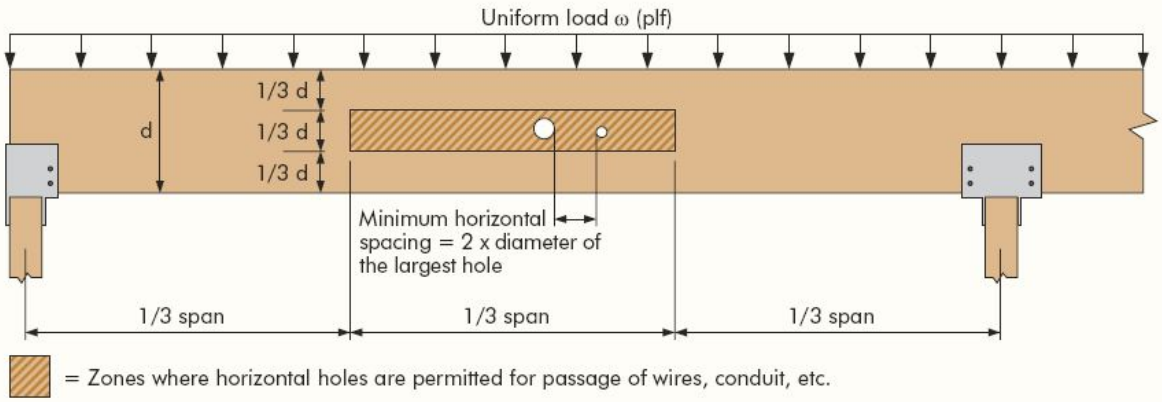
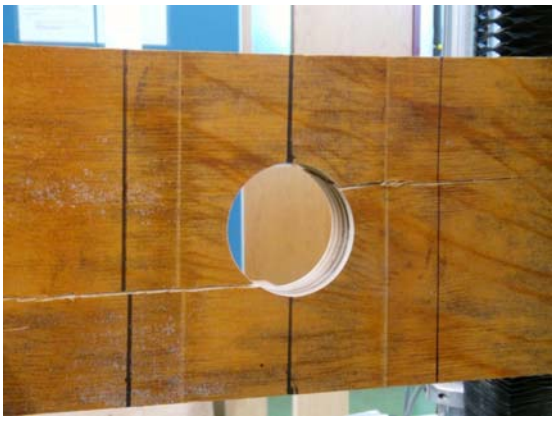
Holes are sometimes cut in beams for plumbing fixtures

PERMISSABLE HORIZONTAL ROUND HOLE LOCATIONS FOR LVL BEAMS UNDER UNIFORM LOADS

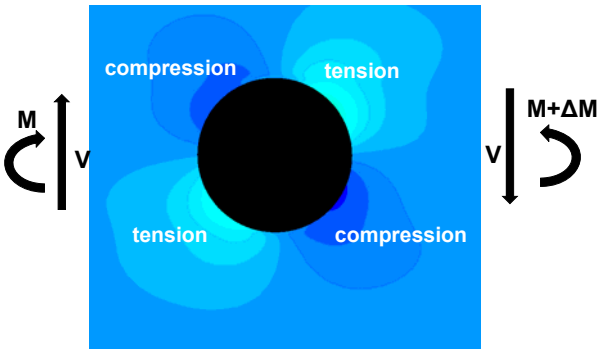


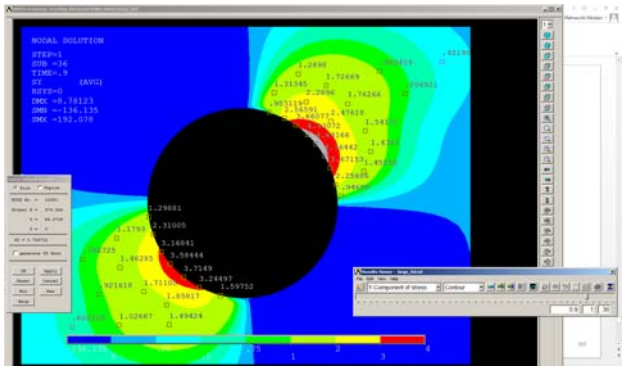
For beam depth of 3-1/2, 5-1/2, and 7-1/4 inches, the maximum hole diameter is 3/4, 1-1/8, and 1-1/2 inches, respectively. For deeper beams, the maximum hole diameter is 2 inches. The maximum number of holes for each span is limited to 3. Holes should not be cut in cantilevers.

Holes reduce the beam's ability to carry load



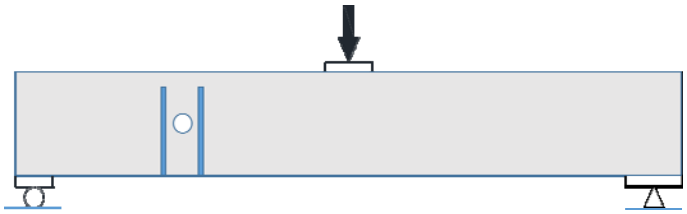
Computer model results



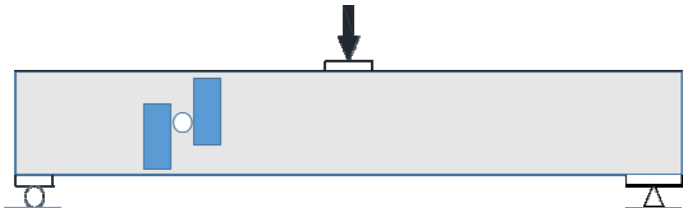


Can we fix the beam?

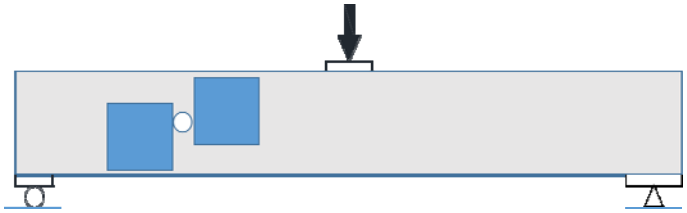
Repair method #1 (stitch bolts):



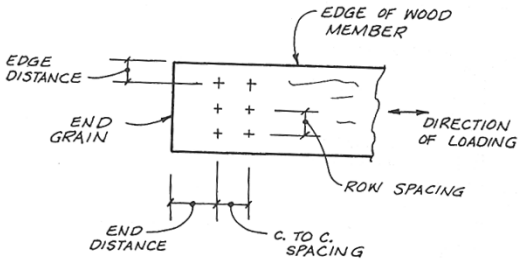
Repair methods #2 & 3 (mending and nail plates):



Repair method #4 & 5 (wood gusset plates):



Recall: Nail spacing requirements (per the wood construction code)



A "row" is a group in a line PARALLEL to the loading direction

	Connection configuration		
	Wood side members *without* prebored holes	Wood side members *with* prebored holes **OR** steel side plates *without* prebored holes	Steel side plates *with* prebored holes
center-to-center spacing			
parallel to grain	15*D*	10*D*	5*D*
perpendicular to grain	10*D*	5*D*	2.5*D*
end distance parallel to grain			
tension loading	15*D*	10*D*	5*D*
compression loading	10*D*	5*D*	3*D*
edge distance	2.5*D*	2.5*D*	2.5*D*
row spacing			
nails staggered in adjacent rows	2.5*D*	2.5*D*	2.5*D*
nails *in-line* in adjacent rows	5*D*	3*D*	2.5*D*

Figure 12.21 Recommended minimum nail spacings based on NDS Commentary provisions.