DPD

Director's Rule 5-2015

Applicant:	Page	Supersedes:
City of Seattle Department of Planning and Development	1 of 3	NA
	Publication: March 19, 2015	**Effective:** May 12, 2015
Subject: Alternate Design Requirements for Use of Special Reinforced Concrete Shear Walls in Over Height Buildings	**Code and Section Reference:** Seattle Building Code Section 1613.1 **Type of Rule:** Code Modification **Ordinance Authority:** SMC 3.06.040	
Index: Seattle Building Code	**Approved** (signature on file) Diane M. Sugimura, Director, DPD	**Date** 5/8/15

BACKGROUND:

This Director's Rule establishes alternate design requirements for the use of Special Reinforced Concrete Shear Walls in buildings with a structural height between 240 feet and 265 feet.

The Seattle Building Code adopts ASCE 7-10 and its requirements for the maximum permitted structural height for different seismic force-resisting systems. Per ASCE 7-10, the maximum structural height of a prescriptively designed Special Reinforced Concrete Shear Wall (SRCSW) seismic force-resisting system is 160 feet. This height may be increased to 240 feet when regularity and redundancy requirements of Section 12.2.5.4 are satisfied.

For a SRCSW building to be constructed with a structural height above 240 feet, the building code requires the designer to engage in a Performance Based Design (PBD) process per ASCE 7-10 Section 12.2.1. Through a rigorous level of analysis relative to prescriptive designs, this

process allows the use of a structural system with a risk level equivalent to a building designed to the code's targeted performance.

The City of Seattle's zoning code references a height limit of 240 feet with a height bonus allowed in some areas of the city. The zoning requirements define height differently than building code structural height. This has resulted in a number of tall buildings being proposed to have a structural height somewhat greater than 240 feet.

Past PBDs have shown that greater strength is needed for certain structural components of the lateral force resisting system. Components typically requiring greater strength include transfer diaphragms, shear walls, and mat foundations.

This has led DPD to determine that an additional prescriptive design option should be allowed for SRCSW buildings that would previously have required a PBD per building code, but have a height only slightly above the prescriptive 240 foot limit.

RULE

As an alternative to a PBD, buildings with a SRCSW seismic force-resisting system may have a structural height increased from 240 feet to 265 feet provided that all of the following structural measures are taken.

1. The earthquake force demands for diaphragm transfer forces shall be amplified by the overstrength factor, Ω_o. These amplified forces shall extend into and be applied to the basement walls.
2. The earthquake shear force demands in shear walls shall be amplified by the overstrength factor, Ω_o.
3. The earthquake force demands in the mat foundation shall be amplified by 2 for shear and 1.5 for flexure.

For the purposes of seismic design, structural height shall be measured in accordance with all of the following:

1. Per ASCE 7-10, the structural height shall be measured from the seismic base to the highest level of the seismic force-resisting system.
2. The highest level of the seismic force-resisting system shall be defined as the roof of the highest occupied story in the building.
3. The seismic base shall be determined in accordance with the definition of "Base" in ASCE 7-10 Section C11.2.
4. Uncovered, occupied roof decks are permitted at the structural height limit.
5. Stair, elevator, mechanical and electrical penthouses, as allowed by SBC Section 1509.2, are permitted to extend above the structural height limit. This includes minimally sized stair and elevator lobbies.

6. The seismic force-resisting system for building elements allowed in item 5 may be of any code defined lateral system. This does not preclude an extension of the SRCSW seismic force-resisting system above the roof of the highest occupied story.
7. The mass of all structure(s) and equipment above the structural height limit, including all penthouses and mechanical equipment, shall be small in comparison to the average mass of the tower floors below.

DPD may require a PBD for unique structures.

A Code Modification Request per SBC Section 104.4 is required by DPD in order to apply this rule.