

3. Walls shall be anchored to floor and roof diaphragms in accordance with Section A113.1.

A110.3 In-plane loading of URM shear walls and frames. Vertical lateral-load-resisting elements shall be analyzed in accordance with Section A112.

A110.4 Redundancy and overstrength factors. Any redundancy or overstrength factors contained in the building code may be taken as unity. The vertical component of earthquake load (E_v) may be taken as zero.

SECTION A111 SPECIAL PROCEDURE

A111.1 Limits for the application of this procedure. The special procedures of this section may be applied only to buildings having the following characteristics:

1. Flexible diaphragms at all levels above the base of the structure.
2. Vertical elements of the lateral-force-resisting system consisting predominantly of masonry or concrete shear walls.
3. Except for single-story buildings with an open front on one side only, a minimum of two lines of vertical elements of the lateral-force-resisting system parallel to each axis of the building (see Section A111.8 for open-front buildings).

A111.2 Lateral forces on elements of structures. With the exception of the provisions in Sections A111.4 through A111.7, elements of structures shall comply with Sections A110.2 through A110.4.

A111.3 Crosswalls. Crosswalls shall meet the requirements of this section.

A111.3.1 Crosswall definition. A crosswall is a wood-framed wall sheathed with any of the materials described in Table A1-D or A1-E or other system as defined in Section A111.3.5. Crosswalls shall be spaced no more than 40 feet (12 192 mm) on center measured perpendicular to the direction of consideration, and shall be placed in each story of the building. Crosswalls shall extend the full story height between diaphragms.

Exceptions:

1. Crosswalls need not be provided at all levels when used in accordance with Section A111.4.2, Item 4.
2. Existing crosswalls need not be continuous below a wood diaphragm at or within 4 feet (1219 mm) of grade, provided:
 - 2.1 Shear connections and anchorage requirements of Section A111.5 are satisfied at all edges of the diaphragm.
 - 2.2 Crosswalls with total shear capacity of $0.5S_{D1}\sum W_d$ interconnect the diaphragm to the foundation.
 - 2.3 The demand-capacity ratio of the diaphragm between the crosswalls that are

continuous to their foundations does not exceed 2.5, calculated as follows:

$$DCR = \frac{(2.1S_{D1}W_d + V_{ca})}{2v_u D} \quad (\text{Equation A1-8})$$

A111.3.2 Crosswall shear capacity. Within any 40 feet (12 192 mm) measured along the span of the diaphragm, the sum of the crosswall shear capacities shall be at least 30 percent of the diaphragm shear capacity of the strongest diaphragm at or above the level under consideration.

A111.3.3 Existing crosswalls. Existing crosswalls shall have a maximum height-to-length ratio between openings of 1.5 to 1. Existing crosswall connections to diaphragms need not be investigated as long as the crosswall extends to the framing of the diaphragms above and below.

A111.3.4 New crosswalls. New crosswall connections to the diaphragm shall develop the crosswall shear capacity. New crosswalls shall have the capacity to resist an overturning moment equal to the crosswall shear capacity times the story height. Crosswall overturning moments need not be cumulative over more than two stories.

A111.3.5 Other crosswall systems. Other systems, such as moment-resisting frames, may be used as crosswalls provided that the yield story drift does not exceed 1 inch (25.4 mm) in any story.

A111.4 Wood diaphragms.

A111.4.1 Acceptable diaphragm span. A diaphragm is acceptable if the point (L, DCR) on Figure A1-1 falls within Region 1, 2 or 3.

A111.4.2 Demand-capacity ratios. Demand-capacity ratios shall be calculated for the diaphragm at any level according to the following formulas:

1. For a diaphragm without qualifying crosswalls at levels immediately above or below:

$$DCR = 2.1 S_{D1} W_d / \sum v_u D \quad (\text{Equation A1-9})$$

2. For a diaphragm in a single-story building with qualifying crosswalls, or for a roof diaphragm coupled by crosswalls to the diaphragm directly below:

$$DCR = 2.1 S_{D1} W_d / (\sum v_u D + V_{cb}) \quad (\text{Equation A1-10})$$

3. For diaphragms in a multistory building with qualifying crosswalls in all levels:

$$DCR = 2.1 S_{D1} \sum W_d / (\sum \sum v_u D + V_{cb}) \quad (\text{Equation A1-11})$$

DCR shall be calculated at each level for the set of diaphragms at and above the level under consideration. In addition, the roof diaphragm shall also meet the requirements of Equation (A1-10).

4. For a roof diaphragm and the diaphragm directly below, if coupled by crosswalls:

$$DCR = 2.1 S_{D1} \sum W_d / \sum \sum v_u D \quad (\text{Equation A1-12})$$

A111.4.3 Chords. An analysis for diaphragm flexure need not be made, and chords need not be provided.