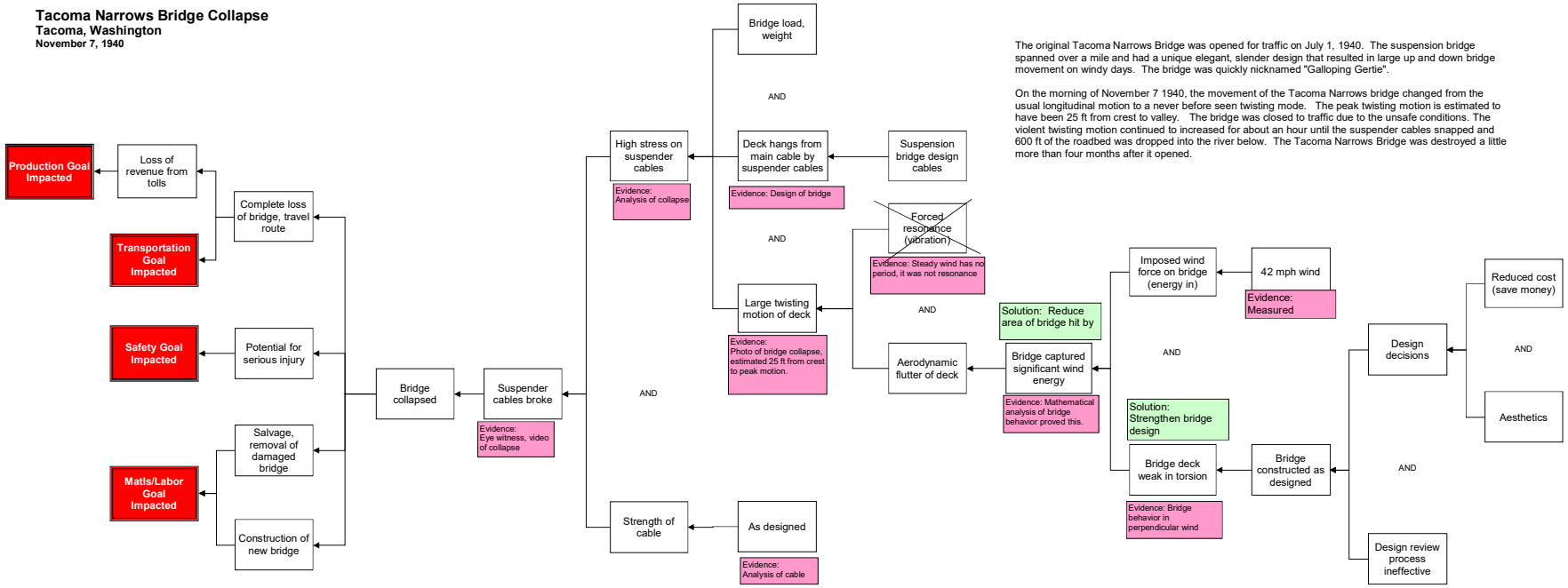
Tacoma Narrows Bridge Collapse

Tacoma, Washington

November 7, 1940



The original Tacoma Narrows Bridge was opened for traffic on July 1, 1940. The suspension bridge spanned over a mile and had a unique elegant, slender design that resulted in large up and down bridge movement on windy days. The bridge was quickly nicknamed "Galloping Gertie".

On the morning of November 7 1940, the movement of the Tacoma Narrows bridge changed from the usual longitudinal motion to a never before seen twisting mode. The peak twisting motion is estimated to have been 25 ft from crest to valley. The bridge was closed to traffic due to the unsafe conditions. The violent twisting motion continued to increased for about an hour until the suspender cables snapped and 600 ft of the roadbed was dropped into the river below. The Tacoma Narrows Bridge was destroyed a little more than four months after it opened.

As the Cause Map Demonstrates there were many causes that contributed to the collapse of the bridge. Wind was one of the more obvious causes. On the day the bridge failed, the wind was blowing across the roadbed at 42 mph, the strongest wind the bridge had experienced. Another cause was the design of the bridge. The Tacoma Narrows Bridge was particularly narrow relative to its length, making the roadbed more flexible than other suspension bridges. Additionally, the bridge had shallow girders and was relatively weak in torsion compared to other suspension bridges built around the same time. The overall design of the bridge resulted in a structure that was weak in torsion and moved relatively easily in the wind.

In addition to the mechanical causes that contributed to the failure, there were a number of issues with the design process. One of the primary drivers behind the bridge design was cost reduction. The first design proposed for the Tacoma Narrows Bridge was a conventional suspension bridge that was estimated to cost $11 million. The price of the bridge design that was actually built was of $3 millions dollars cheaper. Additionally, the approved design was considered to be much more elegant and aesthetically pleasing. As in the case of all designs that failure, the design review process was also ineffective or the design flaws that contributed to the bridge collapse would have been identified prior to construction.

Cause Map

Intermediate Level

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Why?

Effect ← Cause

NOTE: Read the Cause Map from left to right with the phrase "Was Caused By" in place of