



# Committee Report

<b>To:</b>	Warden McQueen and Members of Grey County Council
<b>Committee Date:</b>	April 23, 2020
<b>Subject / Report No:</b>	TR-CW-11-20
<b>Title:</b>	Additional Funding for Structural Monitoring
<b>Prepared by:</b>	Matt Marck, Engineering Manager
<b>Reviewed by:</b>	Pat Hoy, Director of Transportation Services
<b>Lower Tier(s) Affected:</b>	Town of the Blue Mountains
<b>Status:</b>	Recommendation adopted by Committee as presented per Resolution CW81-20; Endorsed by Council May 14, 2020 per Resolution CC50-20;

## Recommendation

- 1. That Report TR-CW-11-20 requesting additional funding for structural monitoring be received; and**
- 2. That \$100,000.00 be allocated for structural monitoring of Structure 013-092, to be funded from the Transportation Services General Reserve; and**
- 3. That Struct-Sure Infrastructure Monitoring Solutions be sole sourced to provide monitoring services.**

## Executive Summary

In the summer of 2018, the Grey County Bridge Crew noticed cracks in the concrete girders of Structure 013-092, which is located on Grey Road 13 in the Town of The Blue Mountains.

Further investigation by two different engineering firms gave similar opinions about the cracks. Both indicated they were shear cracks. They both gave an opinion that to mitigate the concern, a carbon fibre wrap should be applied on the bridge beams. The two firms differed as to timing with one noting they were not a significant structural concern at the time but should be monitored yearly, and the other indicating it should be addressed in the near future.

Transportation Services investigated the cost of a fibre wrap to mitigate the cracks and received an estimate involving spending upwards of \$500,000 on the repair.

Transportation Services is pursuing an additional investigation to properly define the cause of the cracking and select the proper mitigation strategy to address the defect.

Transportation Services is only aware of one consultant who is capable of testing and monitoring the structure to definitively identify the cause of the defect and make a proper recommendation for repair.

Transportation Services would like to secure funding from the Transportation Services General Reserve to load test and perform monitoring consisting of placing gauges and sensors on the structure to record data that will determine how serious, if at all, the cracks are, and the timing of a repair.

The desired investigation is expected to confirm a rehabilitation strategy to save the County from doing a possible full bridge replacement and to err on the side of caution to ensure the continued safety and reliability of the existing structure.

## Background and Discussion

Structure 013-092 is on Grey Road 13 over the Beaver River, 0.3 kilometres west of the 10<sup>th</sup> Line and northeast of Heathcote in the Town of The Blue Mountains. It was constructed in 1966. To present, the structure has had only normal maintenance including joint repairs and concrete patches to areas of the deck, girders and curbs.

Traffic volumes in 2019 averaged 1,000 vehicles a day with four percent truck volume.

The estimated cost to replace Structure 013-092 is approximately \$3,671,965.

Transportation Services is only aware of one consultant, Struct-Sure Infrastructure Monitoring Solutions, who is capable of testing and monitoring this structure to definitively identify the cause of the defect and make a proper recommendation for its repair.

The monitoring program proposal from Struct-Sure Infrastructure Monitoring Solutions will confirm the structural performance of the girders and determine if the cracks are significant.

Struct-Sure Infrastructure Monitoring Solutions would implement an OSMOS Structural Health Monitoring sensor system to monitor structural behaviour and ultimately verify the structural integrity and stability on an ongoing basis. The high accuracy of this system allows it to detect strain in the structure, which would not produce visible deformations or cracks. This strain is brought on the structure due to environmental conditions, seasonal temperature changes and external loading.

The system is also capable of monitoring structural behaviour and stress and deformation trends in the structure. This enables the prediction of deformation prior to the occurrence of the distress and movement, as opposed to measuring the deformation after it has already occurred. The trends observed will also be used to determine if the present issue is progressing.

The objective of the structural monitoring program using OSMOS technology is to monitor and record crack movement and internal stress within the structure in order to demonstrate that the structure is stable and operating within design parameters and can be expected to remain in service for its remaining expected life.

The installation of this monitoring system will enable Transportation Services to manage risk by understanding the structure's behaviour, track the internal strain/stress which may result in deformation of the structure, confirm structural integrity, and support diagnosis in determining the cause and possible remedy of deficiencies. If the monitoring program produces findings of concern, the data can be used to develop remedial measures and verify the effectiveness of the measures.

## Legal and Legislated Requirements

None specific; due diligence

## Financial and Resource Implications

The proposed strategy would incur a cost of approximately \$90,000 (excluding HST) to test and monitor Structure 013-092 for one year and then provide a report outlining the cause and required mitigation measures that will need to be put in place.

### *Project Funding*

Item	Excluding HST	Net HST
Cost of monitoring and reporting	\$86,800.00	\$88,327.66
Estimated cost to bring hydro to site to facilitate monitoring	\$3,500.00	\$3,766.00
Contingency (10%)	\$7,500.00	\$7,632.00
<b>Total Projected Costs</b>		<b>\$99,725.66</b>

The ten percent contingency is required to facilitate any issues that may arise with the hydro feed or other unknowns that may require attention. These project costs would be funded from the Transportation Services General Reserve which at December 31, 2019 has a balance of \$2,699,189.13.

## Relevant Consultation

- Internal
- External
  - Struct-Sure Infrastructure Monitoring Solutions

## Appendices and Attachments

Photograph of Structure 013-092 Shear Cracks (Typical of all girders)  
Site Location Map

Photograph of Structure 013-092 Shear Cracks (Typical of all girders)



# Site Location Map

