

SEISMIC ENGINEERING

PSM has been active in seismic upgrade design for over 35 years. Much of our seismic remediation is for critical facilities that need to remain operational after an earthquake, such as hospitals or power stations, or for buildings with vulnerable populations, such as schools and hospitals.

SEATTLE ASIAN ART MUSEUM SEISMIC UPGRADE

PSM recently completed a seismic upgrade for this important Seattle cultural institution. We remediated most major seismic deficiencies identified over the years. The museum was originally designed with skylights over the galleries. This design resulted in large ceiling openings, which resulted in a weak structural diaphragm. PSM designed a steel horizontal bracing system, which was carefully integrated in the existing steel roof truss framing.



OCEAN BEACH HOSPITAL REHABILITATION AND ADDITION Ilwaco, Washington

This building, the only hospital located in an isolated community near the Pacific Ocean, is an important community resource in this seismically active area. When an upgrade was planned, consideration was also given to seismic upgrade of the existing building. The structural solution included separation joints between the new and existing structure and staging of the construction work so that the hospital could remain in continuous operation. This addition was designed for *Immediate Occupancy* following an earthquake.



PARK 90/5 FACILITY SEISMIC REPAIR AND UPGRADE Seattle, Washington



This multibuilding complex was converted from former uses to important police and emergency functions. During design of the facility, a significant earthquake struck the Seattle area, which caused major damage to the facility. In addition to repair of the seismic damage, the building was upgraded to resist future

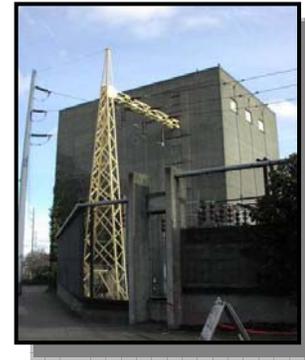


seismic events. Difficult geotechnical conditions (liquefiable soils) added to the complexity of this project. Additional structure (mezzanines) was added in the interior of the facility for new functions.

Seismic Engineering (continued)

SEATTLE CITY LIGHT BROAD STREET SUBSTATION SEISMIC UPGRADE Seattle, Washington

In consultation with electric utility managers, the design team selected Enhanced Performance per FEMA 356. This electrical substation, which feeds all of Downtown Seattle, was upgraded to provide *Immediate Occupancy* in the event of a design earthquake. The various structures on the site should remain relatively undamaged, and the equipment and contents will continue to be operational.

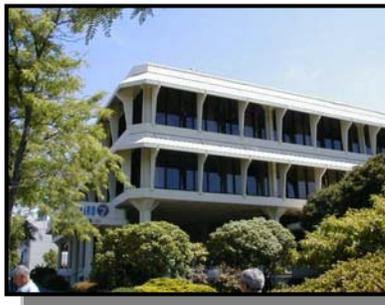


MAGNUSON BUILDING 30 SEISMIC UPGRADE DESIGN Seattle, Washington

We recently designed a seismic upgrade for this historic former Navy airplane hangar, now used for community functions. Damage from the Nisqually Earthquake was also repaired on this historic structure. FEMA 356 was used for upgrade criteria.



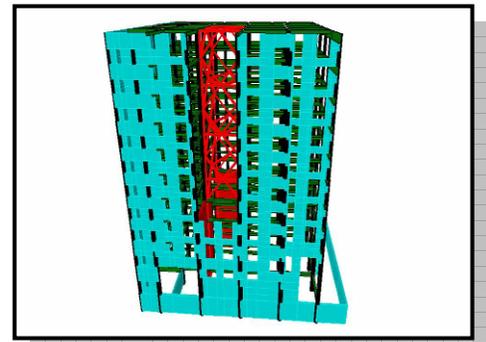
KIRO TELEVISION BROADCAST HOUSE SEISMIC UPGRADE Seattle, Washington



This project is an example of a private owner (a local television broadcaster) choosing to voluntarily upgrade their broadcast facilities to a higher ("Operational") performance level. We designed the upgrade for FEMA 356 criteria. We also reviewed and repaired damaged following the Nisqually Earthquake.

DOWNTOWN SEATTLE LANDMARK STRUCTURE SEISMIC UPGRADE Seattle, Washington

PSM is recently designed a seismic upgrade of this Seattle Landmark, near the downtown retail core.



Seismic Engineering (continued)

BLAINE ELEMENTARY SCHOOL ECKSTEIN MIDDLE SCHOOL Seattle, Washington



PSM has worked with the Seattle School District for over 60 years. We were the lead firm for the District's first seismic review of their facilities, in the 1970's. Both of these Seattle

Schools (originally designed by PSM), as well as many others, have benefited from PSM Seismic Engineering.



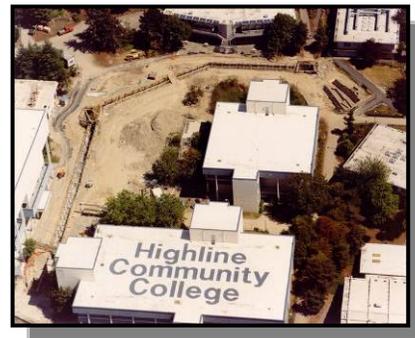
UNIVERSITY OF WASHINGTON GOWEN AND SMITH HALLS SEISMIC STUDY Seattle, Washington

PSM recently finished an extensive seismic evaluation of these two 70-year old structures on the University of Washington campus. Our study included state-of-the-art computer modeling of the lateral force resisting system, investigation and recommendations regarding non-structural seismic hazards, and construction cost estimates for repair of these masonry-clad concrete buildings.



HIGHLINE COMMUNITY COLLEGE UTILITY TUNNEL RECONSTRUCTION Des Moines, Washington

When the Nisqually Earthquake damaged this important campus infrastructure link beyond repair, Peterson Strehle Martinson provided structural engineering services critical to the success of this fast-track project, which restored a critical campus artery.



Seismic Engineering (continued)

ALASKA AIRLINES DATA CENTER SEISMIC RETROFIT **Seattle, Washington**



After 2001 earthquake, the airline decided to upgrade their data center. PSM designed a seismic retrofit for this steel framed building. Major challenge was to design structural modifications for a building with a lot of data cables and the upgrade to be implementable under operational conditions.



BOEING BUILDING 4-21 **MEZZANINE DEMOLITION PROJECT** **Renton, Washington**

As part of an overall project to demolish a large industrial mezzanine, PSM was required to determine the effect on the seismic resistance of the remaining massive airplane assembly building, which was constructed in 1940. This included structural design of support structure for remaining mezzanine. PSM also served as design team project manager.



VALLEY GENERAL HOSPITAL AT MONROE **Monroe, Washington**

Remodeling and upgrading of an existing emergency room while in operation. Extensive interface with existing structure. New braced frames (in photo) replaced existing shear wall.



KING COUNTY REGIONAL COMMUNICATIONS **AND REGIONAL COORDINATION CENTER** **Renton, Washington**

This new facility, designed specifically for coordinating emergency response to natural disasters or other emergencies of all types, required all of its equipment to remain operational after a major earthquake. This involved designing restraint systems and connections for a wide range of equipment, including video monitors, lighting, storage lockers, and air tanks.



Seismic Engineering (continued)

ARCTIC BUILDING SEISMIC STUDY

Seattle, Washington



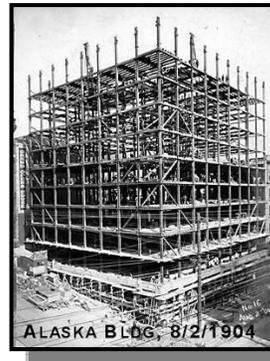
As part of a team, the City of Seattle commissioned us to study the adaptive reuse of this historic, 80-year-old ten story building in Seattle's downtown. Our services included computer modeling, and preliminary design of seismic upgrade schemes in response to architectural requirements. FEMA 356 was used.



ALASKA BUILDING SEISMIC STUDY

Seattle, Washington

PSM completed a design study for this 100-year-old historic steel-framed 15 story building in downtown Seattle, for conversion to mixed use.



HARBOR HEIGHTS CONDOMINIUM SEISMIC STUDY

Seattle, Washington

We recently completed a seismic study for this 19 story concrete building. Complete dynamic and static analysis, for both current code compliance and codes for existing buildings, was completed. Extensive involvement with building owners/residents was also an important part of this study.

