



Building Code Guide 24-10: Seismic Retrofit Options

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QUESTION: Are there additional options to the seismic improvement standards listed in Portland City Code 24.85 for one and two family residences that are converted to commercial uses?

RESPONSE: Existing wood frame buildings that meet certain criteria may choose one of the options outlined in this code guide for a more limited seismic evaluation and retrofit.

A. Requirements For Using This Code Guide

To use any of the options outlined in this code guide, the building and scope of work must meet the following criteria:

- 1) The building must be a legally permitted R-3 occupancy (including one- and two-family residences) changing to an R-1, R-2, R-4, B, M, S, or F occupancy.
- 2) The structure must be wood framed construction (Type W1 or W1A as defined in ASCE 41-17).
- 3) A site-specific geotechnical report and corresponding structural engineering evaluation report will be required for structures located in areas mapped as having a “High” to “Very High” liquefaction hazard as shown in the Public Safety / Hazards section of www.portlandmaps.com. The geotechnical report must evaluate the liquefaction hazard as outlined in Section 1803 of the Oregon Structural Specialty Code. The structural report must demonstrate the building can tolerate anticipated liquefaction induced strength loss and displacement without collapse.
- 4) Structures located on sites where there is an open landslide site complaint or dangerous building case due to a landslide are excluded.
- 5) Alterations and Additions to the existing structure shall conform to the requirements of Chapter 34 of the 2022 Oregon Structural Specialty Code. This

code guide only covers required seismic upgrades based on change of occupancy or use.

B. Option 1: No Additional Seismic Evaluation and Retrofit

Structures meeting the criteria above and constructed to or fully retrofitted under a finalised permit to meet or exceed one of the following standards need not undergo additional seismic evaluation and retrofit:

- 1) **1993 or later editions of Oregon Structural Specialty Code (OSSC)**
- 2) **2003 or later editions of Oregon Residential Specialty Code (ORSC)**
- 3) **1998 edition of Council of American Building Officials (CABO)**
- 4) **FEMA-178 or ASCE 31 to the Life Safety Performance Level** where the seismic design parameters, effective peak velocity, A_v , and effective peak velocity-related acceleration, A_a , were taken as 0.3 or higher.
- 5) Any edition of **ASCE 41 to the Life Safety Performance Level**

Submittal Requirements for Option 1: The applicant shall provide documentation to the satisfaction of the building official to confirm that the building was constructed or retrofitted to one of the listed standards.

C. Option 2: List of Structural Deficiencies to Evaluate and Retrofit.

Designers may limit the required seismic evaluation and retrofit to the following list. Buildings with structural features that fall outside of the scoping of the standard listed for each item may not use this option. Where a standard is not explicitly listed, designers should use current engineering principles or prescriptive options in the OSSC or ORSC.

- 1) **Foundation and anchorage to foundation:** The structure shall be supported on continuous perimeter foundations of competent material and all sill plates shall be attached to the foundations with minimum size and spacing of sill bolts and other requirements set forth in the standards.
 - a. Provisions of IEBC Appendix A3 or FEMA P-1100, Chapter 4, "*Vulnerability-Based Assessment and Retrofit of Crawlspace Dwellings*" may be used as retrofit strategies to address deficiencies related to cripple wall and sill plate anchorage.
 - b. If the structure is on a slope exceeding 1 to 5 (vertical to horizontal), the structure must be retrofitted in accordance with requirements in FEMA P-1100 Chapter 6, "*Vulnerability-Based Assessment and Retrofit of Hillside Dwellings*."
- 2) **Cripple Walls:** All cripple walls shall be braced to the foundations with wood structural panels. See item 1. above.
- 3) **Soft or Weak Story or Open Front Wall Lines:** Buildings shall not have a soft, weak story or open front wall lines (see IEBC for definitions).

- a. Provisions of IEBC Appendix A4 or FEMA P-1100 Chapter 5, "*Vulnerability-Based Assessment and Retrofit of Living-Space-Over-Garage Dwellings*" may be used as retrofit strategies to address deficiencies related to soft or weak stories and open front structures.
- 4) **Elevated Decks, Porches, and Carports:** Carports, and porches and decks with a walking surface 30" or higher above the adjacent grade plane must be removed or laterally braced.
- 5) **Chimneys:** Masonry chimneys shall be removed or braced.
 - a. Chimneys may be retrofitted in accordance with recommendations in FEMA P-1100 Chapter 7 "*Vulnerability-Based Assessment and Retrofit of Masonry Chimneys and Fireplace Surrounds*".
- 6) **Masonry Veneer:** Masonry veneer shall be connected to the backup with corrosion resistant ties for every 2 2/3 sq ft with a spacing no greater than 24" on center. The backup shall not be unreinforced masonry.

Submittal Requirements for Option 2: The engineering analysis and any required retrofit shall be prepared and stamped by a Registered Engineer or Licensed Architect. The submittal shall clearly identify the standard/s used and list any required retrofits.

Exception: A retrofit that utilizes only the simplified or detailed vulnerability-based assessments and prescriptive design methodologies of IEBC Appendix A3, A4, or FEMA P-1100 (not the Engineered assessment and retrofit methodologies) and complies with the requirements noted above is not required to be stamped by a Registered Engineer or Licensed Architect provided it is prepared by a person with demonstrated competence and knowledge of residential construction and seismic retrofits.

D. Option 3: ASCE 41 Checklist

Designers may use the ASCE 41 checklists and retrofit procedures as prescribed below to evaluate and retrofit structural deficiencies.

- 1) Evaluate the buildings per all three of the following Tier 1 checklists for building types W1 (or W1a if applicable) in ASCE 41-17 to BPOE performance objective:
 - a. **Collapse Prevention Basic Configuration Checklist.** The Geologic Site Hazards in this checklist do not need to be included in the evaluation with the exception of structures located in areas mapped as having a "High" to "Very High" liquefaction hazard. See section A(3) above.
 - b. **Collapse Prevention Structural Checklist for Building Types W1 or W1A whichever is applicable.**
 - c. **Nonstructural Checklist:** Only Masonry Veneer and Masonry Chimney sections of the checklist need to be evaluated.
- 2) In addition to the checklists, evaluate the condition of the existing foundation using FEMA P-1100 Chapter 8 "*Detailed Vulnerability-Based Assessment*" section 8.1.

- 3) Address all non-compliant or unknown items in these Tier 1 checklists utilizing the Tier 2 deficiency-based retrofit procedures in ASCE 41-17 section 5.8 and non-compliant foundations using engineering principles or prescriptive options in the OSSC or ORSC.

Exceptions:

- i. Provisions of IEBC Appendix A3 or FEMA P-1100 may be used as retrofit strategies to address deficiencies related to cripple wall and sill plate anchorage, provided they meet the structural limitations of the scope contained in the standard.
- ii. Provisions of IEBC Appendix A4 or FEMA P-1100 may be used as retrofit strategies to address deficiencies related to a soft or weak story, provided they meet the structural limitations of the scope contained in the standard.

Submittal Requirements for Option 3: The engineering analysis and any required retrofit shall be prepared and stamped by a Registered Engineer or Licensed Architect. The submittal shall clearly identify the standard/s used and list any required retrofits.

Amended with new bureau name July 08, 2024.
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