

Preparing Schools for Earthquakes

Schools in Washington

Photo: C.N. Diram/Washington DNR



Above: Lafayette Elementary School in West Seattle was condemned and torn down due to damage from a M7.1 earthquake in 1949.

In this fact sheet:

- Why earthquake safety is critical for Washington's schools
- Strategies and tools to help school districts meet the challenge
- The benefits of investing in seismic safety

The Need for Action

- Many schools were built before the adoption of earthquake (seismic) standards and have not yet been upgraded.
- Children are required to attend school and have a right to expect safe buildings.
- Earthquake readiness takes practice: K–12 public schools should regularly conduct earthquake drills; those in tsunami zones should also practice evacuation procedures.

Why Washington Schools Need to Prepare

Washington is ranked #2 for highest earthquake risk in the U.S. Its hazards include not only the Cascadia subduction zone—expected to produce a magnitude 9.0 quake and tsunami—but many other active fault zones across the state.

The state's past earthquakes reveal the need for safe schools: In 1949, a magnitude 7.1 earthquake damaged 30 schools, 10 beyond repair. Most schools were closed for spring break, but two students were killed by falling masonry at schools in Tacoma and Castle Rock; and a collapsed roof at Puyallup High School would have caused casualties had students not just left the building. Communities cannot depend on luck to keep students safe.

Strategies for Meeting the Challenge

When new schools are built, state laws require that they be designed to withstand earthquakes. Unfortunately, many school buildings predate awareness of the state's earthquake hazard and don't meet modern life-safety seismic design standards. The task of upgrading or replacing these schools can seem daunting.

Recent efforts will help school districts meet the challenge. Following a pilot project in 2011, the Thurston County School Seismic Safety Evaluation Project in 2015 engaged volunteer structural engineers to assess 19 at-risk school buildings in the region of South Puget Sound. Their data was added to geologic surveys to predict how buildings are likely to perform in various earthquakes. This process will help districts identify and rank vulnerable buildings and prioritize seismic upgrades. The results can also be integrated with other factors, including capital improvement plans, to decide how scarce resources will be allocated.



Thanks to seismic retrofits, such as exposed diagonal bracing, this school near Koriyama, Japan, made it through the M9.0 Tohoku quake in 2011 without structural damage.

Photo: John Wallace, UCLA EERI

Did You Know?

Assessing and ranking buildings based on their vulnerability to earthquakes is an essential step when developing a hazard mitigation plan. A school district must have such a plan to apply for FEMA grants for seismic upgrades. FEMA offers grants through the Pre-Disaster Mitigation program and the Hazard Mitigation Grant Program.

—See Featured Links

New Tools for Washington's Schools

The Office of Superintendent of Public Instruction (OSPI) released the *Washington State K–12 Hazard Mitigation Plan* in 2014. The plan and accompanying tools help school districts create district-specific risk assessments and mitigation plans, which improve their eligibility for FEMA grants that support seismic upgrades. OSPI also offers materials to help districts with their grant applications.

The Washington Emergency Management Division is developing a new assessment tool comparable to the benefit-cost analysis tool that Oregon uses for its Seismic Rehabilitation Grant Program. The new tool will help school districts factor in earthquake safety when making decisions about capital projects.

Photo: PCS Structural Solutions



McCarver Elementary School in Tacoma is a historic brick building dating to 1924. Tacoma Public Schools used part of a \$500-million school construction bond to retrofit the building in 2015, thus preserving the historic character of the school, while strengthening the building to protect students in the event of an earthquake.

New Life for Older Schools

Building a new school ensures that students will occupy a building that meets modern life-safety seismic standards. If built to a higher (immediate occupancy) standard, the school can even be used as a shelter or emergency operations center after an earthquake.

Replacing a building isn't always the best option, however. Seismic retrofitting may be a cost-effective choice for a building that hasn't reached the end of its intended lifespan; it may also work for historic school buildings.

In 2013, the local community supported Tacoma Public Schools by passing a \$500-million bond for replacements, renovations and other upgrades. Guided by structural engineering reports, the district used a large portion of the bond to retrofit and modernize several buildings. One such project was historic McCarver Elementary School (left).

Featured Links

OSPI's Hazard Mitigation Plan: www.k12.wa.us/SchFacilities/PDM/pubdocs/PDM_Plan.pdf

OSPI's School Safety Center (earthquakes): www.k12.wa.us/safetycenter/Emergency/Earthquakes.aspx

FEMA's Hazard Mitigation Assistance grant programs: www.fema.gov/hazard-mitigation-assistance

EMD school preparedness: <http://mil.wa.gov/emergency-management-division/preparedness/school-preparedness>

National Clearinghouse for Educational Facilities: www.ncef.org/content/earthquakes-and-schools

School Seismic Safety Pilot Project (2011): http://file.dnr.wa.gov/publications/ger_ofr2011-7_school_pilot_project.pdf

Readiness and Emergency Management for Schools: rems.ed.gov

Great Washington ShakeOut: www.shakeout.org/washington/

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