

MICHIGAN  
STATE HIGHWAY DEPARTMENT  
Murray D. Van Wagoner  
State Highway Commissioner

MICHIGAN TEST ROAD

By

J.W. Kushing

Research Project 39 B-11 (2)  
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*ROADS AND STREETS*

Research Laboratory  
Testing and Research Division  
Report No. 3  
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MICHIGAN TEST ROAD

In May 1940, Murray D. Van Wagoner, Michigan State Highway Commissioner, realizing the need of a comprehensive evaluation of modern theories of design and construction practice, let contracts for the construction of a 17.6 mile, 22 foot concrete, test road to be built on route M-115 between Farwell and M-66. The completion date for the project is November 1, 1940.

Included in the test road are all of the latest ideas of modern concrete road construction and it is considered to be one of the most outstanding projects of its kind to be carried on since the Bates road test in Illinois in 1922-1923. The primary purpose of the project is to establish certain fundamental principles in concrete pavement design and to correlate laboratory studies with construction methods in order to develop more durable concrete pavement.

A ten mile section of the test road is devoted to the study of such factors in design as spacing of expansion and contraction joints, uniform thickness cross section versus thickened edge cross section, amount of reinforcing steel necessary, relation of cross section to subgrade supporting value, cross section thickness and the pre-stressing of concrete slabs during curing. Construction factors incidental to this particular test section are the mechanical handling of concrete, mechanical tamping of forms, vibration of concrete at joints and the use of several different types of joint seals.

The remaining 7.6 miles of the test road is devoted to a durability study of concrete. In this section the constituents which affect the durability of concrete have been varied to include such factors as, the grading of the aggregate, the design of the concrete mixture, the change in physical and chemical characteristics of concrete as influenced by the addition of various types of admixtures with the portland cement, the use of various finishing methods and the application of different methods of curing.

Throughout the entire project special measuring devices will be installed such as electric strain gages for measuring stresses, thermocouples, moisture cells for determining moisture content at different positions, both in the slab and subgrade, permanent monuments for detecting slab movement and elevation points for determining the vertical displacement of the slab at expansion joints. The durability section will be subjected to calcium chloride treatments to determine the relative ability of the various concrete mixtures to resist scaling and disintegration. This study will be augmented by extensive laboratory work.

A meteorological station was established from which a complete record of local weather conditions will be obtained for the duration of the study.

It is estimated that four to five years will be required to make a complete study of all of the factors, but periodic reports will be made as the work progresses.

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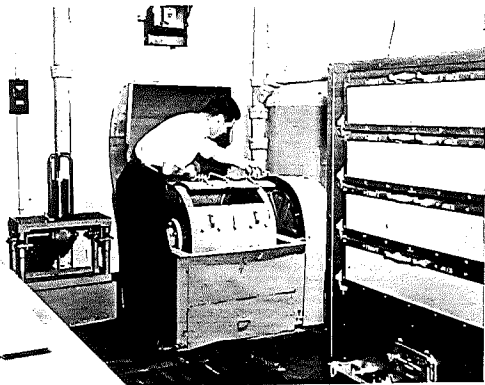
The research phase of the test road is under the jurisdiction of the Research Division. A new division incorporated into the Michigan State Highway Department in September 1939 to carry on more effectively the research work previously done by the various divisions and to investigate the specific technical problems arising within the Highway Department.

In addition to the test road studies, the Research Division is studying primary problems pertaining to higher quality concrete and bituminous pavements as well as subgrade investigations and soils stabilization. In regard to concrete pavements, special emphasis is being placed upon such subjects as, scaling, curing, joint design and concrete mix design. The changes in characteristics of binding medium and consequent development of specifications for binding material are being considered in connection with bituminous pavements. Subgrade and soil studies involve measurement of subgrade modulus, the relation of characteristics of subgrade soil to supporting value and various methods of soil stabilization.

The offices and laboratory of the Research Division are located in Olds Hall of Engineering, Michigan State College, East Lansing. The regular equipment of the Civil Engineering laboratory, which is used jointly by the College and the Research Division, has been augmented by special equipment necessary to conduct advanced studies in Highway Research work.

The personnel of the Division, consisting of several specialists in the field of highway research and supplemented by graduate students majoring in problems pertinent to highway research, is under the direction of J. W. Kushing, Research Engineer and E. A. Finney, Assistant Research Engineer.

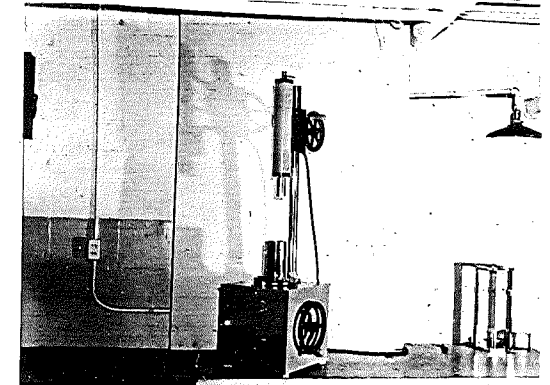
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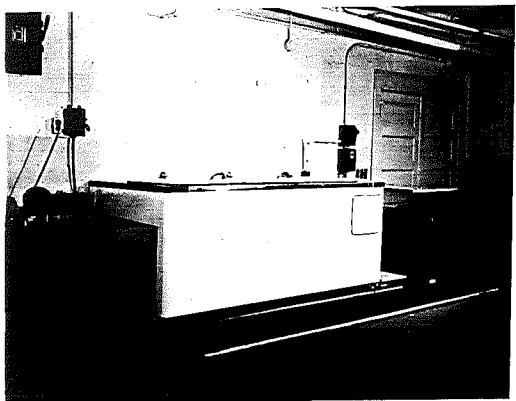
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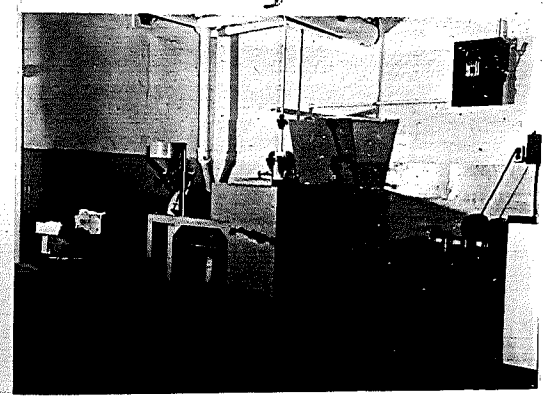
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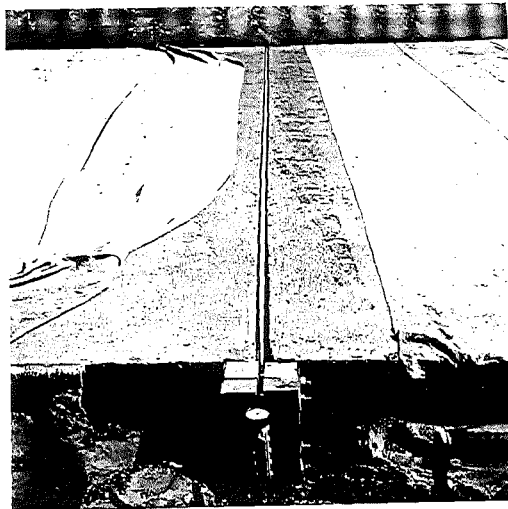


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| 1. Vibratory Soil Compaction Apparatus, Deval Abrasion Machine and Drying Oven | 4. Freezing Cabinet and Thawing Tank Used in Concrete Durability Study.           |
| 2. General View of Cement and Concrete Laboratory                              | 5. Continuous Operating Treadometer Used in Present Gravels Stabilization Project |
| 3. Electrically Operated Proctor Compaction Machine                            | 6. Circular Saw Used in Cutting Concrete Specimens for Microscopic Studies.       |



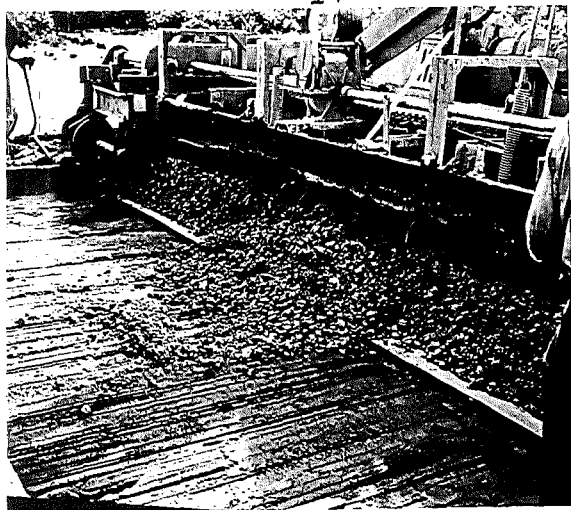
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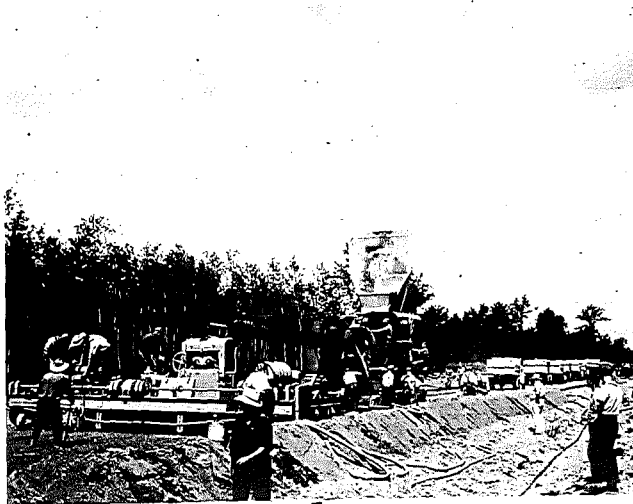
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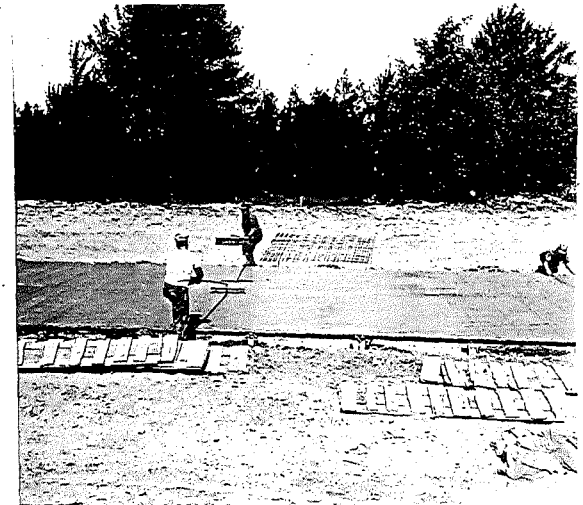
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1. Sampling Concrete on Sections Containing Admixtures
2. Installation of Pressure Cell on Stress Curing Section
3. A study of Various Curing Methods for Resistance to Materials used for Ice Control.
4. Twenty-two Foot Mechanical Concrete Spreader (First of its Kind)
5. Most Modern Type of Contractor's Equipment Used on Test Road.
6. Brooming Concrete Prior to Bituminous Curing to Determine Effectiveness to Ice Control.