

Doug Dixon & Associates Inc

2 County Court Blvd., Suite 345

Brampton, ON Canada L6W 3W8

T: 647.405.0634 | www.doug-dixon.com

June 24, 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 #17 West Grey
Inspection and Recommendation for Repair
Our File WO 20-075**

Dear Chris,

As per Triton Engineering Services Limited (Triton) request, the undersigned attended West Grey's Bridge #17 on Tuesday, June 23rd at 11:00 am to inspect the deck punch through that had previously occurred.

The following letter will provide:

1. The results of our bridge inspection;
2. An assessment of the feasibility of repairing Bridge #17 to be reopened to traffic under the current eleven (11) tonne posting;
3. An outline of a recommended scope of work;
4. A budget estimate for the work outlined in 2. and 3.; and
5. An estimate of the time required to complete the repair.

As discussed, Triton will discuss with Saugeen Valley Conservation Authority (SVCA) regarding any needs for permits to undertake the work. From our meeting with Matt Armstrong, Regulations Officer with SVCA on June 23rd at the site, our understanding was that, given the critical nature of the work to reopen the bridge, that SVCA were receptive to working with West Grey and their consultant to ensure repairs could be completed without delays.

INSPECTIONIntroduction

On June 23rd, 2020, Doug Dixon, P. Eng. and Adam Aubin, Bridge Technician visited Bridge #17 in the Municipality of West Grey. At the site we met with Vance Czerwinski, Director of Infrastructure and Public Works, Tim Cook, Road Superintendent for West Grey, Matt Armstrong, Regulation Officer with SVCA and yourself.

Upon arrival at the site, the bridge was noted to be closed with signs, concrete barriers and snow fence. The bridge is a single-span through truss over the Saugeen River. We understand the bridge was constructed circa 1920. The steel truss has seven (7) 14' – 3" panels. The bridge is approximately 18' – 3" wide. Total length of the bridge is 100 feet.

The deck is a timber nail laminated deck bearing on seven (7) longitudinal stringer. The timbers are “sawn timbers” with dimension 2” x 6”. The timber deck has been covered in a thin layer of “tar and chip” to provide some water protection and a wearing surface.

From the information provided by the Municipality of West Grey, a concrete deck was replaced by the current nail laminate timber deck in approximately 2005. This timber is believed to be Larch.

1. Inspection

At the time of the site visit, there was a depression in the asphalt at the east end of the bridge near the north curb (see Photograph 1). Further investigation below the deck showed that the laminated timber boards had failed (see Photograph 2). The timber was wet and showed signs of decay/rot.

The undersigned, using chest waders, proceeded to move from east to west across the Saugeen River to visually inspect the underside of the deck. Due to the deck soffit height above the bottom of the river, a “hands-on” assessment was not possible. Our visual inspection was complete within 7 ft to 10 ft of the deck soffit. The following discussion/photograph summarizes the observations from that inspection.

The first “bay” from the east abutment, (which contained the “punch through”) was in fair to poor condition. At the time of the inspection, it was raining heavily and had been for about the preceding two (2) hours. The deck soffit was damp or wet over 50% of the 252 square feet in Bay #1. Water could be observed dripping from the soffit.

The undersigned continued the inspection moving west by consecutive bays. In general, the condition of the exposed timber soffit was wet to damp along the edges of the deck. The interior portions exhibited generally “drier” conditions. Areas along the south edge of the deck, as shown in Photographs 3, 4, 5 and 6 were wet, actively dripping and exhibited the growth of surface fungus. Decay is anticipated in these areas.

As the river became too deep to wade through (past the third bay), the undersigned moved to the west abutment and continued to inspect the timber deck from the west abutment moving east. Similar conditions were observed at the west end of the deck. Fungi could be observed growing on the soffit of some timbers. Wet and damp areas were prevalent. Areas to both the north and south edges of the deck were in the worst condition.

From observations made at the time of the timber inspection, the steel supporting floor beams and stringers appear to be in fair condition. Previous repairs have been made to the horizontal wind bracing, and to the ends of some of the floor beam webs. Active corrosion with some section loss is occurring to the flanges of the floor beams and stringers. No perforations were observed in the primary steel members marking up the floor system.

On the deck surface, there was observed significant rutting in the wheel tracks as well as transverse cracks in the “tar and chip” topping. This can be observed in Photographs 7 and 8. We believe this to be the result of the nails used to laminate the timbers becoming “loose” or being corroded. This is causing the loss of the lamination effect and allowing individual timbers to behave independently in flexure and shear.

Other General Photographs are shown in Photographs 9 to 15.

2. Repair

It is our conclusion from the observed condition that the existing bridge deck cannot be repaired to provide any expectation of service even for the short term. Replaced with a new nail laminated timber deck is feasible. The deck would consist of sawn 2" x 6" timbers. If possible, the timber would be dried and preservative treated, however, this may affect the timing of the work.

The repair would not change the existing posting of eleven (11) tonnes. We have not reviewed the existing posting. We have assumed the replacement of the existing deck with a new deck of identical composition and weight, will not result in any change. The new 2 x 6 laminated deck would be able to carry wheel loads from vehicles far exceeding the current eleven (11) tonne posting.

The bridge could be evaluated to the 2019 edition of the Canadian Highway Bridge Design Code to confirm the eleven (11) tonne posting. Field dimensions would need to be obtained for the various component sizes. The total estimated cost of engineering service to update the eleven (11) tonne posting would be \$3,000 to gather field information/member sizes and an additional \$6,000 for the evaluation, presentation of new posting and preparation of a letter/report sealed and signed by two (2) engineers.

3. Scope of Work

We would envision the following tasks (items) to complete the deck replacement:

1. Suspend debris nets or tarps to protect the River;
2. Remove the existing timber deck;
3. Power tool clean and coat/paint the top flanges of the floor beams and stringers. Coat with two (2) coats of a surface tolerant coating such as BAR-Rust 235;
4. Install a new 2 x 6 sawn timber nail laminated timber deck. Timber would be either larch or another appropriate spruce-pine fir equivalent: if possible, timber should be dried and preservative treated to extend the life of the deck;
5. Provide wearing protection to the timber deck with either timber wearing boards or a suitable surface treatment; and
6. Traffic control as may be required.

Other works on the bridge or approaches to enhance safety could also be undertaken at this time.

We would also recommend a contingency be provided for the possible reinforcement of a limited number of top flange locations in the stringer and floor beams which may not be apparent until the existing deck is removed.

4. Budget Estimate

Our estimate for the budget cost is shown below:

Bonding, Insurance, Site facilities	\$ 20,000.00
Debris nets/access	\$ 10,000.00
Remove existing timber deck	\$ 20,000.00
Power tool clean/coat top flanges (400 square feet)	\$ 4,000.00
Supply, Install, (1850 sq. ft.) of 2x6 nail laminated timber deck	\$125,000.00
Protective wearing surface (boards assumed)	\$25,000.00

Contingency 25%	\$50,000
Total (excluding engineering & taxes)	\$ 254,000.00

5. Estimated Construction Duration

The time in the field to complete repairs is estimated to be 20 to 25 working days. This is once all materials are available as we expect considerable lead time required for the ordering of the timber; with additional required if the timber is to be dried and preservative treated.

Breakdown is as follows:

Install protection/remove deck/mobilize	7 working days
Power tool clean/coat concurrent with installing decking	-----
Install nail laminate deck	12 working days
Install wearing boards	3 working days
Site clean up	1 working day
Total Days	23 Working Days

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

W:\Projects\20-075 Triton West Grey County\03 Deliverables\20-075 Triton Eng. Bridge #17 West Grey Letter of Inspection and Recommendation.docx

Photographs of Bridge #17 West Grey Inspection

Photographs 1 – 15



Photograph 1 – Punch Through – Northeast end of the bridge; note the adjacent deck failure location immediately south.



Photograph 2 - Location of Punch Through-timber in an advanced state of deterioration.



Photograph 3 - Second bay from the east abutment - wet deck 1000 mm west of deck drain - decay taking place.



Photograph 4 - Bay #3 from the east abutment, deck north of the second stringer from the south; note the growth of fungus on the wood; rot is occurring.



Photograph 5 - Bay #4 from the east abutment north side of south stringer; note wetness and decay.



Photograph 6 - Bay #3 from the east abutment between the northmost and interior stringers; note the wetness and decay along the exterior stringer.



Photograph 7 - Rutting and transverse cracking of "tar & chip" topping.



Photograph 8 - Transverse cracks in the deck near west abutment.



Photograph 9 - Bay #5 from east abutment; note the decay in the deck particularly along the south side of the deck.



Photograph 10 - Third bay from east abutment; note the very wet local timber.



Photograph 11 - Bay #3 between exterior and first interior stringers.



Photograph 12 - General view of the northeast section of the second bay from the east abutment.



Photograph 13 - Bay #5 north edge; note decay in timbers.



Photograph 14 - Bay #5 north edge; note the wetness and decay.



Photograph 15 - Northside between Bay #6 and #5; Bay #6 in the foreground is in better condition.