



INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

OFFICE MEMORANDUM

DATE: August 1, 2024
TO: City of Ann Arbor / University of Michigan
FROM: DLZ Michigan, Inc.
SUBJECT: Stage 3 Beams Proposal

In July 2021 DLZ responded to an RFP from the City of Ann Arbor (CITY) for the design of a widening and rehabilitation project for the E. Medical Center Drive bridge. The scope of work included in the RFP called for removing the existing beams from the structure, storing them at a location on-site, cleaning and recoating the beams, and finally reassembling them on the substructure units. The scope of work acknowledged the deteriorated state of the beams and the 12month inspection frequency.

DLZ proceeded to complete the initial design of the bridge widening. This design also included three (3) new beams for the widening on the west side of the bridge.

The design of the beam repairs was re-evaluated to account for any additional deterioration noted in the field from an updated bridge inspection in October 2023. While additional repair areas were identified, they were not so extensive as to re-examine the need for all new beams. At no point during the inspection process were any holes noted in any beams. The existing beams were also exhibiting failure of the original paint system which disguised some beam defects.

During construction on the bridge, in order to clean and repair the existing beams, 15 beams were removed from the bridge, with 12 of the existing beams being brought to a steel fabrication shop to be blast cleaned. Nine of the 12 beams that were blast cleaned were slated to be re-used during Stage 2, with the remaining 3 beams being repaired and reinstalled during Stage 3. A material testing firm (SME) was hired to visually inspect and perform thickness measurements on the web and flanges of each beam. The results of the testing found that several of the beams removed during Stage 2 were in worse condition than was anticipated based on the latest field measurements. As a result, 1 of the 9 beams slated to be reinstalled in Stage 2 and 1 of the beams in Stage 3 (that was included in the beam removals for stage 2) will need to be replaced with new beams as the existing beams were in too rough of shape to economically be repaired. Some of the defects found upon completion of the blast cleaning included holes in the web and significant section loss and pitting on the flanges. Photos of the defects that were identified by the material testing firm and confirmed by DLZ are shown below.



Photo 1 (Left): Hole in web of Beam D2



Photo 2 (Right):
Pitting in flange of
Beam D2



Photo 3 (Below
Left): Hole and
Section in web of
Beam D2



Photo 4 (Below
Right): Pitting in
flange of Beam D2

According to the Contractor, the beam replacement for Stage 2 will not be available for installation until late October, but the Contractor is anticipating running out of other work for Stage 2 by Labor Day. Therefore, replacing the beam slated to be reinstalled during Stage 2 is currently resulting in construction delays for the project. The remaining 8 beams to be reinstalled during Stage 2 have additional bolted repairs required as well, including re-welding the bottom cover plates along five of the beams. The cover plates need to be re-welded due to concerns over cracks, pitting, section loss, and potential voids in the existing welds. The re-welding process will involve grinding out the existing welds along the entire length of each beam, inspecting the base material for any potential defects and removing them, then when no additional defects are found, laying a new bead of weld in place of the existing material. The new welds will be subsequently re-inspected to ensure no new defects are found. For each beam, the re-welding procedure costs the City approximately \$12,495 plus tax and testing of the welds.

During Stage 3, an additional 18 existing beams will be removed from the bridge and blast cleaned to determine their condition. Based on the results from Stage 2, there is a high probability that at least one or two of the beams in Stage 3 could be in sufficiently bad enough condition to warrant replacement. Delaying a decision on replacing any of the beams in Stage 3 until they have all been blast cleaned will result in further delays to the project. As the main access point to the UM medical campus, additional delays to the project result in further prolonging traffic backups in the area and pose the potential for negative consequences for Emergency Response operations. Also, with the additional beam repairs required beyond the originally anticipated repair quantities, the cost difference between repairing and replacing the existing beams continues to decrease. In order to prevent long term delays related to the beams, the Contractor has put together a cost estimate to replace all of the beams in Stage 3 for the CITY and UM's review and approval.