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## ARE ABRAMS AND EDWARDS WRONG?

VERY disturbing is the assertion by G. M. Williams, associate engineer of the U.S. Bureau of Standards, in his article in this issue, that the surface area and fineness modulus theories of proportioning concrete mixtures are both faulty; but after the many logical arguments and abundant data that have been presented in support of these theories by their respective sponsors, Lewellyn N. Edwards and Prof. Duff Abrams, supported by the practical results achieved by the Hydro-Electric Power Commission of Ontario through the application of these theories in field and laboratory, engineers will be very reluctant to discard them.

As Mr. Williams intimates, it should be relatively easy for any properly equipped laboratory to prepare aggregate gradings and make tests that will prove or disprove either or both of the theories. Fortunately, arrangements are now being made for a definite series of tests, to be made concurrently and in precisely the same manner, by a number of different laboratories. These tests will be under the auspices of the Concrete Committee of the American Society for Testing Materials, having been planned at a meeting held last November in Chicago. A report of that meeting and its results was published in this column in the December 4th, 1919, issue.

It may be found to be true that neither Prof. Abrams' nor Mr. Edwards' theory will hold for absolutely all possible mixtures, but engineers will not be very seriously concerned about that, provided that they do hold true within the rather limited range of workable mixes. Mr. Williams does not definitely assert that the theories would be found faulty if applied only within the range of workable mixes, but appears to base his main criticisms upon the fact that they will not hold true for all mixtures.

Mr. Williams' article demonstrates that there is some work yet to be done in regard to these theories for the proportioning of concretes, and his criticisms will undoubtedly influence the number and character of tests made under the direction of the A.S.T.M. Concrete Committee, and may lead to certain modifications of the Abrams' and Edwards' theories.

It is certainly to be hoped, however, that the surface area and water-cement ratio theories will prove themselves in the A.S.T.M. series of tests, and it is indeed hard to see why they should not be borne out by the tests of all practical mixtures, as these theories are logical, clear and convincing, and have all the earmarks of well-founded truths.

Somewhat ambiguous reference is made by Mr. Williams to the test data offered by Messrs. Abrams and Edwards, and some readers may interpret his remarks as an impeachment of the accuracy of the data. We are sure that Mr. Williams could not have meant to call into question either the methods of testing or the validity of the data, as the reputation enjoyed by both Prof. Abrams and Mr. Edwards is sufficient guarantee in this respect. It is well known that nowhere have more careful and precise methods been used than at the laboratory of the Lewis Institute.

Moreover, it must be borne in mind that these theories have been actually put into practice upon a large scale by the Hydro-Electric Power Commission of Ontario, and with great success. The "Hydro" rejects Prof. Abrams' fineness modulus theory, and substitutes therefor the more direct surface area measurement, but rigidly applies Prof. Abrams' water-cement ratio theory. The "Hydro" laboratory determines the proper economical mix for the desired strength and normal consistency for the particular materials to be used, and supplies the field engineer with the proper surface area constants and water-cement ratio for those materials. Then, when the grading is changed, the field engineer can readily ascertain the proper amount of cement to use in order to obtain the same strength and workability according to the surface area theory, it being assumed that he maintains the same water-cement ratio. If the "normal consistency" indicated by the laboratory be too dry to suit field conditions, as much more water can be added as the field engineer desires, without affecting the strength, provided that sufficient additional cement is used to keep the cement-water ratio constant. R. B. Young, who is in charge of the concrete research work for the "Hydro," states that this scheme is actually working efficiently in the field at High Falls and on the Queenston-Chippawa work; that concretes of uniform strengths are being obtained despite variations in grading and consistency; and that much higher strengths are being obtained (with the same amounts of cement) than are being secured from the same materials by means of the old methods of volumetric proportioning.

## C. B. & C. I. CHANGE IN DATES

ENGINEERS who are interested in the annual meeting of the Engineering Institute of Canada, to be held January 27th to 29th in Montreal, will heartily appreciate the action taken by the officers of the Association of Canadian Building and Construction Industries in changing the date of the association's conference at Ottawa, which had been scheduled for January 27th-30th but which has been postponed to February 2nd-4th in order to avoid conflict with the institute's meeting.

The change in the association's dates was made with difficulty and at considerable expense, as is indicated by the fact that it was necessary for the president and secretary to telegraph approximately thirty members of their national council residing in various cities from coast to coast; also speakers in many parts of Canada; the management of the Chateau Laurier; and various provincial associations of building and construction industries, in order to avoid conflict with other meetings.

The Ottawa conference has now been arranged so that the engineers who attend the meeting of the institute will be able to go directly from that meeting to the one at