

TJI® Joist Reactions, Web Stiffeners Requirements & Forte®WEB Software Analysis

The need for and the correct use of web stiffeners with TJI® joists is a common question. When properly installed, web stiffeners increase joist reaction capacity by diverting a portion of the reaction load away from the web-flange joint and into the bottom flange. This is accomplished via the direct contact between the bottom of the web stiffener and the top of the bottom flange. Additionally, web stiffeners may be installed to help prevent web buckling and provide additional lateral stability in certain hanger configurations. Increased reaction capacities can be found in [International Code Council® ES Evaluation Report ESR-1153](#), Table 3 (excerpt below).

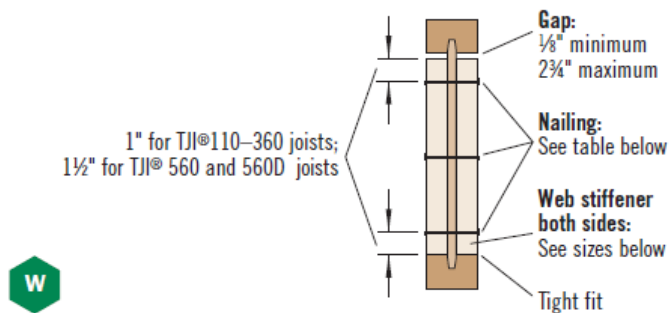
TABLE 3—REFERENCE DESIGN VALUES FOR TJI JOISTS^{1,2,3}

Joist Depth (in.)	Joist Weight ⁽⁸⁾ (plf)	Moment M_R (ft.-lbs.) ^(10, 12)	Shear V_R (lbs.)	EI x 10 ⁶ (bs.-in. ²)	K	REFERENCE DESIGN VALUES										
						END REACTION $R_{R,e}$ (lbs.) ^{4,5,6}					INTERMEDIATE REACTION $R_{R,i}$ (lbs.) ^{4,5,6}					
						1 3/4" ⁽⁹⁾		3 1/2"			3 1/2" ⁽⁷⁾		5 1/4" ⁽⁷⁾			Nails Req'd for Web Stiff.
						Bearing Length		Bearing Length			Bearing Length		Bearing Length			
Web Stiffeners		Web Stiffeners			Web Stiffeners		Web Stiffeners			Nails Req'd for Web Stiff.						
NO YES		NO YES			NO YES		NO YES									
TJI 110																
9 1/2	2.3	2500	1220	157	4.5	910	NA	1220	NA	NA	1935	NA	2350	NA	NA	
11 7/8	2.5	3160	1560	267	4.5	910	1225	1375	1560	3-8d	1935	2295	2350	2705	3-8d	
14	2.8	3740	1860	392	4.5	910	1225	1375	1735	3-8d	1935	2295	2350	2705	3-8d	

The increased allowable reaction of a TJI® joist with web stiffeners assumes (3) nails as shown in detail “W” (figure to right). In some cases, higher allowable reactions can be achieved using more nails. Contact your local Trus Joist representative for assistance with higher reaction capacity needs.

Web stiffeners can be OSB, plywood or 2x_ material, depending on the thickness needed to flush the web stiffener to the edge of the TJI® flange. The “W” detail calls for a gap between the top of the web stiffener and the underside of the top flange. If a gap is not created and the web stiffener is installed tight against the top and bottom flanges, it may cause damage to the web-to-flange joint during installation or when the joist begins to deflect.

Due to the gap, the web stiffener does not function as a method to transfer vertical load from above “around” the joist. For applications where greater vertical load transfer is needed, rim board, squash blocks and blocking panels are acceptable methods to transfer load from above, around the joist, to the bearing below.



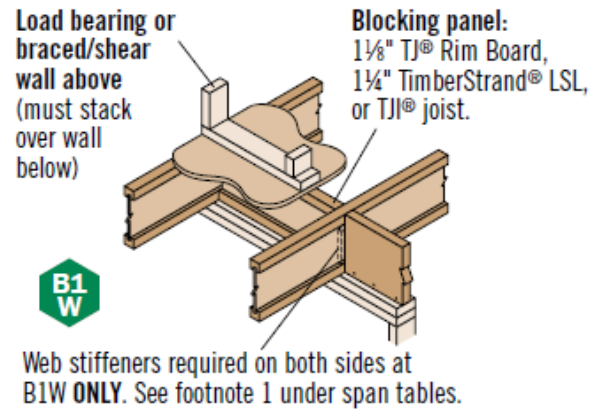
Web Stiffener Requirements

TJI®	Depth (in.)	Minimum Web Stiffener Size	Nail Type	# of Nails	
				End	Int.
110	All	5/8" x 2 5/16" ⁽¹⁾	8d (0.113" x 2 1/2")	3	3
210	All	3/4" x 2 5/16" ⁽¹⁾		3	3
230, 360	All	7/8" x 2 5/16" ⁽¹⁾		3	3
560	All	2x4 ⁽²⁾	16d (0.135" x 3 1/2")	3	3
560D	18"	2x4 ⁽²⁾	16d (0.135" x 3 1/2")	4	4
	20"			5	5
	22" ⁽³⁾			6	11
	24" ⁽³⁾			6	13

- (1) PS1 or PS2 sheathing, face grain vertical
- (2) Construction grade or better
- (3) Web stiffeners are always required for 22" and 24" TJI® 560D joists.

When Are Web Stiffeners Required?

The majority of TJI® framed floors, with standard floor loading of 40 PSF Live Load and 10 PSF Dead Load, do not generally exceed the allowable reaction of a TJI® joist without web stiffeners. However, scenarios with high member reactions, such as long spans with concrete topping or high live loads found in commercial or public space applications, may require web stiffeners. Weyerhaeuser literature and software can be used to help designers and builders determine if web stiffeners are required. When referring to our standard details or placement plans, you may see a “W” added to the end of the detail callout (i.e. “B1W” detail, shown to the right). When found on a placement plan, it signifies that web stiffeners are required at that location as part of the detail. The “W” is triggered automatically in Weyerhaeuser software when the allowable joist reaction (without web stiffeners) is exceeded.



A list of proper applications and requirements for web stiffeners can be found in the [TJI® 110, 210, 230, 360, and 560 Specifiers Guide](#) or the [Trus Joist® Framers Pocket Guide](#). These requirements are as follows:

- A TJI® joist reaction exceeds the “no web stiffener” published design value found in ICC-ES ESR-1153 (The detail callout will be followed by a “W”).
- An intermediate bearing length is less than 5-1/4" and the span on either side of the bearing exceeds a given length. See footnote 1 below the TJI® joist span tables in TJ-4000 for more information.
- Where sides of the supporting hanger do not extend to laterally support at least 3/8" of the TJI joist top flange. When using TJI® web stiffeners, hanger must be a minimum of 60% of the joist height.
- Low end birdsmouth cuts in roof joist applications.
- When required by hanger manufacturer for sloped hangers.
- At all bearings for 22" and 24" deep TJI® 560D joists.

TJI® Joist Reactions and Web Stiffeners in Forte®WEB Software

Forte®WEB, Weyerhaeuser’s single member sizing software, analyzes a joist’s reaction based on the allowable reaction capacity and the available bearing length input by the user. Forte®WEB will apply web stiffeners if any of the above-mentioned scenarios occur in the member you are sizing.

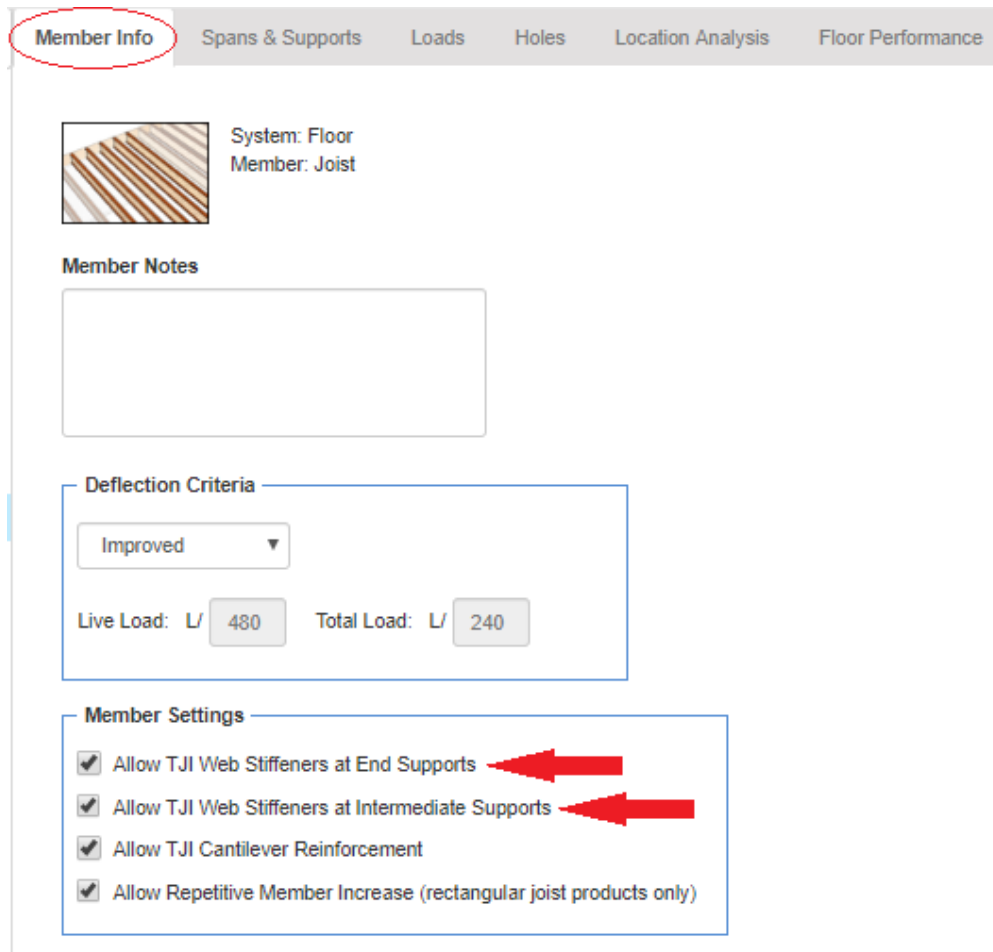
When looking at the final member report, if web stiffeners are required, they will be shown on the graphic at the top of the calculation and in the “Supports” summary box under “Accessories”. If web stiffeners are required at a hanger, the Connector box will include it as an accessory.



Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" PSL beam	3.50"	Hanger ¹	3.06" / 1.75" ²	242	1208	1450	See note ¹
2 - Stud wall - SPF	3.50"	2.25"	1.75"	238	1192	1430	1 1/4" Rim Board, Web Stiffeners

How to Turn on Web Stiffeners in Forte®WEB

To allow Forte®WEB to consider a TJI® joist with web stiffeners, the “Allow TJI Web Stiffeners” setting must be turned to ON in the Member Info page. In the Job Tree, select a Floor Joist member. Once selected, the Member Settings box will appear near the top of the browser window. Click on the box for “Allow TJI Web Stiffeners at End Supports” and “Allow TJI Web Stiffeners at Intermediate Supports”. Finally, click “Save as Default” to ensure web stiffener settings are saved for future calculations.



The screenshot shows the ForteWEB software interface. At the top, there is a navigation bar with tabs: Member Info (circled in red), Spans & Supports, Loads, Holes, Location Analysis, and Floor Performance. Below the navigation bar, there is a section for the selected member, showing a thumbnail image of a joist and the text "System: Floor" and "Member: Joist". Below this is a "Member Notes" section with an empty text box. The "Deflection Criteria" section is highlighted with a blue border and contains a dropdown menu set to "Improved", and input fields for "Live Load: L/ 480" and "Total Load: L/ 240". The "Member Settings" section is also highlighted with a blue border and contains four checked checkboxes: "Allow TJI Web Stiffeners at End Supports", "Allow TJI Web Stiffeners at Intermediate Supports", "Allow TJI Cantilever Reinforcement", and "Allow Repetitive Member Increase (rectangular joist products only)". Red arrows point to the first two checkboxes.

In summary, web stiffeners are not a means for vertical load transfer around a TJI® joist, but rather increase the allowable reaction of a TJI® joist or provide lateral stability. Please review your structural details pages and/or the construction or placement plans to ensure that end bearing details reflect the proper use of web stiffeners. Refer to [TJI® 110, 210, 230, 360, and 560 Specifiers Guide](#) (TJ-4000) or the [Trus Joist® Framer’s Pocket Guide](#) for installation details.