

## **WESTERN STATES SEISMIC POLICY COUNCIL POLICY RECOMMENDATION 20-8**

### **Seismic Design and Construction of New Schools**

#### **Policy Recommendation 20-8**

WSSPC recommends that each member state, province, and territory establish and fund an active program to improve the seismic safety of new schools by selectively increasing the current design and construction requirements for buildings and non-structural components, providing rigorous plan reviews and inspections and by establishing minimum regional seismic design categories for new schools. WSSPC also recommends that appropriate responsible local, state, and federal entities be provided with adequate training and financial support for the establishment of a program that improves the seismic safety of new schools.

#### **Executive Summary**

School facilities, in addition to caring for our children, are often used as public assembly areas as well as areas of refuge or impromptu command centers during natural disasters and other emergencies. The use of schools in this fashion is commonplace throughout most of America, particularly so in rural areas. Current building codes and design standards identify schools with an occupant load greater than 250 as an intermediate priority risk category. School facilities that are designed and built under these criteria are constructed to ensure that the structure has enhanced earthquake resistance but are not specifically designed to remain functional (i.e. safe and habitable) after a design level seismic event. Additionally, in most instances there are no special seismic performance requirements for utilities such as water, electrical, sewer, and HVAC (Heating Ventilation and Air Conditioning). This presents an obvious problem where school facilities are pre-designated as emergency shelters or command centers before disasters occur. Increasing the school's design category to that of an essential facility would be more consistent with its actual use, assure the safety of our children, and enhance the resiliency of the community.

## **Background**

WSSPC supports rigorous plan reviews and inspections of new school building construction to ensure code compliance. Evidence of the value of these reviews and inspections was born out during the November 2018 Anchorage, Alaska earthquake. The earthquake caused dramatically higher levels of damage and required many more restricted or unsafe placards for those areas not requiring plan reviews and building inspections as compared to the areas where they are required.

Currently schools are designed using the International Building Code Risk Category III unless they are pre-designated to be emergency earthquake shelters, operations centers or are otherwise required for emergency response in which case they are required to comply with Risk Category IV code provisions. The code requires the use of Risk Category IV for school buildings that have been pre-designated as emergency facilities.

WSSPC encourages schools to be designed and constructed to a minimum Seismic Design Category (SDC) at or above the minimum code requirement. The minimum Seismic Design Category for schools is recommended to be SDC D for moderate and high seismicity regions. For schools in low seismicity regions SDC C is recommended for schools where SDC B would otherwise apply and in very low seismicity regions SDC B is recommended where SDC A would otherwise be allowed.

Although Risk Category III building code requirements for schools apply only to school facilities with an occupant load greater than 250 persons, WSSPC encourages the use of Risk Category III or higher design provisions for smaller schools as well.

Nonstructural components of buildings are categorized as architectural elements (such as interior partition walls, non-load bearing exterior curtain walls, ceilings, windows, parapets and canopies); as mechanical, electrical, and plumbing (MEP) components (such as HVAC units, ducts, diffusers, conduits, lighting fixtures and pipes); or as furniture, fixtures, and equipment (FF&E) and other building contents. Of particular concern in schools are those components that are overhead falling hazards or whose failure may impede egress. Individual School Districts and private operators should also be made aware of FEMA E-74 that addresses mitigating non-structural hazards from building contents and components. Post disaster assessments have identified that many common injuries and some types of damage can be prevented by properly designing for or otherwise

mitigating non-structural hazards. There is also the additional benefit that school children would be better protected while attending classes.

In low and moderate seismicity regions the incorporation of enhanced nonstructural design provisions beyond building code requirements for new schools can reduce injuries to students and help sustain operability during those smaller earthquakes that are characteristic of these regions. Of particular concern are those components that are overhead falling hazards or whose failure may impede egress. These enhancements would provide for design and construction of seismic restraints for selected nonstructural components regardless of certain building code exceptions that might otherwise be applicable.

Many local, state and provincial regulatory authorities do not effectively enforce the seismic safety requirements in building codes and standards for new construction of public schools because they lack funds, professionally qualified plan reviewers, and certified inspectors. Evidence of the value of these reviews and inspections was born out during the November 2018 Anchorage, Alaska earthquake. The earthquake caused dramatically higher levels of damage and required many more restricted or unsafe placards for those areas not requiring plan reviews and building inspections as compared to the areas where they are required. Improvements to the seismic safety of new schools can only be achieved if on-going funding for plan reviews, building inspections and other code enforcement functions is prioritized and included in capital budgets.

## References

- FEMA E-74, *Reducing the Risks of Nonstructural Earthquake Damage—A Practical Guide, Fourth Edition*, Federal Emergency Management Agency, December, 2012.
- FEMA P-1000, *Safer, Stronger, Smarter: A Guide to Improving School Natural Hazard Safety* (2017)

## **History**

- Policy Recommendation 13-7 was revised and re-adopted as WSSPC Policy Recommendation 17-8 by a unanimous voice vote of the WSSPC members at the WSSPC Annual Business Meeting April 28, 2017 in Oklahoma City, Oklahoma.
- Policy Recommendation 10-7 was re-adopted as Policy Recommendation 13-7 by a voice vote of the WSSPC membership at the Annual Business Meeting May 3, 2013 in Seattle, Washington. Montana and Hawaii Emergency Management were opposed.
- Policy Recommendation 17-8 was first adopted as 10-7 by majority voice vote of WSSPC members July 9, 2010 at the Annual Business Meeting in Broomfield, Colorado. Hawaii was opposed.