

shall be shown to have the capacity to resist the applicable design gravity loads required by this code for new structures.

3404.3.1 Design live load. Where the *alteration* does not result in increased design live load, existing gravity load-carrying structural elements shall be permitted to be evaluated and designed for live loads *approved* prior to the *alteration*. If the *approved* live load is less than that required by Section 1607, the area designed for the nonconforming live load shall be posted with placards of *approved* design indicating the *approved* live load. Where the *alteration* does result in increased design live load, the live load required by Section 1607 shall be used.

3404.4 Existing structural elements carrying lateral load. Except as permitted by Section 3404.5, where the *alteration* increases design lateral loads in accordance with Section 1609 or 1613, or where the *alteration* results in a structural irregularity as defined in ASCE 7, or where the *alteration* decreases the capacity of any existing lateral load-carrying structural element, the structure of the altered building or structure shall be shown to meet the requirements of Sections 1609 and 1613.

Exception: Any existing lateral load-carrying structural element whose demand-capacity ratio with the *alteration* considered is no more than 10 percent greater than its demand-capacity ratio with the *alteration* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces per Sections 1609 and 1613. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces, and capacities shall account for the cumulative effects of additions and alterations since original construction.

3404.4.1 Seismic. Seismic requirements for alterations shall be in accordance with this section. Where the existing seismic force-resisting system is a type that can be designated ordinary, values of R , Ω_0 and C_d for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of a detailed intermediate or special system.

3404.5 Voluntary seismic improvements. Alterations to existing structural elements or additions of new structural elements that are not otherwise required by this chapter and are initiated for the purpose of improving the performance of the seismic force-resisting system of an *existing structure* or the performance of seismic bracing or anchorage of existing nonstructural elements shall be permitted, provided that an engineering analysis is submitted demonstrating the following:

1. The altered structure and the altered nonstructural elements are no less in compliance with the provisions of this code with respect to earthquake design than they were prior to the *alteration*.
2. New structural elements are detailed and connected to the existing structural elements as required by Chapter 16.

3. New or relocated nonstructural elements are detailed and connected to existing or new structural elements as required by Chapter 16.
4. The alterations do not create a structural irregularity as defined in ASCE 7 or make an existing structural irregularity more severe.

3404.6 Means of egress capacity factors. Alterations to any existing building or structure shall not be affected by the egress width factors in Section 1005.1 for new construction in determining the minimum egress widths or the minimum number of exits in an existing building or structure. The minimum egress widths for the components of the *means of egress* shall be based on the *means of egress* width factors in the building code under which the building was constructed, and shall be considered as complying *means of egress* for any *alteration* if, in the opinion of the building code official, they do not constitute a distinct hazard to life.

SECTION 3405 REPAIRS

3405.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section 3401.2. Work on nondamaged components that is necessary for the required repair of damaged components shall be considered part of the repair and shall not be subject to the requirements for alterations in this chapter. Routine maintenance required by Section 3401.2, ordinary repairs exempt from *permit* in accordance with Section 105.2, and abatement of wear due to normal service conditions shall not be subject to the requirements for repairs in this section.

3405.1.1 Dangerous conditions. Regardless of the extent of structural or nonstructural damage, the building code official shall have the authority to require the elimination of conditions deemed dangerous.

3405.2 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 and repaired in accordance with the applicable provisions of Sections 3405.2.1 through 3405.2.3.

3405.2.1 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 this code for wind and earthquake loads. Evaluation for earthquake loads shall be required if the substantial structural damage was caused by or related to earthquake effects or if the building is in Seismic Design Category C, D, E or F.

Wind loads for this evaluation shall be those prescribed in Section 1609. Earthquake loads for this evaluation, if required, shall be permitted to be 75 percent of those prescribed in Section 1613. Values of R , W_0 and C_d for the existing seismic force-resisting system shall be those specified by this code for an ordinary system unless it is demonstrated that the existing system will provide performance equivalent to that of an intermediate or special system.