


**Simplified Seismic Design
Requirements for SDC B Buildings**

John Hooper, SE
Member
2015 BSSC Provisions Update Committee




**SIMPLIFIED SEISMIC DESIGN
REQUIREMENTS FOR SDC B BUILDINGS**

John Hooper, Magnusson Klemencic Associates
Curt B. Haselton, Chair and Assoc. Prof., CSU Chico
Abbie B. Liel, Assist. Prof., Univ. of Colorado Boulder
D. Jared Debock, MS Student, Univ. of Colorado Boulder
Richard Henige, Vice Pres., LeMessurier Consultants




Introduction

- **The Problem:**
 - ✓ Concerns in recent years over code complexity
 - ✓ Design of buildings in SDC B possibly a causative force behind these concerns (for seismic)
- **Our Solution:**
 - ✓ Create a stand-alone seismic design chapter for SDC B buildings (ASCE 7 "Chapter 24")
- **The Benefits:**
 - ✓ Decreased complexity for SDC B (for seismic)
 - ✓ Increased likelihood that important requirements will not be overlooked (e.g. non-structural)




Highlights: Editorial Changes

- Elimination of systems in Table “12.2-1”
 - Special steel, concrete, masonry & composite
 - Dual systems with special systems
 - Special cantilever columns
- Elimination of irregularities not pertinent to SDC B
- Elimination of load effect and combinations with overstrength
- Elimination of RHA option




Highlights: Editorial Changes

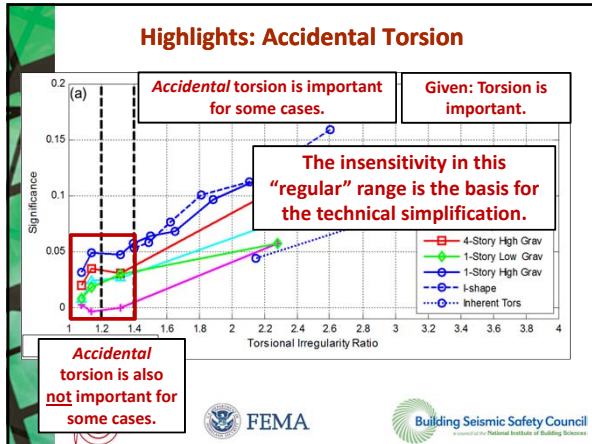
- Elimination of foundation modeling reference to Chapter 19
- Elimination of base shear equations not pertinent to SDC B (T_L and Eq. 12.8-6)
- Simplified period determination ($C_u T_a$)
- Simplified wall anchorage requirements
- Elimination Section 12.14



Highlights: Accidental Torsion

- Question: We know *torsion* is important, but is *accidental torsion* always important in the design?
- Analytical Studies
 - ✓ Full collapse analyses (FEMA P695) of buildings designed with and without accidental torsion.
 - ✓ RC OMF buildings (1-, 4-, 10-story), varying layout.
 - ✓ Note: Full documentation provided in paper submitted to Earthquake Spectra.
- Technical changes:
 - ✓ SDC B: No accidental torsion unless **Type 1B** irreg.
 - ✓ SDC C+: No accidental torsion unless **Type 1A** irreg.





Highlights: Vertical Shaking (Ev)

- Design studies confirmed that vertical shaking (Ev) does not tangibly impact SDC B designs
- Technical change made so $E_v = 0$ in all of SDC B (also being proposed as a general change in ASCE 7 Chapter 12)

NEHRP FEMA Building Seismic Safety Council




Highlights: Chapter 13

- In SDC B, most non-structural components are exempt
- Chapter 13 could be completely removed if not for:
 - ✓ parapets "supported by bearing walls or shear walls",
 - ✓ architectural components with $I_p > 1.0$ (e.g. fire sprinklers, egress stairways, hazardous materials).
- Technical simplification:** Do not require design of architectural components that support hazardous materials.
- Result:** Now a simple 4-page section applying only to:
 - ✓ all parapets (an expansion)
 - ✓ egress stairways

NEHRP FEMA Building Seismic Safety Council

Status

- Chapter 24 approved for 2015 NEHRP Provisions
- Chapter 24 **not** approved for ASCE 7-16
- Chapter 24 provisions beta tested by a team of four design firms
 - ✓ Positive response, overall
 - ✓ Provided additional simplification ideas
 - ✓ Report summarizing the beta testing recently submitted

Questions/Discussion