DSA IR 16-11

SEISMIC OUT-OF-PLANE FORCES FOR NON-BEARING NON-SHEAR CONCRETE AND MASONRY WALLS: 2022 CBC

Disciplines: Structural

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Division of the State Architect (DSA) documents referenced within this publication are available on the DSA Forms or DSA Publications webpages.

PURPOSE

This Interpretation of Regulations (IR) clarifies requirements relating to non-bearing non-shear concrete and masonry walls on construction projects under the DSA's jurisdiction.

SCOPE

The requirements of this IR apply to non-bearing non-shear concrete and masonry walls submitted to DSA for review and approval, with prismatic cross sections full height, not supporting any other accessory element and meet one or more of the following:

- Non-bearing non-shear concrete and masonry walls within the building envelope that comply with the definition of "nonbearing wall" per American Society of Civil Engineers (ASCE) 7 Section 11.2 and meet the criteria of "nonparticipating elements" as defined in TMS 402 Section 7.3.1. Where such walls are braced at the top to the primary structure, the bracing connections shall be configured to transfer wall out-of-plane forces only and accommodate the seismic relative displacements for in-plane movement per ASCE 7 Section 13.3.2.
- Site retaining concrete and masonry walls.
- Free-standing site concrete and masonry walls, such as fences, ball walls, or yard walls.

1. DESIGN REQUIREMENTS

Concrete and masonry walls covered under the scope of this IR shall be designed for out-of-plane seismic forces per this section.

1.1 The component importance factor used for wall design shall be in accordance with ASCE 7 Section 13.1.3, except site retaining walls shall be designed with an importance factor in accordance with ASCE 7 Section 15.4.1.1.

In no case shall the risk category of a site retaining wall be less than the risk category assigned to any adjacent building, structure, or assembly area, including the means of egress from the building or structure. If failure of any site retaining wall or free-standing site wall would affect an emergency vehicle access or any other component required to function for life-safety purposes after an earthquake, such as an egress stairway, a component importance factor of 1.5 shall be used for site wall design and an importance factor of 1.5 shall be used for site retaining wall design.

Exception: The component importance factor for wall (or importance factor for site retaining wall) may be taken as 1.0 where the wall is separated from the building, means of egress, assembly area, or emergency vehicle access, as applicable, by a distance greater than the wall height above adjacent grade.

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1.2 Non-bearing non-shear concrete and masonry walls within the building envelope shall be designed for out-of-plane seismic forces per ASCE 7 Section 13.3.1. The factors for a_p and R_p shall be in accordance with ASCE 7 Table 13.5-1 as noted below:

- Walls braced to structural frame above its center of mass:

  $a_p = 1.0$ $R_p = 2.5$ $\Omega_0 = 2.0$

- Cantilever walls:

  $a_p = 2.5$ $R_p = 2.5$ $\Omega_0 = 2.0$

1.3 The out-of-plane seismic forces for ground-supported free-standing cantilever site walls shall be based on ASCE 7 Section 15.6.8 and Table 15.4-2 using R=1.25, and the Importance Factor will be determined in accordance with ASCE 7 Section 15.4.1.1. Out-of-plane seismic force to be applied as a uniform load over the height of the wall.

1.4 Site retaining walls supporting more than six feet of backfill height shall be designed for dynamic seismic lateral earth pressures due to earthquake ground motions per ASCE 7 Section 15.6.1 and CBC Section 1803A.5.12(1). Per CBC Section 1807A.2.2, this load shall be considered as an earthquake load (E) and combined with the wall seismic inertial force of the wall, (E), and the static lateral earth pressure (H) in accordance with CBC Section 1605A. Site retaining walls supporting six feet or less of backfill height shall be designed for the wall seismic inertial force of the wall, (E), combined with the static lateral earth pressure (H) in accordance with CBC Section 1605A.

REFERENCES:

California Code of Regulations (CCR) Title 24
Part 2: California Building Code, Sections 1605A, 1803A.5.12(1), 1807A.2.2.