



**TRITON  
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ORANGEVILLE • FERGUS • GRAVENHURST • HARRISTON

July 21, 2020

Municipality of West Grey  
402813 Grey Road 4  
R.R. #2  
DURHAM, Ontario  
N0G 1R0

Attention: Mr. Vance Czerwinski, C.E.T., CRS  
Director of Infrastructure and Public Works

**RE: Budget Estimate / Engineers Recommendation  
Structure 189**

Dear Mr. Czerwinski:

Triton Engineering Services has retained the services of Doug Dixon and Associates (DDA) to assist to provide the structural inspection and recommendation for repair of the above noted Structure.

In summary, DDA recommends the structure remain closed until a new replacement is implemented. Based on DDA recommendations and construction budget estimate, Triton estimates the total project cost including engineering to be as follows:

Project Budget Estimate Structure 189 Replacement	
TASK	Estimated Total Cost
Construction Cost Estimate	\$ 363,000.00
Engineering Design/Approvals/Contract Administration/Construction Supervision	\$ 50,000.00
<b>Total Budget</b>	<b>\$ 413,000.00</b>

Please refer to the attached DDA letter outlining the findings of the July 10, 2020 field inspection and also provides a further breakdown of the construction budgets.

July 21, 2020

Trust this satisfactory for you current needs, if you have any questions please do not hesitate to contact the undersigned.

Yours truly,

Triton Engineering Services Limited

A handwritten signature in black ink, appearing to read "Chris Clark". The signature is fluid and cursive, with the first name "Chris" and last name "Clark" clearly distinguishable.

Chris Clark, M.A.Sc., P. Eng.

**Doug Dixon & Associates Inc**

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July 21, 2020

Triton Engineering Services Ltd.  
The Old Post  
39 Elora Street South  
Unit 7 to 9  
PO BOX 159  
Harriston, ON, N0G 1Z0

**Attention: Mr. Chris Clark, M.A.Sc., P.Eng.**

**Re: Bridge #189 West Grey  
Inspection and Recommendation for Repair  
Our File WO 20-078**

Dear Chris,

As per Triton Engineering Services Limited (Triton) request, staff from Doug Dixon & Associates Inc. (DDA) attended Bridge #189 (see Photograph 1) in West Grey on Friday July 10<sup>th</sup>, 2020. In the inspection party was the undersigned Doug Dixon P. Eng., Senior Bridge Engineer and Adam Aubin, Bridge Technician. DDA undertook a visual inspection of Bridge #189 which consists of:

- Visual Inspection of the culvert including the deck soffit and abutments; and
- Inspection of the abutments for scour.

DDA arrived at the site at 3:00 pm and were on site until approximately 4:00 pm. Upon our arrival at the site the bridge was closed to traffic (see Photograph 2).

The following letter will provide:

1. A general description of the bridge;
2. DDA's observations from the July 10, 2020 inspection;
3. Recommended/conclusions on the condition of the existing bridge; and
4. A budget estimation of the cost of replacing the bridges with a new structure (including the foundation).

**INSPECTION****1. Background**

Bridge #189 is located on Sideroad 25 in the Municipality of West Grey. The bridge is approximately 400 m south of Concession 14.

The current OSIM Inspection Form does not provide a year of construction. The bridge is not currently posted, although it is closed.

The bridge is a single span open footing non-rigid frame culvert with a span of approximately 4.24 m (14' – 0").

The deck slab is covered with gravel so the top of the slab could not be inspected. We estimate some 380 ± mm of gravel exists on the slab.

There are concrete “walls” along the edges of the road that are integral with the deck. These features mark the edges of the culvert. While not barriers, these components ensure that motorists can identify the edges of the culvert deck. The existing walls are 450 mm above the gravel surface.

## 2. Observations

The structure appears to be a flat slab resting on concrete abutments. As noted above, the slab is not integral with the abutments (not a rigid frame) as shown in Photograph 3.

The abutments are believed to gain their stability from the ‘U’ shaped configuration of the abutment and wingwalls and their footings. Based on the visible cold joints in the wingwalls, the slab is believed to have been built on top of the abutments/wingwalls (see Photograph 1).

The concrete in the abutments has delaminated sections as can be seen in Photograph 4. In that Photograph, two (2) longitudinal cracks in the deck soffit are visible. These cracks are shown in Photograph 5. These cracks are very wide and appear to have opened in straight lines following suspected cold joints in the concrete. Some rust staining is visible in Photograph 5 however, the amount of rust staining is less than expected. We believe this may be as a result of there being few transverse reinforcing bars crossing the open cracks. Culverts of this vintage reserved steel reinforcement primarily for directions parallel to the span.

The cracks are 25 mm + wide with, in some places, 50 mm of vertical displacement exists between adjacent components. (See Photograph 4 and 5).

The east wall along the edge of the deck has extensive cracks. It appears this area has been struck by a vehicle resulting in the upper portion of the wall rotating outward (easterly). This is shown in Photograph 9 and Photograph 10.

There was no scour observed at the site.

## 3. Conclusions/Recommendations

Based on our observations, this structure is in an advanced state of deterioration as a result of age and vehicle damage.

As we did not observe much exposed reinforcing steel, we anticipate any effort to repair the structure will be ineffective and would result in only “cosmetic” repairs. No increased durability is anticipated from such repairs.

Based on our observations, DDA would recommend that as a result of the above noted deterioration and the lack of observed reinforcement, that the load carrying capacity of the bridge is unknown. It is unknown from our inspection if the observed cracks in the deck soffit and abutment are recent or have occurred in the past.

As the bridge is currently closed to traffic, this appears to be the most prudent course of action given the observed conditions.

Replacement for this structure is recommended by the undersigned. With no drawings and extensive deterioration, we believe that any attempt at rehabilitation would not be cost effective nor result in a durable culvert.

We would recommend the bridge remain closed until the replacement can be implemented.

#### 4. Budget Estimate

Our estimate of the cost to complete the replacement of this structure is as listed below:

<b>TASK</b>	<b>Cost</b>
Bonding, Insurance, Site facilities, Mob/Demobilize	\$12,000.00
Remove existing structure	\$8,000.00
Temporary flume/bypass for creek	\$18,000.00
Sheet piles/Coffer dam/Dewatering	\$30,000.00
Concrete culvert (Precast)/Retaining Walls	\$100,000.00
Excavation and backfill	\$25,000.00
Concrete in Distribution slab	\$12,000.00
Waterproofing	\$3,000.00
Barriers (Open Steel)	\$16,000.00
Road works	\$50,000.00
Environmental	\$8,000.00
Contingency (30%)	\$81,000.00
<b>Total (excluding engineering and taxes)</b>	<b>\$363,000.00</b>

If you have any questions regarding the above, please do not hesitate to contact the undersigned.

Yours Very Truly,



Doug Dixon, P. Eng.  
Senior Bridge Engineer

## Photographs of Bridge #189 West Grey



*Photograph 1 – West Elevations of Bridge #189.*



*Photograph 2 – Bridge 189 Closed – Looking North.*





*Photograph 3 – South Abutment – Note the gap at the slab/abutment juncture.*



*Photograph 4 – Close-up of the north abutment. Note the cracking of the concrete in the abutment and the longitudinal cracks in the deck.*



*Photograph 5 – Longitudinal cracks in deck slab soffit looking south.*



*Photograph 6 – South abutment wall. Note the birds nest at mid-frame of the Photograph.*





*Photograph 7 – Deterioration on the northwest corner. Note the depth of the scaling with no visible reinforcement.*



*Photograph 8 – West elevation. Note the deterioration and cracking of the structure slab.*



*Photograph 9 – Broken wall at northeast corner.*



*Photograph 10 – East wall at north end of span.  
Note the v-shaped wedge on the wall that has partially dislodged from the wall.*