Stop 1  
**Residence Halls**

Non-ductile concrete high rise  
Constructed in 1960  
Retrofitted with steel concentrically braced frames in the 1990s

New “infill” housing constructed in 2005  
Engineered for their location using internal unbonded braces

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Stop 1  
**Dinning facilities**

Original facility constructed in 1960 along with the surrounding high rise accommodation (right)  
Determined to be a very vulnerable so were demolished

Crossroads dining facility constructed in 2002  
Designed for continued operation after an earthquake to serve the Cal and surrounding communities  
Uses unbonded braces and shatter resistant glass
### Stop 2

**Berkeley Art Museum**

- Non-ductile concrete with vertical walls supporting cantilever galleries
- Constructed in 1970
  - Bold and innovative at the time

The same structural elements that make the building innovative also compromise the structural integrity.

- Stepped configuration, cantilever tree walls, expansive skylight entrance, window walls on lower level
- The cost of a retrofit is the same as a new building
- Minimal retrofit now in place, funding for a new building being sort
- The theater moved out

### Stop 3

**PFAT/Hearst Annex**

- Constructed in 1999
  - New (temporary) home to the Pacific Film Archive Theater

The 1997 analysis of the Berkeley Art Museum indicated that it was not safe enough for a busy theater.

- The Hearst Annex provides "surge" housing for those displaced by the retrofit program
Stop 3
Barrows Hall

Non-ductile concrete frame
Constructed in 1964
Retrofit
completed 2001
cost $20 mill

Original design emphasized vertical columns with generous opening on the ground floor: a floating superstructure
Such designs often lack the shear walls necessary to withstand lateral ground motions during an earthquake

The solution was to jacket the ends of the buildings to increase the strength and stiffness of the building

Stop 4
Latimer & Hildebrand

Non-ductile concrete
Constructed from 1960 to 1966
Same architect but different structural engineers:
Latimer: Henry Degenkolb
world renowned earthquake engineer
Hildebrand: T. Lin
recognized for edgy, bold designs

Both required a seismic retrofit following the 1997 review
• The series of earthquakes (Alaska 1964, Caracas 1967, San Fernando 1971) significantly improved understanding of building performance in earthquakes resulting in substantial changes in building codes
• Substantial changes to codes were also made following the Northridge 1994 and Kobe 1995 earthquakes

The 1997 building review incorporated these lessons
Stop 4
Latimer Hall

Non-ductile concrete
Constructed in 1963
Retrofit
completed 2001

Retrofit was entirely external
• added to outer column of concrete to
  vertical box columns and concrete beams on
  odd floors
• added to shear walls on east and west sides

Stop 4
Hildebrand Hall

Non-ductile concrete, shear wall around
  elevators only: soft story and floating
  superstructure
Constructed in 1966
Retrofit
completed 2001
  added shear walls on east and west sides
  added unbonded braces on north and south
  attachment of vertical concrete facing improved
**Stop 5**

**Hearst Memorial Mining**

First building designed by John Galen Howard, the first campus architect who designed much of the campus’ “classical core”

Unreinforced masonry with granite cladding

Completed in 1907

Retrofit
- completed 2002
- cost $80 mill

Base isolation (developed at UC Berkeley) used to decouple the building from ground shaking: minimized the changes to this architecturally important building

134 base isolators

**Stop 5**

**Stanley Hall**

Original Stanley Hall
- constructed 1950 of non-ductile concrete
- demolished in 2001 as retrofit more expensive than a new building

New Stanley is steel moment frame with unbonded braces