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January 29, 2008

Pennsylvania Department of Transportation
Engineering District 6-0
7000 Geerdes Boulevard
King of Prussia, PA 19406-1525

Attn.: Mr. Kevin Sutow

Re: Bucks County NBIS Inspections
2007 – 2008 Cycle
Agreement E01220
BMS No. 09 1014 0110 1854 – Geigel Hill Road over Tinicum Creek
Special Inspection

Dear Mr. Sutow:

At the request of the Department, DMJM Harris performed a special inspection of BMS No. 09 1014 0110 1854 – Geigel Hill Road over Tinicum Creek located in Ottsville, PA on January 28, 2008. The DMJM Harris inspection crew was led by William Ahola, PE. The bridge is currently closed to vehicular traffic but is open to pedestrian traffic and exhibits collision damage to the both trusses.

The structure consists of a single span, steel pony through truss that supports a rolled stringer and floorbeam floor system. The end connections of the floorbeams to the trusses consist of a single u-bolt and pin detail. The lower chords of the trusses consist of forged eyebars that are welded together along the eyebar heads at the lower panel points. The truss diagonals and turnbuckles consist of steel loop bars. The upper chords of the trusses are comprised of steel channels and a top cover plate. The truss verticals consist of built-up angles, lattice, and batten plates. The verticals share the panel points with outriggers comprised of built-up angles. The trusses measure 17 ft. center-to-center and have a span length of 57'-6". The bridge roadway consists of a timber deck with an asphalt overlay. The abutments are concrete faced stone masonry.

Both trusses and the floor system exhibit extensive deterioration and damage throughout. The railing along the left truss is severely damaged due the vehicle impact at PP L3U3 and results in several safety issues caused by the railing protruding out and leaving an open gap. Please reference the attached photo log report. The left truss was seriously damaged as a result of vehicle impact at PP L3U3 and the following deficiencies were noted:

- The vertical member L3U3 is completely severed from the bottom chord and no longer functions as designed (see Photos 5 & 6).
- Diagonal member L2U3 is severely deformed (see Photos 11 & 13) and as a result of the loss of vertical member L3U3, the diagonal member L2U3 is ineffective since the now missing vertical member was needed to balance the vertical force component of the tensile load in member L2U3.
- Diagonal member L3U4 consists of two square metal rods and the inboard rod is severely distorted due to the impact and is considered ineffective (see Photo 7).
- The top chord member between PP U2 and PP U4 is displaced downward 3" at PP U3 due to the loss of the vertical member L3U3 (see Photos 4 & 8).

- Torsional rotation about the longitudinal axis of the top chord was also noted at PP U3. This rotation was identified by placing a level on the top chord cover plate and measuring a ¾" vertical difference between the left and right edge of the cover plate (see Photo 9).

- There is a top chord web splice plate located at PP U3. The splice plate is on the interior face of the chord channels and was shop riveted to the channel on the far side of the joint and field bolted on the near side. The bolts are loose and as a result of the 3" vertical displacement a gap shaped like an inverted "V" has opened up where the ends of the channels were originally butted against each other at PP U3. The gap measures ¼" and now the only effective contact between the channels is at the top flange, resulting in substantially higher bearing stresses (see Photo 14).

- The vertical displacement also generates a bending moment (P-Delta) in the top chord equal to the top chord axial force multiplied by vertical displacement. This condition in an axial member will result in a vertical displacement unless restrained. Normally, this restraint is provided by the vertical truss member and the internal bending force in the chord. At PP U3, the vertical member L3U3 is ineffective and the internal bending moment is reduced to an unknown level due to the poor condition of the splice which was never intended to resist a bending force. This means that the stability of the top chord at this location is being primarily provided by the severely deformed knee brace.

Based on the conditions described above, the load capacity and stability of the left truss is seriously compromised and when this occurs on a non-redundant truss, the situation becomes critical. Therefore, our recommendation is for the bridge to remain closed to vehicular traffic and the bridge should be closed to pedestrian traffic. Currently, there is a concrete barrier across the near bridge approach to prevent vehicles from accessing the bridge (see Photo 1). However, there is no barrier at the far end of the bridge. The Department is urged to immediately place a barrier at the far end and extend the barrier at the near end to stop all vehicle and pedestrian access to the bridge. In addition, unless the Department performs repairs to the left truss and/or a detailed analysis it is recommended that the bridge be demolished.

If have any questions or require additional information, please do not hesitate to contact Glen Vasquez or myself.

Very truly yours,
DMJM Harris, Inc.

Brett Canimore, P.E.
Deputy Project Manager