



Durham Street Bridge No.0419550, Walkerton
Class EA
Third-Party Review

March 7, 2023 – Bruce County
Council Meeting



Presentation Overview



Introduction (Work Completed To-Date)



Detailed Bridge Condition Survey

- Outcomes
- Mitigation



Third-Party Review (Council Direction)

- Detour Route Assessments & Unidentified Alternative Locations
- Alternative Structure Replacement Material
- Proposed Life Extending Repair Measure



Immediate Bridge Repairs

- Extent & Method
- Investigate-Design-Build



Conclusion & Recommendations



Questions



Introduction (Work Completed To-Date)

Burgess Engineering
Independent Inspection

- August 2023

HAL Group
Detailed Bridge Condition Survey

- October 2023 – January 2024

Burgess Engineering
Recommendation Letter

- January 2024

Triton Engineering
Finalize Third-Party Review

- February 23, 2024





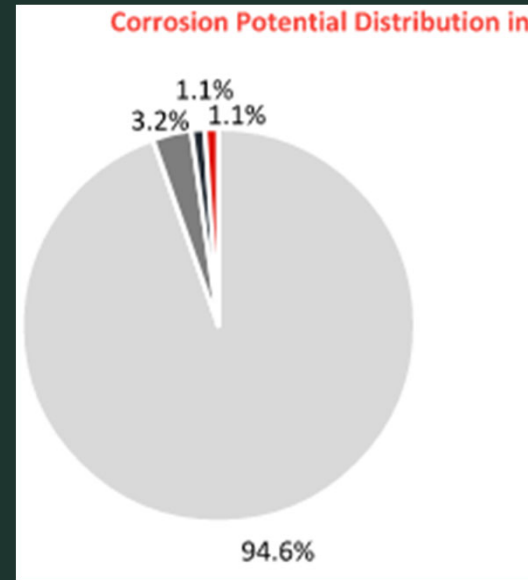
Detailed Bridge Condition Survey



Detailed Bridge Condition Survey Outcomes

HAL Group Inc. Findings

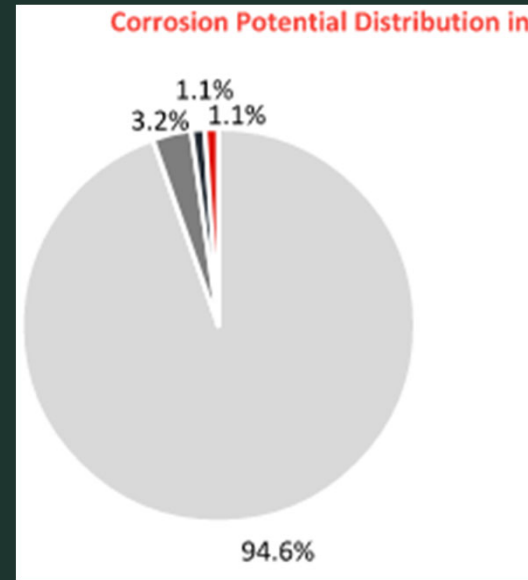
- Concrete Core Samples of Deck Indicate:
 - Low Corrosion Potential
 - Concrete Compressive Strength is High (76.8 MPa)
- Soffit & Girders Inspection
 - signs of delamination
- Half-Joints Inspection
 - Visual signs of leaking



Detailed Bridge Condition Survey Outcomes

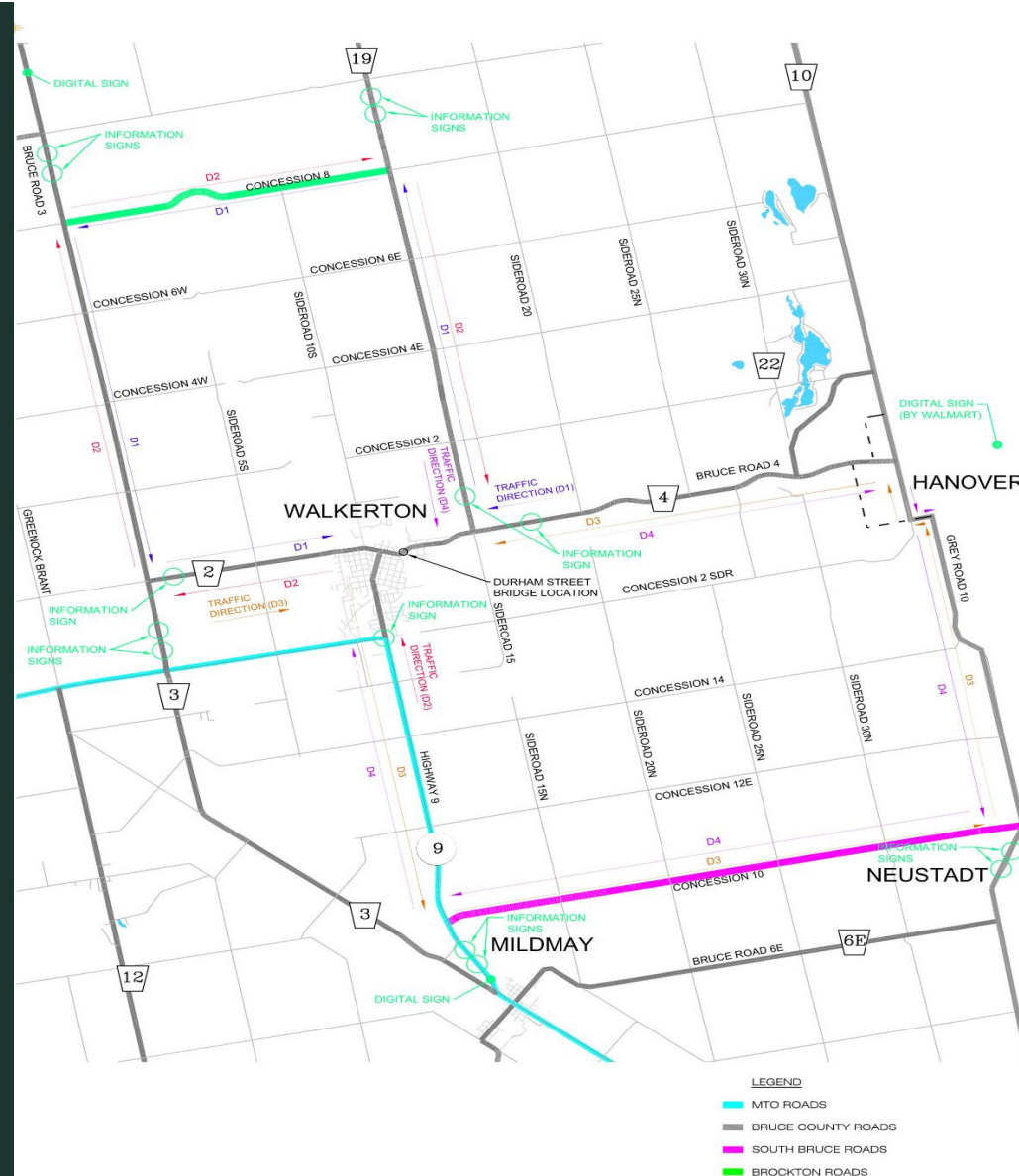
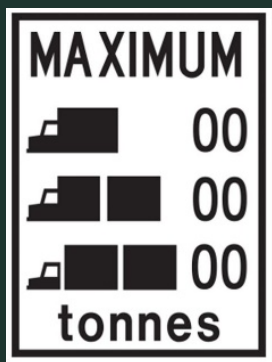
Burgess Assessment/Recommendations

- Bridge Condition, Generally Structurally Sound
- Rehabilitation of Bridge a Potential Viable Option
- Noted Concrete Deterioration and Repetitive Heavy Impact Loading on Half-Joints
- Address Half-Joint Repair or Rehabilitation
- Apply a 3-Level Load Limit (15, 25 & 30 tonnes) to Bridge and Provide Alternate Heavy Truck Route
- Provide Quarterly Half-Joint Visual Inspections



Detailed Bridge Condition Survey Mitigation

- Applied Bridge Weight Restrictions & Alternate Truck Route (ATR) In-Place until Half-Joint Repairs Completed
- ATR & Advanced Warning Signs in-place to Detour Heavy Trucks
- County Amended Existing By-Law to Limit Heavy Trucks from Passing over Bridge
- Immediate Bridge Repairs to Maintain Traffic Flows Recommended in 2024 While MCEA is Completed





Third-Party Review

Detour Route Assessments & Unidentified Alternative Locations



Council Direction

- *“A review of the proposed detour alternatives for the Durham Street Bridge Replacement, as identified in the ongoing Schedule C MCEA, including reviewing the implications of a temporary bridge and potential locations not currently identified.”*



Original MCEA Alternatives



- *“Provided the outcome of the MCEA is to replace the Bridge in the same location,Triton agrees that the“Local Detour Route” alternative along with the County Road Detour as an alternate route for heavy truck traffic.”*
- Cost does not include *“Immediate Repair Measures”*
- Increase in lifespan (75 year)
- Estimated Construction Window – 24 to 36 months

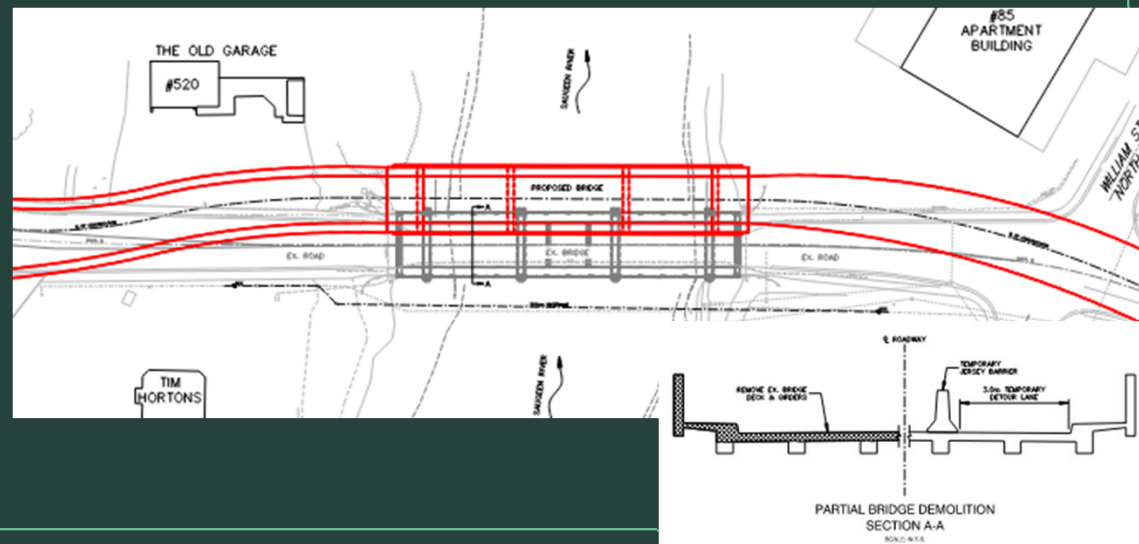
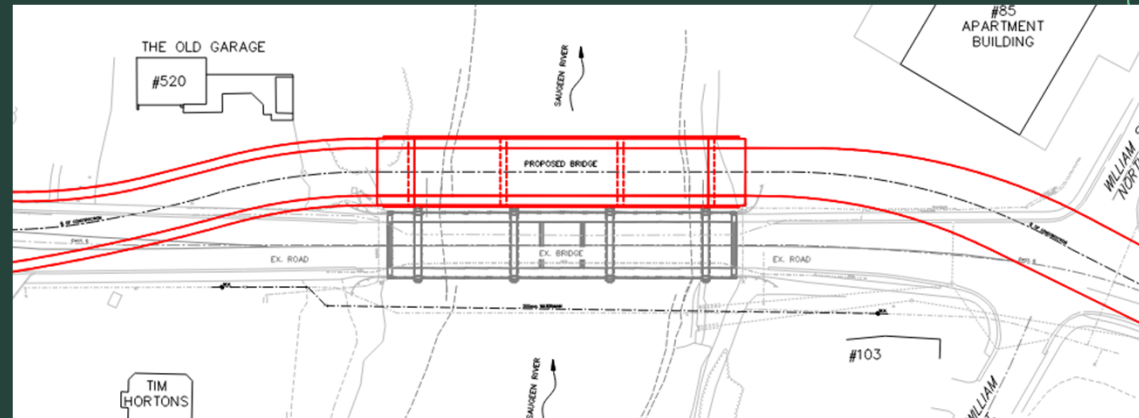
Item	Capital Cost (2024)
Bridge Replacement in same location Detour via Local Detour Route (8.2km)	\$ 15,750,000.00
Bridge Replacement in same location Detour via Temporary Vehicle Bridge Adjacent to Orange Street	\$ 20,500,000.00
Bridge Replacement in same location Detour via Temporary Pedestrian Bridge Adjacent to Orange Street	\$ 16,300,000.0

Alternative Bridge and Detour Considerations Alternative 1

- Replace Existing Bridge & Offset New Bridge Downstream – Maintain Traffic on Existing Bridge

Item	Capital Cost (2024)
Immediate Bridge Repairs	\$ 3,200,000.00 - \$3,500,000.00
Replacement (3 span concrete structure)	\$ 13,500,000.00
Road Realignment	\$ 750,000.00 – \$1,000,000.00
Property Acquisition (estimated)	\$ 500,000.00 - \$2,000,000.00
Total	\$ 17,950,000.00 - \$20,000,000.00

- Cost includes “Immediate Repair Measures”
- Increase in lifespan (75 year)
- Estimated Construction Window – 18 to 24 months
- Recommend NOT to Evaluate in MCEA Process

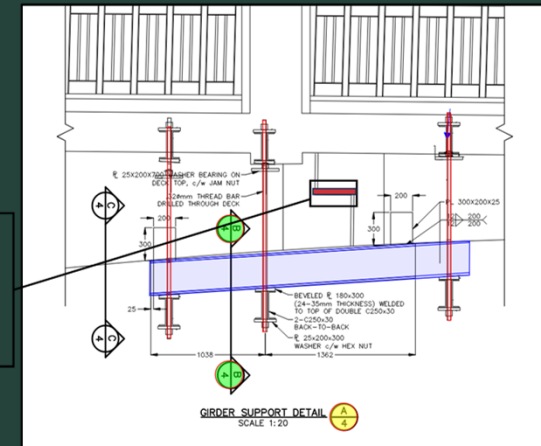
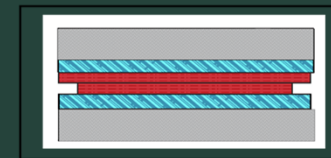
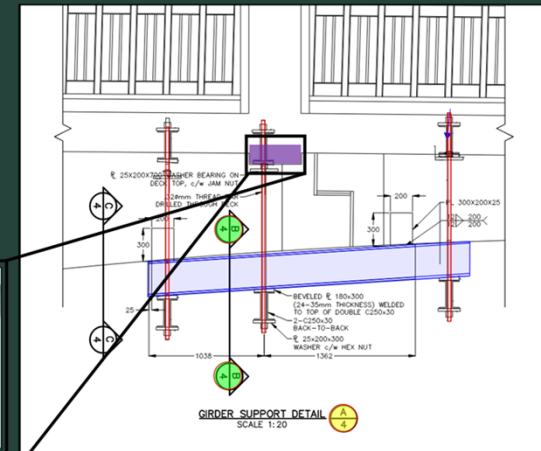
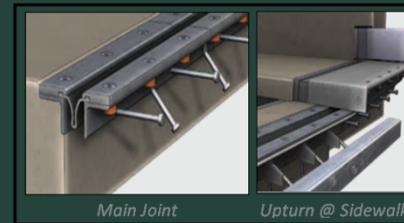


Alternative Bridge and Detour Considerations Alternative 2

Rehabilitate Existing Bridge (Various Levels) – Maintain Single Lane Traffic

Item	Capital Cost (2024)
Immediate Bridge Repair	\$ 3,200,000.00 - \$3,500,000.00
Remaining Bridge Rehabilitation	\$ 1,800,000.00 - \$2,100,000.00
Total	\$ 5,000,000.00 - \$5,600,000.00

- Cost includes “Immediate Repair Measures”
- Increase in lifespan (25 to 40 years) Dependent on Extent of Rehab
- Estimated Construction Window – 12 to 16 months
- Remaining Elements - Parapet walls, Railing system, Piers, Abutments, Expansion Joints, Sidewalk, Deck Overlay, Deck Drainage, Deck Lighting





Third-Party Review

Alternative Structure Replacement Material

Council Direction

- *“A review of implications (by means of comparison) of a wooden permanent bridge vs. a concrete construction permanent bridge, both in length of construction (time) and cost, as well as consideration of environmental factors such as hydrology, etc.”*



Alternative Replacement Structure Material

Various Performance Criteria Evaluated

- Constructability, Capital Cost, Life Cycle Cost, Hydraulic Design, Structural Design

Recommendation

- *“As the bridge is located on a heavily used road.....large volumes of heavy truck traffic, the need to implement a new bridge made of a material that provides the most structural durability, load capacity and overall lower maintenance costs is essential in sustaining a long-term safe and reliable bridge crossing.....the use of a wood bridge to replace the Durham Street Bridge is not recommended and **should not be considered for further evaluation within the MCEA process.**”*





Third-Party Review

Proposed Temporary Life Extending Repair Measure

Council Direction

- *“A Review of BM Ross’ proposed life extending measures (reinforcement) for the Bridge to ensure public safety is maintained and a professional opinion on whether there could be another life extending measure considered.”*



Apply Structural Redundancy

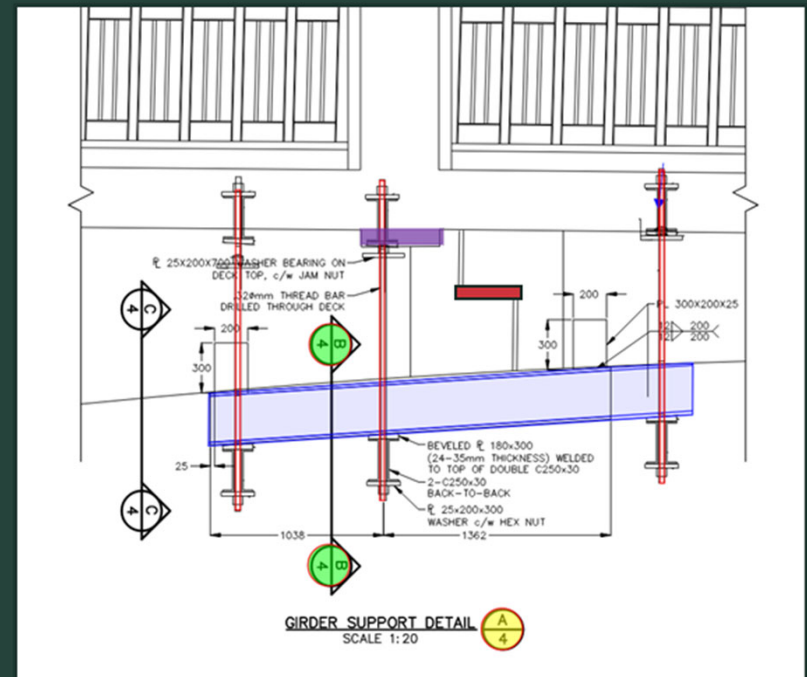


Recommendation

“Original proposed repair will function to support the bridge at the half joints; however, the following is recommended to provide further redundancy in the support system.”

Structural Redundancy

- *Extend I-Beams further beyond the half joint (calculations required).*
- *Grout space between I-Beam and existing arched girder to provide bearing surface area.*
- *Incorporate an additional set of threaded bars to provide support on left and right side of the half joint.*





Immediate Bridge Repairs



Extent and Method of Repairs



Extent of Repairs

- Complete Underside of Bridge Including:
 - Half –Joints (Bearing plates and deteriorated concrete)
 - Soffit
 - Girders

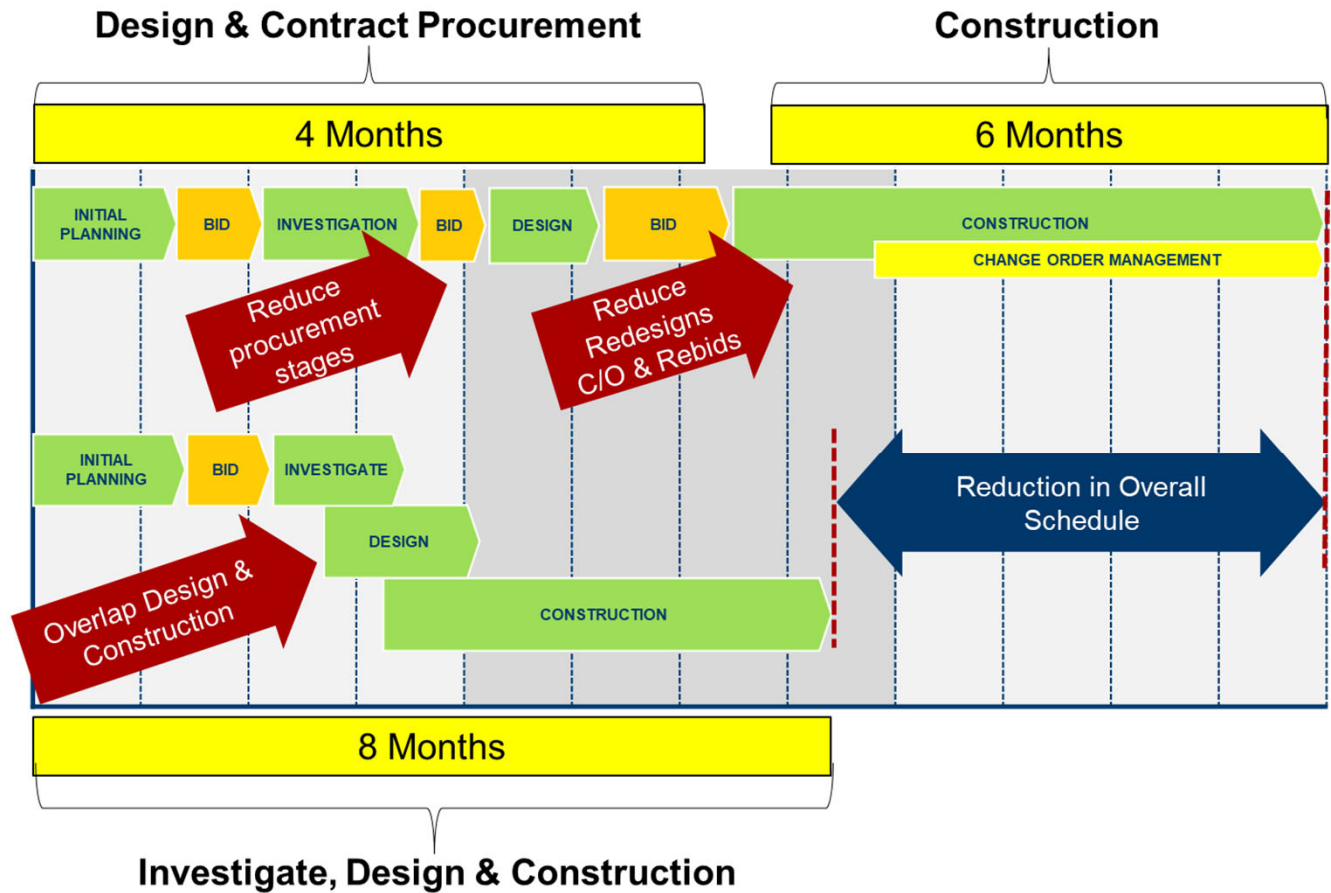
Method of Repair

- *“These repairs can be facilitated in two-phases by transferring traffic to a single lane and completing the necessary repairs under the unloaded areas on the right and left sides, independently. “*
- *“To expedite the immediate repairs it is recommended that the County procure the services of a “Investigate-Design-Build” (IDB) contractor who specializes in this nature of concrete repairs”*
- *Immediate Repairs will Extend Bridge Service Life to 20 years*

Item	Capital Cost (2024)
Immediate Bridge Repair	\$ 3,200,000.00 - \$3,500,000.00
Remaining Bridge Rehabilitation	\$ 1,800,000.00 - \$2,100,000.00
Total	\$ 5,000,000.00 - \$5,600,000.00

Investigate-Design-Build (IDB) Process

“Recommend to Start IDB Process by May 1, 2024, to achieve 2024 Immediate Bridge Repair”





Conclusions & Recommendations



Conclusions & Recommendations



Detour Route Assessment & Unidentified Alternative Locations

Triton and Burgess have identified that bridge rehabilitation is a viable alternative to be evaluated, and this alternative may not require a local traffic detour route; however, a truck detour route is still required.

Alternative Structure Replacement Material

Use of a wood bridge as opposed to the proposed conventional concrete material is not recommended and should not be considered for further evaluation due to structural durability, load capacity, and capital and life cycle cost limitations.

Proposed Temporary Life Extending Repair Measure

Repair of the existing bridge's half-joints via temporary support system is an appropriate life extending measure, consistent with BM Ross' current MCEA process; however, additional redundancy in the support system is recommended.

Conclusions & Recommendations



MCEA Process

Re-introduce bridge rehabilitation into the MCEA process as a viable alternative for evaluation, in addition to the bridge replacement option.

Immediate Bridge Repair

“Procure the services of an Investigate-Design-Build Contractor to complete repairs of the bridge’s half-joint and accompanied bridge elements (Immediate Bridge Repairs) in 2024(while the MCEA process is ongoing)”

Questions?

