Regulatory Environment for School Infrastructure in the United States: Past, Present, and Future

Veronica Cedillos, P.E.

A Roadmap for Safer Schools
January 30-31, 2017

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Outline

- ❑ Regulatory Structure in the U.S.
- ❑ Examples from Several States and Corresponding Challenges
- ❑ Key Points

Regulatory Background in the U.S.

Regulation of Seismic Safety Varies Significantly

- Decisions made at the local/state level
- School construction varies by state and community
  - Some states have statewide school systems
  - Others delegate power to county, city, township-level school boards
- Federal government does not directly regulate school construction, although in some cases can provide technical and financial assistance

Regulatory Background in the U.S.

U.S. Building Codes

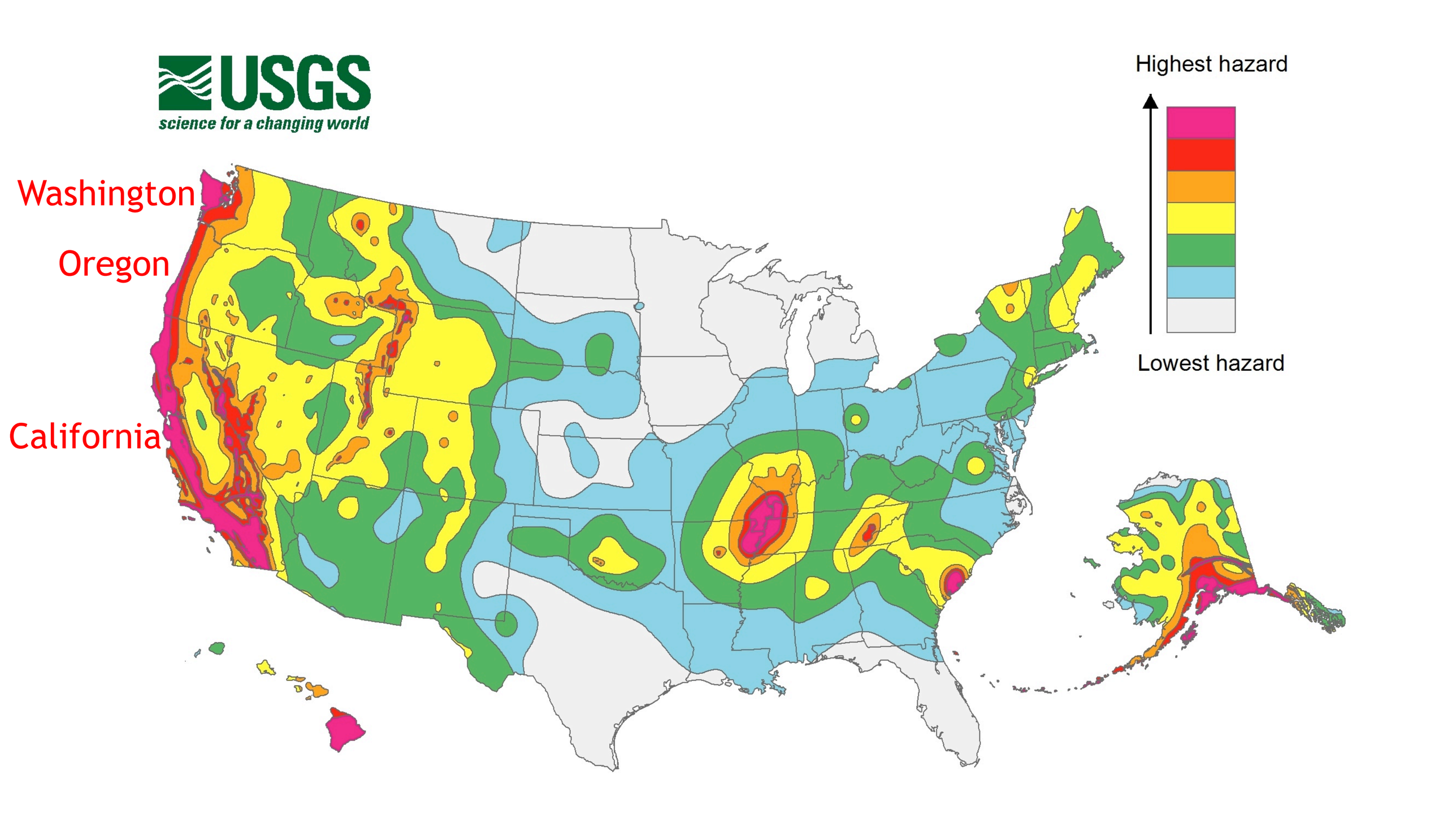
- Most states follow the International Building Code (IBC)
- Code adoption and enforcement highly varies throughout the nation
- States with highest earthquake hazard usually adopt more stringent building code construction and inspection requirements (e.g., 2016 California Building Code is based on 2015 IBC)
- Codes continually improving:
  - 2000 IBC first importance factor (1.5) for schools
  - Northwest's revised seismic risk estimates
  - Incorporate lessons from earthquakes
- Early 1990's codes generally meet societal standards for safety

Regulatory Background in the U.S.

Federal Support: Federal Emergency Management Agency (FEMA)

- ❑ Technical Support and Awareness-Raising:
  - ❑ FEMA P-154
  - ❑ FEMA 395
  - ❑ FEMA E-74
  - ❑ FEMA P-1000 (coming soon)
  - ❑ National Earthquake Technical Assistance Program
- ❑ Financial Support:
  - ❑ Pre-Disaster Mitigation Grant Program
  - ❑ Post-Disaster Hazard Mitigation Grant Program

Examples from Several States


USGS
science for a changing world
Washington
Oregon
California
Highest hazard
Lowest hazard

Examples from Several States: California

1933 Long Beach Earthquake (M6.3)

- March 10 at 5:54 PM
- More than 230 school buildings destroyed, suffered major damage, or were judged unsafe to occupy
- >6,000 children would have been killed if earthquake happened a few hours earlier
- Response: Within 30 days, requirements for strict design and construction standards, “The Field Act”

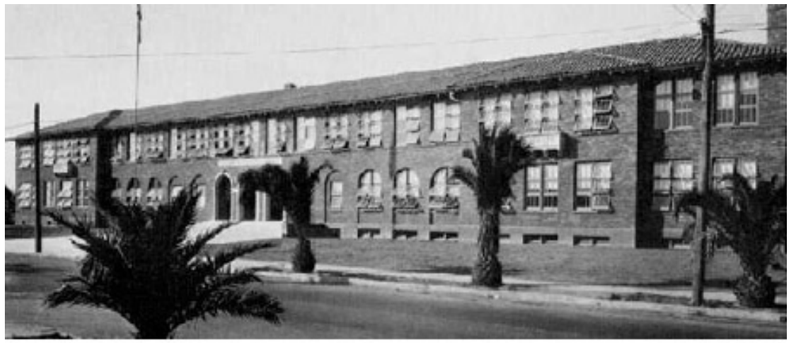
Source: California Geological Survey


Photo: Portland Cement Association

Examples from Several States: California

1933 Field Act

- First earthquake design legislation for schools
- Covers K-12 public schools, and community colleges
- Prohibited construction of unreinforced masonry (URM) school buildings
- Four major principles:
  - Seismic design standards
  - Plan review
  - Construction inspections
  - Special tests

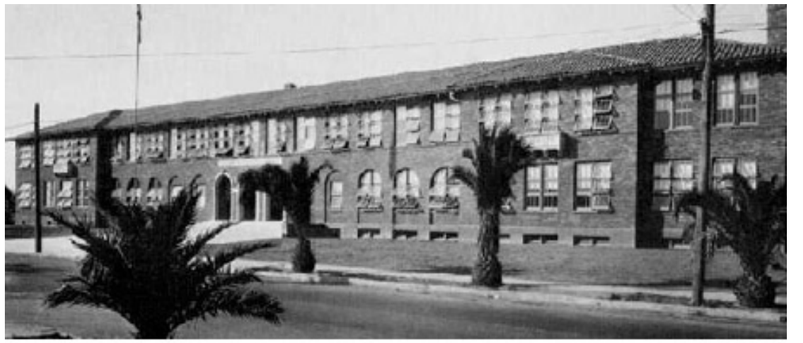


Source: California Geological Survey

Examples from Several States: California

1933 Field Act (continued)

- Required that schools be designed by a certified Structural Engineer[1]
- Established Division of State Architect (DSA), which develops state-wide design standards, quality control procedures
- Plans and specifications must be submitted to DSA for review and approval prior to construction
- Reviewers and inspectors are certified

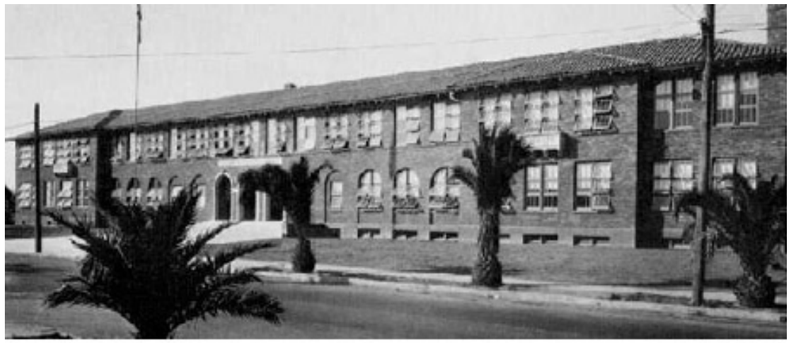


[1] To become a certified Structural Engineer in California, an engineer must pass a two-day, 16-hour exam after three years of qualifying experience as a certified Civil Engineer.

Examples from Several States: California

1933 Field Act (continued)

- Architects, engineers, inspectors, and contractors must file reports, under penalty of perjury, to verify that actual construction complies with approved plans
- Violation of the provisions under the Field Act is a felony



Source: California Geological Survey

Examples from Several States: California

1939 Garrison Act

- Protects public school children in structures built before 1933
- However, school districts are NOT required to make necessary inspections
- Many districts delayed inspecting or renovating older pre-Field Act buildings

Examples from Several States: California

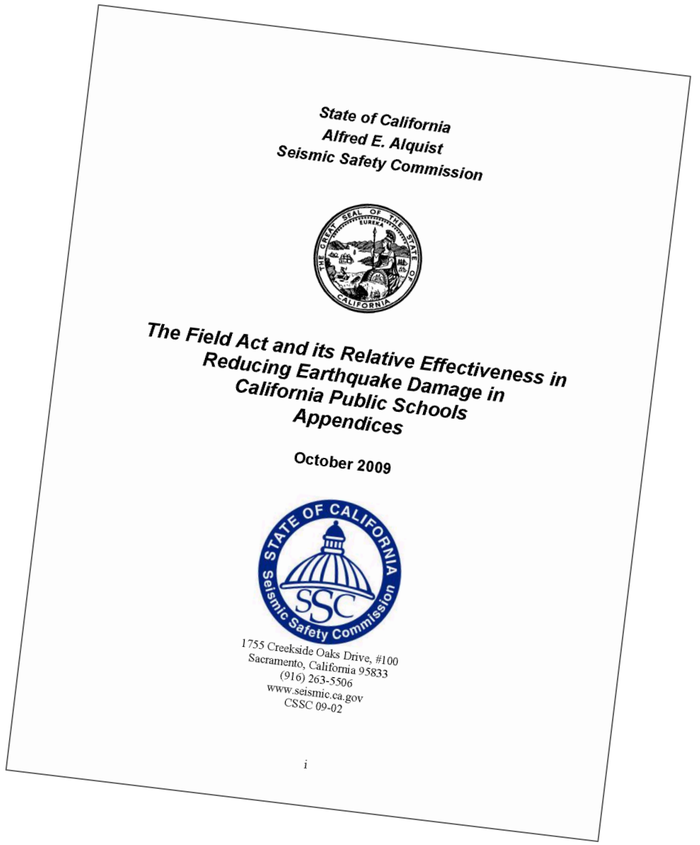
1967-1968 Greene Acts

- Set inspection deadlines for school districts
- School boards are responsible for ensuring non-Field Act buildings were examined
- If found unsafe and if process of correcting not taken, board members were personally liable

Examples from Several States: California

1968 to Present: Various Amendments

- ❑ Triggers requiring retrofit of school buildings
- ❑ Nonstructural components checked by DSA for new schools
- ❑ Matching funds passed to help school districts



State of California
Alfred E. Alquist
Seismic Safety Commission

The Field Act and its Relative Effectiveness in Reducing Earthquake Damage in California Public Schools
Appendices

October 2009

1755 Creekside Oaks Drive, #100
Sacramento, California 95833
(916) 263-5506
www.seismic.ca.gov
CSSC 09-02

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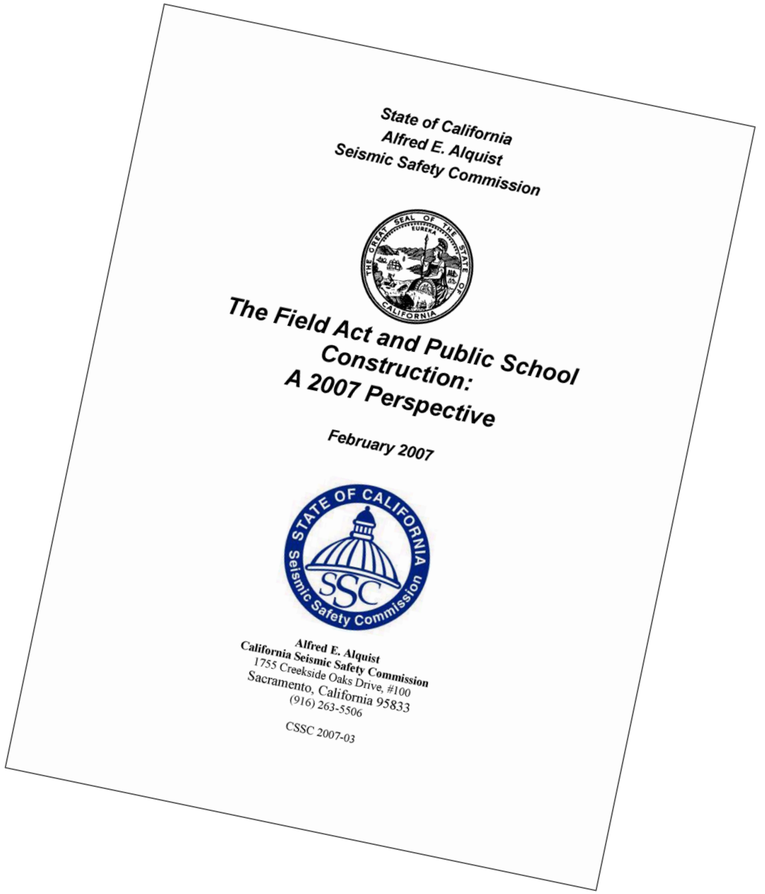
No schools constructed under the Field Act have partially or completely collapsed

Examples from Several States: California

Implementation Issues

- Delays due to time-intensive DSA review processes
- Inconsistency of interpretations of codes/regulations by different DSA offices statewide
- Increased costs due to Field Act requirements and corresponding delays


State of California
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The Field Act and Public School Construction:
A 2007 Perspective

February 2007

Alfred E. Alquist
California Seismic Safety Commission
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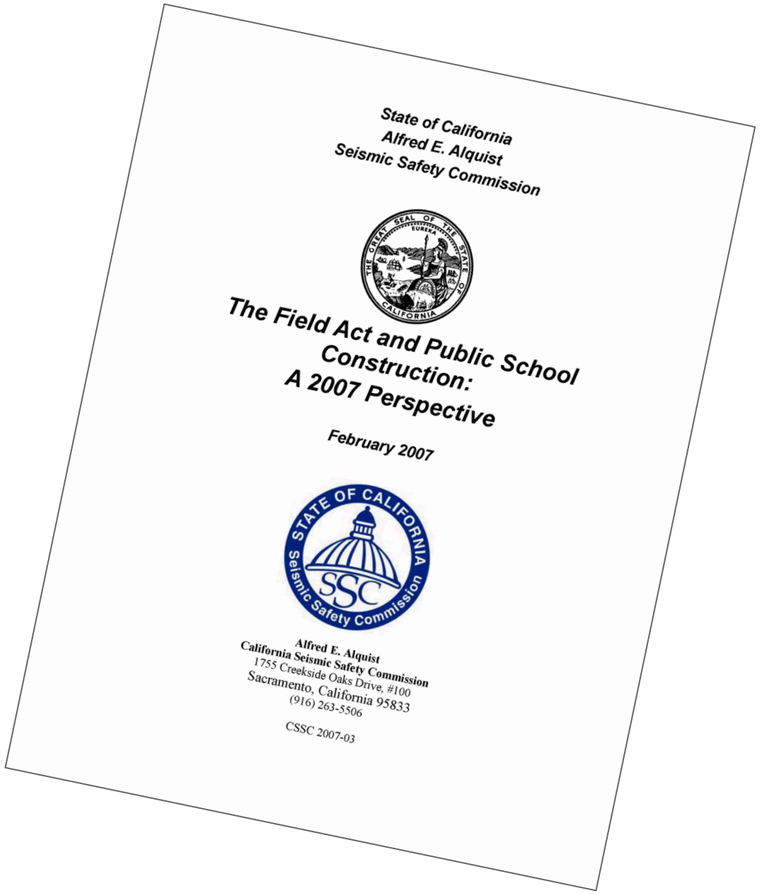
Examples from Several States: California

Solution: Improve timeliness, accuracy, and communication

- ❑ Implemented electronic plan reviews and document submittals
- ❑ Partnered with big school districts to achieve quality and timely plan reviews and consistent code interpretations
- ❑ Allowed for hire of contract plan reviewers to handle peak workloads and allowed for sharing of workload among regional offices
- ❑ Developed Training Academy to reduce inconsistencies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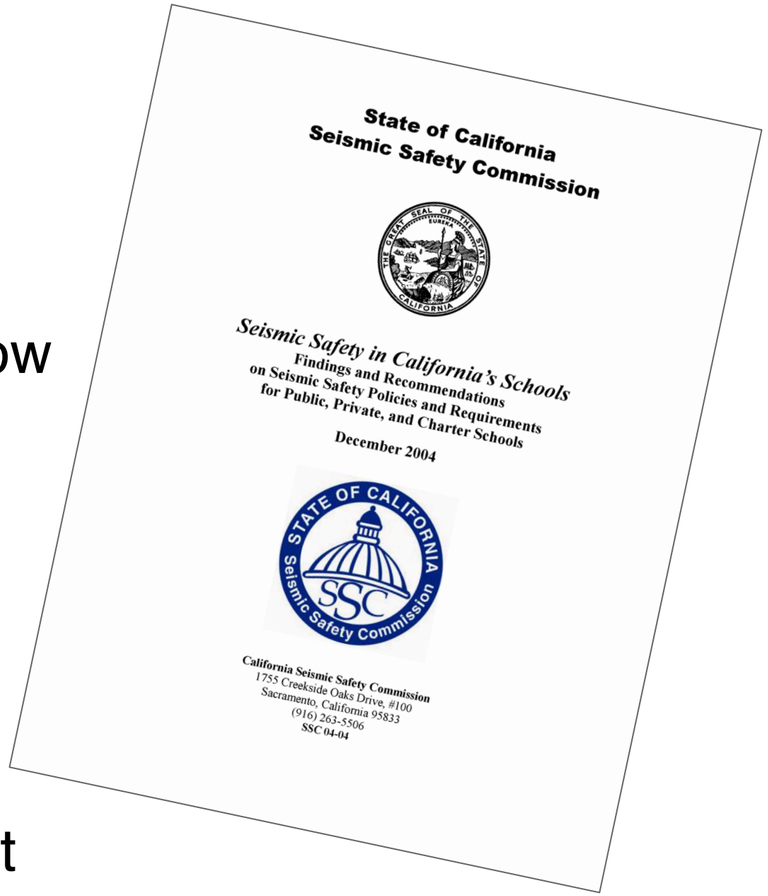
Examples from Several States: California

Limitations and Ongoing Challenges

- ❑ Private schools are not covered; only some charter schools covered
- ❑ Community colleges can now opt out of Field Act
- ❑ Older building codes allowed for construction that we now know is unsafe
  - ❑ Pre-1978s buildings are of most concern
  - ❑ ~7,500 (15% of public schools) identified as potentially at risk
- ❑ School districts not required to evaluate their school buildings
- ❑ Some school districts simply do not have the funding to retrofit their schools



State of California
Seismic Safety Commission

Seismic Safety in California's Schools
Findings and Recommendations
on Seismic Safety Policies and Requirements
for Public, Private, and Charter Schools

December 2004

California Seismic Safety Commission
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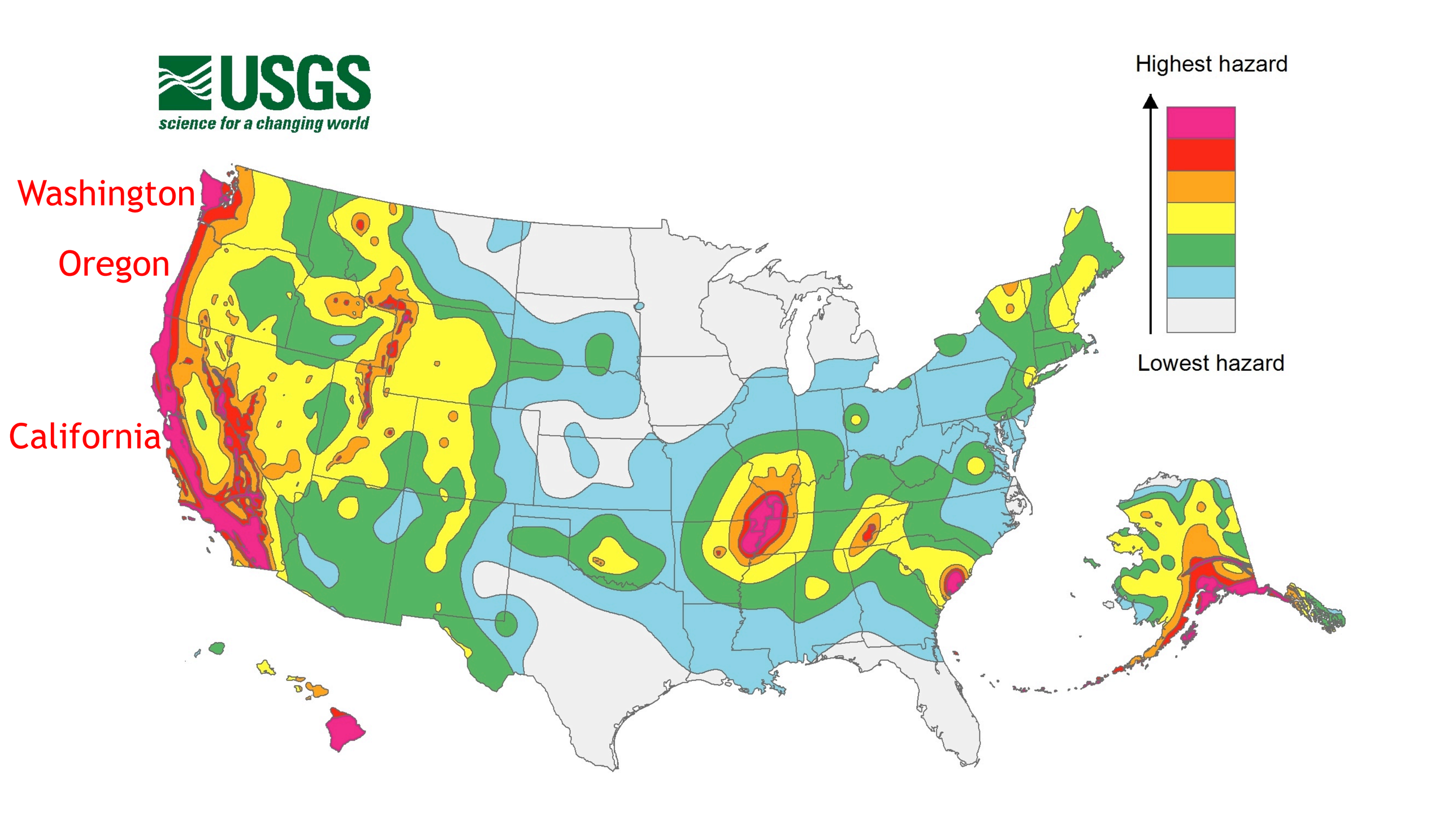

USGS
science for a changing world
Washington
Oregon
California
Highest hazard
Lowest hazard

Examples from Several States: Oregon

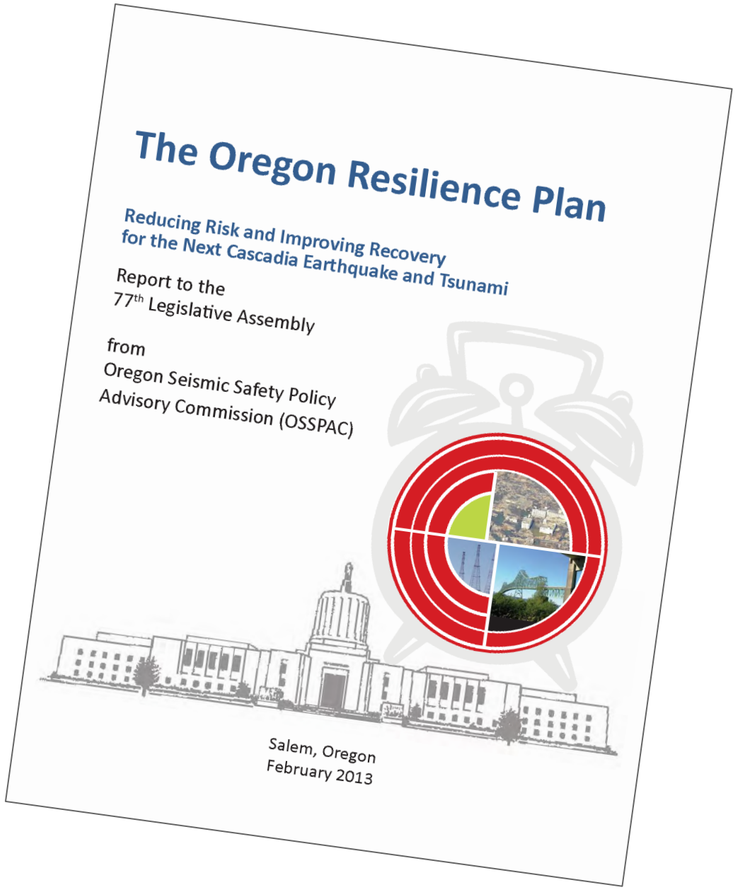
Building Codes

- 1974: First statewide building code
- 1980s: Scientists recognize the Cascadia subduction zone as an active fault that poses a major hazard
- 1993: Seismic standards first incorporated into building code

Examples from Several States: Oregon

Progress: Much because of political support

- ❑ 2001: Law requiring “life safety” in schools by 2032
- ❑ 2002: Seismic bonds for schools
- ❑ 2007: Seismic Needs Assessment: >1,100 public schools at high or very high risk of collapse
- ❑ 2009: Seismic Rehabilitation Grant Program ($15 million for schools)
- ❑ 2012: Department of Education Report card including seismic scores
- ❑ 2015: Seismic Rehab Grant Program ($175 million)



Examples from Several States: Washington

Seismic safety report card

Washington scores poorly compared to other West Coast governments, where retrofits of dangerous school buildings are a priority.

	Law or policy on school seismic upgrades	Structural surveys of all at-risk schools	Dedicated funding for school seismic retrofits
British Columbia	YES	YES	$1.7 billion *(2004-2016)*
Oregon	YES	YES	$210 million *(2009-2016)*
California	YES	YES	$700 million *(1972-2016)*
Washington	**NO**	**NO**	**NONE**

Sources: Seattle Times reporting

FRANK MINA / THE SEATTLE TIMES

Ongoing Challenges

- Schools not covered under regulations:
  - Older, existing school buildings
  - Private schools, some charter schools
- Schools in areas that were recently identified as high seismic hazard regions
- Regions with moderate earthquake hazard
- Nonstructural hazards
- Lack of funding/directive

Key Points

Lessons for all..

- Assigning responsibility for proper implementation is CRUCIAL
- School seismic safety is a PROCESS…it takes time
  - California started in 1933 and it is still working on this!
  - Many regulations allowed time for schools to properly implement and provided financial support or triggers
- Earthquakes can be devastating, but they can also provide windows of opportunity. Have a plan in advance so that you can have the biggest impact when this window arises

Thank you!