

Full-Scale Structural and Nonstructural Building System Performance during Earthquakes & Post-Earthquake Fire

A Joint Venture between Academe, Industry and Government

Base Isolation

Claudia C. Marin
Assistant Professor, Howard University

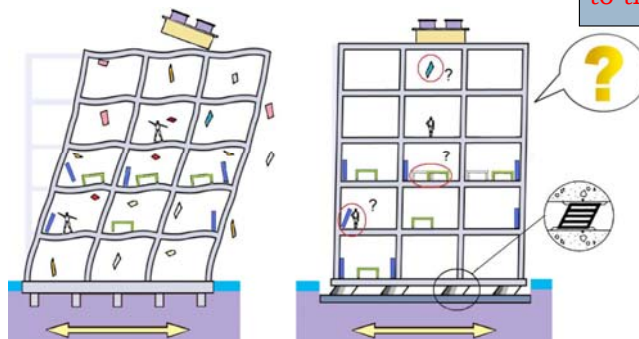


Project Meeting | September 29, 2010

Seismically Isolated Building -Overview

- ▶ Base-isolation minimizes the damage of NCS that is properly attached to the structural system; however, large displacements induced by the isolation system may be detrimental for some NSC that are not properly anchored

Especially relevant to the hospital industry



2

Project Meeting | September 29, 2010

Seismically Isolated Building-Purpose

- ▶ To test the effectiveness of isolation on the performance of both the structural and nonstructural components
- ▶ To obtaining data on the response of NCS on a base-isolated and a fixed-base building
- ▶ Study the seismic response of NCSs that are designed for seismic motions and those that not
- ▶ To creating an experimental database on the characterization of the NCS and its protective mechanisms under seismic motions to improve analysis models

3

Project Meeting | September 29, 2010

Collaboration and funding for Seismically Isolated Building

Industry partner: Vulco Weir
Research partner: Juan Carlos de la Llera



National Science Foundation
Graduate Research Supplement
to support a Ph.D. student
Michelle Chen



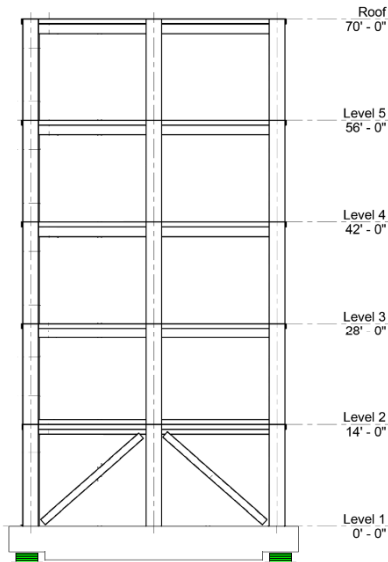
California Seismic Safety Commission



4

Project Meeting | September 29, 2010

Current Status: Preliminary design of base isolation system (SIRVE S.A)



4 Isolators

Isolation period: 2.5 sec

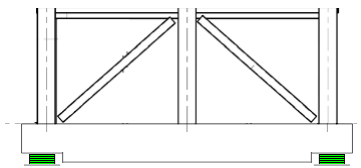
Displacement isolation system:
Maximum : 29 cm (11.4 in) (MCE)
25 cm (9.8 in) (DBE)

Damping ratio: 10%

Additional stiffness with
diagonal bracings

Project Meeting | September 29, 2010

Current Status: Building design-provisions for base isolation



Foundation

Provision to be able to remove the isolators
The foundation will be restrained to
simulate the fixed-base building

Diagonal bracing to carry lateral
loads for internal column

Analysis to determinate
if additional bracings is required
to stiffen the building

Project Meeting | September 29, 2010

Seismically Isolated Building Next Critical Steps

- Final design of base isolation system
 - *Basic building design
 - *Mass/floor
 - *Diagonal bracing
- Analysis of the base isolated building

7

Project Meeting | September 29, 2010

Seismically Isolated Building Next Steps

- Selection of testing ground motions for this component
- Provisions to nonstructural components & systems
- Characterization test for isolation system

8

Project Meeting | September 29, 2010