	Per M. ft. B.M.	Per lin. ft. of trench.	Per sq. ft. penetration.
Hours of labor	11.9	0.973	0.042
Cost of labor	$3.70	$0.305	$0.013

Foundation Pile Driving.—This statement is the record of a large piece of work carried on by the contractor with great vigor. At times as many as 9 pile drivers were at work simultaneously.

sisted for about 10 ft. of a mixture of loose sand, gravel, and clay. Below this was a moderately soft blue clay.

At the job for the hammer shop, a drop hammer, weighing 3,000 lbs. was used. In fact, the same driver and crew foreman did the work as the drop-hammer driving, for which costs are given in Table II. But the soil was clay, whereas the first 10 to 12 ft. was sand, in the other case mentioned in Table II.

From points of view of speed, economy, and excellence of driving, the comparison between drop and steam hammers is strongly in favor of steam hammers.

In addition, a proportional share of local general office and yard expense and the general office expense, should be added.

In sawing off pile-butts two saw filers kept the saws sharp for the gang of sawyers. A pair of sawyers would cut 40 to 60 mixed wood piles per day at a cost per pile of $0.10 to $0.12.

Other men were employed in making runways and unloading piles from cars which were delivered at the edge of the work—a team and 2 men hauling piles to the more inaccessible drivers.

TABLE I.—FOUNDATION PILES. CHICAGO DROP FORGE & FDY. COMPANY. NASH DOWDLE COMPANY., CONTRACTOR.

	Hours.	Cost.	Cost per lin. ft.	Material
Erection and dismantling driver	386.5	$160.53	$0.088	
Unloading and sawing piles in two	39	15.96	0.016	
Driving piles	236	99.32	0.011	96 piles.
Sawing pile tops to grade	53	19.88	0.054	20 ft. long
Total				Crew 10 men
Freight, supplies and piles, cost	714.5	$295.69	$0.169	
Total cost		279.02	0.152	
		$574.71	$0.321	

Soil, hard clay; hammer used, 3,000-lb. drop hammer.

In foundation pile driving, where piles are driven in clusters, the general level of the ground will be higher after driving than it was before. This swell of rise of the level will cause an extra amount of excavation for the placing of the footing concrete around the pile tops.

Careful levels were taken over an area in which 1,570 piles were driven 2½ ft. centers. The piles were 35 ft. long, having 12-in. tops and 7-in. points. The swell of the ground amounted to 1.5 ft. in height, or 8.3 cu. ft. net measurement of the earth per pile, or 0.28 cu. ft. of pile penetration. Inasmuch as the volume of the piles below the original surface averaged 14.1 cu. ft., the consolidation of the earth amounted to 5.8 cu. ft. per pile. The soil con-

TABLE II.—FOUNDATION PILES; GREAT LAKES DREDGE & DOCK COMPANY, CONTRACTOR.

	No. 1 Vulcan Steam Hammer		3,000-lb. Drop Hammer	
Total number of piles	10,417		519	
Total length of piles	373,715	feet	17,855	feet
Total length of pile penetration	358,090	feet	16,817	feet
Average length per pile	36.0	feet	34.4	feet
Average length of piles undriven	1.5	feet	2.0	feet
Average day's work for one driver	277	days	30	days
Average piles driven per day	37.7	piles	17.3	piles
Average piles driven per day	1,349.2	lin. ft.	595.2	lin. ft.
Average piles penetration per day	1,296.2	lin. ft.	560.6	lin. ft.
Crew per driver	10	men	9	men
Auxiliary men per driver per day	8	men	6	men
Total crew per driver per day	18	men	15	men
Crew time 8 hr. day	2,770	days	270	days
Auxiliary time 8 hr. day	1,364	days	180	days
Total time 8 hr. day	4,786	days	450	days
Daily pay roll crew	$34.00		$30.60	
Auxiliaries	19.75		15.25	
Total	53.75		45.85	

Unit Cost.	Lin. ft. of pile	Lin. ft. penetration	Lin. ft. of pile	Lin. ft. penetration
Labor	$0.04	$0.042	$0.007	$0.082
Saving pile butts	0.003	0.003	0.003	0.003
Total labor	0.043	0.045	0.08	0.085
Supplies and repairs, est.	0.01	0.01	0.015	0.015
Piles	0.125	0.125	0.12	0.12
Total "field expense"	$0.178	$0.180	$0.295	$0.220