The cost per cubic yard of material excavated would therefore be:—

For Loading	$26
" Hauling	18
" Dumping	24
" Track gang	8
" Miscellaneous	6
" Interest, repairs, and depreciation, estimated	11
Total	$93 per cub. yd.

Under the circumstances, the quantity of material moved is very large for this size of shovel, being at the rate of 1,385 cubic yards per 12 hour shift, or something over 115 cubic yards per working hour, and when it is considered that only 4-yd. cars were being loaded, and the average depth of cutting was only 10½ feet, it will be seen that the record is a very good one.

The contractors on this work are Messrs. Larkin & Sangster, of St. Catharines, Ont., Mr. Wallace was the superintendent in charge for the contractors, and Mr. E. G. Cameron is the assistant engineer in charge of this section.

ASPHALT PAVEMENTS.

During 1908 the city of Hamilton laid by day labor five stretches of asphalt pavement, and through the kindness of the city engineer we are able to give the detail of costs and figures reduced to prices per square yard.

Labour:—		$	$ *	$ *	$	$
	On gutters and foundation	303.60	262.16			
	Grading	158.54	105.65	157.27	785.75	93.14
	Road rolling	23.50	13.00	37.20	104.70	121.40
	Chanigng gutters	29.88		22.00	31.50	14.00
	At asphalt plant	227.51	226.85		122.94	
	Laying asphalt	329.54	317.20	118.16	583.13	146.46
				157.89	686.18	264.90
Materials:—						
	For Foundation and Gutters.—	$	$	$	$	$
	Stone, loads	28— 38.70		12— 12.00		82.66
	Gravel, loads	70—105.40			80—129.20	
	Cement, bags	740—340.40			437—201.02	
	Stores	3.91	4.26			12.93
	Extras				170.32	
	Brick				5,200—139.62	
	At Asphalt Plant.—					
		$	$	$	$	$
	California asphalt	43,745—546.81	51,954—649.42	27,819—347.74	136,356—704.44	47,106—588.82
	Cuban asphalt	12,023—180.34	13,875—208.17	6,241— 93.61	27,786—416.79	13,314—199.71
	Stone, cu. yd.	51— 58.82	107—123.05		261—309.48	35— 40.25
	Oil, gallons	802— 83.18	483— 44.66	268— 24.78	1,803—167.39	582— 54.38
	Pitch, pounds	2,340— 24.30				
	Sand, loads	58— 96.52	169—279.67			
	Cement, lbs.	1,980— 9.90	7,400— 37.00	32— 53.62	183—316.38	50— 81.67
	Stone dust, lbs.	17,310— 73.08		5,082— 25.41	16,640— 83.20	4,185— 20 93
	Wood, coal, stores	11.50	11.40			
	Extras		74.45	25.84		18.90
	Removing old timber	12.27		14.38		
		$	$	$	$	$
	Total	2,657.70	2,356.94	1,115.65	5,885.01	1,740.15
	Total area, sq. yds.	1,398	1,501	787	4,220	1,214
	Cost per sq. yd.	1.80	1.57	1.42	1.40	1.41

*Includes material.

CONCRETE ENGINE FOUNDATION.*

A. H. Shaw.
Engineer Central Coke and Coal Company, Bevier, Mo.

The application of a reinforced concrete block for an engine foundation is something new and well worth considering by the man who is up against the proposition of having an unstable foundation under his engine and a limited time in which to do the work of making it solid. At the Central Coal and Coke Company's Mine No. 61, near Keota, Macon County, Mo., the following experiment was successfully accomplished.

This mine is equipped with electric haulage, and the generator is driven by an Erie 16-inch by 18-inch engine, making 500 revolutions per minute. This engine was installed about seven years ago on a foundation of sandstone, which, through some fault in its construction, began after six years of continued service to show signs of failing at a line three feet below the top of the foundation. The movement of the engine and foundation began to be so great that it was decided to brace it with 1½-inch iron tie-rods anchored to the solid part of the foundation, but this did not prove very successful, for while it gave temporary satisfaction, it was seen that in a very short time the foundation would be torn to pieces by the continual rocking back and forth of the engine at every revolution. The situation had reached a point where something had to be done, and quickly, but how to do it without shutting the mine down for a week or more was the question, as this would have meant a big loss to the company for they needed every ton of coal that could be hoisted.

The company's chief engineer, Mr. J. R. Stephens, proposed that a reinforced concrete block, of the same dimensions as the damaged part of the old foundation, be made. The block was 3 ft. 10 in. × 13 ft. 0 in. × 3 ft. 6 in. made of 1 : 1 : 2 concrete, reinforced, as shown in Fig. 1 (a) by placing three 12-pound steel rails 12 feet long about four inches from the top and three the same distance from the bottom of the block and three in the centre to serve as longitudinals; the cross reinforcement was made by placing 12-pound rails on top of longitudinals and spacing them six inches apart through the length of the block; vertical reinforcement was thought to be unnecessary.

The forms for the concrete block were supported at the level shown in Fig. 1 (a), for with a block cast in this position it was not necessary to raise it when ready to be moved into place on the old foundation shown at (b). After the forms had been built and braced, wooden core boxes of sufficient size to leave ample room for the anchor bolts were set; care being taken in spacing these core boxes so that there would be no difficulty in setting the block over the

* In the "Mines and Minerals."