HCAI Department of Health Care Access and Information
2020 West El Camino Avenue, Suite 800
Sacramento, CA 95833
hcai.ca.gov

Hospital Building Safety Board
Structural and Nonstructural Regulations Committee

AGENDA
October 22, 2025
10:00 a.m. – 4:00 p.m.

The Committee may not discuss or act on any matter raised during the public comment section that is not included on this agenda, except to place the matter on a future meeting agenda. (Government Code §§ 11125, 11125.7, subd. (a).)

Locations:
2020 West El Camino Ave, Conference Room 930, Sacramento, CA 95833
355 South Grand Avenue, Conference Room 1901, Los Angeles, CA 90071
Teams Meeting Access; Meeting ID: 278 444 024 993; Passcode: eh9xT9t2
Call in: (916) 535-0978; Phone Conference ID: 497 184 772#

Item #1 Call to Order and Welcome
Facilitator: Jim Malley, SE, Senior Principal, Degenkolb Engineers; Committee Chair (or designee)

Item #2 Roll Call and Meeting Advisories/Expectations
Facilitator: Veronica Yuke, HCAI; HBSB Executive Director (or designee)

Item #3 2025 Intervening Code Cycle timeline on proposed amendments to the 2025 California Building Standards Code
- Discussion and public input

Facilitator: Mia Marvelli, Architect, Supervisor; HCAI (or designee)

Item #4 Proposed amendments to the 2025 California Building Code, Title 24, Part 2, Volume 2
- Vote to approve proposed amendments
- Discussion and public input

Facilitator: Roy Lobo, PhD, SE, Principal Structural Engineer; HCAI (or designee)

Item #1 Call to Order and Welcome

Facilitator: Jim Malley, SE, Senior Principal, Degenkolb Engineers; Committee Chair (or designee)

Item #2 Roll Call and Meeting Advisories/Expectations

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- Discussion and public input

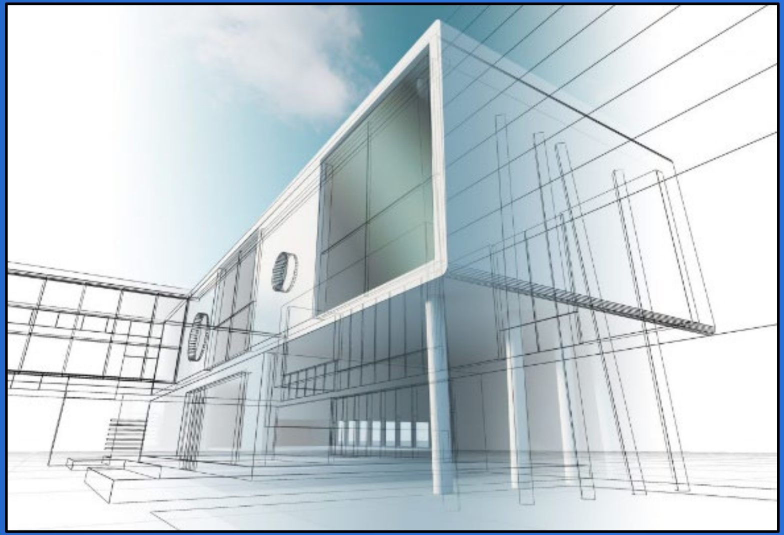
Facilitator: Mia Marvelli, Architect, Supervisor; HCAI (or designee)

Department of Health Care
Access and Information

HBSB Structural and Non-Structural Regulations Committee

2025 Code Cycle update and timeline

October 22, 2025



2025 Edition of Title 24

July 2025, Publication of the 2025 Title 24

January 2026, Effective date of the 2025 Title 24 (Errata issued around Jan. 1)

Today the Committee will hear and vote on draft code changes for the 2025 Intervening Code Cycle (Supplement effective July 1, 2027)

OSHPD 2025 Timeline and HBSB Meetings

DUE TO CBSC

May 2025 CBSC Coordinating Council meeting

December 1, 2025 Submit all Parts of T-24

HCAI/OSHPD INTERNAL TIMELINE

January – June 2025 identify code changes

July 2025 OSHPD DD & DDC review/approve

REVIEW BY HBSB/COMMITTEES

Sept. 10, 2025 (Codes and Process) CAC, CBC Vol. 1, CEC, CMC and CPC

Oct. – Nov. HCA Executive Review

Oct. 22, 2025 (Struct & Non-Struct) CAC, CBC Vol. 2 and CEBC

Dec. 10, 2025 HBSB Full Board meeting

HOW WE GOT HERE

- Review Tentative Interim Amendment (TIA)
- Review updated Reference Standards
- Attend National Codes and Standards committees
- Assess new/recent Legislation
- Ongoing list of T-24 questions, clarifications
  - regsunit@hcai.ca.gov

Questions/comments

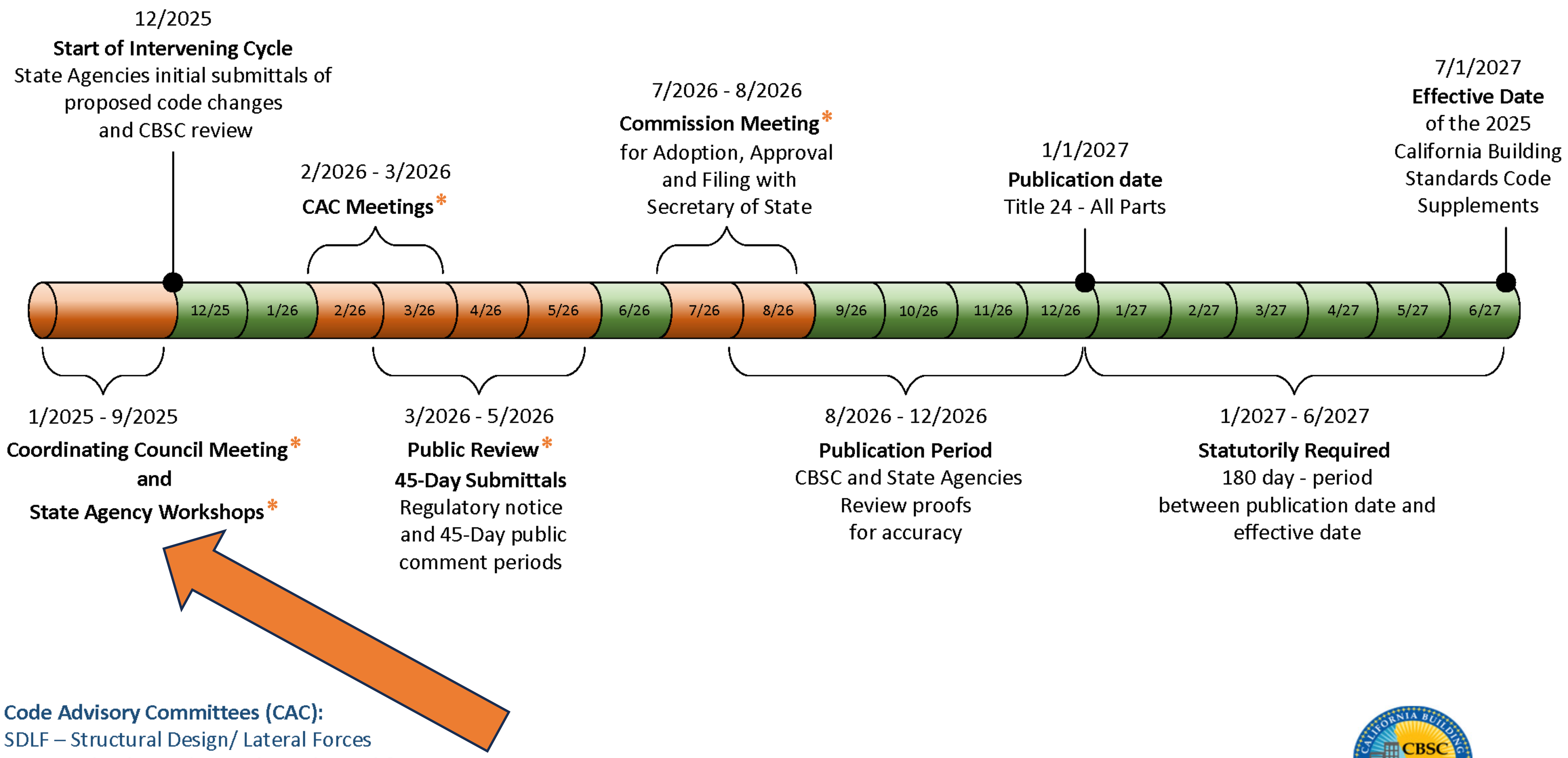
- Stakeholder outreach/workshop
- Coordinate with state agencies (DSA & SFM)

2025 Intervening Code Adoption Cycle

California Building Standards Commission

Amendments to the 2025 California Building Standards Code, Title 24 Supplement July 1, 2027 Effective Date

* **Public Participation Opportunity**



Code Advisory Committees (CAC):
SDLF – Structural Design/ Lateral Forces
PEME – Plumbing, Electrical, Mechanical & Energy
HF – Health Facilities
GREEN – Green Building
BFO – Building, Fire & Other
ACCESS – Accessibility

dgs.ca.gov/BSC
(916) 263-0916

Rev. 01/2025
All dates are subject to change

- **December 2025 Submit all Parts to CBSC**
- **Supplement Publication Jan. 1, 2027**
- **Effective Date: July 1, 2028**
- [2025 Intervening Cycle]

2024-26 CODE ADVISORY COMMITTEES [Code Advisory Committees (ca.gov)]

Expand All

- ACCESSIBILITY COMMITTEE — ACCESS +
- BUILDING, FIRE & OTHER COMMITTEE — BFO +
- GREEN BUILDING COMMITTEE—GREEN +
- HEALTH FACILITIES COMMITTEE—HF +
- PLUMBING, ELECTRICAL, MECHANICAL & ENERGY COMMITTEE—PEME +
- STRUCTURAL DESIGN/LATERAL FORCES COMMITTEE—SD/LF +

Familiar faces:

Connie Christensen-HF Ex-Officio

Gary Dunger-HF

Belinda Young-HF

Bill Zellmer-HF & ACCESS

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www.dgs.ca.gov/BSC/Contact

CBSC Rulemaking page

https://www.dgs.ca.gov/BSC/Rulemaking/2025-Intervening-Cycle

Intervening Code Change Limitations

Assembly Bill 130 Chapter 22, Statutes of 2025, **Committee on Budget. Housing Trailer Bill**

Effective June 30, 2025

AB 130, SEC. 42, HSC §18942 **contains limitations in perpetuity** on the types of building standards that can be proposed and adopted **during an intervening code cycle** (supplements to the Title 24 three-year code cycle).

This will hinder HCAI from proposing building standards during this intervening code cycle that are currently under development.

Intervening Code Change Limitations

18942. (a) (1) The commission shall publish, or cause to be published, editions of the code in its entirety once every three years. In the intervening period the commission shall publish, or cause to be published, supplements as necessary. For emergency building standards defined in subdivision (a) of Section 18913, an emergency building standards supplement shall be published whenever the commission determines it is necessary.

(2) Changes **adopted during the intervening period** described in paragraph (1) **shall be limited to only the following**:

(A) Technical updates to existing code requirements only to the extent necessary to effectuate support or facilitate the incorporation or implementation of those existing code requirements. **The updates shall be limited to clarifying, conforming, or coordinating changes that do not materially alter the substance or intent of the existing code provisions.**

(B) Emergency building standards.

(C) Amendments by the State Fire Marshal to building standards within the California Wildland-Urban Interface Code (Part 7 of Title 24 of the California Code of Regulations). . . .

Item #4 Proposed amendments to the 2025 California Building Code, Title 24, Part 2, Volume 2

- Vote to approve proposed amendments
- Discussion and public input

Facilitator: Roy Lobo, PhD, SE, Principal Structural Engineer; HCAI (or designee)

Department of Health Care
Access and Information

California Building Code, Part 2 Volume 2

CHAPTER 16A STRUCTURAL DESIGN

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SECTION 1603*A*—CONSTRUCTION DOCUMENTS

...

1603*A*.1.5 Earthquake design data. The following information related to seismic loads shall be shown, regardless of whether seismic loads govern the design of the lateral force-resisting system of the structure:

1. Project location.

2. ~~1.~~ Risk category.

3. ~~2.~~ Seismic importance factor, I_e.

4. ~~3.~~ Spectral response acceleration parameters, S_S and S_1.

5. ~~4.~~ Site class.

6. ~~5.~~ Design spectral response acceleration parameters, S_{DS} and S_{D1}, *MPRS spectrum or Site-specific response spectrum.*

7. Design spectral response acceleration, S_{DS}, for non-structural component bracing.

8. ~~8.~~ *Seismic design category.*

9. ~~9.~~ Basic seismic force-resisting system~~(s).~~ *in each direction.*

~~8. Design base shear(s).~~

~~9. Seismic response coefficient(s), CS.~~

CHAPTER 16A STRUCTURAL DESIGN

10. ~~Response modification coefficient(s), R~~. *Seismic force-resisting system factors R, C_d, and Ω_0 in each direction.*

11. Seismic response coefficient, C_s, in each direction.

12. Design base shear, V, in each direction.

13. Design earthquake displacement, δ_{DE}, in each direction.

14. Redundancy factor, ρ, in each direction.

15. ~~11.~~ Analysis procedure used.

16. Fundamental period, T, in each direction.

17. Approximate fundamental period, T_a, in each direction.

18. ~~12.~~ *Applicable horizontal structural irregularities.*

19. ~~13.~~ *Applicable vertical structural irregularities.*

20. ~~14.~~ *Location of base as defined in ASCE 7, Section 11.2.*

1603A.1.5.1 Connections. *Connections that resist design seismic forces shall be designed and detailed on the design drawings.*

Reason for Change – Section 1603A

Revisions to the non-structural bracing provisions for equipment and other non-structural components (ASCE 7-22 Equations 13.3-1 through 13.3-6).

The updated equations now require the building's fundamental period to calculate the forces acting on non-structural components.

During the review of this list, several other important items were identified that should also be documented for future evaluations or renovations.

CHAPTER 16A STRUCTURAL DESIGN

1603*A*.1.6 Geotechnical information. ~~The design load-bearing values of soils shall be shown on the construction documents.~~ The construction documents shall provide a description of the foundation system and the design load-bearing values of soils and/or deep foundations elements. In Seismic Design Categories C through F, the capacity of the soil/foundation for seismic load cases shall be included.

…

CHAPTER 16A STRUCTURAL DESIGN

SECTION 1605*A*—LOAD COMBINATIONS

1605*A*.1 General. Buildings and other structures and portions thereof shall be designed to resist the strength load combinations specified in ASCE 7, Section 2.3, the allowable stress design load combinations specified in ASCE 7, Section 2.4, or the alternative allowable stress design load combinations of Section 1605A.2.

Exceptions:

1. The modifications to load combinations of ASCE 7, Section 2.3, ASCE 7, Section 2.4 and Section1605*A*.2 specified in ASCE 7 Chapters 18 and 19 shall apply. *Exception 2 of ASCE 7 Section 2.4.5 shall not be permitted.*

…

Reason for the change – Section 1605A

In 2011, the masonry design standard TMS 402 increased the allowable stress for commonly used Grade 60 tension reinforcement from 40% to 53% of the specified yield (F_y). Consequently, ASCE 7 Exception 2 in Section 2.4.5 is now unjustified.

Exceptions:

…

2. It shall be permitted to replace 0.6D with 0.9D in combination 10 for the design of special reinforced masonry shear walls where the walls satisfy the requirement of Section 14.4.2.

CHAPTER 16A STRUCTURAL DESIGN

SECTION 1607*A*—LIVE LOADS

…

TABLE 1607*A*.1—MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS, L_0, AND MINIMUM CONCENTRATED LIVE LOADS—continued

OCCUPANCY OR USE		UNIFORM (psf)	CONCENTRATED (pounds)	ALSO SEE SECTION
…	…	…		…
18. Hospitals *[OSHPD1 & 4]*	Corridors above first floor	80	1,000	—
	Operating rooms, laboratories[a]	60	1,000	
	Patient rooms	40	1,000	
	Mechanical and electrical areas including open areas around equipment	*50*	*1000*	
	Storage *Light* *Heavy*	 *125* *250*		
	Dining areas not used for assembly	*100*	*1000*	
	Kitchen and serving areas	*50*	*1000*	
…	…	…	…	…

For SI: 1 inch = 25.4 mm, 1 square inch = 645.16 mm2, 1 square foot = 0.0929 m2, 1 pound per square foot = 0.0479 kN/m2, 1 pound = 0.004448 kN.

a. Live load reduction is not permitted.

…

CHAPTER 16A STRUCTURAL DESIGN

SECTION 1617A—MODIFICATIONS TO ASCE 7

…

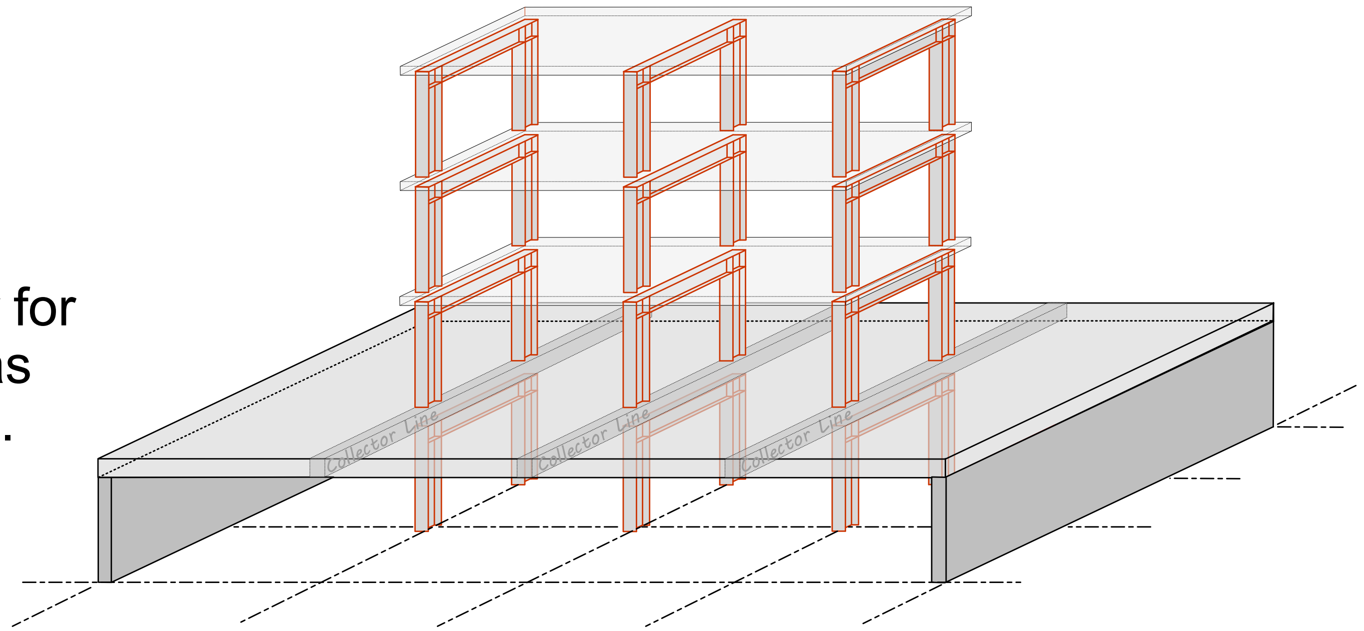
1617A.1.5 ~~*Reserved.*~~***ASCE 7 Section 12.2.3.2 [OSHPD 1 & 4]***
Modify ASCE 7 Section 12.2.3.2 (g) with the following:

> *Modify the last sentence "… and Section 12.10.3.3, in addition to amplification by item (d)," by deleting "…in addition to amplification by item (d)."*

…

Reason for the change – ASCE Section 12.2.3.2

Revisions to the two stage analysis provisions in ASCE 7-22 requiring an R_{upper}/R_{lower} amplification in addition to amplification by the overstrength factor for design of diaphragm transfer forces was found to be unreasonably conservative.



CHAPTER 16A STRUCTURAL DESIGN

SECTION 1617A—MODIFICATIONS TO ASCE 7

…

1617A.1.11 ASCE 7, Section 12.7.2. …

…

1617A.1.11a ASCE 7, Section 12.8.1. [OSHPD 1 & 4] *Modify ASCE 7, Equation 12.8-3, as follows:*

$$C_s = \frac{S_a}{\left(\frac{R}{I_e}\right)} \leq \frac{S_{DS}}{\left(\frac{R}{I_e}\right)} \qquad (12.8\text{-}3)$$

1617A.1.12 ASCE 7, Section 12.10.2.1. …

…

Reason for the change – Section 12.8.2 (ASCE -22)

For short period buildings, if the multi-period spectrum (Method 1) is used, the design base shear can be higher than the design base shear if a two-period spectrum (Method 2) is used. This amendment aligns the two methods when calculating the seismic response coefficient C_s.

CHAPTER 16A STRUCTURAL DESIGN

1617A.1.18a ASCE 7 Section 13.3.1.5. [OSHPD 1 & 4] *Modify ASCE 7 Section 13.3.1.5 with the following:*

1. Modify the sentence after Equation (13.3-7), "where a_i is the maximum acceleration at level i obtained from the nonlinear response history analysis at the Design Earthquake ground motion." by adding the word "total" before acceleration.

2. Add the following at the end of the section. For base-isolated structures designed using nonlinear response history analysis, a smaller lower limit of F_p is permitted, but shall not be less than one-half of that determined by Equation (13.3-3).

…

Reason for change – ASCE 7 Section 13.3.1.5

1. “Total acceleration” is this context is the absolute acceleration as opposed to relative acceleration. Some plan checkers have enforced relative acceleration values to be used. This amendment clarifies that appropriate value.

2. This section permits a lower limit for the design of nonstructural components “F_p” in base isolated buildings, relative to non-isolated buildings. This lower limit cannot be more than half as less at the current lower limit in non-isolated buildings.

HCAi Department of Health Care Access and Information

CHAPTER 16A STRUCTURAL DESIGN

…

1617A.1.37a ASCE 7, Section 18.4 [OSHPD 1 & 4] *Replace last paragraph ASCE 7, Section 18.4.1 with the following:*

The maximum drift at MCE_R shall neither exceed 3%, nor the drift limits specified in Table 12.12-1 times the smaller of $1.5R/C_d$ and ~~1.9~~ *2.0*. C_d and R shall be taken from Table 12.2-1 for the building framing under consideration.

Reason for change – ASCE 7 Section 18.4

This change aligns the maximum permitted drift at the MCE_R level for buildings with dampers as part of the seismic force resisting system to be consistent with the provision in Chapter 16 based on the maximum drift permitted if a Nonlinear Response History Analysis (NLRHA) is used.

Note: Designing a building with dampers also requires a NLRHA.

CHAPTER 17A SPECIAL INSPECTIONS AND TESTS

...

SECTION 1705A—REQUIRED SPECIAL INSPECTION AND TESTS

…

1705A.5.5 Structural glued laminated and cross-laminated timber. …

> ***Exception:*** *Special Inspection is not required for non-custom prismatic glued laminated members identified on drawings ~~and sourced from stock or general inventory~~ of 5 1/2-inch maximum width and 18-inch maximum depth, and with a maximum clear span of 32 feet, manufactured and marked in accordance with ANSI/APA A190.1 Section 14.1 for noncustom members.*

CHAPTER 35 REFERENCED STANDARDS

…

ACI American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48331-3439

…

318—19 *(22)*: Building Code Requirements for Structural Concrete

…

Item #5 Proposed amendments to the 2025 California Existing Building Code, Title 24, Part 10

- Vote to approve proposed amendments
- Discussion and public input

Facilitator: Roy Lobo (or designee)

Department of Health Care
Access and Information

California Existing Building Code, Part 10

CHAPTER 3A PROVISION FOR ALL COMPLIANCE METHODS

…

SECTION 304*A*—STRUCTURAL DESIGN LOADS AND EVALUATION AND DESIGN PROCEDURES

304A.3.5 Modifications to ASCE 41-13 for SPC-2 and SPC-4D. *The text of ASCE 41-13 shall be modified as indicated in Sections 304A.3.5.1 through 304A.3.5.~~17~~18.*

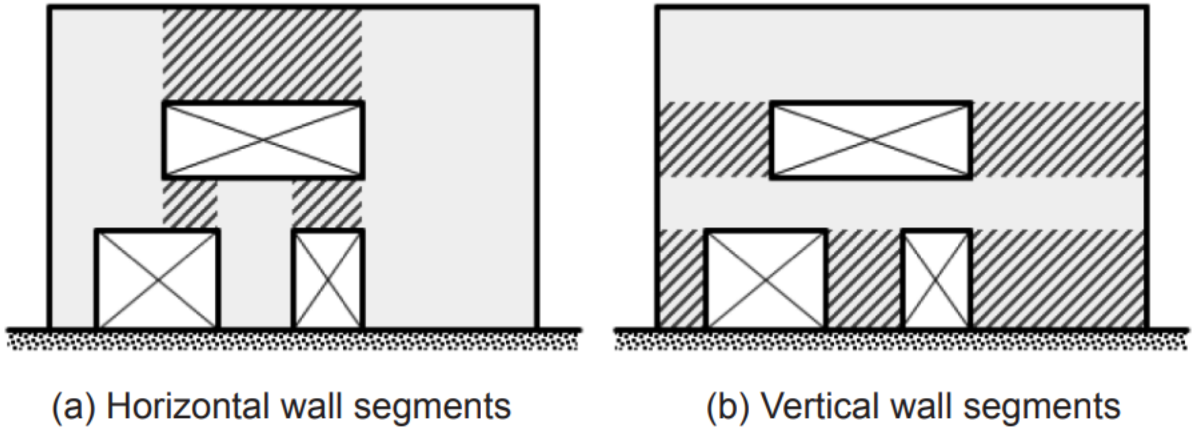
304A.3.5.13 ASCE 41-13 Section 10.7.1.1. *Modify ASCE 41-13 Section 10.7.1.1 with the following:*

> ***Monolithic Reinforced Concrete Shear Walls and Wall Segments.*** *For nonlinear procedures, shear walls or wall segments with axial loads greater than 0.35 Po shall be included in the model as primary elements with appropriate strength and stiffness degrading properties assigned to those components subject to the approval of the enforcement agent. For linear procedures, the effects of deformation compatibility shall be investigated using moment-curvature section analyses and cyclic testing results of similar components to determine whether strengthening is necessary to maintain the gravity load-carrying capacity of that component.*
>
> *~~Horizontal wall segments or spandrels reinforced similar to vertical wall segments or piers shall be classified as wall segments, not shear wall coupling beams, in Tables 10-19 through 10-22.~~ Horizontal wall segments or spandrels controlled by shear action and reinforced similar to vertical wall segments or piers shall be classified as wall segments, not shear wall coupling beams, in ASCE 41-13 Table 10-20 and Table 10-22.*
>
> *Exception: Shear-controlled horizontal wall segments or spandrels with either closed hoops or stirrups anchored to the longitudinal reinforcing at the top and bottom with a standard hook may be classified as a shear wall coupling beam.*

…

Reason for the change - ASCE 41-13 Section 10.7.1.1

Clarified that only Shear-controlled horizontal wall segments are classified as wall segments with the exception when either closed hoops or stirrups anchored to the longitudinal reinforcing at the top and bottom with a standard hook are used, those horizontal wall segments may be classified as a shear wall coupling beam.



CHAPTER 3A PROVISION FOR ALL COMPLIANCE METHODS

[Add new Section] ***304A.3.5.16 ASCE 41-13 Chapter 13.***

Penthouse Structures*: Penthouse structures with aggregate area that is less than one-third of the roof area or is not an extension of the building frame may be evaluated using either criteria 1 or 2 listed below:*

1. *ASCE 41-13 Chapter 13 criteria under BSE-1E. The connection to the existing structure shall be designed for amplified omega level (Ω=2) demands.*

2. *ASCE 41-13 Chapter 13 criteria under BSE-2E.*

Penthouse structures larger than one-third of the roof area and/or an extension of the building frame shall be evaluated using their respective material chapter for both BSE-1E and BSE-2E against Damage Control and Collapse Prevention respectively.

304A.3.5.~~16~~17 ASCE 41-13 Section 14.1. *Modify ASCE 41-13 Section 14.1 by the following:*

> ***Scope****: For buildings located in Seismic Design Category F, verification of the interstory lateral displacements, the strength adequacy of the seismic force-resisting system and anchorage to the foundation shall be accomplished using the Nonlinear Dynamic Procedure.*

Reason for the Change – Section 304A.3.5.16

There was no clear direction in ASCE 41-13 on the force level for evaluation of penthouse structures on building being evaluated/retrofit to SPC-4D. This provision adds clarity to that.

CHAPTER 3A PROVISION FOR ALL COMPLIANCE METHODS

304A.3.5.~~17~~18 ASCE 41-13 Chapter 15 and 16. *Not permitted by OSHPD.*

…

304A.3.6 Modifications to ASCE 41-23. *The text of ASCE 41-23 shall be modified as indicated in Sections 304A.3.6.1 through 304A.3.6.~~9~~10.*

…

304A.3.6.8 ASCE 41-23 Section 11.1. *Modify ASCE 41-23 Section 11.1 by the following:*

Scope*: Unreinforced masonry walls (including unreinforced infill walls) and partitions are not permitted for General Acute Care (GAC) hospital buildings.*

[Add new Section] ***304A.3.6.9 ASCE 41-23 Chapter 13.***

Penthouse Structures*: Penthouse structures with aggregate area that is less than one-third of the roof area or is not an extension of the building frame may be evaluated using either criteria 1 or 2 listed below:*

1. *ASCE 41-23 Chapter 13 criteria under BSE-1E. The connection to the existing structure shall be designed for amplified omega level (Ω=2) demands.*

2. *ASCE 41-23 Chapter 13 criteria under BSE-2E.*

Penthouse structures larger than one-third of the roof area and/or an extension of the building frame shall be evaluated using their respective material chapter for both BSE-1E and BSE-2E against Damage Control and Collapse Prevention respectively.

304A.3.6.~~9~~10 ASCE 41-23 Chapter 16 and 17. *Not permitted by OSHPD.*

…

HOMEWORK DUE SEPT. 30

- Send your feedback on the code changes to hbsbsupportstaff@hcai.ca.gov

DUE Sept. 30

Item #6 Introduction of Wood-Frame Standard Details prepared by the HBSB Codes and Processes Committee

- Discussion and public input

Facilitator: Jim Malley (or designee)

Item #7

Update on OSHPD Preapproved Details (OPD): Standard Partition Wall, Standard Suspended Ceiling, and Standard Gypsum Board Ceiling

- Discussion and public input

Facilitator: Chris Davis, SE, District Structural Engineer, HCAI (or designee)

Department of Health Care Access and Information

Standard Partition Wall Details Update

Chris Davis, DSE

Inspection Services Unit

ASCE 7-22 Force Level

Light Frame Partitions <= 9 ft

	ASCE 7-22			ASCE 7-16
S_{ds}	$F_{p,min}/W_p$	F_p/W_p	$F_{p,max}/W_p$	F_p/W_p
0.99	0.45	1.07	2.38	0.71
1.25	0.56	1.35	3.00	0.90
1.45	0.65	1.56	3.48	1.04
1.95	0.88	2.10	4.68	1.40

↑1.5

Light Frame Partitions > 9 ft

	ASCE 7-22			ASCE 7-16
S_{ds}	$F_{p,min}/W_p$	F_p/W_p	$F_{p,max}/W_p$	F_p/W_p
0.99	0.45	1.49	2.38	0.71
1.25	0.56	1.88	3.00	0.90
1.45	0.65	2.19	3.48	1.04
1.95	0.88	2.94	4.68	1.40

↑2.1

The horizontal seismic design force shall be calculated as

$$F_p = 0.4 S_{DS} I_p W_p \left[\frac{H_f}{R_\mu}\right]\left[\frac{C_{AR}}{R_{po}}\right] \quad (13.3\text{-}1)$$

F_p is not required to be taken as greater than

$$F_p = 1.6 S_{DS} I_p W_p \quad (13.3\text{-}2)$$

and shall not be taken as less than

$$F_p = 0.3 S_{DS} I_p W_p \quad (13.3\text{-}3)$$

13.3.1.1 Amplification with Height, H_f For nonstructural components supported at or below grade plane, the factor for force amplification with height H_f, is 1.0. For components supported above grade plane by a building or nonbuilding structure, H_f is permitted to be determined by Equation (13.3-4) or Equation (13.3-5). Where the approximate fundamental period of the supporting building or nonbuilding structure is unknown, H_f is permitted to be determined by Equation (13.3-5).

$$H_f = 1 + a_1\left(\frac{z}{h}\right) + a_2\left(\frac{z}{h}\right)^{10} \quad (13.3\text{-}4)$$

$$H_f = 1 + 2.5\cancel{\left(\frac{z}{h}\right)}^{1.0} = 3.5 \quad (13.3\text{-}5)$$

$$R_\mu = [1.1R/(I_e\Omega_0)]^{1/2} \geq 1.3 \quad (13.3\text{-}6)$$

Use =1.3

Table 13.5-1. Coefficients for Architectural Components.

Architectural Component	C_{AR} Supported at or below grade plane	C_{AR} Supported above grade plane by a structure	R_{po}	Ω_{op}[a]
Interior nonstructural walls and partitions[b]				
Light frame ≤ 9 ft (2.74 m) in height	1	1	1.5	2
Light frame > 9 ft (2.74 m) in height	1.4	1.4	1.5	2

ASCE 7-22 Force Level for Various Structural Systems

Structure		Stories	Height (ft)	R	Ω_o
Steel Special Moment Resisting Frame, 3 Stories	STL SMRF-3	3	48	8	3
Steel Special Moment Resisting Frame, 10 Stories	STL SMRF-10	10	160	8	3
Special Reinforced Concrete Shear Wall (Building Frame), 3 Stories	SRCSW-BF-3	3	48	6	2.5
Special Reinforced Concrete Shear Wall (Building Frame), 10 Stories	SRCSW-BF-10	10	160	6	2.5
Special Reinforced Concrete Shear Wall (Bearing Wall), 3 Stories	SRCSW-BW-3	3	48	5	2.5
Special Reinforced Concrete Shear Wall (Bearing Wall), 10 Stories	SRCSW-BW-10	10	160	5	2.5

Nonstructural Partition Wall: Light Frame <= 9 ft

	ASCE 7-22 F_p/W_p							ASCE 7-16
S_{ds}	STL SMRF-3	STL SMRF-10	SRCSW-BF-3	SRCSW-BF-10	SRCSW-BW-3	SRCSW-BW-10	Default Case	F_p/W_p
0.25	0.23	0.18	0.25	0.19	0.27	0.22	0.27	0.18
1	0.91	0.73	1.00	0.78	1.08	0.90	1.08	0.72
1.25	1.14	0.91	1.25	0.97	1.35	1.12	1.35	0.90
1.45	1.33	1.06	1.46	1.13	1.56	1.30	1.56	1.04
1.95	1.78	1.43	1.96	1.52	2.10	1.75	2.10	1.40

Nonstructural Partition Wall: Light Frame > 9 ft

	ASCE 7-22 F_p/W_p							ASCE 7-16
S_{ds}	STL SMRF-3	STL SMRF-10	SRCSW-BF-3	SRCSW-BF-10	SRCSW-BW-3	SRCSW-BW-10	Default Case	F_p/W_p
0.25	0.32	0.26	0.35	0.27	0.38	0.31	0.38	0.18
1	1.28	1.02	1.41	1.09	1.51	1.26	1.51	0.72
1.25	1.60	1.28	1.76	1.36	1.88	1.57	1.88	0.90
1.45	1.86	1.48	2.04	1.58	2.19	1.82	2.19	1.04
1.95	2.50	2.00	2.74	2.12	2.94	2.45	2.94	1.40

Note:
1) All cases use z/h = 1.0
2) Default case uses R_mu = 1.3 and Hf = 3.5.
3) Assuming default parameters has a large impact on the design forces and trickles through the entire wall design.

The horizontal seismic design force shall be calculated as

$$F_p = 0.4 S_{DS} I_p W_p \left[\frac{H_f}{R_\mu}\right]\left[\frac{C_{AR}}{R_{po}}\right] \quad (13.3\text{-}1)$$

F_p is not required to be taken as greater than

$$F_p = 1.6 S_{DS} I_p W_p \quad (13.3\text{-}2)$$

and shall not be taken as less than

$$F_p = 0.3 S_{DS} I_p W_p \quad (13.3\text{-}3)$$

13.3.1.1 Amplification with Height, H_f For nonstructural components supported at or below grade plane, the factor for force amplification with height H_f, is 1.0. For components supported above grade plane by a building or nonbuilding structure, H_f is permitted to be determined by Equation (13.3-4) or Equation (13.3-5). Where the approximate fundamental period of the supporting building or nonbuilding structure is unknown, H_f is permitted to be determined by Equation (13.3-5).

$$H_f = 1 + a_1\left(\frac{z}{h}\right) + a_2\left(\frac{z}{h}\right)^{10} \quad (13.3\text{-}4)$$

$$R_\mu = [1.1R/(I_e\Omega_0)]^{1/2} \geq 1.3 \quad (13.3\text{-}6)$$

Table 13.5-1. Coefficients for Architectural Components.

Architectural Component	C_{AR} Supported at or below grade plane	C_{AR} Supported above grade plane by a structure	R_{po}	Ω_{op}[a]
Interior nonstructural walls and partitions[b]				
Light frame ≤ 9 ft (2.74 m) in height	1	1	1.5	2
Light frame > 9 ft (2.74 m) in height	1.4	1.4	1.5	2

Partition Wall Stud Size Updates

PARTITION WALL SCHEDULES

SCHEDULE 1: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'A')

S_{DS}	WALL HEIGHT 9 FT	12 FT	16 FT		
0.25-0.99	362S137-33	362S137-33	362S137-43	400S137-43	600S137-33
1.00-1.25	362S137-33	362S137-33	362S137-43	400S137-43	600S137-33
1.26-1.45	362S137-33	362S137-33	362S137-43	400S137-43	600S137-33
1.46-1.95	362S137-33	362S137-33	362S137-54	400S137-54	600S137-43

SCHEDULE 2: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'B')

S_{DS}	WALL HEIGHT 9 FT	12 FT		16 FT		
0.25-0.99	362S137-33	362S137-43	400S137-43	362S137-54	400S137-43	600S137-43
1.00-1.25	362S137-33	362S137-43	400S137-43	NA	400S137-54	600S137-43
1.26-1.45	362S137-33	362S137-43	400S137-43	NA	400S137-54	600S137-43
1.46-1.95	362S137-33	362S137-54	400S137-43	NA	400S137-54	600S137-43

SCHEDULE 3: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'C')

S_{DS}	WALL HEIGHT 9 FT		12 FT			16 FT
0.25-0.99	362S137-43	400S137-54	362S137-54	400S137-43	600S137-43	600S137-43
1.00-1.25	362S137-43	400S137-54	362S137-54	400S137-54	600S137-43	600S137-54
1.26-1.45	362S137-43	400S137-54	NA	400S137-54	600S137-54	600S137-54
1.46-1.95	362S137-54	400S137-54	NA	NA	600S137-54	600S137-54

SCHEDULE 4: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'D')

S_{DS}	WALL HEIGHT 9 FT			12 FT			16 FT
0.25-0.99	362S137-33	400S137-43	600S137-43	362S137-43	400S137-43	600S137-43	600S137-43
1.00-1.25	362S137-43	400S137-43	600S137-43	NA	400S137-54	600S137-43	600S137-43
1.26-1.45	362S137-43	400S137-43	600S137-43	NA	400S137-54	600S137-43	600S137-54
1.46-1.95	NA	400S137-54	600S137-54	NA	NA	600S137-54	600S137-54

PARTITION WALL SCHEDULES

SCHEDULE 1: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'A')

Fp/Wp Range	9 FT	12 FT	16 FT		
0.00 - > 0.75	362S137-33	362S137-33	362S137-33	400S137-33	600S137-33
0.76 - > 1.50	362S137-33	362S137-33	362S137-33	400S137-33	600S137-33
1.51 - > 2.25	362S137-33	362S137-33	362S137-43	400S137-43	600S137-33
2.26 - > 3.00	362S137-33	362S137-33	362S137-54	400S137-54	600S137-33

SCHEDULE 2: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'B')

Fp/Wp Range	9 FT	12 FT		16 FT		
0.00 - > 0.75	362S137-33	362S137-33	400S137-33	362S137-54	400S137-33	600S137-33
0.76 - > 1.50	362S137-33	362S137-33	400S137-33	362S137-54	400S137-43	600S137-33
1.51 - > 2.25	362S137-33	362S137-54	400S137-43	362S137-54	400S137-54	600S137-43
2.26 - > 3.00	362S137-43	362S137-54	400S137-54	362S137-97	400S137-68	600S137-54

SCHEDULE 3: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'C')

Fp/Wp Range	9 FT		12 FT			16 FT
0.00 - > 0.75	362S137-43	400S137-43	362S137-43	400S137-43	600S137-33	600S137-43
0.76 - > 1.50	362S137-54	400S137-54	362S137-68	400S137-54	600S137-54	600S137-54
1.51 - > 2.25	362S137-97	400S137-68	362S137-97	400S137-97	600S137-54	600S137-68
2.26 - > 3.00	362S137-118	400S137-97	NA	400S137-118	600S137-68	600S137-97

SCHEDULE 4: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'D')

Fp/Wp Range	9 FT			12 FT			16 FT
0.00 - > 0.75	362S137-33	400S137-33	600S137-33	362S137-43	400S137-43	600S137-33	600S137-33
0.76 - > 1.50	362S137-54	400S137-54	600S137-33	362S137-68	400S137-54	600S137-43	600S137-54
1.51 - > 2.25	362S137-68	400S137-68	600S137-54	362S137-97	400S137-97	600S137-54	600S137-68
2.26 - > 3.00	362S137-97	400S137-97	600S137-54	NA	NA	600S137-68	600S137-97

1. Blow up to bring one item forward
2. What are the mils. Show image comparison.
3. Blow up condition. Show typical weights, etc. Use OPD detail

Note: It is not a direct comparison between the rows from the 2013 OPD (left side) and the updated tables (right side).

Partition Wall Stud Size Updates

	ASCE 7-22 F_p/W_p Range	
S_{ds}	<= 9 ft	> 9 ft
0.25-0.99	0.27-1.07	0.38-1.49
1.00-1.25	1.08-1.35	1.51-1.88
1.26-1.45	1.36-1.56	1.90-2.19
1.46-1.95	1.57-2.1	2.20-2.94

SCHEDULE 3: MINIMUM PARTITION WALL STUD SIZE (PARTITION CONDITION 'C')

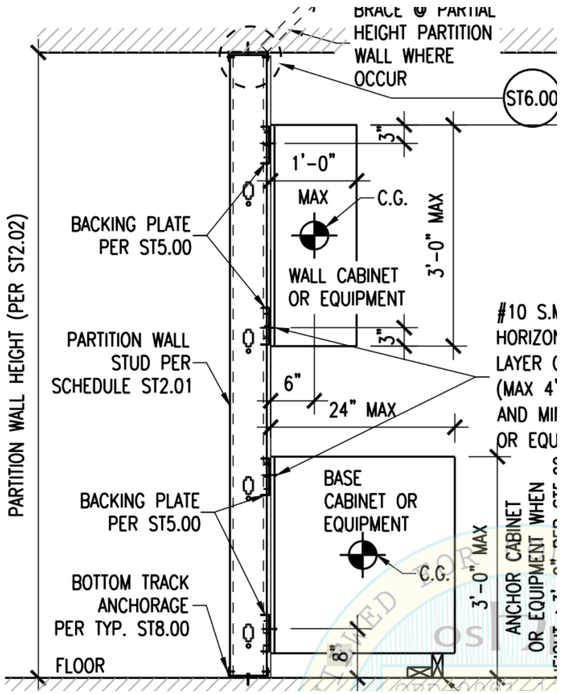
Fp/Wp Range		12 FT			16 FT	
2.26 - > 3.00		362S137-118	400S137-118	600S137-68	600S137-97	2025 OPD 01
1.46-1.95		NA	NA	600S137-54	600S137-54	2013 OPD 01

25% ↑ 73% ↑

Weight Increase

Designation Thickness (mil)	Minimum Thickness [1] (in)
43	0.0428
54	0.0538
68	0.0677
97	0.0966
118	0.1180

26% thicker than 54 mil
80% thicker than 54 mil



Assumes cabinet weight of 38 lbs per ft^3

Expansion Anchor Updates

- **2013 OPD**
  - Based on least allowable strengths of the following ICC ESR reports:
    - 1917 (Hilti KB-TZ)
    - 2427 (ITW Red Head)
    - 2502 (Dewalt Power-Stud)
    - 3037 (Simpson Strong Bolt 2)

- **2025 OPD**
  - Includes strength design capacities of the following ICC ESR reports:
    - 4266 (Hilti KB-TZ2)
    - ~~2427 (ITW Red Head)~~ No current ICC-ESR for cracked concrete in all Seismic Design Categories
    - 2502 (Dewalt Power-Stud)
    - 3037 (Simpson Strong Bolt 2)

- **Rational**
  - Too many variations of anchor diameter and embedment lengths amongst the manufactures. No common diameter-embedment combination amongst all manufacturers.
  - Not all anchors are permitted for all conditions (e.g. ICC ESR 3037 does not permit the use of anchors into the soffit of B-deck).

Note: Manufacturer names are not included in the general notes/details. Only the ICC ESR number.

Anchor Updates

TABLE 9—HILTI KB-TZ2 CARBON STEEL ANCHORS SETTING INFORMATION FOR INSTALLATION ON THE TOP OF CONCRETE-FILLED PROFILE STEEL DECK ASSEMBLIES ACCORDING TO FIGURE 5D[1,2,3]

Design Information	Symbol	Units	Nominal anchor diameter (in.)						
			1/4	3/8			1/2		
Effective Embedment Depth	h_{ef}	in. (mm)	1-1/2 (38)	1-1/2 (38)	2 (51)		1-1/2 (38)		2 (51)
Nominal Embedment Depth	h_{nom}	in. (mm)	1-3/4 (44)	1-7/8 (48)	2-1/2 (64)		2 (51)		2-1/2 (64)
Minimum Hole Depth	h_o	in. (mm)	2 (51)	2 (51)	2-1/2 (64)	2-3/4 (70)	2-1/4 (57)		2-3/4 (70)
Minimum Concrete Thickness[4]	$h_{min,deck}$	in. (mm)	2-1/2 (64)	2-1/2 (64)	2-1/2 (64)	3-1/4 (83)	2-1/2 (64)	3-1/4 (83)	3-1/4 (83)

TABLE 2—POWER-STUD+ SD2 ANCHORS SETTING INFORMATION FOR INSTALLATION ON THE TOP OF CONCRETE-FILLED STEEL DECK ASSEMBLIES ACCORDING TO FIGURE 5D[3,4,5]

ANCHOR PROPERTY AND SETTING INFORMATION	NOTATION	UNITS	NOMINAL ANCHOR SIZE (inch)	
			3/8	1/2
Nominal drill bit diameter	d_{bit}	in.	3/8 ANSI	1/2 ANSI
Minimum nominal embedment depth[1]	h_{nom}	in. (mm)	2 3/8 (60)	2 1/2 (64)
Effective embedment	h_{ef}	in. (mm)	2.00 (51)	2.00 (51)
Minimum concrete member thickness[2]	$h_{min,deck}$	in. (mm)	2 1/2 (64)	2 1/2 (64)

TABLE 5—CARBON STEEL AND STAINLESS STEEL STRONG-BOLT® 2 ANCHOR INSTALLATION INFORMATION IN THE TOPSIDE OF NORMAL-WEIGHT OR SAND-LIGHTWEIGHT CONCRETE-FILLED PROFILE STEEL DECK FLOOR AND ROOF ASSEMBLIES[1,4,5]

Design Information	Symbol	Units	Nominal Anchor Diameter (inch)						
			Carbon Steel Strong-Bolt 2[2]				Stainless Steel Strong-Bolt 2[3]		
			3/8		1/2		3/8		1/2
Nominal Embedment Depth	h_{nom}	in.	1 7/8	1 7/8	2 3/4	3 7/8	1 7/8	1 7/8	2 3/4
Effective Embedment Depth	h_{ef}	in.	1 1/2	1 1/2	2 1/4	3 3/8	1 1/2	1 1/2	2 1/4
Minimum Concrete Thickness[6]	$h_{min,deck}$	in.	2 1/2	3 1/4	3 1/4	4 3/16	2 1/2	3 1/4	3 1/4

- A comparison of the above tables show that the effective embedment varies between manufactures, and even for the same effective embedment, the minimum concrete thickness over metal deck varies. Due to the variations, the current plan is to use separate tables for each ESR (expansion and screw anchors). However, each anchor will have ~5 pages of installation/capacity tables and connection spacing tables. This will result in 30+ pages of tables if (6) anchors are chosen (3 expansion, 3 screw).

Anchor Updates

PLOT DATE: May 09, 2017

EXPANSION ANCHOR GENERAL NOTES

1. CAPACITIES SHALL BE COMPARED TO STRENGTH DESIGN (SD) LEVEL DEMAND IN ACCORDANCE WITH THE 2025 CBC SECTION 1605A.1.
2. CAPACITIES ARE FOR SINGLE ANCHORS WHICH MEET MIN. REQUIREMENTS PER TABLE & SECTION BELOW.
3. MINIMUM CONCRETE STRENGTH f'c=3000 PSI.
4. EXPANSION ANCHORS INSTALLED THROUGH UPPER OR LOWER FLUTES OF METAL DECK SHALL MEET THE REQUIREMENTS OF THE INSTALLATION CRITERIA AND SECTION BELOW. <- REFERENCE ACT FIGURES
5. STEEL DECK TO BE MIN. 20 GA. W-DECK.
6. MINIMUM CONCRETE FILL DEPTH ABOVE THE TOP OF METAL DECK PER SECTION AND INSTALLATION CRITERIA BELOW.
7. EXPANSION ANCHORS SHALL NOT BE USED IN PRE-STRESSED CONCRETE UNLESS NON-DESTRUCTIVE TESTING METHODS ARE USED TO LOCATE STRAND & REINFORCING PRIOR TO ANCHOR INSTALLATION.
8. EXPANSION ANCHOR INSTALLATION SHALL NOT NICK OR DAMAGE EXISTING REINFORCEMENT. SHOULD THIS OCCUR THE RDP IN RESPONSIBLE CHARGE SHALL BE NOTIFIED IMMEDIATELY. EXPANSION ANCHORS SHALL BE INSTALLED 1" CLEAR OF EXISTING REINFORCEMENT.
9. EXPANSION ANCHORS SHALL BE INSTALLED PER CURRENT ICC-ES EVALUATION REPORT OR REPORT FROM OTHER TESTING AGENCY ACCEPTABLE TO OSHPD.
10. TESTING OF EXPANSION ANCHORS SHALL BE PER 2025 CBC SECTION 1910A.5
11. EXPANSION ANCHORS SHALL BE INSTALLED TO COMPLY W/ THE MINIMUM SLAB THICKNESS REQUIREMENTS ESTABLISHED BY THE ICC-ESR FOR THE SPECIFIED ANCHOR.
12. REFER TO NOTE 6C ON ST0.01 FOR ADDITIONAL EXPANSION ANCHOR REQUIREMENTS.
13. ALL VALUES IN TABLES ARE FOR CRACKED CONCRETE & INCLUDE REDUCTION BASED ON ACI 318-11 D3.3.4 REQUIREMENTS. THE ALLOWABLE STRENGTHS ARE BASED UPON THE LEAST OF THE ALLOWABLE STRENGTHS CALCULATED USING THE ICC ESRS 1917, 2427, 2502, & 3037 AND USING AN α FACTOR OF 1.4.
14. ANCHOR DEMANDS SHALL BE BASED ON ACI 318-19 17.10.5.3(D) AND 17.10.6.3(C).

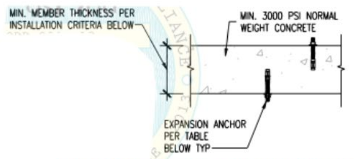


FIG 1: EXPANSION ANCHOR INSTALLATION CRITERIA IN SLAB OR BEAM

TABLE 1 (BASED ON ICC ESR 4266)
EXPANSION ANCHORS INSTALLED IN NORMAL WEIGHT CONCRETE (f'c MIN = 3000 PSI)

ANCHOR DIA (IN)	MIN EFFECTIVE EMBED (IN)	H_MIN (IN)[1]	MIN ANCHOR SPACING (IN)[2]	MIN EDGE DISTANCE (IN)[3]	TENSION (LB)	SHEAR (LB)
3/8	2	4	6	4.375	1586	2200
1/2	2	4	6	5.5	1586	2277
1/2	3-1/4	5.5	9.75	10	2660	4469
5/8	2-3/4	5	8.25	10	2557	6666
5/8	4	6	12	8.75	3631	6666

1. MINIMUM REQUIRED THICKNESS OF CONCRETE.
2. MIN ANCHOR SPACING IS THE MAX OF 3 X MIN EFFECTIVE EMBED AND MIN SPACING FROM ESR REPORT.
3. MIN EDGE DISTANCE IS THE MAX OF 1.5 X MIN EFFECTIVE EMBED AND CRITICAL EDGE DISTANCE FROM ESR REPORT.

SECTION TITLE: STANDARD PARTITION WALL DETAILS
SHEET TITLE: EXPANSION ANCHOR GENERAL NOTES AND CAPACITIES - ICC ESR 4266
OPD NO.: ST1.03

PLOT DATE: May 09, 2017

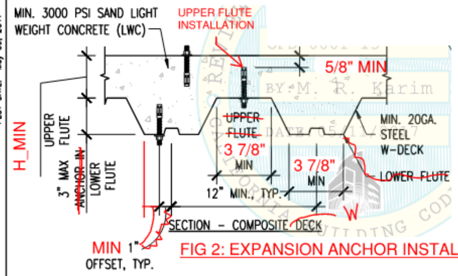


FIG 2: EXPANSION ANCHOR INSTALLATION CRITERIA IN W-DECK

TABLE 2 (BASED ON ICC ESR 4266)
EXPANSION ANCHORS INSTALLED IN TO THE UNDERSIDE OF STRUCTURAL SAND-LIGHTWEIGHT CONCRETE (f'c MIN = 3000 PSI) OVER METAL W-DECK SHOWN IN FIGURE 2 ABOVE. CAPACITIES NOT APPLICABLE FOR B-DECK.

ANCHOR DIA (IN)	MIN EFFECTIVE EMBED (IN)	LOWER ANCHOR, H_MIN (IN)[1]	UPPER ANCHOR, H_MIN (IN)[2]	MIN ANCHOR SPACING (IN)[3]	MIN EDGE DISTANCE (IN)[4]	TENSION (LB)	SHEAR (LB)
3/8	2	2.5	3.75	6.75	3	1119	1378
1/2	2	2.5	3.75	6.75	3	1041	1469
1/2	3.25	2.5	4.875	9.75	4.875	1628	2824
5/8	2.75	2.5	4.375	8.25	4.125	1916	2480
5/8	4	2.5	5.375	12	6	2143	3998

1. MINIMUM REQUIRED THICKNESS OF CONCRETE ABOVE UPPER FLUTE FOR ANCHOR INSTALLED IN LOW FLUTE.
2. MINIMUM REQUIRED THICKNESS OF CONCRETE ABOVE UPPER FLUTE FOR ANCHOR INSTALLED IN UPPER FLUTE.
3. MIN ANCHOR SPACING IS THE MAX OF 3 X MIN EFFECTIVE EMBED AND 1.5 TIMES THE FLUTE WIDTH (TABLE ASSUMES 4.5" FLUTE WIDTH).
4. MIN EDGE DISTANCE IS THE MAX OF 1.5 X MIN EFFECTIVE EMBED AND CRITICAL EDGE DISTANCE FROM ESR REPORT.

TABLE 3 (BASED ON ICC ESR 4266)
EXPANSION ANCHORS INSTALLED IN TO THE TOP OF STRUCTURAL SAND-LIGHTWEIGHT CONCRETE (f'c MIN = 3000 PSI) OVER METAL DECK SHOWN IN FIGURE 2 ABOVE.

ANCHOR DIA (IN)	MIN EFFECTIVE EMBED (IN)	H_MIN (IN)[1]	MIN ANCHOR SPACING (IN)[2]	MIN EDGE DISTANCE (IN)[3]	TENSION (LB)	SHEAR (LB)
3/8	2	2.5	6	8	1586	2200
1/2	2	3.25	9	7.5	1586	2277

1. MINIMUM REQUIRED THICKNESS OF CONCRETE ABOVE UPPER FLUTE.
2. MIN ANCHOR SPACING IS THE MAX OF 3 X MIN EFFECTIVE EMBED AND MIN SPACING FROM ESR REPORT.
3. MIN EDGE DISTANCE IS THE MAX OF 1.5 X MIN EFFECTIVE EMBED AND CRITICAL EDGE DISTANCE FROM ESR REPORT.

SECTION TITLE: STANDARD PARTITION WALL DETAILS
SHEET TITLE: EXPANSION ANCHOR CAPACITIES - ICC ESR 4266
OPD NO.: ST1.01

PLOT DATE: May 09, 2017

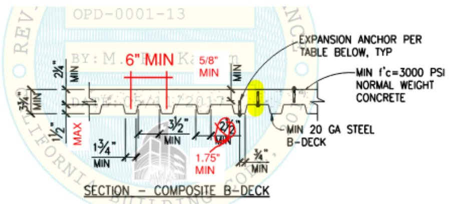


FIG 3: EXPANSION ANCHOR INSTALLATION CRITERIA IN B-DECK

TABLE 4 (BASED ON ICC ESR 4266)
EXPANSION ANCHORS INSTALLED IN TO THE UNDERSIDE OF STRUCTURAL SAND-LIGHTWEIGHT CONCRETE (f'c MIN = 3000 PSI) OVER METAL B-DECK SHOWN IN FIGURE 3 ABOVE.

ANCHOR DIA (IN)	MIN EFFECTIVE EMBED (IN)	LOWER ANCHOR, H_MIN (IN)[1]	UPPER ANCHOR, H_MIN (IN)[2]	MIN ANCHOR SPACING (IN)[3]	MIN EDGE DISTANCE (IN)[4]	TENSION (LB)	SHEAR (LB)
3/8	2	2.25	3.375	6	3	1038	1628
1/2	2	2.25	3.375	6	3	722	2064
1/2	3.25	3.375	4.875	9.75	4.875	921	2252
5/8	2.75	3.25	4.375	8.25	4.125	1285	2655

1. MINIMUM REQUIRED THICKNESS OF CONCRETE ABOVE UPPER FLUTE FOR ANCHOR INSTALLED IN LOW FLUTE.
2. MINIMUM REQUIRED THICKNESS OF CONCRETE ABOVE UPPER FLUTE FOR ANCHOR INSTALLED IN UPPER FLUTE.
3. MIN ANCHOR SPACING IS THE MAX OF 3 X MIN EFFECTIVE EMBED AND 1.5 TIMES THE FLUTE WIDTH (TABLE ASSUMES 1.75" FLUTE WIDTH).
4. MIN EDGE DISTANCE IS THE MAX OF 1.5 X MIN EFFECTIVE EMBED AND CRITICAL EDGE DISTANCE FROM ESR REPORT.

SECTION TITLE: STANDARD PARTITION WALL DETAILS
SHEET TITLE: EXPANSION ANCHOR CAPACITIES - ICC ESR 4266
OPD NO.: ST1.01

- **Each anchor will have 3 sheets covering capacities and installation in concrete flat slab/beam, W-Deck, and B-Deck**

Anchor Updates

PLOT DATE: May 09, 2017

BOTTOM TRACK CONNECTION TO LWC ON METAL DECK FASTENER MAX SPACING SCHEDULE

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'A')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION	
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 2" EMBED
9 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32
12 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32
16 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'B')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION	
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 2" EMBED
9 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32
12 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32
16 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	32	32
	2.26 -> 3.00	32	32

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITIONS 'C')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION	
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 2" EMBED
9 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	24	32
	1.51 -> 2.25	16	16
	2.26 -> 3.00	8	16
12 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	24	24
	1.51 -> 2.25	16	16
	2.26 -> 3.00	8	8
16 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	24	24
	1.51 -> 2.25	16	16
	2.26 -> 3.00	8	8

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITIONS 'D')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION	
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 2" EMBED
9 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	24	24
	2.26 -> 3.00	16	16
12 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	32	32
	1.51 -> 2.25	24	24
	2.26 -> 3.00	16	16
16 FT	0.00 -> 0.75	32	32
	0.76 -> 1.50	24	32
	1.51 -> 2.25	16	16
	2.26 -> 3.00	8	16

NOTES:

1. SEE STX.XX & STX.XX FOR ICC ESR 4266 EXPANSION ANCHOR REQUIREMENTS

SECTION TITLE:
STANDARD PARTITION WALL DETAILS

SHEET TITLE:
BOTTOM TRACK CONNECTION TO
LWC ON METAL DECK
PAF AND ESR 4266 MAX SPACING SCHEDULE

OPD NO.:
ST8.02

BOTTOM TRACK CONNECTION TO NWC SLAB FASTENER MAX SPACING SCHEDULE

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'A' AND 'B')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION		
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 3-1/4" EMBED	5/8"ϕ EXP. ANCHOR W/ 2-3/4" EMBED
9 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	32	32	32
	1.51 -> 2.25	32	32	32
	2.26 -> 3.00	32	32	32
12 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	32	32	32
	1.51 -> 2.25	32	32	32
	2.26 -> 3.00	32	32	32
16 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	32	32	32
	1.51 -> 2.25	32	32	32
	2.26 -> 3.00	32	32	32

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'C')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION		
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 3-1/4" EMBED	5/8"ϕ EXP. ANCHOR W/ 2-3/4" EMBED
9 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32
12 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32
16 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'D')

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION		
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 3-1/4" EMBED	5/8"ϕ EXP. ANCHOR W/ 2-3/4" EMBED
9 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	32	32	32
	1.51 -> 2.25	24	32	32
	2.26 -> 3.00	16	32	32
12 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	32	32	32
	1.51 -> 2.25	24	32	32
	2.26 -> 3.00	16	32	32
16 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32

NOTES:

1. SEE STX.XX & STX.XX FOR ICC ESR 4266 EXPANSION ANCHOR REQUIREMENTS

SECTION TITLE:
STANDARD PARTITION WALL DETAILS

SHEET TITLE:
BOTTOM TRACK CONNECTION TO
NWC SLAB FASTENER MAX SPACING
SCHEDULE

OPD NO.:
ST8.03

- **Each anchor will have 2 sheets for bottom track attachment for various conditions**

Anchor Updates

Deeper embedment and larger diameter anchor options

2013 OPD 01

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITIONS 'C' & 'D')

MAX PARTITION WALL HEIGHT	S_{DS}	MAXIMUM FASTENER SPACING IN INCHES AT BOT		
		PAF	3/8"ø EXP ANCHOR W/ 2" EMBED	1/2"ø EXP ANCHOR W/ 2 1/4" EMBED
9 FT	0.25-0.99	-	32	32
	1.00-1.25	-	32	32
	1.26-1.45	-	32	32
	1.46-1.95	-	24	32
12 FT	0.25-0.99	-	32	32
	1.00-1.25	-	32	32
	1.26-1.45	-	24	32
	1.46-1.95	-	16	24
16 FT	0.25-0.99	-	32	32
	1.00-1.25	-	32	32
	1.26-1.45	-	24	32
	1.46-1.95	-	16	24

2025 OPD 01

OPD CONDITION C

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM FASTENER SPACING IN INCHES AT BOTTOM CONNECTION		
		3/8"ϕ EXP. ANCHOR W/ 2" EMBED	1/2"ϕ EXP. ANCHOR W/ 3-1/4" EMBED	5/8"ϕ EXP. ANCHOR W/ 2-3/4" EMBED
9 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32
12 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32
16 FT	0.00 -> 0.75	32	32	32
	0.76 -> 1.50	24	32	32
	1.51 -> 2.25	16	32	32
	2.26 -> 3.00	8	24	32

Spacing reduced

PAF Updates

2013 OPD Tables

BOTTOM TRACK CONNECTION TO LWC ON METAL DECK F

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'A')

MAX PARTITION WALL HEIGHT	S_{DS}	MAXIMUM FASTENER SF PAF
9 FT	0.25-0.99	32
	1.00-1.25	24
	1.26-1.45	16
	1.46-1.95	16
12 FT	0.25-0.99	24
	1.00-1.25	16
	1.26-1.45	16
	1.46-1.95	8
16 FT	0.25-0.99	16
	1.00-1.25	8
	1.26-1.45	8
	1.46-1.95	8

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITION 'B')

MAX PARTITION WALL HEIGHT	S_{DS}	MAXIMUM FASTENER SF PAF
9 FT	0.25-0.99	16
	1.00-1.25	16
	1.26-1.45	8
	1.46-1.95	8
12 FT	0.25-0.99	16
	1.00-1.25	8
	1.26-1.45	8
	1.46-1.95	8
16 FT	0.25-0.99	8
	1.00-1.25	8
	1.26-1.45	8
	1.46-1.95	–

BOTTOM CONNECTION DEMANDS (PARTITION WALL CONDITIONS 'C' & 'D')

MAX PARTITION WALL HEIGHT	S_{DS}	MAXIMUM FASTENER SF PAF
9 FT	0.25-0.99	–
	1.00-1.25	–
	1.26-1.45	–
	1.46-1.95	–
12 FT	0.25-0.99	–
	1.00-1.25	–
	1.26-1.45	–
	1.46-1.95	–
16 FT	0.25-0.99	–
	1.00-1.25	–
	1.26-1.45	–
	1.46-1.95	–

2013 OPD Tables

TOP TRACK CONNECTION TO LWC FILLED METAL DECK & NWC SLAB (MIN 3000 PSI) FASTENER SPACING SCHEDULES

PARTITION WALL CONDITION 'A'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A 9 FT	12 FT	16 FT
0.25-0.99	30	24	18
1.00-1.25	24	18	12
1.26-1.45	24	18	12
1.46-1.95	18	12	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

PARTITION WALL CONDITION 'B'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A 9 FT	12 FT	16 FT
0.25-0.99	18	18	12
1.00-1.25	12	12	12
1.26-1.45	12	12	6
1.46-1.95	6	6	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

PARTITION WALL CONDITION 'C'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A 9 FT	12 FT	16 FT
0.25-0.99	6	6	6
1.00-1.25	6	6	6
1.26-1.45	6	6	6
1.46-1.95	6	6	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

PARTITION WALL CONDITION 'D'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A 9 FT	12 FT	16 FT
0.25-0.99	6	6	6
1.00-1.25	6	6	6
1.26-1.45	6	6	6
1.46-1.95	6	6	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

PAF SPACING SCHEDULE FOR TOP AND BOTTOM TRACK CONNECTION TO LWC FILLED METAL DECK & NWC SLAB

PARTITION WALL CONDITION 'A'

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM PAF SPACING IN INCHES: BOTTOM CONNECTION PER ST8.01	TOP CONNECTION PER ST7.02A	TOP CONNECTION PER ST7.02B, ST7.02C-D
9 FT	0.00 -> 0.75	32	36	48
	0.76 -> 1.50	16	18	36
	1.51 -> 2.25	8	12	24
	2.26 -> 3.00	8	6	18
12 FT	0.00 -> 0.75	24	30	48
	0.76 -> 1.50	8	12	30
	1.51 -> 2.25	8	6	18
	2.26 -> 3.00	NA	6	12
16 FT	0.00 -> 0.75	16	18	42
	0.76 -> 1.50	8	6	18
	1.51 -> 2.25	NA	6	12
	2.26 -> 3.00	NA	NA	6

PARTITION WALL CONDITION 'B'

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM PAF SPACING IN INCHES: BOTTOM CONNECTION PER ST8.01	TOP CONNECTION PER ST7.02A	TOP CONNECTION PER ST7.02B, ST7.02C-D
9 FT	0.00 -> 0.75	16	18	42
	0.76 -> 1.50	8	6	18
	1.51 -> 2.25	NA	6	12
	2.26 -> 3.00	NA	6	12
12 FT	0.00 -> 0.75	16	18	36
	0.76 -> 1.50	8	6	18
	1.51 -> 2.25	NA	6	12
	2.26 -> 3.00	NA	NA	6
16 FT	0.00 -> 0.75	16	18	36
	0.76 -> 1.50	8	6	18
	1.51 -> 2.25	NA	6	12
	2.26 -> 3.00	NA	NA	6

PARTITION WALL CONDITION 'C' AND 'D'

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM PAF SPACING IN INCHES: BOTTOM CONNECTION PER ST8.01	TOP CONNECTION PER ST7.02A	TOP CONNECTION PER ST7.02B, ST7.02C-D
9 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA
12 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA
16 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA

NOTES:

1. SEE ST7.02 AND ST7.03 FOR DETAILS A, B, C, & D.
2. VALUES IN TABLES ABOVE REPRESENT MAXIMUM SPACING. DECREASE SPACING AS REQ'D TO COORDINATE W/ METAL DECK FLUTE SPACING. WHERE PAF SPACING IS LESS THAN 12" OC, OK TO PROVIDE MULITPLE PAF AT LOW FLUTE AS REQ'D. MAINTAIN EDGE DISTANCE AND SPACING REQUIREMENTS PER ST1.01 & ST1.02.
3. SPACING LISTED INCLUDES (OMEGA_op) PER ASCE 7-22 TABLE 13.5-1.

SECTION TITLE: STANDARD PARTITION WALL DETAILS

SHEET TITLE: PAF SPACING SCHEDULE FOR TOP AND BOTTOM TRACK CONNECTION TO LWC FILLED METAL DECK & NWC SLAB

OPD NO.: ST7.04

- **PAF usage is very limited, especially for Conditions 'C' and 'D'**

PAF Updates

2013 OPD tables for ST7.02A. If using ST7.02B then double spacing.

PARTITION WALL CONDITION 'C'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A		
	9 FT	12 FT	16 FT
0.25-0.99	6	6	6
1.00-1.25	6	6	6
1.26-1.45	6	6	6
1.46-1.95	6	6	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

PARTITION WALL CONDITION D'

S_{DS}/ WALL HEIGHT	PAF SPACING (INCHES O.C.) PER ST7.02 DETAIL A		
	9 FT	12 FT	16 FT
0.25-0.99	6	6	6
1.00-1.25	6	6	6
1.26-1.45	6	6	6
1.46-1.95	6	6	6

FOR DETAIL B THROUGH D (STRAP OR Z-CLIP) DOUBLE THE SPACING INDICATED UP TO 48" OC.

2025 OPD tables

OPD CONDITION C & D COMBINED

MAX PARTITION WALL HEIGHT	F_p/W_p RANGE	MAXIMUM PAF SPACING IN INCHES		
		BOTTOM CONNECTION PER ST8.01	TOP CONNECTION PER ST7.02A	TOP CONNECTION PER ST7.02B, ST7.02C-D
9 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA
12 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA
16 FT	0.00 -> 0.75	NA	6	12
	0.76 -> 1.50	NA	NA	6
	1.51 -> 2.25	NA	NA	NA
	2.26 -> 3.00	NA	NA	NA

How to get F_p/W_p?

‹ Building Safety

Facility Detail

Click on the **Facility List Drop-down** below and scroll to find and select a facility. Or click the drop-down and begin typing a facility name or number to filter the list. Data is updated every 2 weeks.

New: AB 2190 Quarterly Reports are now available.

For accessible copies of facility site plans email Seismic Compliance Unit.

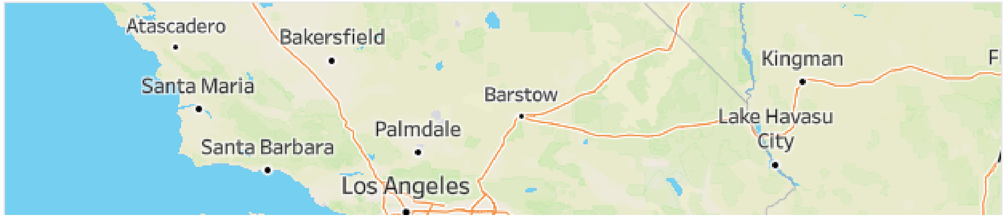
Facility Info | Building List/Seismic Info | Building Services | Instrumented Buildings | AB2190 Report | Unauthorized Construction | Compliance Plan | Building Operational Plan

Show facilities:
- (All)
- Do not have AB 2190 Extensions
- Have AB 2190 Extensions

Facility List Drop-down

11659 UC San Diego Health La Jolla - Jacobs Medical Center Sulpizio Cardiovascular Center

11659 UC San Diego Health La Jolla - Jacobs Medical Center Sulpizio Cardiovascular Center
(HCAI ID: 106374141)
9300 Campus Point Dr
La Jolla, CA-92037
County: San Diego
License Type: General Acute Care



How to get F_p/W_p?

Facility Info | Building List/Seismic Info | Building Services | Instrumented Buildings | AB2190 Report | Unauthorized Construction | Compliance Plan | Building Operational Plan

Back to Main

11659 UC San Diego Health La Jolla - Jacobs Medical Center Sulpizio Cardiovascular Center

Bldg Num	Bldg Name	Classification & Status	RACs Date	NPC Status	Building Code	Year Built	Building Type**	Stories	Height in Feet	Instrumented	Construction Type	Sprinklered	AB1882 Signage	
BLD-02561	Main Hospital	OSHPD 1, In Service		1/1/2030 * NPC 5 Rpt: Review Completed; Initial Sub Date:12/21/2023	1989 California Building Code (CBC)	1994	Steel Moment Resisting Frame	4	Unknown	Yes			Compliant	SPC: 3 NPC: 4
BLD-02591	Perlman Ambulatory Care Center	Local, Non Acute Care Building			Unknown	1991	Steel Moment Resisting Frame	UNKNOWN	Unknown	No				SPC: NA NPC: NA
BLD-02846	Main Hospital	OSHPD 1, In Service		1/1/2030 * NPC 5 Rpt: Review Completed; Initial Sub Date:12/21/2023	1989 California Building Code (CBC)	1994	Steel Moment Resisting Frame	4	Unknown	No			Compliant	SPC: 3 NPC: 4
BLD-05315	UCSD Sulpizio Family Cardiovascular Center	OSHPD 1, In Service		1/1/2030 * NPC 5 Rpt: Review Completed; Initial Sub Date:12/21/2023	2001 California Building Code (CBC)	2011	Steel Moment Resisting Frame	4	72.87	No			Compliant	SPC: 5 NPC: 4
BLD-05419	Central Plant	OSHPD 1, In Service		1/1/2030 * NPC 5 Rpt: Review Completed; Initial Sub Date:12/21/2023	2007 California Building Code (CBC)	2016	Steel Braced Frame, Steel Light Frame	2	42.33	No			Compliant	SPC: 5 NPC: 4
				1/1/2030 *	2007		Steel Moment							

Facility Seismic Design Parameters for New Buildings | Facility Seismic Design Parameters for Existing Buildings | ASCE 7-16 Tsunami Design not required | ASCE 7-22 Spectra and Fp Calculation

HCAi Department of Health Care Access and Information

How to get F_p/W_p?

ASCE7-22 Fp Calculation

USING THE DEFAULT OPTIONS WILL LEAD TO CONSERVATIVE RESULTS

Title for report

11659 UC San Diego Health La Jolla - Jacobs Medical Center Sulpizio Cardiovascular Center

S_{DS}, as obtained in previous page, can modify here

0.990 − +

☑ Select for Fp for OPDs

F_p for OPDs:

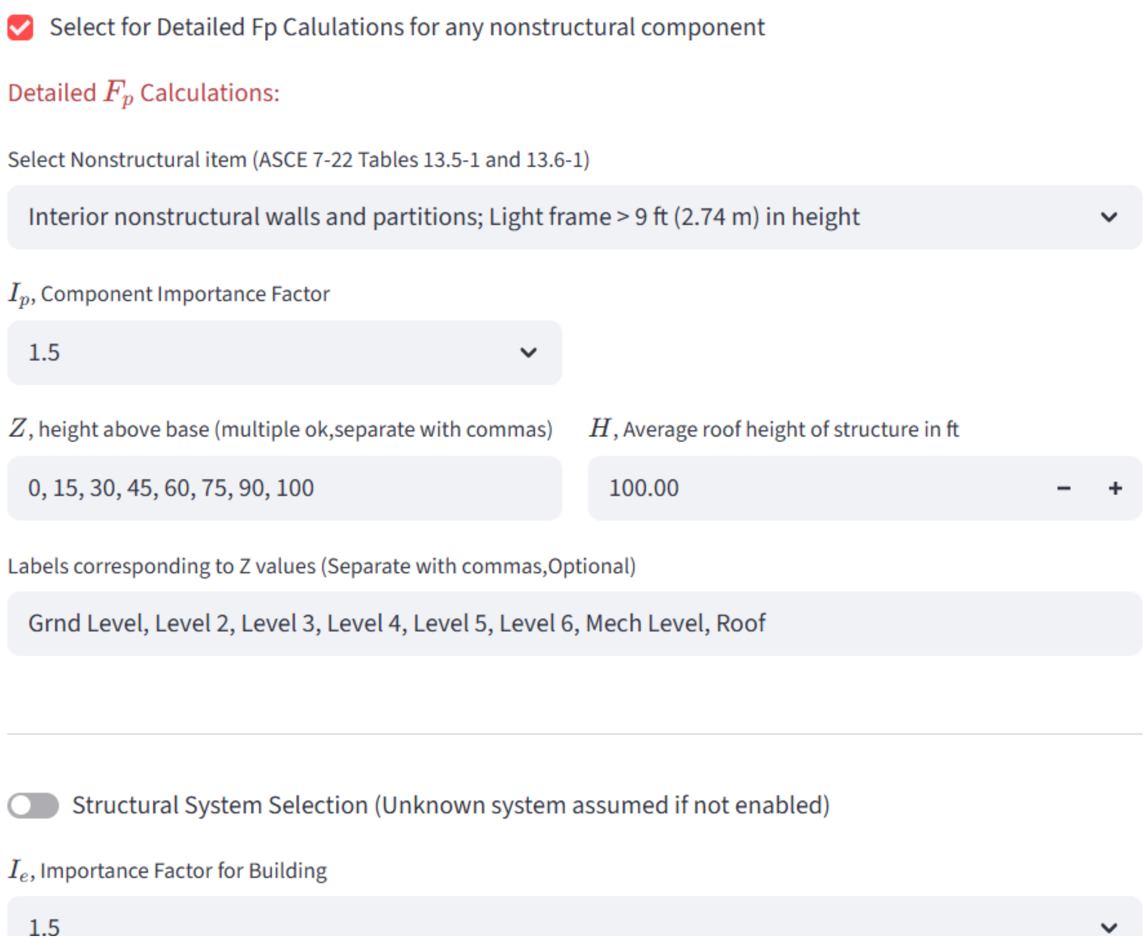
Assumes I_p = 1.5, R_μ= 1.3, H_f per ASCE 7-22 Eq 13.3-5

Governing F_p:

Location, (Sds = 0.99)	Fp/Wp for Partition Walls (OmegaOP =2.0)	Fp/Wp for Ceilings (OmegaOP =2.0)
At Grade	0.5544	0.4455
Lower Third	0.7818	0.5585
Middle Third	1.1372	0.8123
Upper Third (including roof)	1.4926	1.0662

- **‘Select for Fp for OPDs’ is intended for projects where there is not a structural engineer involved, and the design professional does not have detailed information about the building’s lateral force resisting system. This option is potentially more conservative since it assumes the worst-case defaults for the Fp calculation.**

How to get F_p/W_p?



- **'Select for Detailed Fp Calculations…' is intended for projects where there is a structural engineer involved or the design professional has detailed information about the building's lateral force resisting system. This option can also be used to get Fp forces for other non-structural components.**

Item #8 Proposed removal or revision of California Building Code exceptions to AISC (American Institute of Steel Construction) design specifications

- Discussion and public input

Facilitator: Jim Malley (or designee)

Discussion of Potential Changes to Allowable Systems for HCAI Projects

Discussion: In a previous SNSR meeting Jim Malley discussed a review of all OSHPD requirements beyond AISC design specifications (AISC 360 and 341), many of which date back to 2005. Almost all of the OSHPD specific requirements were reviewed and many were removed since they had been modified by AISC to OSHPD's satisfaction. The only items that remain for discussion are a requirement for a project specific AMOC for all projects employing certain AISC approved seismic systems

Request: That OSHPD review latest material on the STMF, SPSW, and "SpeedCore" systems to consider whether or not to retain this requirement for AMOC for all such projects with these systems.

Steel Special Truss Moment Frame (STMF) Provisions: 1997–2027

Steel Special Truss Moment Frame (STMF)

ASCE 7-22

Table 12.2-1. Design Coefficients and Factors for Seismic Force-Resisting Systems.

Seismic Force-Resisting System	ASCE 7 Section Where Detailing Requirements Are Specified	Response Modification Coefficient, R^a	Overstrength Factor, Ω_0^b	Deflection Amplification Factor, C_d^c	Structural System Limitations Including Structural Height, h_n, Limits (ft)[d] — Seismic Design Category: B	C	D[e]	E[e]	F[f]
C. MOMENT-RESISTING FRAME SYSTEMS									
1. Steel special moment frames	14.1 and 12.2.5.5	8	3	5½	NL	NL	NL	NL	NL
2. Steel special truss moment frames	14.1	7	3	5½	NL	NL	160	100	NP

AISC 341-27

E4. SPECIAL TRUSS MOMENT FRAMES (STMF)

1. Scope

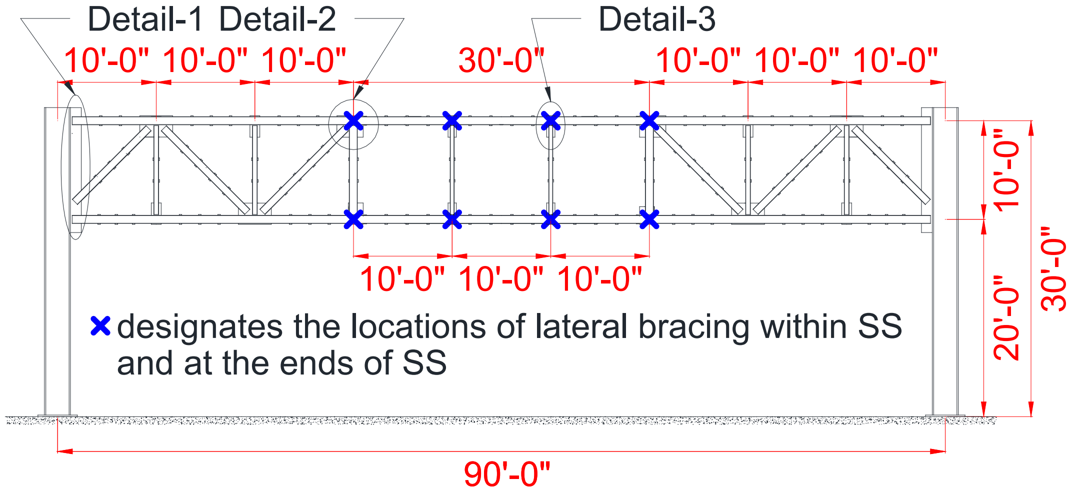
Special truss moment frames (STMF) of structural steel shall be in conformance with this section.

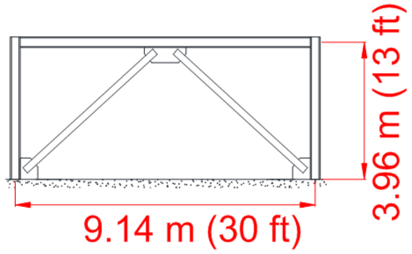
2. Basis of Design

STMF are expected to provide significant inelastic deformation capacity at the ductile special segment located near the midspan of the truss. The inelastic deformation results from flexural yielding of the chords, and, when used, flexural yielding of the intermediate vertical web members, as well as yielding and inelastic buckling of the diagonal members within the special segment. The columns and nonspecial truss segments outside of the special segments shall be designed to resist the forces that are generated by the fully yielded and strain-hardened special segment. Flexural yielding of columns at the base is permitted. Connection design, including at the ends of both the special segment chords and the intermediate vertical web members, shall be based on connection tests that provide the performance required as specified in Sections E4.4b and E4.6b.

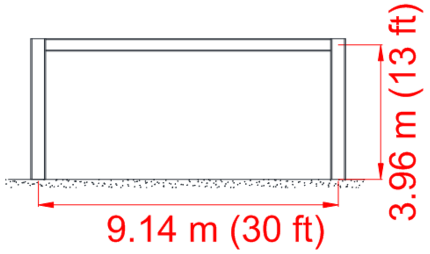
Special Truss Moment Frames (STMF)

- Truss girders can be economically used over longer spans (up to 65 ft span and 6 ft depth allowed by AISC Seismic Provisions)
- Higher elastic lateral stiffness than moment frames
- Open-webs can accommodate mechanical and electrical ductwork



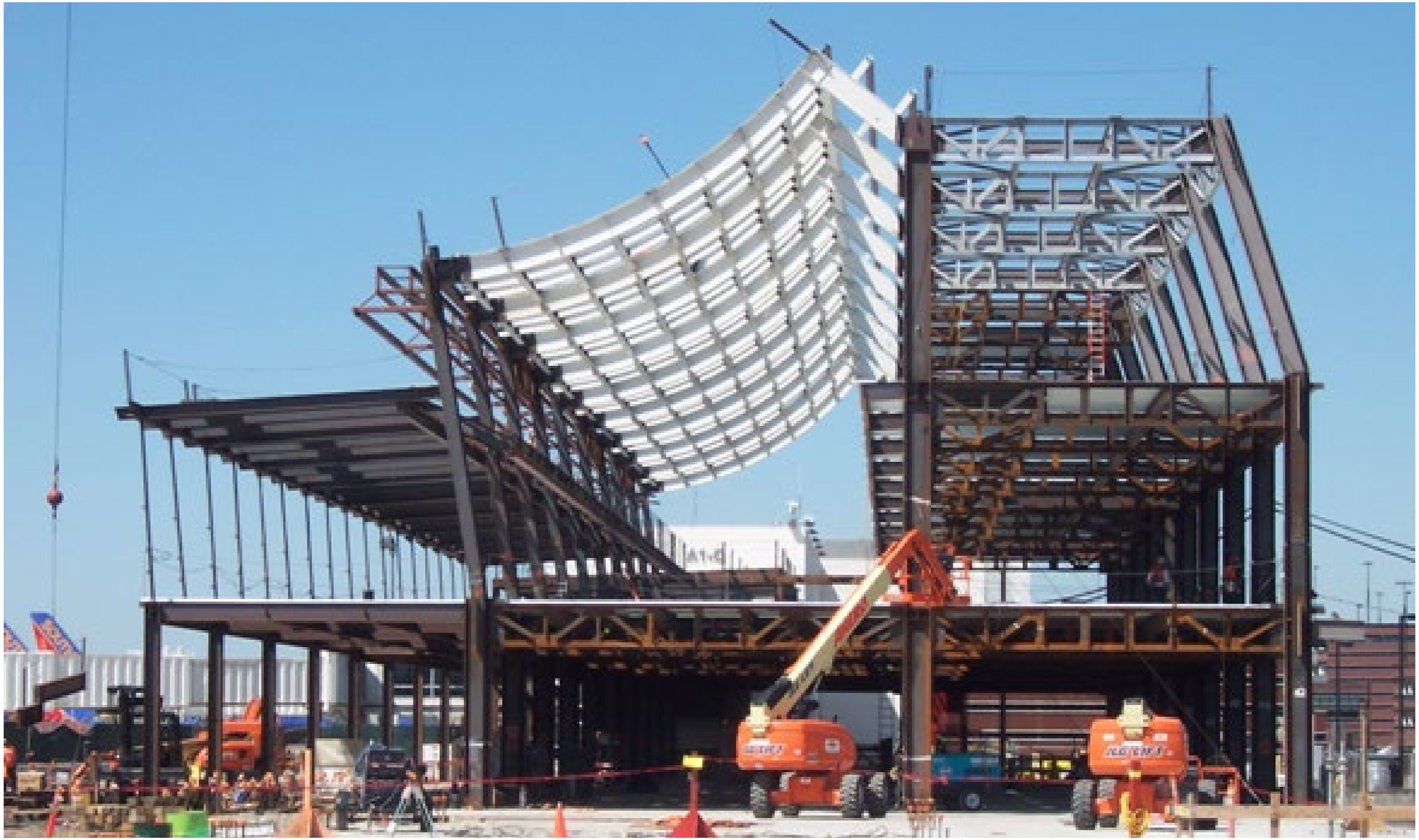


Braced Frame



Moment Frame

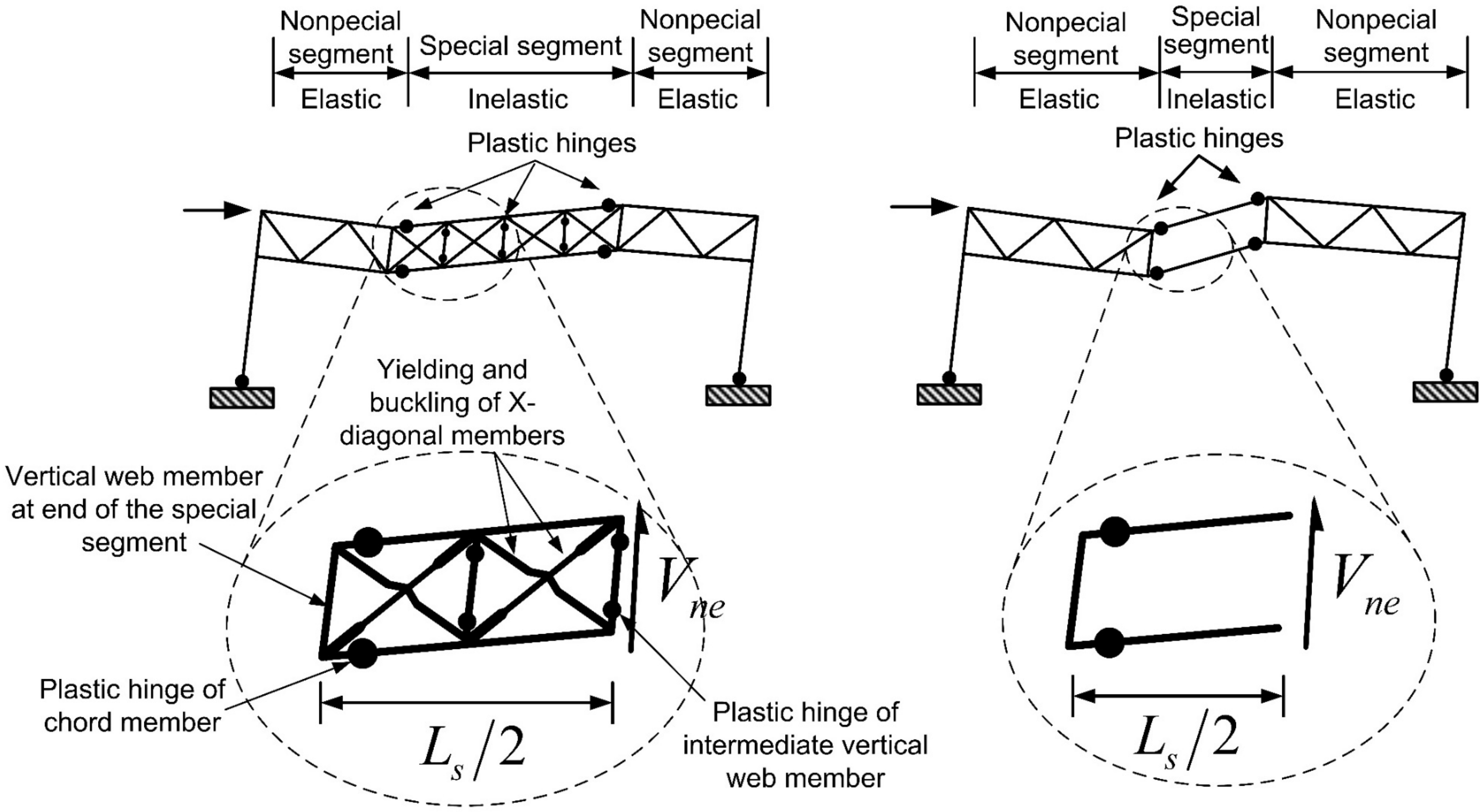
SPECIAL TRUSS MOMENT FRAME (STMF)



Mineta San Jose International Airport (photo courtesy of John Hooper, MKA)

Yield Mechanism of Special Truss Moment Frames (STMF)

Elements such as truss members, columns, and connections outside the special segment are designed based on V_{ne}, which accounts for the material overstrength and strain hardening of the members within the special segment.



Special segment with diagonal members

Special segment with Vierendeel panel

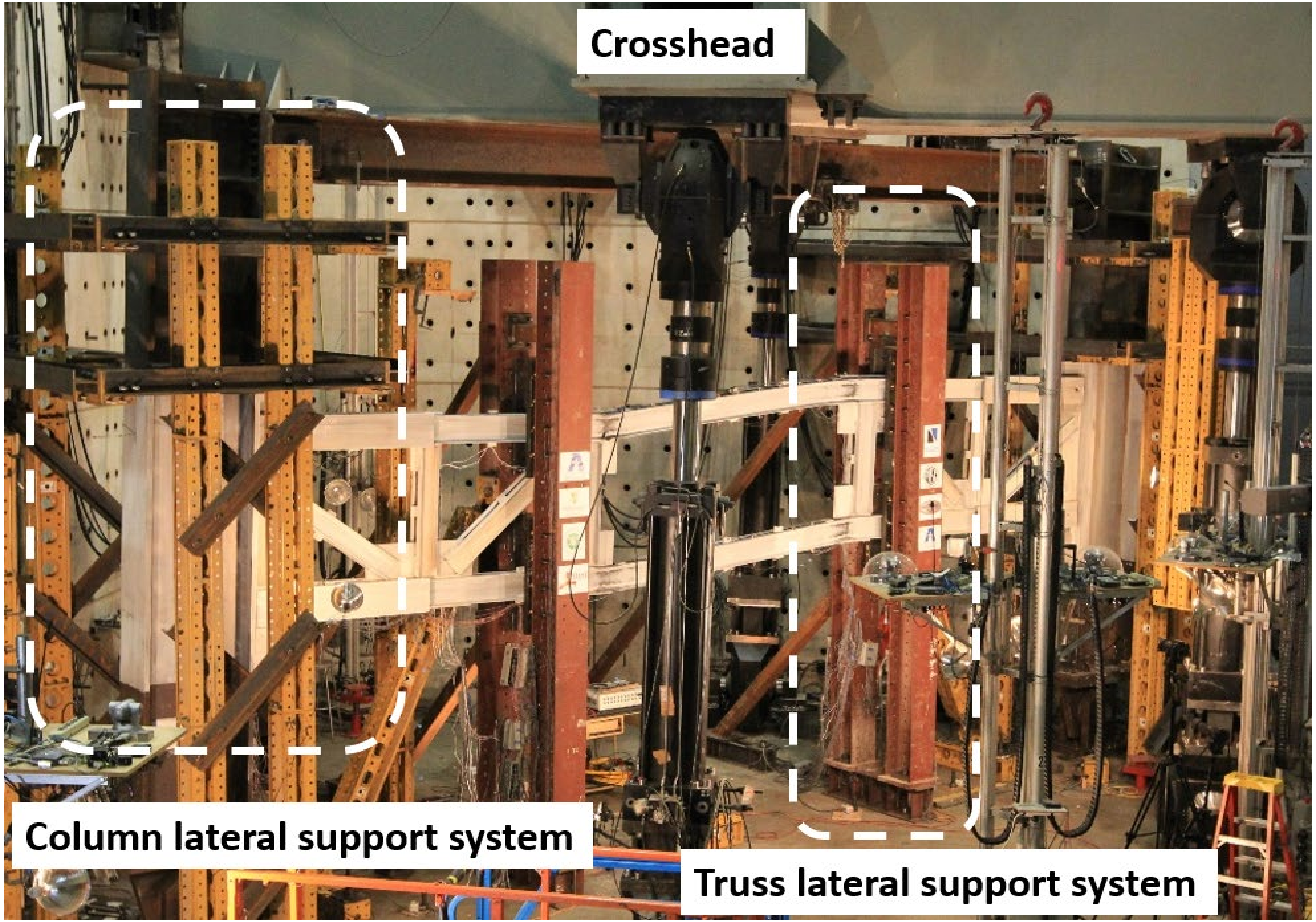
The current (2022) STMF seismic design provisions in Section E4 of AISC 341 are primarily based on research conducted during the 1990s using smaller double-angle truss members (up to L4×4×½)

Yielding and buckling of diagonal members

Vierendeel Type Special Segment (without diagonals)

More Recent Full-Scale STMF Experiments (Chao et al., 2015)

Stronger truss members: C12 for channels, L6 for angles, and HSS8 for HSS



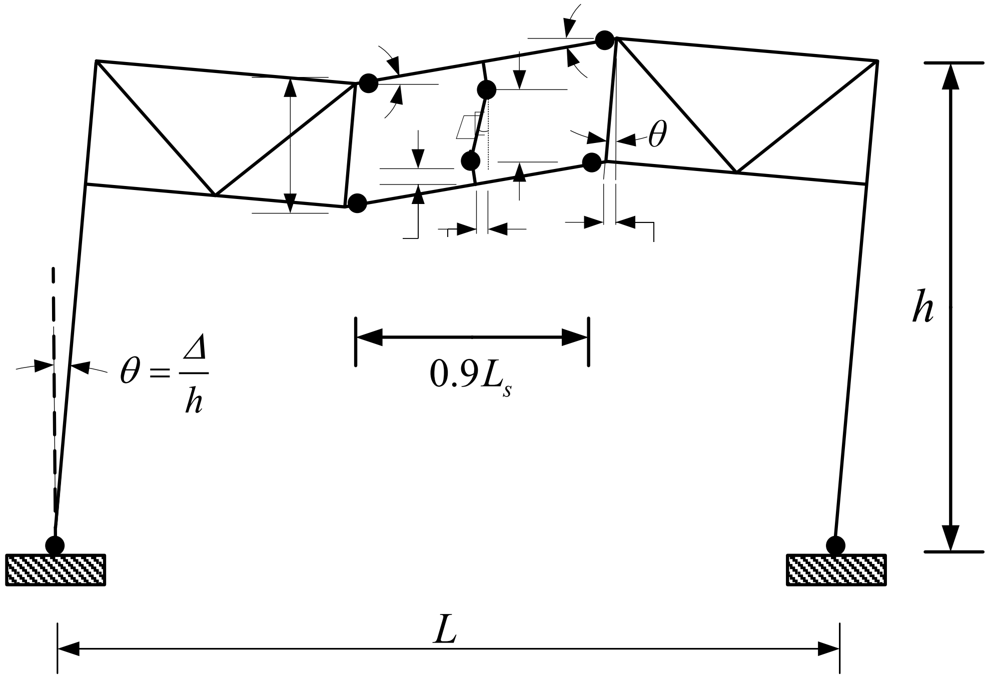
Rotational demands of the chord members in the special segment

4a. Special Segment

Each horizontal truss that is part of the SFRS shall have a special segment that is located between the quarter points of the span of the truss. The length of the special segment shall be between 0.1 and 0.5 times the truss span length. The length-to-depth

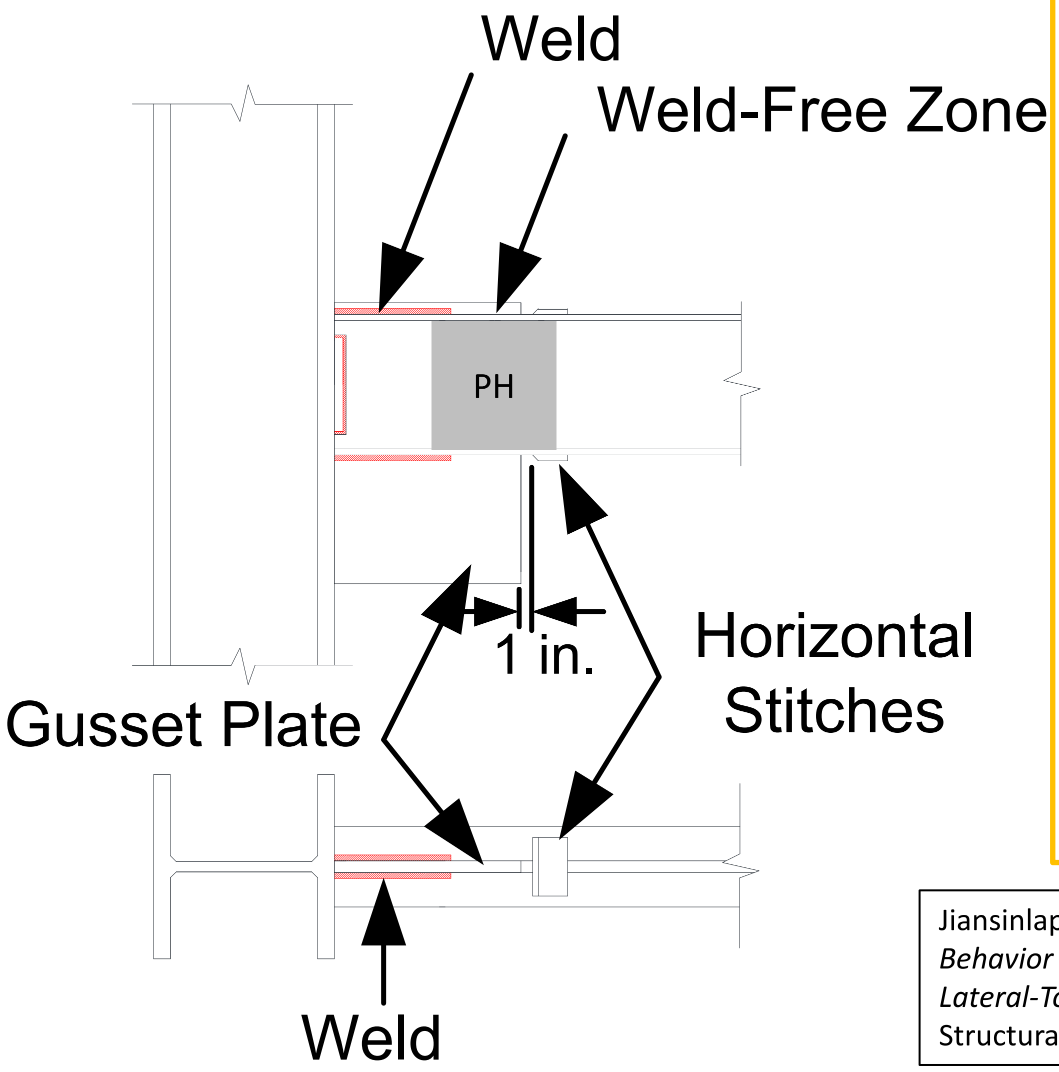
For a typical STMF with a length ratio of special segment to truss girder span to = 0.27:

Story Drift Ratio (rad)	Plastic Rotation (rad.)
0.50	0.00
0.75	0.01
1.00	0.02
1.25	0.03
1.50	0.04
1.75	0.05
2.00	0.06
2.25	0.07
2.50	0.08
2.75	0.09
3.00	0.10



Summary of the Recommended Detailing

The proposed detailing provides self-stabilizing ability at plastic hinge region to prevent lateral torsional buckling, thus enhancing plastic rotational capacity.

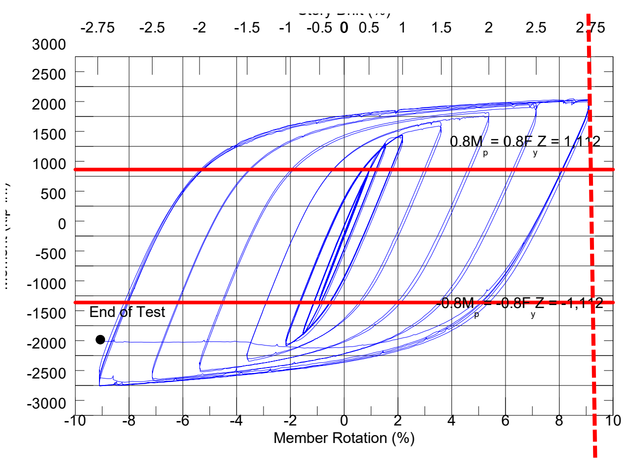


Features

- Weld-free zone allows the channels to rotate freely under bending while the gusset plate in the center provides stability;
- Horizontal stitches improve resistance to channel separation;
- Chamfered, horizontal stitches located 1 in. from the gusset plate accommodate up to 0.1 rad of rotation before they hit the gusset plate.

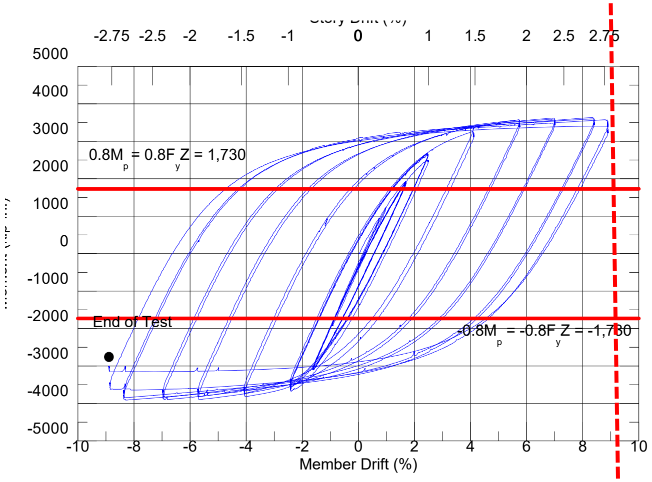
Jiansinlapadamrong, C., Price, B., and Chao, S.-H., (2018), "*Cyclic Behavior of Steel Double-Channel Built-Up Components with a New Lateral-Torsional-Buckling Prevention Detail*," ASCE Journal of Structural Engineering, Vol. 144, No. 8, August 2018.

The University of Texas ARLINGTON
Double Channels

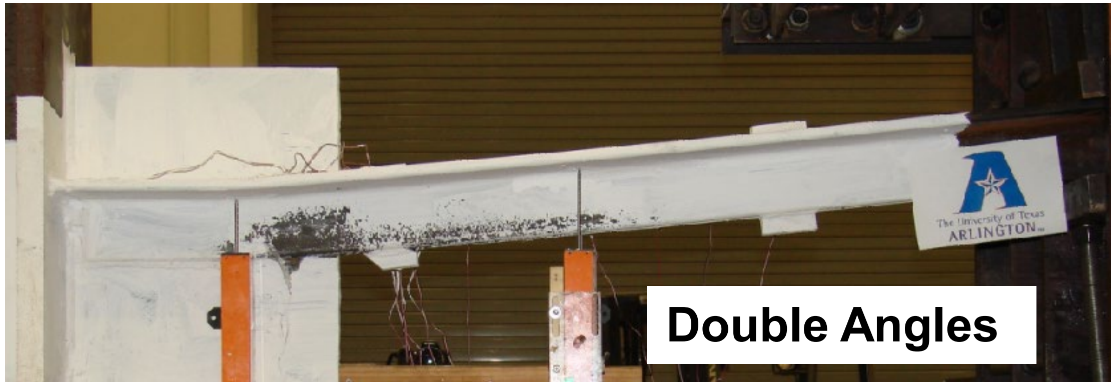


0.8Mp = 0.8FyZ = 1,112
-0.8Mp = -0.8FyZ = -1,112
End of Test
Member Rotation (%)

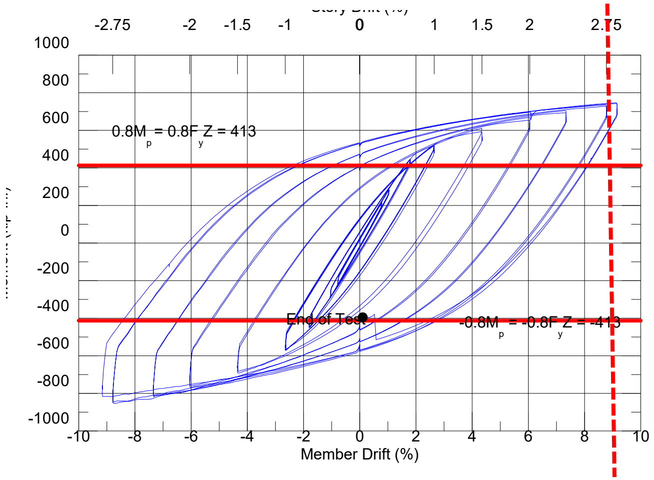
The University of Texas ARLINGTON
Double HSS



0.8Mp = 0.8FyZ = 1,730
-0.8Mp = -0.8FyZ = -1,730
End of Test
Member Drift (%)

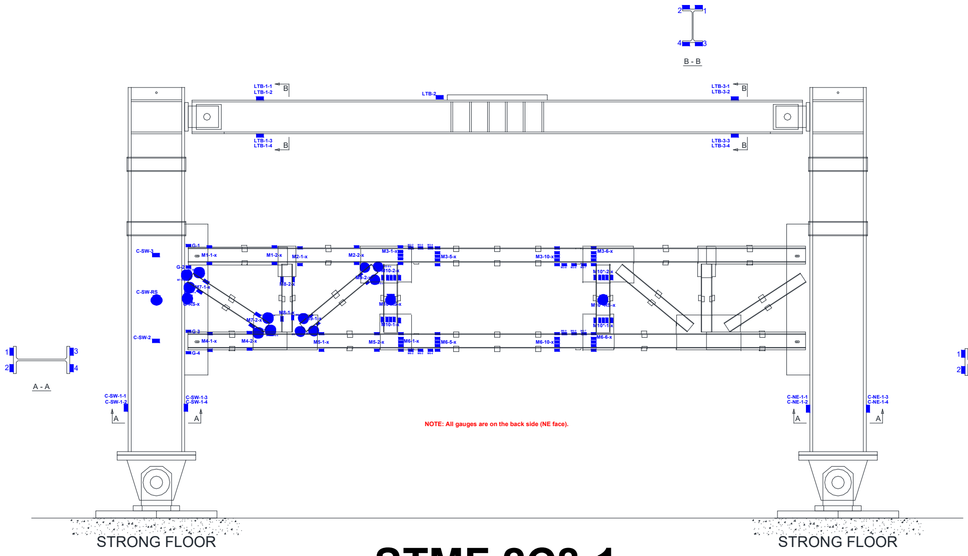


The University of Texas ARLINGTON
Double Angles

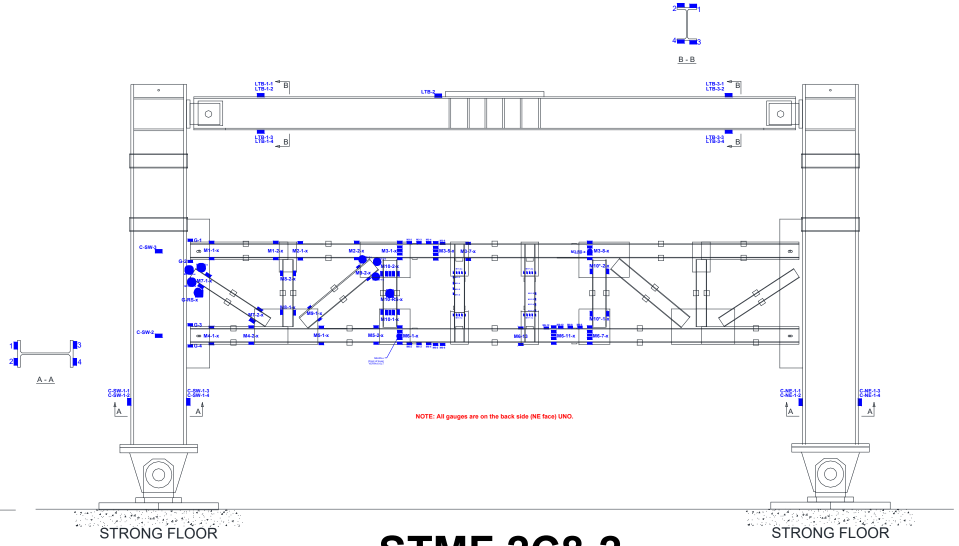


0.8Mp = 0.8FyZ = 413
-0.8Mp = -0.8FyZ = -413
End of Test
Member Drift (%)

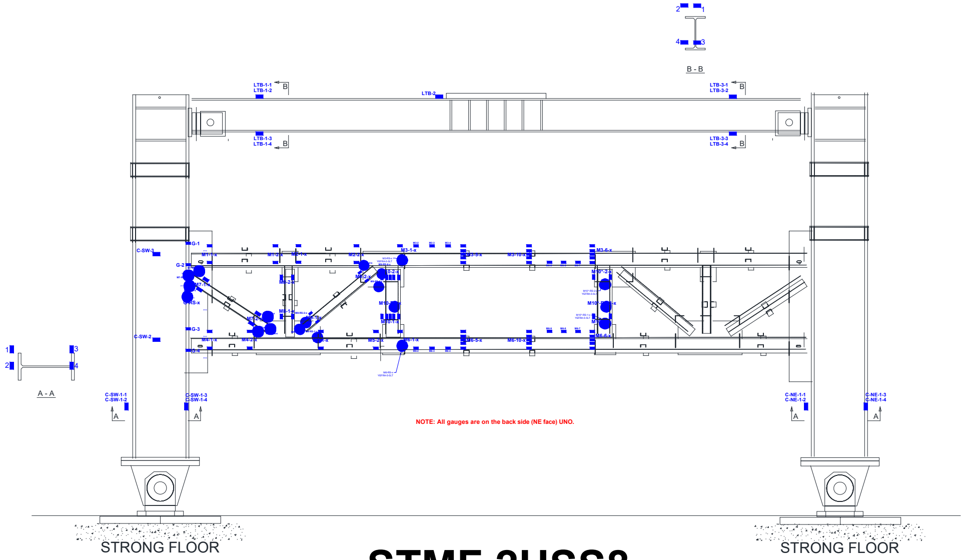
Full-Scale STMF Subassemblage Tests



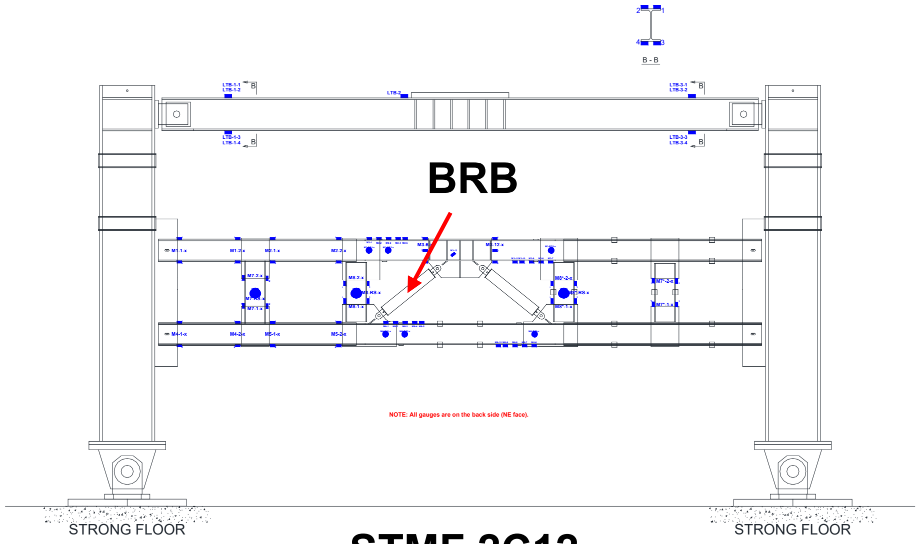
STMF 2C8-1



STMF 2C8-2

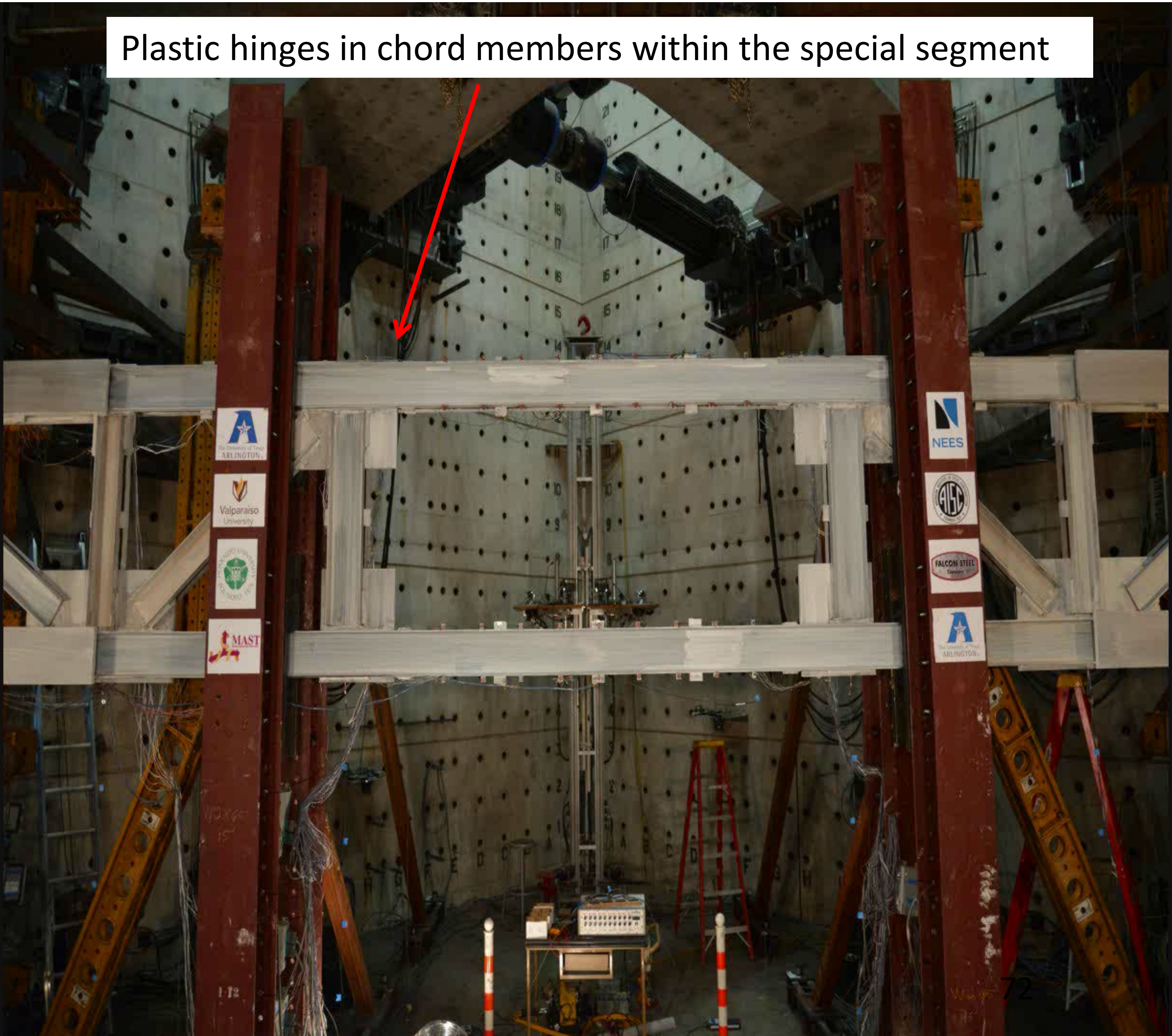


STMF 2HSS8

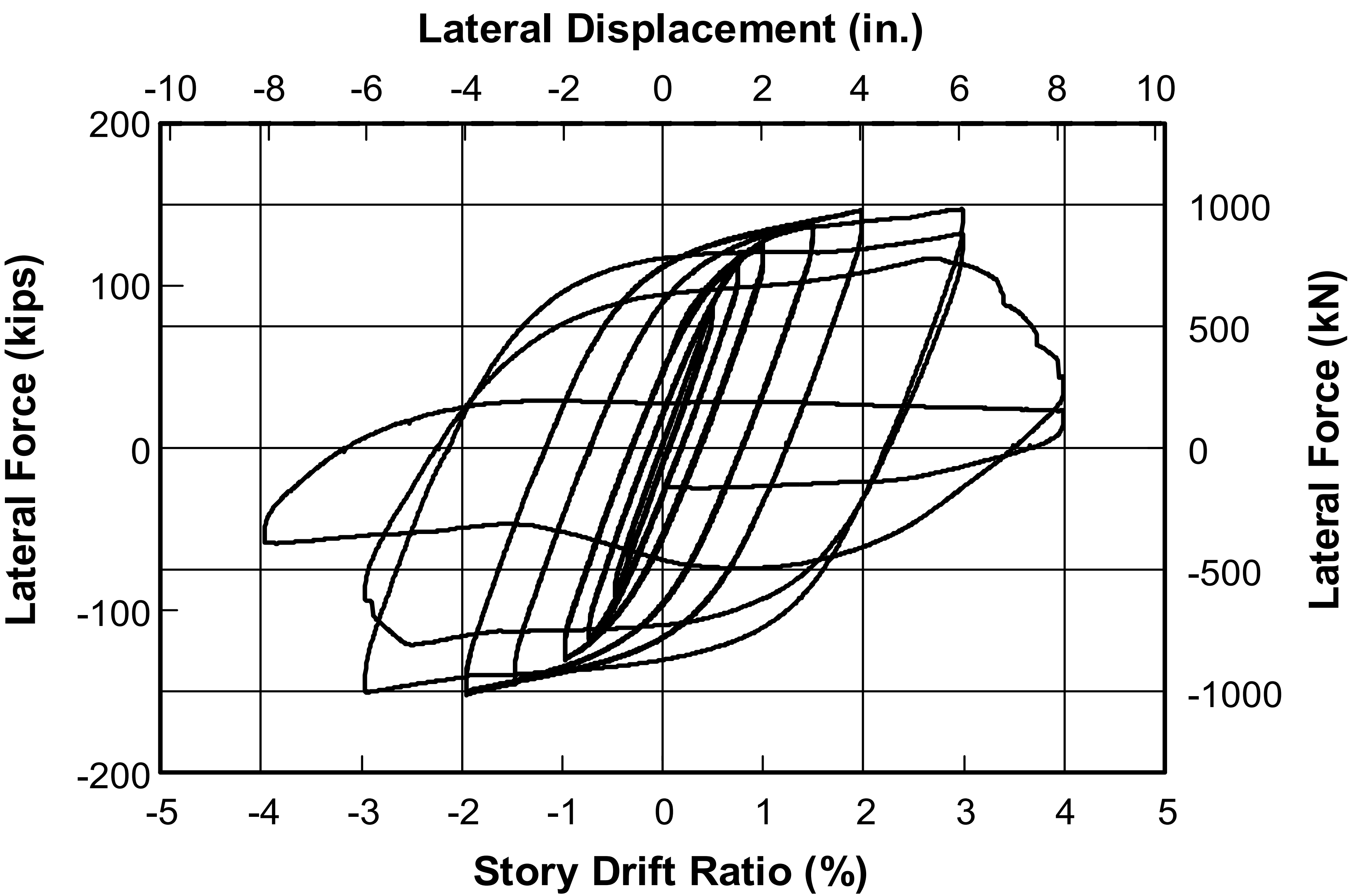


STMF 2C12

Plastic hinges in chord members within the special segment



STMF Test Specimen 1 (STMF 2C8-1): 2C8x18.75 chords

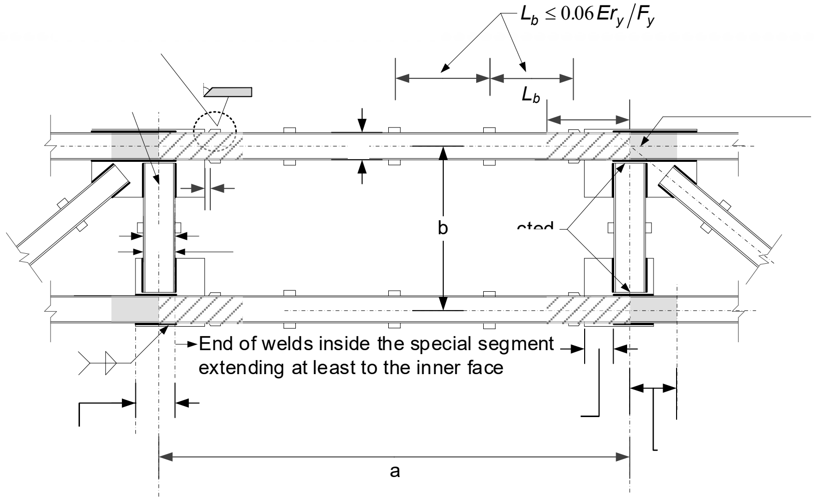


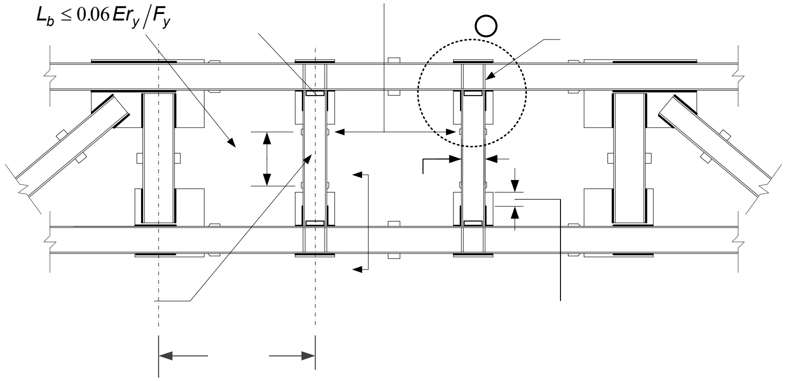
E4.5c Expected Vertical Shear Strength of Special Segment (AISC 341-27)

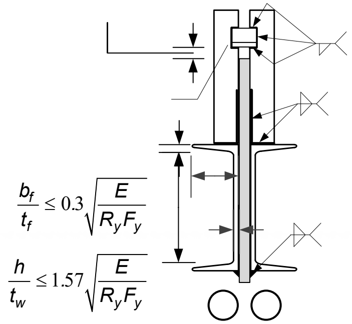
$$V_{ne} = \frac{4\omega_c R_y M_{nc}}{0.9L_s} + \frac{2m\omega_v R_y M_{nv}\left(d_t/d_t'\right)}{0.9L_s} + R_y\left(P_{nt} + 0.3P_{nc}\right)\sin\alpha$$

Chords Intermediate Vertical Members Diagonal Members

Fig. C-E4.6. Recommended details for double-channel connections between chord and vertical web members at the ends of and within the special segment







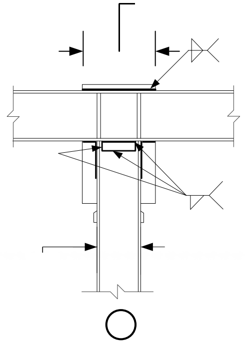


Fig. C-E4.7. Recommended details for double-angle connections between chord and vertical web members at the ends of and within the special segment.

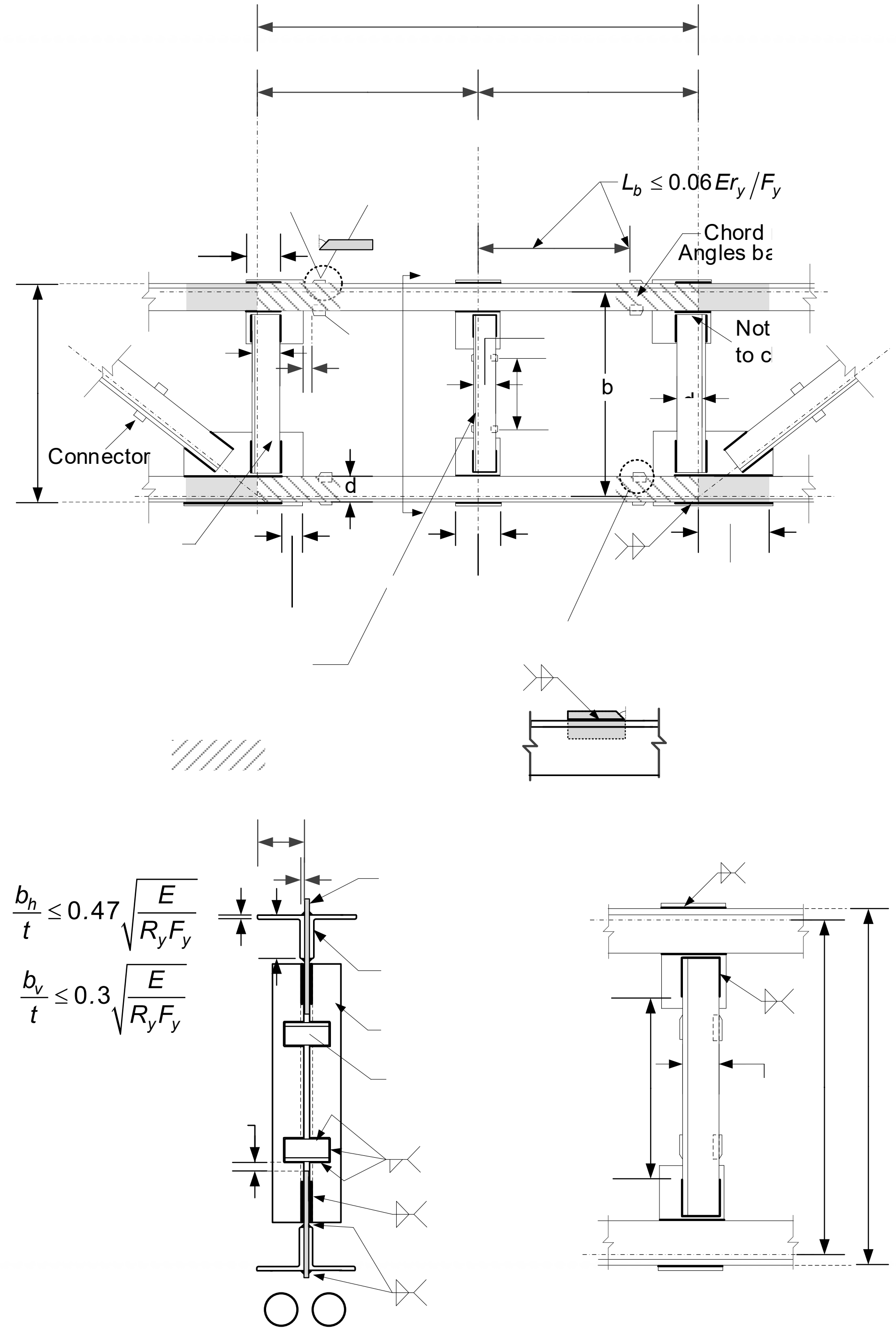
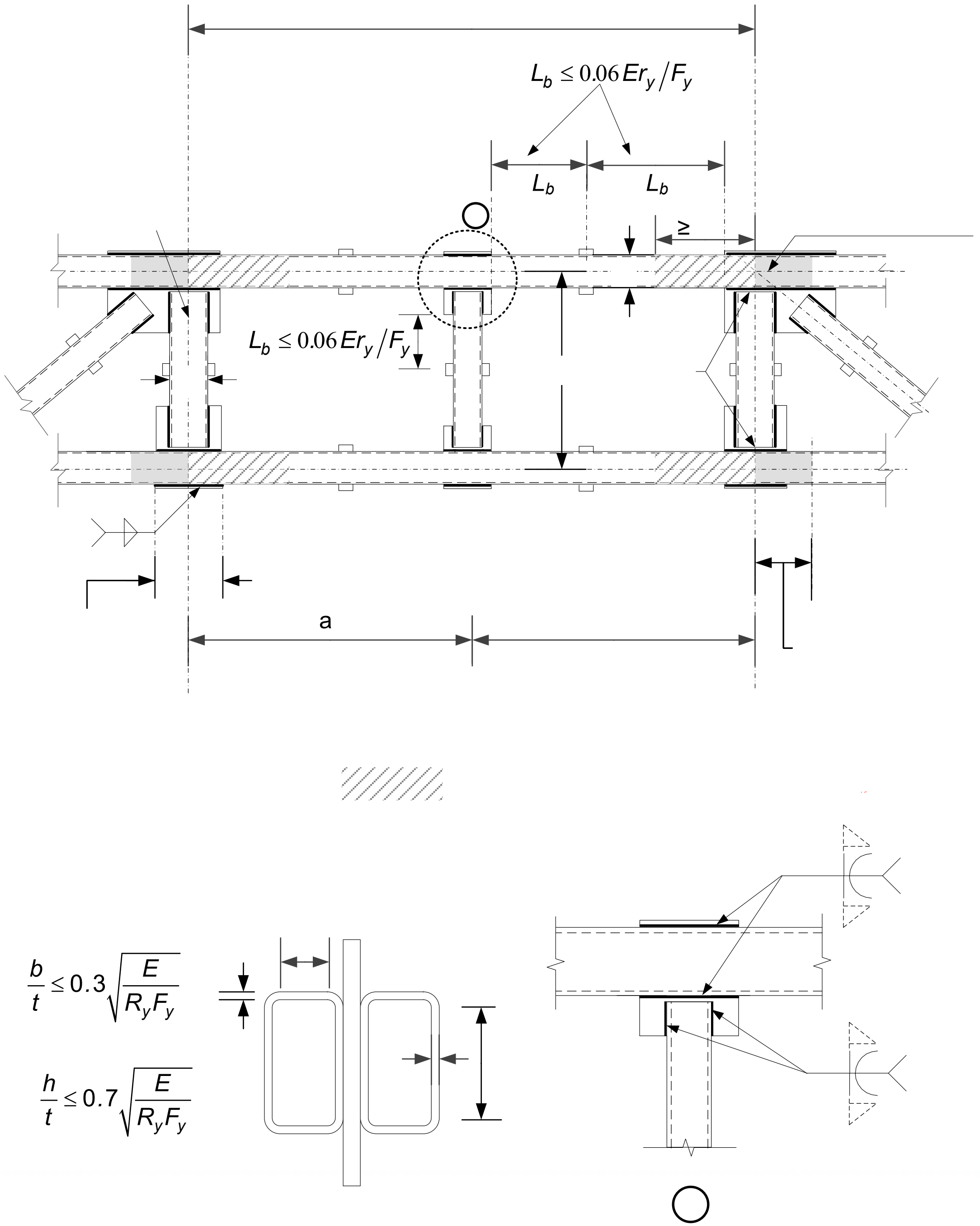


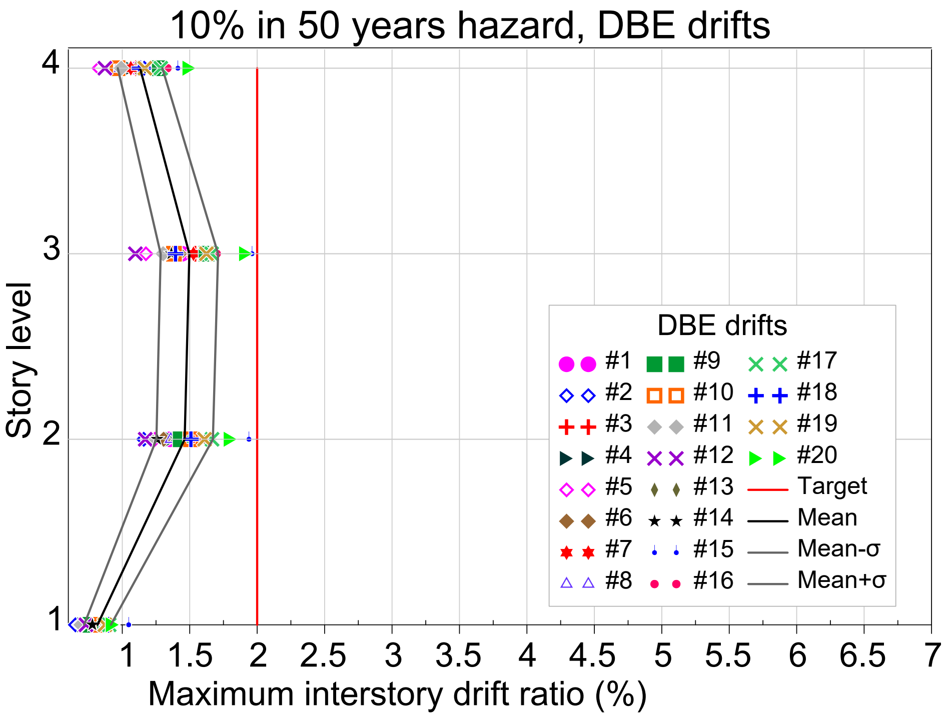
Fig. C-E4.8. Recommended details for double-HSS connections between chord and vertical web members at the ends of and within the special segment.

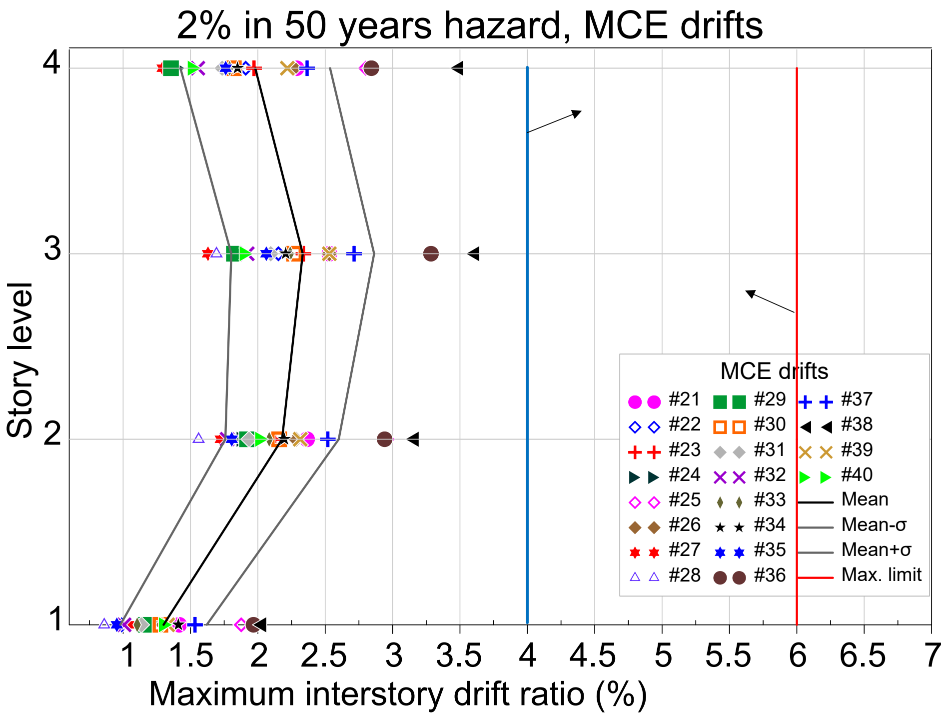


Four-Story 45-ft STMF: Drift Ratios under DBE and MCE Ground Motions via Nonlinear Time-History Analysis

All DBE interstory drift ratios ≤ 2%.
MCE drift ratios:

1. **Section 16.4.1.2 of ASCE 7-22:** The mean transient story drift ratio should not exceed two times the DBE drift limit (2 × 2% = 4%).
2. **Item #5 of Section 16.4.1.1:** The peak transient story drift ratio should not exceed 150% of the mean drift limit (1.5 × 4% = 6%).





Related Publications:

- Shakibaie, Vesal. Assessing the Seismic Performance of 45-ft and 65-ft Special Truss Moment Frames (STMFs) Designed with Proposed 2027 AISC Seismic Provisions Using Nonlinear Time-History Analysis. (2024). Department of Civil Engineering, The University of Texas at Arlington. Civil Engineering Theses, No. 453.

- Park, K.-S., Jiansinlapadamrong, C., and Chao, S.-H. (2021), "Double-HSS Seismic Resistant Beam-to-Column Moment Connections," *ASCE Journal of Structural Engineering*, V.147, No. 7, pp. 04021098-1 to 04021098-17.

- Chao, S.-H., Jiansinlapadamrong, C., Simasathien, S., Okazaki, T., (2020), "Full-Scale Testing and Design of Special Truss Moment Frames for High Seismic Areas," *ASCE Journal of Structural Engineering*, March 2020 Volume 146, No. 3, pp. 04019229-1 to 15.

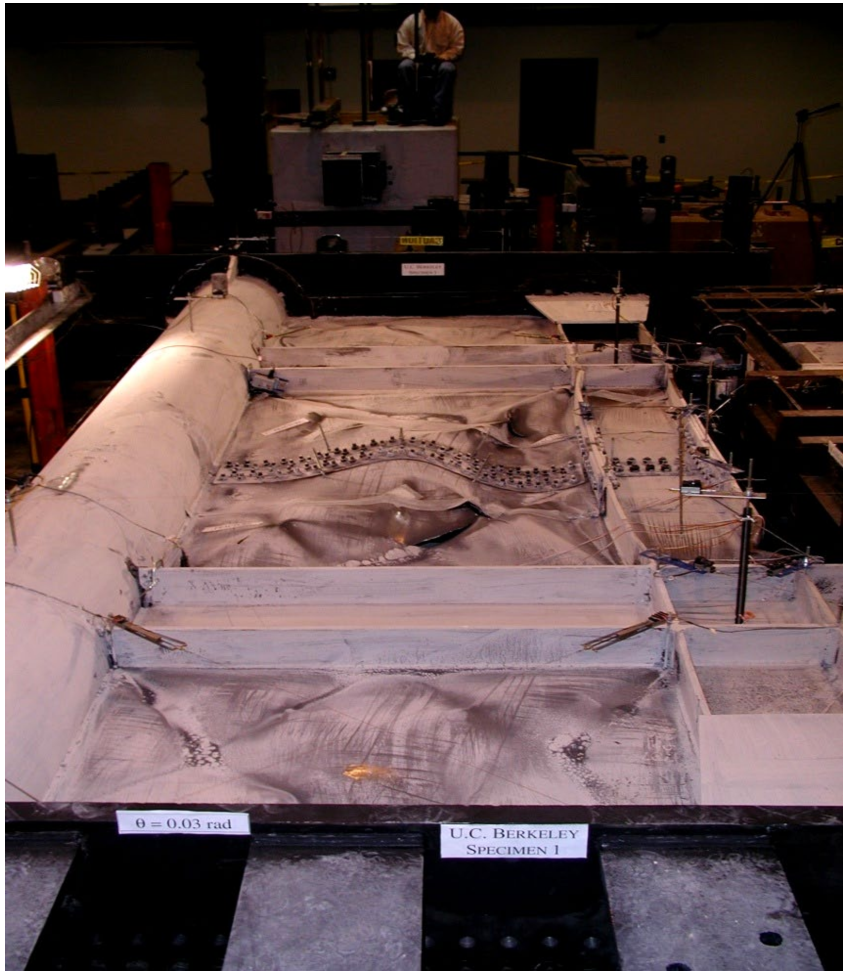
- Jiansinlapadamrong, C., Park, K.-S., Hooper, J. D., and Chao, S.-H., (2019), "Seismic Design and Performance Evaluation of Long-Span Special Truss Moment Frames," *ASCE Journal of Structural Engineering*. Vol 145, No. 7, April 2019.

- Jiansinlapadamrong, C., Price, B., and Chao, S.-H., (2018), "Cyclic Behavior of Steel Double-Channel Built-Up Components with a New Lateral-Torsional-Buckling Prevention Detail," *ASCE Journal of Structural Engineering*, Vol. 144, No. 8, August 2018.

- Simasathien, S., Jiansinlapadamrong, C., and Chao, S.-H. (2017), "Seismic Behavior of Special Truss Moment Frame with Double Hollow Structural Sections as Chord Members," *Engineering Structures*, Vol. 131, 15 January 2017, pp. 14–27.

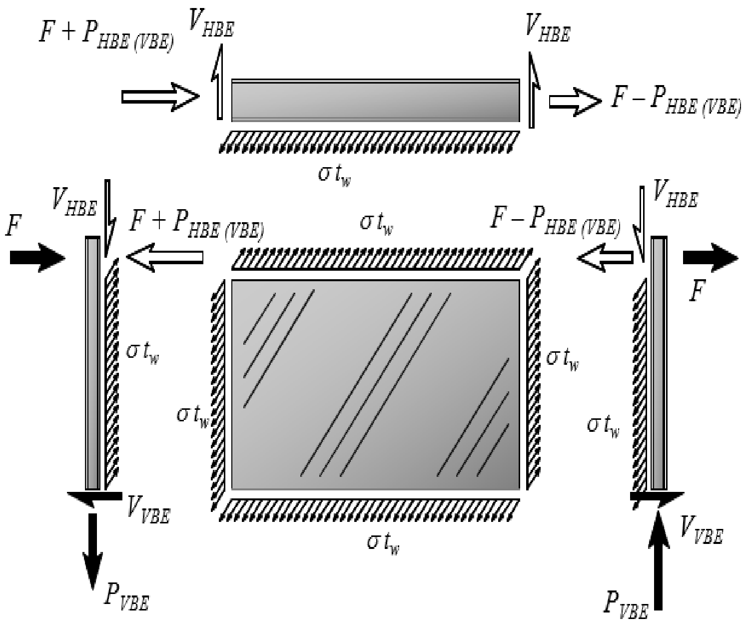
SPSW Provisions

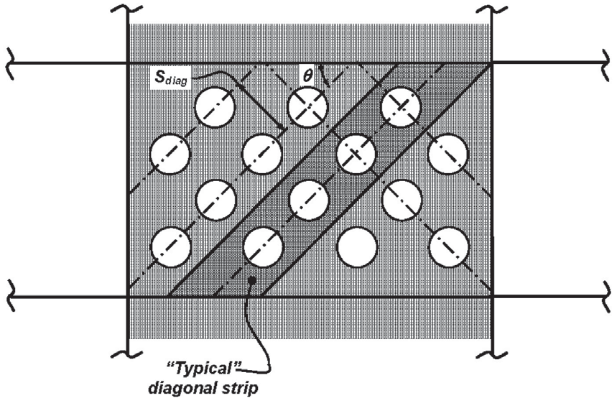
- SPSW like plate girder design approach (tension field theory)
  - Can generate tremendous strength and stiffness as compared to CBF
- SPSW concept developed in Canada
  - NBCC Code provisions developed
  - UC Berkeley research as well
- Panel Shear Capacity Based on Simple Formula with web designed for 100%
  - Includes panel aspect ratio
  - L/h between 0.8 and 2.5



SPSW Provisions (Continued)

- Panels with Openings to have boundary elements (BE)
- BE's to develop panels. OMF style connections
- Lateral bracing spacing like SMF
- Vertical BE's also have bending stiffness requirements
- Perforated Webs and corner cut-outs can be used
- Connection rotation requirements, DC welds at column splices and base, and no PJP groove welded splices similar to SCBF





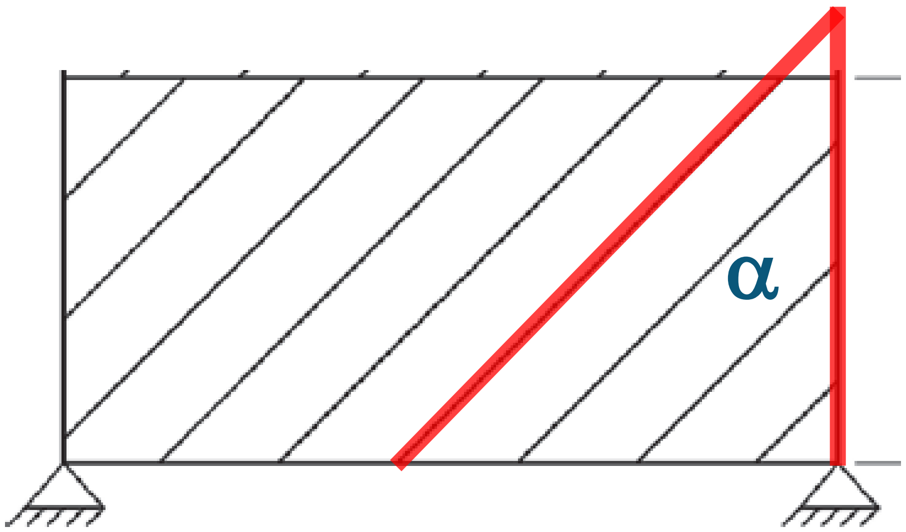
AISC 341-22 – AISC *Seismic Provisions*

Section F5. Special Plate Shear Walls

$$V_n = 0.42 F_y t_w L_{cf} \sin 2\alpha$$

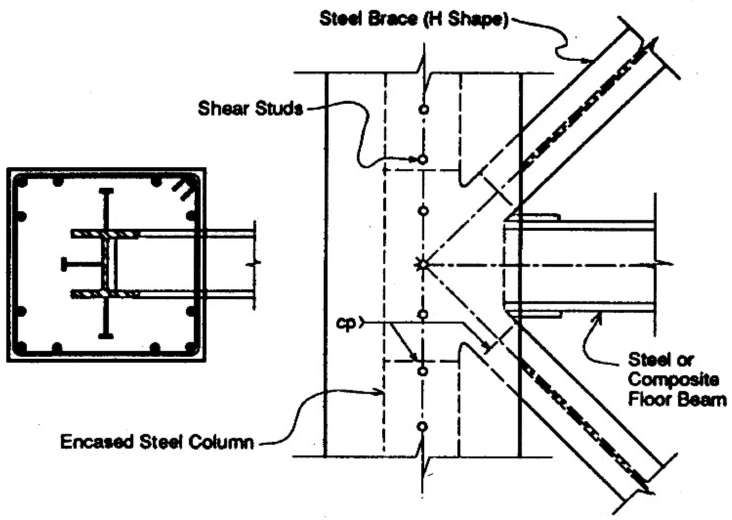
α = angle of web yielding in degrees, as measured relative to the vertical.

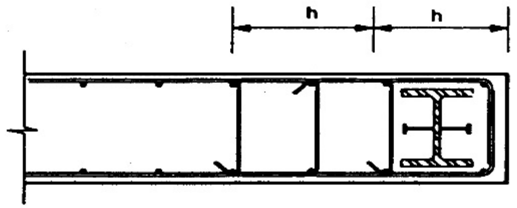
The angle of inclination, α, may be taken as 45°.

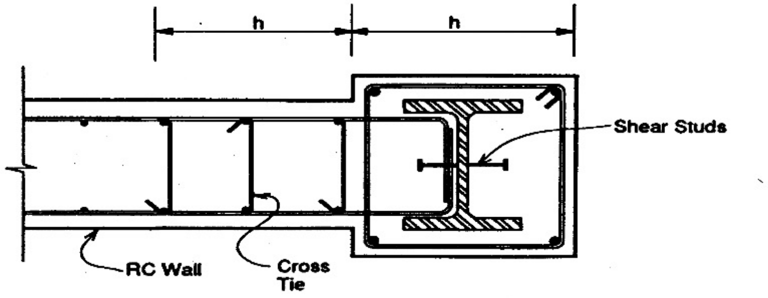


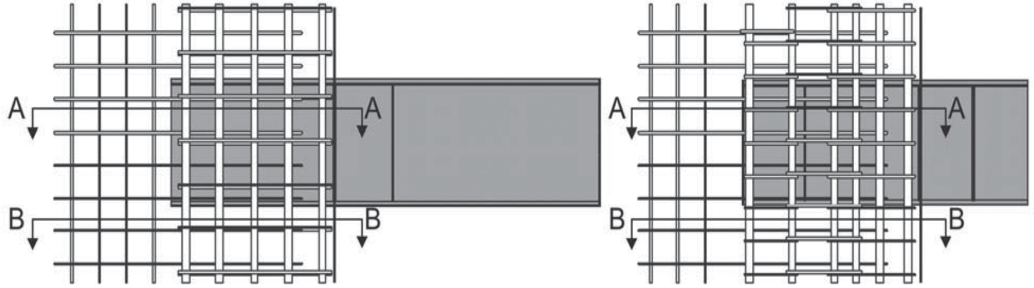
Composite Systems – All presently require AMOC

- Chapters G and H - Composite Construction Provisions
  - Identifies Numerous System Options, both frames and walls (12 total, 13 in 2022)
  - Provides Detailed Requirements for Member and Connection Design
  - Modified to be Consistent with Steel Systems

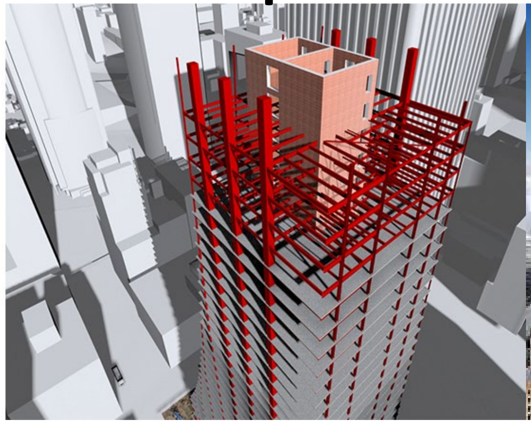








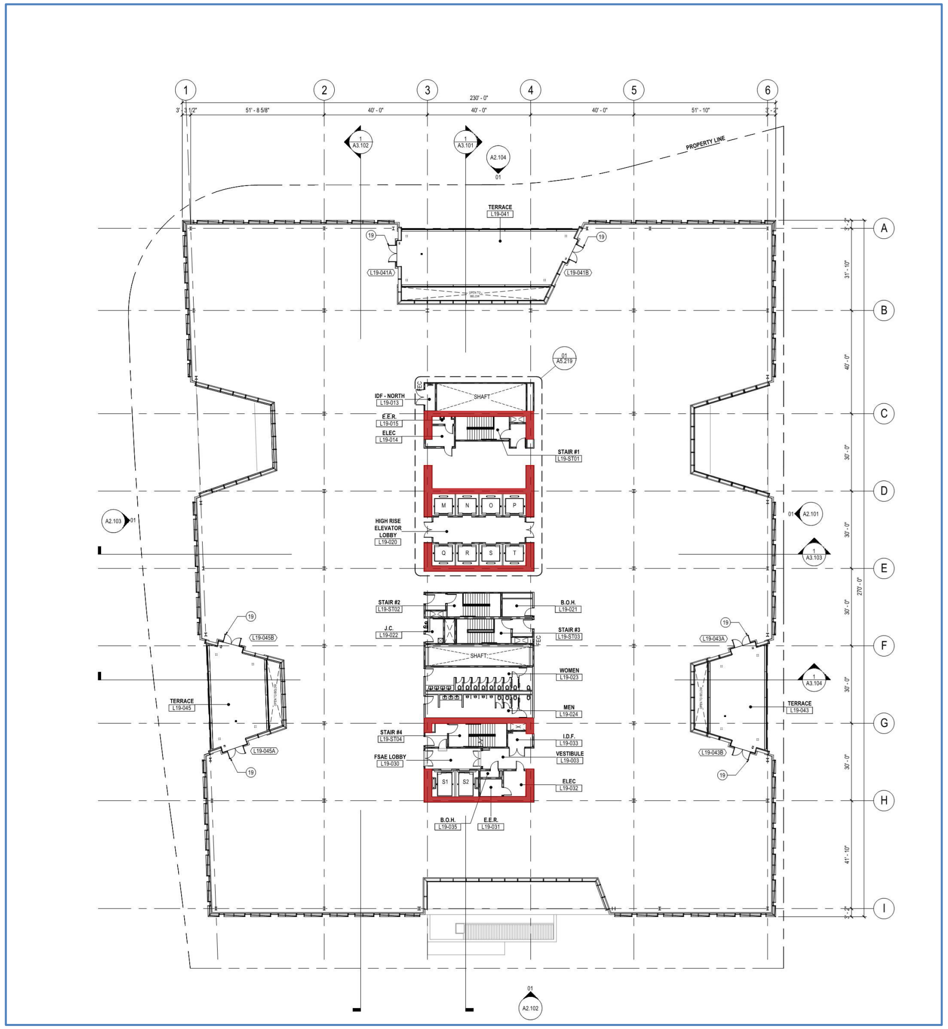
New System - Concrete-filled steel sandwich panel walls



- New type of composite plate shear wall (C-PSW)
- Benefits include
  - Wall thickness reduction compared to R/C
  - Steel provides confinement of the concrete
  - Steel acts as formwork for accelerated construction (saved almost a year on Rainier Square)
  - Concrete core delays local buckling of steel plate
  - Reinforcing bars are not necessary
  - Used on recent high-rise project in Seattle to replace R/C core walls
    - Called “SpeedCore” by AISC

200 Park Ave., San Jose, CA

Very High Seismic Region. Coupled C-PSW/CF Lateral Force Resisting System

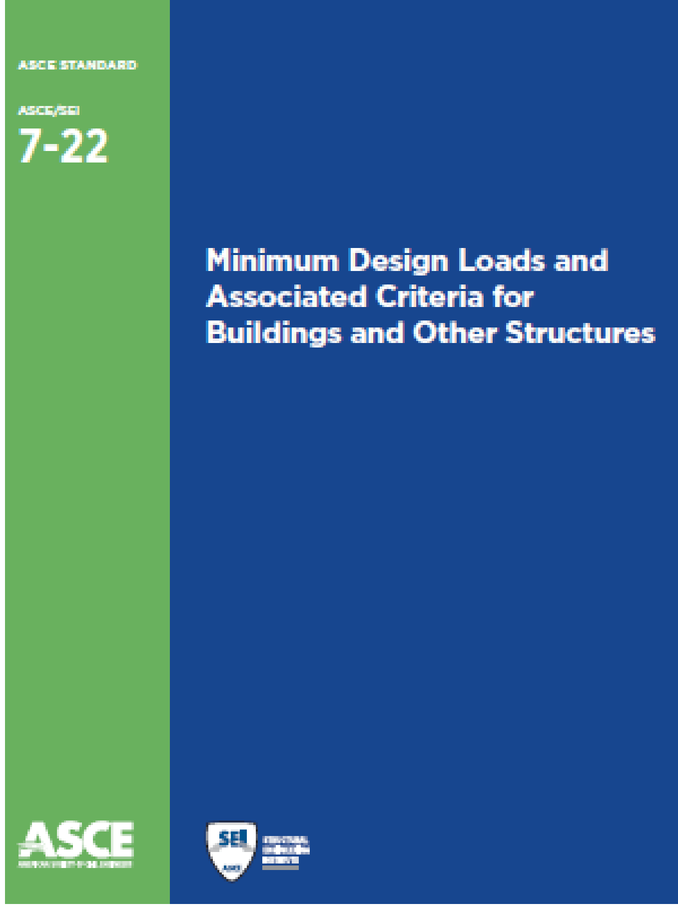


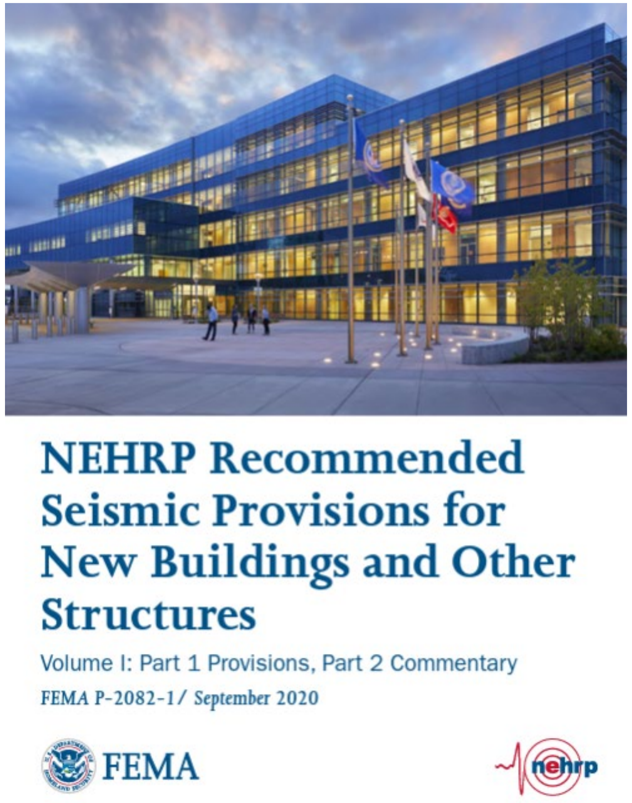
AISC 341-22 – AISC *Seismic Provisions*

Section H8. SpeedCore

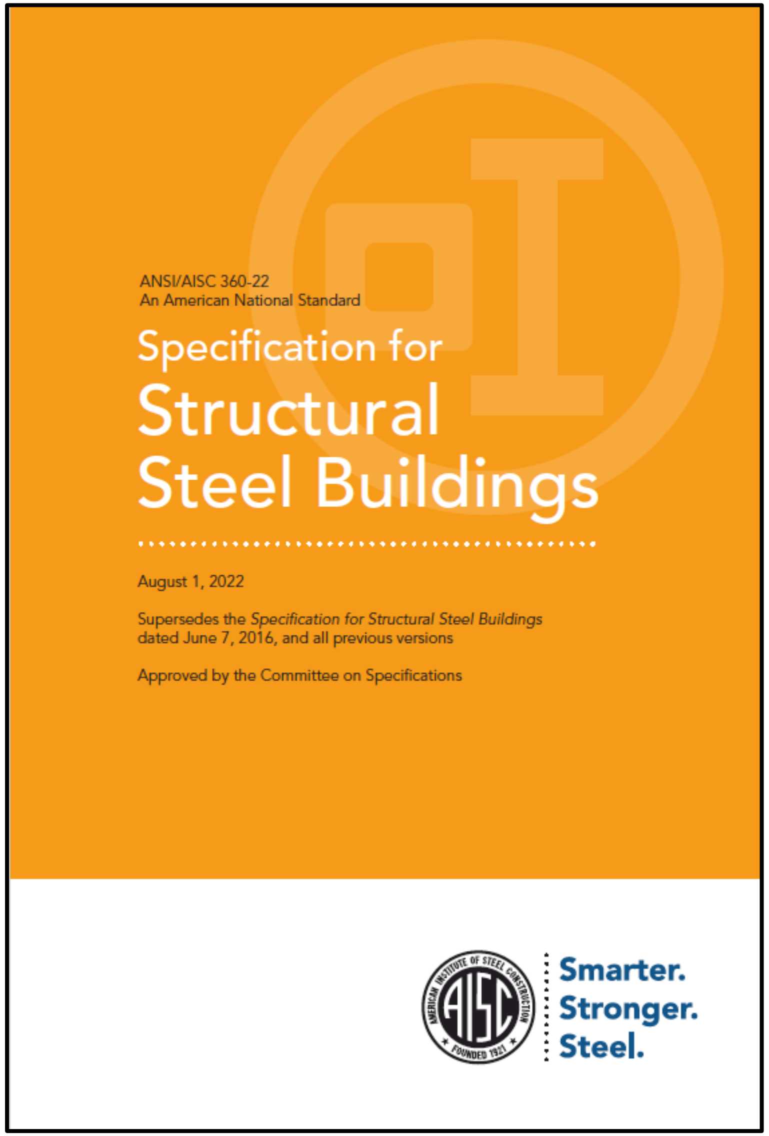
<u>Basis in Building Code</u>

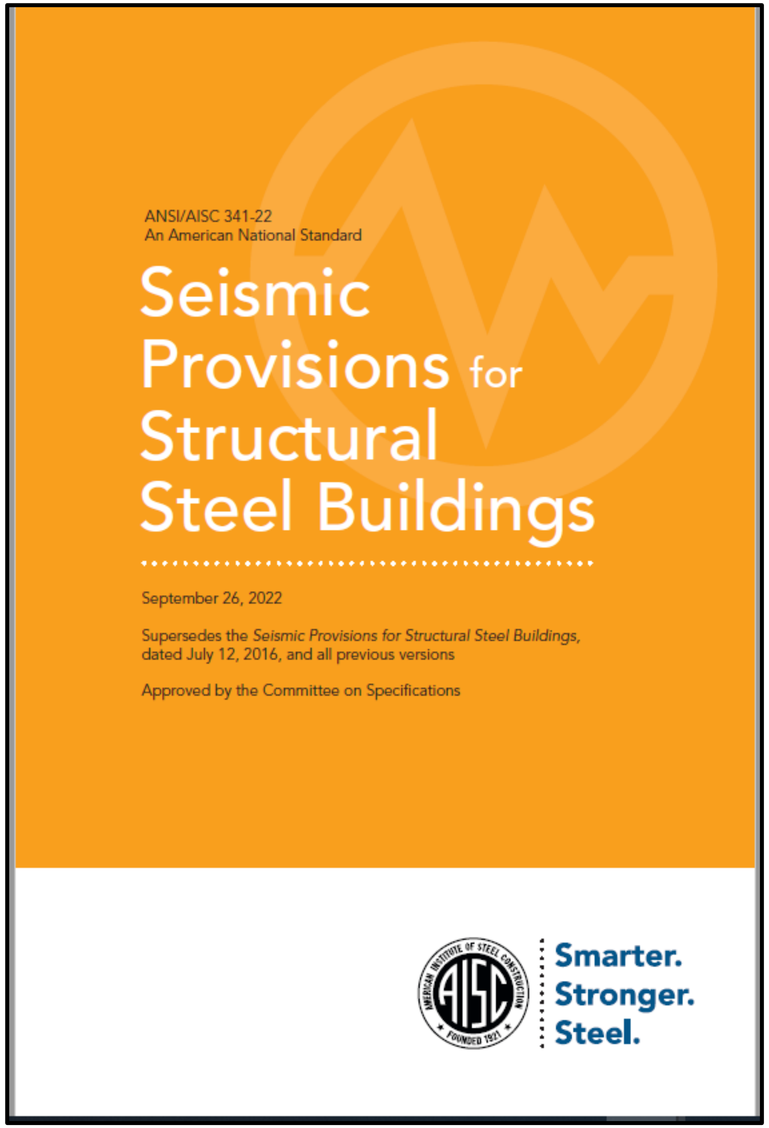
- Added to ASCE/SEI 7-22, Table 12.2-1
- $R = 8$
- $\Omega_0 = 2.5$
- $C_d = 5.5$
- Direct reference to AISC 341 for detailing requirements

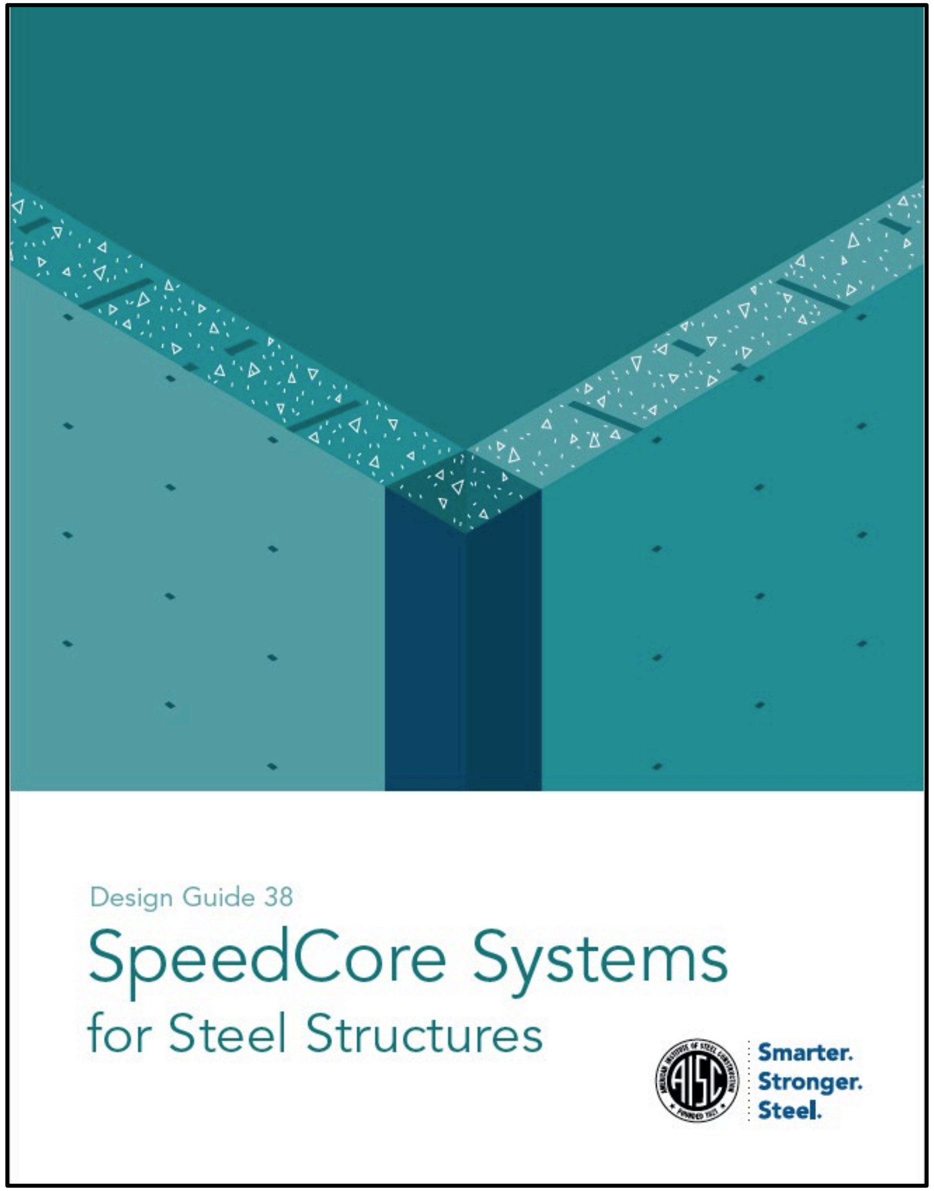




Codes, Standards, & Design Guides



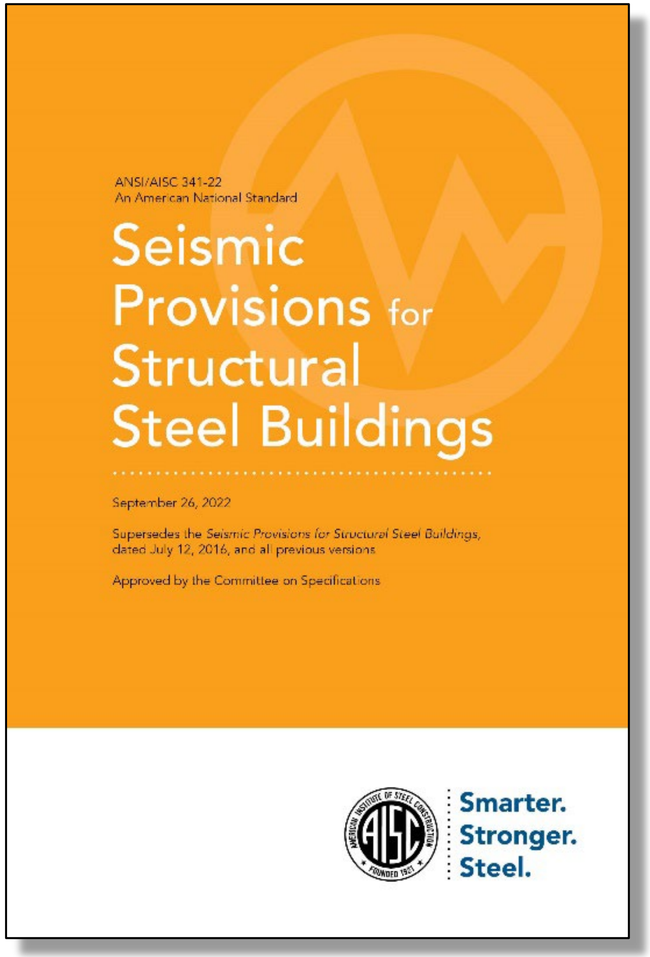




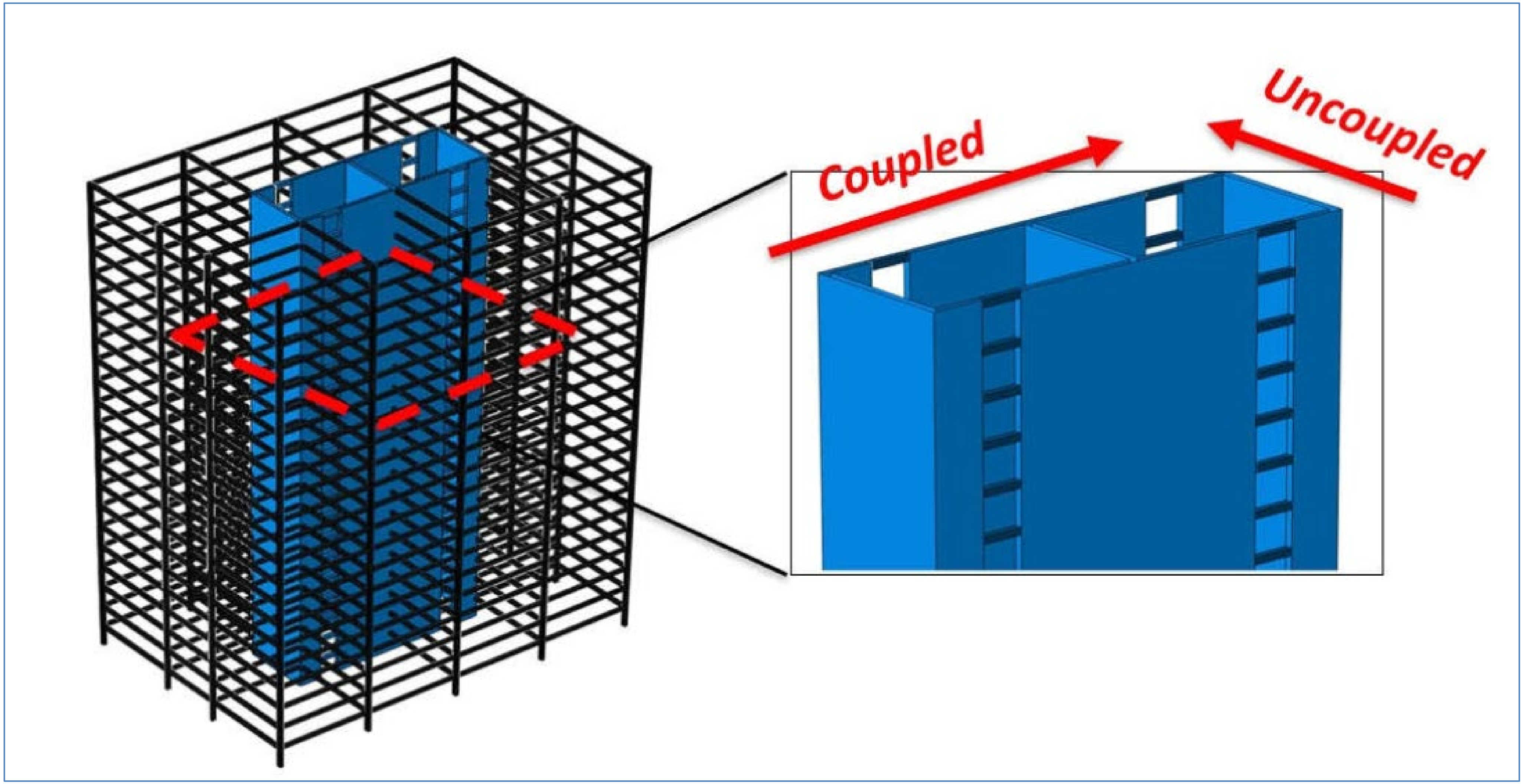
AISC 341-22 – AISC *Seismic Provisions*

Section H8. SpeedCore – In *Seismic Provisions*

- Available stiffness, required strengths for coupling beams and composite walls
- Composite wall and coupling beam requirements (area of steel, slenderness, tie bar spacing, etc.)
- Composite wall and coupling beam strength (tension, compression, flexure, combined axial and flexure, shear)
- Connections at beam-to-wall and foundations
- Protected zones and demand-critical welds defined



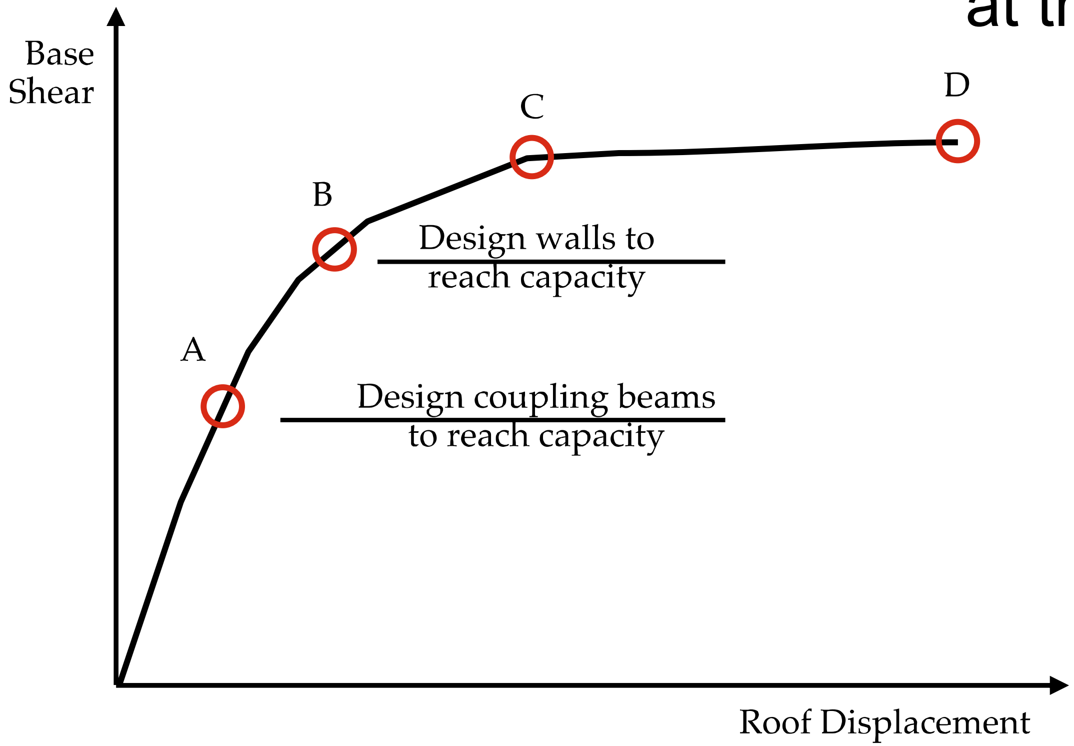
SpeedCore Systems – Coupled & Uncoupled



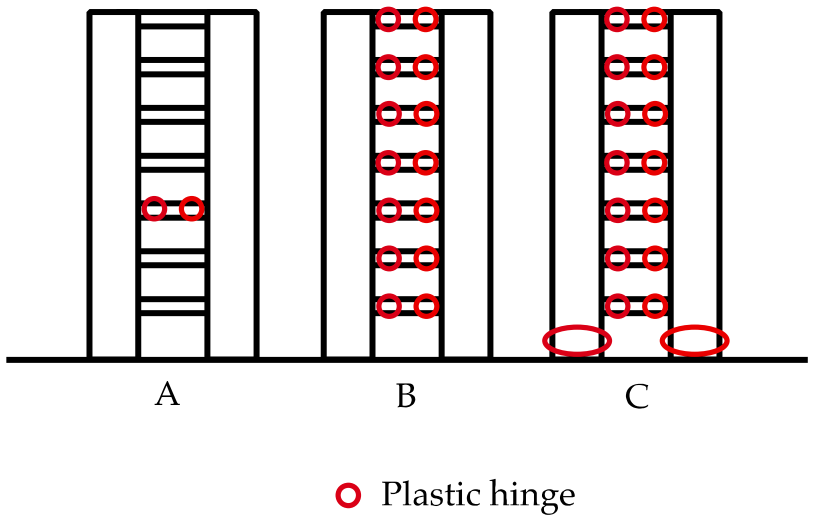
AISC 341-22 – AISC *Seismic Provisions*

Section H8. SpeedCore – Behavior in Seismic Events

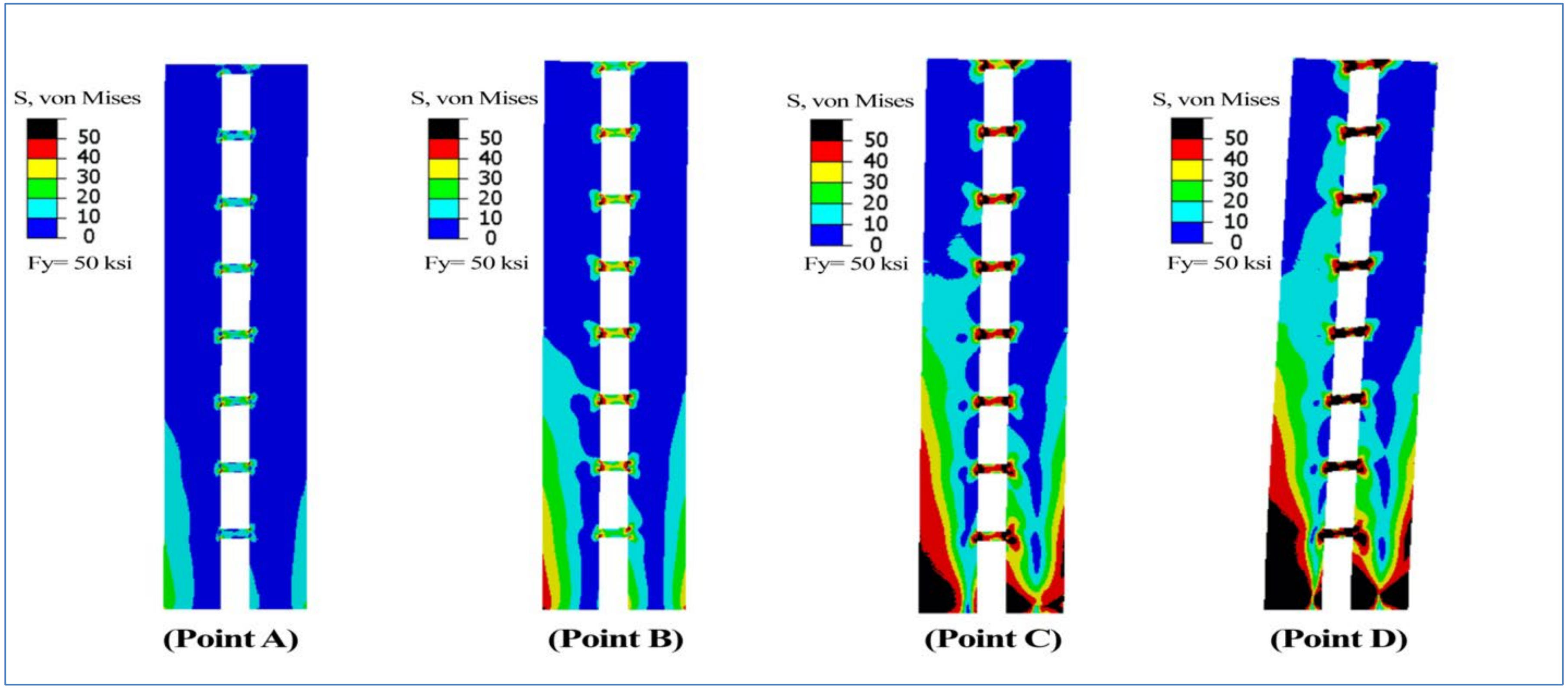
- *R* = 8
- Highly Ductile

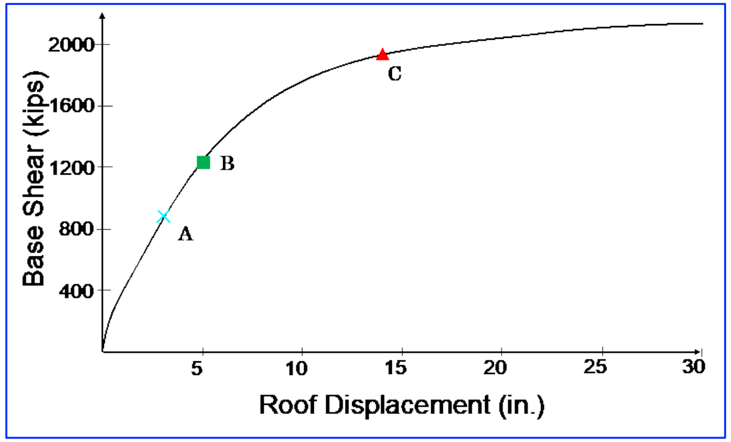


- Coupling beams provide most of the ductility, along with some wall yielding at the base



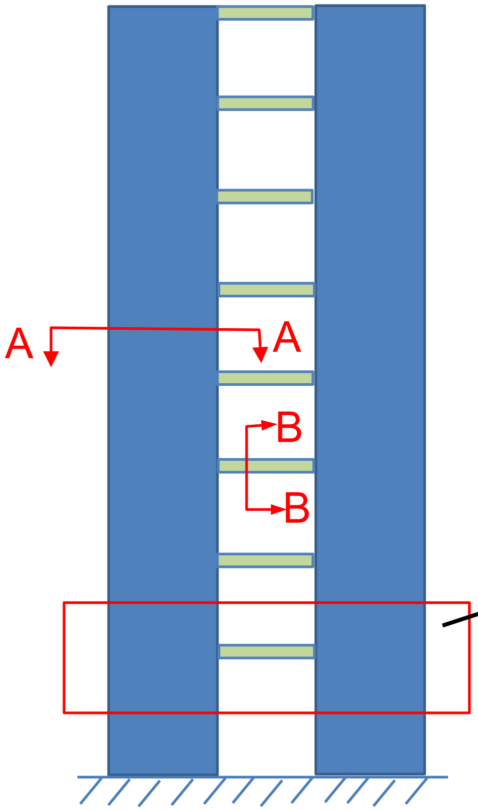
Coupled SpeedCore: Capacity Design



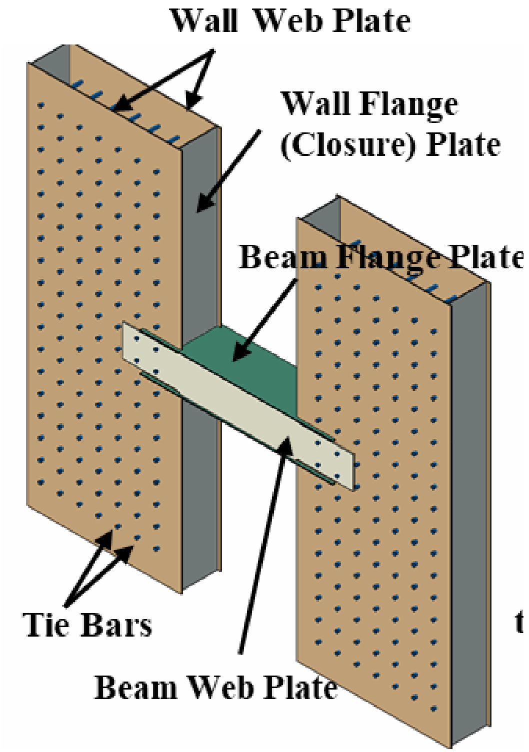


Coupled SpeedCore System

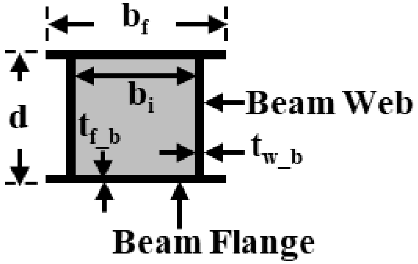
- Composite coupling beams –concrete-filled steel tubes



Coupled SpeedCore

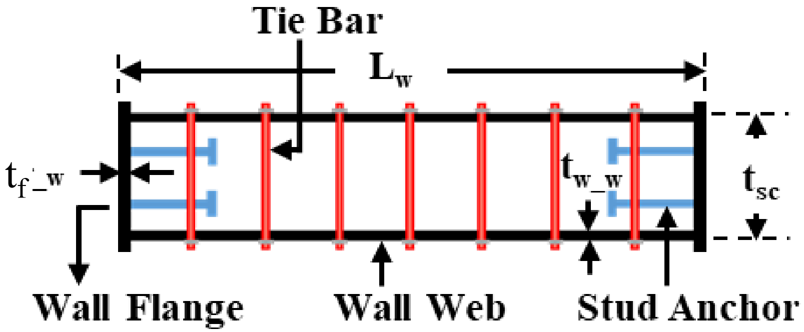


Steel Modules



Coupling Beam

Section B-B



Composite Wall

Section A-A

R-Factors for Coupled Composite Plate Shear Walls—Concrete Filled (Coupled-C-PSW/CF)

Presented to BSSC IT-4
Seattle, February 6, 2019

Michel Bruneau
University at Buffalo
Amit Varma
Purdue University

Project Scope

- This project seeks R-Factors (and other Seismic Design Coefficients and Factors) developed from FEMA P-695 studies for Coupled Composite Plate Shear Walls—Concrete Filled (Coupled-C-PSW/CF), for inclusion in ASCE-7, higher than R-factors for corresponding non-coupled walls.
  - Investigating whether it is possible to use of R=8

Seismic Design Factors for Coupled SpeedCore

- FEMA P695 studies were conducted
- Using the capacity-design method, archetype structural systems were designed
- Modeled using three different independent approaches by teams at Purdue and Univ. at Buffalo
- Hundreds of thousands of nonlinear time history analyses were conducted for 44 scaled ground motions with increasing intensity
- Statistical analysis of results using FEMA P695 processes

Engineering Structures 244 (2021) 112766

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journal homepage: www.elsevier.com/locate/engstruct

Seismic design coefficients and factors for coupled composite plate shear walls/concrete filled (CC-PSW/CF)

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[a] Dept. of Civil Structural and Environmental Engineering, University at Buffalo, Buffalo, NY 14260, United States

[b] Lyles School of Civil Engineering, Purdue University, West Lafayette, IN 47907, United States

ABSTRACT

ASCE 7–16 (2016) [4] defines three seismic performance factors to approximately predict the inelastic response of a seismic resisting system. These factors are the response modification factor, R; deflection amplification factor, C_d; and the system over-strength factor, Ω_o. The research presented here was conducted, using FEMA P695 methodology, to determine the value of the above factors for a special seismic-force resisting system defined as Coupled Composite Plate Shear Walls-Concrete Filled (CC-PSW/CF). The ASCE 7–16 (2016) [4] and AISC 341–16 (2016) seismic provisions provide specific requirements for the use of planar composite steel plate shear walls in seismic regions. However, the ASCE-7–16 standard does not differentiate between coupled and non-coupled walls. Coupled walls can benefit from the added energy dissipation provided by their coupling beams and are accordingly expected to exhibit better seismic hysteretic behavior than uncoupled walls. Therefore, coupled walls systems should arguably have a higher response modification factor value. In this paper, the FEMA P695

Fire Resistance and Design of C-PSW/CF Walls

- Focus on unprotected composite walls
- Experimental Behavior - Thermal & Structural
- Uniform and non-uniform heating
- Numerical Models, Benchmarking, Parametric Studies
- Wall axial strength equation as function of temperature
- Fire resistance rating in hours
- Steam vent hole design

Design Strength Equation in AISC 360-22, App. 4

Lower Bound

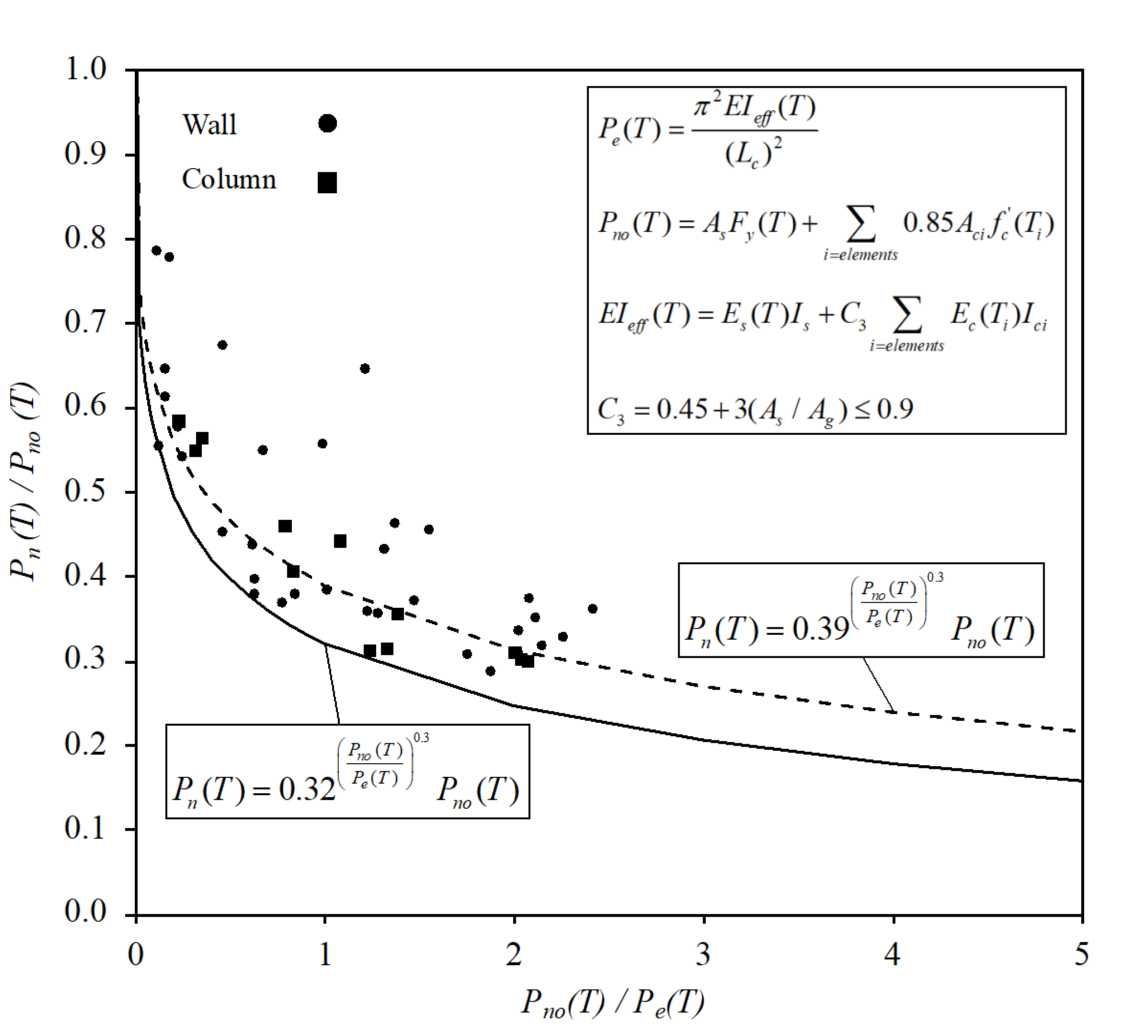
$$P_n(T) = \left[0.32^{\left(\frac{P_{no}(T)}{P_e(T)}\right)^{0.3}}\right] P_{no}(T)$$

AISC 360-22, App. 4, Eq. A-4-11

$$P_e(T) = \frac{\pi^2 EI_{eff}(T)}{(L_c)^2}$$

$$P_{no}(T) = A_s F_y(T) + \sum_{i=elements} 0.85 A_{ci} f_c'(T_i)$$

$$EI_{eff}(T) = E_s(T) I_s + C_3 \sum_{i=elements} E_c(T_i) I_{ci}$$



Fire Resistance Rating Equation in AISC 360-22

Using results from parametric studies, and strength equation

$$R = \left[-18.5 \left(\frac{P_u}{P_n} \right)^{\left(0.24 - \frac{H/t_w}{230}\right)} + 15 \right] \left(\frac{1.9 t_w}{200} - 1 \right)$$

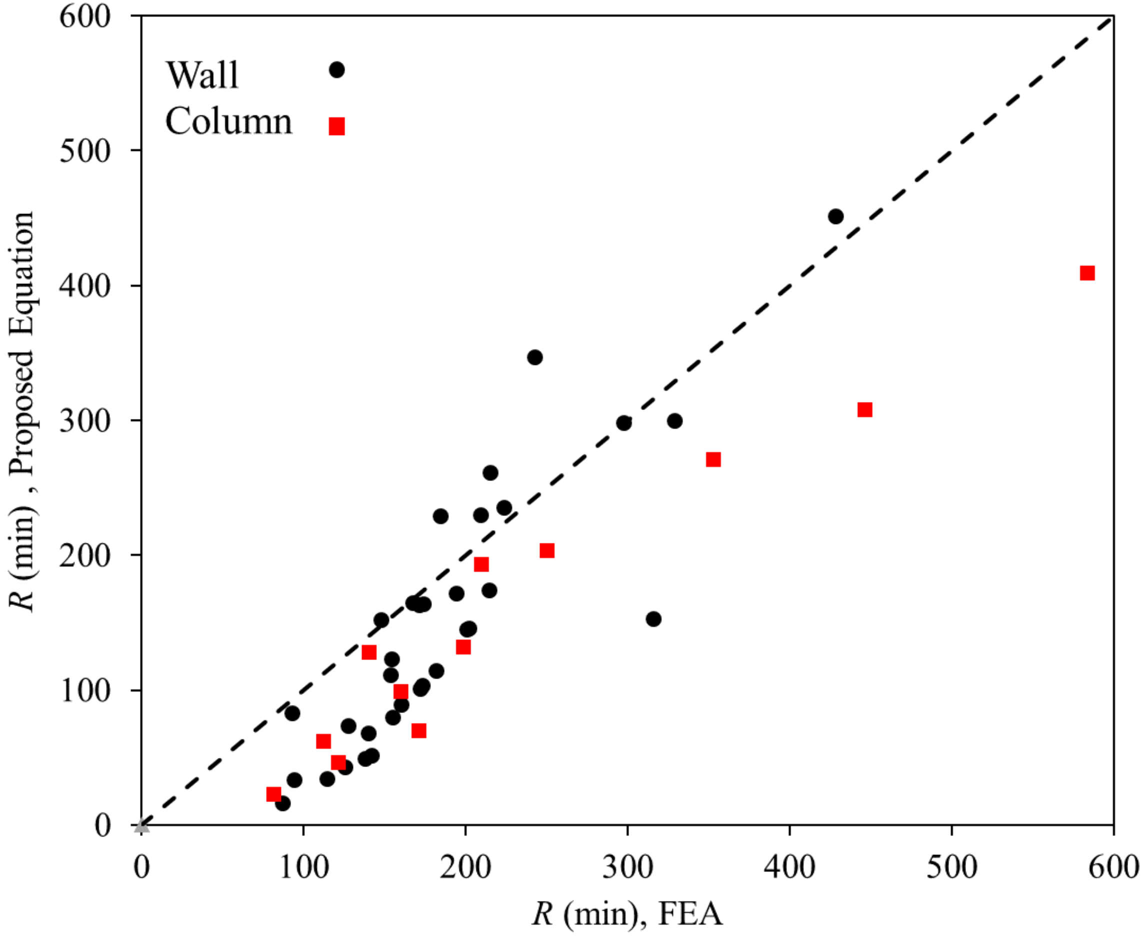
AISC 360-22, App. 4, Eq. A-4-34

R = Fire resistance rating in hours

P_u/P_n = utility ratio at ambient

H/t_w = wall slenderness

t_w = wall thickness in mm.



Summary of References

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Discussion of Potential Changes to Allowable Systems for HCAI Projects

Request: That OSHPD review latest material on the SPSW, STMF and SpeedCore systems to consider whether or not to retain the requirement for an AMOC for all such projects with these systems.

Offer: AISC Representatives will provide all requested information/documentation and offer to work with OSHPD as needed to assist in their review.

Concrete Filled Composite Plate Shear Walls (CPSW)

Section I1.6a. Slenderness Requirement for Plates

$$\frac{b}{t} \le 1.2\sqrt{\frac{E}{F_y}}$$

where b = largest clear distance between rows of anchors or ties
t = plate thickness

Section I1.6b. Tie Bar Requirement

tie bar spacing, s_t:

$$s_t \le t_{sc}$$

$$\frac{s_t}{t} \le 1.0\sqrt{\frac{E_s}{2\alpha + 1}}$$

where

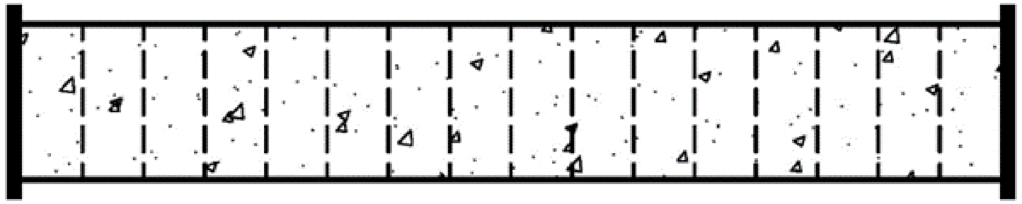
$$\alpha = 1.7\left(\frac{t_{sc}}{t} - 2\right)\left(\frac{t}{d_{tie}}\right)^4$$

CHAPTER I. DESIGN OF COMPOSITE MEMBERS

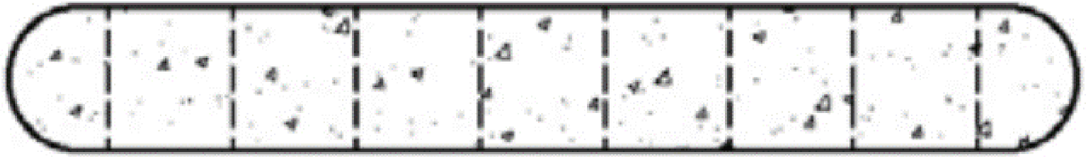
Concrete Filled Composite Plate Shear Walls (CPSW)

Section I1.6. General Requirements

1) $1\%A_{total} \leq A_s \leq 10\%A_{total}$
2) Opposing steel plates connected using ties
3) Steel plates are anchored to concrete using ties/anchors
4) Walls without flange plates or boundary elements are prohibited



Planar rectangular wall with flange plates and tie bars



Planar wall with semi-circular boundary elements and tie bars

CHAPTER I. DESIGN OF COMPOSITE MEMBERS

Concrete Filled Composite Plate Shear Walls (CPSW)

Section I1.5. Effective Stiffness

Flexural: $$(EI)_{eff} = E_s I_s + 0.35 E_c I_c \quad \text{(I1-1)}$$

Axial: $$(EA)_{eff} = E_s A_s + 0.45 E_c A_c \quad \text{(I1-2)}$$

Shear: $$(GA)_{eff} = G_s A_{sw} + G_c A_c \quad \text{(I1-3)}$$

Stiffness reduction parameter, τ_b = 1.0, used in Chapter C with direct analysis method

Concrete Filled Composite Plate Shear Walls (CPSW)

Section I2.3. Compressive Strength $\phi_c P_n$ or P_n/Ω_c

When $\dfrac{P_{no}}{P_e} \leq 2.25$

$$P_n = P_{no}\left(0.658^{\frac{P_{no}}{P_e}}\right) \qquad \text{(I2-2)}$$

When $\dfrac{P_{no}}{P_e} > 2.25$

$$P_n = 0.877 P_e \qquad \text{(I2-3)}$$

where

$$P_{no} = F_y A_s + 0.85 f_c' A_c \qquad P_e = \pi^2 \left(EI\right)_{eff} \Big/ L_c^2$$

ϕ_c = 0.90 (LRFD); Ω_c = 1.67 (ASD)

CHAPTER I. DESIGN OF COMPOSITE MEMBERS

Concrete Filled Composite Plate Shear Walls (CPSW)


Section I2.3. Tensile Strength:

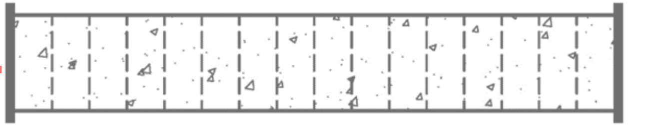
Limit state of yielding: $P_n = F_y A_s$ (I2-16)

$\phi_t P_n \text{ or } \frac{P_n}{\Omega_t}$

ϕ_t = 0.90 (LRFD) Ω_t = 1.67 (ASD)

CHAPTER I. DESIGN OF COMPOSITE MEMBERS

Concrete Filled Composite Plate Shear Walls (CPSW)



Section I3.5. Flexural Strength: $\phi_b M_n$ or M_n/Ω_b

No consideration of local buckling effects

M_n determined in accordance with Section I1.2, using

- Plastic stress distribution method
- Strain compatibility method
- Elastic stress distribution method
- Effective stress-strain method

ϕ_b = 0.90 (LRFD) Ω_b = 1.67 (ASD)

Concrete Filled Composite Plate Shear Walls (CPSW)

Section I4.4. In-Plane Shear Strength: $\phi_v V_n$ or V_n/Ω_v

$$V_n = \frac{K_s + K_{sc}}{\sqrt{3K_s^2 + K_{sc}^2}} A_{sw} F_y \qquad \text{(I4-2)}$$

$\phi_v = 0.90$ (LRFD) $\quad \Omega_v = 1.67$ (ASD)

where

A_{sw} = area of steel plates in the direction of in-plane shear

$$K_s = G_s A_{sw}$$

$$K_{sc} = \frac{0.7(E_c A_c)(E_s A_{sw})}{4E_s A_{sw} + E_c A_c}$$

Item #9 Comments from the Public/Committee Members on Issues not on this Agenda

The Committee will receive comments from the Public/Committee Members. Matters raised at this time may be taken under consideration for placement on a subsequent agenda.

Facilitator: Jim Malley (or designee)

There are no future Structural and Nonstructural Regulations Committee meetings scheduled in 2025.

Item #10 Adjournment