

when exposed to air. The material was not a shale but a boulder clay having a number of stones scattered through it ranging in size from half an inch to small boulders.

The excavated material was transported on a small car to the foot of the shaft, where it was hoisted to an elevated track and dumped into wagons. The completed sewer followed the excavation closely, except where it was thought necessary to hold back to prevent injury from blasting. The shock was never serious, however, owing to the small charge used, and the completed work was never more than 15 feet from the face of the excavation.

The tunnel was electrically lighted, and the absence of forms facilitated the laying of a small track for the cars carrying the excavated material, and the blocks, etc., used in the sewer.

After the excavation in a length was completed the subdrain was laid. Then the concrete was laid in the

ing the band the concrete backing was placed so as to fill the space between the blocks and the earth. The lower half of the ring having been extended meanwhile, the form was moved ahead and the process repeated.

In completing a junction of the sewer between any two shafts, the operation is very simple. After the excavation work on any two faces has been completed, the work of constructing the sewer on each side of the junction is carried on in the usual manner. A measurement is made of the gap between the two sections of sewer, before these approach too close, in order to ascertain how many tiers of blocks will be required to fill the gap. In this way it is often possible, by slightly increasing the width of the joints, to have the final tier of blocks just nicely close the final gap. At other times it is seen by the measurements that the final gap cannot be adjusted to a block in width except by too great a change in the width of the joint. In such cases, the final gap is closed by cutting the blocks

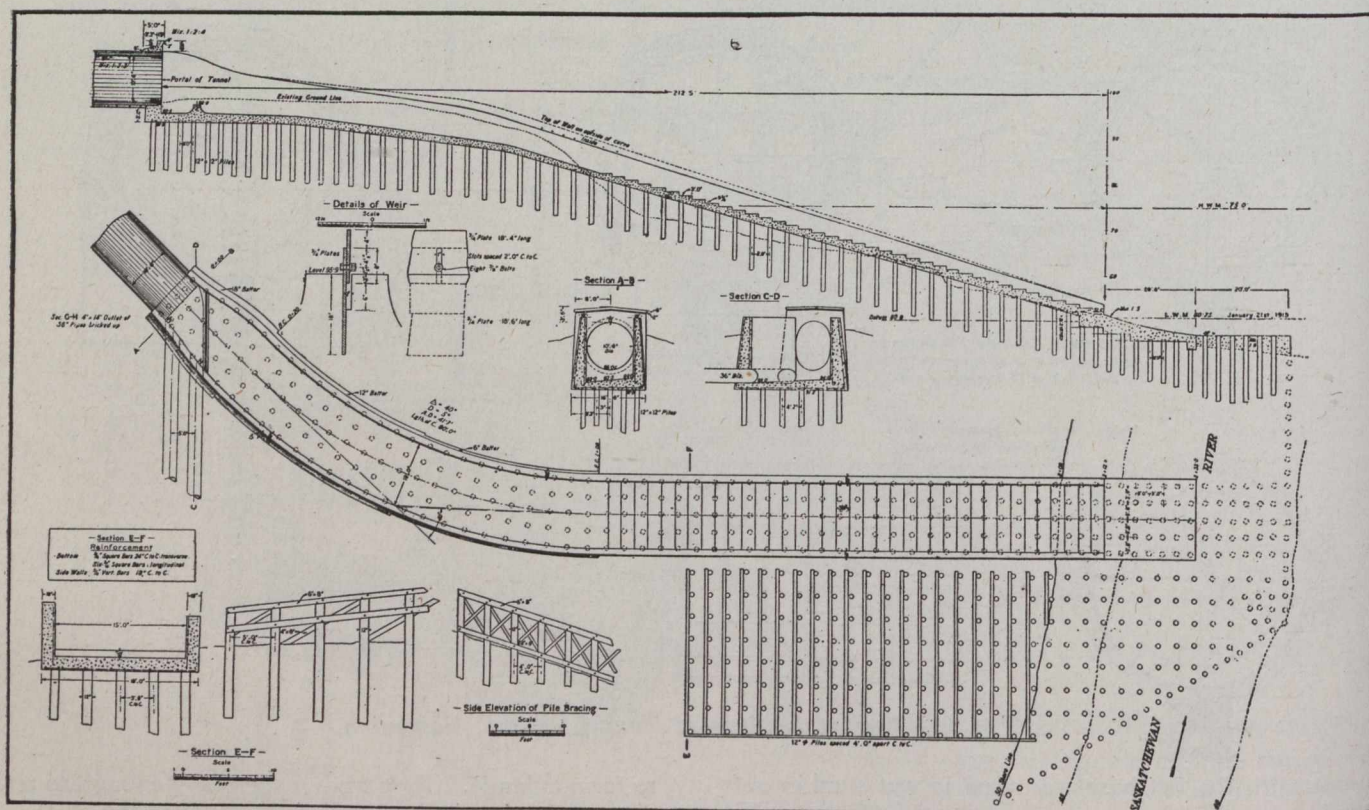


Fig. 7.—Plan, Profile and Details of Main Sewer Outlet, Edmonton.

bottom, to the level of the bottom of the blocks. The lower half of the hooping band was then placed on the concrete, and the invert block on top of the band. The remaining blocks up to the springing line were added, the backing concrete being placed as the block laying proceeded until the lower half of the ring was complete. A short wooden form extending partly into the finished sewer was then used to complete the upper part of the ring. The reinforcing crown bar, previously bent to the proper shape, was first placed in position against the face of the previous ring, so as to rest on the projection on these blocks. Block laying was then continued, care being taken to fill the joints between the blocks thoroughly, so that the reinforcing bar and the jointing irons would be surrounded by and bedded in the mortar. After the last block was placed at the top, the upper half of the hooping band was put on, the halves being connected by coupling shoes, and drawn up tightly by wrenches. After tighten-

ing the band the concrete backing was placed so as to fill the space between the blocks and the earth. The lower half of the ring having been extended meanwhile, the form was moved ahead and the process repeated.

to the required width. The lower portion of the sewer is thus completed with blocks without difficulty. The final gap in the upper half is made with mass concrete, working from each side up towards the crown, lagging being used to hold the concrete in place; these being added from time to time as the work progresses towards the crown. The last small portion at the crown is lifted or shoved into place. After the concrete has set sufficiently, the forms are removed and the work smoothed off, leaving the junction with the appearance of a wide joint.

The rate of progress was 30 to 36 feet of completed sewer in each face per week. In the 4-ft. 6-in. and 5-ft. sewers, two men worked at the face, one as car pusher, and two or three men on top, exclusive of hoistmen and foreman. The former served the two faces worked from his shaft, and the latter looked after several faces. In the 6-ft., 6-ft. 6-in. and 8-ft. sewers three men worked at the face, and there were two car pushers. Work was carried