

ASCE/SEI 7-22

Seismic Subcommittee

John Hooper – Chair
Emily Guglielmo – Vice Chair
Alex Chu – Secretary
Jenna Wong – Balloteer
Kevin Aswegan – Historian





ASCE/SEI 7–22 SSC Make-up

- >200 Total Applications
- 46 Voting Members
 - 91 Associate & Emeritus Members
- Divided into 12 Task Committees
 - TC-1: Ground Motions (C.B. Crouse)
 - TC-2: General Provisions (Emily Guglielmo)
 - TC-2S: Simplified Provisions (Tom Szewczyk)
 - TC-2N: Nonlinear Provisions (Russell Berkowitz)
 - TC-3: Foundations/Site Conditions (Ron LaPlante)
 - TC-4: Concrete (S.K. Ghosh)



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ASCE/SEI 7–22 SSC Make-up

- Divided into 12 Task Committees, Cont.
 - TC-5: Masonry (Ed Huston)
 - TC-6: Steel (Bonnie Manley)
 - TC-7: Wood (Phil Line)
 - TC-8: Non-Structural Components (John Gillengerten)
 - TC-12: Seismic Isolation and Damping (Andrew Whittaker)
 - TC-13: Non-Building Structures (Greg Soules)



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ASCE/SEI 7–22 SSC Operations

- Targeting three multi-day meetings per year – February/March, June/July & October
 - Meetings held near SF Airport
- First meeting was held in early March
 - Next meeting – July 13th and 14th
 - Fall meeting – October 19th and 20th
- Task Committees hold WebEx sessions between in-person meetings



ASCE/SEI 7–22 SSC Supplement 1 Proposals

- 1 Approve new proposal TC-1-CH11-01r00 Supplement 1 by C. Kircher; Revise Table 11.4-2
- 2 Approve new proposal TC-1-CH21-01r00 Supplement 1 by C. Kircher; Revise Section 21.2.2, 21.2.3, and 21.3
- 3 Approve new proposal TC-2N-CH16-01r00 Supplement 1 by R. Hamburger; Revise Section 16.4.2.1 and Commentary
- 4 Approve new proposal TC-3-CH12-01r00 Supplement 1 by S. Harris; Revises wording in Section 12.13.9.2.1.1 Foundation Ties
- 5 Approve new proposal TC-3-CH12-02r00 Supplement 1 by S.Harris; Revises consideration of downdrag in loading
- 6 Approve new proposal TC-13-CH15-01r00 Supplement 1 by J.G. Soules; Revise language related to 15.5.3.1 Steel Storage Racks



ASCE/SEI 7-22 SSC Supplement 1 Proposals

Table 11.4-2 Long-Period Site Coefficient, F_v

Mapped Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response

Acceleration Parameter at 1-s Period

Site Class	$S_1 \leq 0.1$	$S_1 = 0.2$	$S_1 = 0.3$	$S_1 = 0.4$	$S_1 = 0.5$	$S_1 \geq 0.6$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.8	0.8	0.8	0.8	0.8	0.8
C	1.5	1.5	1.5	1.5	1.5	1.4
D	2.4	2.2 ^a	2.0 ^a	1.9 ^a	1.8 ^a	1.7 ^a
E	4.2	<u>3.3^aSee</u>	<u>2.8^aSee</u>	<u>2.4^aSee</u>	<u>2.2^aSee</u>	<u>2.0^aSee</u>
		Section 11.4.8	Section 11.4.8	Section 11.4.8	Section 11.4.8	Section 11.4.8
F	See	See	See	See	See	See
	Section 11.4.8	Section 11.4.8	Section 11.4.8	Section 11.4.8	Section 11.4.8	Section 11.4.8

Note: Use straight-line interpolation for intermediate values of S_1 .

^aAlso, see requirements for site-specific ground motions in Section 11.4.8.



The technical changes to the deterministic MCE_R floor (Section 21.2.2) are being proposed to eliminate the unnecessary "corners" near response periods T_s and T_0 that result from the 2-domain spectrum shape and to better capture the spectral accelerations in the 1-2 second range for softer sites while maintaining the important longer period (greater than 3 seconds) values.



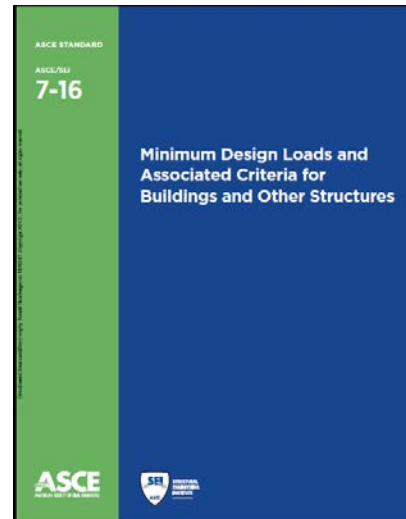
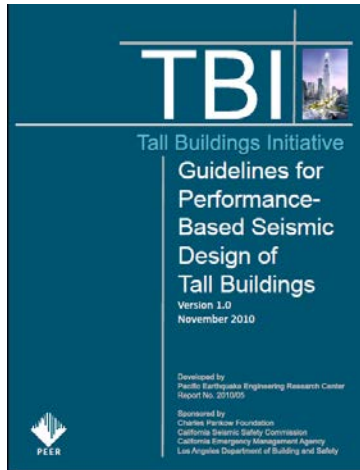
Ties. Individual footings shall be interconnected by ties in accordance with Section 12.13.8.2 and the additional requirements of this section. ~~The ties shall be designed to accommodate the differential settlements between adjacent footings per Section 12.13.9.2, item b.~~ Reinforced concrete sections shall be detailed in accordance with Sections 18.6.2.1 and 18.6.4 of ACI 318.

12.13.9.3.1 Downdrag Design of piles shall incorporate the effects of downdrag caused by liquefaction. For geotechnical design, the liquefaction-induced downdrag shall be determined as the downward skin friction on the pile within and above the liquefied zone(s). The net geotechnical ultimate capacity of the pile shall be the ultimate geotechnical capacity of the pile below the liquefiable layer(s) reduced by the downdrag load. For structural design, downdrag load induced by liquefaction shall be treated as a seismic load and factored accordingly. Downdrag load induced by liquefaction need not be considered concurrently with axial loads resulting from inertial response of the structure, determined according to Section 12.4.



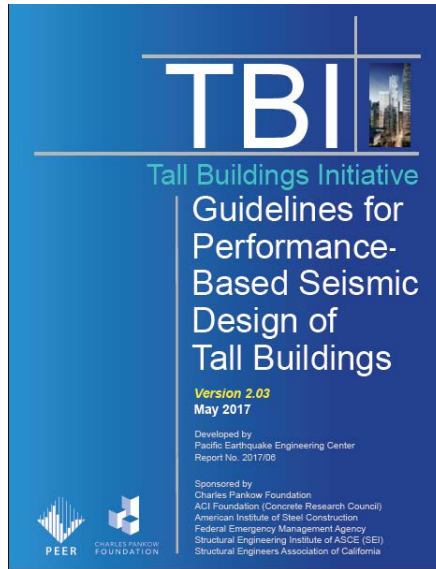
15.5.3.1 Steel Storage Racks. Steel storage racks supported at or below grade shall be designed in accordance with ANSI/RMI MH 16.1, ~~and~~ its force and displacement requirements, and the seismic design ground motion values determined according to Section 11.4, except as follows:

Background



- ASCE 7-16 adopted a complete rewrite of Chapter 16 based on the PEER TBI Guidelines (2009)
 - Analysis for MCE
 - Collapse risk directly evaluated consistent with Chapter 1 goals
- Introduced some new and somewhat strange load combinations
- Conflicted with some requirements of ACI 318

Background



- In 2017, PEER made a major update to it TBI Guidelines
 - Adopted load combinations compatible with other ASCE 7 Load Combinations
 - Refers to AISC and ACI for resistance factors
 - More directly acknowledges capacity-limited design approaches
- Proposal is to bring these updates forward in ASCE 7 to minimize conflict among TBI, ACI, AISC and ASCE

Chapter 16 in Brief

- Build nonlinear model
- Select and modify suite(s) of MCE_R ground motions
- Perform Analyses
- Evaluate adequacy:
 - Global
 - Analyses complete within acceptable ranges of response
 - Limited permitted exceptions
 - Transient and residual drift within acceptable Levels
 - Local
 - Deformation (ductile) actions:
 - Mean demands < ASCE 41 acceptance criteria for Collapse Prevention
 - Force-controlled (brittle) actions:
 - Mean demands satisfy strength criterion

Strength Criterion

- ASCE 7-16

$$\gamma I_e (Q_u - Q_{ns}) + Q_{ns} \leq Q_e$$

Expected strength

Seismic demand

Non-Seismic demand

Table 16.4-1 Load Factor for Force-Controlled Behaviors

Action Type	γ
Critical	2.0
Ordinary	1.5
Noncritical	1.0

Proposed Replacement

- Where demand is not “capacity-limited”:

$$(1.1 + 0.12S_{MS})D + 0.5L + 1.3(Q_u - Q_{ns}) \leq \phi BR_n$$

$$(0.9 - 0.12S_{MS})D + 1.3(Q_u - Q_{ns}) \leq \phi BR_n$$

ACI or AISC resistance factors

Bias factor, when
 $R_{ne}/R_n > 1.1$

- Where demand is “capacity-limited”

$$(1.1 + 0.12S_{MS})D + 0.5L + E_m \leq \phi BR_n$$

$$(0.9 - 0.12S_{MS})D + E_m \leq \phi BR_n$$

Capacity-limited demand



ASCE/SEI 7–22 SSC Focus

- Simplify and Clarify the provisions
- Proposals for consideration from last cycle (mainly in response to public comments)
- Public proposals
 - Call for proposals from ASCE
- Proposals generated by the Building Seismic Safety Council's (BSSC) Provisions Update Committee (PUC)
- Proposals generated by the SSC TCs



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ASCE/SEI 7–22 SSC Focus—PUC Proposals

- Changing the number of Seismic Design Categories and their triggers
- Set $C_d = R$ for drift checks (deformation compatibility, building separations, etc.)
- Horizontal and vertical irregularities (ATC-123)
 - Eliminate mass irregularity
 - Eliminate prohibition of extremely torsionally irregular buildings in SDC E and F
 - Changes to the requirements for buildings with torsional irregularities and extreme torsional irregularities (reducing the current design requirements and combine with redundancy and orthogonal loading requirements)
- Potential new systems for Table 12.2-1
 - Coupled special concrete shear walls
 - Coupled special composite shear walls
 - Potential several others (shear walls, steel moment frames, etc.)



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ASCE/SEI 7–22 SSC Focus—PUC Proposals

- Updating Chapter 13 based on the results of the ATC-120 project
- Updates to corrugated Steel Liquid Storage Tanks, FRP Cooling Towers, Table 15.4-1 Ordinary Concentrically Braced Frames, etc.
- Working to improve coordination and reduce inconsistencies between Chapters 17/18 (isolation and damping) and 12 (linear design procedures)
- Rigid Wall-Flexible Diaphragm (RWFD) Building requirements

ASCE/SEI 7–22 SSC Focus—Project 17 Proposals

- Keeping the current MCE_R basis for the seismic design maps
- Redefine, but retain “characteristic” earthquake (Deterministic Caps)
- Provide spectral values at multiple periods including Site Class effects
 - Will require design parameters to come from a web-based tool (no maps!)
- Possibly publish separate maps for SDCs

Questions ?

