

51

MICHIGAN
STATE HIGHWAY DEPARTMENT
G. Donald Kennedy
State Highway Commissioner

SUMMARY

MICHIGAN TEST ROAD

By

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Research Projects 39 B-11 (2)
39 F-7 (2)

Research Laboratory
Testing and Research Division
Report No. 8
January 28, 1941

MICHIGAN TEST ROAD

The Michigan Test Road has resulted from the realization by the Michigan State Highway Department of the urgent need for a comprehensive evaluation of modern theories of design and construction practices. The object 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 pavements. Included in the test road are all of the latest ideas of modern concrete road construction.

Consisting of 17.8 miles of 22-foot concrete, the Michigan Test Road is constructed on M-115 between US-10 and M-56 in Clare and Osceola counties. It is further identified as state projects F 18-20, C3; F 18-20, C4 and F 67-57, C6, or Federal Aid 537-D (2); 537-E (2) and 537-F (4) respectively. The test road is divided into two sections. One section 7.7 miles in length is devoted to a durability study of concrete, the remaining 10.1 mile section is dedicated to a study of the many factors pertinent to design and construction.

The important design factors considered with respect to modern practice are -

1. Spacing of expansion and contraction joints.
2. Uniform slab thickness versus thickened edge cross sections.
3. Amount of reinforcing steel necessary.
4. Relation of pavement cross section to subgrade supporting value.
5. Pavement cross section thickness
6. Prestressing of concrete slabs during curing.

The construction features incidental to this design section are -

1. Mechanical versus manual handling of concrete on subgrade.
2. Mechanical versus hand tamping of forms.
3. Vibration of concrete along forms and at joints
4. The use of different types of joint seals.

In the durability section the constituents which affect the durability of concrete have been varied to include -

1. The grading of aggregates.
2. Design of concrete mixture.
3. The change in physical and chemical characteristics of concrete as influenced by the addition of various types of admixtures with Portland cement.
4. The use of various finishing methods
5. The application of different methods of curing.

Measuring Devices

Throughout the entire project special measuring devices and reference points have been installed including -

1. Electrical strain gauges for measuring stresses.
2. Thermocouples for temperature studies.
3. Moisture cells for determining moisture content of concrete and subgrade soil.
4. Reference monuments for detecting slab movement.
5. Reference points for measuring changes in joint width.
6. Elevation points for measuring changes in joint width.

7. Meteorological station for obtaining complete record of weather conditions.
8. A traffic counter for recording vehicle movement over the test road.

Subsequent Studies on Test Road

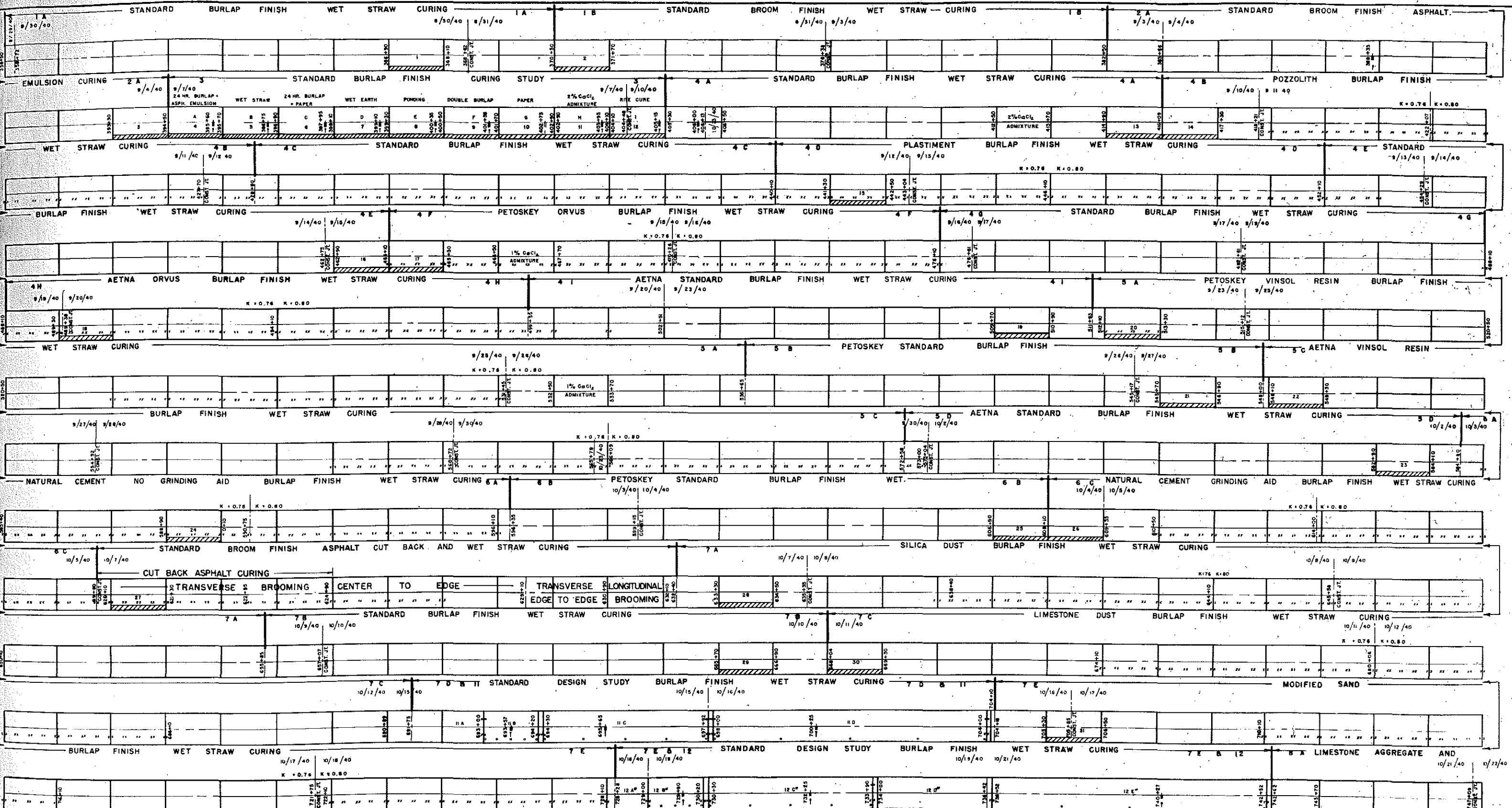
Scaling Study. The durability section will be subjected to a series of controlled calcium chloride treatments each winter season for several years to determine the relative ability of the various concrete mixtures to resist scaling and disintegration. The study will be augmented by extensive laboratory work.

Condition Surveys. Twice each year visual condition surveys will be conducted to obtain the changes occurring in the physical structure of the pavement slabs.

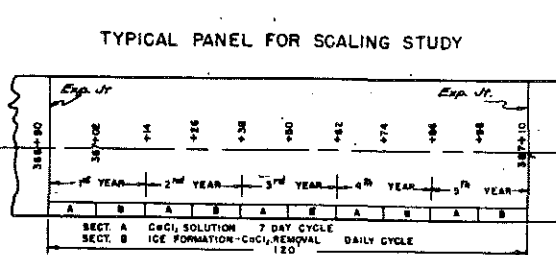
Pavement Studies. In the design section daily and seasonal periodic measurements will be made with the various measuring devices embedded in the concrete to determine the changes in physical characteristics of the concrete with age, temperature and moisture conditions.

The project was constructed under regular contract procedure and in accordance with Michigan State Highway 1840 specifications with modifications in certain cases. Concrete operations were started on July 31, 1940 and finished October 25, 1940. It is estimated that four to five years will be required to make a complete study of all the factors, but periodic reports will be made as the work progresses.

Research Division
Michigan State Highway Department
East Lansing, Michigan
January 1941



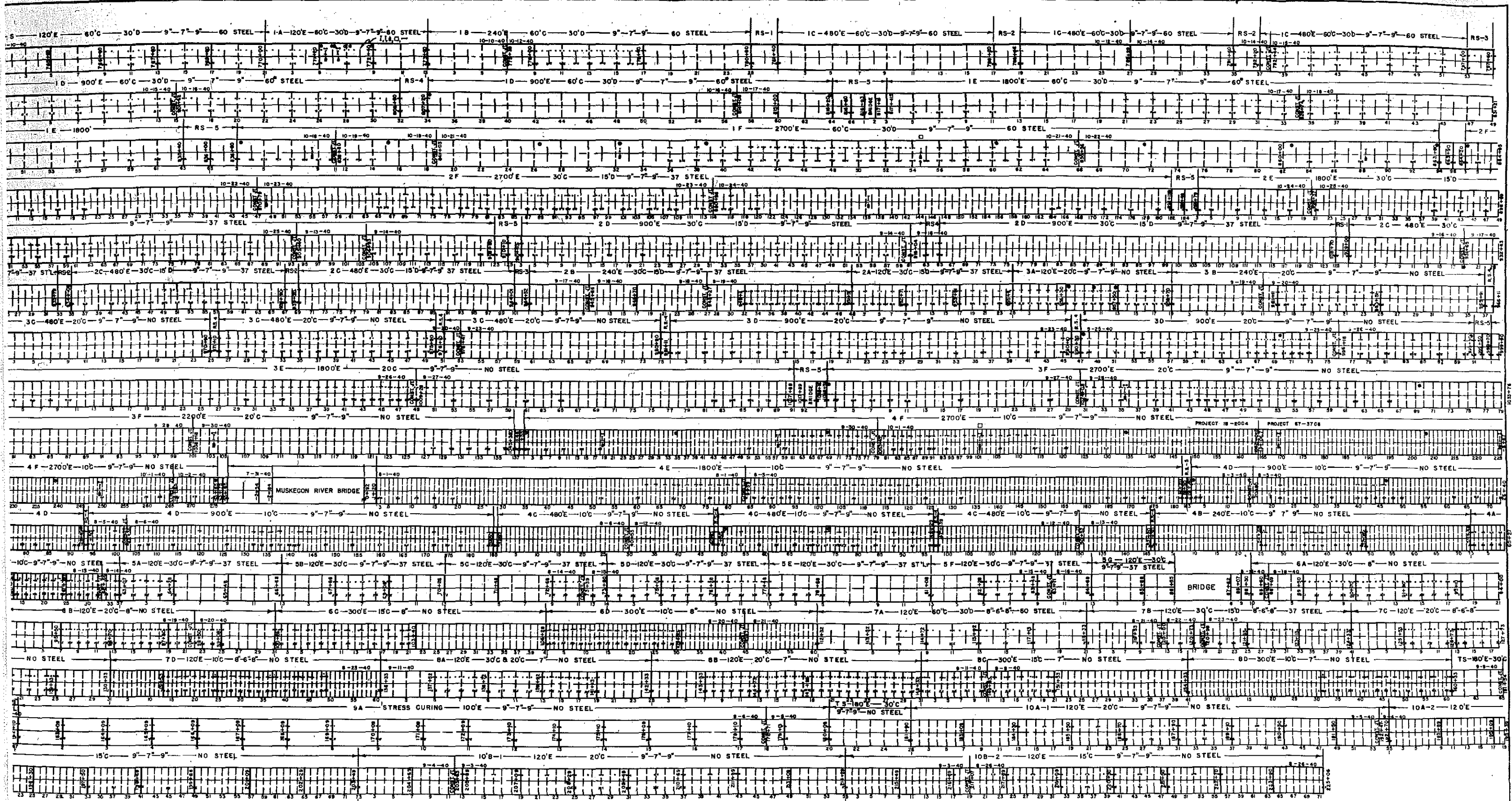
- LEGEND**
- JOINT WIDTH MOVEMENT REFERENCE PLUGS
 - PRECISE LEVEL REFERENCE BOLTS
 - MOISTURE CELL ASSEMBLY
 - THERMOCOUPLE ASSEMBLY
 - SLAB MOVEMENT BOX
 - TEST PANEL
 - * 12A TO 12E NON-REINFORCED



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MICHIGAN TEST ROAD CONCRETE DURABILITY STUDY

PROJECT - 18-20 C, RESEARCH DIVISION
LOCATION - M118, RESEARCH PROJECT - 39-B-11
LENGTH - 7.8 MILES, SCALE - 1" = 100' - 0"
CONSTRUCTED - 1947, DATE - 1-16-48
DRAWN BY -



- LEGEND—
- JOINT WIDTH REFERENCE PLUGS
 - PRECISE LEVEL REFERENCE BOLTS
 - SURFACE STRAIN GAGE PLUGS
 - STRAIN GAGE CELL
 - MOISTURE CELL ASSEMBLY
 - THERMOCOUPLE ASSEMBLY
 - SLAB MOVEMENT BOX
 - CONTROL SLAB

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**MICHIGAN TEST ROAD
CONCRETE DESIGN STUDY**

RESEARCH DIVISION
PROJECT—18-20 C 67-37 C
LOCATION—M115
LENGTH—10.8 MILES
CONSTRUCTED—1940

RESEARCH PROJECT—39-F-7
SCALE—1"=100'-0"
DATE—1-14-41
DRAWN BY—