



SEISMICALLY VULNERABLE BUILDING TYPES

Pre-1980s residential wood frames with tuck-under parking or soft story

Concern: Collapse or partial collapse due to inadequate first-story strength

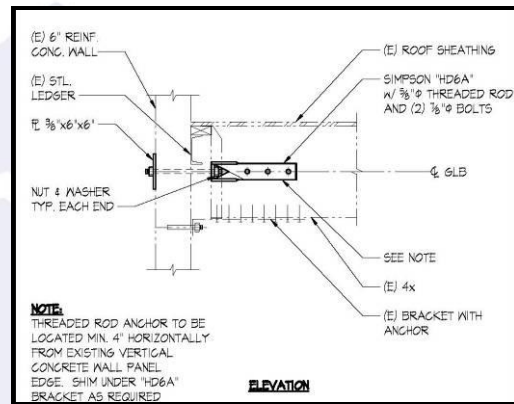
Solution: Steel moment-resisting frames or shear panels at grade level



Pre-1974 reinforced concrete tilt-up and masonry block buildings

Concern: Wall separation or collapse due to weak roof-to-wall anchorage and diaphragms

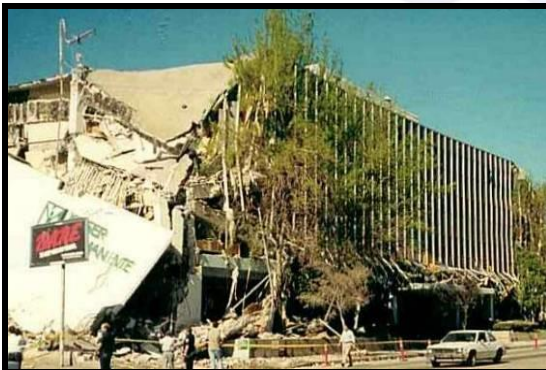
Solution: Wall anchorage and roof diaphragm connections



Pre-1970 reinforced concrete frames

Concern: Collapse due to inadequate steel reinforcing to confine concrete elements

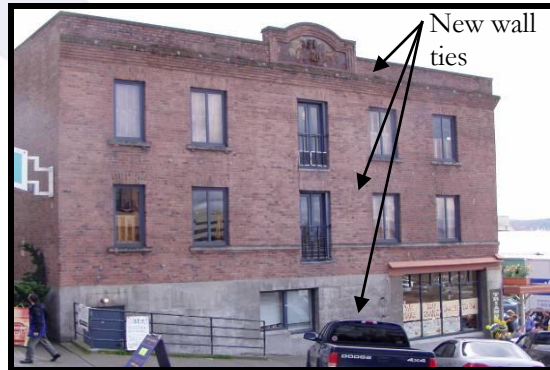
Solution: Reinforced concrete shear walls or energy dissipation devices



Unreinforced masonry bearing walls

Concern: Inadequate wall anchorage, unstable walls and parapets, and soft stories

Solution: Wall anchorage, strongbacks, diaphragm upgrades, braced frames





WHAT BUILDINGS ARE SEISMICALLY OK?

Buildings designed to the building code edition noted below likely satisfy acceptable earthquake performance criteria:

Building Type	Uniform Building Code Edition ¹
Wood frame	1976
Moment-resisting steel frame	1994
Reinforced concrete frame or shear walls	1976
Reinforced concrete tilt-up walls	1997
Reinforced masonry walls with wood floors and roof	1997
Reinforced masonry with concrete floors and roof	1976
Retrofitted unreinforced masonry	1991

1. Note: a risk evaluation may still be required to verify if the structure is compliant with the noted provisions.

MRP ENGINEERING SERVICES

MRP Engineering is a structural engineering and risk analysis company. We partner with our clients in assessing natural and man-made hazard risks and developing practical loss mitigation solutions. MRP Engineering services include:

- Earthquake and wind risk evaluation
- Structural benefit-cost analysis
- Upgrade design
- Independent design review
- Damage (root cause) investigation

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