The physical condition of this bridge is very poor. Apparently it has not been painted since erection, and consequently some parts of the bridge are badly corroded. The top chords of the trusses have corroded until the cover plates are practically of no value. The floor beams are in almost as bad condition, which reduces their efficiencies to a dangerous point. The wood joists are in a serious condition. Where the plank floor rests on them they have decayed to a depth of two inches. Many of these joists, after they have rotted until they do not hold the nails, have been taken out and turned upside down and put back in the floor.

One of the diagonal tension members in the north Whipple truss is broken, as is also a similar member in the south truss. These members have a calculated efficiency of 119 per cent. Attempts were made to splice these members, but the splices, which were less efficient than the members, were also broken. A bottom lateral in one of these trusses was also found broken.

Many of the details are of a very poor design, are in bad condition, and would not be tolerated in a new structure if in charge of a competent engineer.

The long bents that support the Pratt trusses have low efficiencies and in addition are badly corroded. They are in an unsafe condition.

There is one expansion joint in the structure, and that is at the west end of the Whipple truss. Theoretically, it has an efficiency of 130 per cent., but practically it has no value whatever. Dirt has filled in around the shoe until it has clogged the rollers. The roller nest has been crowded out until it is only partially on the bearing plate. Apparently, little effort has been made to put this bridge into even a moderately safe condition.

This bridge should be condemned and a new one constructed in its place.

The next bridge investigated was the Gilbert Street bridge, which spans the Vermillion River at Danville, Illinois, just to the southwest of the main business section of the city.

This bridge is about 1,050 feet long and was built by the Chicago Bridge Company in 1893. It is made up of two 275 ft.-0 in. subdivided deck Warren truss spans, two 4-panel deck Pratt truss spans, four 3-panel deck Pratt truss spans and four tower spans. The Warren truss spans are supported on stone masonry piers, and the other spans are supported on four towers, one rocker bent and the abutments. The tower posts are set on square stone bases.

The trusses are 20 feet centre to centre. The roadway is 22 feet wide with a 4½ foot walk on each side.

The floor system is made up of 6 x 16-in. wood joists spaced 2 feet centre to centre with a floor of yellow pine plank and creosoted wood block paving. The floor is new, having been laid in the fall of 1910.

Cooper's Highway Bridge Specifications were used in the investigation of this structure and it is rated as a Class A-2 bridge.

The vehicle traffic over this bridge is very much the same as the traffic over the Woolen Mills bridge, consisting principally of the hauling of coal and brick from the mines and brick yards just outside the city. For several years an interurban electric line crossed this bridge, but the tracks have been removed.

It was noted that the efficiencies of practically all the members of the deck Warren trusses are low and that they are comparatively uniform throughout the truss. This would indicate that this bridge was designed for a lighter load than that assumed in the investigation. The laterals and wind bracing are all very efficient.

The efficiencies of the 4-panel deck Pratt truss are about the same as for the Warren trusses, except for the middle section of the top chord, which show an efficiency of only 55 per cent.

The 3-panel Pratt trusses have sections practically the same as the 4-panel Pratt trusses and would, therefore, have proportionately higher efficiencies.

The lowest efficiency in any of the posts of the tower bents was 84 per cent. The posts are made up of 4 angles laced, forming a box column.

The joists have an efficiency of 68 per cent. The floor beams have an efficiency of 55 per cent. for uniform and 37 per cent. for concentrated loads.

There are expansion rollers under the shore ends of the Warren trusses. These rollers have a calculated efficiency of 96 per cent.

The wood floor system is in good condition, having been renewed in the fall of 1910. The steel work, with some few exceptions which will be discussed, is in very good condition.

The lower struts in the owers are badly corroded and in some cases the lower end of the post is in bad condition. Some of the struts were badly damaged when the new floor was being laid. The old joints were dropped from the floor above and evidently some of them struck the tower struts. Some repair work has been done on the bases of the towers by encasing the strut and the base of the post in concrete. This kind of repair work is of doubtful value, unless the concrete is designed to take the stress formerly taken by the steel, as the steel may continue to corrode inside the concrete until it is entirely gone.

The expansion joint under the right hand end of the second Warren truss was renewed in the fall of 1910. The rollers in this joint are only 3 inches in diameter, which is entirely too small for the length of span. The old roller nest, when removed, was in such condition that it was impossible for the rollers to turn, and evidently they had not turned for a number of years. The new rollers will be in the same condition in a short time if they are not carefully watched and kept clean. The other expansion joint has not been repaired or cleaned and is of little value. The portal struts in the Warren trusses are badly corroded. They are made up of four angles laced, and are placed in such position that one angle forms a trough which holds water, thus causing corrosion to take place rapidly.

The efficiencies of the members in this bridge are low for the loadings assumed. This bridge carries heavy wagon traffic and at one time carried an interurban electric line. The tracks for the interurban line have been removed and there is little likelihood of their ever being replaced. The wagon traffic is not continuous and there is slight chance for the bridge ever to become fully loaded. If the bridge is repaired, the traffic regulated, and the bridge carefully maintained, it should be safe for some time to come.

This structure should be put in safe condition by renewing or reinforcing both the struts and bases of the posts in the towers, and by renewing the damaged struts in the Warren trusses. The entire structure should be thoroughly scraped to remove all old paint and rust, and then given two good coats of paint. Car tracks should never again be permitted on this bridge, and wagon traffic should be regulated whenever there is a tendency toward congestion.

The third bridge which was investigated is known as the Interurban bridge. It is located just at the west edge of Danville, Illinois, and spans the North Fork of the Vermillion River.