ICC-ES Evaluation Report

ESR-3897

Reissued April 2025

Subject to renewal April 2026

DIVISION: 05 00 00—METALS Section: 05 42 00—Cold-Formed Metal Joist Framing	REPORT HOLDER: MARKO SISTEMAS METALICOS DE CONSTRUCAO	EVALUATION SUBJECT: TWIN SYSTEM COLD-FORMED STEEL TRUSSES	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015 and 2012 *International Building Code®* (IBC)

Property evaluated:

- Structural

2.0 USES

The TWIN System cold-formed steel trusses are used to support roof loads.

3.0 DESCRIPTION

3.1 Truss Components:

The TWIN System is made up of the cold-formed steel truss components listed in Table 1 and shown in Figure 1. The cold-formed steel truss components are manufactured from steel complying with ASTM A653 SS50 with a G90 coating.

3.2 Trusses:

There are three different truss configurations; TW36, TW48, and TW60. The 36, 48, and 60 indicate approximate truss depths from the top of the top chord to the bottom of the bottom chord. Table 2 defines truss depths, spacing, and weights for minimum capacity (MIN) and maximum capacity (MAX) truss configurations for each depth. The MIN configuration utilizes unbraced 173U118-61 web diagonals and the MAX configuration utilizes braced (at mid-length) 173U118-106 web diagonals and a P-106 shield plate at the web-to-top chord connections. See Figures 2, 3, 4, and 5 for depiction of trusses and connection details.

3.3 Bolts:

Bolts must have: a nominal diameter of $^3/_8$ inch; a length of $^5/_8$ inch; a minimum tensile strength (F_u) of 120 ksi (827 Mpa); and comply with ASTM A449.

3.4 Truss Chord Splice:

A typical top or bottom truss chord splice is made with three 172U97-106 chord splice members, see Table 1 and Figure 5. The splice is assembled with 20 – $^3/_8$-inch-diameter ASTM A449 bolts and the splice length is 20 inches (508 mm). Refer to the TWIN Assembly Manual for field details.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The tabulated values in this report are based on the allowable strength design (ASD).

Truss span tables are provided in Table 3. Table 3 is based on uniformly loaded simple spans. The registered design professional must also consider concentrated loads and deflections limits required by Chapter 16 of the IBC.

4.2 Installation:

Installation must comply with the project specific drawings.

5.0 CONDITIONS OF USE:

The components 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 Installation must comply with the approved plans and the applicable code.

5.2 For each project, complete plans and calculations verifying compliance with this report must be submitted to the code official for approval. These calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 Uncoated minimum steel thickness of cold-formed members, as delivered to the jobsite, must be at least 95 percent of the uncoated design thickness indicated in Table 1, as applicable.

5.4 The design, quality assurance, and installation, and testing of the trusses must comply with AISI S214 under the 2015 and 2012 IBC and be under the directive of the report holder, and are subject to approval by the code official.

5.5 The truss components are manufactured by the report holder in Rio de Janeiro, Brazil.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members (AC46), Approved October 2019.

7.0 IDENTIFICATION

7.1 Each component pallet delivered to the job site is identified with the report holder's name, the minimum base steel thickness (uncoated), the minimum specified yield strength, the coating grade, the member designation, and the evaluation report number (ESR-3897).

7.2 The report holder's contact information is the following:

MARKO SISTEMAS METALICOS DE CONSTRUCAO
AV. MARECHAL HENRIQUE LOTT, 163,
BL. 2 SALA 303 - BARRA DE TIJUCA
RIO DE JANEIRO 22631-370
BRAZIL
+55-21-3282-0400
http://www.marko.com.br

TABLE 1—TRUSS COMPONENT PROPERTIES

Member Designations	Truss Components	Design Base-Metal Thickness[1] (in.)		Height (in.)	Width (in.)	Weight (plf)
		inch	mm			
173U118-61	Web Diagonal	0.061	1.55	1.18	1.73	0.83
173U118-106	Web Diagonal	0.106	2.70	1.18	1.73	1.45
130L130-61	Lateral/ Transverse Bracing	0.061	1.55	1.30	1.30	0.53
676W236-61	Top/Bottom Chord	0.061	1.55	2.36	6.76	2.99
172U97-106	Chord Splice	0.106	2.70	0.970	1.72	1.21
P-106	Shield Plate	0.106	2.70	-	-	-

For **SI:** 1 inch = 25.4 mm; 1 plf = 14.6 N/m

[1]Minimum uncoated base-metal thickness of the cold-formed steel members as delivered to the jobsite must be at least 95 percent of the design base-metal thickness.

TABLE 2—TRUSS PROPERTIES

ROLL-ON TRUSS SYSTEM[1]	DEPTH FROM TOP OF TOP CHORD TO BOTTOM OF BOTTOM CHORD		TRUSS SPACING ON CENTER		WEIGHT OF SINGLE TRUSS	WEIGHT OF ASSEMBLED BRACING
	inch	mm	inch	mm	plf	plf
TW36 (MIN)	33.78	858	36	914	7.35	8.18
TW36 (MAX)	33.78	858	36	914	8.37	9.20
TW48 (MIN)	44.88	1140	36	914	7.70	8.52
TW48 (MAX)	44.88	1140	36	914	8.97	9.80
TW60 (MIN)	57.87	1470	36	914	8.66	9.49
TW60 (MAX)	57.87	1470	36	914	9.69	10.52

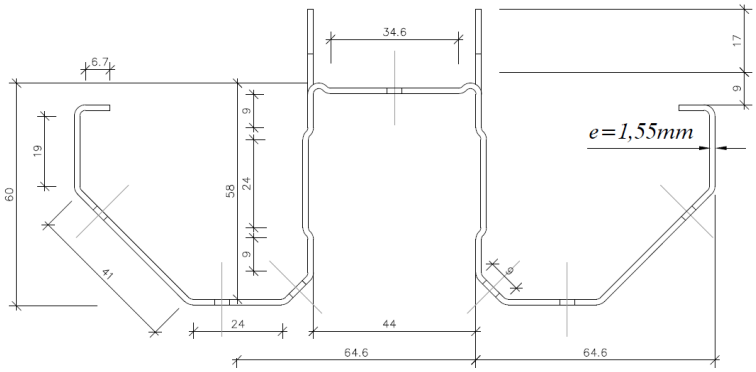
For **SI:** 1 inch = 25.4 mm; 1 plf = 14.6 N/m

[1]The MIN configuration utilizes unbraced 173U118-61 web diagonals and the MAX configuration utilizes a braced 173U118-106 web diagonal and a P-106 shield plate at the web-to-top chord connections.

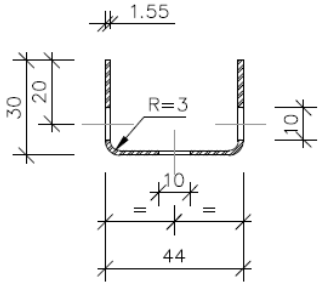
TABLE 3—TRUSS LOAD/ SIMPLE SPAN TABLE BASED ON STRENGTH[1,2,3,4,5,6] (ASD)

Span (ft)	36TW		48TW		60TW	
	MIN	MAX	MIN	MAX	MIN	MAX
	Maximum gravity or uplift strength (lbs/ft)					
30	117	213	101	232	92	242
32	110	200	95	218	86	227
34	104	188	89	205	-	214
36	98	178	84	193	-	202
38	93	168	-	183	-	191
40	88	160	-	174	-	182
42	84	152	-	166	-	173
44	-	145	-	158	-	165
46	-	139	-	151	-	158
48	-	133	-	145	-	151
50	-	128	-	139	-	145
52	-	123	-	134	-	140
54	-	119	-	129	-	134
56	-	114	-	124	-	130
58	-	108	-	120	-	125
60	-	100	-	116	-	121
62	-	94	-	112	-	117
64	-	88	-	109	-	113
66	-	83	-	105	-	110
68	-	-	-	102	-	107
70	-	-	-	98	-	104
72	-	-	-	93	-	101
74	-	-	-	88	-	98
76	-	-	-	83	-	96
78	-	-	-	-	-	93
80	-	-	-	-	-	91
82	-	-	-	-	-	89
84	-	-	-	-	-	86
86	-	-	-	-	-	84

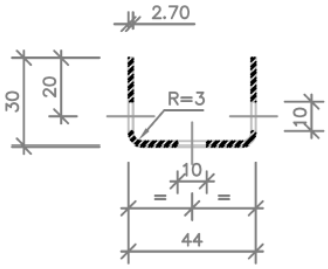
[1] Tabulated values assume uniform loads with an ASD load combination of 1.0 D + 1.0 (L or Lr or S or R).
[2] Spans in the table assume all trusses are simply supported with a bearing location on the bottom chord at the vertex of web diagonals.
[3] Tabulated values do not consider the capacity of the top chord at the supports which must be determined by the registered design professional.
[4] Other loads required by the IBC must be considered.
[5] Tabulated values assume a deflection limit of span/240 for 1.0 D + 1.0 (L or Lr or S or R).
[6] Truss bearing support design is the responsibility of the registered design professional.



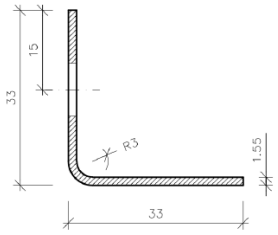
CHORD



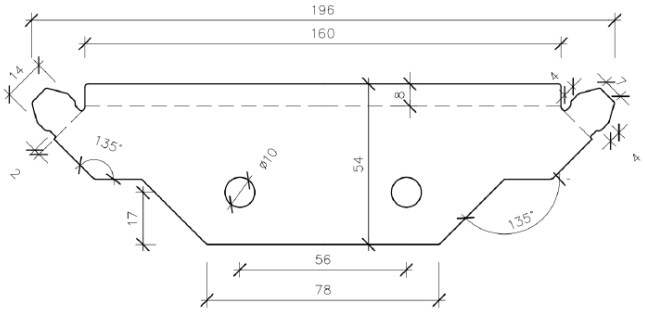
1.55 mm (0.061 in.) WEB DIAGONAL

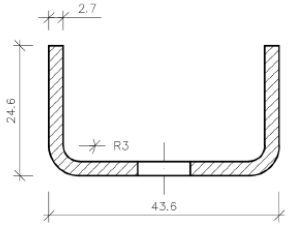


2.70 mm (0.106 in.) WEB DIAGONAL

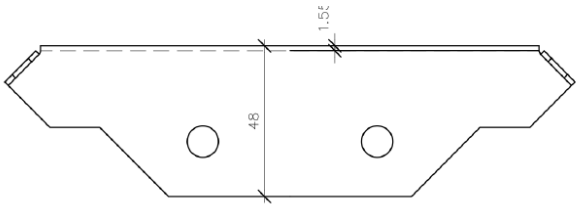


Lateral or Transverse Bracing





SPLICE PLATE



SHIELD PLATE

FIGURE 1—MEMBERS (dimensions shown are in mm)

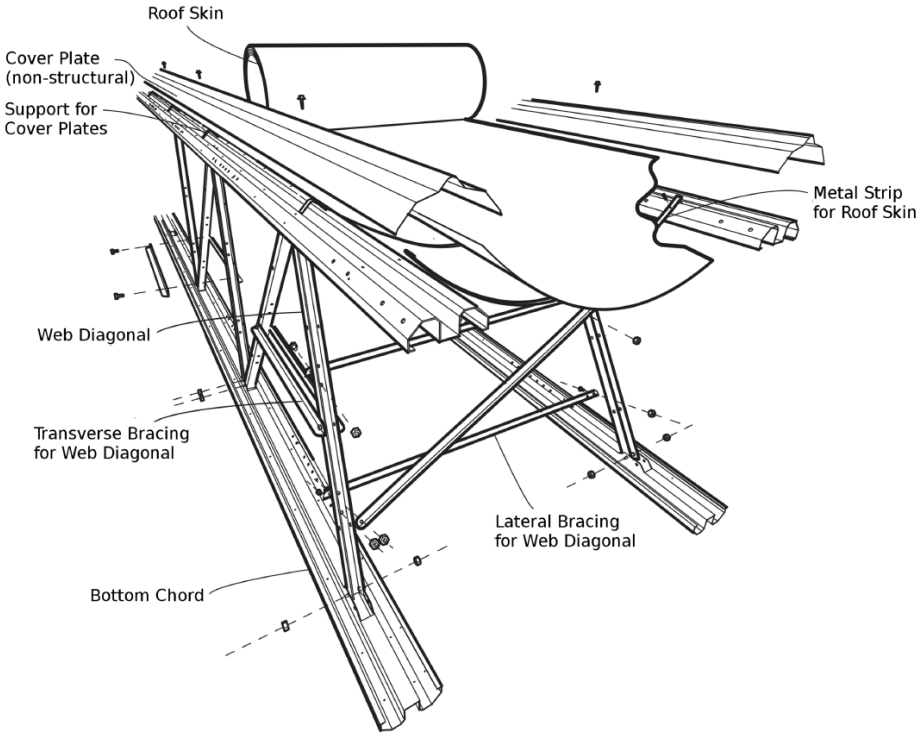


FIGURE 2—ISOMETRIC VIEW OF TRUSS MEMBERS
(The roof skin, metal strip for roof skin, support for cover plates, and cover plate are outside the scope of this report.)

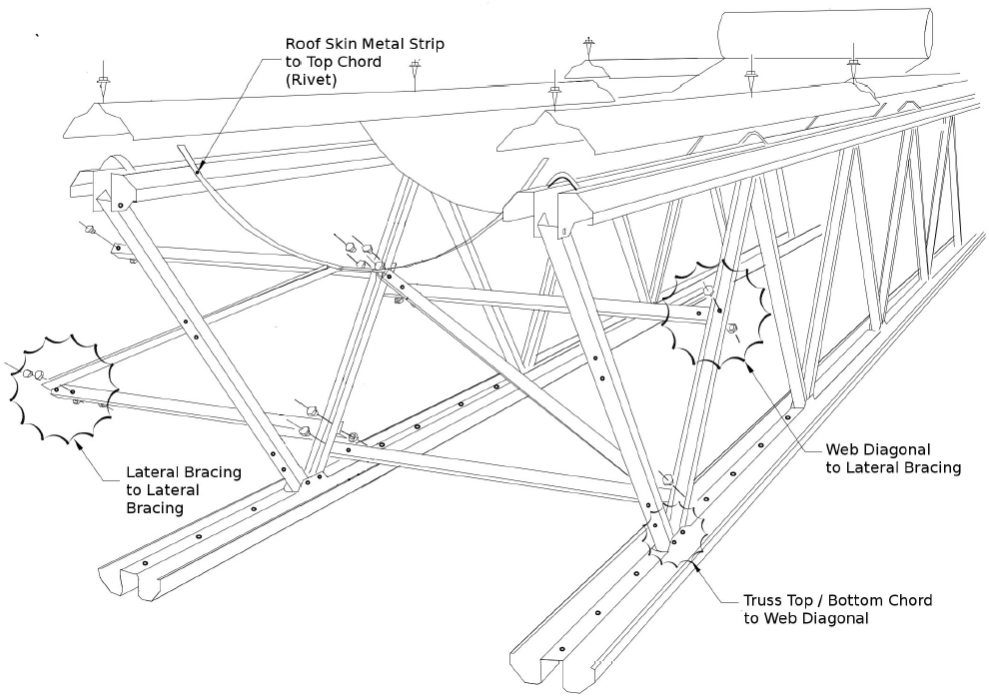


FIGURE 3—ISOMETRIC VIEW OF TRUSS CONNECTIONS
(The roof skin, metal strip for roof skin, support for cover plates, and cover plate are outside the scope of this report.)

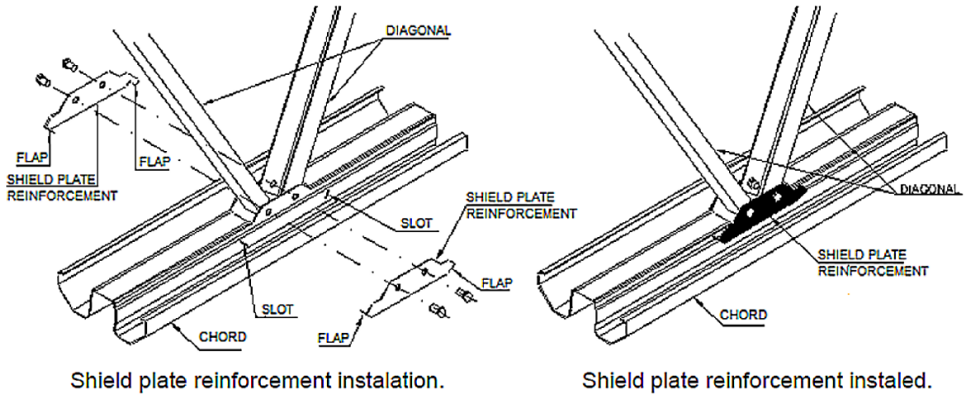


FIGURE 4—REINFORCED CHORD TO WEB DIAGONAL CONNECTION

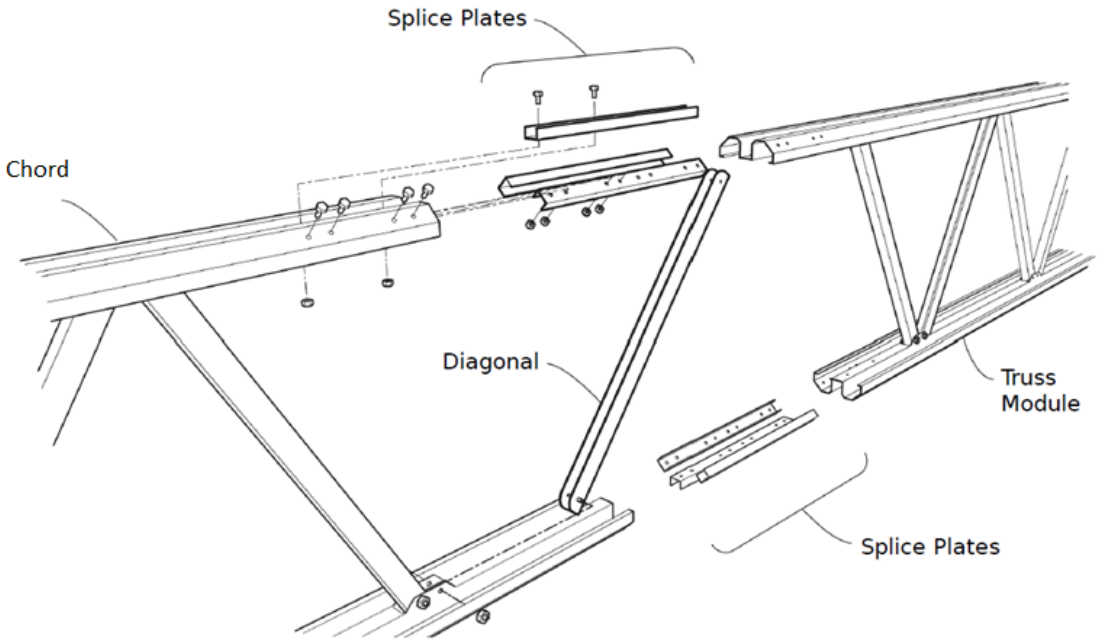


FIGURE 5—CHORD SPLICE CONNECTION