Student Essay on Collapse of Tacoma Bridge

Collapse of Tacoma Bridge

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Essay

Introduction:

The Tacoma Narrows Bridge was the third longest suspension span in the world at the time. It was suppose to have been revolutionary in it design, and it was know for it tendency to sway windstorm. Nevertheless, on November 7, 1940, a large storm caused it to collapse. This failure report on Tacoma Narrows will be divided into 4 more sections: Description of Failure, Reasons of Failure, Consequences of Failure, and Lessons to be Learned.

Description of failure:

The bridge had galloped, but not twisted prior to November 7. Throughout the early morning hours of Thursday, November 7, 1940, the center span had been undulating three to five feet in winds of 35 to 46 miles per hour. At about 10:30 A.M., a center span floor panel dropped into the water 195 feet below, and the remainder of the bridge kept twisting. At 11:09 A.M., the remaining sections fell down into the water.

Reasons of failure:

The main reason of this failure is because of the resonance. The velocity of the windstorm caused the bridge to oscillate at its maximum amplitude, and the bridge was not strong enough to support the oscillation caused by the windstorm. As a result, it started to twist in the windstorm and eventually fell into water in parts.

Consequences of Failure:

Other than jammed traffic, the collapse of Tacoma Narrows Bridge did not result in any casualties. The bridge was blocked a few days before it collapsed. However, this design failure brought many engineers worldwide to the realization that they did not have enough understanding of building a suspension bridge.

Lessons to be Learned:

Before the collapse of the Tacoma Narrows Bridge, the engineers did not think much about the maximum oscillation a suspension could withstand. However, after the collapse, they started to investigate ways to aid the strength of a suspension bridge. The official investigation into the collapse recommended the use of wind-tunnel tests to aid in the design of the second Tacoma Narrows Bridge. Also, new mathematical theories of vibration, aerodynamics, wave phenomena, and harmonics as they apply to bridge design arose from these studies.