

ABSTRACT

The purpose of this investigation was to study the flexural fatigue strength of two prestressed steel I-beams which had previously been fabricated in connection with a jointly sponsored project under the auspices of the Iowa State Highway Commission.

The beams were prestressed by deflecting them under the action of a concentrated load at the center of a simple span, then welding unstressed high strength steel plates to the top and bottom flanges to retain a predetermined amount of prestress. The beams were rolled sections of A36 steel and the plates were USS "T-1" steel.

Each of the two test specimens were subjected to an identical repeated loading until a fatigue failure occurred. The loading was designed to produce stresses equivalent to those which would have occurred in a simulated bridge and amounted to 84 percent of a standard H-15 live load including impact. One of the beams sustained 2,469,100 repetitions of load to failure and the other sustained 2,756,100 cycles.

Following the fatigue tests, an experimental study was made to determine the state of stress that had been retained in the prestressed steel beams. This information, upon which the calculated stresses of the test could be superimposed, provided a method of correlating the fatigue strength of the beams with the fatigue information available on the two steels involved.