



Reference Copy CTR Does not Circulate



SUMMARY REPORT 504-1F)S)

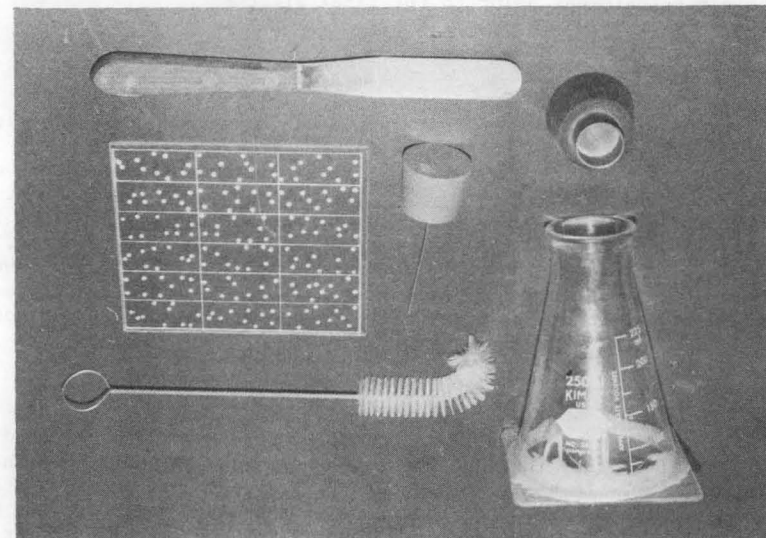
CENTER FOR TRANSPORTATION RESEARCH LIBRARY



L040612

FIELD EVALUATION OF VOID SPACING INDICATOR

RESEARCH STUDY 1-9-72-504



Cooperative Research Study of The
Texas Highway Department, and U.S. Department of
Transportation, Federal Highway Administration

February 1974

TEXAS HIGHWAY DEPARTMENT
Austin, Texas

OCT 25 1974

MATERIALS & TESTS
LIBRARY

TEXAS HIGHWAY DEPARTMENT

FIELD EVALUATION OF VOID SPACING INDICATOR

by

Billy N. Banister

FORWARD

This report presents the results of the field study and testing of the Void Spacing Indicator (VSI). Five highway districts performed the VSI testing to determine the feasibility of a testing procedure. It was desired to determine the spacing of air entrained voids while still in the plastic state. In this way an inspector could determine the quality of the air entrainment prior to the final placement.

THEORY

Air entraining admixes when properly placed in concrete mixes develop a system of very small air bubbles uniformly throughout the mixture. Under normal conditions these bubbles remain in the mix and do not change after placement and final set. The theory for this evaluation test was to establish some measurable relationship between the void spacing in the plastic concrete and the void spacing in the hardened concrete. If this relationship could be established then the inspector would have a new method of predetermining the quality of the air entrained system and could reject the batch prior to placement if the quality was not good.

EXPERIMENTAL WORK

It has been proven that small air voids, closely spaced in hardened concrete will greatly increase concrete resistance to the freeze-thaw action of water. It has also been determined that the quality of the air voids depend on many factors including the mixer action in the mixing of the concrete. The pressure meter determines the quantity of air in a mix but it does not indicate the size or quality. Research was done to determine the number of voids in a given volume of mortar and then relate that to the number of voids in the hardened concrete as measured by linear traverse. Several methods were tried with the VSI appearing to be the most favorable.

FIELD TESTING

Qualified concrete inspectors from various districts in Texas were schooled in the proper method of testing with the Void Spacing Indicator.

On returning to their Districts, they selected bridge construction projects where the testing could be performed on the plastic concrete that was going to be placed in the deck slab. Later, sixty-four cores were lifted and brought back to the State laboratory. These cores were split with a diamond point saw, and then polished for petrographic examination. Linear traverse measurements were made for air content, void spacing and other parameters.

CONCLUSIONS AND RECOMMENDATIONS

A statistical analysis was run and no mathematical relationship could be established between the indicated void spacing in plastic concrete to the void spacing in hardened concrete.

It could be used as an indicator test by an inspector to visually observe the relative size and quantity of air entrainment that is in the plastic concrete prior to placement.

No implementation of the VSI Test is planned by the Texas Highway Department.

The published version of this report may be obtained by addressing your request as follows:

Phillip L. Wilson, Engineer-Director
Planning & Research Division
Texas Highway Department - File D-10
Box 5051
Austin, Texas 78763
(Phone 512-475-7403)