

Repair Detail for a Hole in a TJI® Joist

This technical bulletin provides repair details for hole shear reinforcement of a TJI® joist for use in applications that extend beyond the limitations of Weyerhaeuser literature and design software. Repair values listed in the tables are based on testing performed by Weyerhaeuser.

Overview

The following design provisions apply to 11 $\frac{7}{8}$ " to 16" deep, TJI® 110, 210, 230, 360, and 560 joists. The reinforcement is restricted to the maximum hole sizes listed in Tables 1 through 4 for TJI® joists that fail due to hole shear capacity only when designed in [ForteWEB®](#) software. These tables outline the allowable hole shear for various reinforcement configurations that allow the hole to remain in place or be covered by the reinforcement.

How to Select Reinforcement

1. Use [ForteWEB®](#) to analyze the TJI® joist based on the loading and hole configuration under investigation.
2. If the member fails due to hole shear capacity only, obtain the "actual" shear from the report (Figure 1)

Holes (Size)	Width	Height	Vertical Offset	Location	Shear (lbs)			Comments
					Actual	Allowed	Result	
1 - Rectangular (L)	14.00"	8.88"	5 15/16"	5'	293	205	Failed (143%)	

Figure 1: Excerpt from [ForteWEB®](#) hole calculation (U.S., Allowable Stress Design)

3. From Tables 1-4, find the hole size that is greater than or equal to the failing hole. Scan across to find an allowable hole shear the meets or exceeds the actual shear from [ForteWEB®](#).

Metal or wood repairs cannot restore a TJI® joist to its published code-evaluated allowable shear design values. Repairs are limited to the specific design load and application under investigation. Changes in loading conditions over time (e.g., remodel) may invalidate the repair.

U.S. Allowable Stress Design Reinforcement Values



For information on how to construct repairs, see Details A through E starting on page 4.

TABLE 1: U.S. MAXIMUM ALLOWABLE RECTANGULAR HOLE SHEAR (ALLOWABLE STRESS DESIGN)^[1]

TJI®	Depth	Maximum Rectangular Hole (in. x in.)	Horizontal Split-Hole Remains					Full Depth-Hole Covered	Web Filler-Hole Covered
			1 1/4" 1.3E TimberStrand® LSL		1 1/8" TJ® Rim Board			23/32 OSB	
			One Side		One Side		Two Sides	One Side	Two Sides
			Detail A (Nail) (lb)	Detail B (Epoxy) (lb)	Detail A (Nail) (lb)	Detail B (Epoxy) (lb)	Detail B-Alt (Epoxy) (lb)	Detail C (Nail) (lb)	Detail E (Nail) (lb)
110, 210, 230, 360, 560	11 7/8"	8 7/8 x 14	385	515	340	400	540	495	630
	14"	11 x 14	385	515	340	400	540	495	630
	16"	13 x 14	385	515	340	400	540	495	630
		13 x 18	385	430	295	360	540	495	630

[1] Values may be increased for load duration.

TABLE 2: U.S. MAXIMUM ALLOWABLE CIRCULAR HOLE SHEAR (ALLOWABLE STRESS DESIGN)^[1]

TJI®	Depth	Maximum Diameter Circular Hole (in.)	Horizontal Split-Hole Remains	Web Filler-Hole Covered
			23/32 OSB	
			One Side	Two Sides
			Detail D (Nail) (lb)	Detail E (Nail) (lb)
110, 210, 230, 360, 560	11 7/8"	8 7/8	480	820
	14"	11	480	820
	16"	13	480	820

[1] Values may be increased for load duration.

Conditions and Limitations

- One (1) repaired hole per span.
- Uniformly distributed loads only.
- Original, undamaged TJI® joist is properly designed.
- Attaching additional nailed reinforcement that engages both sides TJI® joist flange is not permitted and may cause further damage.
- The repairs have not been evaluated for situations where any part of the reinforcement is positioned over a bearing support.

For Epoxy Reinforcement (Detail B and B-Alt)

- West System® Six10® Thickened Epoxy Adhesive
 - Two (2) cartridges (6.46 oz., 190 mL)
 - Purchase/order from specialty wood working stores, marine suppliers, and/or online retailers. (e.g., [Amazon](#), [West Marine](#))
- Wood at bonding surfaces must be clean, dry, and unweathered.
- Not for use in fire-resistance rated assemblies.
- Floor applications only (i.e., no roof joists).

Canada Limit States Design Reinforcement Values



For information on how to construct repairs, see Details A through E starting on page 4.

TABLE 3: CANADA MAXIMUM FACTORED RECTANGULAR HOLE SHEAR (LIMIT STATES DESIGN)^[1]

TJI®	Depth	Maximum Rectangular Hole (in. x in.)	Horizontal Split-Hole Remains					Full Depth-Hole Covered	Web Filler-Hole Covered
			1 1/4" 1.3E TimberStrand® LSL		1 1/8" TJ® Rim Board			23/32 OSB	
			One Side		One Side		Two Sides	One Side	Two Sides
			Detail A (Nail) (lb)	Detail B (Epoxy) (lb)	Detail A (Nail) (lb)	Detail B (Epoxy) (lb)	Detail B-Alt (Epoxy) (lb)	Detail C (Nail) (lb)	Detail E (Nail) (lb)
110, 210, 230, 360, 560	11 7/8"	8 7/8 x 14	560	745	495	580	785	720	915
	14"	11 x 14	560	745	495	580	785	720	915
	16"	13 x 14	560	745	495	580	785	720	915
		13 x 18	560	625	430	520	785	720	915

[1] Values may be increased for load duration.

TABLE 4: CANADA MAXIMUM FACTORED CIRCULAR HOLE SHEAR (LIMIT STATES DESIGN)^[1]

TJI®	Depth	Maximum Diameter Circular Hole (in.)	Horizontal Split-Hole Remains	Web Filler-Hole Covered
			23/32 OSB	
			One Side	Two Sides
			Detail D (Nail) (lb)	Detail E (Nail) (lb)
110, 210, 230, 360, 560	11 7/8"	8 7/8	695	1190
	14"	11	695	1190
	16"	13	695	1190

[1] Values may be increased for load duration.

Conditions and Limitations

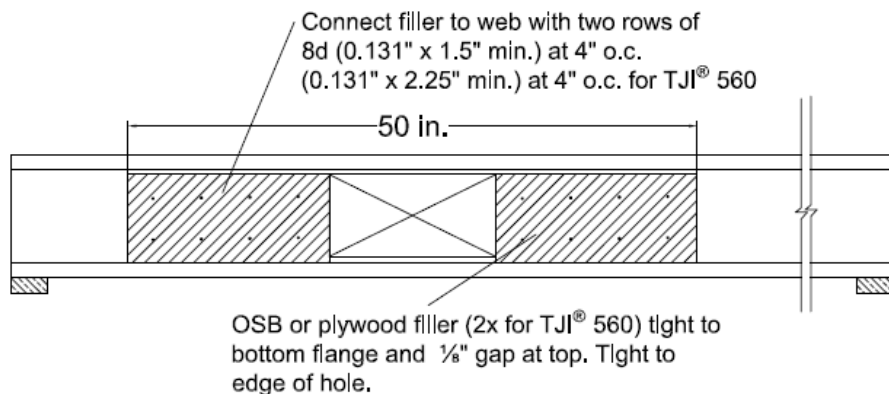
- One (1) repaired hole per span.
- Uniformly distributed loads only.
- Original, undamaged TJI® joist is properly designed.
- Attaching additional nailed reinforcement that engages both sides TJI® joist flange is not permitted and may cause further damage.
- The repairs have not been evaluated for situations where any part of the reinforcement is positioned over a bearing support.

For Epoxy Reinforcement (Detail B and B-Alt)

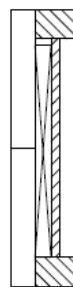
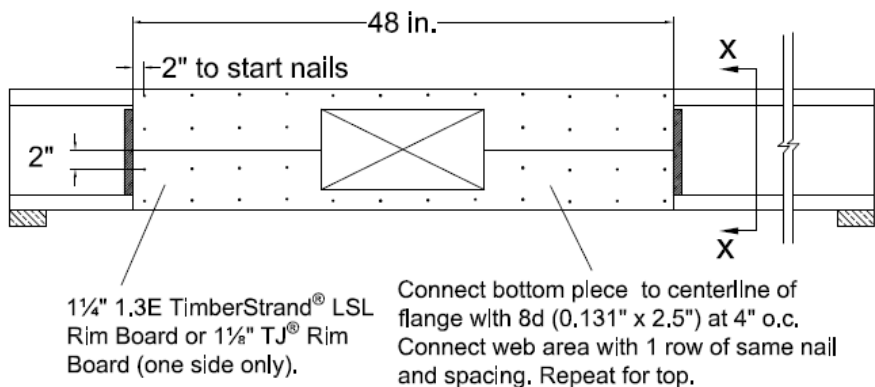
- West System® Six10® Thickened Epoxy Adhesive
 - Two (2) cartridges (6.46 oz, 190 mL)
 - Purchase/order from specialty wood working stores, marine suppliers, and/or retailers. (e.g., [Amazon](#), [West Marine](#))
- Wood at bonding surfaces must be clean, dry, and unweathered.
- Floor applications only (i.e., no roof joists).
- Not for use in fire-resistance rated assemblies.

Detail A – Split Nail Reinforcement

Step 1:



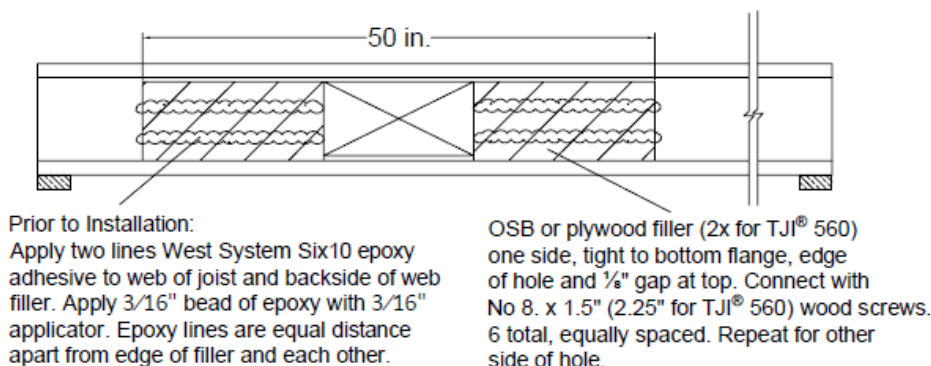
Step 2:



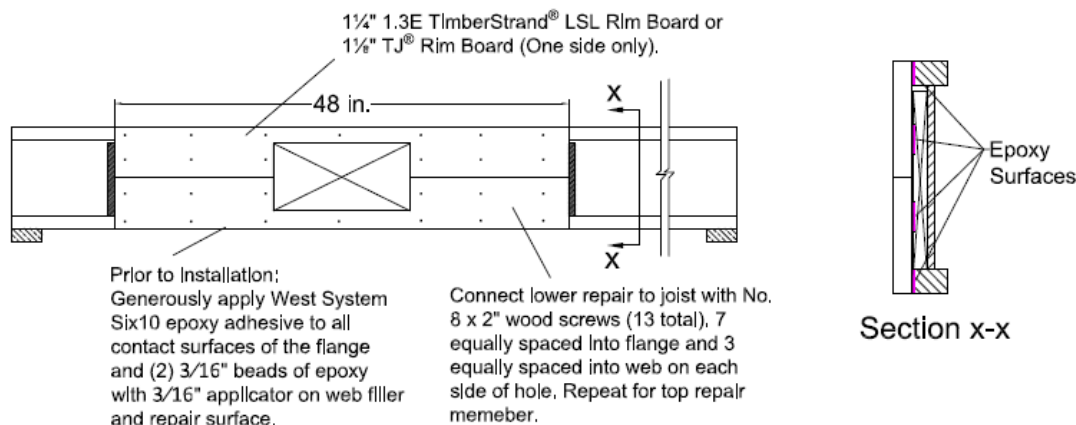
Section x-x

Detail B – Split Epoxy Reinforcement (One Side)

Step 1:



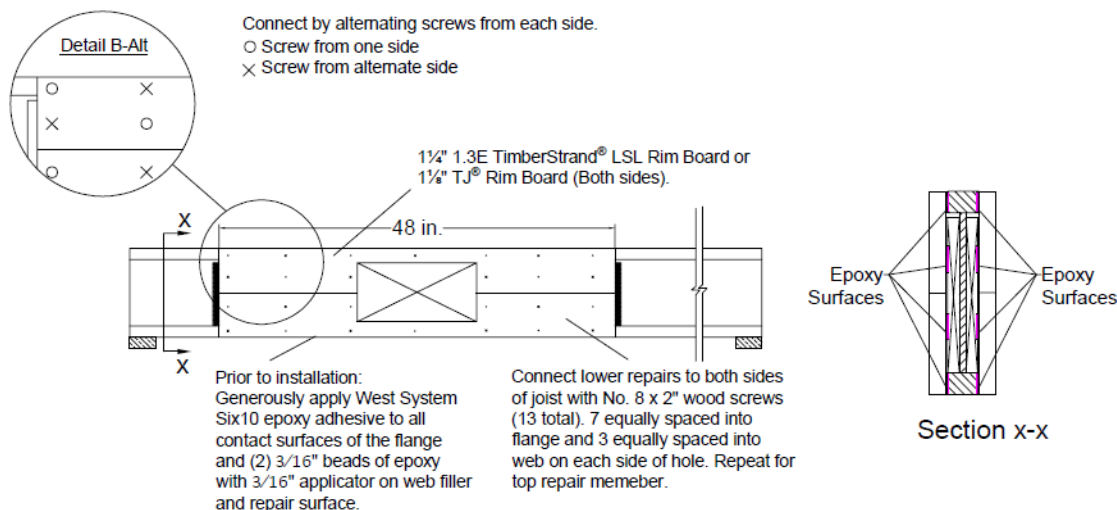
Step 2:



Detail B-Alternative – Split Epoxy Reinforcement (Both Sides)

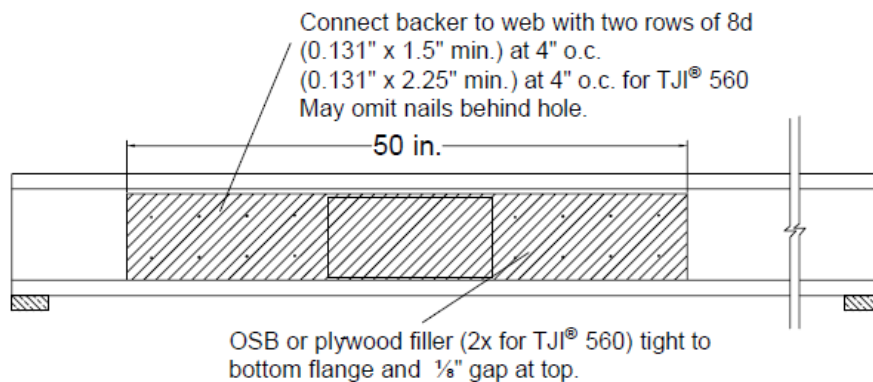
Step 1: Follow Step 1 from Detail B to construct web fillers on both sides of the web.

Step 2:

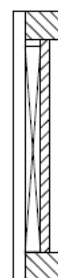
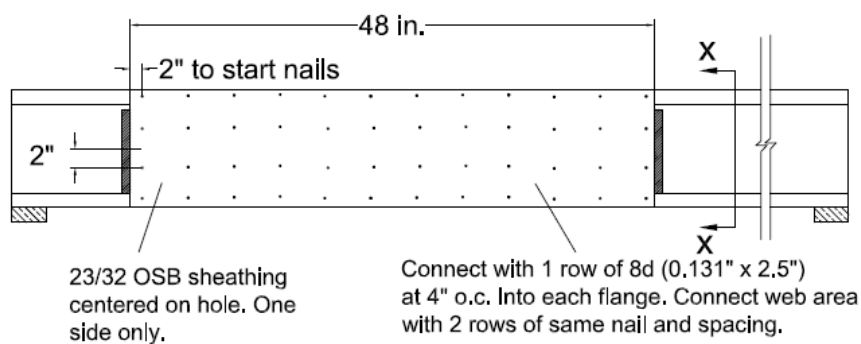


Detail C – Full Panel Reinforcement

Step 1:



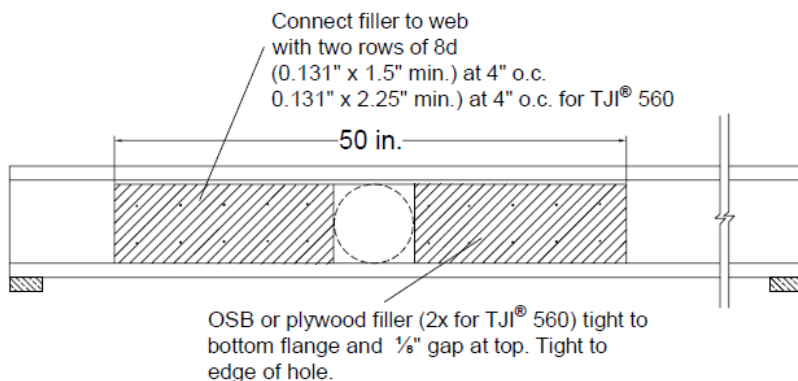
Step 2:



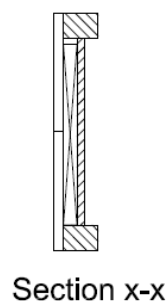
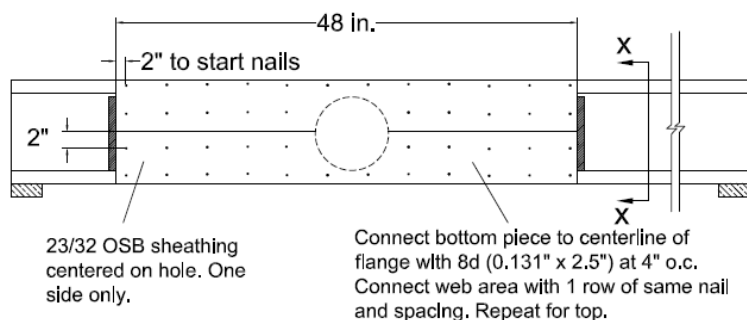
Section x-x

Detail D – Split Nail Reinforcement

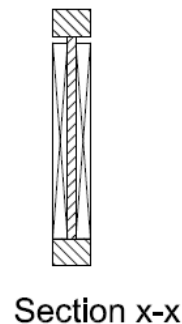
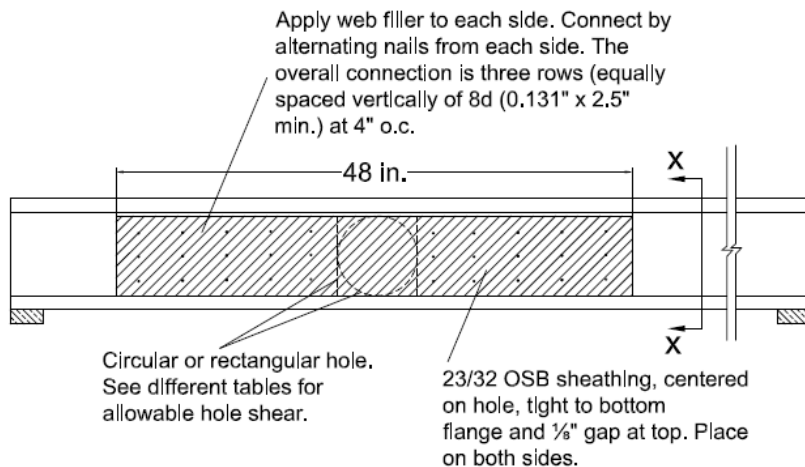
Step 1:



Step 2:



Detail E – Two-Sided Web Filler Reinforcement



If you have any questions, please contact your Weyerhaeuser representative.