

Michigan Department of Transportation

Historic Bridge Inventory Update



NBI_Bridge_ID # 78178014000B012 **Structure #:** 10265 **County:** ST. JOSEPH
NR Recommendation: Eligible **City:** FABIUS TWP

MDOT Region: 5- SOUTHWEST **Owner:** MDOT
Location: 0.3 MI W OF THREE RIVERS **Milepoint:** 2

Feature On: US-131 SB

Feature Intersected: ROCKY RIVER

Type: BOX BEAM **Design:** ADJACENT

Material: PRESTRESSED CONCRETE

Railing Type: CONCRETE BARRIERS (1981)

Spans: 2 **Overall Length (ft):** 90 **Deck Width (ft):** 49.2

Year Built: 1956 **Alteration (Date):** 1981 **Source:** MDOT INSPECTION FILE

Designer/Builder: MI STATE HWY DEPT

Setting/Context:

SUBURBAN

Physical Description:

The 2 span, 90'-long, prestressed concrete adjacent box beam bridge was built in 1956 when the existing highway was widened and dualized. It is adjacent to a 1951 steel stringer bridge that carries the northbound traffic and is separated from that earlier bridge by a mountable median. The box beams are supported on concrete abutments and a pier accented with scoring. The wingwalls are stepped, and the safety-shape barrier, placed in 1981, is on the west side only. Maximum span length for the box beams is 45'.

Summary of Significance:

The 1956 adjacent box beam bridge is historically and technologically significant as one of the earliest extant prestressed concrete bridges built by the Michigan State Highway Department (MSHD). Use of prestressed concrete for bridges was the single most important technological advance in bridge design during the last half of the 20th century, so much so that by 1986 it, not steel, was Michigan's preferred bridge material. This bridge marks Michigan's move to the new technology, albeit later than the national leader states like Pennsylvania, Florida, and Illinois, and some counties and cities in Michigan. The MSHD demonstrated an interest in prestressed concrete, but they took a measured approach of examining efforts in other states in the early to mid 1950s, then conservatively adopting beam designs and specifications developed by federal engineers from 1952 to 1956 and approved by the American Association of State Highway Officials (AASHTO) in 1956. In 1957 the MSHD adopted the AASHTO design criteria for 27", 33", and 42"-deep adjacent box beams from 25' to 70' in length.

Michigan was a steel bridge state, and the department leadership was trained and well-versed in its use. Ironically, it was steel delivery delays that forced the state to turn to the new material in order to maintain construction schedules. Michigan was fortunate to have two capable fabricators, Lamar Pipe and Tile Company of Grand Rapids and Superior Products Company of Detroit, that promoted the product and worked with clients to either design or advise on designs. The ready availability of prestressed concrete units made them competitive with steel. But despite the advantages of prestressed concrete units, it was still a challenge to unseat steel or reinforced concrete as the material of choice by the

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MASHD. The 1956 Rocky River bridge, along with the 1956 Coldwater River bridge on M-43 in Barry County (08108012000B020), marks the beginning of the evolution. It is the beams and their use that makes the bridge historically and technologically important; the replacement barrier does not reduce that significance.

Much of the credit for moving the state to use prestressed concrete goes to manufacturers like Lamar Pipe and Tile Company of Grand Rapids who, under the leadership of plant manager J. W. Corson, led the effort to bring precast, prestressed concrete bridges to Michigan. Lamar was established in 1923 to produce concrete and terra-cotta sanitary and drainage systems. It was acquired in 1954 by American-Marietta Company, the largest concrete pipe manufacturer in the country, and Corson, who recognized the potential of prestressed concrete, encouraged American-Marietta to acquire Concrete Products Company of America, the company that developed the prestressed concrete box beam in 1949-50. American-Marietta now had the license for the prestressed concrete voided beam, and Lamar immediately constructed a casting yard at its Grand Rapids facility based on the layout of Concrete Products's Pottstown, PA yard. As both bridge designer and salesman, Lamar worked to educate potential clients about their new product, illustrating its strength, economy, and ease of construction, especially in poor weather conditions when cast-in-place concrete was impractical.

The voided box beam bridge type was developed by Concrete Products Company of America in 1949-50. The company was associated with construction of America's first prestressed concrete bridge, the 1949-51 Walnut Lane bridge at Philadelphia. It was looking for a way to increase the capacity of the channel beam, a precast reinforced concrete unit that was being used with great frequency on secondary roads after World War II. By enclosing the C-shaped channel beam into a box shape and then applying the new reinforcing system of prestressing with seven-strand wire developed by John A. Roebling's Sons, they came up with the 17" and 21"-deep precast hollow box beam that is longer and stronger than the channel beam. One of the keys features of their design was using cylindrical cardboard sono-tubes to form the voids. Concrete Products worked with the Pennsylvania State Highway Department, which placed its first adjacent box beam bridges late in 1950. While other engineers also produced different prestressed beam designs, it was the voided box beam developed by Concrete Products and produced in Michigan under their license starting in 1954 that came to be one of the dominant beam designs during the last half of the 20th century.

Reviewed By: LCE (7/07)

Notes: