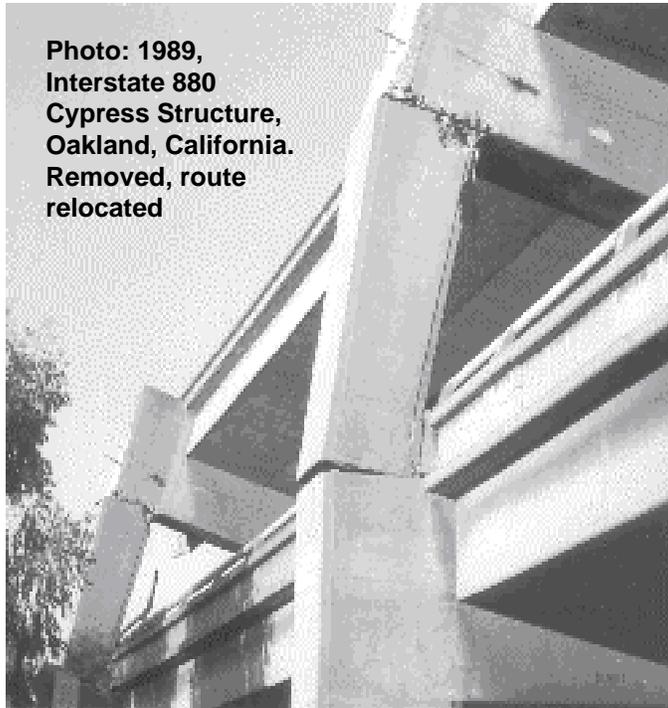


**The
California Department of Transportation
(CALTRANS)
Post Earthquake Inspection Team
PEQIT**

**Photo: 1989,
Interstate 880
Cypress Structure,
Oakland, California.
Removed, route
relocated**



**Prepared by
California Department of Transportation
Division of Engineering Services, Earthquake Engineering
November 7, 2001**

WELCOME TO THE CALTRAN'S POST EARTHQUAKE INVESTIGATION TEAM

The Caltrans Post Earthquake Investigation Team (PEQIT) was formed following the 1971 San Fernando (Sylmar, California) earthquake to gather information about the performance of bridges and other highway structures after a large earthquake. The team investigates the state bridges after large earthquakes, with magnitude 5.5 or greater. Earthquakes with less than 5.5 usually do not result in major damage and may be investigated through other resources. The information obtained by the team is used to evaluate Caltrans' current design and retrofit procedures.

The team observes and records:

- ground cracks, displacements, liquefaction, slides and settlement,
- structure cracks and failures and determines the cause such as bending, shear, compression,
- signs of movement and misalignment: cracking at abutments, piers and retaining walls, etc.,
- amount of movement at hinges, joints, railings and curbs,
- damage to utilities in, on or near the bridge,
- distress, cracking or movement in signs, electroliers, barriers, etc.,
- exposed foundation piles and condition,
- condition of connection of widenings to original structures,
- scrape marks, dents, holes, indicating parts of structures sliding or hitting each other,
- direction of leaning or falling,
- deformed or displaced bearings,
- condition of equalizing bolts, restrainers, shear keys,
- broken welds, rivets or bolts,
- warping or tearing of steel members and
- condition of structures, equipment and facilities in vicinity of bridges.

The Team may take samples of reinforcement bar at failures, record comments from eyewitnesses, and provide digital or hard copies of all photos. The team then prepares complete report.

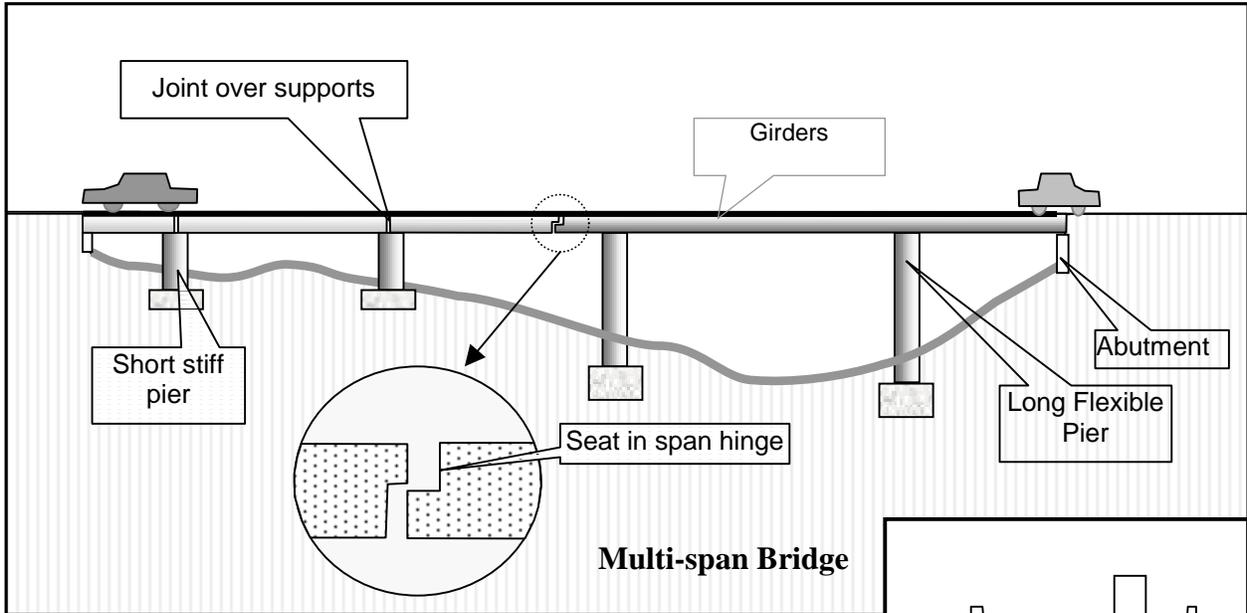
Following is a page of basic components of bridges followed by photos of damage to bridges. The photos in this document illustrate some of the damage the team observed after a major earthquake. The pictures are from the:

- 1989 Loma Prieta, Magnitude 7.1 (Northern California, near Santa Cruz, south of the San Francisco Bay Area),
- 1992 Landers, Magnitude 7.3 (Southern California, the desert, east of Los Angeles urban),
- 1994 Northridge, Magnitude 6.7 (Southern California, the San Fernando Valley, northwest of downtown Los Angeles).

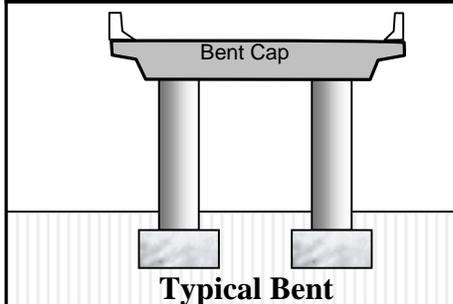
All photos property of California Department of Transportation.

For more information on earthquakes and bridges visit your library, bookstore or the Internet.

Please site source if text, graphics and photos are used in other publications.



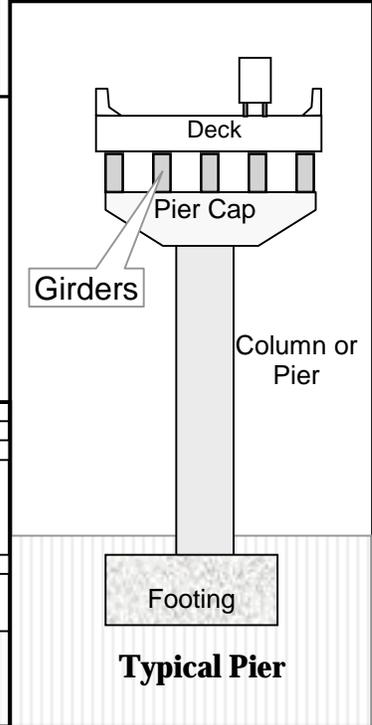
Multi-span Bridge



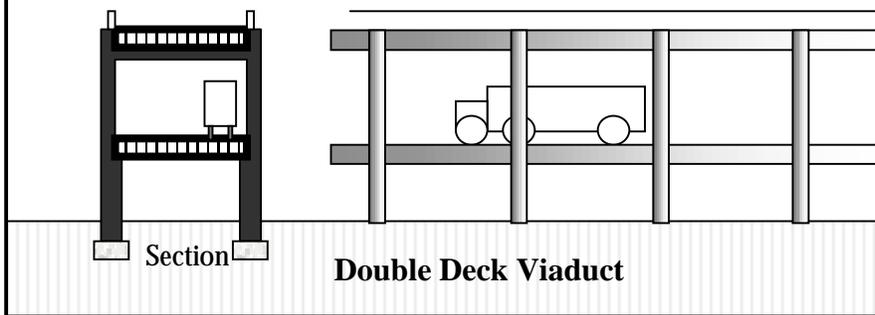
Typical Bent

BRIDGE BASICS

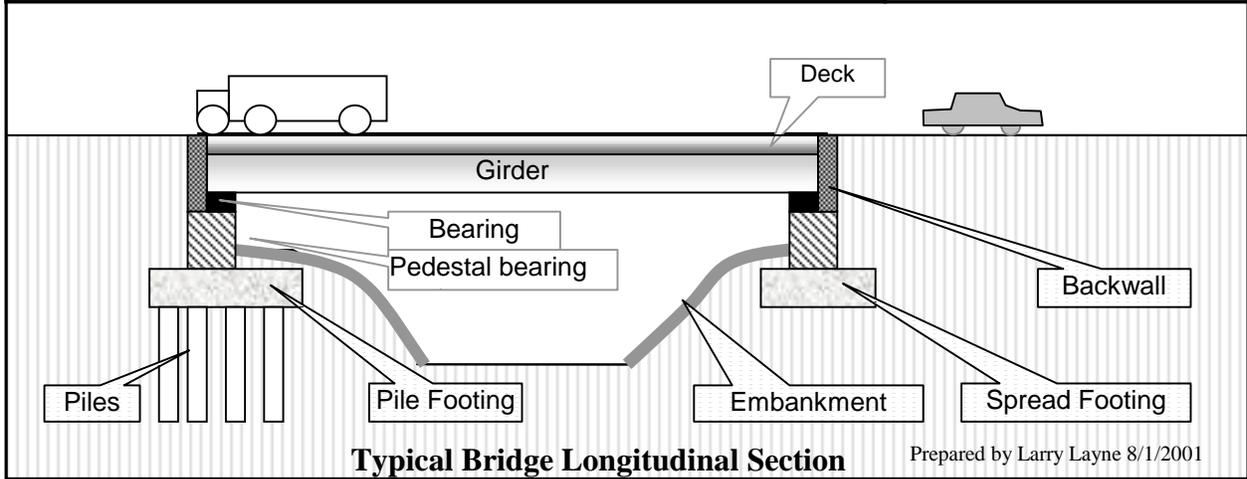
The information on this page represents the basic components of bridges.
No Scale



Typical Pier

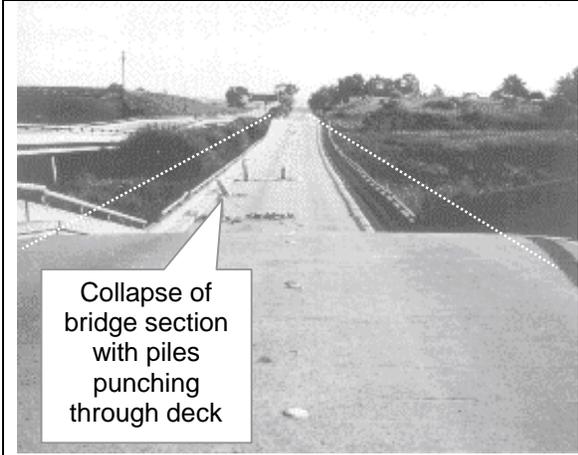


Double Deck Viaduct

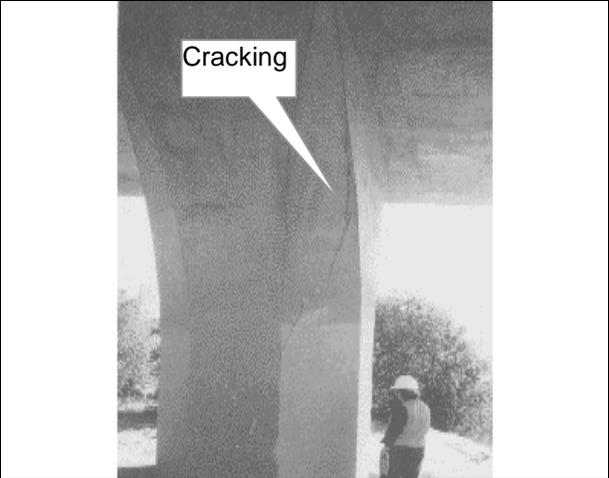


Typical Bridge Longitudinal Section

Prepared by Larry Layne 8/1/2001



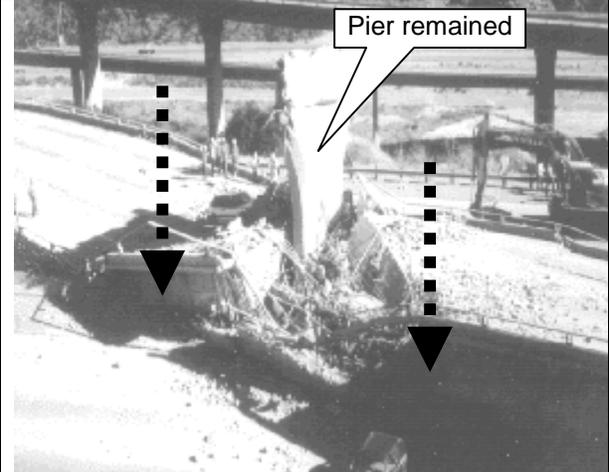
1989 Loma Prieta – State Route 1, Watsonville area weak soil caused column failure.



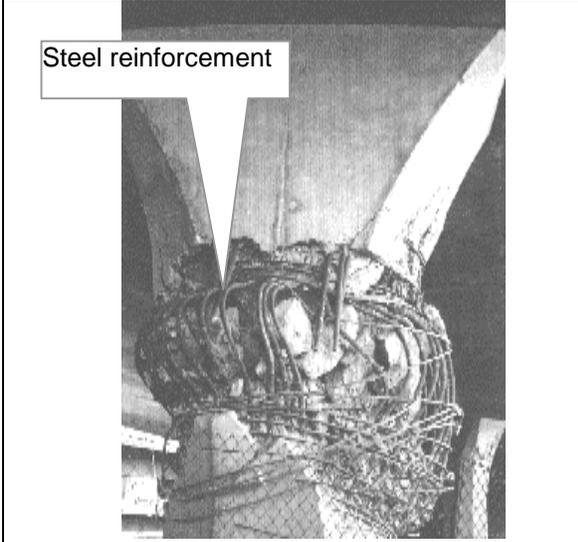
1994 Northridge – Interstate 5 and State Route 118 interchange, torsional damage on column



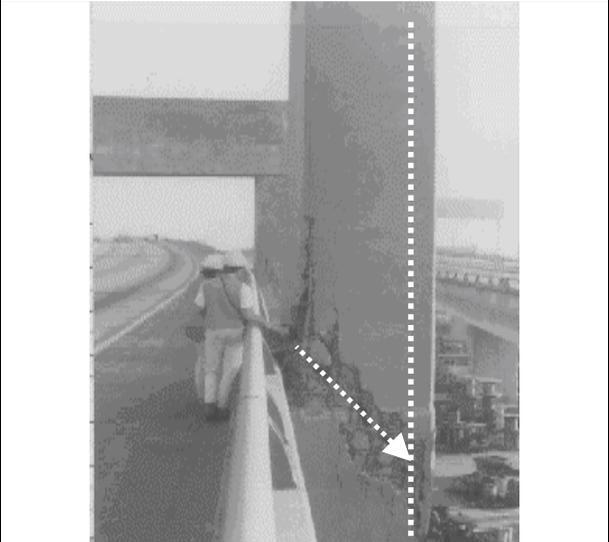
1994 Northridge - State Route 118, San Fernando Valley, bridge settlement and approach settlement.



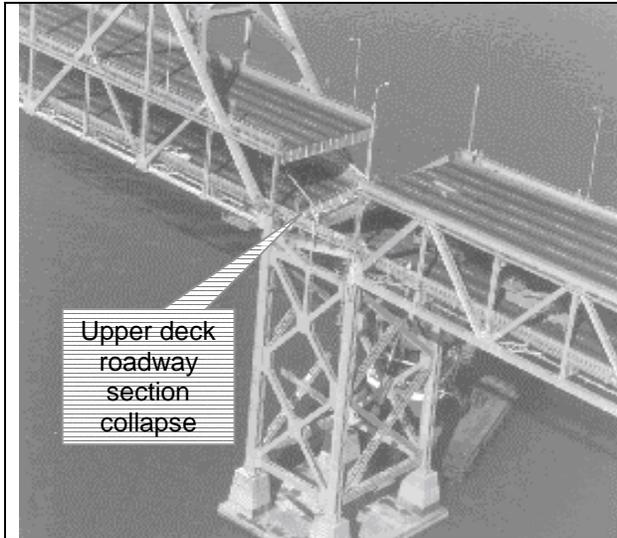
1994 Northridge, Interstate 5 and State Route 14 interchange superstructure collapse.



1994 Northridge – Major Damage to flared bridge column

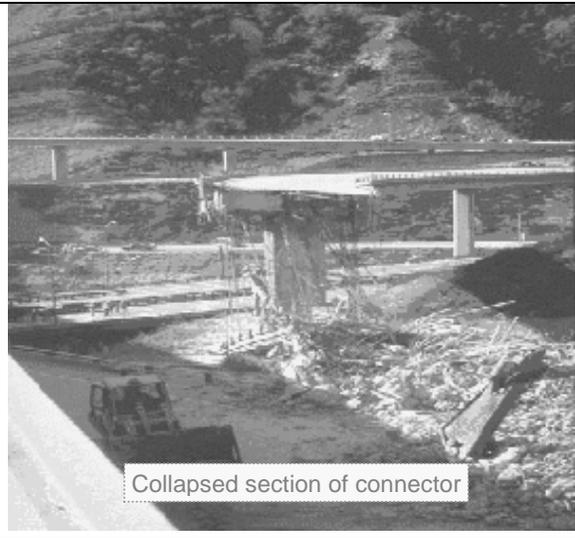


1989 Loma Prieta - Interstate 280 in San Francisco joint shear damage at outrigger bent.



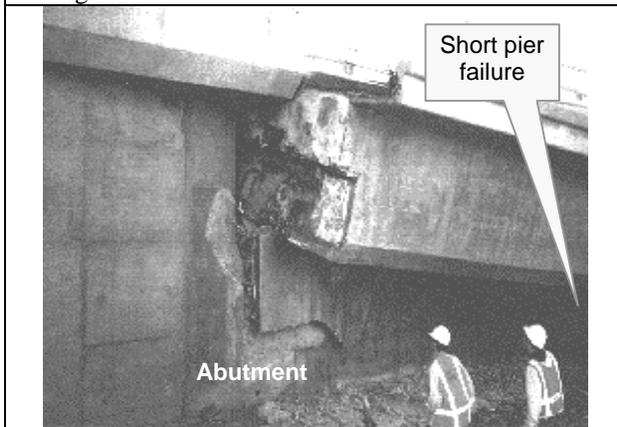
Upper deck roadway section collapse

1989 Loma Prieta - Interstate 80, San Francisco-Oakland Bay Bridge, structural vibration caused bridge damage.



Collapsed section of connector

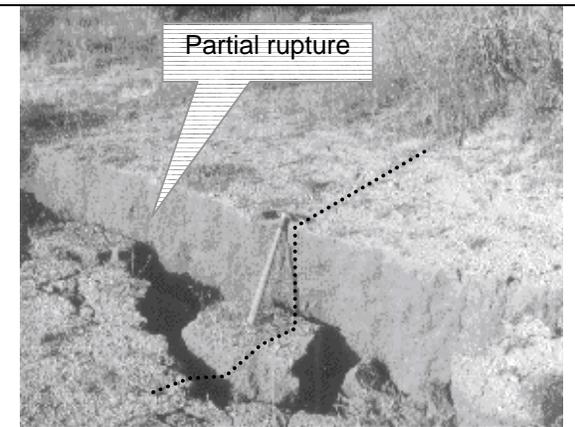
1994 Northridge - Interstate 5 and State Route 14 interchange damage, collapse of bridge.



Short pier failure

Abutment

1994 Northridge - the State Route 14 and Interstate 5 Interchange north connector collapsed as a result of failure of short stiff pier,



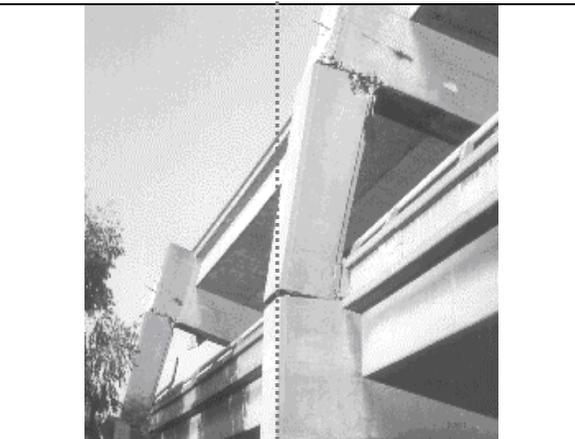
Partial rupture

1992 Landers - Fault Rupture

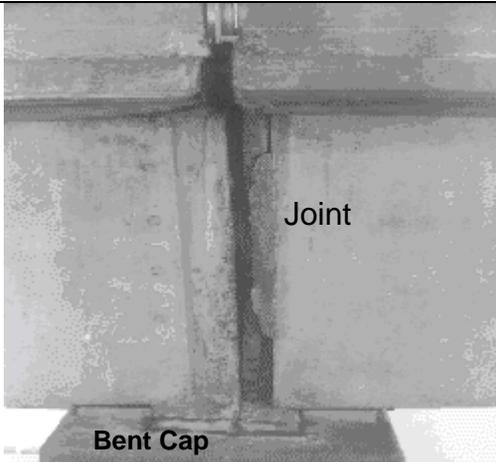
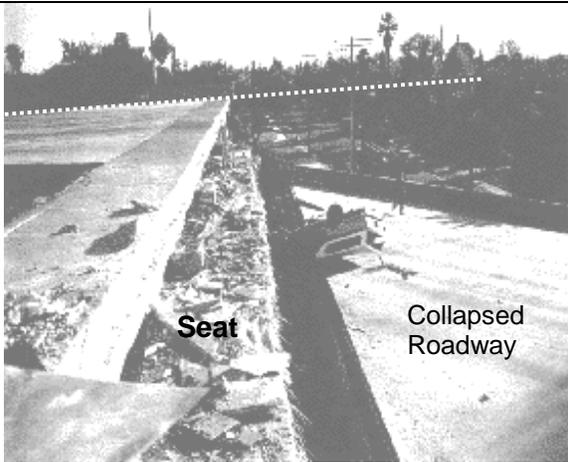
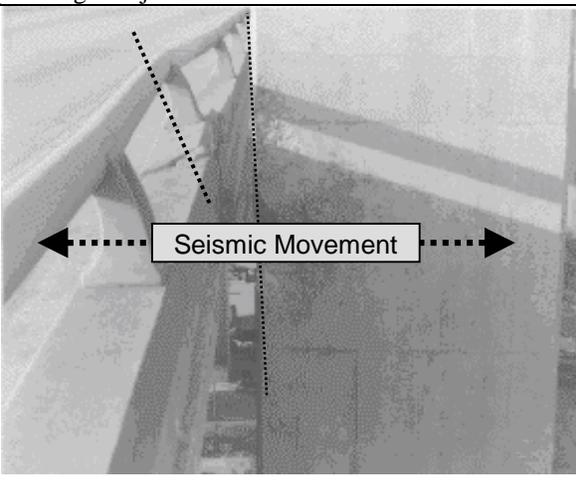
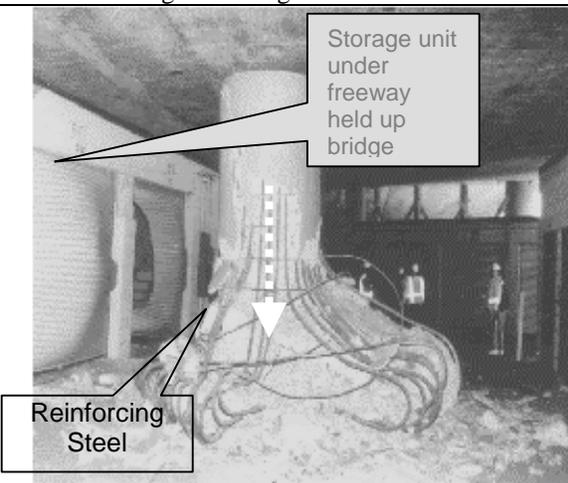
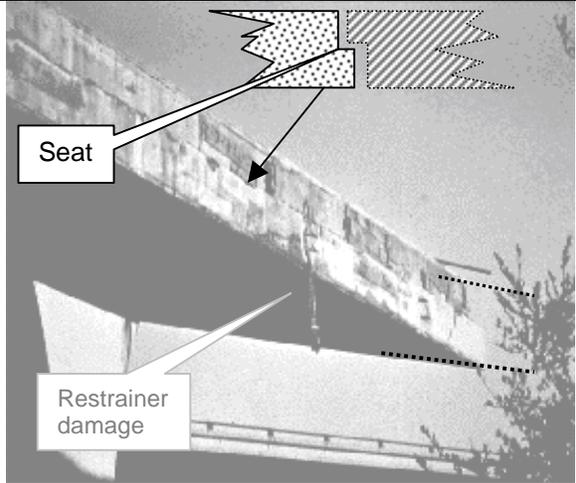


Cracks in pavement

1992 Landers - Surface deformations, cracks in pavement



1989 Loma Prieta - Interstate 880, Oakland, Cypress double deck Viaduct damage. Removed, replaced with bridge on a different alignment.

	
<p>1994 Loma Prieta - Napa River Bridge, minor damage at precast girder joint.</p>	<p>1994 Northridge - Mission Gothic U.C., column failure resulted in bridge unseating at abutment.</p>
	
<p>1989 Loma Prieta - Interstate 280 San Francisco, banging damage, roadway hitting column</p>	<p>1994 Northridge - Interstate 10 Los Angeles, La Cienega U.C. Concrete column damage</p>
	
<p>1994 Northridge - Interstate 5, San Fernando Valley, Galvin Canyon crossing. Adjacent span collapse due to unseating.</p>	<p>1994 Northridge - Interstate 10, La Cienega Bl. Column failure, bridge collapse</p>