HINTS ON THE CONSTRUCTION OF VITRIFIED CLAY SEGMENT BLOCK SEWERS.*

At the present time, there are on the market two vitrified sewer blocks of different design, one being a single-ring block and the other a two-ring block. The single block has a ship-lap joint on the ends and a tongue and groove joint on the sides, while in the double block, the laps and joints are made in the construction of the sewer and the blocks are placed one on top of the other as in a two-ring brick sewer. The blocks are hollow longitudinally with web braces. They are made for sewers varying in size from 30 to 108 ins. in diameter, and according to size, weigh from 40 up to 120 lbs., are 18 and 24 ins. long, are from 9 to 15 ins. wide, and are from 5 to 10 ins. thick. Short lengths are also made for convenience in construction and for use on sharp curves. Special blocks are also made for connections and junctions and consequently this type of sewer is as flexible as any pipe, brick, or concrete sewer. The blocks are also made for use in egg-shaped sewers, in which case, an extra heavy base block is furnished.

In constructing the sewer with the blocks, the method of excavating the trench does not vary from methods used in constructing sewers of other types. If the soil excavated is stiff enough to permit, the bottom of the trench should be shaped to conform to the outside of the sewer, thus forming a good foundation and eliminating excessive tamping. A template may be used to procure this shape as well as a means of guidance for laying the blocks. The first block is laid in the centre of the trench to line and grade and the blocks comprising the invert are laid to it. As the blocks of the invert are laid up, care in back-filling behind the blocks must be practised. The joints, both end and side, must be mortared about ¼ in. thick, and the blocks must be laid broken or staggered. The joints of the invert may be pointed up as they are laid. Careful tamping on each side of the spring line behind the blocks will give much added strength to the sewer and this tamping should continue to the second course above the spring line. Wooden forms are used for the arch and are usually placed a little bit higher than the required diameter in order to allow a little wider space for the key block. The blocks are then laid up on either side of the form, the key block finally inserted, the form immediately removed, and the arch will then settle into place and form the correct diameter. Backfilling can then be started at once. In laying these blocks, experienced bricklayers are not needed, as the ordinary pipelayer can soon pick up the art of laying the blocks. If wet and quicksandy conditions prevail in the trench and sheeting is necessary, it must be driven low and cut off and left in the trench below the spring line. In cases where steel sheeting would be used, very careful backfilling must be resorted to and as the sheeting is slowly pulled, water flushing must be carried on as it is very necessary that a good bearing be given the invert. In cases where the soil conditions in the trench bottom are very bad, planks may be laid under the first block or a cradle may be used for holding the first few blocks. However, there are no disadvantages in using the block in bad trench work not encountered in using other materials, and it is claimed by some of the engineers that have used them in bad trench conditions, that they are to be preferred to any other type of material.

The cost of laying the blocks, of course, varies with the efficiency of the contractor and his organization, and with the varying labor conditions. It should not exceed 1 cent per inch in diameter of the sewer per lineal foot; this to include labor of laying, cost of mortar, and back-filling up to the spring line. The cost of the block is moderate and has the advantage over the large sewer pipe in that it takes a smaller freight rate, the breakage in transit is exceedingly small, and the cost of handling from cars to trench and in the trench is low as it is easily a one-man job. The cost of the block sewer complete is undoubtedly lower than the cost of either the brick or reinforced concrete sewer, and on account of its lower coefficient of friction, smaller sewers may be used with as good results as larger sizes of the other two materials with a consequent lowering of cost. There is only 7 per cent. of surface exposed to the jointing material in the block sewer as against 28 per cent. in the brick sewer, and the highly glazed impervious block is certainly superior to the ordinary sewer brick. Good speed in construction can be made and it is not necessary to have much trench open ahead of the block-laying and, as mentioned before, back-filling can be done as soon as forms are lowered and the work cleaned up generally as it progresses. All of these points tend to lower the cost of this type of sewer with the advantage of giving a more efficient structure.

Good connections can be made between segment block sewers of different size as well as between segment block sewers and pipe lines. The segment block sewer can also be adjusted to fit sharp curves with very little loss of efficiency. Special blocks are made for the small connections with the pipe molded to the block and in the large sizes, four or six adjacent blocks are so molded in the manufacture to permit of the entrance of the large pipe and thus saves any cutting or chipping of the block on the construction work. The matter of sub-drainage is eliminated, as the ducts in the hollow block form a sub-drain and the ground water is readily carried off.

These blocks, while being particularly adapted for use in constructing storm and sanitary sewers, are also coming into use as outlet drains for large farm drainage projects instead of small open ditches. They can also be used for service tunnels as well as for highway culverts. Sewers of vitrified clay segment blocks have been constructed during the past few years in many cities in this country and Canada.

Both internal hydrostatic pressure and loading tests have been carried on in connection with this type of sewer and the results of these tests may be obtained from the manufacturers and testing laboratories, it being enough to state here that the strength of the blocks have proven ample and sufficient for the use for which they are made. Examinations of segment block sewers have been made after they have been in use for some time and the reports are that they are in good shape and answering their purpose in every respect. Perhaps one of the most critical tests in actual practice was made at Louisville, Kentucky, where a 72-in. diameter block sewer was examined after it had been in service for two years, being located in a trench 28 ft. deep. The examination showed that the sewer was in perfect condition with absolutely no defects either from abrasion or the weight of the fill above the same.

*From a paper read before the annual meeting of Illinois Society of Engineers and Surveyors, by J. M. Egan, Jr.

The asphalt deposits found at Trinidad and the Red Sea are practically pure bitumen.

Owing to the scarcity of box cars for shipping automobiles, an American manufacturer is using flat cars and gondolas. After loading the cars on board, a heavy tarpaulin is used to cover them, something similar to the English method.