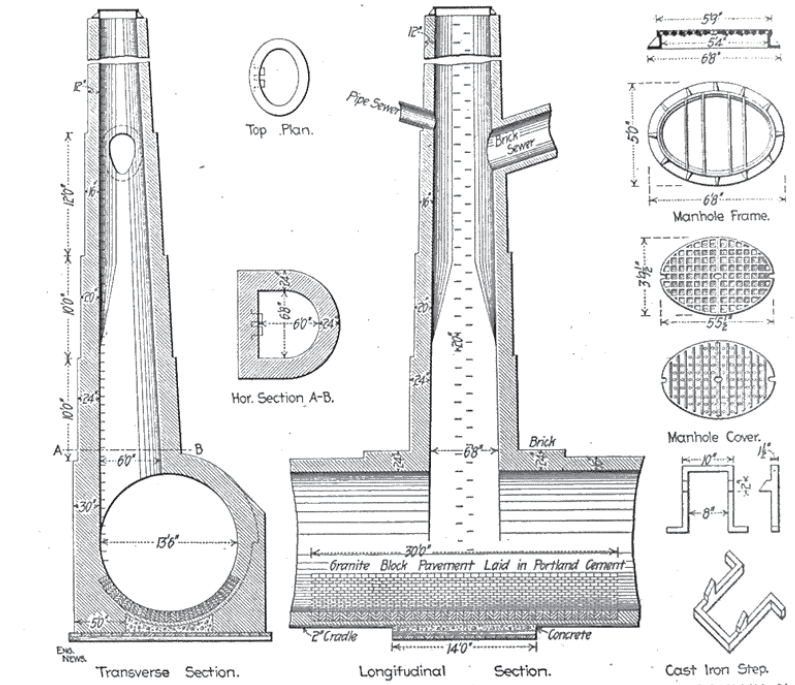

FIG. 3. DEEP MANHOLE CONSTRUCTION ON 60TH ST. SEWER TUNNEL, BROOKLYN, N. Y.

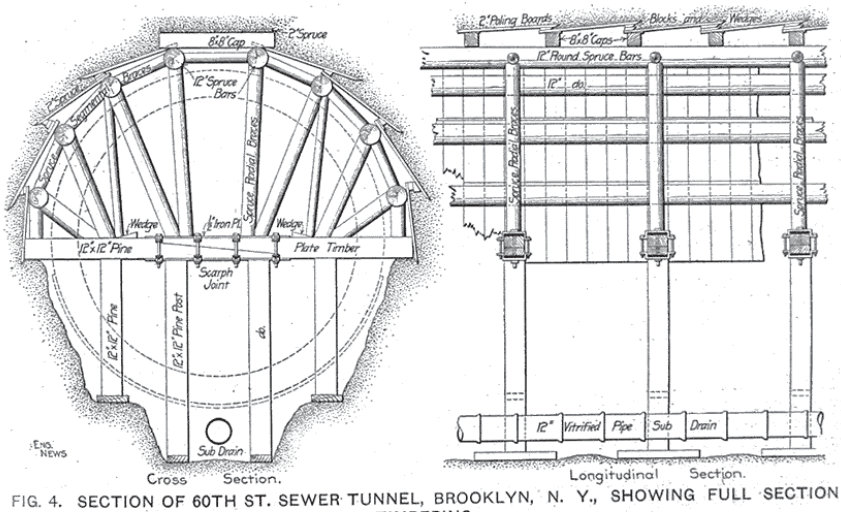

FIG. 4. SECTION OF 60TH ST. SEWER TUNNEL, BROOKLYN, N. Y., SHOWING FULL SECTION TIMBERING.