

1800 East High Street
Suite 125
Pottstown, PA 19464
610.323.4735
Fax 326.0759

www.cmceng.com

P.O. Box 958
2215 Kimberton Road
Kimberton, PA 19442
610.983.9200
Fax 983.9202

Boyce Plaza 1
Suite 120
1035 Boyce Road
Upper St. Clair, PA 15241
412.257.9666
Fax 257.3521

189 Market Street
Kingston, PA 18704
570.288.5882
Fax 288.5889

496 Kings Highway North
Suite 222
Cherry Hill, NJ 08034
856.667.7495
Fax 482.0071

200 Marsh Lane
Suite 200
New Castle, DE 19720
Ph: 302.654.0273

February 19, 2008

Board of Supervisors
Tinicum Township
163 Municipal Road
Pipersville, PA 18947

RE: Geigel Hill Rd. Bridge

Dear Supervisors:

As a result of the recent notification by PennDOT to close the bridge to pedestrian traffic and remove the structure entirely, an associate and I inspected the structure in detail on February 8, 2008. We also reviewed the inspection report by DMJM Harris.

In order to make a determination about the ability of the bridge to support its own dead weight and that of pedestrians, good engineering practice requires a structural analysis. The DMJM analysis is a first step, but it is just an observational inspection and it notes that a detailed analysis is recommended.

We completed the detailed structural analysis of the truss as it presently exists, as suggested in the DMJM report. Our analysis shows the truss is more than capable of supporting not only its own weight but also that of pedestrians.

Observations

A minor vertical compression member was removed by the crash. A diagonal tension member was deformed by compression, as was an outrigger providing lateral support to the truss. Some vertical displacement occurred to the top chord at the time of the crash at the point of impact, which was also close to a load point of the truss.

Other members of the truss have strained as a result of the sudden elimination of the vertical compression member. The main function of the missing vertical member was to stabilize and support the top chord members. The top chords of the truss are actually constructed as a continuous, rigid through-beam in a semi-arch configuration. This rigid member would have resisted overloading during construction and is now providing additional support where the vertical member is missing.

A riveted splice in this beam coinciding at the point of impact and immediately adjacent to the load point is made up of overlapping steel plates. The vertical displacement at this point was caused by the impact and was immediately arrested in large part by the reinforced splice connection and more over by the strength of the ridged through beam acting as the top chord member.

One diagonal tension member failed in compression as a result of the displacement caused by the impact.

Obviously, automobile traffic has properly been prevented since the damage to the truss has occurred. The truss has remained in its present state for approximately five years without any expectation or indication of collapsing. Weather and in-place deterioration has not aggravated the overall structural condition of the truss.

These conditions, as noted in the DMJM report, have existed for the past five years. The report suggests that repairs be made and/or a detailed analysis be performed on the structure. Only without repairs or calculations does the report suggest demolition.

Engineering Analysis

We field measured the bridge members and the dead weight of the bridge was determined. The loadings were assigned to the truss and the member section forces were calculated. The member stresses were then determined for the dead load. A live loading of 50 pounds per square foot was then assigned and the member forces and stresses calculated.

The bridge was determined to be completely self-supporting in its present condition. There are, in fact, actual redundancies in the structure and none of the members have stress levels which approach the maximum allowable limits of the strength of the steel members. The maximum dead load stress was found to be 7,000 pounds per square inch. Using the live load of 50 pounds per square foot (pedestrians) resulted in a maximum stress of 12,000 pounds per square inch for the same member. Based on a maximum stress of 24,000 pounds per square inch for the steel (conservative) the calculated stresses are about 50% of this maximum allowable, for a factor of safety of 2. A complete, detailed structural report can be submitted within a few days.

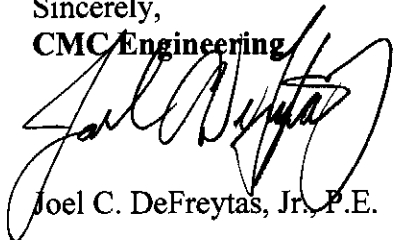
Conclusion

There is no need to make structural repairs to prevent the collapse of the bridge. Our calculations scientifically demonstrate what has actually been occurring for five years. That is, the bridge is capable of remaining in place without relying on the damaged members. Minor repairs could be made to the steel structure which would provide a level of comfort for those concerned about the stability of the bridge.

The emergency removal of the bridge is unwarranted. Preservation of the trusses would appear to be in serious jeopardy should the bridge be removed by a contractor other than the one responsible for its reconstruction. Care during removal, long term storage and protection until reconditioning can begin are serious issues.

Sincerely,

CMC Engineering



Joel C. DeFreytas, Jr., P.E.

JCD/pmb