

Tariffville Bridge Disaster

By Frank Griggs, Jr., Dist. M.ASCE, D.Eng., P.E., P.L.S.

The Connecticut Western Railroad was chartered on June 25, 1868, to run from Hartford, Connecticut to the New York State line at Salisbury, where it was planned to connect with the Dutchess & Columbia Railroad in New York State near Millerton, NY. It would then connect to the New York & Harlem Extension railroad running northerly out of New York City towards Albany, NY. It was completed on December 21, 1871, with many of its bridges being wood and iron Howe Trusses, even though many railroads had adopted iron bridges by this date. Tariffville was a small town west of Hartford and located in a bend in the Farmington River that generally flowed eastward into the Connecticut River.

The Railroad Commissioners described the bridge as:

“The structure was a through bridge of two similar spans, of the ordinary Howe truss pattern, each span 163 feet in length between extreme panel points, and some ten feet above the water of the river... The bridge, built in 1870... uncovered and unpainted. Its diagonal braces, top and bottom chords, were of yellow pine, and vertical suspension rods of wrought iron. Each span consisted of 16 panels of 10 feet 2 inches each, or in all a few inches less than 163 feet. Height between chords, 20 feet. Upper chord composed of two pieces 6 x 11 inches, and two pieces 7 x 11 inches, lower chord two pieces 6 x 14 inches, and two pieces 7 x 14 inches. Main braces, two to each panel, 9 x 11 inches; counter braces, one to each panel, 7 x 8 inches. Floor beams, 6 x 12 inches, 14 feet in the clear between chords. One track stringer 10 x 11 inches under each rail.”

The Commissioner’s description went on to detail the sizes and locations of the suspension rods. Sizes ranged from 1¼ inches to 1⅞ inches. None of the rods had enlarged or upset ends, but the cutting of threads in the rods reduced diameters by ¼ inch or more.

On January 14, 1878, about seven years after the bridge opened, a train consisting of two locomotives and eight passenger cars running westerly from Hartford and ½ mile west of Tariffville Station started to cross the bridge at a speed estimated at six to eight miles per hour. The locomotives and cars passed over the easterly span safely, and the forward engine just reached the western abutment, “when suddenly a snapping was heard and a sense of sinking experienced by those in charge of the engines and baggage cars and by the occupants of the forward passenger cars. Then a fearful crash and fall of the bridge carrying with it engine tender, baggage, and three passenger cars causing the death of thirteen persons and wounding and injuring many others.”

The Annual Report of the Railroad Commissioners of Connecticut described the crash as, “Both the trusses of the west span, with the two locomotives and baggage car thereon, immediately fell together towards the south, the forward locomotive being overturned and leaving its ashpan on the abutment, the second locomotive landing on the ground just



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behind it, and the baggage car still further back in the river. The three passenger cars on the east span were also forced into the opening by the momentum of the train behind them, the first one being turned to a position nearly at right angles with the bridge, and the second and third left with their forward ends in the river and their rear platforms against the center pier. The remaining six cars of the train were uninjured.”

The Hartford Courant described the collapse more emotionally as follows,

“The first locomotive had cleared the west span, and entered upon the trestlework, when the entire span gave way, breaking off immediately east of the heavy stone pier in the center of the river. As the structure gave way, the first locomotive was hurled violently over, and embedding itself in the ground was completely wrecked. The other engine and the baggage car went down with the wreck in an upright position, and the side of the heavy truss fell over upon them. The first passenger car was whirled around and sank to the bottom of the river, lying nearly in a parallel direction with the stream. The second

passenger car went down end foremost upon the first car, smashing the larger portion of it into kindling wood, the rear end of the car resting upon the bridge. The next car occupied a similar position but swerved more to the left and therefore did not rest upon the car in front of it.

None of the remaining coaches left the track. The crash produced by the fall, and the cries of the wounded and dying, speedily brought assistance, but the first-comers worked at a great disadvantage.

The cars had broken through the ice, which rendered it difficult to approach near enough to reach the passengers. But all worked with a will.”

As was usual in these cases, a Coroner’s Jury was convened and they visited the site between January 22nd and February 12th. “A large number of witnesses were examined, not only of persons on the train, or who were connected with the railroad but also of experts and scientific men, bridge-builders, civil and mechanical engineers, from various parts of the country in this and adjoining states.” They, 8 out of 12 jurors, concluded the following, as taken from their report.

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1) We are of the opinion that no blame or censure can be justly charged upon the conductor of the fated train, or any of those associated with and aiding him in running it, but on the contrary have before us the most abundant evidence of the constant carefulness and watchful solicitude of Conductor Elmo, Superintendent Jones, and their subordinates on the eventful night.

2) We have not the least evidence to lend us to believe that the bridge had been tampered with for the purpose of wrecking the train, or for any other purpose.

3) We have not sufficient evidence to lead us to believe that there was any derailment, either of engines or cars, but, on the contrary, all were moving along smoothly when a sudden crash of the bridge was heard and felt, with a simultaneous sense of sinking.

4) We are of the opinion that placing an additional engine on the track in advance of the train, or the uniting and running two engines together, when deemed necessary, is not at all censurable, but that, in the language of a witness of large experience and intelligence, 'Any bridge that would not carry two locomotives ought not to carry one.'

5) We are of the opinion that if the materials of the bridge at the time of its construction were of suitable quality, quantity, and proportion to fulfill all of its requirements, they had at the time of the disaster become deteriorated; that the iron suspension rods, from being overstrained or from some other cause, had lost their tension and sustaining power; that the timber of the chords from many years exposure to the action of the elements without covering or paint, had become weakened by decay to such an extent as to render the bridge unsafe and unfit for the purpose for which it was constructed; and that the disaster was occasioned by the heavy train passing over a bridge thus rendered dangerously weak and defective.

6) We, therefore, find that the responsibility of this sad disaster largely rests upon the directors of the Connecticut Western Railroad Company and that they are deserving of censure for allowing the use of a bridge for railroad purposes after its materials had become defective to the point of danger, and for permitting so many years to pass without covering, strengthening, and preparing the same in such a manner as not to jeopardize human life.

"In conclusion...it is time to take a new departure; that in their construction the eternal principles of nature's laws should not be violated; and that in their management all from the highest official to the lowest operative, should at times be held to a strict accountability. Upon the directors especially rests a weight of responsibility which they cannot shake off; they have assumed duties which they cannot shirk. These duties are not fully discharged by attending only to the financial affairs of the company. ...To them is committed the most sacred of all trusts – the freight of human life! For its safe transportation, they should be held accountable; and this disaster should remind them that eternal vigilance is the price of safety."

The other four non-majority jurors concluded,

"In our opinion, from the evidence, the bridge at the time of the disaster was in a safe condition for the passage of trains, whether consisting of one or more engines. And we further believe that the same was constructed upon thorough scientific principles, and we do not believe that it had become deteriorated by exposure to the elements sufficient to weaken the same to a point of danger. We also believe by the numerous tests of the iron that it is of good quality and that the same had not been overstrained sufficiently to cause any weakening or danger therefrom. We have had sufficient evidence to believe that there was a derailment of some portion of the train, and if so, by falling upon the timbers of the bridge, or coming in contact with the side of the same, would in either case, in our opinion, cause a severe shock, sufficient to cause the structure to fall."

The Railroad Commissioners concluded, after writing a lengthy report on the bridge and its failure,

"The principal lesson, therefore, taught by the Tariffville disaster is the necessity of larger suspension rods than those heretofore used in most of the wooden railroad bridges of the State. If, in that bridge, the broken rods had been one-quarter inch larger in diameter with upset ends, their area and efficiency would have been nearly doubled, their liability to breakage correspondingly diminished, and their strength nearer the standard recommended by the best engineers. They were, however, fully equal in size and strength to the general average of rods used on other similar bridges in the State. At the time of the accident, this Board was not empowered by law to order any changes of construction to increase the safety of bridges or other railroad structures, but simply "to recommend from time to time the adoption of such measures and regulations as they may deem conducive to the public safety and interest."

Mansfield Merriman, a well-known professor of civil engineering at Yale and Lehigh, concluded in a letter to the *Courant*,

"In short, the designers of this bridge violated mathematical calculation and engineering precedent; to save the money which a few pounds of iron would have cost, human lives were daily put in danger. Wooden bridges are usually covered to protect them from the action of the rain, ice, and snow; but this was left exposed for six years until the upper chord became rotten enough to give way under a fraction of the strain which it was intended to support, and no steps were taken to repair it. Not even the iron rods were painted. To save the money which repairs would have cost, the lives of passengers were daily risked. It was not properly inspected by a commission which has examined it every year since its erection on behalf of the State. An efficient inspection would have discovered the defective tie-rods six years ago; an effective inspection would not have allowed it to remain exposed to the action of the weather for six successive years; an intelligent inspection would have detected and repaired the rotten timbers. For the lack of such inspection, human lives were lost. The immediate responsibility for the accident must fall upon the officers of the railroad company, not for running two locomotives over the bridge, but for building such a structure and neglecting to keep it in repair. But the State of Connecticut is also responsible for sanctioning, as it has done annually by its railroad commissioners, the use of such an ill-proportioned and unsound bridge."

It is clear that different people placed the blame for the collapse on the railroad company, the bridge designers and builders, the maintenance and inspection corps, a derailment, and more. The New York Times in its August 17, 1878 issue wrote, under a headline – A BRIDGE DISASTER EXPLAINED, "At the time of the inquest it was held that, if the car was off the track, the engineers and passengers would have noticed it, but with the experience of Satan's Kingdom [a local name for the area] it is now firmly believed that the car derailed on the Tariffville wooden bridge and the wheels striking the weak timbers let the span down. This exploded the theory that the bridge had been tampered with, which was prevalent at the time of the accident."

Despite this failure, the Howe Truss was still used on many railroads and roadways around the country well into the 20th century. Like the iron bridge builders, the builders of most of the Howe Trusses adopted the upsetting of threaded tension bars such that the cross-sectional area of the bars at the root of the threads was equal to or greater than the cross-section of the main bar.

The Western Connecticut Railroad went bankrupt in 1880 after it settled with families of the 13 victims for an amount varying from \$200-\$600 per person. The lesson learned is the importance of inspection of wooden bridges. •



Dr. Frank Griggs, Jr. specializes in the restoration of historic bridges, having restored many 19th Century cast and wrought iron bridges. He is now an Independent Consulting Engineer. (fgriggsjr@twc.com)