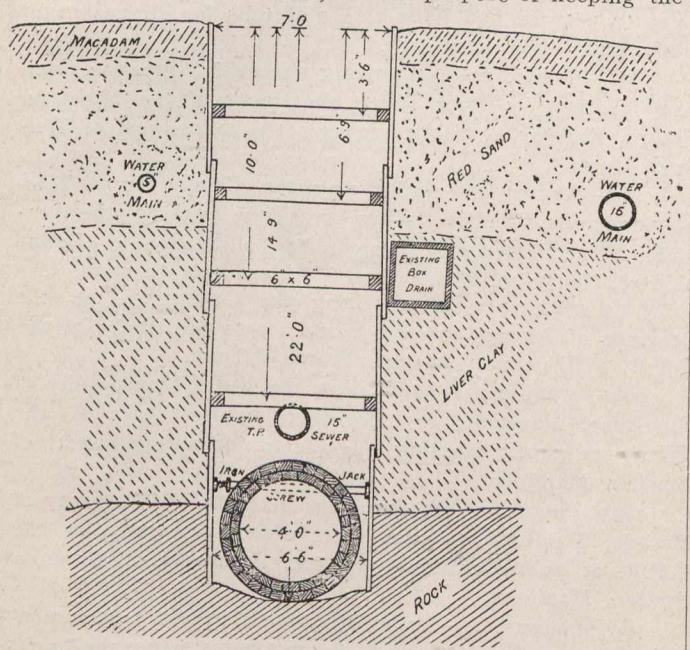
A PAGE OF COSTS
ACTUAL, ESTIMATED and CONTRACTED

COST OF BRICK SEWER.*

On the 26th June, 1908, work was commenced on the construction of the Kent St. Relief Sewer, and which was carried out by the city (day labor). Starting at a point on the Ottawa River, it extends in a southerly direction. This sewer is for the purpose of relieving a system of small tile pipe sewers and a 2′ 8″ x 4′ Brick sewer, which becomes badly surcharged after every rain storm, in the vicinity of Laurier Ave. W. From the outlet on the Ottawa River to the 6 foot by 6 foot inspection chamber at the top of the cliff the sewer is of steel pipe, 24 inches in diameter, in six sections flanged and bolted together. The total length is 146 feet 6 inches, on a 70 per cent. grade, and the last two pipes at the flanges are bedded on a rock foundation in a mass of concrete 7 ft. by 9 feet by 3 feet 9 inches. From the inspection chamber the sewer is circular, 48 inches in diameter, and built of brick 8 inches in thickness. The brick sewer is constructed in open cut throughout, and the trench is directly on the line of the old 15 inch tile pipe sewer. At first, considerable difficulty was experienced in getting rid of the water from the old tile pipe, for the purpose of keeping the



trench dry in the drilling of the rock-bed and the building of the brickwork. A 5-inch electric centrifugal pump was used, but proved expensive, and unsatisfactory for moving, as the work proceeded. Finally, iron troughs were substituted, connecting the old work and the new, and found of great service, as they were light, not bulky, of sufficient carrying capacity, and allowed the workmen perfect freedom to carry on their duties. At the inspection chamber the sewer has a rise of 2 ft. with a ramp, after which there is a grade of 0.291% till Vittoria St. is reached, and another rise of 3.44 feet is made with a ramp. From this point to north building line of Wellington St. the grade is much steeper at 2.05% until it again changes back to 0.291% and Queen St. is reached. From Cliff St. to Wellington St. the rock averaged 9 feet deep and was of a hard, tough nature. The Ingersoll-Sergeant steam drill has been used all the time, with steam at 90 lbs. pressure, supplied from the boiler of the traveller, and has given very satisfactory results. Very great care had to be taken with the timbering of the trench, which was close sheeted in two to four settings, all through from roadway level to rock level. The strata above the rock were of a varying nature, from red sand to hard pan and liverclay, while between Wellington and Sparks St. the strata were particularly bad, for under the liverclay was a bed of pure running sand. Work was carried on by two gangs working day and night until the crossing was made. A 5-inch water main on the one side, a 15-inch on the other, gas and Bell Telephone cables and an old 30-inch box drain to make the work of construction difficult. In the blasting of the rock, care had also to be taken on account of the danger of vibration and concussion to the surrounding property, including St. Andrews Presbyterian Church, the British American Bank Note Co. and other buildings, with the possibility of a cave-in of the whole sewer trench, which at this section is 22 feet deep. (See diagram.) It is a matter for congratulation that the work was caried out in winter and not in summer, otherwise there would be more serious danger. In winter the liverclay and running sand were in a frozen state, and so until tampered with and exposed to the atmosphere has some stability of its own. The traveller which weighs about 2 tons was carried directly over the bench on rails 7 ft. 6 inches gauge, and handles all the material expeditiously in buckets holding ⅔ of a cubic yard. Construction is proceeding as fast as it is possible to proceed with under the circumstances, and in the face of the peculiar difficulties that have presented themselves as far as is consistent with good workmanship and public safety. The length of the sewer constucted, for the estimate, was 860 feet or 0.16 miles, and the cost of construction $18,097.41.

The detail cost of the 48-inch brick circular sewer is as follows:—

	Actual Cost per foot.	Estimated Cost per foot.
Brickwork	$1.93	
Bricklaying	1.66	
Sand	0.23	
Cement	0.72	
	$4.54	$4.95

*Adapted from a report of W. H. Carson, C. E., to Mr. N. J. Ker, City Engineer, Ottawa.

FAIR RATES OF RENTAL FOR MACHINERY ON MUNICIPAL WORK.

In their recently published report to the Boston Finance Commission, Metcalf & Eddy, of Boston, consulting civil engineers, discuss in some detail the fair rates of rental for machinery on municipal work, particularly with relation to conditions heretofore existing in the Sewer Department of Boston, when over $32,000 was paid in machinery rentals during a period of nineteen months.

It was found that the prices paid for such rentals were very much higher than the market prices and than were reasonable. Had the city rented its machinery at a monthly rate of 5 per cent. of the first cost of the machinery, a material saving would have been effected. If the city should continue to do work by day labor, which the engineers do not recommend, however, they indicate that it would seem wise for it to purchase and own its machinery, in which case the rental, including interest, would be materially less than 5 per cent. per month. During the period of nineteen months nearly enough money was paid for rentals to pay the first cost of an equipment sufficient to meet the requirements of the department.

"It is somewhat difficult," so state the engineers, "to determine what is a fair rental for machinery upon this class of work. It not infrequently happens that much machinery is abused by those operating it, and it is also at times injured when being moved, and in cold weather it is liable to be damaged by freezing of water in pipes and boilers. The owner must take all of these conditions into consideration in fixing his price. There are, however, a few firms which make a business of building and renting ma-