

REPORT OF DEPARTMENT OF MATERIALS AND CONSTRUCTION

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REPORT OF COMMITTEE ON METHODS OF HANDLING AND PLACING CONCRETE

SYMPOSIUM ON VIBRATION OF PAVEMENT CONCRETE

OPENING DISCUSSION

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This year the Project Committee on Methods of Handling and Placing Concrete is sponsoring the presentation of four reports on the subject of vibration. One of these covers French practice, the other three the results of tests and observation on the application of vibration to pavement construction in three states,—Wisconsin, Kansas and Illinois. It is hoped that the presentation of these reports and the discussion following will stimulate interest in the possibilities of this construction practice as a means of improving the quality of pavement concrete.

It is a curious fact that, in spite of the almost uniformly encouraging reports of field experiments which have been received since the modern method of high frequency vibration was first proposed in 1930, there has been no general acceptance of the process by the various states. This may be due in part to a natural inertia which tends to resist changes in construction practice as well as to a feeling on the part of engineers that the advantages so far indicated are not of sufficient magnitude to balance the increased equipment charge. There may also be a feeling that production may be slowed down

sufficiently to result in an increase in construction costs. It is true that the increase in strength, in terms of which the quality of pavement is usually measured, is not great, only about 10 percent for a given cement content. However, it must be remembered that experience to date, both in the laboratory and in the field, indicates that vibration imparts other desirable qualities which, although not so easily evaluated as strength, are fully as important. The ability to handle drier, harsher mixes than are possible when the usual surface screeding methods of finishing are employed, should result in denser and consequently more durable concrete.

The matter of surface durability of pavement concrete is of prime importance. There is no question but that modern methods of finishing, which emphasize smoothness above everything else, tend to produce a surface layer of weak, porous mortar which becomes an easy prey to weathering or to the action of salts used for ice removal. The tendency to use a highly oversanded mix in order to insure maximum workability should also be discouraged. Vibration should tend to correct these evils to a

certain extent by making it possible to use less sand and water and more coarse aggregate per unit volume of cement. This reduces the excess mortar left for finishing and, moreover, the mortar which does come to the top contains less sand and water in proportion to its cement content and consequently must be more durable.

In virtually all of the reports of field experience with vibration so far made, the point is emphasized that the harshest and driest mix which may be used is controlled not by the vibratory equipment but by other units in the mixing, placing and finishing operation. The possibilities of high frequency vibration are distinctly limited so long as we insist on using mixer buckets and finishing equipment designed for plastic mixtures. The problem calls for a new approach. We must study all of the operations involved in the manufacture and handling of the concrete with a view to so designing the equipment that the potentially high density and strength of the very dry harsh mixes may be realized in construc-

tion. This would appear to be a problem well worth the attention of the Joint Project Committee on the Development of Highway Construction Equipment.

It should not be inferred from the foregoing that the benefits which may be derived from the use of vibration with equipment now on the market are not of practical significance. It is desired simply to point out the possibility of still further benefits which should result when the other units are re-designed to handle the type of concrete most suitable for vibration. In the meantime it would seem that the states could well afford to use this new tool more generally than has been the case up to the present time. The discussion this afternoon will show beyond question that the application of vibration using existing equipment is practical and economical. This fact, coupled with the improvement in quality which has been demonstrated should result in a wider and more general acceptance of vibration than has been evidenced up to this time.