

cavating was done with the aid of a clam shell. Since the bottom of this trench was wet, a great deal of pumping was required. Part of the sewer in this open cut was so near the surface of the ground that an extra ring of brick was provided, and at the nearest point to the surface a 6-inch concrete covering was also provided.

For the 24-inch and 18-inch tile pipe sections of this sewer, the excavating was done in stretches of open cut and tunnel alternating; or, say, a 12-foot stretch of open cut and then 8 feet of tunnel. The space remaining above the sewer in the tunnelled stretches was packed with 1:4:9 concrete. These short stretches of tunnel saved a great deal of handling of excavation.

A fair line of costs was kept on this job, and we shall endeavor to give them as clearly as possible. Of course, they do not include overhead charges, depreciation of plant, cost of bond or wastage of tools, etc. In the costs is given separately the cost of the tunnelled section, open cut section, 24-inch tile pipe, 18-inch tile pipe, lining, building one lock, setting up compressor plant and building Nos. 1, 2 and 3 shafts and manholes.

Tunnel Section, Weston Road South.

Ground wet in lower 2 feet only, compressed air used.
 Sizes, 3 ft. 4 ins. x 5 ft.; 3 ft. x 4 ft. 6 ins.;
 2 ft. 8 ins. x 4 ft. 1,054 feet of tunnel.

Item	Total Time	Total Material	Unit	Cost
Foreman	200 days	1,812 cu. yds.	0.11 days / c. yd.	\$ 800.00
Comp. Engr.	1,626 day hrs.	1,812	0.90 hrs.	
Pump	1,600 night hrs.	237,000 br.	6.71 / 1,000	1351 70
Team Brick	145	1,812 cu. yds.	1.046 "	758 00
Plant	201	237,000 br.	0.61 / 1,000	98.10
" Surplus	464	1,054 lin. ft.	0.9 / ft.	135.97
" Misc.	22	1,812 cu. yds.	0.26 / c. yd.	309 35
Miners	1,929	1,054 lin. ft.	1.065 / ft.	4.65
Muckers	2,297	1,812 cu. yds.	1.065 / yd.	964.50
Tagman	1,478	1,812	1.270 "	803 95
Brick haul	533	1,812	0.816 "	443.40
Bricklayers	1,374	237,000 br.	0.290 / 1,000	159 90
" labor	6,556	237,000	5.80 "	1442.70
Labor, Misc.	708	237,000	27.64 "	2,094.60
Cl'n'g Sewer	811	1,054 lin. ft.	0.66 / 1 ft.	212.40
Labor, Pumps	136	1,054	0.77 "	24.30
Plant	337	1,054	0.13 "	40 80
Watchman	43 days	1,054	0.32 "	101 10
Cement	2,449 bags	1,054	"	86 00
Brick	237,000	1,054	"	979.60
Brickpackers	28,000	"	"	2,607.00
Sand	275 cu. yds.	"	27 0	308 00
Lumber	"	"	8.00 B.M. / l. ft.	412.50
				400 00
			Total Cost.....	\$12,767 52

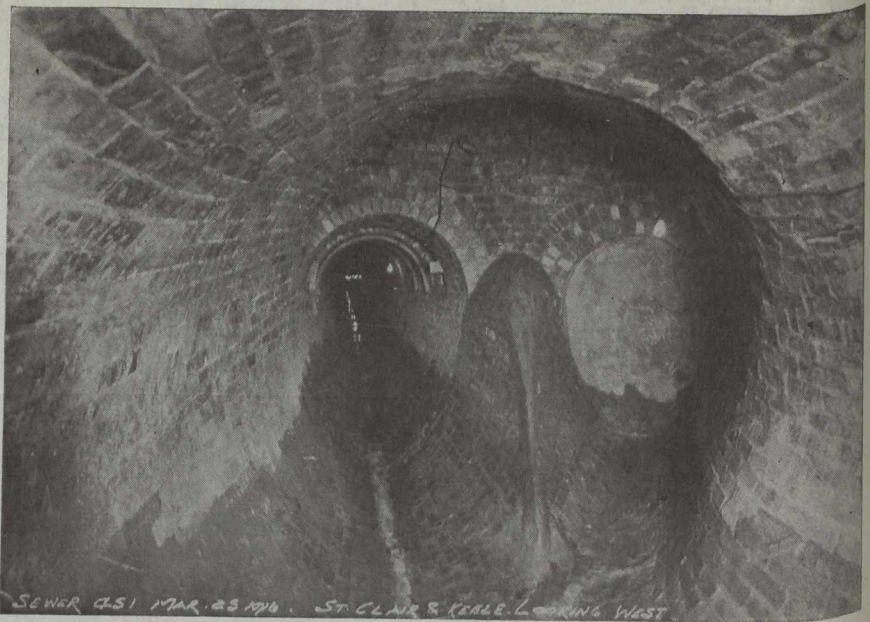
Cost per foot of sewer (tunnel).....	\$15.02, with air	\$15.02
Total cost brickwork, in place per 1000 (in tunnel).....	40.50,	42.00
Total cost mining / c. yd. / tunnel.....	1 63,	3.05
compressed air / l. ft.....	3.00	

Weston Road South—Shaft and Manhole No. 1.

Sand; 39 ft. deep, 8 ft. x 10 ft.

Item	Time, etc.	Volume	Unit	Cost
Foreman	13 days	112 cu. yds.	0.12 days / c. y.	\$52.00
Engineer	69 hours	112	0.610 hrs. / "	27.60
Team	60	112	0.536 "	39 80
Excavation	251	112	2.241 "	75.30
Timber	77	112	0.689 "	23.10
Backfill	92	72	1.278 "	27 60
Moving Plant	156	112	1.393 "	46.80
Bricklayer	49	11,000	4.455 / 1,000	36.75
" labor	210	11,000	19.091 "	63.00
Brick	11,000	117 bags cement	"	121.00
Cement	117 bags	112 cu. yds.	"	46.80
Sand	13 cu. yds.	112	"	19.50
Lumber	"	"	"	30.00
				\$609.25

Total cost of brick in place, \$28.82 per thousand.



Intersections of Weston Road South Sewer with that on St. Clair Avenue.

Lining.

The third or inner ring of the 2 ft. 8 ins. x 4 ft. was left out and built after the tunnelling was completed.

Item	Time, etc.	Volume	Unit	Cost
Foreman	10 days	27,100	0.37 hrs. / 1,000	40.00
Bricklayer	335 hrs.	27,100	13.36 "	117.25
" labor	579	27,100	58.26 "	552.65
Cleaning	46	27,100	1.70 "	16.10
Team	26	27,100	0.96 "	9.10
Brick	27,100	325	"	298.00
Cement	325 bags	27,100	83 / bag	190.00
Sand	36 cu. yds.	"	"	54.00
		Total brick	27,100	\$1,217.10

Total cost of brick lining in place, \$44.91 per 1,000.

Weston Road South—Shaft and Manhole No. 3.

Sand; 31 ft. deep, 10 ft. x 14 ft.

Item	Time, etc.	Volume	Unit	Total Cost
Foreman	11 days	160 cu. yds.	0.07 days / c. y.	\$ 44.00
Excavation	480 hrs.	160	3.00 hrs.	144.00
Timbering	128	160	0.80 "	38.40
Backfill	36	80	0.35 "	10.80
Team Surplus	83	80	1.04 "	55.35
Moving Plant	180	160	1.14 "	54.00
Engineer	64	160	0.40 "	25.60
Bricklayer	60	7,050	8.64 "	45.35
" labor	187	7,050	26.80 "	56.25
Concrete	67	5	13.40 "	20.10
Cement	96 bags	"	"	38.40
Sand	11 cu. yds.	"	"	16.50
Brick	7.047	"	"	77.00
				\$625.75

Shaft and Manhole No. 2.

39 ft. deep.

Item	Time, etc.	Volume	Unit	Total Cost
Foreman	16 days	324 cu. yds.	0.05 days / c. y.	\$ 64.00
Engineer	249 hrs.	"	0.77 hrs. / "	99.60
Fireman	185	"	0.57 "	64.75
Pumps (labor)	34	"	0.105 "	11.90
Team (D.R.)	195	224	0.87 "	130.00
Excavation	1,127	324	3.48 "	450.80
Timbering	170	324	0.525 "	119.35
Backfill	341	100	3.41 "	16.45
Concrete	47	5	9.40 "	130.70
Bricklayer	174	16,400	10.64 / 1,000	185.85
" labor	531	16,400	32.40 / 1,000	181.00
Miscellaneous	34	"	0.105 / c. y.	33.00
Brick	16,400	324	"	77.20
Sand	22 cu. yds.	"	"	121.00
Cement	193 bags	"	"	46.80
			Total Cost.....	\$1,644.50

Total cost of brickwork in this shaft, \$35.53 per thousand, in place.