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*Visual Inspection Report*

# STRUCTURAL REVIEW OF BRIDGE over BIG WALNUT CREEK

VILLAGE OF SUNBURY  
DELAWARE COUNTY, OHIO

Date of Inspection: December 11, 2018

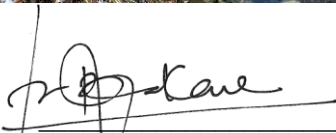
Prepared for



December 20, 2018



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7965 North High Street (Suite 340)  
Columbus, OH 43235

  
Tajudeen A. Bakare, P.E.

12/20/2018  
Date

CT PROJECT #181043



## Letter of Transmittal

December 20, 2018

Mr. Matthew Simpson, RLA  
Senior Park Planner  
Preservation Parks of Delaware County  
2656 Hogback Road,  
Sunbury, Ohio 43074

**Re: Visual Bridge Inspection Report  
Structural Review of Bridge over Big Walnut Creek**

Dear Mr. Simpson:

CT Consultants, Inc. (CT) appreciates the opportunity to provide the above referenced report for the Preservation Parks of Delaware County.

The inspection included a visual engineering review of the old 3-span railroad bridge crossing (that was converted into a trail structure) including its supports.

Should you have any questions or need any additional information concerning our recommendations, please contact me at 614.779.0016.

Sincerely,

**CT CONSULTANTS, INC.**

David Parkinson, P.E.  
Senior Project Manager

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## I. PURPOSE

Preservation Parks of Delaware County engaged CT Consultants (CT) to conduct a visual professional engineering review of the existing 3-span railroad bridge spanning over the Big Walnut Creek at the Weiss and Mohler properties for the purpose of providing an opinion as to the structural integrity of the bridge and its components to support a multi-use trail.

CT visually examined the bridge by walking and use of free-climbing techniques.

### INSPECTION ITEM CONDITION DESCRIPTIONS

**Good Condition** - indicates 'No Repair Required'

**Fair Condition** - indicates 'Minor Deficiency, Item Still Functioning as Designed'

**Poor Condition** - indicates 'Major Deficiency, Item in Need of Repair to Continue Functioning as Designed'

**Critical Condition** - indicates 'Item No Longer Functioning as Designed'

In general, the Rear Abutment is in Poor Condition, mainly due to the continuous undermining of the lower supporting area.

The Piers are in Fair Condition due to their deteriorating bridge seats.

The Forward Abutment is in Fair Condition, due to its exposed footing and missing material supporting the approach embankment which renders it unstable.

Based upon the visual inspection, it is our opinion that the bridge and its components are capable of supporting the proposed multi-use trail but the structure and components will need to endure some repairs.

## II. INSPECTION PROCEDURE FOR VISUAL INSPECTION

Inspection was conducted by CT Team under supervision of team leader Tajudeen Bakare, P.E. and Project Engineer Samuel Tony, EI.

Our procedure consisted of visual inspection of accessible structural members of the bridge. Structural components were visually examined for deterioration and signs of distress. Non-structural elements were inspected for deficiencies which could render them potentially hazardous to the safety of the public and pedestrians.

Access to the underside of the superstructure, bearings, and substructures was gained by walking and free-climbing techniques.

Steel members were checked for rust, pitting, section loss, paint failure, impact damage and signs of distress.

Steel bearings were inspected for rust, signs of structural distress, locking, positioning and undermining. Expansion bearings were examined for restraints to horizontal movement. Anchor bolts were checked for tightness including missing bolts and nuts.

All exposed concrete surfaces of the superstructure and substructure were checked for delamination.

The timber deck and ties and elements were checked for delamination, rutting and warping.

Concrete in abutments and piers were visually inspected for cracks, spalls, rebar exposures, settlements, undermining, scour problem, and delamination.



### III. BRIDGE DESCRIPTION

This structure can be briefly described as follows:

There are no records of the existing railroad structure. The approximately 220-foot long "Converted Trail" Bridge crossing over Big Walnut Creek is a riveted steel plate girder bridge supported on concrete abutments and piers.

The superstructure consists of a 3-span, simply-supported, twin riveted plate girder with railroad ties deck supporting a 4'-5" wide pedestrian passageway. In spans 1 and 2, the plate girders are spaced at 7'-6" and in span 3, the girders are spaced at 6'-6" apart. The simple span center-to-center bearing span lengths are 90'-0", 90'-0", 33'-0" consecutively, resulting in an approximate overall bridge length of 220 ft. The bridge has no skew.

The superstructure steel consists of two lines of transversely stiffened, riveted steel plate girders (109" height between top and bottom back-to-back angled flanges at spans 1 and 2, and 43" height between top and bottom back-to-back angle flanges at span 3) that are constructed parallel with the aid of intermediate and end cross frames, including top and bottom lateral wind bracings; all supported on steel bearings.

The substructures (abutments and piers) consist of a full-height Rear Abutment, a stub-type Forward Abutment and two solid-shaft Piers. The maximum height measured from the top of deck to the channel flow-line of Big Walnut Creek is approximately 45 feet.

South Elevation of Bridge





South Elevation (Spans 1 and 2)



South Elevation (Span 3)



## IV. INSPECTION FINDINGS

The following were observed:

### SUPERSTRUCTURE

The superstructure has been given a "Fair Condition" based on the following findings:

In general, rusts and debris accumulation (generated over so many years of deterioration) on the connection plates connecting the bottom lateral bracings are contributing to the section losses, rusting and pitting observed at the plates, flange angles, transverse stiffeners and bracing angles over the entire length of the structure.

**Girders** - The riveted steel plate girders are in fair condition. Corrosion was noted on the web and interior flange angles with minor section losses in transverse stiffeners.

**Crossframes** - The crossframes are generally in fair condition with minor section losses.

**Lateral Bracing** - The bracings are in fair condition with minor section losses (Photo 1).

**Bearing Devices** - Spans 1 and 2 are supported on a steel rocker 'Roller Nest' expansion type bearings on each girder end while girders in span 3 are supported on a 'stilt-framed' fixed type bearing on pier 2 and a 'sliding plate' type expansion bearings at the forward abutment. In general, all bearings in spans 1 and 2 are in poor condition as they exhibit missing nuts with their nests frozen and locked in place due to heavy rust pack and are not functioning as designed (Photo 2-4).

**Protective Coating System** - Painting on the entire structural steel has failed. Both the exterior and interior surfaces of the structure exhibit corrosion and rusts throughout the structure.

### SUBSTRUCTURE

The substructure has been given a "Poor Condition" based on the following findings at the rear abutment and as described below:

**Abutments** - The Rear Abutment is in poor condition with heavy spalled areas, concrete delamination behind the abutment (Photo 5 and 6). Scour was observed due to the eroding action of Big Walnut Creek and it is continuous. Undermining of the abutment foundation is imminent as the weathered shale support is eroding away below and behind the abutment (Photo 7 thru 9).

**Abutment Seats** - The seat area of the Rear Abutment is in fair condition (Photo 10). Debris consisting of sand and steel rust residue can be found surrounding the bearings above the bridge seat. Cleaning of bridge seat area at this abutment is highly recommended.

**Piers & Pier Seats** - Cracks and spalling areas were observed at the piers seats (Photo 11). The seat areas at piers are in fair condition. Debris consisting of sand and steel rust residue can be found surrounding the bearings above the seat. Cleaning of bridge seat area at this abutment is highly recommended (Photo 12).

**Wingwall** – The back of the wingwalls of the Forward Abutment are exposed and embankment and fillings that were supposed to retain the approach pavement have been displaced (Photo 13).

### **CHANNEL**

The channel of the Big Walnut Creek under the structure is given a “Fair Condition” rating. Items noted were channel alignment, slope erosion and scour at the Rear Abutment. A corrective action is recommended at the abutment (Photo 14).

### **BRIDGE APPROACHES**

This is in “Poor Condition” because the embankment and support materials that were supposed to retain the forward approach pavement have been displaced and spilled down the slope.



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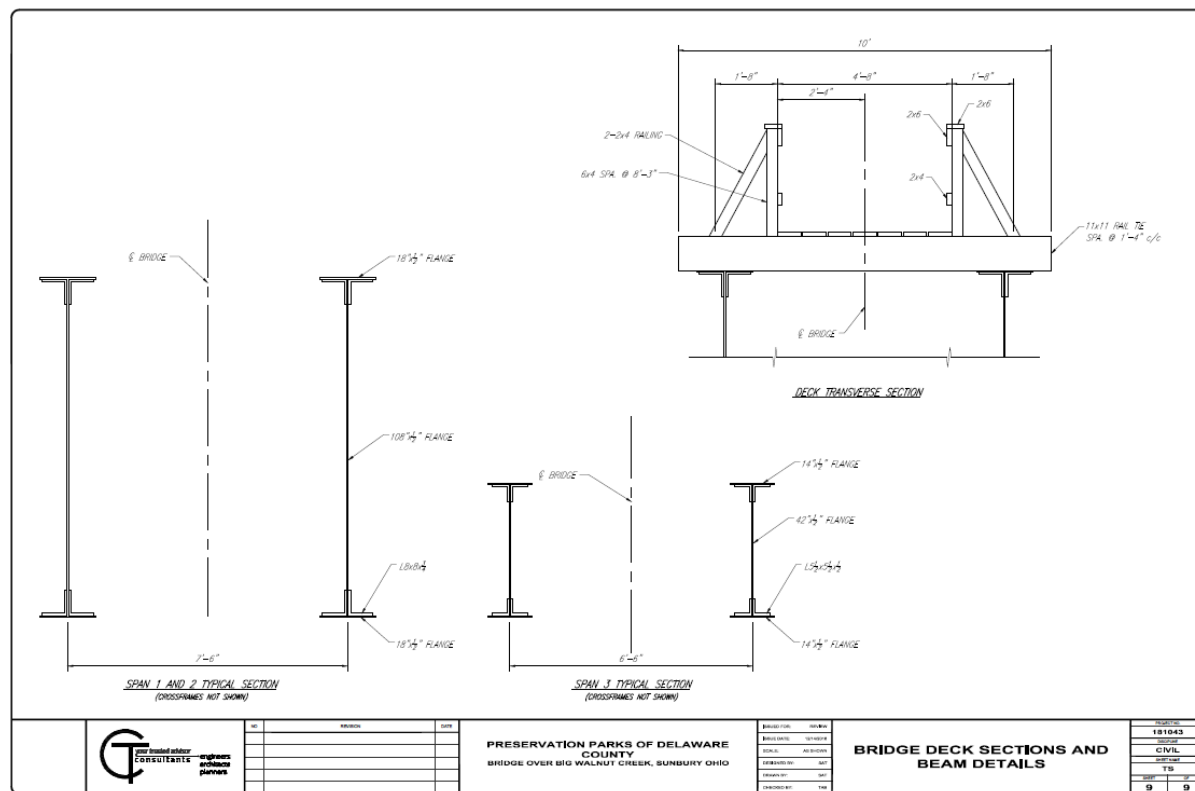
## V. CONCLUSION

Based upon the inspection notes and our visual field investigation as documented above, the structural integrity of the bridge is confirmed to support its own dead load weight including trail but we have the following recommendations that should be performed before converting or modifying the structure to receive a Multi-use Trail:

1. Sandblast and clean the entire steel superstructure
2. Fix Rear Abutment scour and foundation undermining problem (correct erosion problem by incorporating scour countermeasures to prevent further degradation)
3. Repair and patch spalled bridge seat at all substructure units (abutment and piers) and seal repaired surfaces with epoxy-urethane Sealer
4. Clean and refurbish all bearings
5. Address and fix embankment problem for a new approach pavement at forward abutment area

Upon completion of the above, the structure will be capable to support a wider Multi-use Trail.

The profile view shows a bridge with a total length of 220'-0". It consists of three main spans: Span 1 (90'-0"), Span 2 (90'-0"), and Span 3 (34'-0"). The bridge is supported by two piers, Pier 1 and Pier 2. The existing ground line is shown below the bridge deck. Labels include "BRIDGE RAILING", "EXIST. GROUND LINE", "PIER 1", "PIER 2", "BEARING SPAN 1", "BEARING SPAN 2", "BEARING SPAN 3", and "FORWARD ABUTMENT". Dimensions are provided for various sections, including 1'-0" at both ends, 90'-0" for the first two spans, 34'-0" for the third span, and 33'-0" for the forward abutment.



## VII. APPENDIX B (PHOTOGRAPHS)

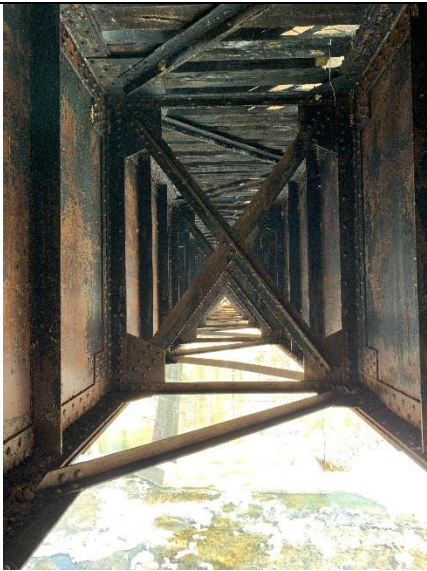


Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6





Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12





Photo 13



Photo 14