



CFS Design Standards & References

- AISI S100-12 in 2015 IBC, 2018 IBC
- AISI Standards (2007, 2010): *General Provisions, Floor & Roof System, Wall Stud Design, Header, Lateral (S213-09), Truss, & Prescriptive Methods*
- AISISTandards.com
- www.cfsei.org
- www.steel.org

Accommodating Building Movement

Seismic Drift

13.5.3 Exterior Nonstructural Wall Elements and Connections

Exterior nonstructural wall panels or elements that are attached to or enclose the structure shall be designed to accommodate the seismic relative displacements defined in Section 13.3.2 and movements due to temperature changes. Such elements shall be supported by means of positive and direct structural supports or by mechanical connections and fasteners in accordance with the following requirements:

- a. Connections and panel joints shall allow for the story drift caused by relative seismic displacements (δ_r) determined in Section 13.3.2, or 0.5 in. (13 mm), whichever is greater.
- b. Connections to permit movement in the plane of the panel for story drift shall be sliding connections using seated or oversized holes, connections that permit movement by bending of steel, or other connections that provide equivalent sliding or ductile capacity.
- c. The connecting member itself shall have sufficient ductility and rotation capacity to preclude fracture of the concrete or brittle failures at or near welds.
- d. All fasteners in the connecting system such as bolts, inserts, welds, and dowels, and the body of the connectors shall be designed for the force (F_u) determined by Section 13.3.1 with values of R_u and A_n taken from Table 13.5-1 applied at the center of mass of the panel.
- e. Where anchorage is achieved using flat straps embedded in concrete or masonry, such straps shall be attached to or hooked around reinforcing steel or otherwise terminated so as to effectively transfer forces to the reinforcing steel or to assure that pullout of anchorage is not the initial failure mechanism.

seblog.strongtie.com

STRUCTURAL ENGINEERING

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RECENT POSTS

- CFS Designer v2.3 Makes Cold-Formed Steel Design Easier Than Ever
- Simpson Build Change Follows Vails Columbia
- Happy Independence Day 2018

CFS Designer Software

New 3.0 Version available

- Now design multi-story load-bearing wall systems up to **8 stories**
- Beam-column design tool models up to 3-span beams with overhangs at each end



GET THERE QUICKER!
With Simpson Strong-Tie CFS Designer™ Software

New for 2017 - CFS Designer Version 3.0!
CFS Designer 3.0 is the most powerful design tool available for cold-formed steel design. It now allows you to design up to 8 stories, 3-span beams with overhangs at each end, and 3-span beams with overhangs at each end. It also allows you to design up to 3-span beams with overhangs at each end.

Additional Key Features:

- Now design multi-story load-bearing wall systems up to 8 stories
- Beam-column design tool models up to 3-span beams with overhangs at each end
- 3-span beams with overhangs at each end
- 3-span beams with overhangs at each end

Design tool capabilities:

- 1. New multi-story wall design
- 2. New 3-span beam design
- 3. New 3-span beam design with overhangs
- 4. New 3-span beam design with overhangs

Design Requirements:

- 1. Minimum 100 ksi yield strength
- 2. Minimum 50 ksi yield strength
- 3. Minimum 50 ksi yield strength
- 4. Minimum 50 ksi yield strength

C-CF-2017

The new **CF-17** catalog combines all product offerings for commercial construction including:

- + Deflection Connectors
- + Drift Clips
- + Rigid Connectors
- + Bridging Connectors
- + Fasteners
- + Anchors
- + Holdowns
- + Joist Framing Connectors
- + And much more!




Connectors for Cold-Formed Steel Construction
C-CF-2017 | (800) 999-5089 | strongtie.com

NEW IDCB Drift Clip Bypass Framing Clip

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- Provides 1" of lateral and 1" of vertical movement in both directions.

Model No.	No. of #14 Shouldered Screws ¹	No. of #12 XLQ Screw Anchors ²	Load Direction	Stud Thickness mil (ga.)	Strength ³		Service Limit ⁴		Code Ref.
					ASD	LRFD	1/4" Deformation	1/2" Deformation	
IDCB45.5	3	2	F ₂ and F ₃	33 mil (20 ga.)	600	900	410	650	170
				43 mil (18 ga.)	680	1,060	455	695	
				54 mil (16 ga.)	760	1,220	500	745	



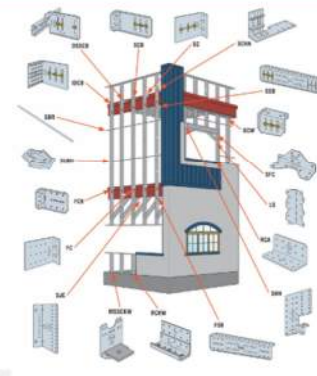
XLQ14B1224 Screw for Anchorage to Steel Edge Angle
2010 (separately)

XLQ14B1224 Screw for Anchorage to Steel Edge Angle
2010 (separately)

ICDB45.5 Connector Loads

Model No.	ASD	LRFD	ASD	LRFD	ASD	LRFD	ASD	LRFD
ICDB45.5	600	900	680	1,060	760	1,220	410	650

Connectors for Commercial Construction



Deflection Connections

Pages 24 - 41

SIMPSON Strong-Tie

CFS Projects

WIND = 30 PSF @ $\frac{16}{12}$ = 40 PLF

Slip/Slide Clip Detail

SIMPSON Strong-Tie

SCB/MSCB - Bypass Framing Slide-Clip Connector

Pages 26 - 28

U.S. Patent 8,550,502

SIMPSON Strong-Tie

#14 Shouldered Screw – XLSH34B1414

#14 Shouldered Screw

SIMPSON Strong-Tie

Slide Mechanism

Gap

Clip

Stud

SIMPSON Strong-Tie

SCB/MSCB - Bypass Framing Slide-Clip Connector

Pages 27 & 28

SCB/MSCB Allowable Connector Loads

Model No.	Connector Material Thickness mil (ga.)	L (ft.)	No. of #14 Shouldered Screws	Steel Thickness												Code Ref.		
				33 mil (20 ga.)						43 mil (16 ga.)							54 mil (14 ga.)	
				F ₁ ^{1/2}	F ₂ ^{1/2}	F ₃ ^{1/2}	F ₁ ^{1/4}	F ₂ ^{1/4}	F ₃ ^{1/4}	F ₁ ^{1/2}	F ₂ ^{1/2}	F ₃ ^{1/2}	F ₁ ^{1/4}	F ₂ ^{1/4}	F ₃ ^{1/4}			
SCB43.5	54 (16)	3/4	2	100	520	520	155	610	690	185	760	975	185	760	975	#2, LB, FL		
			2	75	490	520	85	610	690	85	760	975	85	760	975			
SCB45.5	54 (16)	5/8	3	120	675	675	140	895	1,000	140	990	1,260	140	990	1,260	#2, LB		
			2	75	490	520	120	780	690	135	1,065	1,200	135	1,195	1,475			
MSCB45.5	66 (14)	5/8	3	120	675	675	185	1,070	1,000	225	1,220	1,930	225	1,365	1,930	#2, LB, FL		
			2	55	490	520	55	610	690	55	760	945	55	760	945			
SCB47.5	54 (16)	7/8	3	70	675	675	70	895	1,300	70	990	1,260	70	990	1,260	#2, LB, FL		
			2	70	490	520	75	780	690	65	1,065	1,200	65	1,195	1,475			
MSCB47.5	66 (14)	7/8	3	90	675	675	90	1,070	1,000	110	1,220	1,930	110	1,365	1,930	#2, LB		
			2	40	490	520	40	690	690	40	760	945	40	760	945			
SCB49.5	54 (16)	9/8	3	45	675	675	45	895	1,000	45	990	1,260	45	990	1,260	#2, LB, FL		
			2	30	490	520	30	690	690	30	990	920	30	990	920			
SCB411.5	54 (16)	1 1/8	3	35	675	675	35	860	1,000	35	990	1,260	35	990	1,260			

SIMPSON Strong-Tie

SCB/MSCB - (*Engineer letter L-CF-CWCF1DIR17)

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SCB/MSCB Allowable Anchorage Loads

Anchorage Type	Minimum Base Material	No. of Anchors	F ₂ and F ₃	
			SCB	MSCB
#12 self-drilling screws Simpson Strong-Tie® X Metal screws XLD151214, XLS1214	A36 steel 3/8\" thick	2	795	1,020
		3	1,120	1,525
		4	1,590	2,040
Simpson Strong-Tie #12-24 x 1 1/2\" Strong Drive® X1, X1-Large-Head Metal screws XLD1141224, XLD114B1224-2K	A36 steel 3/8\" thick	2	1,115	1,150
		3	1,645	1,725
		4	2,230	2,300
Simpson Strong-Tie 0.157\" x 3/8\" power-actuated fasteners FDPAT-62KP	A36 steel 3/8\" thick	2	440	520
		3	585	780
		4	895	1,040
Simpson Strong-Tie 0.157\" x 3/8\" power-actuated fasteners FDPAT-62KP	A572 or A992 steel 3/8\" thick	2	585	610
		3	800	915
		4	1,170	1,220
Simpson Strong-Tie 3/8\" x 1 1/2\" Titen® hex-head masonry screws T1N2513-4H	Concrete f _c = 2,500 psi	2	380	380
		3	445	445
		4	510	510
Welded E70XX electrodes	A36 steel 3/8\" thick	Hard side: 2\" Free side: 1\"	1,735	2,040

Free side of clip | Hard side of clip | Welded

SSB Bypass Framing Slide-Clip Connector

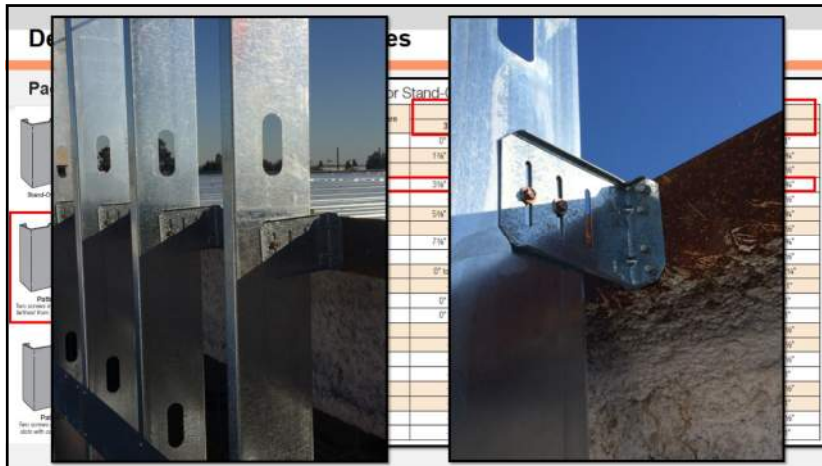
Page 33

SSB Allowable Anchorage Loads

Anchorage Type	No. of Anchors	Allowable Load F ₂ and F ₃
#12-24 self-drilling screws ¹	2	1,250
	3	1,335
	2	1,320
Simpson Strong-Tie® 0.157\" FDPAT powder-actuated fasteners	2	1,320
	3	1,335
Welded	Hard side: 2\" Free side: 1\"	1,335

SSB Allowable Connector Loads

Anchor	Anchor Type	Min. Embedment	Min. Spacing	Min. Edge	Min. Spacing	Min. Edge	Min. Spacing	Min. Edge
1	#12-24	1 1/2	12	3	12	3	12	3
2	#12-24	1 1/2	12	3	12	3	12	3
3	#12-24	1 1/2	12	3	12	3	12	3
4	#12-24	1 1/2	12	3	12	3	12	3
5	#12-24	1 1/2	12	3	12	3	12	3
6	#12-24	1 1/2	12	3	12	3	12	3
7	#12-24	1 1/2	12	3	12	3	12	3
8	#12-24	1 1/2	12	3	12	3	12	3
9	#12-24	1 1/2	12	3	12	3	12	3
10	#12-24	1 1/2	12	3	12	3	12	3
11	#12-24	1 1/2	12	3	12	3	12	3
12	#12-24	1 1/2	12	3	12	3	12	3
13	#12-24	1 1/2	12	3	12	3	12	3
14	#12-24	1 1/2	12	3	12	3	12	3
15	#12-24	1 1/2	12	3	12	3	12	3
16	#12-24	1 1/2	12	3	12	3	12	3
17	#12-24	1 1/2	12	3	12	3	12	3
18	#12-24	1 1/2	12	3	12	3	12	3
19	#12-24	1 1/2	12	3	12	3	12	3
20	#12-24	1 1/2	12	3	12	3	12	3
21	#12-24	1 1/2	12	3	12	3	12	3
22	#12-24	1 1/2	12	3	12	3	12	3
23	#12-24	1 1/2	12	3	12	3	12	3
24	#12-24	1 1/2	12	3	12	3	12	3
25	#12-24	1 1/2	12	3	12	3	12	3
26	#12-24	1 1/2	12	3	12	3	12	3
27	#12-24	1 1/2	12	3	12	3	12	3
28	#12-24	1 1/2	12	3	12	3	12	3
29	#12-24	1 1/2	12	3	12	3	12	3
30	#12-24	1 1/2	12	3	12	3	12	3



Head-of-Wall Slide Clips

Pages 36 - 38

SCW3.25 | SCW5.5 | DTC | DTC Anchor Layout

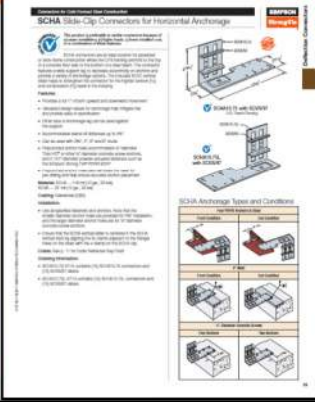
1 1/2\" min. (typ.) | 1\" min. (typ.) | 1\" clear of structure | (7) #8 screws confined in slots

Do not stack studs to thick

NEW SCHA Slide-Clip for Horizontal Anchorage

Pages 39 - 41

- Ideal Solution for panelized curtainwalls
- Can be anchored to top or bottom of the floor line with 1/4" THD, PDPAT (pins), or welds.
- Load values for concrete and structural steel
- Multiple standoff distances



SCHA Slide-Clip Connections for Horizontal Anchorage

Anchor to Top of Floor Slab

Anchor to Bottom of Floor Slab

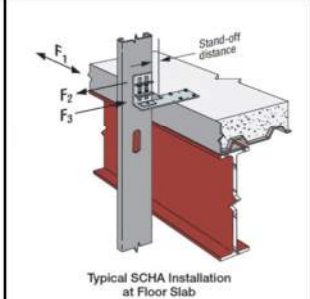
SCHA Anchorage Top and Bottom

Stand-off Distances

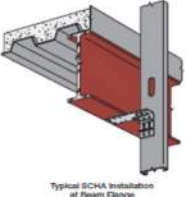
SIMPSON Strong-Tie

NEW SCHA Slide-Clip

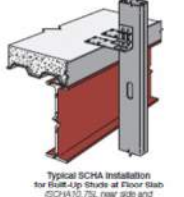
Pages 39 - 41



Typical SCHA Installation at Floor Slab



Typical SCHA Installation at Beam Flange





Typical SCHA Installation for Slide-Clip Shells at Floor Slab (SCHA110, 75L, rear side and SCHA110, 75 for side)

Nominal or Agreement Concrete $f_c = 2,500$ psi minimum	Concrete shell anchors - "d" diameter	# anchors	Min.	d	SCHA110, 75L			SCHA110, 75		
					Min.	Max.	Min.	Max.	Min.	Max.
	4 anchors	Min.	4	33 (25)	155	625	475			
				43 (33)	192	830	575			
				54 (40)	185	830	725			
	2 anchors	Min.	6	54 (40)	350	1,080	775			
				68 (51)	350	1,080	775			
				84 (63)	350	1,080	775			
	4 anchors	Min.	4	33 (25)	155	625	475			
				43 (33)	192	830	575			
				54 (40)	185	830	725			
	2 anchors	Min.	6	54 (40)	350	1,080	775			
				68 (51)	350	1,080	775			
				84 (63)	350	1,080	775			

SIMPSON Strong-Tie


Field Adjustments

- Traditional clips require stud layout before wall framing
- Adjustments not possible without grinding clip off

SIMPSON Strong-Tie

Panelization Benefits



SIMPSON Strong-Tie



Product Description

- Clip Product:
 - Sizes 3.5", 6" & 8"
 - 12ga 50ksi
 - G90
 - Dual function clip (deflection and fixed)
 - Deflection: 1" deflection up and down
 - 3.5" (2) slots, 6" (3) slots, 8" (4) slots
 - No equal sign functions as screw guide
 - Fixed: 3.5 (4 screws), 6" (6) screws, 8" (8) screws
 - Ordering information : 25 connectors
 - Value Engineered

DSSCB43.5

DSSCB46
Paint Finishing

DSSCB48
Paint Finishing

ELBACR1444
#14 Rivetless Screw for Attachment to Steel Framing (Included)

Splicing Planges
Match the slot depth with the slot.

Offsetted Edges and Heavy 12-Gauge Construction
Provides greater strength and superior load-rated track.

Dual Function
Clip can be used for either deflection or fixed conditions.

Single Formed Inset
Minimizes standard 1/2" and 1/4" deep, 12 gauge steel, interference friction, with offset or easy hole installation.

No Equal Slanges
Maintains the vertical alignment of the channel when deflection occurs.

Product Description

Product Description

- Strut Channel Parameters
 - Web (1-5/8")
 - Flange (13/16" and 1-5/8" option)
 - 12ga 33ksi
- Common Manufacturers
 - Uni-Strut
 - PHD
 - B-line
- Piercings Allowed
 - Un-Punched
 - 1-1/8" x 9/16" slotted @ 2" o.c.
 - 9/16" hole @ 1-7/8" o.c.
 - 7/8" hole @ 6" o.c.
- 13/16" and 1-5/8" flange options for deflection clip and 13/16" flange option only for rigid clip

3/4" Strut Channels

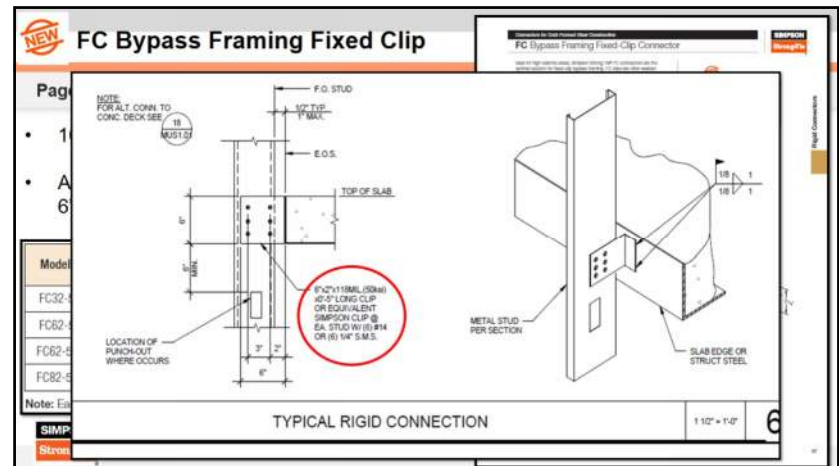
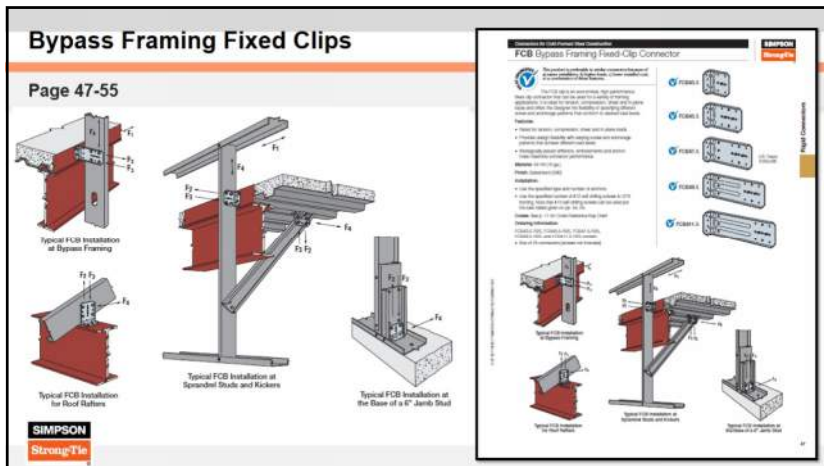
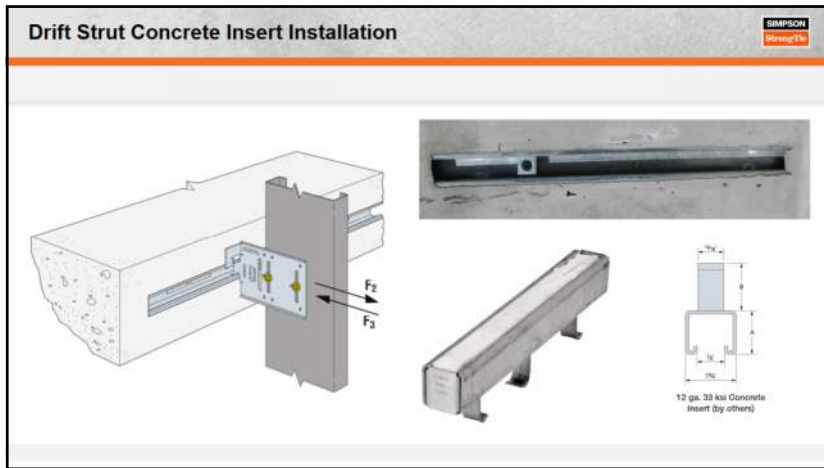
1" Strut Channels

3/4" Strut Channel

1" Strut Channel

DSHS Drift Stopper

DSHS Connector (sold separately and optional if required by designer). Use to prevent horizontal movement when needed. Fasten to top of strut channel with (1) #10-16.



NEW **FSB Bypass Framing Fixed-Clip**

FSB System Framing Fixed-Clip Stud Connector

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FSB Allowable Connections

Model No.	Connector Material Thickness (min. gal.)	Max. Stud Size	Min. Stud Spacing
1380158	3/4 (3)	Min.	Max.

FSB Allowable Connections

Anchorage

#12-24 self-drilling

Simpson Strong-Tie 0.145" PD/PT or 0.140" powder-actuated

Welded

LOCATE UTILITY PUNCH AWAY FROM CONNECTION

STUD PER SECTIONS/ ELEV.

(4) #10 S.M.S.

(E) BEAM

1/8" / 1/2"

4005162-54 STICKER EA. STUD

1/8" / 1/2" WELD SIZE

RIGID CONNECTION TO BOTTOM OF BEAM

1 1/2" = 1'-0"

9

SJC Steel-Joist Connectors

Pages 82 – 87 (SJC – 14ga. / MSJC – 12ga.)

Header to Jamb

Rickers to Underside of Deck

Joists to I-Beam

Joist to Girder

SJC10.25 (MSJC10.25 similar)

SJC8.25 (MSJC8.25 similar)

U.S. Patent D730,545

Note: For 8" and 8" joists, SSC connectors are recommended.

SJC Steel-Joist Connectors

1" diameter anchors per table 605

1'-0"

2" TYP.

BENT R4x4 w/(2)#10

TYPICAL (2) 5/8" EXP. ANCHORS

SEE SECTIONS AND OR DETAILS FOR STUD SIZE AND SPACING

PERPENDICULAR TO DECK **A**

Kneewall Connections

Bearing pressure

M

F_x

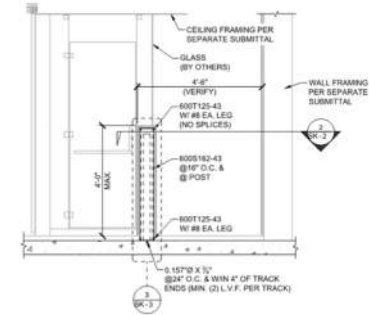
SIMPSON Strong-Tie

Kneewall Applications



Innovative Idea – Kneewall Clip

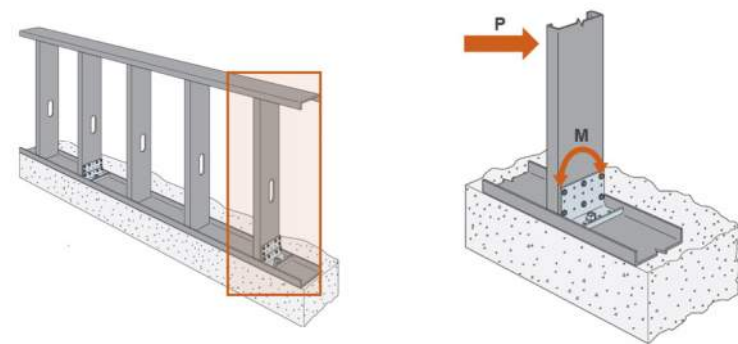
- Very common design connection
- Post installed
- Requires base moment resistance
- Must adhere to code requirements
- More Economic Solution
- Labor Saving
- Ease of Installation

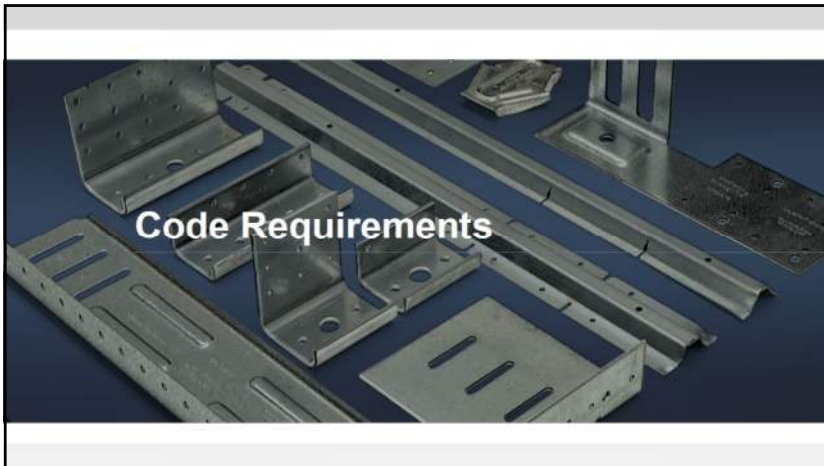
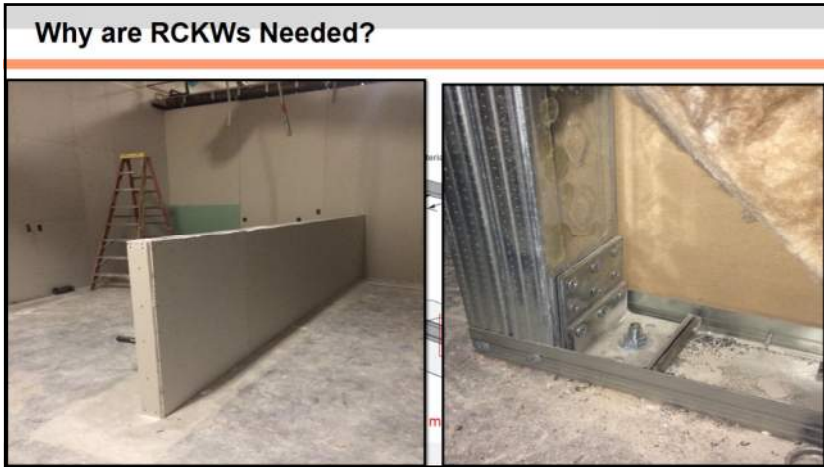


Pre-fabbed Steel Post (HSS)



Structurally – Why are Kneewall Clips Needed?





Code Requirements

Loads Imposed on Kneewalls

Exterior
Lateral Load (Seismic/Wind Pressure)
ASCE 7-10

Code Requirements

Interior: Guard or Handrail Applications

Interior

Guard or Handrail Applications

ASCE7-10, Section 4.5.1
(Ref. IBC 1607.8.1 & 1607.8.1.1)
The IBC requires 42" high guardrails.
OSHA requires 45" +/- 3"

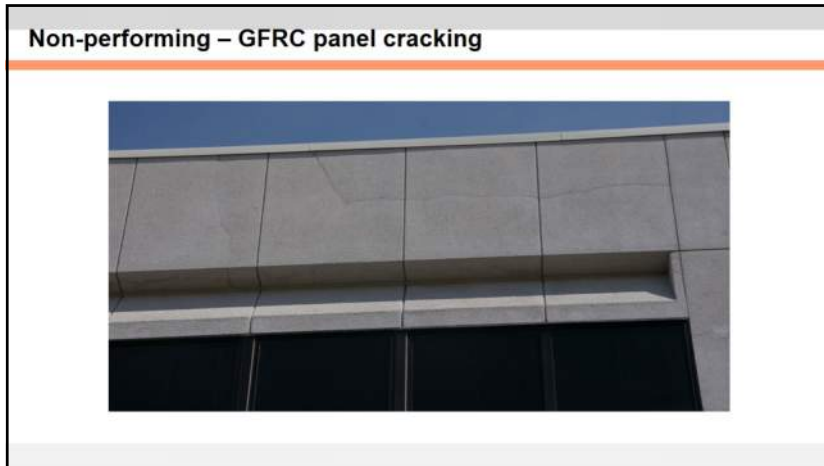
P = 200 lb.

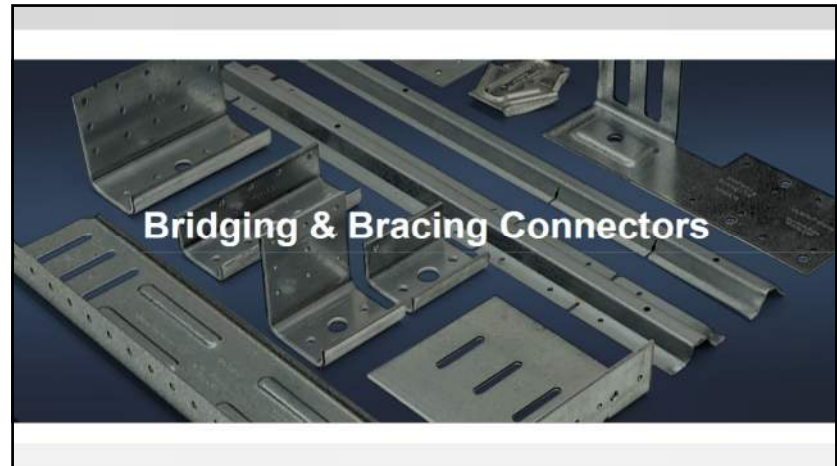
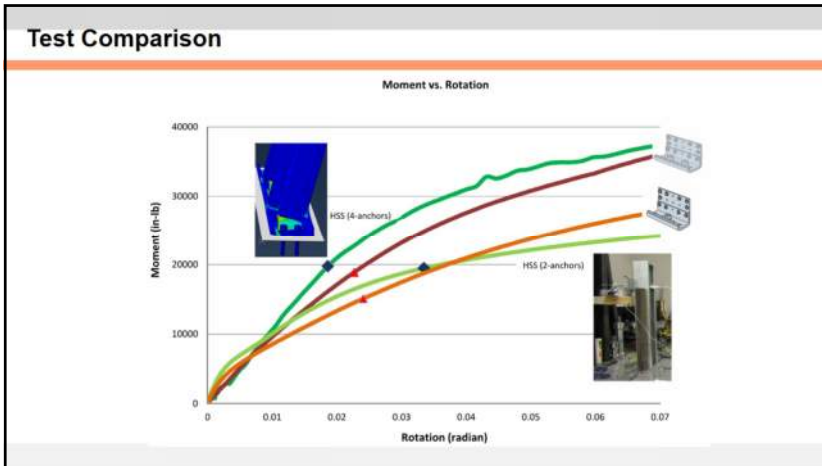
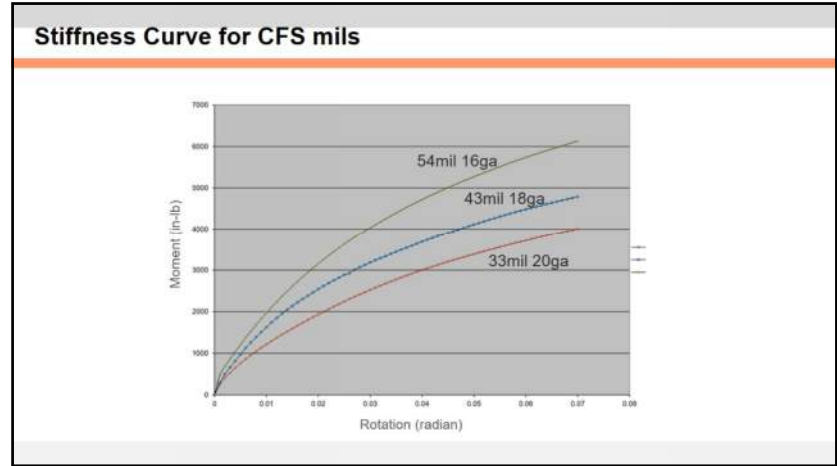
w = 50 plf

Code Requirements – IBC Table 1604.3 Deflection Limits

CONSTRUCTION	L	S or W ^f	D + L ^{d,g}
Roof members: ^a			
Supporting plaster or stucco ceiling	L/360	L/360	L/240
Supporting nonplaster ceiling	L/240	L/240	L/180
Not supporting ceiling	L/180	L/180	L/120
Floor members	L/360	----	L/240
Exterior Walls:			
With plaster or stucco finishes	----	L/360	----
With other brittle finishes	----	L/240	----
With flexible finishes	----	L/180	----
Interior partitions:^b			
With plaster or stucco finishes	L/360	----	----
With other brittle finishes	L/240	----	----
With flexible finishes	L/120	----	----
Farm building	----	----	L/180
Greenhouses	----	----	L/120

Note a – Flexible, folding and portable partitions are not governed by the provisions of this section. The deflection criterion for interior partition is based on the horizontal load defined in Section 1607.14.
 Note f – The wind load permit to be taken as a 0.42 times the component and cladding for determining deflection limits. For glass 0.60 times.





CFS Framed Shear Wall Design

Wall Stud Flange Bracing: Steel Based Design

Stud Bracing with Strapping and Blocking

Strap & Blocking

AISI Design Guides
Bracing Design Examples

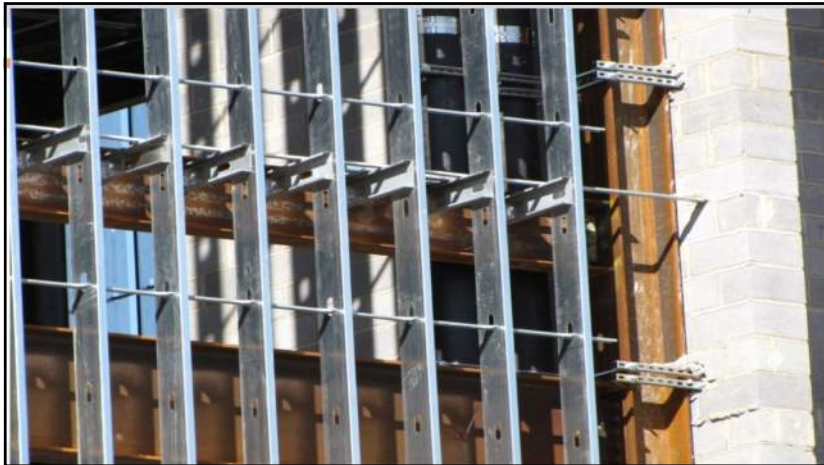
Stud Bracing with Cold-Rolled Channel

Channel & Clip Angle

SIMPSON Strong-Tie

Typical Jobsite Bridging Pics


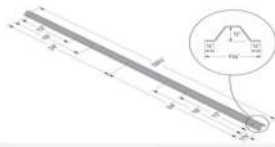
SIMPSON Strong-Tie



NEW **SBR / DBR Spacer Bracers**



Pages 125 - 132

- New spacer bracers reduce the installed cost of cold-formed steel stud walls by enabling faster stud layout while minimizing the need for bridging clips.
- + Prepunched slots enables 12", 16", and 24" on-center stud spacing
- + SBR Accommodates 3-5/8" and 6" studs in thicknesses of 33 mil (20ga.) through 68 mil (14ga.)

SIMPSON Strong-Tie



Fasteners and Quik Drive




Fasteners Information


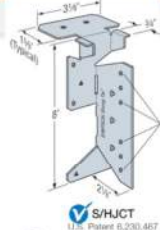

- ASTM C1513
 - XE (#10x3/4")
 - E (#14x1")
- Code Reports
 - FPHSD (#10, #12, 22-12ga. sht'g-to-CFS)
 - X Series (#10, #12, sht'g to 3/8" structural steel)
 - XM/XL Series (#12, steel deck to 3/8" structural steel)
 - PPSD (#8, #10, #12 wood sht'g to CFS)
 - DWF (#6, drywall to CFS)



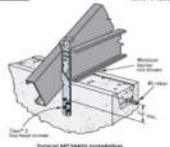



Fasteners & Corrosion (p19)

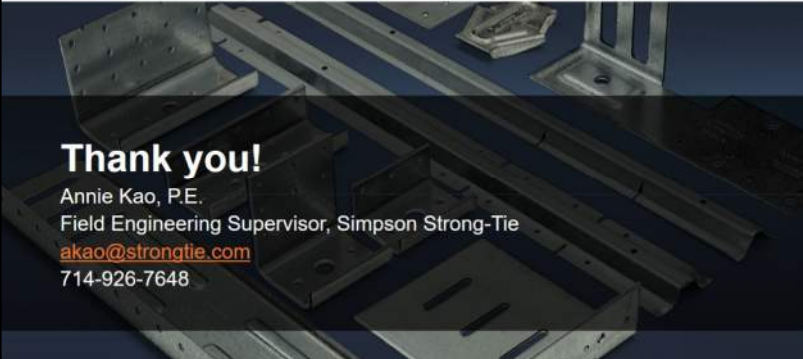
CORROSION RESISTANCE RECOMMENDATIONS			
Low	Medium	High	Severe
FASTENERS			
Phosphate (gray, black), Clear (bright) zinc (ASTM F1941), Heavy electro-galvanized (ASTM A641-Class 1), Yellow zinc (ASTM F1941), Electrocoat (E-coat), Type 410 stainless steel	Mechanically galvanized (AS 3566.2-C3, N2000, ASTM B695-Class 55), Quik Guard™ coating, Hot-dip galvanized (ASTM A153-Class D), Double-barrier coating, Type 410 stainless steel with protective top coat	Type 304 stainless steel, Type 305 stainless steel	Type 316 stainless steel, Hot-dip galvanized (ASTM A153-Class C), Silicon bronze, Copper
CONNECTORS			
Simpson Strong-Tie® gray paint Powder coating Standard G90 zinc coating	ZMAX® (G185) Hot-dip galvanized (ASTM A123 - Class D)	Type 316L stainless steel	Type 316L stainless steel

Joist Hangers / Holdowns / Miscellaneous

Typical SHJCT Installation



Thank you!

Annie Kao, P.E.
Field Engineering Supervisor, Simpson Strong-Tie
akao@strongtie.com
714-926-7648