ORDINANCE No.

Adopt amendments to Portland City Code 24.85, Seismic Design Requirements for Existing Buildings, to revise code references, retain effective design load requirements for seismic upgrades to existing buildings, and add definitions (Ordinance; amend Code Chapter 24.85)

The City of Portland Ordains:

Section 1: The Council finds:

1. The Bureau of Development Services (BDS) promotes safety, livability, and economic vitality through efficient and collaborative application of building and development codes.

2. BDS administers Portland City Code (PCC) Title 24, Building Regulations. PCC Chapter 24.85, Seismic Design Requirements for Existing Buildings, regulates the seismic design of existing buildings, including identification of thresholds for evaluation and upgrade of existing buildings for seismic resistance.

3. Chapter 24.85 was adopted in 1995 (Ordinance No. 168627, effective Mar. 22, 1995) and last amended in 2004 (Ordinance No. 178831, effective November 20, 2004.)

4. In 2014, the code referenced by Chapter 24.85, ASCE (American Society of Civil Engineers) 31, was replaced by ASCE 41-13, and ASCE 31 became obsolete.

5. Under ASCE 31, existing buildings are typically evaluated and designed for 25% lower force levels than that required for new buildings.

6. The new ASCE 41-13 has approaches this requirement with a different methodology. In the Portland metro area analysis has shown that this new approach may result in design force levels that are 35% -48% lower than that required for new buildings, as opposed to the 25% lower force level required under ASCE-31 now.

7. The intent of Chapter 24.85 has not changed. To maintain consistency with the intent of Chapter 24.85, the proposed changes limits the design and evaluation of existing buildings to 75% of the design values for which new buildings are required to be designed, consistent with the 25% lower force levels than that required for new buildings currently.

8. Currently, there is no definition of Occupant Load in Chapter 24.85. This leads to inconsistent methods of calculation of the base number from which seismic upgrade requirements are derived.

9. At the request of the Structural Advisory Board the definition of structural systems damaged by catastrophic events in section 24.85.055 was revised to be consistent with definition for structural systems damaged by an earthquake in section 24.85.056. Since this Title deals with Lateral Load Resisting Systems of existing structures, instead of the percentage of damage being related to the net area of the building the definition was revised to relate damage to a percentage of the capacity of the existing lateral load resisting system.

10. Proposed amendments were submitted to the Building Owners and Managers Association (BOMA), the Structural Engineers Association of Oregon (SEAO), and published on the BDS website. Proposed amendments were also submitted to the City of Portland's Development Review Advisory Committee (DRAC) and Structural Engineering Advisory Board.

11. The following amendments reference the correct external code, include provisions to maintain the intent of Chapter 24.85 by adding an additional minimum limit to the design force levels required for existing buildings, add a definition of Occupant Load, revises the definition of structural systems damaged by catastrophic events, and add other definitions for clarity and ease of use.

NOW, THEREFORE, the Council directs:

a. Section 24.85.020, Seismic Related Definitions, is amended as follows:

24.85.020 Seismic Related Definitions.

(Amended by Ordinance Nos. 169427, 170997, 178831 and 180917, effective May 26, 2007.) The definitions contained in this Section relate to seismic design requirements for existing buildings outlined in this Chapter.

A. **ASCE ~~31~~41** means the Seismic Evaluation and Retrofit of Existing Buildings ASCE/SEI ~~31-03~~41-13 published by the American Society of Civil Engineers and the Structural Engineering Institute.

B. **ASCE ~~31~~41** Evaluation means the process of evaluating an existing building for the potential earthquake-related risk to human life posed by that building, or building component, and the documentation of that evaluation, performed and written according to the provisions of ASCE ~~31~~41. Tier 1 and Tier 2 deficiency based evaluation for both structural and non-structural components using the Basic Performance Objective for Existing Buildings (BPOE) as defined in ASCE 41 shall be the performance objective for the evaluation, unless a Tier 3 evaluation is required by ASCE 41. ~~ASCE 31 Evaluation is divided into two categories:~~

~~**1.** Non-essential facilities evaluation means a Tier 1 and a Deficiency-Only Tier 2 analysis to the Life Safety (LS) performance level as defined by ASCE 31 unless a complete Tier 2 analysis is required by ASCE 31.~~

~~**2.** Essential facilities evaluation means a Tier 2 analysis to the Immediate Occupancy (IO) performance level as defined by ASCE 31.~~

C. **ASCE ~~31~~41-BPOE Improvement Standard** means the ~~Tier 1 and Tier 2 Life Safety Performance Level Criteria of ASCE 31~~. Tier 1 and Tier 2 Deficiency based retrofit for both structural and non-structural components using the Basic Performance Objective for Existing Buildings (BPOE) as defined in ASCE 41, unless a Tier 3 evaluation is required by ASCE 41.

D. **ASCE 41-BPON Improvement Standard** means Tier 3 Retrofit for both structural and non-structural components using the Basic Performance Objective Equivalent to New Buildings (BPON) as defined in ASCE 41.

~~D~~E. **ATC 20** means the ~~1989~~ latest Edition of the manual on "Procedures for Post Earthquake Safety Evaluation of Buildings" published by Applied Technology Council.

~~E~~F. **BDS** means the City of Portland's Bureau of Development Services.

G. **BPOE-** Basic Performance Objective for Existing Buildings: A series of defined Performance Objectives based on a building's Risk Category meant for evaluation and retrofit of existing buildings; See Table 2-1 of ASCE 41.

H. **BPON-** Basic Performance Objective Equivalent to New Building Standards: A series of defined Performance Objectives based on a building's Risk Category meant for evaluation and retrofit of existing buildings to achieve a level of performance commensurate with the intended performance of buildings designed to a standard for new construction; See Table 2-2 of ASCE 41.

I. **BSE-1E:** Basic Safety Earthquake-1 for use with the Basic Performance Objective for Existing Buildings, taken as a seismic hazard with a 20% probability of exceedance in 50 years, except that the design spectral response acceleration parameters Sx_s and Sx_1 for BSE-1E seismic hazard level shall not be taken as less than 75 percent of the respective design spectra response acceleration parameters obtained from BSE-1N seismic hazard level and need not be greater than BSE-2N at a site.

J. **BSE-1N:** Basic Safety Earthquake-1 for use with the Basic Performance Objective Equivalent to New Buildings Standards, taken as two-thirds of the BSE- 2N.

K. **BSE-2E:** Basic Safety Earthquake-2 for use with the Basic Performance Objective for Existing Buildings, taken as a seismic hazard with a 5% probability of

exceedance in 50 years, except that the design spectral response acceleration parameters of Sx_s and Sx_1 for BSE-2E seismic hazard level shall not be taken as less than 75 percent of the respective design spectra response acceleration parameters obtained from BSE- 2N Seismic hazard level and may not be greater than BSE-2N at a site.

L. **BSE-2N:** Basic Safety Earthquake-2 for use with the Basic Performance Objective Equivalent to New Buildings Standards, taken as the ground shaking based on Risk-Targeted Maximum Considered Earthquake (MCE_R) per ASCE 7 at a site.

~~F~~M. **Building Addition** means an extension or increase in floor area or height of a building or structure.

~~G~~N. **Building Alteration** means any change, addition or modification in construction.

~~H~~O. **Catastrophic Damage** means damage to a building that causes an unsafe structural condition from fire, vehicle collision, explosion, or other events of similar nature.

~~I~~P. **Essential Facility** has the same meaning as defined in the OSSC.

~~J~~Q. **Fire and Life-safety for Existing Buildings (FLEx) Guide** means a code guide published by the Bureau of Development Services, outlining alternative materials and methods of construction that are allowed for existing buildings in Portland.

~~K~~R. **FM 41** Agreement means a joint agreement between Portland Fire & Rescue, the Bureau of Development Services and a building owner to schedule improvements to the building following a determination of the fire and life safety hazards posed by the existing condition of the building as provided under Oregon law.

~~L~~S. **Live/Work Space** means a combination working space and dwelling unit. A live/work space includes a room or suite of rooms on one or more floors designed for and occupied by not more than one family and including adequate working space reserved for the resident's occupancy. A live/work space is individually equipped with an enclosed bathroom containing a lavatory, water closet, shower/and or bathtub and appropriate venting.

~~M~~T. **Net Floor Area** means the entire area of a structurally independent building, including an occupied basement, measured from the inside of the permanent outer building walls, excluding any major vertical penetrations of the floor, such as elevator and mechanical shafts.

U. **Occupant Load** means the number of persons for which the means of egress of a building or portion thereof is designed. The occupant load shall be calculated based on occupant load factors in the table assigned to each space in the Oregon Structural Specialty Code (OSSC).

~~N~~V. **Oregon Structural Specialty Code (OSSC)** means the provisions of the State of Oregon Structural Specialty Code as adopted by Section 24.10.040 A.

~~O~~W. **Reinforced Masonry** means masonry having both vertical and horizontal reinforcement as follows:

1. Vertical reinforcement of at least 0.20 in^2 in cross-section at each corner or end, at each side of each opening, and at a maximum spacing of 4 feet throughout. One or two story buildings may have vertical reinforcing spaced at greater than 4 feet throughout provided that a rational engineering analysis is submitted which shows that existing reinforcing and spacing provides adequate resistance to all required design forces without net tension occurring in the wall.

2. Horizontal reinforcement of at least 0.20 in^2 in cross-section at the top of the wall, at the top and bottom of wall openings, at structurally connected roof and floor openings, and at a maximum spacing of 10 feet throughout.

3. The sum of the areas of horizontal and vertical reinforcement shall be at least 0.0005 times the gross cross-sectional area of the element.

4. The minimum area of reinforcement in either direction shall not be less than 0.000175 times the gross cross-sectional area of the element.

X. **Risk Category:** A categorization of a building for determination of earthquake performance based on Oregon Structural Specialty Code (OSSC).

~~P~~Y. **Roof Covering Repair or Replacement** means the installation of a new roof covering following the removal of an area of the building's roof covering exceeding 50% or more of the total roof area within the previous five year period.

~~Q~~Z. **Unreinforced Masonry (URM)** means adobe, burned clay, concrete or sand-lime brick, hollow clay or concrete block, hollow clay tile, rubble and cut stone and unburned clay masonry that does not satisfy the definition of reinforced masonry as defined herein. Plain unreinforced concrete shall not be considered unreinforced masonry for the purpose of this Chapter.

~~R~~AA. **Unreinforced Masonry Bearing Wall** means a URM wall that provides vertical support for a floor or roof for which the total superimposed vertical load exceeds ~~200~~ 100 pounds per lineal foot of wall.

~~S~~AB. **Unreinforced Masonry Bearing Wall Building** means a building that contains at least one URM bearing wall.

b. Section 24.85.040, Change of Occupancy or Use, is amended as follows:

24.85.040 Change of Occupancy or Use.

(Amended by Ordinance Nos. 169905, 170997 and 178831, effective November 20, 2004.)

The following table shall be used to classify the relative hazard of all building occupancies:

TABLE 24.85-A		
Relative Hazard Classification	**OSSC Occupancy Classification**	**Seismic Improvement Standard**
5 (Highest)	A, E, I-2, I-3, H-1, H-2, H-3, H-4, H-5	OSSC or ASCE 41-BPON
4	R-1,R-2, SR, I-1, I-4	
3	B, M	~~ASCE 31~~ 41-BPOE
2	F-1, F-2, S-1, S-2	
1 (Lowest)	R-3, U	

A. Occupancy Change to a Higher Relative Hazard Classification. An occupancy change to a higher relative hazard classification will require seismic improvements based upon the factors of changes in the net floor area and the occupant load increases as indicated in Table 24.85-B below. All improvements to either the OSSC or ASCE ~~31~~41 improvement standard shall be made such that the entire building conforms to the appropriate standard indicated in Table 24.85-B.

TABLE 24.85-B				
Percentage of Building Net Floor Area Changed		**Occupant Load Increase**	**Required Improvement Standard**	**Relative Hazard Classification**
1/3 of area or less	and	Less than 150	None	1 through 5
More than 1/3 of area	or	150 and above	ASCE ~~31~~ 41-BPOE	1, 2, and 3
More than 1/3 of area	or	150 and above	OSSC or ASCE 41-BPON	4 and 5

Multiple occupancy changes to a single building may be made under this section without triggering a seismic upgrade provided the cumulative changes do not exceed 1/3 of the building net floor area or add more than 149 occupants with respect to the legal building occupancy as of October 1, 2004.

B. **Occupancy Change to Same or Lower Relative Hazard Classification**. An occupancy change to the same or a lower relative hazard classification or a change in use within any occupancy classification will require seismic improvements using either the OSSC or ASCE ~~31~~ 41 improvement standard, as identified in Table 24.85-A above, where the change results in an increase in occupant load of more than 149 people as defined by the OSSC. Where seismic improvement is required, the entire building shall be improved to conform to the appropriate improvement standard identified in Table 24.85-A.

Multiple occupancy changes to a single building may be made under this section without triggering a seismic upgrade provided the cumulative changes do not result in the addition of more than 149 occupants with respect to the legal building occupancy as of October 1, 2004.

C. **Occupancy Change to Live Work Space.** Any building occupancy classified as relative hazard category 1, 2, or 3 may undergo a change of occupancy to live/work space provided that:

1. The building shall be improved such that the entire building conforms to the ASCE ~~31~~ 41-BPOE improvement standard; and

2. The building meets the fire and life safety standards of either the FLEx Guide or the current OSSC.

3. Any Unreinforced Masonry bearing wall building converted to live/work space, regardless of construction costs, shall be improved such that the entire building conforms to the ASCE ~~31~~ 41-BPOE improvement standard.

D. Occupancy Change to Essential Facilities. All structures which are being converted to essential facilities, as defined in the OSSC, shall comply with current state code seismic requirements or ASCE 41-BPON improvement standard, regardless of other requirements in this section.

c. Section 24.85.050, Building Additions or Structural Alterations, is amended as follows:

24.85.050 Building Additions or Structural Alterations.

(Amended by Ordinance No. 178831, effective November 20, 2004.) An addition that is not structurally independent from an existing building shall be designed and constructed such that the entire building conforms to the seismic force resistance requirements for new buildings unless the ~~three~~ following two conditions listed below are met. Furthermore,

structural alterations to an existing building or its structural elements shall also meet the following ~~three~~ two conditions:

A. The addition or structural alteration shall comply with the requirements for new buildings; and

B. ~~The addition or structural alteration shall not increase the seismic forces in any structural element of the building by more than 5 percent unless the capacity of the element subject to the increased forces is equal to or greater than that required for new buildings. Multiple force increases on an element are allowed provided the cumulative force increase does not exceed 5 percent of the force on the element from its original, unaltered state; and~~ Any existing lateral load-carrying structural element whose demand-capacity ratio with the addition(s) or structural alteration(s) considered is no more than 10% greater than its demand-capacity ratio with the addition(s) or structural alteration(s) ignored shall be permitted to remain unaltered. For purposes of this paragraph, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and structural alterations since original construction.

C. ~~The addition or structural alteration shall not decrease the seismic resistance of any structural element of the existing building unless the reduced seismic resistance of the element is equal to or greater than that required for new buildings.~~

d. Section 24.85.055, Structural Systems Damaged by Catastrophic Events, is amended as follows:

24.85.055 Structural Systems Damaged by Catastrophic Events.
(Added by Ordinance No. 170997; amended by 178831, effective November 20, 2004.)

A. Building ~~structural~~ Lateral Load Resisting systems along any principal axis damaged less than or equal to 50%.

1. If a building is damaged by a catastrophic event such that ~~the area of the resulting structural damage is less than or equal to 50 percent of the building's net area,~~ less than or equal to 50 percent of the capacity of the existing lateral load resisting system along any principal axis of the building are damaged, only the ~~all~~ damaged lateral load resisting components of the building's structural system must be designed and constructed to current provisions of the OSSC. These components must also be connected to the balance of the undamaged lateral load resisting system in conformance with current code provisions. Undamaged components need not be upgraded to current lateral load provisions of the current code, unless required by other provisions of this title.

2. New lateral system vertical elements must be compatible with any existing lateral system elements, including foundations. In multistory buildings, the engineer shall confirm that the new lateral system vertical elements do not introduce soft or weak story seismic deficiencies, as defined by ASCE ~~31~~41, where they did not previously exist, or make existing conditions more hazardous.

B. Building ~~structural~~ Lateral Load Resisting systems along any principal axis damaged more than 50%. Where a building is damaged by a catastrophic event such that ~~the area of the resulting structural damage is greater than 50 percent of the building's net floor area,~~ more than 50% of the capacity of the existing lateral load resisting system along any principal axis of the building is damaged, all lateral load resisting components of the entire building's structural system along that principal axis must be designed and constructed to the current provisions of the OSSC or ASCE 41-BPON improvement standard.

e. Section 24.85.056, Structural Systems Damaged by an Earthquake, is amended as follows:

24.85.056 Structural Systems Damaged by an Earthquake.

(Added by Ordinance No. 178831, effective November 20, 2004.) As a result of an earthquake, the Director may determine through either an ATC 20 procedure or through subsequent discovery any structure or portion thereof to be in an unsafe condition as defined by State law. As a result of making this determination, the Director may declare the structure or portion thereof to be a public nuisance and to be repaired or rehabilitation as provided in Subsections 24.85.056 A.-C., or abated by demolition or removal in accordance with Title 29. For the purposes of this Section, an "unsafe condition" includes, but is not limited to any portion, member or appurtenance of a building that has become detached or dislodged or appears likely to fail or collapse and thereby injure persons or damage property; or any portion of a building or structure that has been damaged to the extent that the structural strength or stability of the building is substantially less than it was prior to the damaging event.

A. Buildings built prior to January 1, 1974 with lateral support systems that have unsafe conditions shall be repaired or improved to resist seismic forces such that the repaired lateral system conforms to the ASCE ~~31~~ 41-BPOE improvement standard.

1. Where less than 50% of the lateral support system has been damaged, only the damaged elements must be repaired.

2. Where 50% or more of the lateral support system has been damaged, then the entire lateral support system must be repaired to resist seismic forces such that the repaired system conforms to the ASCE ~~31~~ 41-BPOE improvement standard.

B. Buildings built on or after January 1, 1974 with lateral support systems that have unsafe conditions shall be repaired or improved to resist seismic forces such that the repaired lateral system conforms to the code to which the building was originally designed, but not less than that required to conform to the ASCE ~~31~~ 41-BPOE improvement standard.

1. Where less than 50% of the lateral support system has been damaged, only the damaged elements must be repaired.

2. Where 50% or more of the lateral support system has been damaged, then the entire lateral support system must be repaired to resist seismic forces such that the repaired system conforms to the code to which the building was originally designed, but not less than that required to conform to the ASCE ~~31~~ 41-BPOE improvement standard.

C. New lateral system vertical elements must be compatible with any existing lateral system elements, including foundations. In multistory buildings, the engineer shall confirm that the new lateral system vertical elements do not introduce soft or weak story seismic deficiencies, as defined by ASCE ~~31~~ 41, where they did not previously exist, or make existing conditions more hazardous.

f. Section 24.85.060, Required Seismic Evaluation, is amended as follows:

24.85.060 Required Seismic Evaluation.

(Added by Ordinance No. 169427; amended by 178831, effective November 20, 2004). When an alteration for which a building permit is required has a value (not including costs of mechanical, electrical, plumbing, permanent equipment, painting, fire extinguishing systems, site improvements, eco-roofs and finish works) of more than $175,000, an ASCE ~~31~~41 evaluation is required. This value of $175,000 shall be modified each year after 2004 by the percent change in the R.S Means Construction Index for Portland on file with the Director. A letter of intent to have an ASCE ~~31~~41 evaluation performed may be submitted along with the permit application. The evaluation must be completed before any future permits will be issued. The following shall be exempted from this requirement:

A. Buildings constructed or renovated to seismic zone 2, 2b or 3 under a permit issued after January 1, 1974.

B. Detached One- and two-family dwellings, and their accessory structures.

C. Single story, light frame metal and light wood frame buildings, not more than 20 feet in height from the top surface of the lowest floor to the highest interior overhead finish and ground area of 4,000 square feet or less.

A previously prepared seismic study may be submitted for consideration by the Director as equivalent to an ASCE ~~31~~41 evaluation.

g. Section 24.85.060, Seismic Strengthening of Unreinforced Masonry Bearing Wall Buildings, is amended as follows:

24.85.065 Seismic Strengthening of Unreinforced Masonry Bearing Wall Buildings. (Added by Ordinance No. 169427; amended by 170997 and 178831, effective November 20, 2004). When any building alterations or repairs occur at an Unreinforced Masonry Bearing Wall Building, all seismic hazards shall be mitigated as set forth in Subsections 24.85.065 A. and B. A previously permitted seismic strengthening scheme designed in accordance with FEMA 178/310/ASCE 31 may be submitted for consideration by the Bureau Director as equivalent to the ASCE ~~31~~41 improvement standard:

A. Roof Repair or Replacement. When a roof covering is repaired or replaced, as defined in 24.85.020, the building structural roof system, anchorage, and parapets shall be repaired or rehabilitated such that, at a minimum, the wall anchorage for both in-plane and out-of-plane forces at the roof and parapet bracing conform to the ASCE ~~31~~ 41-BPOE improvement standard. In-plane brick shear tests are not required as part of the ASCE evaluation under this subsection.

B. Additional Triggers.

1. Building alterations or repair. When the cost of alteration or repair work which requires a building permit in a 2 year period exceeds the following criteria, then the building shall be improved to resist seismic forces such that the entire building conforms to the ASCE ~~31~~ 41-BPOE improvement standard.

Table 24.85-C

Building Description	Cost of Alteration or Repair
Single Story Building	$40 per square foot
Buildings Two Stories or Greater	$30 per square foot

2. Special building hazards. Where an Unreinforced Masonry Building of any size contains any of the following hazards, the building shall be seismically improved if the cost of alteration or repair exceeds $30 per square foot:

a. The Building possesses an Occupancy Classification listed within the Relative Hazard Category 5 as determined in Section 24.85.040 of this Chapter; or

b. The building is classified as possessing either vertical or plan irregularities as defined in the OSSC.

3. **Exclusions from cost calculations.** Costs for site improvements, eco-roofs, mandated FM41 agreements, mandated ADA improvements, mandated non-conforming upgrades under Title 33, mandated elevator improvements and mandated or voluntary seismic improvements or work exempted from permit as described in Chapter 1 of the OSSC will not be included in the dollar amounts listed in Subsections 24.85.065 B.1. and 2.

4. **Live/Work spaces in Unreinforced Masonry buildings.** See Section 24.85.040 B for requirements when a Unreinforced Masonry building is converted to contain live/work spaces.

5. **Automatic cost increase.** The dollar amounts listed in Subsections 24.85.065 B.1. and 2. shall be modified each year after 2004 by the percent change in the R.S. Means of Construction Cost Index for Portland, Oregon. The revised dollar amounts will be made available at the Development Services Center.