SDCI | Director's Rule 20-2018

Applicant: City of Seattle Department of Construction and Inspections	**Page** 1 of 2	**Supersedes:**
	Publication: July 9, 2018	**Effective:** August 6, 2018
Subject: Implementation of March 22,2018 USGS/SDCI Basin Amplification Workshop Results	**Code and Section Reference:** 2015 Seattle Building Code Section 1613.5.3 ASCE7-10 Chapter 21	
	Type of Rule: Code Modification	
	Ordinance Authority: SMC 3.06.040	
Index: Seattle Building Code	**Approved** **Date** (signature on file) 8/6/2018 Nathan Torgelson, Director, SDCI	

BACKGROUND

The Seattle Building Code (SBC) adopts the 2010 edition of the American Society of Civil Engineers Standard 7, Minimum Design Loads for Buildings and Other Structures (ASCE 7-10) and its requirements for site-specific ground motion procedures. Per ASCE 7-10 Section 21.2, the site-specific "analysis shall incorporate current seismic interpretations, including uncertainties for models and parameter values for seismic sources and ground motions." Basin amplification factors due to the Seattle Basin are an important consideration in such analyses and are thus required by this rule.

On March 22, 2018, SDCI held a joint workshop with the United States Geological Survey (USGS), "Incorporating results of the M9 project and other recent research to estimate Basin Effects in the design of Tall Buildings," to discuss current basin amplification research. The goal of the workshop was to obtain consensus within the design and geotechnical peer review community as to how the results of current research would be applied to Seattle performance-based design projects. The participants at the workshop agreed that basin amplification factors for subduction sources are different than crustal sources. Workshop participants agreed on

several recommendations, which SDCI is adopting via this Director's Rule. A detailed summary of the workshop will be published by USGS at a later date.

RULE

All building designs utilizing site-specific ground motion procedures shall incorporate basin effects in accordance with this Director's Rule. Basin amplification factors for site-specific procedures shall be established in accordance with the following:

- The basin response shall be captured by multiplying the MCE_R spectrum from a site-specific PSHA by basin amplification factors in accordance with the USGS/SDCI 2013 workshop (USGS Open-File Report 2014-1196). The basin amplification factors shall be calculated for each type of earthquake source and weighted by percent contribution of the source for each period. Basin amplification factors shall be applied to sites within the Seattle basin as defined by geology, gravity, and aeromagnetic data.

- Crustal sources – Use basin amplification factors from Campbell and Bozorgnia (2014), based on the $Z_{2.5}$ from the Stephenson et al. (2017) velocity model.

- Intraslab sources – Use observed Seattle basin amplification factors from local and regional earthquakes such as M6.8 2001 Nisqually and the M6.4 2004 Vancouver Island earthquakes (USGS Open-File Report 2014-1196).

- Subduction interface sources – Use the results of M9 Project basin amplification factors with a reference site of $Z_{2.5} \approx 3$km. This results in basin amplification factors that increase from 1.0 to 2.0 between periods of 0 to 2 seconds, and then remains constant at 2.0 at periods greater than 2 seconds.

These site-specific basin amplification ground motion procedures will be implemented starting December 1, 2018. The following projects are not required to implement the 2018 workshop results.

- Code-prescriptive projects with a complete building permit application in accordance with SBC Section 101.3.1 prior to December 1, 2018.

- Projects utilizing a performance-based seismic design methodology with a peer review kick-off meeting prior to December 1, 2018. Previously approved analysis methods agreed to by the project geotechnical peer reviewer may be used.

The building owner can choose to implement the 2018 workshop results prior to December 1, 2018.