



Publications

HIGHWAY ACCIDENT REPORT

Adopted: December 16, 1970

COLLAPSE OF U. S. 35 HIGHWAY BRIDGE

POINT PLEASANT, WEST VIRGINIA

DECEMBER 15, 1967

NTSB Number: HAR-71/01

NTIS Number: PB-190202

SYNOPSIS

The U. S. 35 Highway Bridge connecting Point Pleasant, West Virginia, with Kanauga, Ohio, collapsed at approximately 5 p.m. (EST) December 15, 1967. Forty-six persons died in the accident, nine were injured, and 31 of the 37 vehicles on the bridge fell with the bridge. Twenty-four vehicles fell into the Ohio River and seven fell on the Ohio shore. There were no pedestrians on the bridge at the time of collapse.

The initial failure in the bridge structure was a cleavage fracture in the lower limb of the eye of eyebar 330 (north bar, north chain, Ohio side span) at joint C13N, the first eyebar chain joint west of the Ohio tower of the bridge. The cleavage fracture was followed by a ductile fracture in the upper limb of the eye of eyebar 330 at joint C13N, separating eyebar 330 from the chain. Immediately following the separation of eyebar 330 from joint C13N, the sister eyebar 33 slipped from the C13N joint pin, resulting in the separation of the north chain at that location. The collapse of the bridge began in the Ohio side span, moving eastward toward the West Virginia shore, with the result that within a period of about 1 minute, the 700-foot center span, the two 380-foot side spans, and the towers had collapsed.

The Safety Board finds that the cause of the bridge collapse was the cleavage fracture in the lower limb of the eye of eyebar 330 at joint C13N of the north eyebar suspension chain in the Ohio side span. The fracture was caused by the development of a critical size flaw over the 40-year life of the structure as the result of the joint action of stress corrosion and corrosion fatigue.

Contributing causes are:

1. In 1927, when the bridge was designed, the phenomena of stress corrosion and corrosion fatigue were not known to occur in the classes of bridge material used under conditions of exposure normally encountered in rural areas.
2. The location of the flaw was inaccessible to visual inspection.
3. The flaw could not have been detected by any inspection method known in the state of the art today without disassembly of the eyebar joint.

RECOMMENDATIONS

The Safety Board recommends that:

1. The Secretary of Transportation expand existing research programs or institute new research programs to:
 - a. Identify bridge building materials susceptible to slow flaw growth by any of the suspected mechanisms;
 - b. Determine critical flaw size under various stress levels in bridge building materials;
 - c. Develop inspection equipment capable of detecting critical or near critical flaws in standing bridge structures;

- d. Devise analytical procedures to identify critical locations in bridge structures which require detailed inspection;
- e. Develop standards which incorporate appropriate safeguards in the design and fabrication of future bridges to ensure protection against failures of material such as occurred in the Point Pleasant Bridge;
- f. Develop standards for the qualification of materials for future bridge structures, using the information disclosed in this investigation;
- g. Devise techniques for repair, protection, or salvage of bridges damaged by internal flaws; and
- h. Expand the knowledge of loading history and life expectancy of bridges.

2. The Secretary of Transportation explore the alternatives for action to assure mandatory application of the bridge safety requirements of the 1968 Federal-Aid-Highway Act to all highway bridges in the United States, since the majority of older bridges in the country are not in the Federal-Aid-Highway System and these bridges are most susceptible to extensive repair or replacement; including such alternative courses of action as urging the adoption by the States of mandatory standards, or the enactment of Federal legislation applicable to all highway bridges.

3. The Secretary of Transportation consider the advisability of proposing a program of Federal aid to ensure the adequate repair of all bridges not in the Federal-Aid-System.