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Studies in Surface Area Proportioning Method

Hydro-Electric Power Commission of Ontario Satisfied That Surface Area Method of Proportioning Materials of Mortars and Concretes Is Correct in Principle—Fineness Modulus Varies as Surface Area—Not Necessary to Obtain Actual Surface Area of Aggregate

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WHEN the writer first seriously studied the paper "Proportioning the Materials of Mortars and Concretes by Surface Area of Aggregates" (see *The Canadian Engineer* for July 4th and 18th, 1918), he was impressed with both its simplicity and its adaptability. It seemed to him to contain certain salient points found lacking to a large extent in any other method with which he was then acquainted, and it was the lack of these points which had caused the greatest difficulty in the field. If this method could be applied to proportioning concrete it would provide:—

1.—A means of accurately estimating the strengths of concretes produced from any combination of cement and aggregate; and

2.—A means of maintaining a constant strength with the fluctuations in grading inevitable with natural materials, and a foundation upon which to build a simple and inexpensive system of laboratory and field tests for determining the relative concrete-making values of materials, and the proportions in which they must be combined to give desired results.

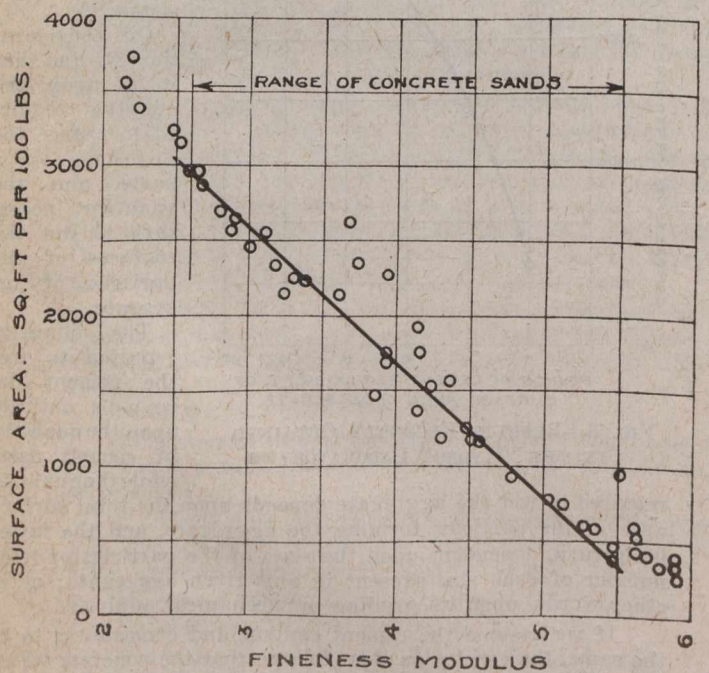

FIG. 1—RELATION BETWEEN FINENESS MODULUS AND SURFACE AREA OF FINE AGGREGATES

This method of proportioning possesses the further advantage that the underlying theory is so simple that it can be explained to and is appreciated by even the laborers on concrete work.

The lack of these important features is in a great measure accountable for the attitude of construction men towards any methods of concrete proportioning other than "rule of thumb."

The field engineer is a man with a practical turn of mind who has to do mainly with men of a type impatient with involved methods and hampering restrictions. A method, to gain his respect, must give him an unequivocal answer to the question, "How much cement must I use under the conditions existing on this work to get the results which are required of me?"

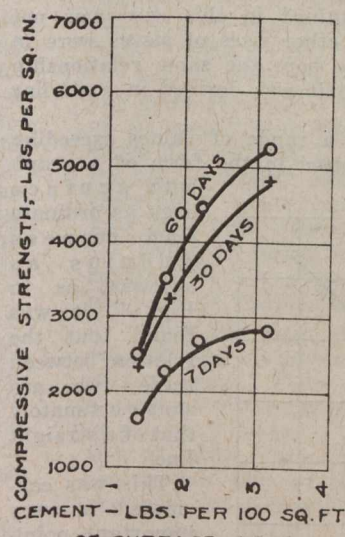

FIG. 2—RELATION OF COMPRESSIVE STRENGTH OF MORTARS TO WEIGHT OF CEMENT (EDWARDS, 1918)

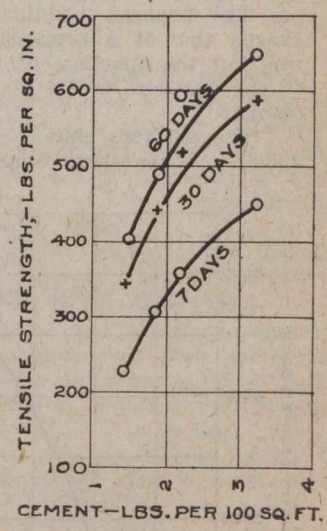

FIG. 3—RELATION OF TENSILE STRENGTH OF MORTARS TO WEIGHT OF CEMENT (EDWARDS)

When a method is proposed which will not give him a direct answer to this, he loses faith in it, which is quite natural when you appreciate his point of view. He is interested in ways of getting certain desired results and he expects your method, the tool with which he is expected to work, to do this or else he is a little contemptuous of it. If its theory and application is at all involved, he is apt to become skeptical and to consider it only a tool to be used by experts and scientists.

Any method of proportioning which does not take cognizance of this attitude will never gain his support, no matter how meritorious it may be, and without his unqualified support it is very difficult to get results.

Contemplation of the above conditions led naturally to the consideration of experimental proof of the applicability of the surface-area method of proportioning concrete, but