

Question: How do sections 1633.2.6 and 1633.2.9.6 relate. We are currently retrofitting an existing one story tiltup concrete building with a re-entrant corner. We are following the design requirements of section 163.2.6 for the design of collector elements and their connections. If section 1633.2.9.6 were applied, it seems that ASD would be penalized more heavily than LRFD because the duration of load increase is not allowed in the latter section. Also this latter section makes no direct mention of collector elements, while the former does.

Code reference: 97 UBC Sec. 1633.2.6 and Sec. 1633.2.9.6

Sec. 1633.2.6 is intended for collector elements, splices and their connections to lateral resisting elements. These items shall resist the forces determined in accordance with the formula 33-1. In addition these items shall have the design strength to resist the combined loads resulting from the special seismic load of section 1612.4. The intent is to ensure that the inelastic energy dissipation occurs in lateral force resisting elements more likely to be ductile, i.e. frames, braces and walls. Design strength may be determined using an allowable stress increase of 1.7 and a resistance factor $\phi = 1$. This increase shall not be combined with one-third stress increase per sec. 1612.3 but may be combined with the duration of load increase permitted in Div. III of chapter 23. The collector includes the connections between floor or roof diaphragms and the vertical shear resisting elements. These connections should be designed to prevent localized shear failure which would preclude inelastic energy dissipation from developing in the lateral force resisting system. Particular attention to this problem is required for post tensioned slab connection to shear walls and for precast concrete floor and/or wall panel connections.

Sec. 1633.2.9.6 Plan irregularity: connections of diaphragms to the vertical elements - diaphragm is an assemblage of elements (roof/floor sheathing, framing members supporting sheathing, boundary members i.e. chords and collectors). This provision does not apply to plywood edge nailing but does apply to anchor bolt and other connections of diaphragm. Plywood edge nailing values from UBC tables 23-I-J-1 and 23-I-J-2 may be used directly. For LRFD, this requirement may be satisfied by the use of a load factor of 1.33 for seismic load E.