

I-30W Bridge Collapse  
Minneapolis, Minnesota  
August 1, 2007  
HWY07MH024

Low quality versions of the animations are available in Windows Media format. A high quality version is available on DVD.

## **Structure and Components**

### Animation Description/Disclaimer

This animation uses a three dimensional engineering model to demonstrate the various structural components of the deck truss portion of the bridge. This animation contains audio.

### Voice Over

1. This animation demonstrates the various structural components of the deck truss.
2. The deck truss portion of the bridge was supported on four piers, numbered from the south as piers 5, 6, 7, and 8.
3. Pier 7, on the north side of the river, had a fixed bearing, meaning that the structure rested on the pier and that there was no mechanism for allowing movement of the structure relative to the pier at this location.
4. At piers 5, 6, and 8, there were roller bearings between the piers and the truss.
5. These roller bearings allow for thermal expansion and contraction of the deck truss relative to the piers at these locations.
6. The deck truss portion of the bridge had two main trusses that extended a total length of 1,064 feet.
7. These two trusses are the main support for the bridge deck. The design of the bridge is non redundant, which means that failure of an individual member in a truss would cause collapse of the bridge.
8. The center span of the truss, across the Mississippi River, was 456 feet long.
9. The north and south spans of the deck truss were each 304 feet long.
10. The main trusses were composed of four types of members, upper chord members, lower chord members, diagonal members and vertical members.

11. Truss members were connected to each other at nodes using gusset plates, typically with one plate on each side of the node.
12. The gusset plates were made from steel, ranging in thickness from ½ inch to 1 inch, and were riveted to the members of the truss, although some bolts were also used.
13. The nodes were numbered, starting with 0 on the south end of the truss and continuing to 14 in the center of the truss.
14. Because of north to south symmetry, a prime sign was used to denote nodes north of the center of the truss.
15. Upper nodes were given the prefix U, and lower nodes the prefix L.
16. The gusset plates at node U10 were each one half inch thick, almost 9 feet long and slightly more than 6 feet high.
17. Truss members were subject to applied loads: either compression, shown in blue, or tension, shown in red.
18. At node U10, two of the connected members were under compression loading, and the remaining three were under tension loading.
19. Floor trusses extended between the main trusses and supported the bridge deck.
20. Lateral braces and sway braces were attached at each node to stabilize the structure.
21. A series of 14 deck stringers were located above the upper chord of the floor trusses to support the reinforced concrete deck.
22. The deck was originally designed to be 6 ½ inches thick with two slabs—a slab for the northbound lanes, and a slab for the southbound lanes—and included median barriers and steel guard rails.

## **Initial Failure**

### Animation Description/Disclaimer

This animation uses a three dimensional engineering model to demonstrate the events causing the failure at node U10. The animation shows how the compression diagonal shifts, how the U10 node is pulled down through the diagonal, and how deformations developed in other structural members of the main truss. No attempt was made to precisely quantify the speed of this initial phase of the collapse process. This animation is shown twice. This animation does not contain audio.