TRENCHING MACHINE WORK.*

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IN 1909-1910 the city of New York installed between Valley Stream and Amityville, Long Island (a distance of 83,800 feet) a 72-inch lock-bar 7/16-inch steel pipe as a portion of its Brooklyn conduit system. The contract, which was dated November 6th, 1908, was awarded to the T. A. Gillespie Co., and the total estimated cost for all the work, which included culverts, valve chambers, valves and other appurtenances, was $1,879,390.

That portion of Long Island traversed by the pipe is an almost level sandy plain, there being only a few feet difference in elevation between the small valleys and the low, intervening ridges. The material to be excavated was sand, with some gravel and a light sandy top soil. A right-of-way, in general 200 feet in width, with few cross-roads, gave opportunity for the use of any excavating system.

The contractors used practically every known method in excavating the trench, including hand, horse and scraper, clam-shell buckets, steam shovels and the Austen trenching machine. The trenching machine was used for the greater part of the work. It could be, and was, operated from the shallowest trench section up to a maximum depth of about ten feet, the limiting depth being determined by the resultant width of trench, it being necessary to have a secure track foundation on each side of the trench on which the machine travelled, and by which it was supported. Where the depth of the trench was greater than 10 feet, the contractor removed a portion of the material by other methods and then used the trenching machine.

In a section where the average depth of cut was 8 feet, and the work was performed during a period of one month, data are available on which accurate determination of the cost of excavation by this method can be worked out.

Two machines were regularly employed, working in tandem, one machine removing approximately half the material and the other machine completing the trench. This method was considered to give maximum rate of progress. The contractors were desirous of completing the work as rapidly as possible, and the methods adopted were based, first, on progress, and second, on unit cost.

The two machines used were not owned by the T. A. Gillespie Co., but were rented from the F. C. Austin Drainage Excavator Co. at a yearly rental of $8,500 and $9,300, respectively. This rental was based on the total yardage excavated by either machine being 100,000 cubic yards or less, all over and above 100,000 cubic yards being paid for at the rate of $0.055 cents per cubic yard. The machines were worked in tandem for the greater part of the work, and in many cases for the 24 hours in each day.

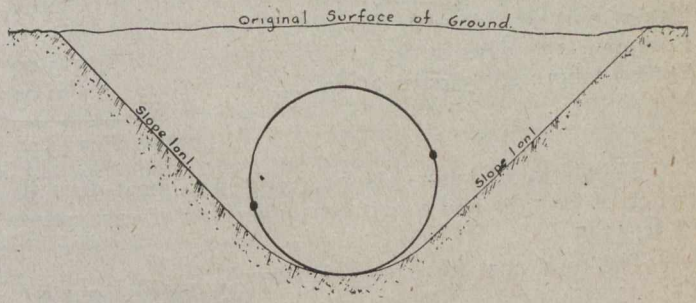
To determine the cost per cubic yard for excavating the trench by use of the trenching machine, a length of trench was taken extending from Sta. 969-52 to Sta. 1090-92, or a total of 12,140 ft. The machines were worked in this section three shifts per 24 hours for one month, from May 15th to June 16th, 1909. An accurate force account was kept by the department for this period.

*Paper read before the American Waterworks Convention, Richmond, Va., May 10th, 1917.

The total cost of excavating per cubic yard was subdivided under the following:—

(1) Rental of machines.
(2) Repairs and coal for machines.
(3) Labor force.

The total amount of excavation made by the two machines was approximately 400,000 cu. yds., or 200,000



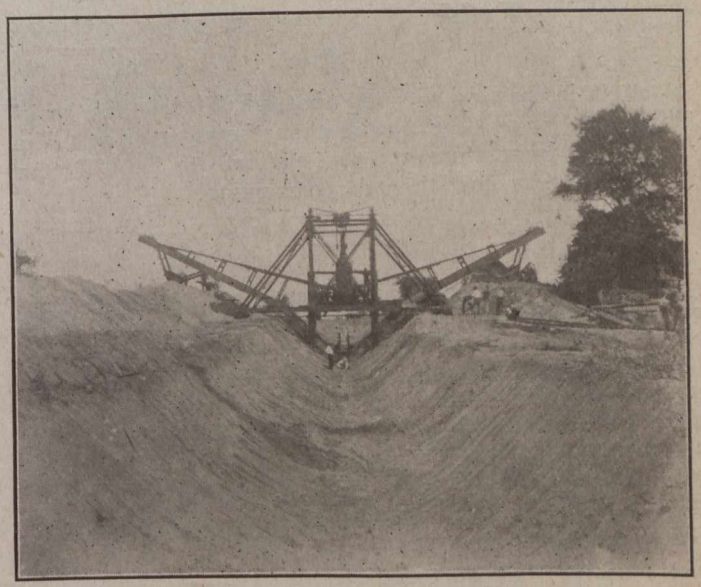
Typical Cross-section of Trench.

cu. yds. for each machine. The cost for rental per cubic yard would, therefore, be for

	Per cu. yd.
Machine No. 1—The first 100,000 cu. yds.....	$.085
" " The second 100,000 cu. yds...	.055
Machine No 2—The first 100,000 cu. yds.	.093
" " The second 100,000 cu. yds...	.055

The average for both machines would be $0.072 per cubic yard.

The trenching machine excavated the trench with side slopes of 1 on 1 and the bottom of the trench rounded to conform with the curve of the pipe. The average depth of the trench for the 12,140 feet excavated was approximately 8.0 feet. This gave a total of 48,560 cubic yards, or 4 cubic yards per linear foot of trench. The repairs on the two machines for the first six months, including the cost of setting up, amounted to $6,000, and the cost of coal for the same period was $2,000. The



Austin Trenching Machine Excavating a 16-ft. Trench.

cost for repairs, coal, etc., for one month would be $1,334, or $0.0275 per cubic yard.

The force included:—

(a) The men who operated the machines.
(b) The gang laying and shifting the track and moving machines.