

Materials Used in Tests

Cement.—As compared with the cement used in the 1916 tests, the "Canada" brand cement used in these tests developed in the 7 and 28-day tests a strength 10.8 per cent. less than that used in 1916, the same standard tests being used. One cubic foot of cement was assumed to weigh 100 lbs.

Sand and Gravel.—The pit run gravel secured for the tests contained by weight 65.2 per cent. of sand passing a No. 4 sieve and 34.8 per cent. of gravel. The gradings of these portions are shown in Table I.

In its original state this material contained 7.59 per cent. of moisture, of which the sand portion contained

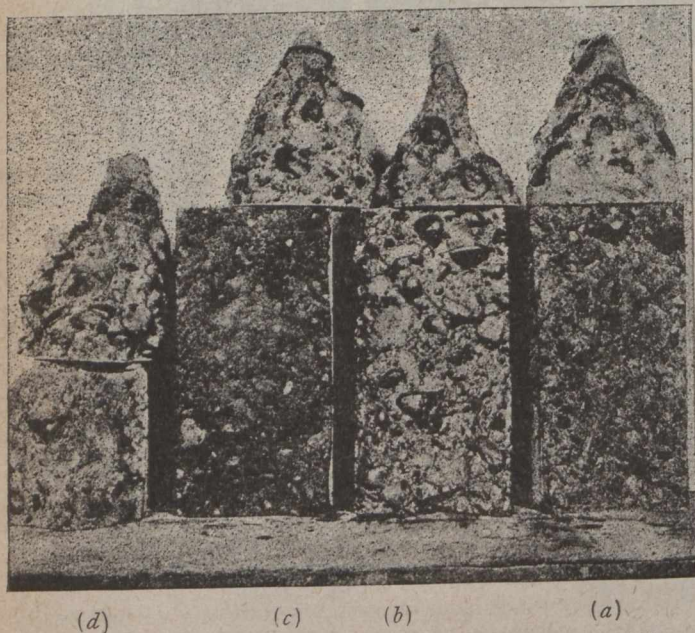


Fig. 9—Broken Concrete Test Cylinder of Various Mixes

- (a) Contains Broken Stone (Limestone) Aggregate, 1:2:4 Mix.
- (b) Gravel Concrete, 1:2:4 Mix.
- (c) Gravel Concrete, Pit Run, 1:6 Mix.
- (d, upper) Gravel Concrete, 1:2½:5 Mix.
- (d, lower) Gravel Concrete, Pit Run, 1:9 Mix.

5.86 per cent. This moisture was not dried out but was taken into account in proportioning the sand and the water contents of the mix.

The unit weights assumed for proportioning the mix were as follows:

- One cubic foot of sand assumed at 100 lbs.
- One cubic foot of pit run gravel assumed at 110 lbs.
- One cubic foot of screened gravel assumed at 110 lbs.

The screened gravel and the sand used in the regularly proportioned mixes were obtained by passing the pit run material over a screen having four meshes per linear inch.

Results of Tests

The tests of a 1:3 "normal" mortar, in which the aggregate was the sand used in these tests, showed at 28 days' age a tensile strength of 412 lbs. and a compressive strength of 3,312 lbs. per square inch. Briquettes and 2-in. cubes were used for these tests.

Fig. 7 shows the compressive strengths obtained from the tests of the 6-in. cylinders prepared from each mix. Five specimens were tested at each age of 7, 30, 60, 90 and 180 days.

Fig. 8 shows the mortar bedding of gravel particles in a 1:2:4 mix. The gravel particles removed from the

beddings are shown at the right side of the photograph. This photograph is typical of the beddings found in specimens of all mixes. However, the porosity and the color of the mortar portion varied with the quantity of cement in the mix.

Fig. 9 shows broken cylinders of various mixes. It will be noted that the portions of gravel concrete cylinders contain very few broken particles, while the cylinder at the extreme right containing broken stone aggregate shows a considerable number of fractured particles. This failure of the mortar portion of the concrete, leaving the gravel particles intact, was typical of all mixes. The excess of mortar in the pit run specimens is clearly shown in the photograph.

LABOR-SAVING MACHINERY IN WATERWORKS SERVICE

IN a paper read before the Minnesota Section of the American Waterworks Association, J. A. Jensen, superintendent of the Minneapolis Waterworks, pointed out the value of labor-saving devices in connection with waterworks operation, from which the following extracts are taken:—

On work in limestone ledge, trenching for pipe-laying, an air compressor and operator with two plug-drills and two men replaced twenty men with hand-drills. In laying steel pipe the same compressor with ten boiler-makers equipped with the necessary riveting and caulking hammers, reaming tools and other equipment carried on the work of a whole company of similar skilled labor with hand tools.

A single first-class power-operated trench pump has been found to do as much work as three hand-operated pumps manned by a dozen laborers.

In 1913 the city of Minneapolis purchased a large trenching machine for use on several miles of trunk pipe lines. This machine put out 39,200 cu. yds. of earth at a unit cost of 9.3 cents per cubic yard on about three miles of trench. On another piece of work a steam shovel on back-fill handled 23,730 cu. yds. on 9,250 ft. of trench at a unit cost of 4.8 cents per cubic yard.

In service work at Minneapolis with miscellaneous jobs scattered over forty or more square miles of territory, Ford runabout trucks are employed, each rig and two men, generally speaking, replacing three single-horse rigs and six men. This is explained by the fact that the principal part of the performance in street service is mileage, and the work itself is secondary, so far as time element is concerned.

ACTIVATED SLUDGE PLANTS

AT the new plant of the International Nickel Co., Limited, Port Colborne, Ont., a sewage disposal plant using the activated sludge process will be installed, the company having come to terms with Messrs. Jones & Attwood, Limited, of Stourbridge, England, the owners of the activated sludge patents.

The authorities of the City of Manchester, England, have secured the sanction of the War Cabinet to carry out immediately, at their main outfall at Davyhulme, an activated sludge scheme for treating a million gallons of sewage per day.