CHAPTER 4

REPAIRS

User note:

About this chapter: *Chapter 4 provides requirements for repairs of existing buildings. The provisions define conditions under which repairs may be made using materials and methods like those of the original construction or the extent to which repairs must comply with requirements for new buildings. Requirements from Section 303 of the 2015 Seattle Existing Building Code have been relocated to this chapter.*

SECTION 401
GENERAL

[S] 401.1 Scope. ((~~*Repairs* shall comply with the requirements of this chapter. *Repairs* to *historic buildings* need only comply with Chapter 12.~~)) Damaged buildings and structures, and parts thereof shall be *repaired* in compliance with this chapter. Work on undamaged parts of a building or structure that is necessary for the required *repair* of damaged parts shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* except as specifically required in this chapter. Routine maintenance, ordinary *repairs* exempt from permit in accordance with *International Building Code* Section 106.2, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

[S] 401.1.1 Determining repair levels. *Repairs* shall be classified as *repair* of minor damage, *repair* of moderate damage, *repair* of significant damage, or repair of extensive damage. Required *repair* levels shall be based on the *damage ratio* as defined in Section 202. *Damage ratios* shall be determined according to rules promulgated by the Director.

[S] 401.1.2 Requirements for repair of minor damage. *Repair* of buildings with *damage ratios* less than 10 percent shall comply with this Section 401.1.2. Repair of unreinforced masonry chimneys shall comply with Section 302.9.

1. Damage to structural elements and fire/life safety systems shall be repaired.
2. New or replaced elements shall comply with current code requirements.

   Exception: Like materials shall be permitted for nonstructural alterations, provided no hazard to life, health or property is created, and the materials do not adversely affect any structural member or result in a change to the fire-resistance rating of any part of the building or structure.
3. New or replaced structural elements shall be tied into new or existing structure in accordance with the structural engineer's recommendations and accepted practice.
4. All structural *repairs* shall be designed and approved by a structural engineer licensed in the State of Washington.
5. Cracked concrete and masonry shall be repaired if repair is required by FEMA 306, 307 and 308.
6. Strengthening of the entire building or structure is not required.
7. Fire protection and life safety systems required when the building was built or altered shall be repaired in accordance with Section 101.5.
8. No portion of the building shall be repaired in such a manner that the building becomes less safe than it was before the damage occurred, nor shall the repair create an unsafe condition as defined in Section 101.14.

[S] 401.1.3 Requirements for repair of moderate damage. *Repair* of buildings with *damage ratios* of at least 10 percent and less than 30 percent shall comply with Section 401.1.2 and this Section 401.1.3. All structures supporting and supported by the damaged portions of the building shall be repaired in accordance with items 1 through 6 below.

1. The capacity of existing structural elements supporting and supported by the damaged portion of the building shall not be less than the capacity of those elements before the damage occurred.
2. The lateral loading to existing elements of the lateral force resisting systems shall not be increased beyond their capacity.
3. New work shall not introduce new irregularities, and shall not worsen existing irregularities.
4. New structural elements shall be detailed and connected to the existing structural elements as required by this code.
5. New or relocated nonstructural elements shall be detailed and connected to existing or new structural elements as required by this code.
6. The *alterations* shall not create an *unsafe* condition.

[S] 401.1.4 Requirements for repair of significant damage. *Repair* of buildings with *damage ratios* of at least 30 percent and less than 50 percent shall comply with Sections 401.1.2, 401.1.3 and this Section 401.1.4.

1. The engineer shall submit a report identifying structural damage, and falling hazards to exitways, pedestrian walkways and public rights of way. The report shall also contain a statement acknowledging that compliance with this section may not satisfy the requirements for *substantial alteration* of Section 307.
2. All identified falling hazards in exits and exit discharges shall be mitigated so as to limit damage at primary means of egress.
3. The walls, roofs and floors of unreinforced masonry buildings shall comply with the sections of ASCE 41 or Appendix A1 in Table 401.1. Seismic forces shall comply with reduced International Building Code forces per Section 303.4.2.

   Exception: If the tested mortar strength is less than the minimums indicated in Table 401.1, Item a, the structure shall comply with all requirements of 303.4.2.
4. Repair of damage for buildings subject to this Section 401.1.4 will be considered when determining whether Section 307 provisions for *substantial alterations* apply.

[S] 401.1.5 Requirements for repair of extensive damage. *Repair* of buildings with *damage ratios* of at least 50 percent and less than 60 percent shall comply with Sections 401.1.2 through 401.1.4 and this Section 401.1.5.

1. The structure shall be *repaired* and designed to satisfy the requirements of ASCE 41 and the performance criteria in Table 303.4.2.
2. A seismic evaluation report shall be submitted. The report shall comply with rules promulgated by the *code official*, and the following requirements:

   2.1 The report shall be prepared by a structural engineer registered in the state of Washington.

   2.2 The report shall be based on ASCE 41 and the performance criteria in Table 303.4.2.

   Exception: Unreinforced masonry buildings are permitted to comply with Appendix A1. The reduction of Section 401.1.4 Item 3 is not allowed.

   2.3 At a minimum, the report shall contain the information listed below. A previously written report may be submitted if it satisfies the requirements of this section.

   2.3.1 An overall description of the building, including size (number of stories and basements, approximate floor area) and the occupancies or uses in the building.

   2.3.2 Identification of building deficiencies.

401.1.6 Requirements for repair of more than extensive damage. Repair of buildings with damage ratios of 60% or more shall comply with Section 307.

[S] TABLE 401.1
REQUIREMENTS FOR UNREINFORCED MASONRY BUILDINGS

COMPONENT	ASCE 41 SECTION	APPENDIX A SECTION
a. Masonry strength (mortar and anchor tests) for anchorage to masonry and for wall bracing	16.2.2.2	A106.2.3
b. Diaphragm shear transfer	16.2.3.2.6	A111.5
c. Out-of-plane transfer	16.2.4.3	A113.1
d. Wall bracing	16.2.4.2	A113.5

401.2 Compliance. The work shall not make the building less complying than it was before the *repair* was undertaken.

* **[S][BS] 401.3 Flood hazard areas.** In flood hazard areas, *repairs* that constitute a *substantial improvement* of the existing structure or buildings that have been *substantially damaged* shall ((~~require that the building~~)) comply with ((~~Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable~~)) the requirements for repairs in Section 310 of this code.

SECTION 402
BUILDING ELEMENTS AND MATERIALS

402.1 Glazing in hazardous locations. Replacement glazing in hazardous locations shall comply with the safety glazing requirements of the *International Building Code* or *International Residential Code* as applicable.

Exception: Glass block walls, louvered windows and jalousies repaired with like materials.

SECTION 403
FIRE PROTECTION

403.1 General. *Repairs* shall be done in a manner that maintains the level of fire protection provided.

SECTION 404
MEANS OF EGRESS

404.1 General. *Repairs* shall be done in a manner that maintains the level of protection provided for the means of egress.

SECTION 405
STRUCTURAL

[S][BS] 405.1 General. Structural *repairs* shall be in compliance with ((~~this section and~~)) Section ((~~401.2~~)) 303.

[S] ((~~[BS] 405.2 Repairs to damaged buildings.~~ ~~*Repairs* to damaged buildings shall comply with this section.~~

~~**[BS] 405.2.1 Repairs for less than substantial structural damage.** Unless otherwise required by this section, for damage less than *substantial structural damage*, the damaged elements shall be permitted to be restored to their predamage condition.~~

~~**[BS] 405.2.1.1 Snow damage.** Structural components whose damage was caused by or related to snow load effects shall be repaired, replaced or altered to satisfy the requirements of Section 1608 of the *International Building Code*.~~

~~**[BS] 405.2.2 Disproportionate earthquake damage.** A building assigned to Seismic Design Category D, E or F that has sustained *disproportionate earthquake damage* shall be subject to the requirements for buildings with substantial structural damage to vertical elements of the lateral force-resisting system.~~

~~**[BS] 405.2.3 Substantial structural damage to vertical elements of the lateral force-resisting system.** A building that has sustained *substantial structural damage* to the vertical elements of its lateral force-resisting system shall be evaluated in accordance with Section 405.2.3.1, and either repaired in accordance with Section 405.2.3.2 or repaired and retrofitted in accordance with Section 405.2.3.3, depending on the results of the evaluation.~~

~~**Exceptions:**~~

1. ~~Buildings assigned to Seismic Design Category A, B or C whose *substantial structural damage* was not caused by earthquake need not be evaluated or retrofitted for load combinations that include earthquake effects.~~
2. ~~One- and two-family dwellings need not be evaluated or retrofitted for load combinations that include earthquake effects.~~))

~~**[BS] 405.2.3.1 Evaluation.** The building shall be evaluated by a registered design professional, and the evaluation findings shall be submitted to the *code official*. The evaluation shall establish whether the damaged building, if repaired to its predamage state, would comply with the provisions of the *International Building Code* for load combinations that include wind or earthquake effects, except that the seismic forces shall be the reduced seismic forces.~~

~~**[BS] 405.2.3.2 Extent of repair for compliant buildings.** If the evaluation establishes that the building in its predamage condition complies with the provisions of Section 405.2.3.1, then the damaged elements shall be permitted to be restored to their predamage condition.~~

~~**[BS] 405.2.3.3 Extent of repair for noncompliant buildings.** If the evaluation does not establish that the building in its predamage condition complies with the provisions of Section 405.2.3.1, then the building shall be retrofitted to comply with the provisions of this section. The wind loads for the *repair* and *retrofit* shall be those required by the building code in effect at the time of original construction, unless the damage was caused by wind, in which case the wind loads shall be in accordance with the *International Building Code*. The seismic loads for this *retrofit* design shall be those required by the building code in effect at the time of original construction, but not less than the reduced seismic forces.~~

~~**[BS] 405.2.4 Substantial structural damage to gravity load-carrying components.** Gravity load-carrying components that have sustained *substantial structural damage* shall be rehabilitated to comply with the applicable provisions for dead and live loads in the *International Building Code*. Snow loads shall be considered if the *substantial structural damage* was caused by or related to snow load effects. Undamaged gravity load-carrying components that receive dead, live or snow loads from rehabilitated components shall also be rehabilitated if required to comply with the design loads of the *rehabilitation* design.~~

~~**[BS] 405.2.4.1 Lateral force-resisting elements.** Regardless of the level of damage to vertical elements of the lateral force-resisting system, if *substantial structural damage* to gravity load-carrying components was caused primarily by wind or seismic effects, then the building shall be evaluated in accordance with Section 405.2.3.1 and, if noncompliant, retrofitted in accordance with Section 405.2.3.3.~~

~~**Exceptions:**~~

1. ~~Buildings assigned to Seismic Design Category A, B, or C whose substantial structural damage was not caused by earthquake need not be evaluated or retrofitted for load combinations that include earthquake effects.~~

2. One- and two-family dwellings need not be evaluated or retrofitted for load combinations that include earthquake effects.

[BS] 405.2.5 Flood hazard areas. In *flood hazard* areas, buildings that have sustained *substantial damage* shall be brought into compliance with Section 1612 of the *International Building Code*, or Section R322 of the *International Residential Code*, as applicable.))

[S] ((SECTION 406 ELECTRICAL

406.1 Material. Existing electrical wiring and equipment undergoing *repair* shall be allowed to be repaired or replaced with like material.

406.1.1 Receptacles. Replacement of electrical receptacles shall comply with the applicable requirements of Section 406.4(D) of NFPA 70.

406.1.2 Plug fuses. Plug fuses of the Edison-base type shall be used for replacements only where there is no evidence of over fusing or tampering per applicable requirements of Section 240.51(B) of NFPA 70.

406.1.3 Nongrounding type receptacles. For replacement of nongrounding type receptacles with grounding type receptacles and for branch circuits that do not have an equipment grounding conductor in the branch circuitry, the grounding conductor of a grounding-type receptacle outlet shall be permitted to be grounded to any accessible point on the grounding electrode system or to any accessible point on the grounding electrode conductor in accordance with Section 250.130(C) of NFPA 70.

406.1.4 Group I-2 receptacles. Receptacles in patient bed locations of Group I-2 that are not "hospital grade" shall be replaced with "hospital grade" receptacles, as required by NFPA 99 and Article 517 of NFPA 70.

406.1.5 Grounding of appliances. Frames of electric ranges, wall-mounted ovens, counter-mounted cooking units, clothes dryers and outlet or junction boxes that are part of the existing branch circuit for these appliances shall be permitted to be grounded to the grounded circuit conductor in accordance with Section 250.140 of NFPA 70.))

[S] ((SECTION 407 MECHANICAL

407.1 General. Existing mechanical systems undergoing *repair* shall not make the building less complying than it was before the damaged occurred.

407.2 Mechanical draft systems for manually fired appliances and fireplaces. A mechanical draft system shall be permitted to be used with manually fired appliances and fireplaces where such a system complies with all of the following requirements:

1. The mechanical draft device shall be listed and installed in accordance with the manufacturer's installation instructions.
2. A device shall be installed that produces visible and audible warning upon failure of the mechanical draft device or loss of electrical power at any time that the mechanical draft device is turned on. This device shall be equipped with a battery backup if it receives power from the building wiring.
3. A smoke detector shall be installed in the room with the appliance or fireplace. This device shall be equipped with a battery backup if it receives power from the building wiring.))

[S] ((SECTION 408 PLUMBING

408.1 Materials. Plumbing materials and supplies shall not be used for *repairs* that are prohibited in the *International Plumbing Code*.

408.2 Water closet replacement. The maximum water consumption flow rates and quantities for all replaced water closets shall be 1.6 gallons (6 L) per flushing cycle.

* **Exception:** Blowout-design water closets [3.5 gallons (13 L) per flushing cycle].))