

US-131 Bridge Rehabilitation Over the Muskegon River

BIG RAPIDS, MICHIGAN

SUBMITTED BY FREYSSINET, INC.

The 580 ft (177 m) long northbound and southbound cast-in-place concrete post-tensioned (PT) box girder bridges at US-131 over the Muskegon River are three-span bridges constructed in 1982 and supported by two fixed piers resting 55 ft (17 m) above the water.



Routine bridge inspections and a more thorough structure study in 2013 identified inadequate reinforcement in the diaphragms and webs above the piers as well as surrounding the top and bottom slab anchorages supporting the longitudinal post-tensioning. It was determined that the web shear cracking at pier locations and cracking in the bottom slab at post-tensioning anchorage locations were

the result of the bearings not providing direct support to the webs and box girders. Furthermore, it was determined that the reinforcement around the anchorages was insufficient for the demands of the post-tensioning. A combination of harped external post-tensioning through the box girder, along with pier modifications to redistribute the shear forces, was recommended to strengthen the structure. Michigan DOT proceeded with the \$5 million rehabilitation project. The post-tensioning and structural repair work represented approximately \$1.5 million of the overall project cost.

The complete project scope included pier modifications, flat jack installation, diaphragm retrofits, external post-tensioning, articulating concrete block, joints and epoxy overlay, crack injection, and concrete surface coating.

The project was completed in September 2015 ahead of schedule and under budget. The value engineered solution consisting of concrete corbels and use of flat jacks allowed Michigan DOT to extend the life of the bridge structures instead of replacing them.



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OWNER

Michigan Department of Transportation
Lansing, MI

PROJECT ENGINEER/DESIGNER

Michigan Department of Transportation
Lansing, MI

REPAIR CONTRACTOR

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