Damage to the San Francisco-Oakland Bay Bridge (Again)
October 27, 2009

During evening rush hour on October 27, less than 2 months after a broken eyebar repair was completed, two metal rods and a 5,000 pound metal beam fell onto the roadway. The items that fell were part of the eyebar repair, which was supposed to have lasted until the new bridge opened in 2013. Although only one motorist was injured, other injuries or even fatalities were possible, and the damage to the bridge necessitated repairs and closing the transportation route for 280,000 cars a day for more than 5 days.

Step 1. Outline the Problem

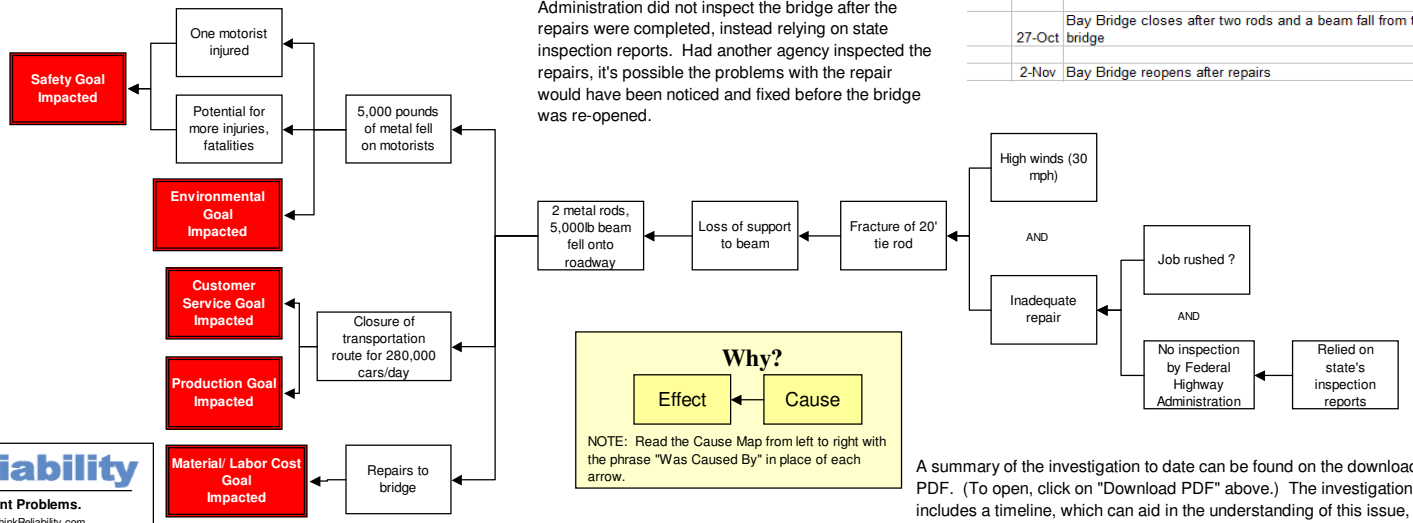
What	Problem(s)	Damage to Bay Bridge, metal fell on motorists	
When	Date	October 27, 2009	
	Differences	30+ mph winds	
Where	Physical Location	San Francisco, CA	
	Work Being Done	Evening commute	
Impact to the Goals			
Safety		One motorist injured	
		Potential for more injuries, fatalities	
Environmental		5,000 pounds of metal fell on motorists	
Cust. Service		Closure of transportation route for	
Production-Schedule		280,000 cars/day	?
Material, Labor Cost		Repairs to bridge	?
		This incident	
	Frequency	Last repairs on bridge less than 2 months ago	
		Annual Total	?

The "cause" given for the failure of one of the rods (which snapped, leading to the falling of the other rod and the beam) was fatigue caused by high (over 30 mile per hour) winds. However, an adequate repair would have been able to withstand less than 2 months of traffic and 30 mile per hour winds, so the rod failure must have been caused by the combination of the high winds and an inadequate repair.

Given the speed with which the repair was completed (see our previous blog), it's possible that the repair job was rushed. Additionally, the Federal Highway Administration did not inspect the bridge after the repairs were completed, instead relying on state inspection reports. Had another agency inspected the repairs, it's possible the problems with the repair would have been noticed and fixed before the bridge was re-opened.

TIMELINE

Year	Date	Description
1933	9-Jul	Construction on Bay Bridge begins
1936	12-Nov	Bay Bridge opened
1989	17-Oct	Loma Prieta earthquake - 50 foot section of upper deck collapses into lower deck
	18-Nov	Bay Bridge reopens after repairs from earthquake damage
1997		Officials determine it will be cheaper to build a new span than to retrofit the old one
2009	9/4-9/7	Crack in eyebar found and repaired during retrofitting project
	27-Oct	Bay Bridge closes after two rods and a beam fall from the bridge
	2-Nov	Bay Bridge reopens after repairs



Why?

Effect ← Cause

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

Cause Map
Detail Level

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A summary of the investigation to date can be found on the downloadable PDF. (To open, click on "Download PDF" above.) The investigation includes a timeline, which can aid in the understanding of this issue, the problem outline, and the Cause Map (visual root cause analysis). As with any investigation, as more information becomes known, more detail can be added to the Cause Map.