ICC-ES Evaluation Report

ESR-2507

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DIVISION: 05 00 00—METALS
Section: 05 40 00—Cold-Formed Metal Framing

DIVISION: 09 00 00—FINISHES
Section: 09 21 16—Gypsum Board Assemblies
Section: 09 22 16.13—Non-Structural Metal Stud Framing

REPORT HOLDER:

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EVALUATION SUBJECT:

SUPREME STEEL FRAMING SYSTEM ASSOCIATION™ STUDS AND TRACKS

ADDITIONAL LISTEES:

CONSOLIDATED FABRICATORS CORP.
8584 MULBERRY AVENUE
FONTANA, CALIFORNIA 92335
(909) 770-8920
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QUAIL RUN BUILDING MATERIALS, INC.
2102 WEST LONE CACTUS DRIVE
PHOENIX, ARIZONA 85027
(602) 269-2316
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STEEL CONSTRUCTION SYSTEMS
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UNITED METAL PRODUCTS, INC.
234 NORTH SHERMAN AVENUE
CORONA, CALIFORNIA 92882
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code®* (IBC)
- Other Codes (see Section 8.0)

Property evaluated:

Structural

2.0 USES

Supreme Steel Framing System Association™ (SSFSA) studs and tracks are used for joists, rafters, ceiling framing, wall framing and framing of interior nonload-bearing composite walls.

3.0 DESCRIPTION

3.1 General:

The SSFSA metal framing members described in this report are factory-formed from coils of steel at the locations listed in Table 5. See Table 1 for recognized members and Figures 1 and 2 for member configurations. The C-shapes (studs) are manufactured with and without web punch-outs. When punch-outs are provided, they are located along the center of the web, with a maximum size as noted in Table 1. See Figure 3 for details of punch-outs. The punch-outs are spaced a minimum of 24 inches (1219 mm) on center. Punch-outs must be spaced so it is a minimum of 10 inches (254 mm) from each end of the stud to the nearest edge of the punch-out. The values for studs listed in each of the tables of this report are for studs with punch-outs unless otherwise noted. Track sections are produced without punch-outs.

3.2 Material:

3.2.1 Steel: The steel framing members are cold-formed from galvanized steel coils with a minimum yield strength (F_y) of 57 ksi (388 MPa) and a minimum tensile strength (F_u) of 65 ksi (450 MPa), complying with SSFSA's published specification for steel. All framing members have a minimum G40 or G60 galvanization coating designation in accordance with ASTM A 653, depending on use. (See Section 5.4.)

3.2.2 Gypsum Sheathing: For composite wall assemblies, the gypsum sheathing must be $^5/_8$-inch-thick (15.9 mm) Georgia Pacific Type X complying with ASTM C 1396.

3.2.3 Fasteners: For composite wall assemblies, fasteners for attaching the gypsum sheathing to the studs must be No. 6, Type S, fine thread, bugle head drywall screws conforming to ASTM C 1002.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The section properties indicated in Table 2 have been determined in accordance with the North American Specification for Design of Cold-formed Steel Structural Members, including 2004 Supplement (AISI-NAS). The allowable moments, M_a, as indicated in Table 2, are for use with Allowable Strength Design (ASD), and are for flexural members installed with the compression flange continuously braced. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI-NAS. The design of flexural members must address web crippling, combined bending and web crippling, and combined bending and shear, as applicable, in accordance with AISI-NAS. As an alternate, interior, nonload-bearing composite wall heights may be determined in accordance with Section 4.1.2.

4.1.2 Nonload-bearing Composite Walls: Allowable wall heights for interior nonload-bearing composite wall assemblies are shown in Table 3.

4.2 Installation:

4.2.1 General: The framing members must be installed in accordance with the code, the approved construction documents and this report. If there is a conflict between the construction documents submitted for approval and this report, this report governs. The approved construction documents must be available at the jobsite at all times during installation.

4.2.2 Nonload-bearing Composite Walls: For nonload-bearing composite walls, the gypsum sheathing must be installed on both sides of the wall framing for full wall height, with the long dimension of the gypsum sheathing parallel to the studs. Placement of joints in the gypsum sheathing must be in accordance with Sections 4.6.3 and 4.6.4 of GA-216 (Gypsum Association Application and Finishing of Gypsum Panel Products) or Section 7.5 of ASTM C 840. The gypsum sheathing must be fastened to the studs with the fasteners spaced a maximum of 12 inches (305 mm) on center along the studs. Fasteners attaching the gypsum sheathing to the track, top and bottom must be spaced a maximum of $1^1/_2$ inches (38 mm) from each edge of the individual gypsum sheathing panels. For walls with studs spaced 24 inches (610 mm) on center, the maximum fastener spacing along the tracks must be 12 inches (305 mm) on center (minimum five fasteners per panel). For walls with studs spaced 16 inches (406 mm) on center, fasteners attaching the gypsum sheathing to the track must be spaced a maximum of 16 inches (406 mm) on center (minimum four fasteners per panel). The gypsum sheathing must be as specified in Section 3.2.2. The fasteners must be as specified in Section 3.2.3. Fasteners only connecting the stud to the track may be omitted.

5.0 CONDITIONS OF USE

The Supreme Steel Framing System Association™ studs and tracks described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The cold-formed steel framing members are installed in accordance with the applicable code, the approved construction documents and this report.

5.2 Minimum uncoated base-metal thickness of the framing members as delivered to the jobsite must be at least 95 percent of the design base-metal thickness. (See Table 2.)

5.3 Complete construction documents verifying compliance with this report must be submitted to the code official for each project at the time of permit application. The construction documents must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.4 Studs and tracks having a G40 galvanized coating designation are limited to use as nonload-bearing interior wall framing subject to a maximum transverse load of 5 psf (239 Pa).

5.5 The interior nonload-bearing composite wall assemblies must be limited to interior installations where the superimposed axial load is zero.

5.6 Use of the SSFSA C-shapes must be limited to simple-span, uniformly loaded conditions subject to end one-flange loading only.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members (AC46), dated February 2011.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members—Interior Nonload-bearing Wall Assemblies (AC86), dated February 2010.

7.0 IDENTIFICATION

Each cold-formed steel framing member must have a legible label, stamp or embossment, at a maximum of48 inches (1219 mm) on center, indicating the manufacturer's name or initials (see the Additional Listee at the beginning of this report); the member designation; the evaluation report number (ESR-2507); the acronym "ICC-ES"; material minimum base-metal thickness (uncoated) in decimal inches or mils; minimum specified yield strength; and coating grade designation (if G60or greater).

8.0 OTHER CODES

8.1 Evaluation Scope:

In addition to the code referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the 2003 *International Building Code*® (2003 IBC). The products comply with the 2003 IBC as noted below.

8.2 Uses:

See Section 2.0.

8.3 Description:

See Section 3.0.

8.4 Design and Installation:

8.4.1 Design: The section properties for members subject to the 2003 IBC are indicated in Table 1 and have been determined in accordance with the 2001 edition of the North American Specification for Design of Cold-formed Steel Structural Members (AISI-NASPEC). The allowable moments, M_a, as indicated in Table 2, are for use with Allowable Strength Design (ASD), and are for flexural members installed with the compression flange continuously braced. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI-NASPEC. The design of flexural members must address web crippling, combined bending and web crippling, and combined bending and shear, as applicable, in accordance with AISI-NASPEC.

Allowable wall heights for interior nonload-bearing composite wall design subject to the 2003 IBC are shown in Table 4.

8.4.2 Installation: See Section 4.2.

8.5 Conditions of Use:

See Section 5.0.

8.6 Evidence Submitted:

See Section 6.0.

8.7 Identification:

See Section 7.0.

TABLE 1—SSFSA MEMBERS[1,2]

MEMBER DESIGNATION	WEB[3] (in)	FLANGE (in)	LIP (in)	INSIDE BEND RADIUS (in)	DESIGN THICKNESS (in)	MINIMUM BASE-METAL THICKNESS[4] (in)	PUNCH-OUT DIMENSIONS (in)
C-Shapes							
162 SFS-22	1.625	1.4375	0.375	0.0820	0.0235	0.0223	----
250 SFS-22	2.500	1.4375	0.375	0.0820	0.0235	0.0223	0.75 x 1.75
362 SFS-22	3.625	1.4375	0.375	0.0820	0.0235	0.0223	1.50 x 2.50
400 SFS-22	4.000	1.4375	0.375	0.0820	0.0235	0.0223	1.50 x 2.50
600 SFS-22[5]	6.000	1.4375	0.375	0.0820	0.0235	0.0223	See note 5.
Tracks							
162 SFT-22	1.625	1.250	---	0.0820	0.0235	0.0223	----
250 SFT-22	2.500	1.250	---	0.0820	0.0235	0.0223	----
362 SFT-22	3.625	1.250	---	0.0820	0.0235	0.0223	----
400 SFT-22	4.000	1.250	---	0.0820	0.0235	0.0223	----
600 SFT-22[5]	6.000	1.250	---	0.0820	0.0235	0.0223	----

For **SI:** 1 inch =25.4 mm.

[1]See Figures 1 and 2 for member geometry.
[2]See Table 3 for member section properties.
[3]Web height is measured from outside face to outside face of the flanges for C-Shapes and inside face to inside face of the flanges for tracks.
[4]Minimum base-metal thickness represents 95 percent of the design thickness and is the minimum acceptable thickness of the uncoated base metal delivered to the jobsite.
[5]h/t exceeds 200. Unless otherwise noted in this report, web stiffeners in accordance with AISI-NAS Sections B1.2 and C3.6.1 are required. Unless otherwise noted in this report, no holes or punch-outs in the web are permitted.

TABLE 2—SECTION PROPERTIES

MEMBER DESIGNATION	GROSS							EFFECTIVE					TORSIONAL PROPERTIES					
	Area (in^2)	Weight (lb/ft)	I_{XX} (in^4)	S_{XX} (in^3)	R_X (in)	I_{YY} (in^4)	R_Y (in)	I_{XX} (in^4)	S_{XX} (in^3)	M_a (ft-lb)	V_a (lb)	Y_{cg} (in)	Jx1000 (in^4)	C_W (in^6)	m (in)	X_O (in)	R_O (in)	β
C-Shapes																		
162 SFS-22	0.117	0.40	0.055	0.068	0.684	0.035	0.543	0.052	0.048	136	621	0.938	0.022	0.027	0.776	-1.395	1.616	0.292
250 SFS-22	0.138	0.47	0.145	0.116	1.025	0.041	0.542	0.136	0.090	255	505	1.379	0.025	0.060	0.716	-1.212	1.677	0.478
362 SFS-22	0.164	0.56	0.339	0.187	1.437	0.046	0.529	0.331	0.116	331	338	2.212	0.030	0.128	0.652	-1.069	1.867	0.672
400 SFS-22	0.173	0.59	0.427	0.213	1.569	0.047	0.524	0.417	0.129	367	305	2.468	0.032	0.159	0.634	-1.029	1.949	0.721
600SFS-22[1]	0.220	0.75	1.112	0.371	2.247	0.053	0.492	0.976	0.219	622	200	3.715	0.041	0.388	0.553	-0.864	2.457	0.876
Tracks																		
162 SFT-22	0.097	0.33	0.052	0.060	0.734	0.016	0.410	0.037	0.031	88	621	1.096	0.018	0.009	0.502	-0.874	1.213	0.481
250 SFT-22	0.118	0.40	0.130	0.099	1.052	0.019	0.399	0.097	0.053	150	478	1.624	0.022	0.023	0.458	-0.765	1.361	0.984
362 SFT-22	0.144	0.49	0.297	0.158	1.437	0.021	0.379	0.235	0.076	217	326	2.412	0.027	0.052	0.412	-0.663	1.628	0.834
400 SFT-22	0.153	0.52	0.373	0.181	1.562	0.021	0.373	0.299	0.084	239	295	2.684	0.028	0.065	0.399	-0.635	1.727	0.865
600 SFT-22[1]	0.200	0.68	0.970	0.317	2.204	0.023	0.341	0.649	0.124	353	195	4.213	0.037	0.163	0.340	-0.520	2.290	0.948

For **SI:** 1 inch = 25.4 mm, 1 pound = 4.4482 N.

[1]Web height-to-thickness ratio (h/t) exceeds 200. Unless otherwise noted in this report, web stiffeners in accordance with AISI-NAS Sections B1.2 and C3.6.1 are required. Unless otherwise noted in this report, no holes or punch-outs in the web are permitted.

Notes to Table 2:

I_{XX} = Moment of Inertia about x-axis.
S_{XX} = Section Modulus about x-axis.
R_X = Radius of Gyration about x-axis.
I_{YY} = Moment of Inertia about y-axis.
R_Y = Radius of Gyration about y-axis.
M_a = Allowable Moment about x-axis.
V_a = Allowable strong axis shear away from punch-out.
Y_{cg} = The distance from the neutral axis to the top fiber of the flange.
J = St. Venant Torsion Constant.
C_w = Warping Torsion Constant.
m = Centerline of web to shear center.
X_O = Distance from shear center to the centroid along the principal x-axis.
R_O = Polar Radius of Gyration about the shear center.
β = $1-(X_O/R_O)^2$.

TABLE 3—INTERIOR NONLOAD-BEARING COMPOSITE WALL PANELS LIMITING HEIGHTS[1,2,3,4] (ft-in)

MEMBER DESIGNATION	SPACING (in. o.c.)	5 PSF			7.5 PSF			10 PSF			15 PSF		
		L/120	L/240	L/360	L/120	L/240	L/360	L/120	L/240	L/360	L/120	L/240	L/360
162 SFS-22	16	12-10	10-2	8-9	11-2	8-9	---	10-2	---	---	---	---	---
	24	11-6	9-1	---	10-0	---	---	9-1	---	---	---	---	---
250 SFS-22	16	15-7	12-5	10-10	13-8	10-10	9-5	12-5	9-9	8-6	9-3	8-6	---
	24	13-7	10-10	9-5	11-11	9-5	8-3	10-10	8-7	---	---	---	---
362 SFS-22	16	20-5	15-8	13-8	17-10	13-8	12-0	16-3	12-5	10-10	11-1	10-10	9-4
	24	18-7	14-3	15-5	15-8	12-5	10-9	13-3	11-3	9-8	9-1	9-1	8-4
400 SFS-22	16	20-9	16-6	14-5	18-2	14-5	12-7	16-6	13-1	11-5	11-5	11-5	9-9
	24	18-9	14-8	12-10	16-0	12-10	11-2	13-7	11-8	10-1	9-4	9-4	8-9
600 SFS-22	16	28-6	21-6	18-9	24-11	18-9	16-5	21-11	17-1	14-11	13-4	13-4	13-0
	24	24-9	18-6	16-6	20-6	16-2	14-5	16-6	14-8	13-1	10-4	10-4	10-4

For **SI:** 1 inch = 25.4 mm, 1 psf = 47.88 Pa.

[1]Sheathing, as specified in Section 3.2.2, must be attached to both faces of the wall for the full height of the wall with the long dimension parallel to the studs.
[2]Sheathing must be fastened to the studs and tracks with fasteners as specified in Section 3.2.3. Maximum spacing of fasteners into studs must be 12 inches o.c. For attachment to tracks when studs are spaced 24 inches o.c., fasteners must be placed at a maximum spacing of $9^5/_8$ inches o.c. For attachment to tracks when studs are space 16 inches o.c., fasteners must be placed at a maximum spacing of 12 inches o.c. Fasteners only connecting the stud to the track may be omitted.
[3]Placement of joints in the gypsum sheathing must be in accordance with Sections 4.6.3 and 4.6.4 of GA-216 (Gypsum Association Application and Finishing of Gypsum Panel Products) or Section 7.5 of ASTM C 840.
[4]Holes and punch-outs, as shown in Figure 3, are permitted in all members in Table 3. Size and location of holes and punch-outs must be in accordance with Section 3.1. No web stiffeners are required.

TABLE 4—WEB CRIPPLING[1,2] (lbs)

MEMBER DESIGNATION	CONDITION[3]			
	1	2	3	4
	1 in. Brng	3.5 in. Brng	1 in. Brng	3.5 in. Brng
250SFS-22	396	See Footnote 5.	See Footnote 5	See Footnote 5
362SFS-22	380	See Footnote 5	See Footnote 5	See Footnote 5
400SFS-22	376	See Footnote 5	See Footnote 5	See Footnote 5
600SFS-22	See Footnote 4.			

For **SI:** 1 inch = 25.4 mm, 1 lb = 4.4482 N.

[1]Listed allowable loads are based on studs fastened to tracks.
[2]Listed allowable loads are for unpunched web.
[3]See Figure 4 for illustration of loading conditions.
Condition 1 – End Reaction – One Flange Loading
Condition 2 – Interior Reaction – One Flange Loading
Condition 3 – End Reaction – Two Flange Loading
Condition 4 – Interior Reaction – Two Flange Loading
[4]h/t ratio exceeds 200. Unless otherwise noted in this report, web stiffeners in accordance with AISI-NAS Sections B1.2 and C3.6.1 are required. Unless otherwise noted in this report, no holes or punch-outs in the web are permitted.
[5]Use of SSFSA C-shapes is limited to simple span uniformly loaded conditions subject to end one-flange loading only.

TABLE 5—MANUFACTURING FACILITIES

Consolidated Fabricators Corp. 8584 Mulberry Avenue Fontana, California 92335 (909) 770-8920	Steel Construction Systems 11250 Astronaut Boulevard Orlando, Florida 32837 (800) 548-8499
Consolidated Fabricators Corp. 650 Live Oak Avenue, Galt, California 95632 (209) 744-2704	Steel Construction Systems 5301 Hamilton, Theodore, Alabama 36582 (800) 548-8499
Quail Run Building Materials, Inc. 2102 West Lone Cactus Drive Phoenix, Arizona 85027 (602) 269-2316	United Metal Products, Inc. 234 North Sherman Avenue Corona, California 92882 (951) 739-9535
SCAFCO Steel Stud Manufacturing Company (SCAFCO) 6200 East Main Avenue Spokane, Washington 99211-1215 (509) 343-9000	

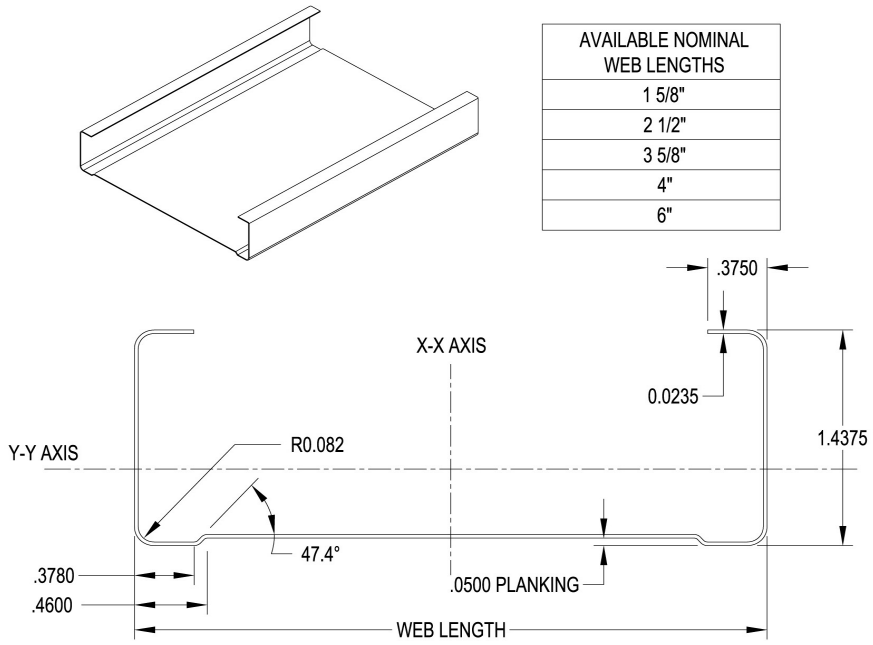


FIGURE 1

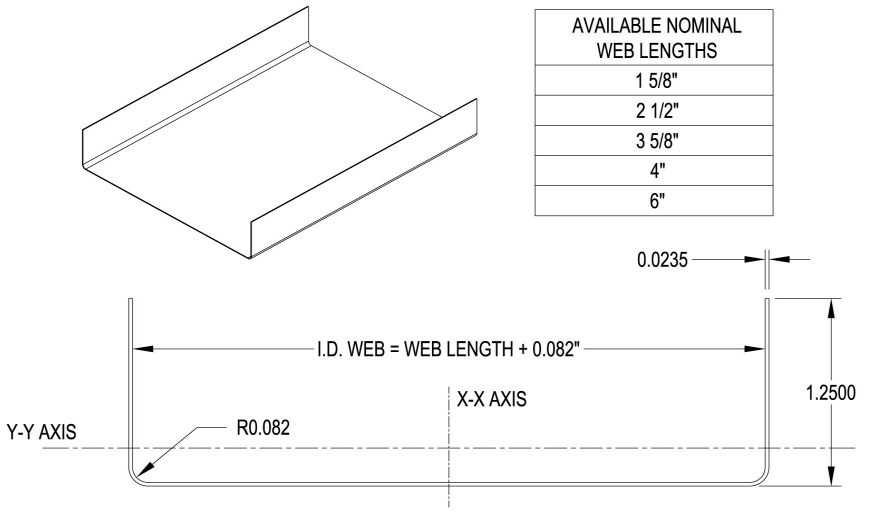
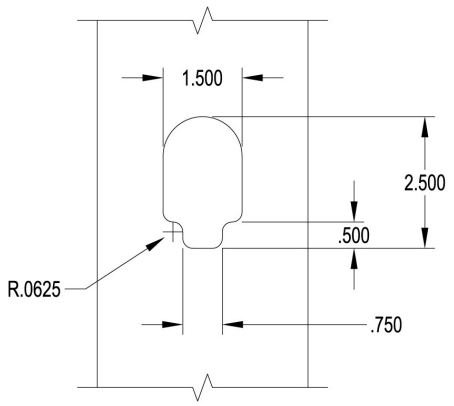
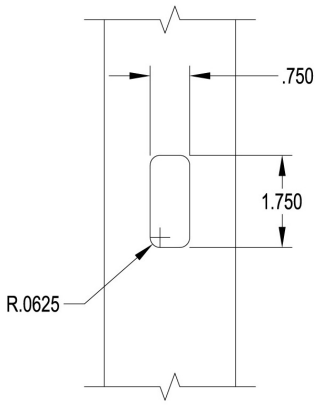


FIGURE 2



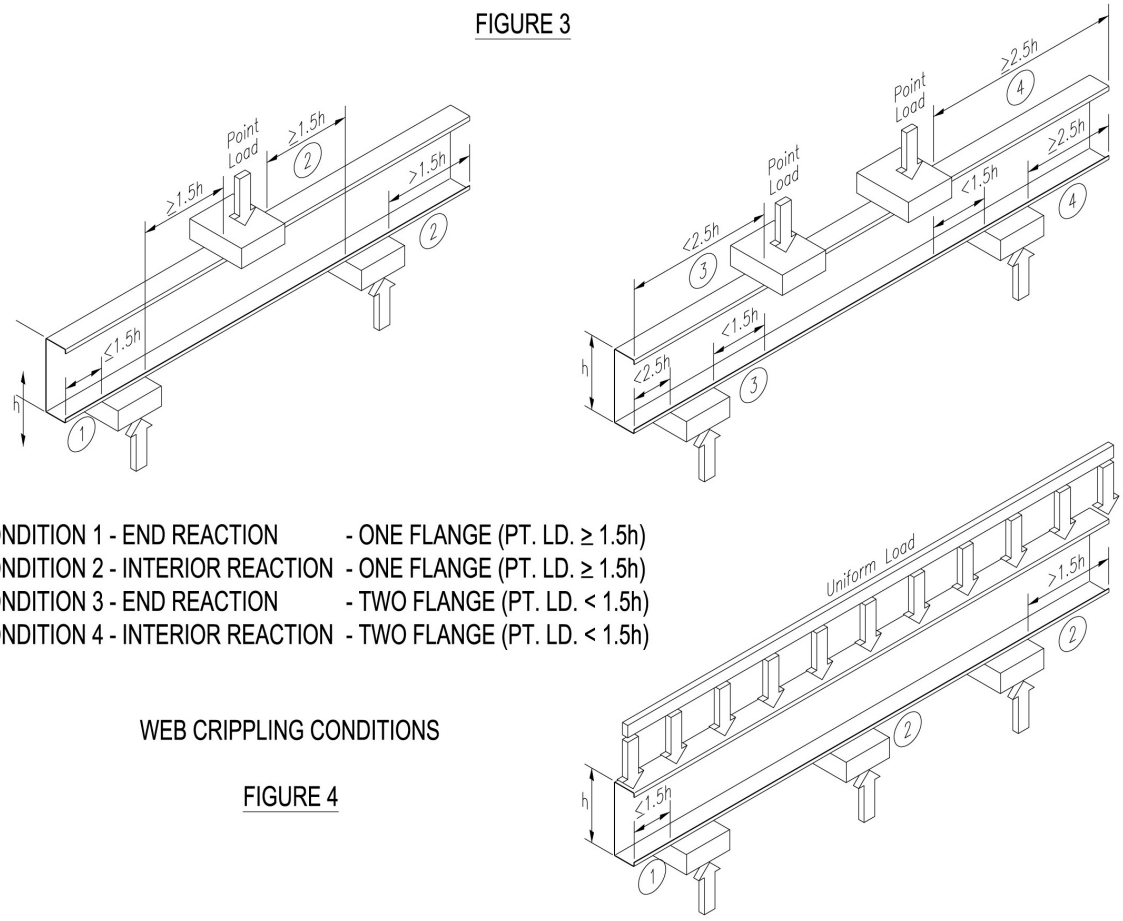
PUNCHOUT SIZE FOR
3 5/8, 4, AND 6 INCH STUDS
CENTERED IN WEB



PUNCHOUT SIZE FOR
1.625 AND 2.5 INCH STUDS
CENTERED IN WEB

NOTE: PUNCHOUT IN 6" STUD ALLOWED
ONLY IN COMPOSITE WALL DESIGN.

FIGURE 3



1. CONDITION 1 - END REACTION - ONE FLANGE (PT. LD. ≥ 1.5h)
2. CONDITION 2 - INTERIOR REACTION - ONE FLANGE (PT. LD. ≥ 1.5h)
3. CONDITION 3 - END REACTION - TWO FLANGE (PT. LD. < 1.5h)
4. CONDITION 4 - INTERIOR REACTION - TWO FLANGE (PT. LD. < 1.5h)

WEB CRIPPLING CONDITIONS

FIGURE 4