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## Legacy report on the 1997 *Uniform Building Code*™

**DIVISION: 06—WOOD AND PLASTICS**  
**Section: 06170—Prefabricated Structural Wood**

### SPACEJOIST WEBS

**TRUSWAL SYSTEMS CORPORATION**  
**1101 NORTH GREAT SOUTHWEST PARKWAY**  
**ARLINGTON, TEXAS 76011**

#### 1.0 SUBJECT

SpaceJoist Webs.

#### 2.0 DESCRIPTION

##### 2.1 General:

SpaceJoists are parallel chord trusses constructed with 2-inch by 3-inch or 4-inch (51, 76 or 102 mm) Douglas fir-larch, southern pine, hem-fir, or spruce-pine-fir chords positioned flat or on edge as shown in Figures 1, 2 and 3. The webs are installed in pairs, are V-shaped sections with a 24-inch or 28-inch (610 mm or 711 mm) truss panel length and are cold formed from ASTM A 653 Grade 37 structural quality galvanized steel sheet with teeth formed integrally.

##### 2.2 Installation:

The various SpaceJoist truss end conditions are indicated in Figures 4 and 6. A minimum bearing width equal to the width of the chord must be maintained and the compression stress perpendicular to grain must not exceed that allowed for the species and grade of material used. The top flange must be laterally supported at least every 24 inches (610 mm). The ends of the joists must be restrained to prevent rollover. This is normally provided by a diaphragm sheathing attached to the top flange and to an end wall or a shear transfer panel capable of transferring a minimum force of 50 pounds per foot (725 N/m). Blocking or X-bracing with equivalent strength may be used.

##### 2.3 Truss Fabrication:

The trusses must be produced by manufacturers having inspections by an approved agency as required by Section 2321 of the 1997 *Uniform Building Code*™ (UBC).

All truss plates are the R-5000, RN-5000 or Model 20 as indicated in the ICBO ES evaluation report ER-1607. An opening at midspan is permitted as indicated in Figures 5 and 7, which is compatible with the 24-inch or 28-inch (610 or 711 mm) panel lengths. The webs are installed in pairs on opposite faces of the chord members and the contact area must be clear of knots. The fabrication tolerances and chord splice locations are as indicated in Figures 2 and 3. Each

chord may have one splice joint located within the middle half of the respective panel. The minimum connector plate centered over the splice joint must be a 2.5-inch-by-6-inch (63 mm by 152 mm) Model 20. The required connector plate size must be specified on an engineered truss drawing.

##### 2.4 Truss Design:

The top and bottom truss chords are designed as continuous members subject to combined axial and bending stresses. Deflections are limited as set forth in Section 1608 of the UBC using beam formulas and considering the full areas of the top and bottom chords and the modulus of elasticity assigned to the lumber used, except for the SJ12V20. Deflection details in accordance with Figure 9 may be used for the SJ12V20 joist. The allowable lumber stresses are in accordance with Section 2316 of the UBC with increases permitted for duration of loading as indicated. Allowable loads for web members are as indicated in Tables 1 and 2. One-hour fire-resistive construction is based on ICBO ES evaluation reports ER-1352, ER-1632 and ER-1607 for 10<sup>3</sup>/<sub>4</sub>-inch or greater depth trusses.

##### 2.5 Identification:

The webs are identified by a stamping of the letter "T" superimposed on the letter "W." The trusses are identified by a stamp indicating the evaluation report number, the truss manufacturer's name and the name of the quality control inspection agency. See Figure 10 for additional details.

#### 3.0 EVIDENCE SUBMITTED

Load tests, truss details and calculations are submitted.

#### 4.0 FINDINGS

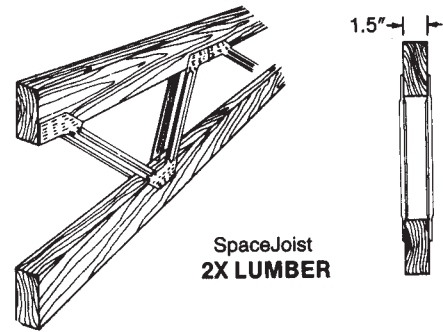
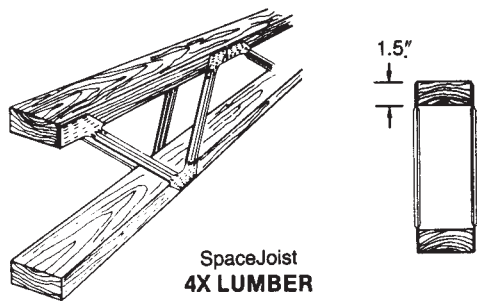
**That the SpaceJoist as described in this report is an alternate method of construction to that specified in the 1997 *Uniform Building Code*™ (UBC), subject to the following conditions:**

- 4.1 The fabrication and design are as set forth in this report.**
- 4.2 Where a one-hour fire-resistive rating is required, see ICBO ES evaluation reports ER-1352, ER-1632 and ER-1607.**
- 4.3 The allowable loads are allowed only when plans, truss designs and calculations are submitted and accepted by the building official showing compliance with the UBC and specifying that fabrication inspection will be provided in accordance with Section 2321 of the UBC.**

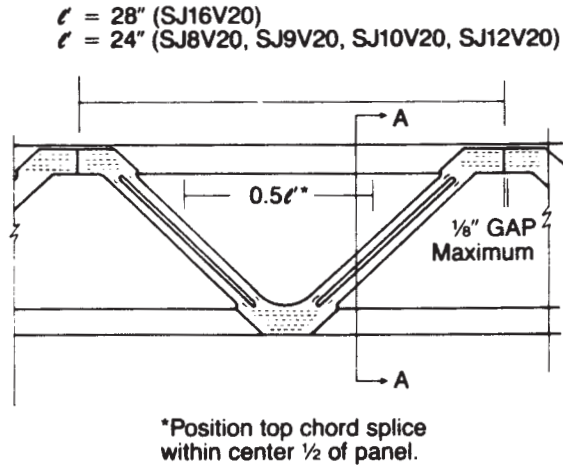
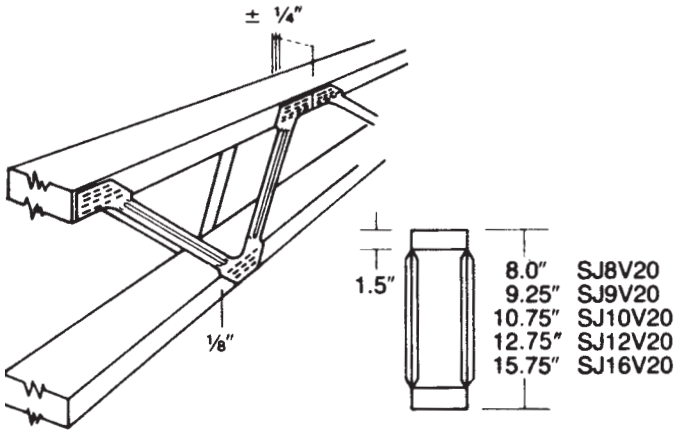
**This report is subject to re-examination in two years.**

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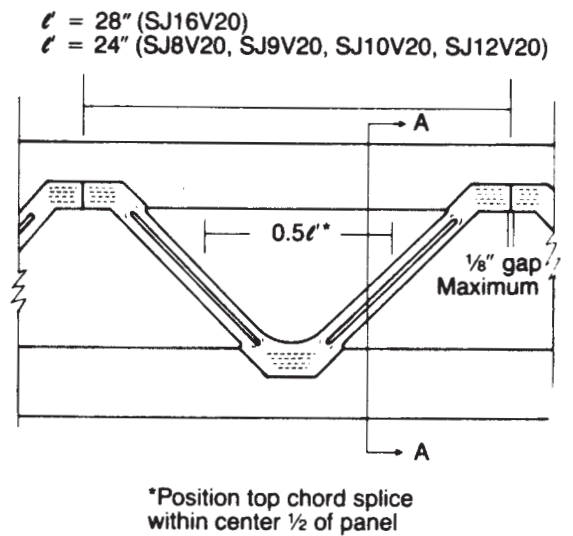
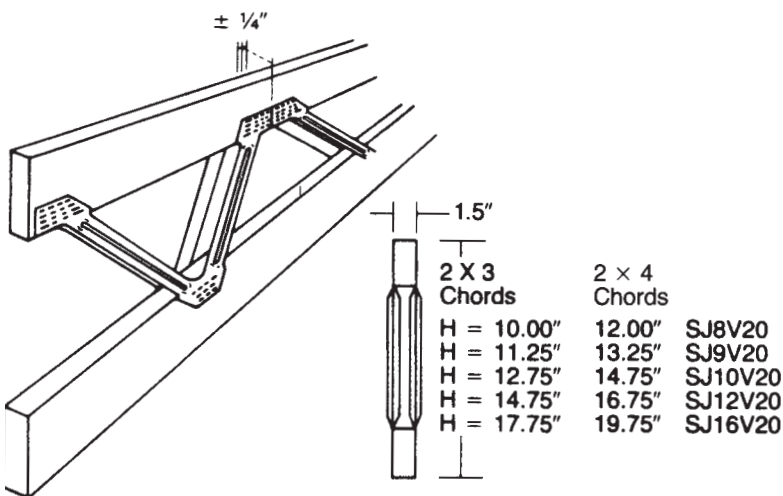


**FIGURE 1**  
For SI: 1 inch = 25.4 mm.

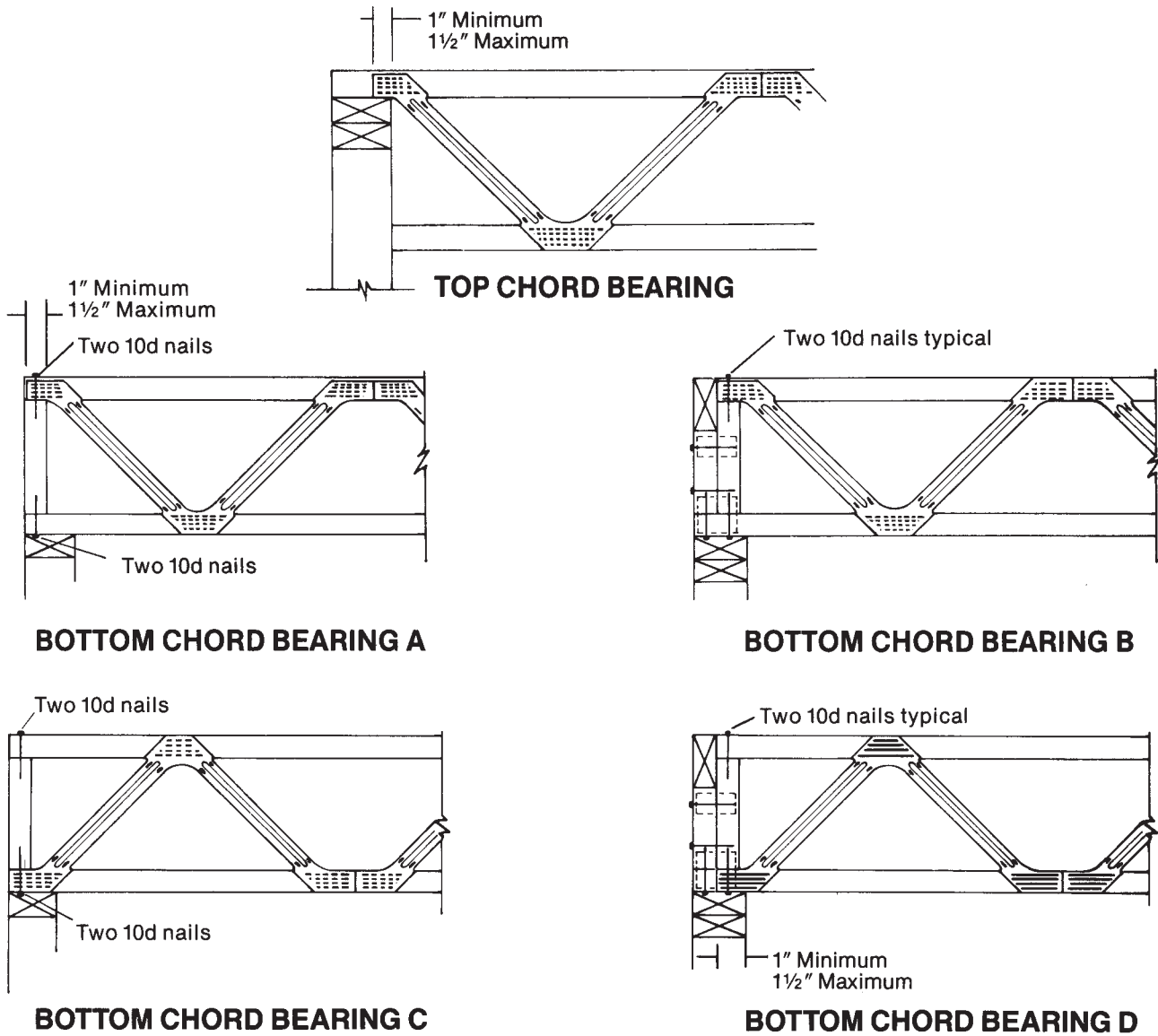


**4X LUMBER**

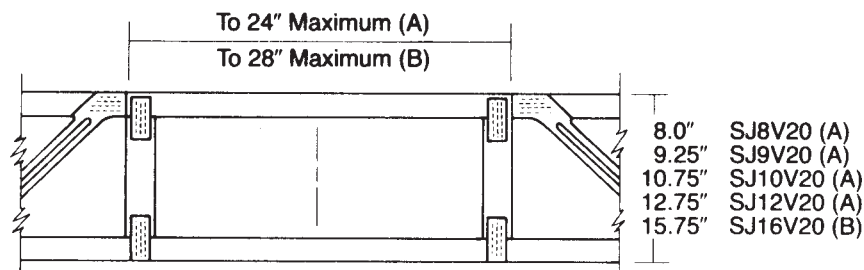
**FIGURE 2**  
For SI: 1 inch = 25.4 mm.



**FIGURE 3**  
For SI: 1 inch = 25.4 mm.



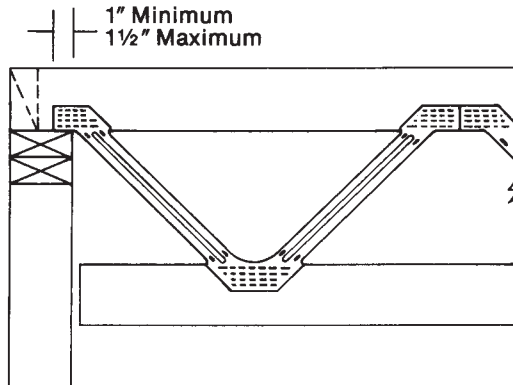
**FIGURE 4**  
For SI: 1 inch = 25.4 mm.



1.5-3 (See ICBO ES evaluation report ER-1607, Model 20)

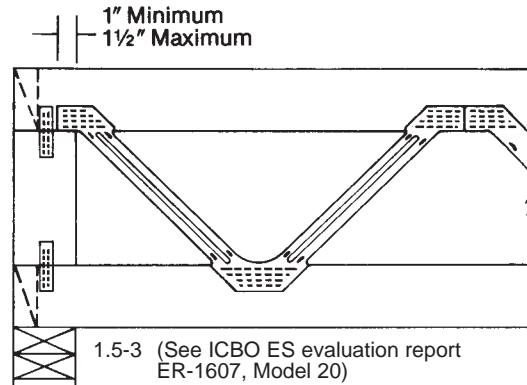
An opening at midspan is permitted so that the 28-inch or 24-inch length, when starting from each end of the span, may be accommodated. As the truss span reduces and this opening reduces to zero inches or less, the SpaceJoist web closest to the center of the span is omitted, and the opening is again defined by the addition of 2 x 4 verticals and connector plates. The center of this opening is never more than 14 inches or 12 inches off the center of the span and the width of the opening is never more than 28 inches or 24 inches, respectively.

**FIGURE 5**  
For SI: 1 inch = 25.4 mm.



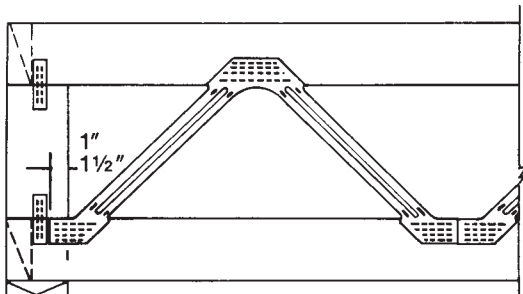
**TOP CHORD BEARING A**

2x Solid blocking where shown



**BOTTOM CHORD BEARING A**

2x Solid blocking where shown



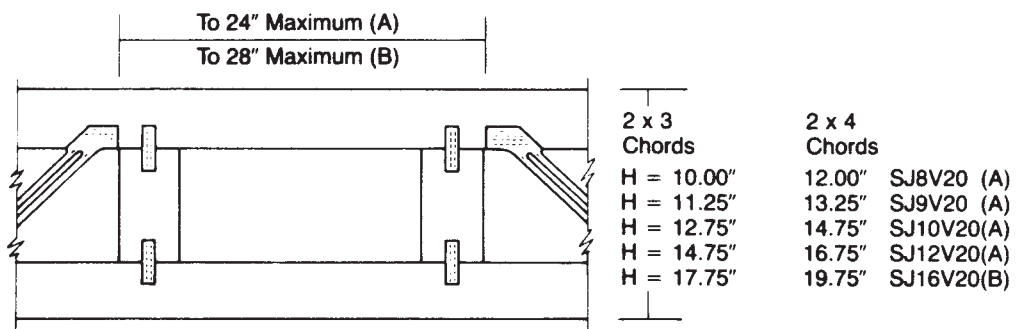
**BOTTOM CHORD BEARING B**

2x Solid blocking where shown

Solid blocking or other shear-resistive construction capable of resisting 50-pounds-per-foot minimum is required at all bearing walls to prevent trusses from rolling over. This does not consider other shear requirements which may have to be transferred through the same shear-resisting element.

**FIGURE 6**

For SI: 1 inch = 25.4 mm.



1.5-3 (See ICBO ES evaluation report ER-1607, Model 20)

(OPENINGS)  
2x LUMBER

**FIGURE 7**

For SI: 1 inch = 25.4 mm.

## Supplementary Nailing for additional strength in webs

See Table 1

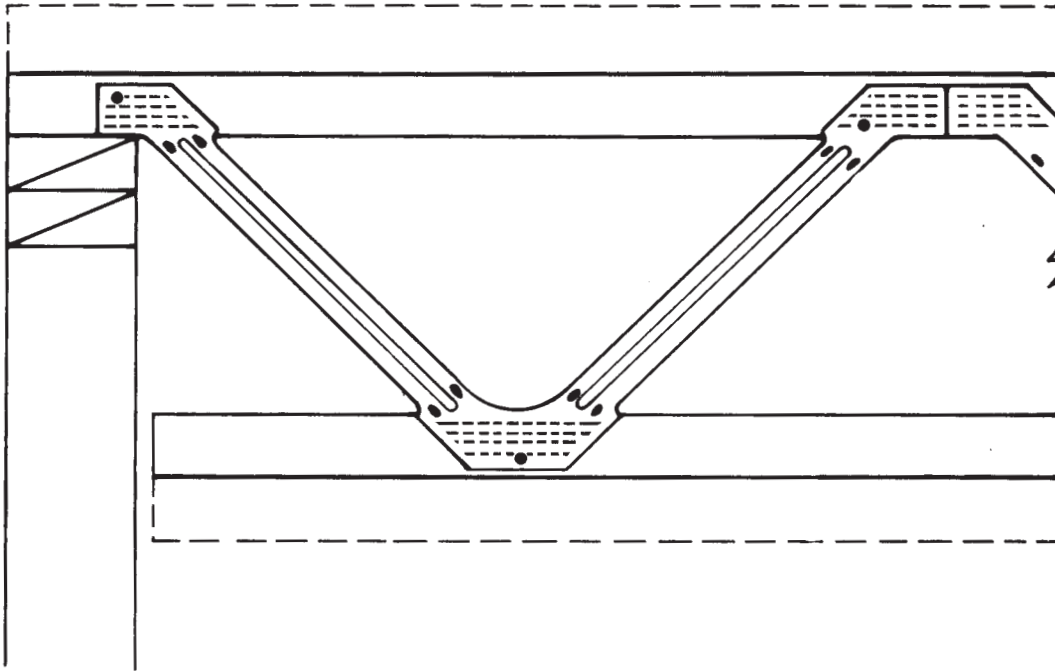


FIGURE 8

TABLE 1—ALLOWABLE LOADS IN POUNDS FOR A PAIR OF SPACE JOIST NO. 20 GAGE STEEL WEBS<sup>1,2,3</sup>

STRUTS	TYPE OF LOAD <sup>4</sup>	CHORD MATERIAL	
		DOUGLAS FIR/SOUTHERN PINE	1650f MSR H.F./S.P.F.
SJ8 V20 SJ9 V20 SJ10V20	Tension with nails	1,000	900
	Tension without nails	870	790
	Compression with nails	910	845
	Compression without nails	725	660
SJ16V20	Tension with nails	1,190	1,070
	Tension without nails	1,070	970
	Compression with nails	980	980
	Compression without nails	900	810

For **SI**: 1 lbf = 4.44822 N, 1 inch = 25.4 mm.

<sup>1</sup>The allowable loads are vertical shear values or the vertical component of the web stress.

<sup>2</sup>The allowable loads may not be increased for duration of loads.

<sup>3</sup>The allowable load is based on total load (LL + DL) and the dead load may not exceed 75 percent of the live load.

<sup>4</sup>The nails are 1½-inch-long 8d common nails installed as indicated in Figure 8.

TABLE 2—ALLOWABLE AXIAL FORCE IN POUNDS FOR A PAIR OF SJ12V20 STEEL WEBS<sup>1,2</sup>

STRUTS	TYPE OF LOAD	CHORD MATERIAL	
		DOUGLAS FIR/SOUTHERN PINE	1650f MSR H.F./S.P.F.
SJ12V20	Tension with nails <sup>3</sup>	1,400	1,235
	Tension without nails	1,470	1,395
	Compression with nails	1,415	1,125
	Compression without nails <sup>4</sup>	2,315	2,255

For **SI**: 1 lbf = 4.44822 N, 1 inch = 25.4 mm.

<sup>1</sup>The allowable loads may not be increased for duration of loads.

<sup>2</sup>The allowable load is based on total load (LL + DL) and the dead load may not exceed 75 percent of the live load.

<sup>3</sup>The nails are 1½-inch-long 8d common nails installed as indicated in Figure 8.

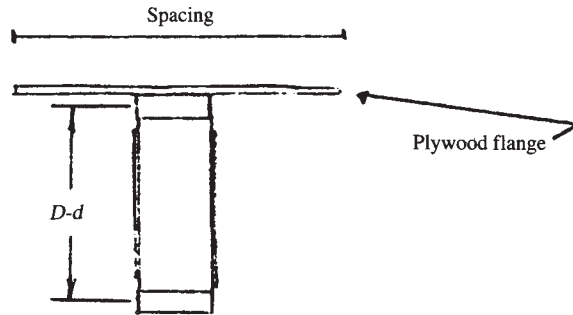
<sup>4</sup>A total of four webs, two on each side, is required.

**MIDSPAN DEFLECTION EQUATION**

$$\Delta = \frac{5wl^4}{384EI} + \frac{72.9 \times 10^{-6}wl^2}{(D - d)(8)}$$

For SI: 
$$\Delta = \frac{5wl^4}{384EI} + \frac{4.11 \times 10^{-5}wl^2}{(D - d)(8)}$$

- $\Delta$  = deflection (inches) (mm).
- $w$  = loading (pli) (N/m).
- $l$  = clear span (inches) (mm).
- $E$  = modulus of elasticity (psi) (Pa).
- $D$  = overall depth of truss (inches) (mm).
- $d$  = depth of top or bottom chord (inches) (mm).
- $I$  = moment of inertia of transformed T-section (inches<sup>4</sup>) (mm<sup>4</sup>).




**Transformed T-section**

$I$  is to be calculated by using a reduced width of the plywood.

The reduction factor is equal to  $\frac{0.7 \times 10^6}{E \text{ of chord lumber}}$  For SI:  $\frac{4.82 \times 10^6 \text{ kPa}}{E \text{ of chord lumber}}$

e.g., (spacing)  $\times \frac{0.7 \times 10^6}{E \text{ of chord lumber}}$  For SI:  $\frac{4.82 \times 10^6 \text{ kPa}}{E \text{ of chord lumber}}$ ; equals the reduced width of the plywood.

**FIGURE 9—DEFLECTION DETAILS FOR THE SJ12V20 JOIST**

	(Name, location and evaluation report number of truss fabricator)	Name of Inspection Agency <sup>①</sup>  CONFORMS TO <b>TPI QST-85</b>
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① May be any quality control agency accredited by ICBO Evaluation Service, Inc.

**FIGURE 10—TYPICAL TRUSS IDENTIFICATION STAMP OR LABEL**