

A REINFORCED CONCRETE

ARCH BRIDGE MODEL

Thesis for the Degree of B. S.

Lee W. Maurer

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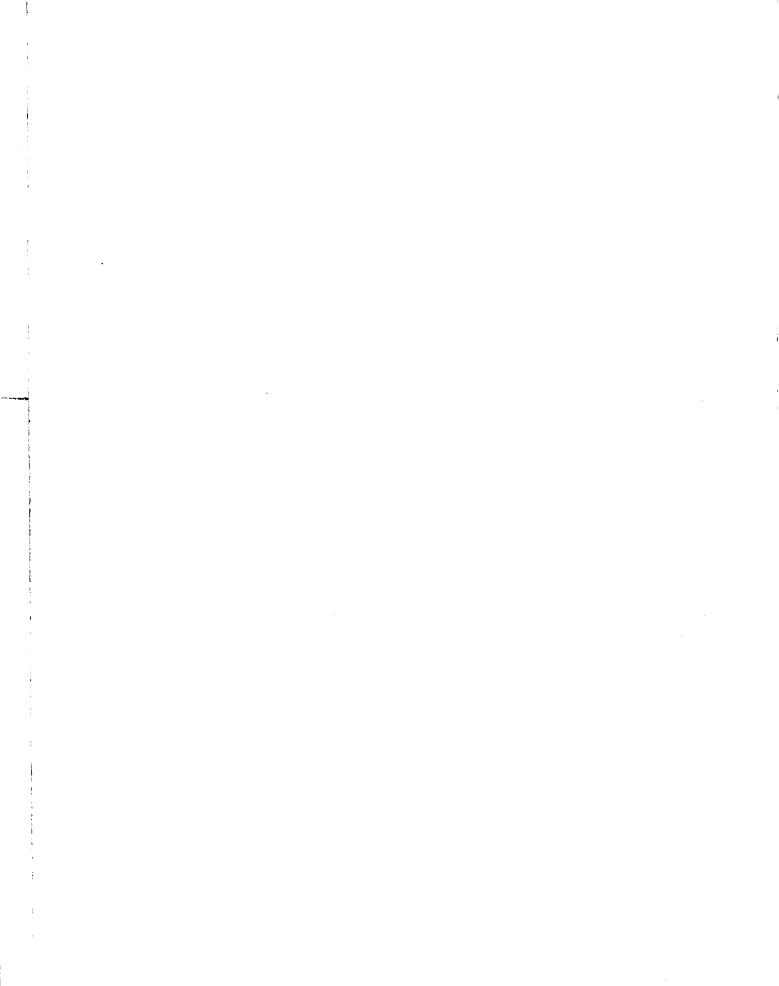
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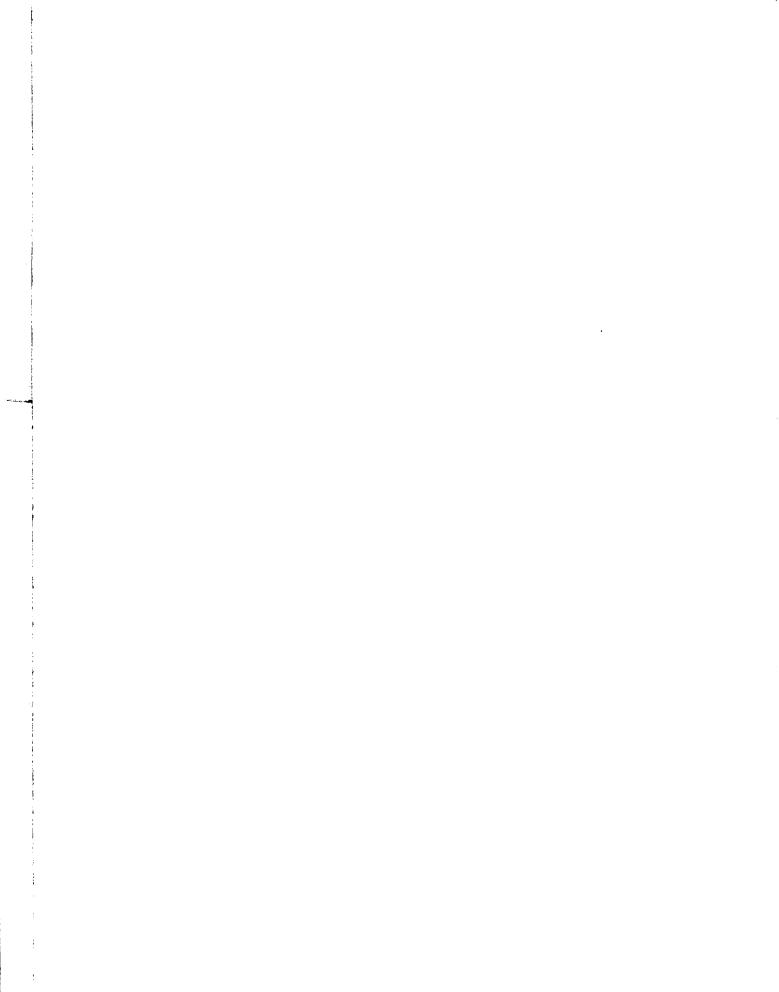
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## A REINFORCED CONCRETE ARCH BRIDGE MODEL

# A THESIS

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SUBMITTED TO THE FACULTY OF THE MICHIGAN STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE.

BY

LEE V. MAURER

CAMDIDATE FOR THE DEGREE OF BACHELOR OF SCIENCE.

JUNE 1927.

## THESIS

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The writer at this time wishes to express
his thanks to Mr. Miller and Mr. L. V. Rothgery of the C. E. Department and also Mr. A.
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#### GENERAL DISCUSSION

In the past few years, persons engaged in the teaching profession, have been materially aided with the advent of the movies and the radio. Things are accomplished by memas of these two agencies which would etherwise take days or even weeks to complete.

The use of movies in our larger High Schools, and practically all our Colleges and Universities, is universal. Much time is saved, and what is vastly more important, especially in our Engineering classes, a clearer and more sharply defined picture is left in the mind of the student.

However, movies also have their disadvantages, due to the fact that the professor is forced to teach his classes in a more or less blind fashion. He cannot "look his class in the face" on account of the absence of light in the class room. Therefore, it is reasonable to believe that the interest and attention of a class would be harder to hold when movies are used.

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When a professor is teaching a subject which deals with the designing of buildings, dams, and bridges, he has the choice of one of three methods:

- Instructing the class with the aid of movies, pictures and designs.
- 2. Using no movies, but simply pictures and designs. (This is the usual procedure)
- Using a "Working Model" of the subject at hand in conjunction with pictures and designs.

The writer believes that the last method mentioned is best adaptable to classes that have the design of bridges and structures. With this method, the disadvantages of the movies are eliminated, and what is more important, the student may examine closely the parts, the construction, and the position of reinforcements in a working model. It was, therefore, with this in view that the writer constructed the "Model of a Reinforced Concrete Arch Bridge."

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### CHMERAL SPECIFICATIONS

(Scale 1 inch - 2 feet)

Span - 65 feet.

Roadway Width (Small) - 15 feet.

Roadway Width (Large) - 25 feet.

Sidewalks - Two 6 foot walks to be supported on arch ring.

Abutment Width - 8 feet.

Overall Length of Bridge - 97 feet.

Más - 142 feet.

Arch Ring at Crown -  $1\frac{1}{2}$  feet.

Arch Ring at Springing - 3 feet.

Total Width of Bridge at Grown - 42 feet.

Total Width of Bridge at Inds - 52 feet.

Pour Street Lights - 4 to 5 feet high.

Balustrade - 5 feet 2 inches high.

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In order to break the monotony of a plain bridge, it was decided to curve the spandrel walls from the springing line outward to make the approaching roadway 25 feet wide.

#### METHOD OF CONSTRUCTION

In constructing this model Homesote well board three-eights of an inch in thickness was used throughout. This wall board is a very good solor imitation of concrete and is much lighter. The reinforcing steel which is shown in all sections is in reality one-sixteenth inch copper buss bar, which to the scale of the model (one inch equals two feet) actually would show as one and one-half inch bars, which is about a quarter of an inch over standard bars. However, in most cases the above scale was strictly adhered to.

The abutments were made and placed in position first.

A templet of the arch ring and an abutment was made and the proper number of characteristic shapes were sawed out on the band saw. These strips were glassic and nailed together.

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Pifty-six to fifty-eight of them were required to give the proper width. A large heavy rasp was used to smooth both the arch ring and the abutments. When this was finished the arch ring was placed in pasition upon the abutments and the two spandrel walls were glued and nailed into position. To represent the water level a strip of tin was nailed in place under the arch ring, following the course of the river on each side of the bridge. The river banks were now nailed and glued in place and later trimmed and chiseled down to a smooth surface. This surface was given coat of glue and Homesote sandust sprinkled over it to give it a rough finish. The counterforts and curtain walls were now placed and then the sidewalks and roadway. The balustrade was modeled directly after those used in practice, with the exception of the spindles and lamp posts, which were made of wood. In finishing the model, the outside boxing or casing was painted grey, the river banks "blind green" and the roadway given a coat of black asphaltic paint. The river surface was given a coat of navy blue Duco which was mixed with clear lacquer.

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