PROPORTIONING THE MATERIALS OF MORTARS AND CONCRETES

(Continued from page 8)

Water.—All water used in the tests was taken from the city water mains, the source of supply being Lake Ontario. The chemical analysis is as follows:

	Parts per Million.
Total solids	120.0
Alkalinity (lacmoid) bicarbonates 103; carbonates 2	105.0
Permanent hardness	32.5
Total hardness	137.5
Silicious matter	3.84
Iron oxide, alumina and phosphates	0.17
Lime (CaO)	43.4
Magnesia (MgO)	12.2
Sulfates (SO_4)	18.5
Chlorides	9.0

Composition and Preparation of Test Sands

The grading of the sands used in the tests was not predetermined. In combining the portions retained upon each sieve an effort was made not only to provide a range of gradings comparable with the usual gradings of natural sands, but also to include a few rather irregular or "freak" gradings. Table V. gives the gradings of the test sands. Several of these gradings are shown graphically in Fig. 5.

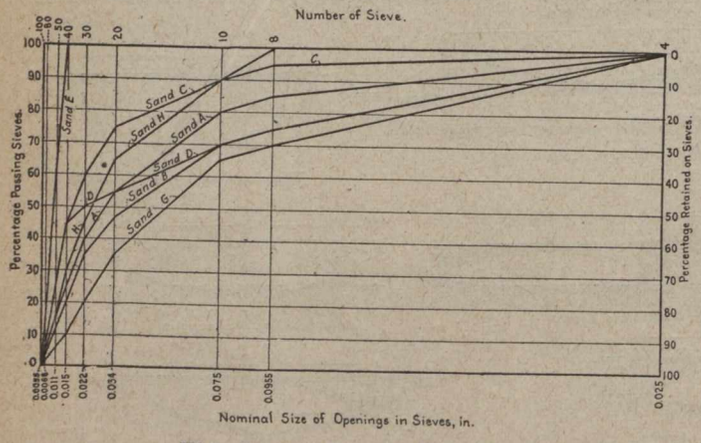


Fig. 5—Grading of Test Sands

Fig. 6, reproduced from photographs of the fractured surfaces of mortar cylinders, gives a general idea of the range of sand gradings used in the tests.

The grading of a test sand having been decided upon and the quantities of the component sizes having been computed and weighed, a uniform composite sand was produced by hand mixing.

As previously mentioned, the sands used in concrete tests were not subdivided into their component sizes.

Test Specimens and Testing

The test specimens made in connection with the various tests were as follows:

1. For the mortar consistency tests, standard briquettes only.

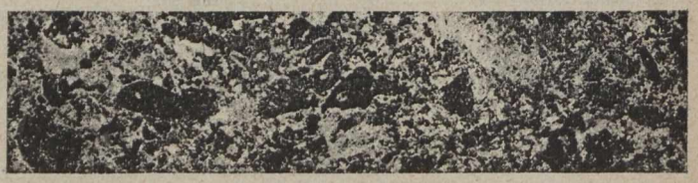
2. For the mortar strength tests, standard briquettes and cylinders 2 ins. in diameter by 4 ins. long.

3. For the concrete tests, cylinders 6 ins. in diameter by 12 ins. long, and from the mortar content of the excess concrete cylinders 2 ins. in diameter by 4 ins. long.

All test specimens of mortar consistency and mortar strength tests were tested at the municipal laboratory of the city of Toronto. All concrete test specimens and the mortar test specimens made in conjunction with them were tested at the testing laboratory of the Hydro-Electric Power Commission of Ontario, Toronto, Ont. In both laboratories the testing machines used were manufactured by the Tinius Olsen Testing Machine Company, Philadelphia, Pa.

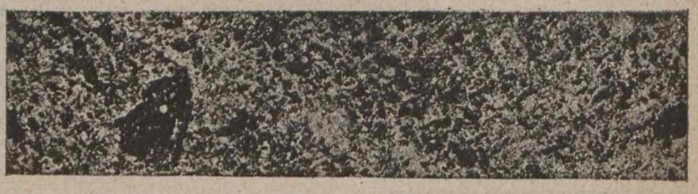
In all compression tests a spherical seated bearing block was used and the ends of the specimens were bedded with sheets of beaver board to secure an even distribution of the load.

In all mortar tests, except the so-called "consistency tests," four 2-in. cylinders and four "standard" briquettes

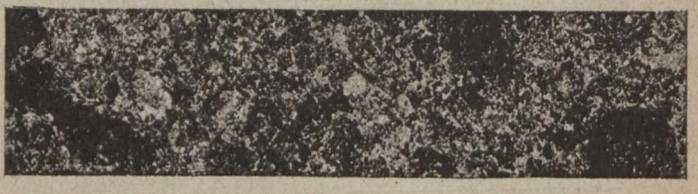


(*a*) Sand A.

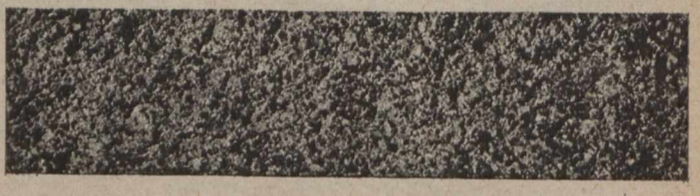
(*b*) Sand B.



(*c*) Sand C.



(*d*) Sand D.



(*e*) Sand E.

Fig. 6—Texture of Mortars (× 4)

were tested at each age of 7, 30 and 60 days. Only briquettes were used in the mortar consistency tests. In the concrete tests five specimens were tested at each age.

For all tests the maximum load at ultimate failure was recorded.

Preparation of Test Specimens

In the preparation of test specimens a special effort was made to do the work with the greatest dispatch, consistent with the securing of uniform results. The mixing of the materials and the making of test specimens was the work of two operators.