The diagram herewith gives the dimensions of a cellar that was excavated in still clay soil. A plow was used to loosen the material and it was hauled out with a dray scraper.

CanEng.

Longest haul two hundred feet; average haul one hundred feet.

The cost was distributed as follows:

One team and driver 5 days at \$4 per day\$20	0 00	C
One man 5 days at \$1.75 per day 8	7	5
One man trimming sides 3 days at \$1.75 per	di l'	
day	2!	5
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The amount of earth excavated was 170 cubic yards. This made the cost about 20 cents per cubic yard.

## SOCIETY NOTES.

## Association of Municipal and County Engineers.

The annual meeting of the Incorporated Association of Municipal and County Engineers was held at Nottingham, Eng., on June 25th, 26 th and 27th.

Mr. E. P. Hooley, in his presidential address, dealt mainly with the road question. He said that little had been done in this country towards the permanent improvement of roads, but in Nottinghamshire, after repeated failures, they had been successful in making roads which appeared to withstand heavy and light motor traffic satisfactorily. Such roads treated with tarmac had hitherto cost 65 cents per superficial yard to convert from ordinary macadam, and up to the present time, although some portions of these roads had been reconstructed for six winters, they had only cost 30 per cent. of the former charges for manual labor, and had entailed no expenditure in materials.

Mr. C. S. Meik read a paper on "Reinforced Concrete in Engineering Structures." The author pointed out that, although the laws governing the combination of steel and concrete were not absolutely fixed, they were known with sufficient approximation to enable all classes of engineering structures to be designed with safety under normal conditions. He referred to experience gained in connection with works carried out under his own supervision at Swansea and at Purfleet. He was of opinion that I to 8 was as weak a mixture as should be used with reinforced concrete for beams or flooring, while piles should not be weaker than 1 to 5. The extra compressive strength gained by using 1 to 4 as against t to 8 would be at least 30 per cent., while the cost of the additional cement, with cement at 30s. per ton, would not be more than 2¼d. per cubic foot of concrete. The piles used in the construction of a pier at Purfleet were made of concrete composed of 1 of cement to 11/2 of sand and 31/2 screened ballast, and they sometimes fractured at the heads when the

driving became hard. At Swansea the concrete used for piles tested was composed of 1 of cement to 11/2 of sand and 2% of graded granite broken to pass through 5%-inch square mesh. These piles behaved satisfactorily, the monkey used, weighing 21/2 tons, being frequently allowed to fall through 10 ft. without causing the least damage. It was most important to have as few joints as possible in the reinforcing bars, and any which were necessary in a beam should be made with screwed couplings. In columns or extensions of piles the joints should be at the junction of the columns with a brace or strut, experience having shown that fracture took place, when a ship collided with a pier, at the joints in the steel bars. It was not possible to drive reinforced piles without a cushion being employed, and in the Hennebique system a heavy cast-iron cap filled with sawdust was used to deaden the blow. A new system of driving piles had lately been introduced on the Continent, the pile being hollow and a solid mandrel inserted in order to transmit the blow of the monkey to the pile shoe. This method put the concrete under tension to a certain extent, and only experience could determine whether this would not be more detrimental than allowing the whole of the effect of the blow of the monkey to pass through the pile to the shoe. At the new King's Dock at Swansea 14-inch concrete piles were now being driven with a monkey weighing 21/2 tons. The Hennebique cap was being used, and as illustrating the effect of the cap in diminishing the effect of the blow he would point out that at Purfleet, where ferro-concrete piles were driven under his supervision, it took as many as 30 blows for an inch set towards the finish, with a monkey weighing two tons falling through 4 ft. 6 in., the material being driven into consisting of compact ballast. Figures relating to the cost of ferro-concrete at Purfleet and Swansea showed that the cost of material in the reinforced concrete was from 42 to 45 per cent. of the total cost, while as regarded the cost of the work as a whole, the cost of the reinforced concrete in the pier at Purfleet worked out at 17s. 8d. per superficial foot of docking, the pier to 15s. 4d. and the approach viaduct at 10s. 2d. At Swansea the cost was about 12s. 6d. per superficial foot. The bridge at Purfleet was, perhaps, the most interesting part of the work carried out there. The girders were of the bow-string type, and both top and bottom booms were equally reinforced with steel bars. In this girder the steel in the lower boom took all the tensile stress, and in the upper boom the steel took about 75 per cent. of the compressive stress and the greater part of the shearing stresses. One of the difficulties was to get reliable joints in the steel bars of the tension members, and, owing to the lower bars requiring to be 63 ft. long, welding had to be resorted to. After completion the bridge was tested with a rolling load of 100 tons on sight wheels, and showed no appreciable deflection.

## Western Canada Irrigation Association.

In July 1907 the Western Canada Irrigation Association was formed at the conclusion of the Irrigation Convention held in Calgary.

The executive are now planning for the meeting to be held in Vernon, B.C., August 10 to 15th.

It is expected that a most interesting programme will be carried out, which, it is hoped, will include papers from Prof. L. G. Carpenter, Director and Professor of Irrigation, Colorado Agricultural College, Fort Collins, Col.; Senator W. C. Edwards; A. E. Ashcroft, Esq., C.E., of Coldstream; J. S. Dennis, of Calgary, and others. Another important feature will be the comprehensive discussions anticipated on the vital subject of water legislation.

The following is the skeleton programme for the week: Monday, August 10th—Arrive Vernon, 11 a.m. Three business sessions at 11 a.m., 2 and 8 p.m.

Tuesday, August 11th—Three business sessions, 9.30 a.m., 2 and 8 p.m.

Wednesday, August 12th—Drive over Grey Canal Irrigation System. Evening session at 8 p.m.

Thursday, August 13th—Leave Vernon for Kelowna, 7-30 a.m. Drive over the irrigation system of the Kelowna Land and Orchard Company.

(Continued on Page 507.)

