



## EERI Policy White Paper

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### Schools shall be URM FREE BY 2033

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#### EERI Policy Position

To keep students, staff, and faculty safe, school buildings should be “URM free by 2033” in regions with high and moderate earthquake hazard.

#### Background

During the early to mid-twentieth century, school buildings were commonly constructed out of unreinforced masonry (URM). This structural type has inherent, life-threatening vulnerabilities to earthquake ground shaking. URM buildings have collapsed or suffered major damage in numerous earthquakes in the US and throughout the world, leading to many casualties.

In particular, the risk posed by school buildings was brought to public attention following the 1933 Long Beach earthquake in southern California where more than 230 URM school buildings were either destroyed, suffered major damage, or were judged unsafe to occupy following the earthquake (Fatemi and James, 1997; CSSC, 2007). More than 88 years after this earthquake, many school children in the U.S. still attend school in these dangerous buildings.



Jefferson Junior High School in Long Beach, California, destroyed by the March 11, 1933, earthquake (USGS, 1993).



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View of John Muir School, showing damage from the March 10, 1933 Long Beach earthquake. Located on Pacific Ave. in Long Beach, California. Photo taken 8 days after, on March 18, 1933. (photo: W.L. Huber, source: USGS, 1993).

Unreinforced masonry is traditionally considered to be brick or block construction without any reinforcing steel. However, even brick construction with lightly or under-reinforced walls can perform poorly in earthquakes. For the purposes of this policy statement URM should (shall) include those schools identified as having considerably less than the minimum code reinforcement for masonry buildings.

School buildings share seismic deficiencies common to other buildings of the same structural types in the same setting, but several considerations set school buildings apart from their peers in terms of priority for seismic assessment and retrofit:

- Schools are the only high-occupancy buildings other than prisons and courthouses whose occupants are compelled by legal mandate to be inside them.
- Students are considered to be a vulnerable population due to their age and their developmental stage. Children are dependent on adults to provide safety, whereas adults are presumed capable of consenting to and accepting risks
- School buildings in many communities remain in use longer than comparable structures in private ownership, and tend to receive less frequent and less consistent capital renewal investment.
- Community members and public officials often hold a high (sometimes unfounded) expectation that schools will provide community shelter or host public services in the wake of a natural disaster (Wolf and Wang, 2014).
- Schools provide de facto daycare for children, thus school closure after earthquakes limits the ability of parents to go to work, an essential part of community recovery.
- School buildings often have large assembly rooms (e.g., gyms, auditoriums), which can increase their seismic vulnerability, making them more vulnerable than other buildings of similar construction types.
- The collapse of a school building is particularly devastating to communities because schools can hold an entire generation (i.e., all children of a certain age range in the community), a community's future.



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- Damaged URM school buildings cannot be occupied after an earthquake, even as a temporary shelter for children and staff, due to their susceptibility to further damage or collapse from aftershocks.

EERI is dedicated to promoting safe buildings for school children through its School Earthquake Safety Initiative (SESI), a global and collaborative network of diverse, expert, and passionate professionals who are committed to creating and sharing knowledge and tools that enable progressive, informed decision making around school earthquake safety (EERI, 2016a).

Several school inventory, assessment, and retrofit programs have been completed in various states within the U.S. These programs provide examples of strategies to mitigate the problem of unsafe school buildings using a variety of policy approaches that are implemented at various levels of government. EERI's SESI Safety Screening, Inventory, and Evaluation of Schools Subcommittee documented many case studies of successful school seismic screening programs in five different states (EERI, 2016b).

Some significant school inventory and retrofit programs include:

1. British Columbia Seismic Mitigation Program for Schools (<https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/capital/seismic-mitigation>) Engineers and Geoscientists Seismic Retrofit Guidance (<https://www.egbc.ca/Practice-Resources/Programs-Resources/Seismic-Retrofit-Guidance>)
2. State of Washington School Seismic Safety (<https://www.dnr.wa.gov/school-seismic-safety#download-phase-2-reports>)
3. State of Oregon Seismic Retrofit program (<https://www.orinfrastructure.org/Infrastructure-Programs/Seismic-Rehab>) + link to legislation establishing funding and program)
4. State of Utah Wasatch Front Unreinforced Masonry Risk Reduction Strategy ([https://www.fema.gov/sites/default/files/documents/fema\\_wasatch-front-urm-risk-reduction-strategy.pdf](https://www.fema.gov/sites/default/files/documents/fema_wasatch-front-urm-risk-reduction-strategy.pdf)) + possibly Utah Unreinforced Masonry K-12 Public School Inventory (December 2021)

It is important to note that other hazardous types of school buildings exist beyond URM buildings (i.e., non-ductile concrete buildings), which should also be retrofitted or replaced. The importance of mitigating all vulnerable building types through retrofit or replacement is clearly stated in the Western States Seismic Policy Council's Policy Recommendation 19-10 titled "Joint Policy for the Evaluation and Seismic Remediation of School Buildings," which is also supported by EERI.

## Needed Action

As noted by the National Earthquake Hazard Reduction Program (NEHRP) Advisory Committee on Earthquake Hazard Reduction, "Schoolchildren have a right to learn in buildings that are safe from earthquakes" (ACEHR, 2012). EERI strongly supports this statement and advocates for the reduction of earthquake risk to students from URM buildings.

Legislatures, school districts, and school boards in regions with high and moderate earthquake hazard should:

1. Raise awareness of dangers of URM school buildings in states and communities with moderate to high seismic risk.
2. Establish programs to identify URM school buildings via inventory efforts, then use screening or risk assessment methodologies to identify vulnerabilities, identify possible repair or replacement costs, and prioritize URM buildings for retrofit, repurposing or replacement.
3. Establish funding mechanisms, financial assistance, and incentives to finance programs for the retrofit or replacement of URM school buildings.
4. Establish fully-funded programs at the state, regional, or school district levels to set criteria and standards,



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allocate funding for school retrofit and replacement projects, and ensure quality compliance of all retrofit or replacement projects for schools.

5. Require structural upgrades or replacement of all URM school buildings in regions with moderate and high seismic hazard by 2033, the 100-year anniversary of the Long Beach Earthquake.

URM buildings are used as both public and private schools; both should be mitigated.

In addition, communities should require adequate building codes for existing and new schools with enforcement and inspections, as well as providing and publicizing public access to the status of seismic school safety. Further considerations for safe schools should also include mitigating nonstructural hazards and creating community resilience plans that align and prioritize mitigation efforts.

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