Memorandum

March 30, 2022

McINTOSH PERRY

To: Marc Legault, Director of Public Works

Re: The Nation Municipality, Road-06-2021
Touchette Bridge Rehabilitation, Site No. 27-174
Construction Cost and Schedule Update Memo

Per the Municipalities request McIntosh Perry (MP) has prepared a summary of the construction budget and the scheduling options for the Rehabilitation of the Touchette Bridge, located on Route 650 over the South Nation River. McIntosh Perry Consulting Engineers Ltd. (MP) was retained by the Nation Municipality to complete the preliminary and detailed design for the rehabilitation.

The purpose of the bridge rehabilitation is to improve roadway safety and extend the useable service life of the structure. The scope of the rehabilitation was based on the previous inspection reports and was expected to include the following major elements:

- Replacement of deck, stringers, floor beams, and bottom bracing;
- Installation of new concrete deck;
- Repair of structural steel (fractured members, rivets);
- Abutment refacing;
- Expansion joint replacement.

The cost to complete the work noted above was expected to be $2.5M with 2.1M being provided by the federal and provincial governments. MP has completed the 90% design for the project and associated cost estimate. Based on several factors the cost estimate has increased from the original $2.5M budget. This memo summarizes the rationale behind the cost increases and the implications to the construction schedule.

1.0 CONSTRUCTION BUDGET INCREASES

1.1 Changes in Scope

At the start of the assignment, McIntosh Perry completed a field investigation and identified three potential changes from the original scope of work based on the bridge condition.

Wingwalls

The existing bridge wingwalls had significant concrete deterioration and corrosion of the exposed reinforcing steel. Based on the extent of deterioration, it was recommended that the wingwalls be reconstructed to ensure the service life extension is maximized.

Abutment Stability

During the investigation, MP noted that the bridge truss was pushing against the bridge abutment and that the bearings were no longer in their correct position. A gap between the bridge truss and abutment is required to accommodate the expansion and contraction of the bridge due to temperature changes which can be as big as 50 mm.

The lack of gap meant that the bridge abutments must have moved inward (toward water), eliminating the expansion and contraction gap. The binding of the abutment and bridge truss has caused the ballast wall to crack. A desktop review of the existing abutment design was completed to try and determine why the abutments are

moving. Modelling confirmed that the existing timber piles likely did not have enough lateral (horizontal) resistance to withstand the earth loads behind the abutments. It is likely that the earth and vehicle loads caused the abutments to rotate inward (toward water) until they wedged against the bridge truss.

To stabilize the bridge abutments, a deadman anchor system needs to be installed behind the existing abutments to withstand the earth loads and prevent abutments from moving any further.

The deadman system will consist of a sheet pile anchor system with threaded bars fixed through the abutments and secured to the sheet piles. The abutments can't be pushed back to their original position so the ballast wall will need to be rebuilt and moved further back to restore the gap between the abutment and bridge truss.

The installation of this system will be costly as it requires additional excavation behind the abutments, replacement of the ballast wall and backfill with engineered granular. An illustration of the deadman anchor system is provided in the Figure 1.

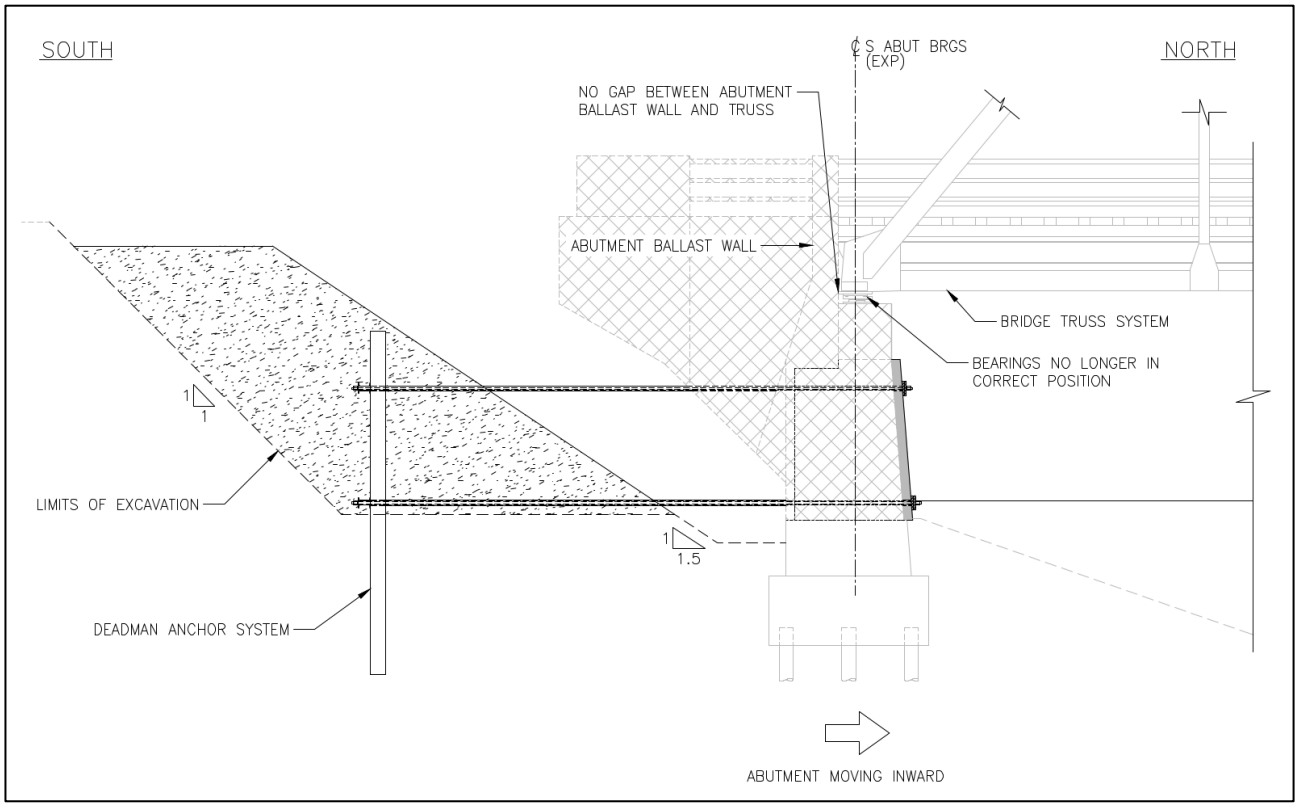

Figure 1: Sketch of Abutment Deadman Anchor System

Once stabilized the south abutment bearings will also need to be replaced as they are no longer in their correct position due to the abutment movement.

Structural Steel Condition

The existing structural steel, in select locations, was in poor condition and continues to deteriorate as the existing protective paint coating has failed. It is expected that additional corrosion may be uncovered or damaged during construction. To account for this risk, it is recommended that a $100,000 contingency be included in the budget.

1.2 Covid Impacts

Construction costs have been steadily rising over the previous two years from the economic impacts of COVID. The Ministry of Transportation (MTO) monitors the average annual change in tender item pricing per year. Their data shows that the average unit cost of structural items has increased by 10% since March 2020.

Based on this, it is expected that the original cost of the rehabilitation has increased by 10% without considering the changes in scope noted above.

1.3 Summary of Budget Changes

A summary of the additional costs from the change in scope have been summarized below:

Table 1: Additional Costs from Change in Scope

Item	Added Cost
Wingwall and Ballast Wall Replacement	$239,600
Deadman Anchor System	$264,900
Bearing Replacement	$72,000
Structural Steel Repair Contingency	$100,000
Covid Impacts (10%)	$346,900
Total	**$1,023,400**

Based on the change in scope and impacts of Covid, the total construction cost has now increased from $2.5M to $3.47 M.

2.0 CONSTRUCTION SCHEDULE

Based on above changes in scope, the amount of working days for construction has increased. It is expected that construction within a single construction season will be challenging as in-water work cannot begin until July 1st. Table 2 provides a comparison of different construction schedules for review.

Table 2: Summary of Schedule Alternatives

Alternative	Pros	Cons/Risks
Tendering Proceeds as Planned **(June 2022 to December 2022)**	• Critical work begins before any further deterioration occurs • Provides the least interruption to traffic	• An accelerated timeline may be more susceptible to delays • Cost may not be competitive due to time of tendering • Contractor availability may reduce the number of bids
Delay Tendering to January 2023 **(April 2023 to December 2023)**	• More contractors will be available to bid • Competitive bids are typically seen at this time of year	• Construction costs may continue to rise • Closure in place during spring planting season for farmers • Further deterioration may require closure of the bridge if not addressed
Provide Extension to Construction Schedule **(June 2022 to June 2023)**	• A less compressed schedule will invite more competitive bids • Unforeseen delays will have less impact on meeting the completion date • Potential to do some work from the ice	• The bridge will be closed for a longer period • Closure in place during spring planting season for farmers • Time of tendering may still impact prices

Yours truly,

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