BEACH CITIES HEALTH DISTRICT

SEISMIC ASSESSMENT

JANUARY 16, 2018

NABIH YOUSSEF ASSOCIATES
STRUCTURAL ENGINEERS

514 BUILDING

Original 1958 4-story (north) tower

1967 4-story Addition (south tower)

Constructed of concrete roof, floors and columns

Designed and constructed in conformance with Building Code requirements in effect at time of construction.

Performance similar to other concrete buildings constructed in this era.

Building Code requirements have evolved over time based on research, best practice, and experience from past earthquakes – more stringent today

No mandatory seismic upgrade required by City of Redondo Beach

LA RETROFIT ORDINANCE

In October 2015 City of Los Angeles adopted -

Mandatory Earthquake Hazard Reduction in Existing Concrete Buildings

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Los Angeles will have the nation's toughest earthquake safety rules

Lucy Jones, U.S. Geological Survey seismologist, second from left, celebrates with City Atty. Mike Feuer, center, as Mayor Eric Garcetti signs sweeping legislation to require earthquake retrofits on 15,000 buildings in Los Angeles on Friday. (Luis Sinco / Los Angeles Times)

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JUL. 30, 2015

By Rong-Gong Lin II, Rosanna Xia and Doug Smith · Contact Reporters

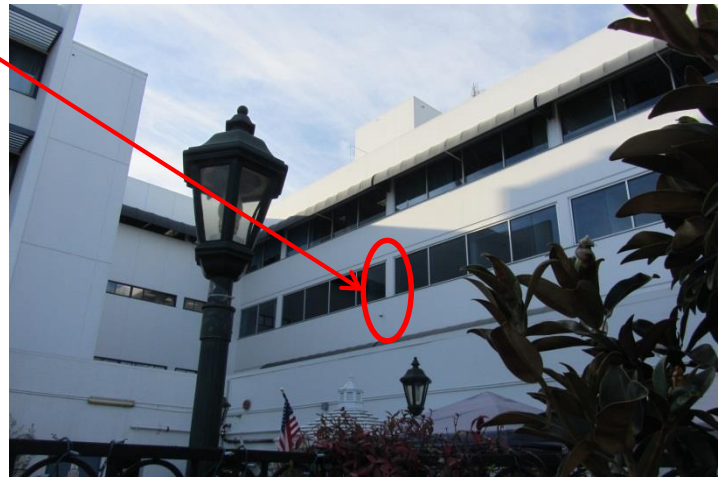
OCTOBER 9, 2015, 5:38 PM

In a stark recognition of Los Angeles' vulnerability to a major earthquake, the city on Friday enacted the nation's most sweeping seismic regulations, requiring an estimated 15,000 buildings be retrofitted so they will better withstand violent shaking.

- Poor performance of these older concrete buildings in past earthquakes
- Applies to existing concrete buildings built under building code standards enacted before January 13, 1977 (pre-1976 UBC)

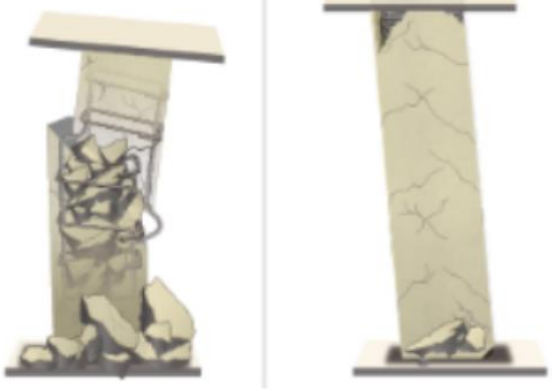
COMMON DEFICIENCIES

Captive Columns



COMMON DEFICIENCIES

Insufficient Column Confinement

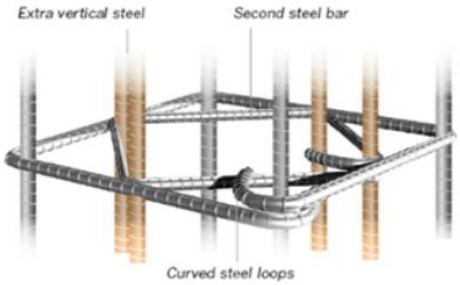


Poor steel design

This steel reinforcement configuration can easily bend apart during shaking.

Stronger steel design

A second square steel bar is added, and the ends are curved at about 135 degrees to keep the steel in place.

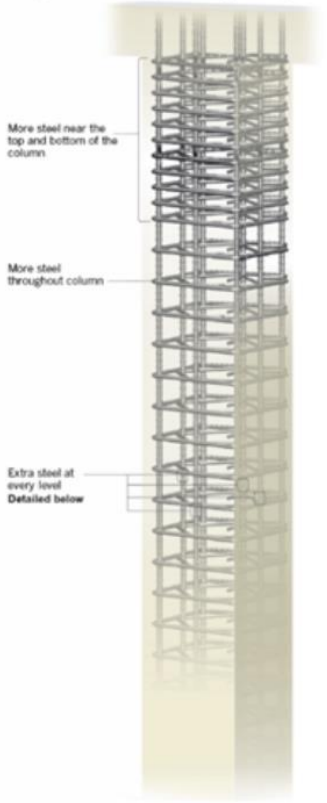


Brittle concrete column

Too little steel allows concrete to break apart from the column.

Stronger concrete column

A flexible column has more steel reinforcing bars to keep the concrete in place during shaking.



LA RETROFIT ORDINANCE (CONT'D)

Compliance Timeline

- **3** years – Submit checklist to determine if building is subject to ordinance

- **10** years – Submit detailed evaluation
  - Comply w/ordinance requirements
  - Plans for seismic upgrade to comply w/ordinance
  - Plans for demolition

- **25** years – Complete all retrofit or demolition work

Ordinance represents "Best Practice"

City of Redondo Beach has not adopted ordinance, yet

Any seismic retrofit work for BCHD towers considered voluntary at this time

RISK MITIGATION

How other institutions are addressing their seismic risk exposure

- Public schools
- Public and private universities
- Commercial real estate investors
- Healthcare

Institutional Approach

- Identify vulnerable buildings
- Prioritize high risk buildings
- Develop long-term plan to reduce risk

BCHD ASSESSMENT

Summary of Recommendations

Building	Seismic Upgrade
North Tower (Orig.)	Extensive
South Tower (Add.)	Extensive
Elevator Tower	None
Low-rise	None
Central Plant	Limited

BCHD ASSESSMENT

General Scope of Strengthening for North and South Towers

- Strengthen foundations
- Add new exterior steel braced frames (south tower)
- Add new and/or strengthen existing concrete walls (north tower)
- Slot cut perimeter spandrel beams
- FRP wrap interior columns (approximately 50% of columns)

Intrusive – impacts all floors

Challenging to maintain occupancy during construction

Scope of Strengthening for Central Plant

- Add straps and blocking to roof