

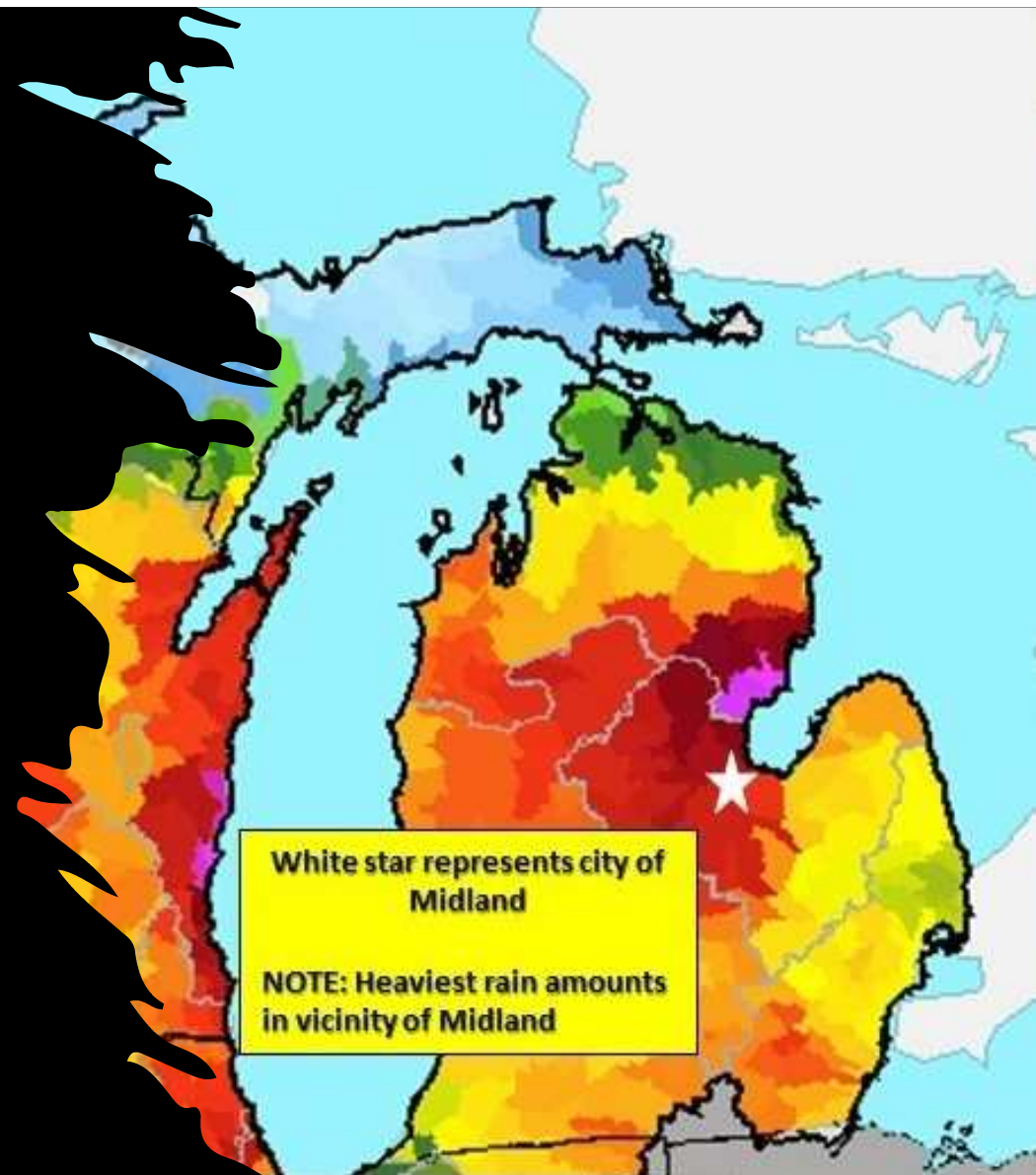


**M-30
Truss
Bridge
over Tobacco River**

**Presented By:
Shaun Bates, P.E.
MDOT
Construction Engineer**

Mid–Michigan Flooding Event 2020

- May 17 – 19, 2020
- Flood on the Tittabawassee River at US-10 was between the 0.5% (200-year) and 0.2% (500-year) return frequencies.
- Flooding in Midland, Gladwin, Arenac, Saginaw, and Iosco counties
- Heavy rain resulted in the Edenville Dam breaching. Water travelled down the Tittabawassee River to Sanford Lake where it subsequently overwhelmed the Sanford Dam and causing it to breach and flood city of Midland and areas of Saginaw County.
- Emergency Declarations
- Largest Emergency Relief Event in Michigan
- **No fatalities**



Closure

- May 19, 2020. M-30 closed due to flooding caused by dam failures at Wixom and Sanford Lakes.
- MDOT worked with Midland CRC and Gladwin CRC to detour M-30 traffic.
- Utilized two Emergency Projects to open roadway:
 - Debris Removal
 - Construct Temporary Bridge



DAMAGE

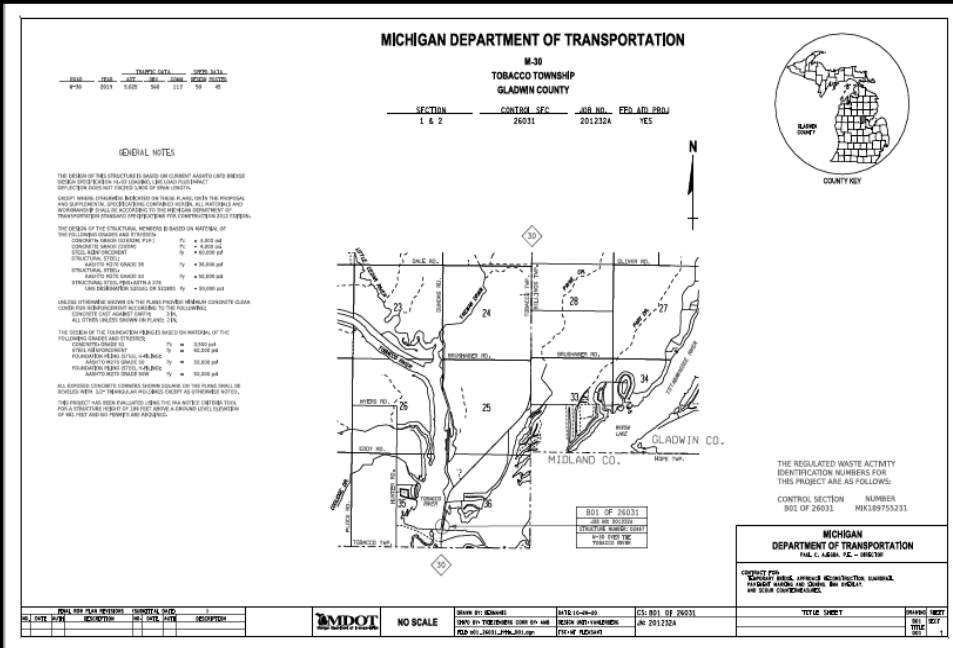
- Bridge collapsed into the channel
- Roadway approach collapsed and washed downstream
- Major scouring of the channel
- Major damage to overhead and underground utilities (electric, gas, & fiber communication)



Debris Removal Project

- June 18, 2020. Fisher Contracting, Co. awarded contract.
- June 29, 2020. Debris removal started.
- July 15, 2020. Debris project completed.
- Cut north approach to build access drive to remove debris
- Removed the following debris:
 - Guardrail
 - HMA pavement
 - Concrete bridge approaches
 - Bridge abutment walls, box beams, and deck
 - Abandoned underground utilities
- Utilized excavators and hydraulic hammer to breakup and remove bridge abutment walls, box beams, and deck





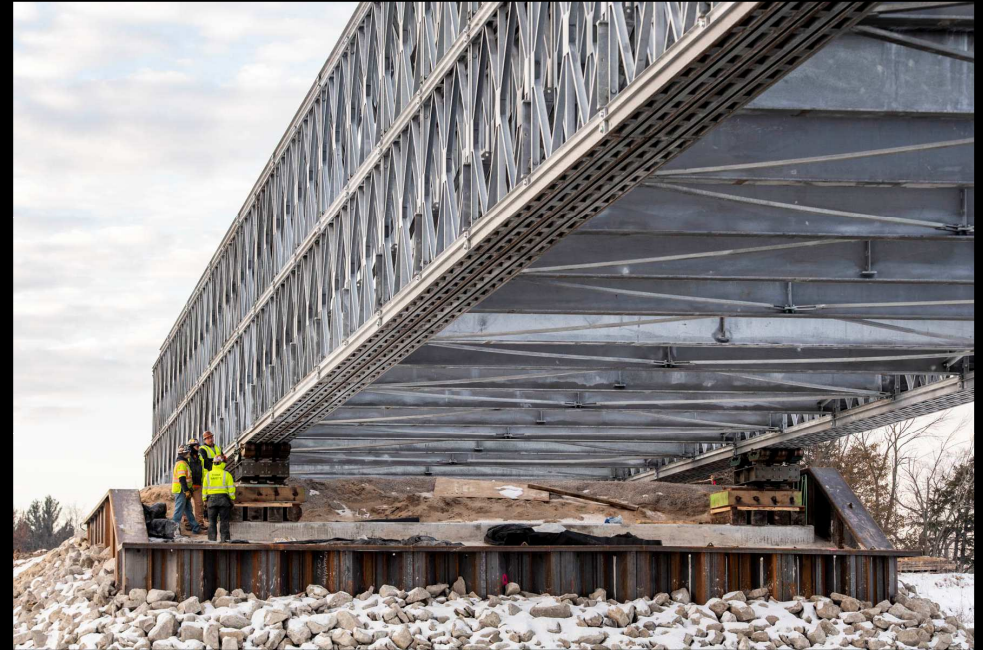
Temporary Bridge Project Design

- Mt Pleasant TSC, Bay Region, Bureau of Bridges, Hydraulics Unit, Geotech Unit, and Fishbech worked on design package
- MDOT coordinated with EGLE, Four Lakes Task Force, Utility Companies, and Local Agencies
- Advertised on November 13, 2020
- Let on November 24, 2020
- Awarded on December 1, 2020



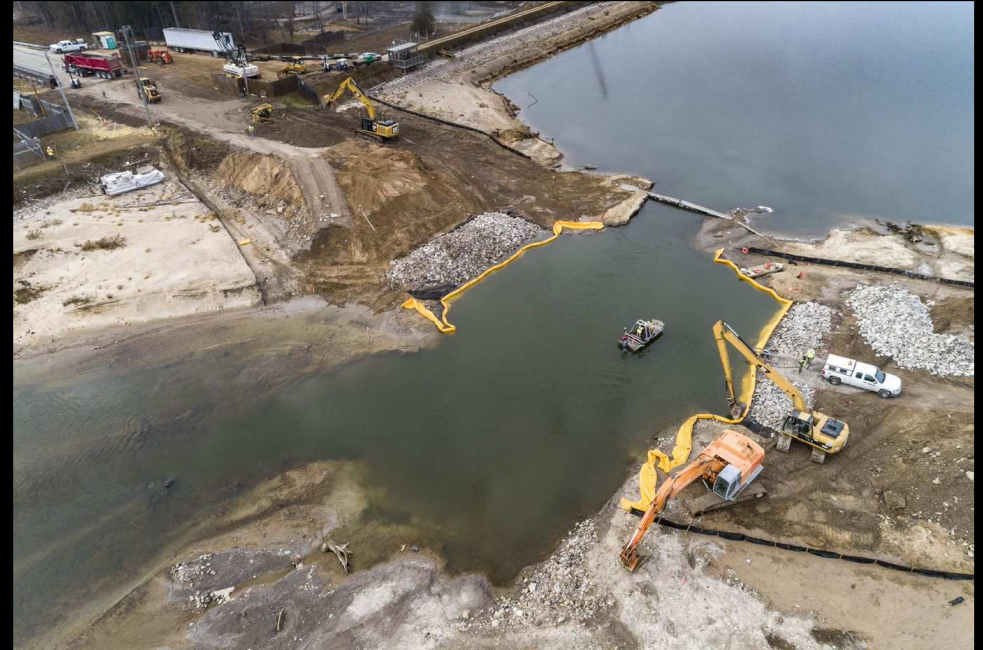
Temporary Bridge Project Design

- Temporary bridge was designed in lieu of a permanent bridge.
- Temporary bridge had to meet some of the following requirements:
 - Span 230ft without center pier.
 - Width to allow for two 12ft lanes and 3ft shoulders.
 - Design Live Load in accordance with AASHTO HL93 loading.
 - Live Load Deflection not exceed $L/800$



Temporary Bridge Project Design

- Project was designed to be constructed in two phases.
- Phase 1: Construct the temp bridge, substructure, armoring the channel, paving concrete base course, installing guardrail and opening to traffic.
- Phase 2: Pave the HMA overlay on the Acrow bridge and concrete base course.



Temporary Bridge Project Construction

- Anlaan started mobilizing equipment on December 2, 2020
- Anlaan had to adjust work being performed to allow Consumer's Energy to finish utility relocate
- West sheet pile line had to be adjusted 3.5ft due to Consumer's Energy adjusting their direction bore location without informing MDOT



Temporary Bridge Project Construction

- Geotextile Containers and riprap were placed to fill major scour hole and armor the channel
- Permanent sheet pile was installed to construct abutment walls and provide additional scour protect
- Anlaan worked up to twenty-four hours & seven days a week to complete sheet pile installation and h-piles
- Cold temps, soil friction, and side friction caused a longer duration to drive the sheet piles.



Temporary Bridge Project Construction

- Geosynthetic Reinforced Soil (GRS) was installed behind the abutment walls
- Placed riprap to armor both abutment walls and foreslopes on the north roadway approach
- Installed flowable fill between abutment wall and sheet pile wall
- Installed mechanical splices for south abutment wall to pour backwall after Acrow Bridge was installed.
- Underdrain behind the abutment walls had to be adjusted

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MICHIGAN
DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION
FOR
TEMPORARY, BRIDGE, SPECIAL

BRG-JRV 1 of 3 APPR:MJC:SCK:10-27-20

a. **Description.** This work consists of designing, furnishing, and constructing a fully-engineered temporary steel panel bridge of modular galvanized steel construction for permanent installation in accordance with section 714 of the Standard Specification for Construction, the project plans and this special provision.

b. **Design.** Certify that the design of the prefabricated bridge superstructure system is in accordance with AASHTO LRFD Bridge Design Specifications. Ensure the design live loading is as indicated on the plans. The load rating must pass for all Michigan legal loads and Unrestricted Class A for Overloads. As part of the certification, include the horizontal and vertical reactions at the bearing locations and design calculations. Ensure the design is sealed by a Professional Engineer licensed in the State of Michigan.

1. Ensure span lengths and bridge superstructure type are as shown on plans. No modification of the pier or abutment locations will be accepted unless submitted and approved by the Engineer. Submit proposed modification design calculations signed and sealed by a Professional Engineer licensed in the State of Michigan. Allow 14 calendar days for review of submittals.

2. Ensure the clear roadway width on the structure between curbs is as shown on the plans.

3. Ensure the design Live Load is in accordance with AASHTO HL93 loading.

4. Ensure the Live Load Deflection does not exceed L/800.

5. Ensure all bridge element and connection hardware meet the AASHTO infinite life fatigue criteria.

6. Provide a positive continuous connection between the temporary bridge guardrail and the approach temporary concrete barrier.

7. Provide a superstructure launching or placement sequence that avoids conflict with the overhead electric lines to remain in place. Submit the sequence to the Engineer for approval.

8. Provide drainage collection and conveyance system at bridge deck joints to ensure surface water runoff does not saturate or erode abutment fill or geosynthetic reinforced soil fill.

c. **Rating.** Perform load ratings on the prefabricated bridge in accordance with AASHTO Manual of Bridge Evaluation, Section 6, the Michigan Bridge Analysis Guide and the Michigan

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Temporary Bridge Project Construction

- Anlaan chose to supply the Acrow bridge for the temp bridge
- MDOT worked with Anlaan and Acrow to establish Bolt Torque inspection plan
- Acrow bridge was new and was purchased by MDOT with this project



Temporary Bridge Project Construction

- Aggregate launch pad was built on south approach with rocking rollers
- Acrow bridge was assembled on the south approach and pushed across the channel in three phases
- Acrow bridge was pushed with Cat D8 dozer
- After the final push, the 140ft launching nose and 10ft QRS tail were removed before lower the bridge into the bridge bearings and securing

- [2021 M-30 Temporary Bridge Push Time Lapse - YouTube](#)



Temporary
Bridge Project
Construction

Final Push Time Lapse Video



Temporary Bridge Project Construction

- Utilized Acrow epoxy coated deck panels
- Ground heaters and insulated blankets were used to remove the thaw from the ground to allow pouring of the concrete bridge approaches and concrete base course
- Concrete base course was constructed for Stage 1 to allow the roadway to be opened in winter and before the HMA plants were opened.



Temporary Bridge Project Construction

- There was a slight sag in the installed Acrow bridge
 - Acrow calculations showed deflection for live and dead load.
 - MDOT surveyed deflection for live and dead load of the installed Acrow bridge.
 - MDOT also installed strain gauges to measure deflection.
 - Survey data and strain gauge data showed the actual deflection was less than calculated deflection.



Temporary Bridge Project Construction

- Completion of Stage 1 was completed on March 11, 2021.
- Completion of Stage 2 was completed by May 14, 2021.



Questions

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