San Francisco Bay Bridge

By Sharath Kumar, Justin Morrell, & Miriam Brody
Presentation Overview

- History
- Recent Problems
- Alternative Routes
About the Bay Bridge

- Built in 1936
- Length: 8.4 miles
- Made up of two suspension bridges
  - Meet in the middle of the San Francisco Bay at Yerba Buena Island
- Double-deck bridge
- Average daily traffic: 280,000 vehicles
- Connects San Francisco with Oakland
- Cost: $4
History of the Bay Bridge
Ferries carried 46 million people between San Francisco and Oakland yearly.

An underwater tunnel was considered.

- Rejected because it would not be big enough to handle the auto traffic.

Mass production of the automobile called for the bridge to be built.
Construction of the Bridge

- Took 3 years to build
- Opened November 12, 1936
- Cost $77 million
- Originally:
  - 6 lanes of traffic on upper level
  - Truck traffic and railway cars on lower level
Consequences

- **1936** – traffic on bridge exceeded expected traffic levels for 1950
  - Tolls for bridge were lowered to attract ferry users
- **1958** – demand for bridge was so great it had to be reconfigured
- **Changes:**
  - Railway system was removed
  - Upper level: 5 lanes of traffic going East
  - Lower level: 5 lanes of traffic going West
Loma Prieta Earthquake

- October, 17 1989
- 7.1 Magnitude Quake
- 250 Ton section of the upper deck on the East Side collapsed
- Killed one person
Bay Area Seismic Retrofit Project

- Result of seismic studies after Earthquake
- All four sections needed to be drastically improved
- Entirely new structures arising
- Total Cost estimated to be $6 Billion
- Completion date slotted for late 2013
West Approach

- One mile stretch linking Interstate 80 to Bay Bridge
- Needed to completely remove and replace original foundation
- $429 Million
- Each section demolished and rebuilt one at a time
- Major lane reconfigurations, traffic shifts, and temporary road ways being employed during work
- Work scheduled at off-peak hours (weekends and nights)
West Span

- San Francisco to Yerba Buena and Treasure Islands
- Resurfacing of bridge deck
- Steel added to suspension rails or rails were replaced
- 17 million tons of new steel brought in
- All work done at night to minimize impact on traffic
Self-Anchored Suspension Span (SAS)

- Part of the new East Span
- Single Suspension Tower designed to withstand major earthquake
- Side-by-Side Decks
- Estimated completion date is late 2013
Between SAS and Oakland touchdown
Longest Portion of new East Span 1.2 miles
Five Lanes, 10 foot shoulders to keep traffic moving
Oakland Touchdown

- Will connect Interstate 80 in Oakland to the new East Span
- Involves building two new roadway sections
  - New westbound lanes connecting the East Span
  - New eastbound lanes coming off the bridge to Interstate 80
- Traffic will shift to new westbound lanes first
  - Demolition of old westbound lanes will allow for connection of the new eastbound lanes coming off the bridge
Yerba Buena Island Transition Structure

- Will connect the Yerba Buena Island to SAS
- Connecting side-by-side East Span decks to upper and lower decks of YBI tunnel and West Span decks
- Traffic shifted to a temporary detour that connects East Span to the tunnel
- Movements and building of new sections and detours closed the entire bridge labor day weekend 2007
Recent Problems and Repairs
Recent Problems

- Labor Day Weekend 2009
  - During closure for retrofitting, major crack found in an eyebrow (see picture)
  - CalTrans created new materials and repaired bridge
  - Was not inspected by Federal Highway Administration, but state inspection reports were used
Recent Problems Cont.

- **October 27, 2009**
  - 5,000 lbs of metal came crashing down on rush hour traffic
  - Falling debris hit cars, but no injuries/deaths
  - The falling pieces were the same ones repaired over Labor Day Weekend
  - Closure lasted for roughly 6 days

- **The S-Curve**
  - Curvy temporary section with more than 50 accidents (1 fatal) in two months
Repairs

- Failures attributed to design affects
  - Tight and lack of secure attachment of components
- Repairs took a while, and hit a few snags
- Modifications
  - Structural welding, addition of structural components, monitors, and protective measures
- Opening postponed until November 2, 2009
Affects of Recent Problems

- Shut down main link of Bay Bridge – rerouting roughly 280,000 daily users
- Disrupted regional businesses
- Workers stayed home, flocked to public transportation, or were stuck in horrible traffic on alternate routes
Commuter’s Alternative Routes

- **Golden Gate Bridge**
  - Approx. 30 mi away from Bay Bridge
  - Very congested
  - Can add over an hour onto commute
  - Cost: $6

- **San Mateo Bridge**
  - Experiences 40% more traffic than usual
  - Approx. 40 miles from Bay Bridge
  - Can add half an hour – hour onto commute
  - Cost: $4
Alternative Routes Cont.

- **San Rafael Bridge**
  - Approx. 20 mi from Bay Bridge
  - Can add up to 40 minutes onto commute
  - Cost: $4

- **Ferries**
  - Runs 12-13 times per weekday
  - Trips take 35-45 minutes between Oakland and San Francisco
  - Cost: $12.50 round trip
Alternative Routes Cont.

- **BART – Bay Area Rapid Transit**
  - Subway system
  - Deal with overflow conditions
    - Ran extra trains and longer hours
    - When Bay Bridge is closed, ridership can increase up to 49%.
  - Set ridership record on Sept 8th while bridge was closed
    - 437,000 people
    - Most people in 37 year history of BART
  - Cost: Varies depending on destination
    - $6.20 to cross San Francisco Bay
Conclusion

- Seismic Retrofitting Project still ongoing
- Alternative routes remain congested when Bay Bridge is closed
- Recent repairs have been successful but problems reflect growing concern about bridges, and the American transportation infrastructure, today.