



## **LUMBER I-JOISTS**

**Strength, Reliability and Long life**

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## LUMBER I-JOISTS



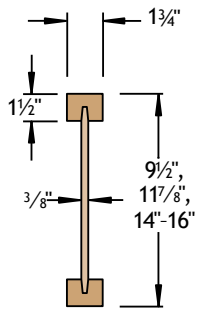
Goods Description	Size/MM	Weight/M	Meters/40HQ
<p>I JOSIT BEAMS AS/NZS4063.1 Phenolic glue Material : Larch/ Radiata pine H2s Treatment</p>	<p>Depth : 250mm/300mm Web :12MM / 9mm OSB Flange: pine LVL 63mm*45mm Length: 11000mm/6600mm/6000mm/ 5400mm/4800mm</p>	<p>5kg</p>	<p>about 3500</p>

## LUMBER I-JOISTS



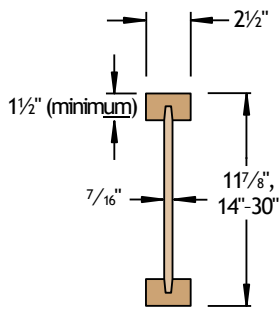
# I JOIST DESCRIPTIONS

This guide covers five series of joists: I45, I65, I90, I90H, and I90HS. These joists are primarily intended for commercial applications such as retail stores, office buildings, schools, restaurants, multi-family, hotels, warehouses, and nursing homes. **I joists are normally produced without camber.** However, camber is available at 2,250' radius as a special order for I45, I65, I90, 90H, series joists. Camber is not recommended for floors, or for multiple-span or cantilever applications.



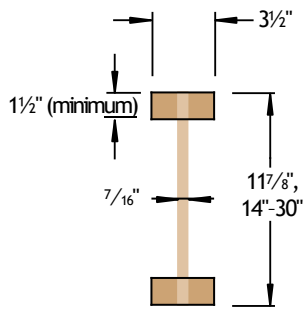
**I45**

Top and bottom flanges of 1 1/2" x 1 3/4" LVL with 3/8" OSB web.



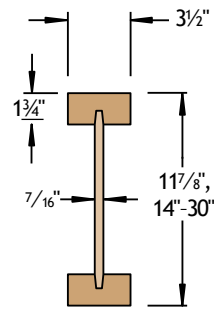
**I65**

Top and bottom flanges of 1 1/2" (minimum) x 2 1/2" LVL with 7/16" OSB web.



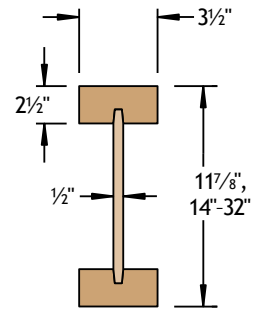
**I90**

Top and bottom flanges of 1 1/2" (minimum) x 3 1/2" LVL with 7/16" OSB web.



**I90H**

Top and bottom flanges of 1 3/4" x 3 1/2" LVL with 7/16" OSB web.



**I90HS**

Top and bottom flanges of 2 1/2" x 3 1/2" LVL with 1/2" OSB web.

- I65 available in tapered profile.
- I90HS provides increased bending strength and stiffness for heavy loads and 8' on-center roof systems.
- roof systems Joist depths from 14" to 32" are available in 2" increments.

Joist Depth	Joist Weight (lb/ft)	Reference Design Values												
		Moment <sup>(1)</sup> M <sub>r</sub> (ft-lb)	Shear <sup>(2)</sup> V <sub>r</sub> (lb)	EI (10 <sup>6</sup> in <sup>2</sup> -lb)	EI <sup>(3)</sup> I Joist with Nailed Floor Sheathing (10 <sup>6</sup> in <sup>2</sup> -lb)	EI <sup>(3)</sup> I Joist with Glue-Nailed Floor Sheathing (10 <sup>6</sup> in <sup>2</sup> -lb)	End Reaction (lb) <sup>(4)(5)</sup>				Intermediate Reaction (lb) <sup>(4)(5)</sup>			
							1 3/4" Bearing		3 1/2" Bearing		3 1/2" Bearing		5 1/4" Bearing	
							Web Stiffeners <sup>(7)</sup>		Web Stiffeners <sup>(7)</sup>		Web Stiffeners <sup>(7)</sup>		Web Stiffeners <sup>(7)</sup>	
No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes			
<b>145 Joist</b>														
9 1/2"	2.2	3,620	1,590	185	221	250	1,015	NA	1,560	NA	2,025	NA	2,575	NA
11 7/8"	2.5	4,685	1,785	319	375	420	1,015	1,225	1,560	1,785	2,025	2,385	2,575	2,930
14"	2.8	5,570	1,960	474	553	615	1,015	1,225	1,560	1,915	2,025	2,385	2,575	2,930
16"	3.0	6,390	2,120	653	756	839	1,015	1,225	1,560	1,915	2,025	2,385	2,575	2,930
<b>165 Joist</b>														
11 7/8"	3.6	6,750	2,255	450	512	561	1,375	1,745	1,885	2,255	2,745	3,120	3,365	3,735
14"	3.9	8,030	2,540	666	752	821	1,375	1,750	1,885	2,505	2,745	3,365	3,365	3,985
16"	4.2	9,210	2,810	913	1,025	1,116	1,375	1,750	1,885	2,625	2,745	3,490	3,365	4,105
18"	4.4	10,380	3,080	1,205	1,348	1,462	1,375	1,750	1,885	2,750	2,745	3,615	3,365	4,230
20"	4.7	11,540	3,345	1,545	1,722	1,864	NA	1,750	NA	2,875	NA	3,740	NA	4,355
22"	5.0	12,690	3,615	1,934	2,149	2,322	NA	1,750	NA	3,000	NA	3,860	NA	4,480
24"	5.3	13,830	3,200	2,374	2,632	2,838	NA	1,750	NA	3,125	NA	3,875	NA	4,605
26"	5.5	14,960	3,200	2,868	3,172	3,416	NA	1,750	NA	3,200	NA	4,725(8)	NA	5,345(9)
28"	5.8	16,085	3,200	3,417	3,772	4,056	NA	1,750	NA	3,200	NA	4,850(8)	NA	5,470(9)
30"	6.1	17,205	3,200	4,025	4,434	4,762	NA	1,750	NA	3,200	NA	4,975(8)	NA	5,590(9)
<b>190 Joist</b>														
11 7/8"	4.6	9,605	2,255	621	687	741	1,400	1,715	1,885	2,200	3,350	3,665	3,965	4,285
14"	4.9	11,430	2,540	913	1,005	1,079	1,400	1,875	1,885	2,355	3,350	3,825	3,965	4,440
16"	5.2	13,115	2,810	1,246	1,366	1,462	1,400	2,030	1,885	2,515	3,350	3,980	3,965	4,600
18"	5.4	14,785	3,080	1,635	1,786	1,908	1,400	2,030	1,885	2,515	3,350	3,980	3,965	4,600
20"	5.7	16,435	3,345	2,085	2,272	2,422	NA	2,190	NA	2,675	NA	4,140	NA	4,755
22"	6.0	18,075	3,615	2,597	2,824	3,006	NA	2,345	NA	2,830	NA	5,090	NA	5,705
24"	6.3	19,700	3,400	3,172	3,442	3,659	NA	2,345	NA	2,830	NA	5,405	NA	6,020
26"	6.5	21,315	3,400	3,814	4,132	4,387	NA	2,450	NA	2,990	NA	6,180(8)	NA	6,795(9)
28"	6.8	22,915	3,400	4,525	4,895	5,191	NA	2,450	NA	3,145	NA	6,335(8)	NA	6,800(9)
30"	7.1	24,510	3,400	5,306	5,732	6,073	NA	2,450	NA	3,145	NA	6,655(8)	NA	6,800(9)
<b>190H Joist</b>														
11 7/8"	4.6	10,960	2,300	687	755	810	1,400	1,715	1,885	2,200	3,495	3,810	4,100	4,420
14"	4.9	13,090	2,600	1,015	1,109	1,185	1,400	1,875	1,885	2,355	3,495	3,970	4,100	4,575
16"	5.2	15,065	2,880	1,389	1,512	1,610	1,400	2,030	1,885	2,515	3,495	4,130	4,100	4,735
18"	5.4	17,010	3,160	1,827	1,982	2,106	1,400	2,030	1,885	2,515	3,495	4,130	4,100	4,735
20"	5.7	18,945	3,445	2,331	2,522	2,676	NA	2,190	NA	2,675	NA	4,285	NA	4,890
22"	6.0	20,855	3,725	2,904	3,136	3,321	NA	2,345	NA	2,830	NA	5,235	NA	5,840
24"	6.3	22,755	3,800	3,549	3,825	4,046	NA	2,345	NA	2,830	NA	5,425	NA	6,155
26"	6.5	24,645	3,800	4,266	4,590	4,850	NA	2,450	NA	2,990	NA	6,315(8)	NA	6,920(9)
28"	6.8	26,520	3,800	5,059	5,436	5,737	NA	2,450	NA	3,145	NA	6,470(8)	NA	7,080(9)
30"	7.1	28,380	3,800	5,930	6,363	6,710	NA	2,450	NA	3,145	NA	6,790(8)	NA	7,395(9)
<b>190HS Joist</b>														
11 7/8"	6.0	16,050	2,320	900	974	1,034	1,835(6)	2,320(6)	2,150	2,320	3,995	4,650	4,690	5,345
14"	6.3	19,425	2,565	1,355	1,457	1,538	1,836(6)	2,565(6)	2,150	2,565	3,995	4,980	4,690	5,670
16"	6.6	22,550	2,790	1,876	2,008	2,113	1,837(6)	2,790(6)	2,150	2,790	3,995	4,980	4,690	5,670
18"	7.0	25,640	3,020	2,488	2,654	2,787	1,838(6)	3,020	2,150	3,020	3,995	5,310	4,690	6,000
20"	7.3	28,695	3,250	3,195	3,399	3,562	NA	3,250(6)	NA	3,250	NA	5,425	NA	6,330
22"	7.6	31,725	3,480	3,998	4,244	4,442	NA	3,475(6)	NA	3,480	NA	5,425	NA	6,330
24"	7.9	34,730	3,710	4,901	5,194	5,428	NA	3,496(6)	NA	3,710	NA	5,425	NA	6,655
26"	8.2	37,715	3,940	5,905	6,249	6,523	NA	3,497(6)	NA	3,940	NA	6,985(8)	NA	7,675(9)
28"	8.5	40,680	4,165	7,014	7,412	7,730	NA	3,498(6)	NA	4,165	NA	6,985(8)	NA	7,675(9)
30"	8.8	43,630	4,375	8,230	8,687	9,052	NA	3,499(6)	NA	4,375	NA	7,310(8)	NA	8,005(9)
32"	9.1	46,560	4,375	9,555	10,075	10,490	NA	3,500	NA	4,375	NA	7,640(8)	NA	8,335(9)

- (1) Do not increase joist resistive moment properties by a repetitive-member-use factor.
  - (2) For possible increases in shear capacity see shear design information at right.
  - (3) For deflection calculation only. Assumes 24" joist spacing with a 24" span-rated panel.
  - (4) Interpolation between bearing lengths is permitted for allowable design reactions.
  - (5) Reaction capacity has been determined based on products. Allowable bearing on supporting members shall be checked.
  - (6) 2 1/2" bearing length is required at end reactions.
  - (7) Refer to page 16 for web stiffener details.
  - (8) 5/4" bearing length is required at intermediate reactions.
  - (9) 7" bearing length is required at intermediate reactions.
- The stated allowable design properties are for loads of normal duration. Adjustments to the allowable design values shall be in accordance with the applicable code.

## I Joist Shear Design

When joists are used as simple span members, the design shear is equal to the shear at the face of the support.

When joists up to 24" in depth are used as multiple-span members, the design shear is the calculated shear at the interior support reduced by the following:

$$R = \frac{W}{V_{12}} \leq 18\%$$

Where: R = percent reduction  
W = uniform load, plf  
V<sub>12</sub> = reference design shear for an 11 7/8" deep joist, lb

## Instructions for Load Tables on pages 7–9

### To size floor joists:

- Calculate total load and live load in pounds per linear foot (plf).
- Check both total load (100% TL) and live load (100% LL). Live load (100% LL) values may be increased with a glue-nailed floor system;

### To size roof joists:

- Calculate total load in pounds per linear foot (plf).
- Check the appropriate snow load area (115% TL) value or non-snow load area (125% TL) value to determine the maximum allowable total load.

Span	11 7/8"		14"		16"	
	100%TL 100%LL	115%TL 125%TL	100%TL 100%LL	115%TL 125%TL	100%TL 100%LL	115%TL 125%TL
12'	320 252	368 401	354 350	407 442	388 *	444 /

**100%TL (Total Load)**  
Use this and the 100% LL to select floor member. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/240 at total load.

**115%TL (Total Load)**  
Use this to select roof member in snow load areas. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/180 at total load.

**100%LL (Live Load)**  
Use this and the 100% TL to select floor member. This number is the maximum allowable live load capacity in pounds per linear foot of joist. Value is based on the Commercial Floor Deflection Limit shown on page 20.

**125%TL (Total Load)**  
Use this to select roof member in non-snow load areas. This is the maximum allowable total load in pounds per linear foot of joist. Values are limited by deflection equal to L/180 at total load.

## General Notes for Load Tables on pages 7–9

- Values shown are maximum allowable load capacities based on the following assumptions:
  - Simple span; horizontal clear distance between supports.
  - Uniformly loaded conditions with 2 1/2" bearing length. Web stiffeners are assumed for joist depths greater than 9 1/2". Positive drainage in roof applications (1/4" per foot slope minimum).
  - Composite action is not considered for deflection.
  - **Floor Total Load** deflection limit is L/240.
  - **Floor Live Load** deflection limit is based on commercial deflection criteria shown on page 20.
  - **Roof Total Load** deflection limit is L/180.
- Camber (2,250 radius) is available for simple-span applications only (not available for I90HS). For span or loading conditions not covered by these tables (such as multiple spans or concentrated loads)



**I45 Joist Allowable Uniform Load (PLF)**

Span	Depth							
	9 1/2"		11 7/8"		14"		16"	
	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL
	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL
10'	245	282	288	331	299	344	299	344
	160	307	257	360	*	373	*	373
12'	195	224	240	276	249	287	249	287
	98	244	162	301	230	312	*	312
14'	129	165	186	214	214	246	214	246
	64	173	107	233	154	268	205	268
16'	89	119	143	164	170	196	188	216
	44	119	74	179	106	213	143	235
18'	64	85	107	130	135	155	154	178
	28	85	47	141	69	168	92	193
20'		63	80	105	109	126	125	144
		63	30	106	46	136	63	157
22'		48		81	89	104	104	119
		48		81	35	113	48	130

**Table Footnotes**

- \* Indicates total load (TL) value controls.
- Red numbers refer to 115% total load (TL).

See Load Table Instructions and General Notes on page 6.

**I65 Joist Allowable Uniform Load (PLF)**

Span	Depth																			
	11 7/8"		14"		16"		18"		20"		22"		24"		26"		28"		30"	
	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL	100% TL	115% TL
	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL	100% LL	125% TL
10'	386	444	407	469	418	480	428	492	439	504	449	517	460	529	466	536	466	536	466	536
	347	482	*	509	*	522	*	535	*	548	*	562	*	575	*	583	*	583	*	583
12'	322	371	340	391	349	401	358	411	366	421	375	432	384	442	389	448	389	448	389	448
	220	403	310	426	*	436	*	447	*	458	*	469	*	480	*	487	*	487	*	487
14'	269	309	292	336	300	345	307	353	315	362	322	371	330	379	334	385	334	385	334	385
	147	336	210	365	277	375	*	384	*	393	*	403	*	412	*	418	*	418	*	418
16'	206	237	245	282	262	302	269	309	276	317	282	325	289	332	293	337	293	337	293	337
	102	258	146	307	194	328	249	336	*	345	*	353	*	361	*	366	*	366	*	366
18'	149	188	194	223	223	256	239	275	245	282	251	289	257	296	261	300	261	300	261	300
	65	199	94	243	126	279	163	299	204	307	248	314	*	321	*	326	*	326	*	326
20'	111	148	157	181	181	208	204	234	221	254	226	260	231	266	235	270	235	270	235	270
	44	148	64	197	86	226	112	255	140	276	172	283	206	289	*	293	*	293	*	293
22'	85	113	123	150	149	172	168	194	187	216	206	237	211	242	213	246	213	246	213	246
	34	113	49	163	66	187	86	211	108	234	133	257	161	263	190	267	*	267	*	267
24'	88	96	126	126	145	142	163	158	181	173	199	189	217	196	225	196	225	196	225	
	88	38	129	52	157	68	177	85	197	105	217	127	236	151	245	177	245	*	245	
26'	70	77	102	104	123	121	139	134	155	148	170	161	185	174	201	181	208	181	208	
	70	30	102	41	134	54	151	68	168	84	185	102	201	122	218	143	226	166	226	
28'	56	83	84	106	104	120	116	133	127	147	139	160	150	173	162	186	168	193		
	56	83	33	112	44	130	55	145	69	159	83	174	100	188	117	202	136	210		
30'	46	68	92	90	104	101	116	111	128	121	139	131	151	141	162	151	173			
	46	68	92	36	114	46	126	57	139	69	151	82	164	97	176	113	189			
32'	38	56	77	75	92	89	102	98	112	106	122	115	133	124	143	133	152			
	38	56	77	30	100	38	111	47	122	57	133	69	144	81	155	95	166			
34'	32	47	64	81	79	90	86	100	94	108	102	117	110	126	117	135				
	32	47	64	84	32	98	40	108	48	118	58	128	68	137	80	147				
36'	40	54	71	81	77	89	84	97	91	105	98	113	105	121						
	40	54	71	88	34	97	41	105	49	114	58	122	68	131						
38'	34	46	61	72	69	80	75	87	82	94	88	101	94	108						
	34	46	61	78	29	87	35	94	42	102	50	110	58	118						
40'	29	40	52	65	68	78	74	85	79	91	85	98								
	29	40	52	67	78	30	85	36	92	43	99	50	106							

## 190 Joist Allowable Uniform Load (PLF)

Span	Depth																			
	11 7/8"	14"	16"	18"	20"	22"	24"	26"	28"	30"										
	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL								
14'	271 192	312 339	293 268	337 367	315 *	363 394	315 *	363 394	338 *	389 423	360 *	414 450	360 *	414 450	378 *	435 473	387 *	446 484	387 *	446 484
16'	237 134	273 297	257 189	296 321	276 249	318 346	276 *	318 346	296 *	341 370	315 *	363 394	315 *	363 394	331 *	381 414	339 *	390 424	339 *	390 424
18'	198 87	243 264	229 124	263 286	246 164	283 307	246 209	283 307	263 258	303 329	281 *	323 351	281 *	323 351	295 *	339 369	302 *	347 378	302 *	347 378
20'	148 59	198 198	206 85	237 257	221 113	255 277	221 144	255 277	237 179	273 297	253 217	291 316	253 *	291 316	265 *	305 332	272 *	313 340	272 *	313 340
22'	114 45	152 152	164 65	214 219	201 87	232 252	201 112	232 252	216 140	248 270	230 170	264 287	230 203	264 287	241 239	278 302	247 *	285 309	247 *	285 309
24'	89 35	119 119	129 51	172 172	172 69	206 224	185 89	212 231	198 111	228 248	211 135	242 264	211 162	242 264	221 191	255 277	227 222	261 284	227 *	261 284
26'	71 28	95 95	103 41	137 137	138 55	176 184	171 71	196 213	183 89	210 229	195 109	224 243	195 131	224 243	204 155	235 256	210 181	241 262	210 208	241 262
28'	77 77	83 33	111 111	112 45	150 150	145 58	171 186	165 73	190 207	181 89	208 226	181 108	208 226	190 127	218 237	195 149	224 243	195 172	224 243	
30'	63 63	91 91	92 37	123 103	120 48	149 169	144 60	166 180	158 74	182 198	169 89	194 211	169 106	194 211	177 106	204 222	182 124	209 227	182 143	209 227
32'	52 52	76 76	77 30	103 103	100 40	131 133	126 50	146 158	139 62	160 174	152 75	175 190	152 89	175 206	164 104	189 213	170 104	196 213	170 120	196 213
34'	44 44	64 64	64 86	86 86	84 33	112 112	106 42	129 140	123 52	142 154	135 63	155 168	135 75	155 182	146 88	167 196	157 88	180 196	160 102	184 201
36'	37 37	54 54	54 73	73 73	71 28	95 95	90 36	115 120	110 44	127 138	120 54	138 150	120 64	138 162	130 75	149 175	140 75	161 175	149 87	172 187
38'	31 31	46 46	46 63	63 63	63 82	82 82	77 31	103 103	95 38	114 124	108 46	124 135	108 55	124 146	117 65	134 157	125 65	144 157	134 75	154 168
40'	40 40	40 40	40 54	54 54	54 70	70 70	89 89	89 89	89 33	110 110	82 33	103 110	82 40	103 122	97 47	112 132	105 56	121 142	113 65	130 151
42'	34 34	47 47	47 61	61 61	61 77	77 77	72 28	93 96	87 34	101 110	87 41	101 119	87 41	101 119	95 49	110 128	103 49	118 128	110 57	126 137

### Table Footnotes

- \* Indicates total load (TL) value controls.
- Red numbers refer to 115% total load (TL).

See Load Table Instructions and General Notes on page 6.

## 190H Joist Allowable Uniform Load (PLF)

Span	Depth																			
	11 7/8"	14"	16"	18"	20"	22"	24"	26"	28"	30"										
	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL								
14'	271 208	312 339	293 290	337 367	315 *	363 394	315 *	363 394	338 *	389 423	360 *	414 450	360 *	414 450	378 *	435 473	387 *	446 484	387 *	446 484
16'	237 146	273 297	257 206	296 321	276 270	318 346	276 *	318 346	296 *	341 370	315 *	363 394	315 *	363 394	331 *	381 414	339 *	390 424	339 *	390 424
18'	211 95	243 264	229 135	263 286	246 179	283 307	246 227	283 307	263 *	303 329	281 *	323 351	281 *	323 351	295 *	339 369	302 *	347 378	302 *	347 378
20'	162 65	217 217	206 93	237 257	221 158	255 277	221 196	255 297	237 237	273 316	253 217	291 316	253 *	291 316	265 *	305 332	272 *	313 340	272 *	313 340
22'	125 50	167 167	180 72	215 234	201 96	232 252	201 123	232 252	216 153	248 270	230 186	264 287	230 222	264 287	241 *	278 302	247 *	285 309	247 *	285 309
24'	98 39	131 131	142 56	189 189	185 76	212 231	185 97	212 231	198 122	228 248	211 149	242 264	211 178	242 264	221 209	255 277	227 *	261 284	227 *	261 284
26'	78 31	104 104	113 45	151 151	152 61	196 203	171 78	196 213	183 98	210 229	195 120	224 243	195 144	224 243	204 170	235 256	210 198	241 262	210 *	241 262
28'	84 84	92 36	123 123	124 49	165 165	158 64	182 198	170 80	195 212	181 98	208 226	181 118	208 226	190 140	218 237	195 163	224 243	195 188	224 243	
30'	69 69	76 30	101 101	102 114	136 116	132 170	158 53	182 177	169 66	194 198	169 82	194 211	169 98	194 211	177 116	204 222	182 136	209 227	182 157	209 227
32'	57 57	84 84	85 34	114 114	111 44	148 148	139 55	168 183	158 68	182 198	158 82	182 198	158 98	182 198	166 98	191 208	170 114	196 213	170 132	196 213
34'	48 48	70 70	71 28	95 95	93 37	124 124	118 47	149 157	142 58	164 178	149 70	171 186	149 83	171 196	156 83	180 196	160 97	184 201	160 112	184 201
36'	41 41	60 60	60 81	81 81	79 31	106 106	100 40	133 133	123 49	146 159	139 59	160 173	139 71	160 185	148 83	170 185	151 83	174 189	151 96	174 189
38'	35 35	51 51	51 69	69 69	69 90	90 90	86 34	114 114	106 42	131 141	124 51	143 156	135 61	155 169	143 71	165 179	143 83	165 179	143 83	165 179
40'	30 30	44 44	44 60	60 60	60 78	78 78	74 29	99 99	92 36	118 122	111 44	129 141	122 53	140 152	131 62	151 164	131 62	151 164	136 72	157 171
42'	38 38	52 52	52 68	68 68	68 86	86 86	80 32	106 106	97 32	117 106	97 38	117 127	110 46	127 138	119 54	137 149	119 54	137 149	127 63	146 159



## 190HS Joist Allowable Uniform Load (PLF)

Span	Depth																			
	11/8"	14"	16"	18"	20"	22"	24"	26"	28"	30"	32"									
	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL	100% TL 115% TL 100% LL 125% TL								
14'	327 263	376 409	362 *	416 452	393 *	452 492	426 *	490 532	458 *	527 573	490 *	564 613	494 *	568 617	494 *	568 617	494 *	568 617	494 *	568 617
16'	287 186	330 358	317 265	364 396	345 *	396 431	373 *	429 467	402 *	462 502	429 *	494 537	432 *	497 541	432 *	497 541	432 *	497 541	432 *	497 541
18'	255 121	293 319	282 175	324 352	307 232	353 383	332 295	382 415	357 *	411 447	382 *	439 478	385 *	443 481	385 *	443 481	385 *	443 481	385 *	443 481
20'	209 83	264 278	254 121	292 317	276 161	318 345	299 207	344 374	322 256	370 402	344 310	396 430	347 *	399 433	347 *	399 433	347 *	399 433	347 *	399 433
22'	161 64	215 215	231 94	266 289	251 126	289 314	272 162	313 340	293 202	337 366	313 245	360 391	315 292	363 394	315 *	363 394	315 *	363 394	315 *	363 394
24'	127 50	169 169	185 74	244 247	230 100	265 288	249 129	287 312	268 161	309 336	287 197	330 359	289 235	333 362	289 276	333 362	289 *	333 362	289 *	333 362
26'	101 40	135 135	149 59	199 199	201 80	245 266	230 104	265 288	248 131	305 310	267 160	307 332	267 192	307 334	267 226	307 334	267 262	307 334	267 *	307 334
28'	82 32	109 109	121 48	162 162	164 65	219 219	214 85	246 268	230 107	265 288	246 132	283 308	248 158	285 310	248 187	285 310	248 217	285 310	248 *	285 310
30'	90 90	100 40	133 133	136 54	181 181	177 230	215 70	247 236	230 89	264 269	232 109	266 287	232 132	266 290	232 156	266 290	232 182	266 290	232 210	266 290
32'	75 75	83 33	111 111	113 45	151 151	148 59	197 197	187 75	232 250	216 92	248 270	217 111	250 272	217 131	250 272	217 154	250 272	217 177	250 272	217 203
34'	63 63	70 28	93 93	95 88	127 127	125 50	167 167	158 63	211 211	195 78	233 254	204 94	235 256	204 112	235 256	204 131	235 256	204 151	235 256	204 173
36'	53 53	53 79	79 32	108 108	106 42	142 142	135 54	180 180	167 66	220 222	193 80	222 241	193 96	222 241	193 112	222 241	193 130	222 241	193 149	222 241
38'	45 45	45 68	68 93	93 93	91 36	122 122	116 46	155 155	143 57	191 191	174 69	210 229	183 82	210 229	183 97	210 229	183 112	210 229	183 129	210 229
40'	39 39	39 58	58 80	80 80	79 31	105 105	100 40	134 134	124 49	166 166	151 60	198 201	174 71	200 217	174 84	200 217	174 98	200 217	174 112	200 217
42'	34 34	34 51	51 70	70 70	91 35	116 116	87 35	116 116	108 43	144 144	131 52	175 175	157 62	190 207	166 73	190 207	166 85	190 207	166 98	190 207
44'	29 29	29 44	44 61	61 61	80 30	102 102	95 38	126 126	115 46	154 154	138 55	177 184	158 64	182 198	158 75	182 198	158 86	182 198	158 86	182 198
46'		39 39	39 53	53 53	70 70	90 90	83 33	111 111	101 40	135 135	121 48	162 162	143 57	174 189	151 66	174 189	151 76	174 189	151 76	174 189
48'		34 34	34 47	47 47	62 62	79 79	74 29	99 99	90 36	120 120	108 43	144 144	127 50	161 169	145 59	161 181	145 68	161 181	145 68	161 181
50'		30 30	30 42	42 42	55 55	70 70	88 32	107 107	80 32	107 107	96 38	128 128	113 45	148 151	132 52	148 173	139 60	160 174	139 60	160 174

### Table Footnotes

- \* Indicates total load (TL) value controls.
- Red numbers refer to 115% total load (TL).

See Load Table Instructions and General Notes on page 6.

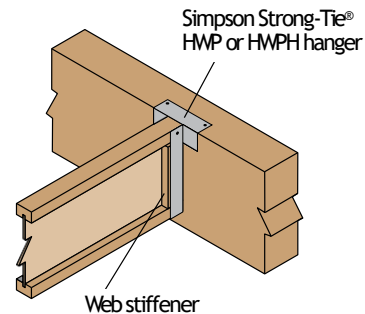
## 8' ON-CENTER ROOF SPAN TABLE

### 190HS Joist, 8' On-Center Roof Span

190HS Joist Depth	12 PSF Dead Load	14 PSF Dead Load	16 PSF Dead Load
16"	27'-0"	26'-0"	24'-6"
18"	29'-10"	28'-6"	26'-8"
20"	32'-4"	30'-1"	28'-1"
22"	35'-4"	33'-7"	31'-4"
24"	38'-0"	35'-8"	33'-3"
26"	40'-2"	37'-9"	35'-1"
28"	42'-0"	39'-9"	36'-11"
30"	43'-8"	41'-9"	38'-8"
32"	45'-4"	41'-9"	38'-8"

#### Table is based on:

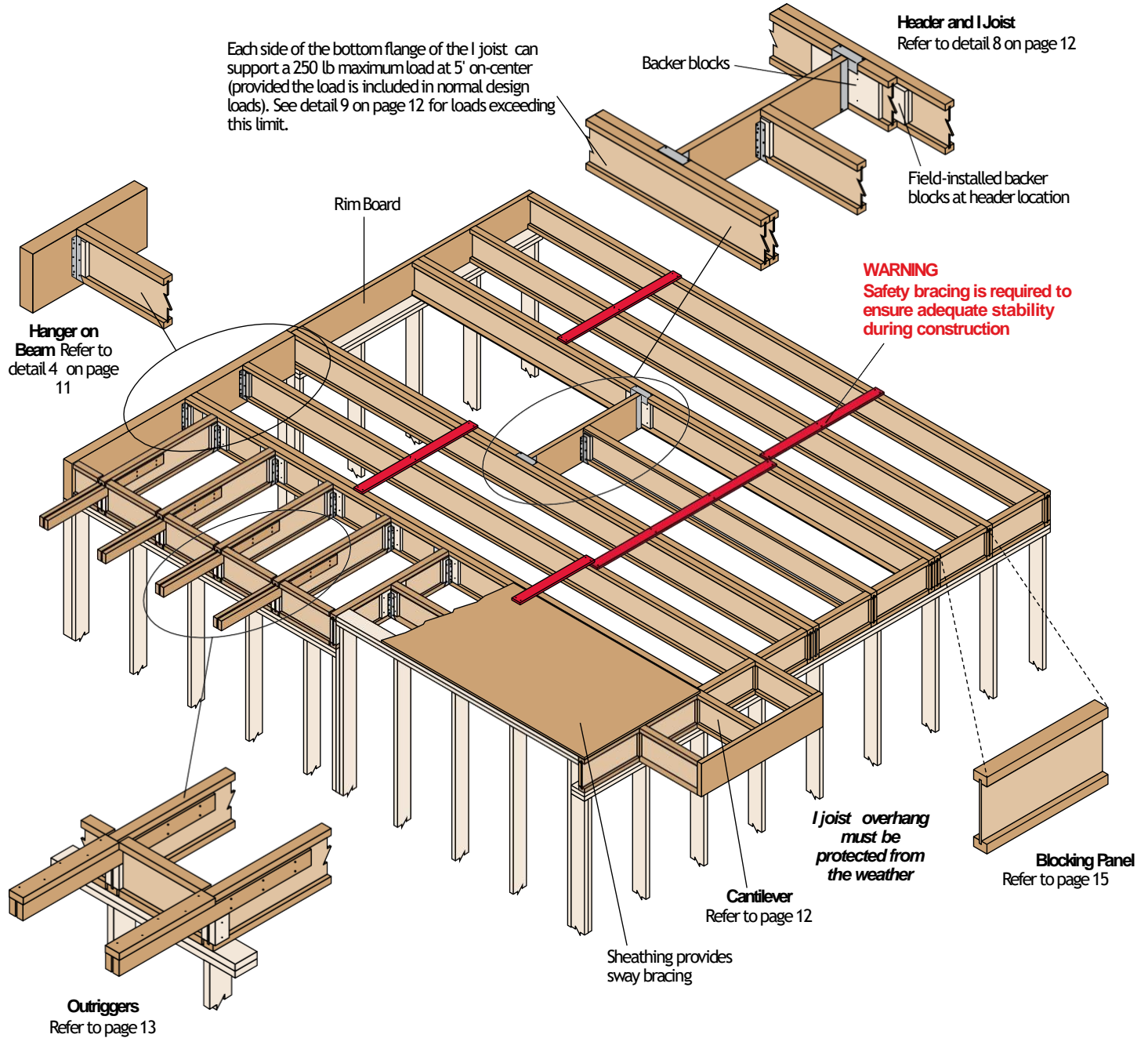
- Uniformly loaded, simple-span joists
- 190HS joists spaced at 8' on-center
- Spans limited by total load deflection of L/180
- Spans reflect 125% duration of load adjustment
- Roof live load of 20 psf with live load reductions applied per 2021 IBC Section 1607.14.2
- Roof slopes of 1/4" per foot
- DF/SP (or equivalent) support for hanger.



#### General Notes

- Span is defined as horizontal clear distance between inside face of beam/wall supports.
- Reaction based on hanger bearing length and web stiffeners. See web stiffener information on page 16.
- **Italic** numbers indicate HWP hanger required.
- Fill all nail holes in hanger. Use 0.148" x 1 1/2" nails into joists and 0.162" x 3/2" nails into header.

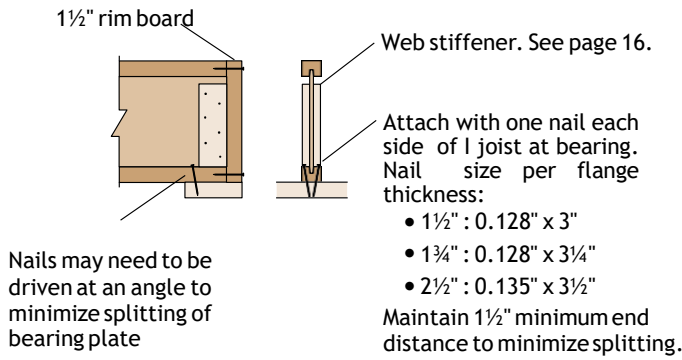
## Typical Floor System



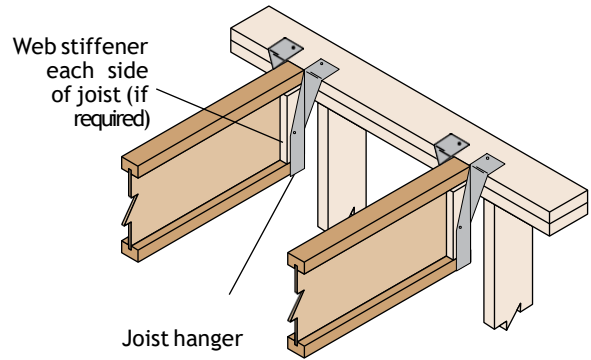
### General Notes

- Details shown on pages 10-14 are conceptual. Attachments and connections shall be made to the supporting structure in accordance with the specific design requirements.
- Rim board or I blocking panels (or an equivalent alternative) must always be used to prevent rollover and to provide structural attachment of the deck sheathing to the supporting structure in accordance with the specific design requirements.

**1 Nailing I Joist to Bearing Plate**

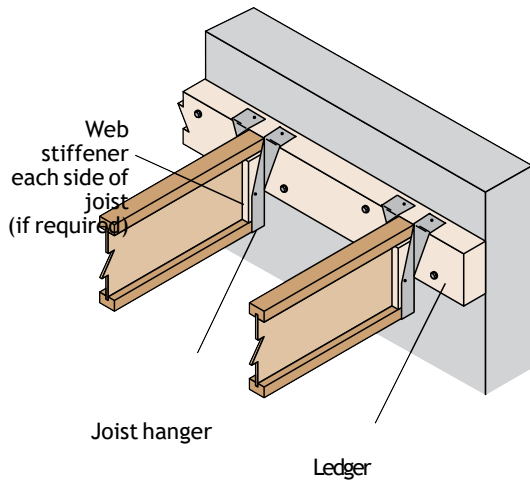


**2 Hanger on Stud Wall**

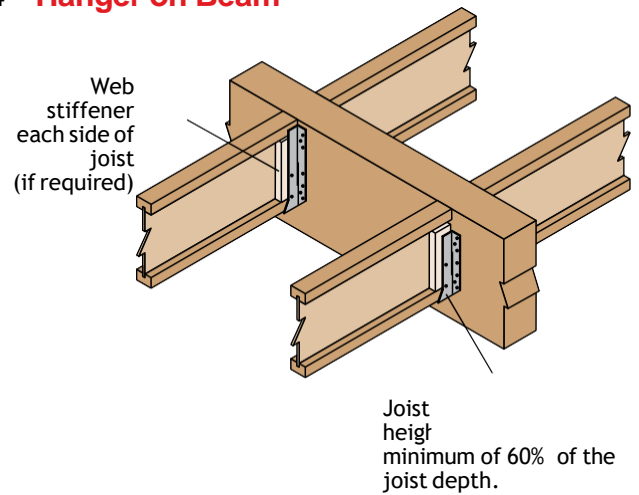


*The potential for top plate rotation may reduce hanger capacities.*

**3 Hanger on Ledger**

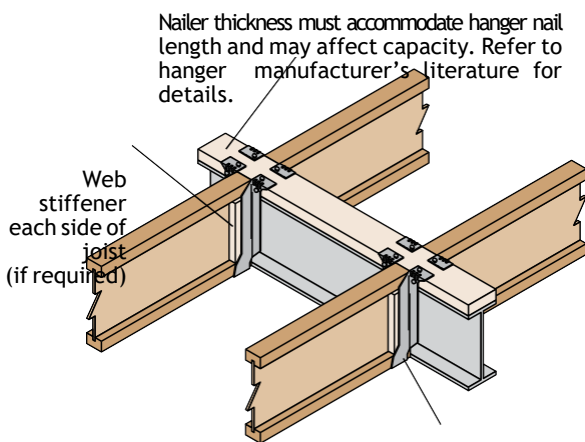


**4 Hanger on Beam**

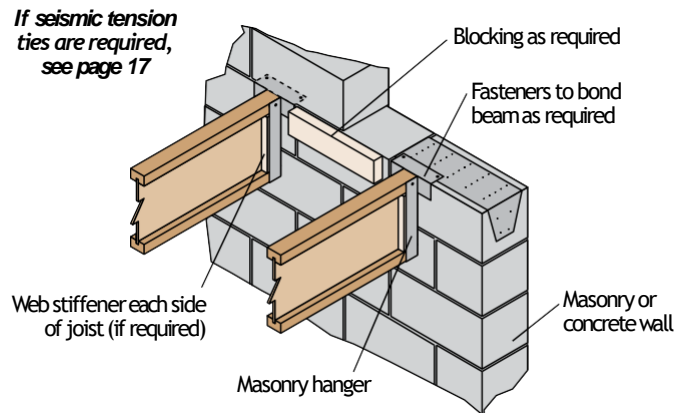


*Web stiffeners are required if the sides of the hanger do not laterally support at least 3/8" of the I joist top flange.*

**5 Hanger on Steel Beam**

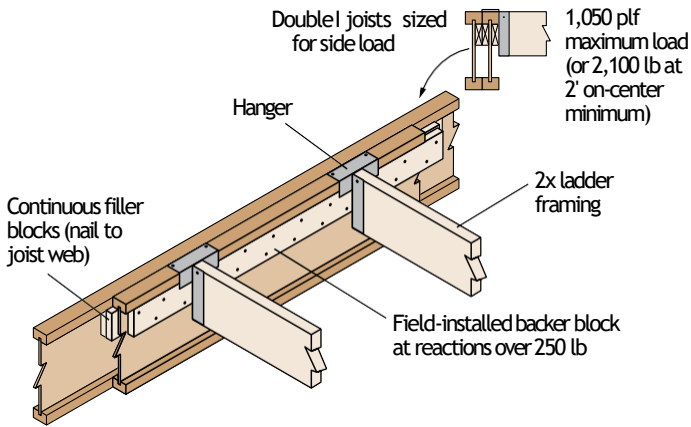


**6 Hanger on Masonry Wall**

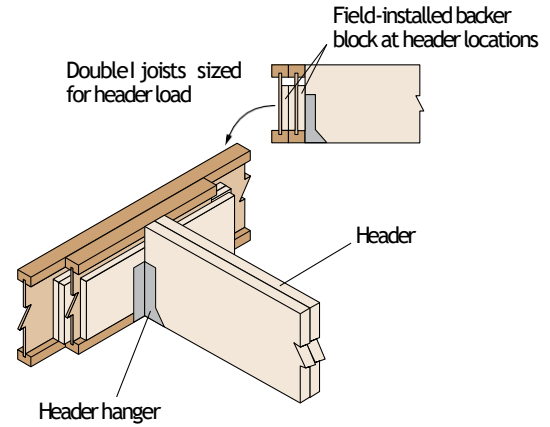


*Traditional masonry hangers will not support construction loads without a minimum amount of cured masonry construction above hanger level. Refer to hanger manufacturer's literature for information on the correct installation and use of masonry hangers.*

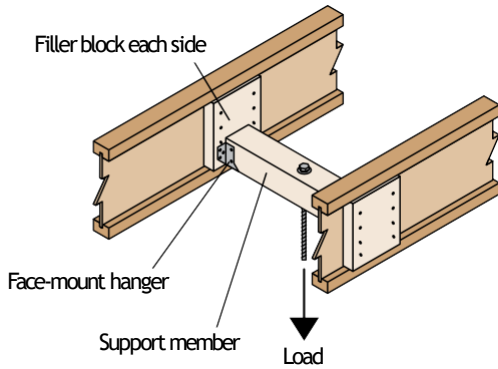
## 7 Side-Loaded Double Joist (Ladder Framing)



## 8 Side-Loaded Double Joist (Header Location)

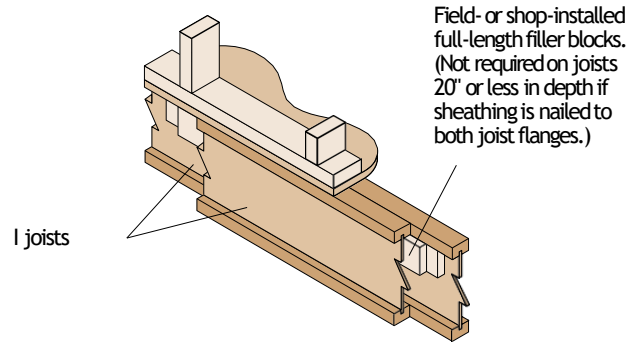


## 9 Support Detail (For Loads Exceeding 250 lb)



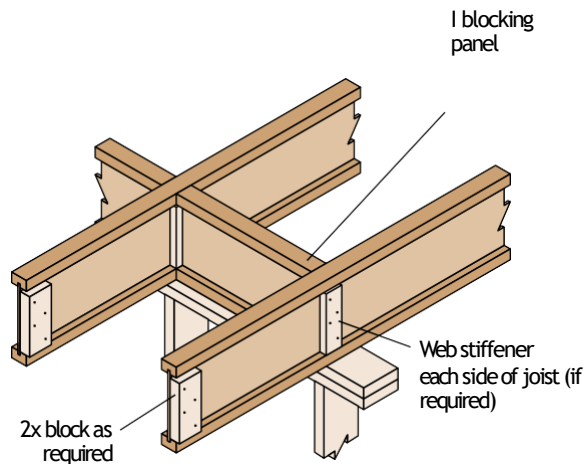
Each side of the bottom flange of the I joist can support a 250 lb maximum load at 5' on-center (provided the load is included in normal design loads). Use detail 9 above for loads exceeding this limit.

## 10 Top-Loaded Double Joist



# CANTILEVERS AND OUTRIGGERS

## 11 I Joist Cantilever



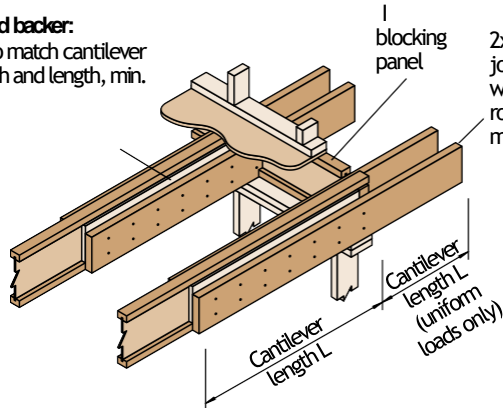
*I joists are intended for dry-use applications.*



## 12a Cantilevers (Field-Assembled Only)

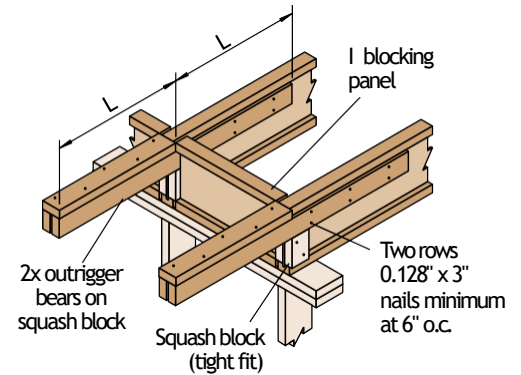
Wood backer:

2x to match cantilever depth and length, min.



*I joists and cantilevers/outriggers are intended for dry-use applications.*

## 12b Outriggers (Available as Plant-Assembled)



Double application shown in detail 12. Single application is similar. See General Notes below regarding allowable loads.

## Double 2x Cantilever/Outrigger—Allowable Uniform Loads (PLF)

Cantilever/ Outrigger Length L	Solid Sawn Lumber														
	Two 2x4			Two 2x6			Two 2x8			Two 2x10			Two 2x12		
	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof
24"	342	393	427	393	451	491	393	451	491	393	451	491	393	451	491
30"	219	251	273	384	441	480	384	441	480	384	441	480	384	441	480
36"	152	174	189	323	371	403	378	435	473	378	435	473	378	435	473
42"	111	128	139	237	272	295	374	430	467	374	430	467	374	430	467
48"	77	97	106	181	208	225	289	330	358	371	426	463	371	426	463
54"	54	77	83	143	163	177	227	260	281	337	384	414	368	424	460
60"		62	63	115	132	143	183	209	227	271	308	332	362	410	441
66"			47	95	109	118	151	172	186	222	252	271	296	335	359
72"				79	91	99	126	144	156	186	210	226	246	277	295
78"				68	77	84	107	122	132	157	178	190	207	232	246
84"				56	66	72	92	105	113	135	152	162	177	197	208
90"					57	62	80	91	97	116	131	139	153	169	178
96"					50	54	70	79	85	102	114	124	132	146	152
Cantilever/ Outrigger Length L	LVL														
	Two 1½" x 3½"			Two 1½" x 5½"			Two 1½" x 7¼"			Two 1½" x 9¼"			Two 1½" x 11¼"		
	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof	Floor	Snow Roof	Non-Snow Roof
24"	393	451	491	393	451	491	393	451	491	393	451	491	393	451	491
30"	292	441	467	384	441	480	384	441	480	384	441	480	384	441	480
36"	173	277	277	378	435	473	378	435	473	378	435	473	378	435	473
42"	110	177	177	374	430	467	374	430	467	374	430	467	374	430	467
48"	74	119	119	277	419	444	371	426	463	371	426	463	371	426	463
54"	53	84	84	198	317	317	368	424	460	368	424	460	368	424	460
60"		62	62	146	233	233	322	421	458	366	421	458	366	421	458
66"		46	46	110	177	177	246	355	381	365	419	456	365	419	456
72"		36	36	85	137	137	191	295	306	363	418	453	363	418	454
78"				67	108	108	152	243	243	306	360	375	362	417	453
84"				54	87	87	122	196	196	247	302	314	361	378	386
90"					71	71	100	160	160	203	256	265	305	318	324
96"					58	58	83	132	132	168	219	225	260	270	274

Table is based on:

Solid Sawn<sup>(1)</sup>

$F_v = 175$  psi

$F_b = 900$  psi<sup>(2)</sup>

$E = 1.6 \times 10^6$  psi

LVL

$F_v = 285$  psi

$F_b = 2140$  psi<sup>(3)</sup>

$E = 1.6 \times 10^6$  psi

Cantilever/Outrigger Deflection

- 2L/480 at floor live load (live load = 0.80 x total load)
- 2L/240 at roof total load

General Notes

- **Bold Italic** cells indicate a single 2x can be used; at half the table load. For all other cells single 2x members are not permitted.
- Members have been evaluated for 300 lb point load.

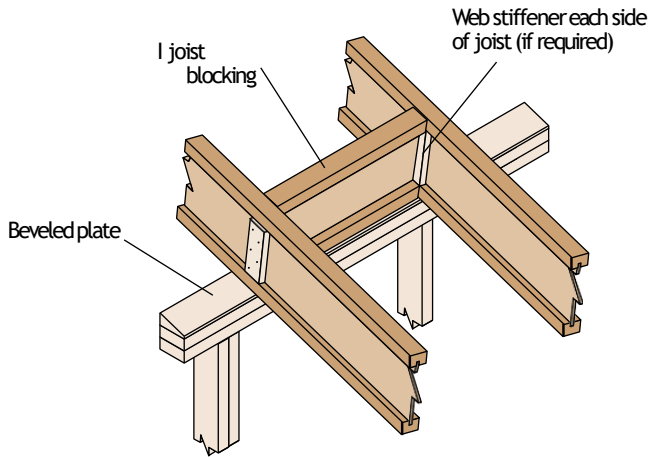
(1) Lesser of Douglas Fir-Larch #2 or Southern Pine #1.

(2) Size Factor,  $C_s$ , per 2018 NDS® Supplement Table 4A is applied.

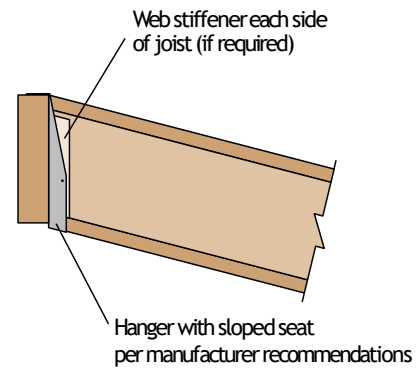
(3) For 12" depth; for other depths, multiply by  $(12/d)^{0.136}$



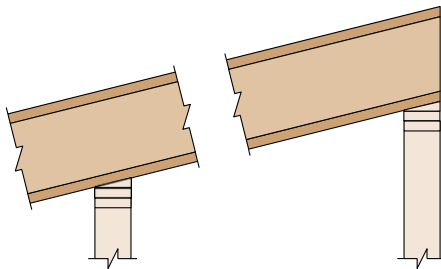
## 13 Slope Detail



## 14 Slope Detail at High End

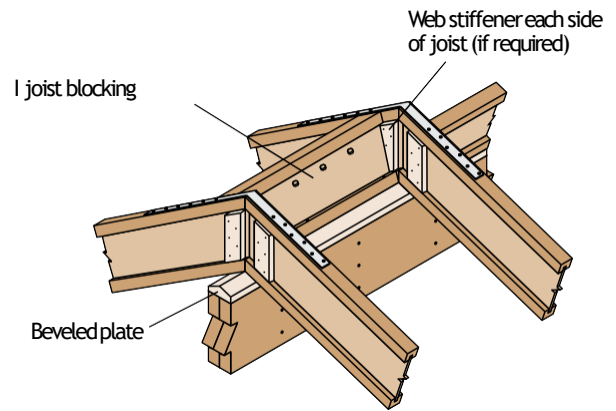


## 15 Beveled Plate Requirements



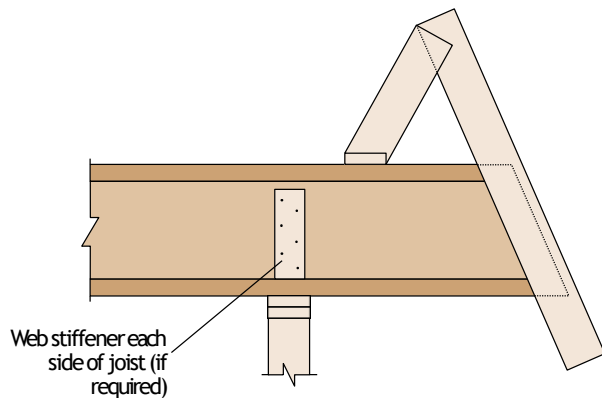
Required Bearing Length	Maximum Slope Without Beveled Plate
1 3/4"	1/2" in 12"
3 1/2"	1/4" in 12"
5 1/2"	1/8" in 12"

## 16 Ridge Detail

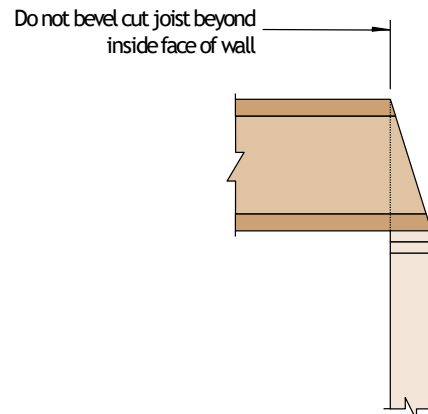


*A strap and alternating blocking panels, or two rows of blocking panels, are required for lateral stability.*

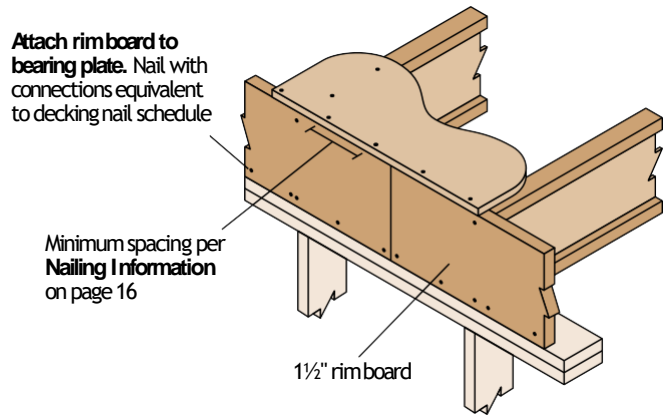
## 17 Cantilever with Mansard Framing



## 18 Bevel Cut or Fire Cut



- Rim board (up to 24" in depth) may be used for:
- Shear transfer (nailing must be established by design).
  - Vertical load transfer.
  - General closure.
  - Helping to prevent rollover during joist installation.



## I BLOCKING PANELS

- I blocking panels may be used for:
- Vertical load transfer.
  - General closure.
  - Helping to prevent rollover during joist installation.
  - Shear transfer (nailing must be established by design).
- Maximum shear transfer capacity for each joist is:
- 1,785 plf for I45 joists;
  - 2,255 plf for I65 and I90 joists;
  - 2,300 plf for I90H joists;
  - 2,320 plf for I90HS joists.
- May be increased for duration of load.

When I blocking panels are used for vertical load transfer, values shown in the following table may be used:

### Allowable Uniform Vertical Load Transfer (PLF)

I Joist Series	I Blocking Panel Depth				
	9 1/2"	11 7/8" – 14"	16"	–	–
I45	2,100	2,100	2,100	-	-
I65, I90, I90H and I90HS	3,050	2,450	1,850	1,200	

- Loads are for I blocking panels or I joists as rim board.
- Loads shown may not be increased for duration of load.

### Concentrated Vertical Loads

The allowable concentrated vertical loads on I blocking panels or rim joist can be determined by using the equation provided below. Loads exceeding the calculated value should be supported by squash blocks.

$$P_{allow} = W_{allow} \left[ \frac{L_c + 2t_s + 2t_f}{12} \right]$$

#### Where:

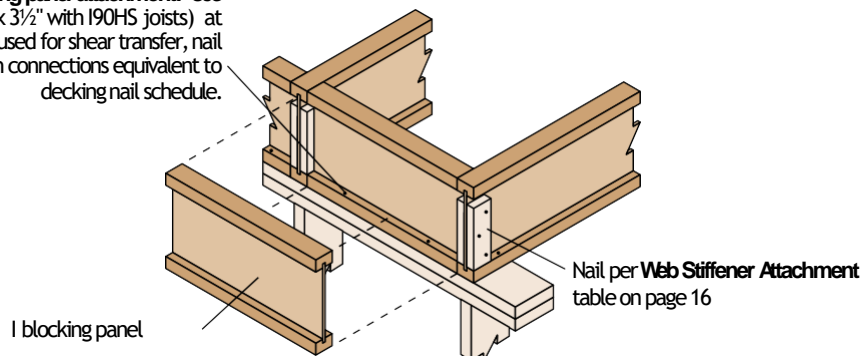
- $P_{allow}$  = Allowable concentrated vertical load, lb
- $W_{allow}$  = Allowable uniform vertical load for transfer, plf
- $L_c$  = Bearing length of column base, in
- $t_s$  = Thickness of material between column base and blocking panel, such as sole plate or sheathing, in
- $t_f$  = Effective flange thickness:  
7/8" for I45, I65 and I90 joists;  
1 1/8" for I90H joists;

#### Example Calculation

4x4 post applied to 20" I65 joist through 2 3/32" sheathing.

$$P_{allow} = 2,450 \left[ \frac{3.5 + 2(2^{3/32}) + 2(7/8)}{12} \right] = 1,365 \text{ lb}$$

**Minimum I blocking panel attachment:** Use 0.128" x 3" nails (0.135" x 3 1/2" with I90HS joists) at 6" on-center. When used for shear transfer, nail to bearing plate with connections equivalent to decking nail schedule.



## The Importance of Web Stiffeners

Web stiffeners are available in pre-cut sizes and can be installed at the plant on one or both ends upon request. Web stiffeners are an important part of almost all I joist installations because they will:

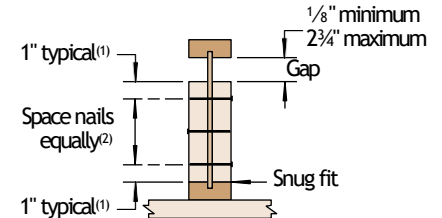
- Stiffen the I joist web for increased reaction capacity.
- Minimize the bearing length required for the I joist.
- Help transfer reaction loads into the I joist web.
- Provide stabilization in hangers.

## Proper Installation Ensures System Performance

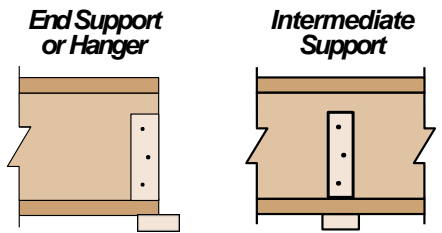
- Web stiffeners must be installed at bearing points as shown in the details below and at points of concentrated loads exceeding 1,500 lb.
- Web stiffeners are required on joists 20" and greater in depth.
- Web stiffeners are available and typically have the maximum gap shown below. Verify that hanger nails adequately engage the web stiffener.
- Gap must be at top for all bearing conditions. For concentrated loads, the gap must be at the bottom (see details below).

## Web Stiffener Attachment—Nail Quantities

Joist Depth	I45	I45	I65	I90 and I90H		I90HS
	16g Staple x 1 1/2" with 7/16" crown	8d (0.113" x 2 1/2") Nails <sup>(1)</sup>		16d (0.135" x 3 1/2") Nails <sup>(2)</sup>		
	End or Intermediate	End or Intermediate	End or Intermediate	End	Intermediate	End or Intermediate
9 1/2"	4	3	—	—	—	—
11 7/8"	4	3	3	3	3	5
14"	7	3	5	4	4	7
16"	8	3	6	5	5	7
18"	—	—	7	5	5	9
20"	—	—	8	6	6	11
22"	—	—	9	7	12	11
24"	—	—	10	7	14	13
26"	—	—	11	8	15	15
28"	—	—	12	9	16	15
30"	—	—	13	9	18	17
32"	—	—	—	—	—	19



(1) 1 1/2" (typical) with 2x4 solid sawn lumber web stiffeners.  
 (2) Nails may be driven from one side only.



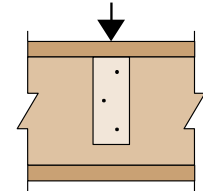
(1) 0.113 x 2 1/4" smooth or deformed-shank nails are acceptable.  
 (2) 0.131 x 3 1/4" smooth or deformed-shank nails are acceptable.

## Web Stiffener Size and Material

Flange Width	Minimum Web Stiffener Size	Web Stiffener Material
1 3/4"	5/8" x 2 5/16"	Sheathing (with face grain vertical) that meets the requirements of PS1 or PS2
2 1/2"	1" x 2 5/16"	Sheathing (with face grain vertical) that meets the requirements of PS1 or PS2
3 1/2"	2x4	Construction grade or better (LVL or LSL required for I90HS)

## Concentrated Load (No Bearing Wall Below)

*If concentrated loads from above exceed 1,500 lb, install web stiffeners tight to I joist top flange. See tables at left for nailing and material requirements.*

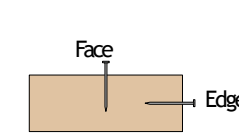
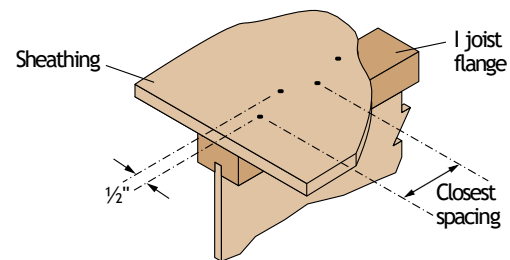


## Minimum Nail Spacing

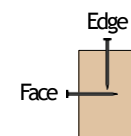
Nail Type	Nail Size	LVL			Sawn Lumber		
		Face	Edge		Face	Edge	
			Joist Flange	Rim Board, Header, Beam			
8d <sup>(1)</sup>	Box	0.113" x 2 1/2"	2"	4"	3"	4"	2"
	Common	0.131" x 2 1/2"	2"	6"	3"	6"	2"
10d	Box	0.128" x 3"	2"	6"	3"	6"	2"
	Common	0.148" x 3"	3"	6"	4"	6"	2 1/2"
12d	Box	0.128" x 3 1/4"	2"	6"	3"	6"	2"
	Common	0.148" x 3 1/4"	3"	6"	4"	6"	2 1/2"
16d	Box	0.135" x 3 1/2"	3"	6"	4"	6"	2 1/2"
	Sinker	0.148" x 3 1/4"	3"	6"	4"	6"	2 1/2"
	Common	0.162" x 3 1/2"	4"	8"	8"	8"	4"

(1) 14 gauge staples may be a direct substitute for 8d nails if a minimum penetration of 1" into the flange is maintained.

- If more than one row of nails is used, offset rows at least 1/2" and stagger. Use 0.148" x 3" nails, maximum, and maintain 3/8" minimum edge distance. **Exception: Wind/Seismic Connections** (see page 17).
- Nailing pattern to be per plans and specifications, and nail spacing should comply with criteria listed on this page.
- For member stability, nail sheathing to the full length of the member (24" on-center, maximum).
- Lag screw allowed only in face of I joist flange. Prebored lead hole required. I45: up to 1/4" diameter. I65, I90, I90H, I90HS: up to 3/8" diameter. No lag screw allowed in edge of flange.



**Flatwise orientation**  
 (typical with I joists and plywood edge blocking)



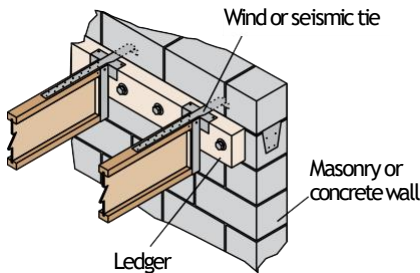
**Edgewise orientation**  
 (typical with rim board, beams, and headers)

## Strap Tension Tie Nailing and Capacities—Allowable Tension Loads\*

Design Category	Maximum Ledger Size	Model No.	Strap Length	Embed. Length, $l_e$		Uncracked Concrete			Cracked Concrete			GFCMU Wall			Max. Allowable Strap Tension (lb)
				Concrete	CMU	Nail Qty.	Nail Size	Tension (lb)	Nail Qty.	Nail Size	Tension (lb)	Nail Qty.	Nail Size	Tension (lb)	
Wind and SDC A-B	4x	PAI18	18"	4"	6"	10	0.148 x 1½"	2,025	10	0.148 x 1½"	2,025	9	0.148 x 1½"	1,055	N/A
		PAI23	23"	4"	6"	15	0.148 x 1½"	3,035	12	0.148 x 1½"	2,260	14	0.148 x 1½"	1,805	N/A
		PAI28	29"	4"	6"	16	0.148 x 1½"	3,230	12	0.148 x 1½"	2,260	16	0.148 x 1½"	2,705	N/A
		PAI35	35"	4"	6"	16	0.148 x 1½"	3,230	12	0.148 x 1½"	2,260	18	0.148 x 1½"	2,815	N/A
		MPAI32	33½"	5½"	5½"	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,355	N/A
		MPAI44	45½"	5½"	5½"	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,885	24	0.148 x 1½"	2,865	N/A
SDC C-F	4x	PAI18	18"	4"	6"	10	0.148 x 1½"	2,025	10	0.148 x 1½"	1,980	9	0.148 x 1½"	1,055	4,180
		PAI23	23"	4"	6"	14	0.148 x 1½"	2,830	10	0.148 x 1½"	1,980	14	0.148 x 1½"	1,805	4,180
		PAI28	29"	4"	6"	14	0.148 x 1½"	2,830	10	0.148 x 1½"	1,980	16	0.148 x 1½"	2,705	5,070
		PAI35	35"	4"	6"	14	0.148 x 1½"	2,830	10	0.148 x 1½"	1,980	18	0.148 x 1½"	2,815	5,070
		MPAI32	33½"	5½"	5½"	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,355	3,205
		MPAI44	45½"	5½"	5½"	16	0.148 x 1½"	2,885	16	0.148 x 1½"	2,885	24	0.148 x 1½"	2,865	3,205

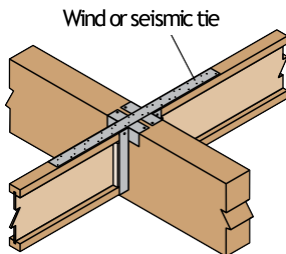
### 19 Wall Tension Tie With Straps

For 2½" or wider I joists.



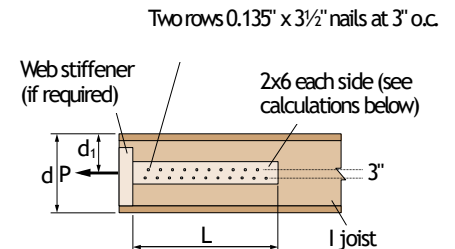
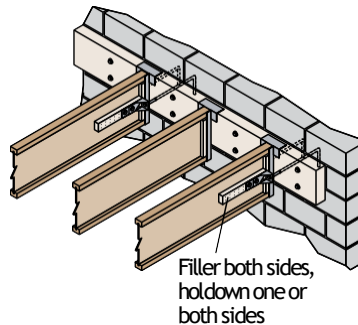
### 20 Wind or Seismic Tie at Butting Joists

Tension straps must have a minimum nail spacing of 3" on-center per row, with a minimum of ⅜" between rows and maximum nail diameter of 0.148" (10d common).



See strap manufacturer's literature for allowable loads.

### 21 Wall Tension Tie—HD Connections



To calculate the length of the filler block (to transfer shear to joist flange):

$$1. \text{ Find } L_1 = \left[ \frac{0.75 (K_P) d_1}{C_D V_r \cdot [V_{DL} + (0.75 V_{LL})]} \right]$$

$$2. \text{ Find } L_2 = \frac{3}{2} (n) + 3, \text{ where } n = \frac{K_P}{V_n C_D}$$

3. Compare  $L_1$  and  $L_2$ . Use maximum of the two values for the length of the the filler block.

- $C_D$  = Load duration factor
- $d_1$  = Distance from top of joist to axial load, inches
- $L_1, L_2$  = Length of filler block, inches
- $K$  = ASD conversion factor for axial load: 0.6 for LRFD wind, 0.7 for LRFD seismic, 1.0 for ASD
- $n$  = Number of nails
- $P$  = Axial load (LRFD or ASD), lb
- $V_r$  = Resistive shear of joist (see page 5), lb
- $V_{DL}$  = Shear due to gravity dead load (ASD), lb
- $V_{LL}$  = Shear due to gravity live load (ASD), lb
- $V_n$  = Nail shear capacity (see table below), lb

### Nail Shear Capacity

I Series	$V_n$ (lb)
I45	107
I65, I90, I90H	124
I90HS	142

## SOUND ASSEMBLIES

The ability of a wall or floor/ceiling system to reduce airborne sound transmission is measured using ASTM E90, and reported using the ASTM E413 Sound Transmission Class (STC) rating system. The ratings listed below—originally developed by the Acoustical and Insulation Materials Association and now considered a standard throughout the industry—are a practical reference for a range of STC numbers. In general, the higher the number, the better the acoustical performance. It is important to note that this table is valid only for a given level of background noise and should be used only for generalized comparisons.

Floor/ceiling systems can also be rated for impact noise transmitted through an assembly. Ratings are determined using the ASTM E492 Impact Insulation Class (IIC) system, and like STC ratings, a high IIC rating indicates significantly reduced impact noise.

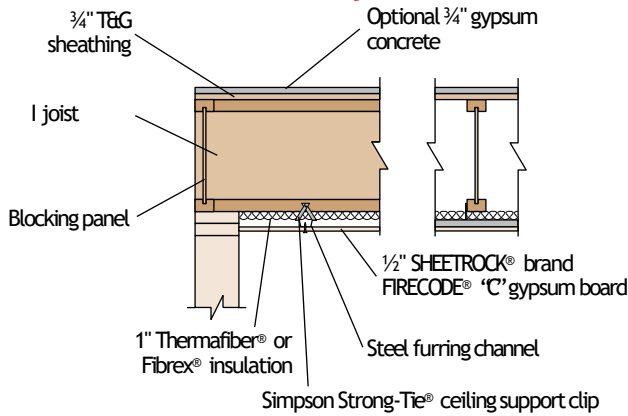
### STCRatings

25	Normal speech can be understood quite clearly
30	Loud speech can be understood fairly well
35	Loud speech audible but not intelligible
42	Loud speech audible as a murmur
45	Must strain to hear loud speech
48	Some loud speech barely audible
50	Loud speech not audible

### Testing

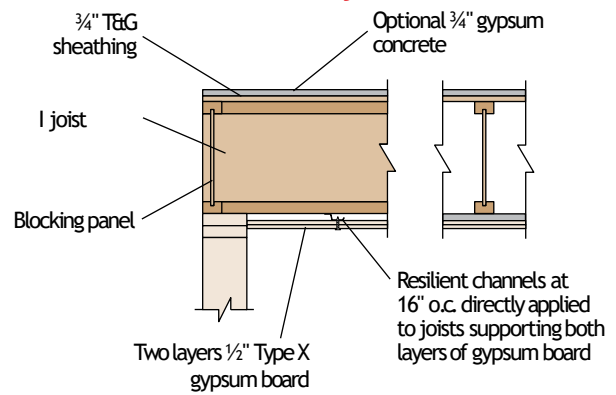
The acoustical assemblies provided below have been tested and rated by recognized acoustical laboratories, and the ratings shown are well within the acceptable range for multi-family buildings. However, in order to achieve these ratings, precautions should be taken to prevent flanking noise and sound leaks, and to ensure that actual construction conforms to the assembly shown.

### 22 ICGES ESR-2994 Assembly D



Without Gypsum Concrete	With Gypsum Concrete
STC = 47	STC = 59
Pad and carpet IIC = 54	Pad and carpet IIC = 54
Cushioned vinyl IIC = 43	Cushioned vinyl IIC = 43

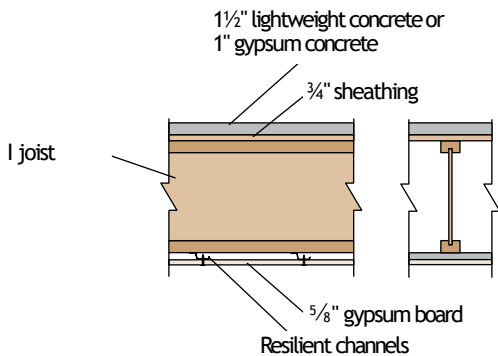
### 23 ICGES ESR-2994 Assembly B



Without Gypsum Concrete	With Gypsum Concrete
STC = 50	STC = 58
Pad and carpet IIC = 60	Pad and carpet IIC = 54
Cushioned vinyl IIC = 45	Armstrong Vios/Armstrong Cambray sheet vinyl LLC = 50(1)
Tarkett Acoustiflor® IIC = 51(1)	Tarkett Acoustiflor® IIC = 54(1)

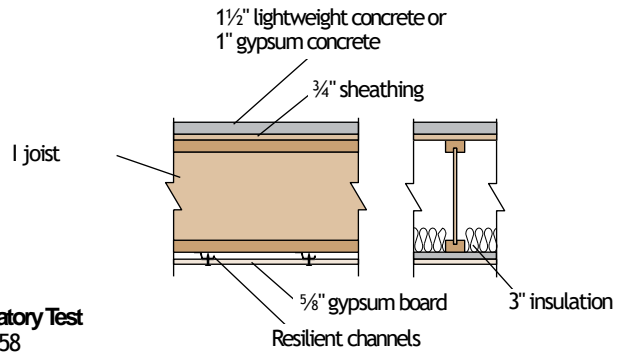
(1) Requires two layers of 5/8" Type X gypsum board with one layer of 3/2" thick batt insulation.

### 24



**Laboratory Test**  
STC = 57  
G&H No. USDA-11xST

### 25



**Laboratory Test**  
STC = 58  
With pad and carpet IIC = 77  
With vinyl tile IIC = 50  
G&H No. USDA-11xST



## Recommended Deflection Criteria

Full-scale tests have shown repeatedly that products have deflection characteristics that are consistently predictable by calculation, with minimal set after load withdrawal.

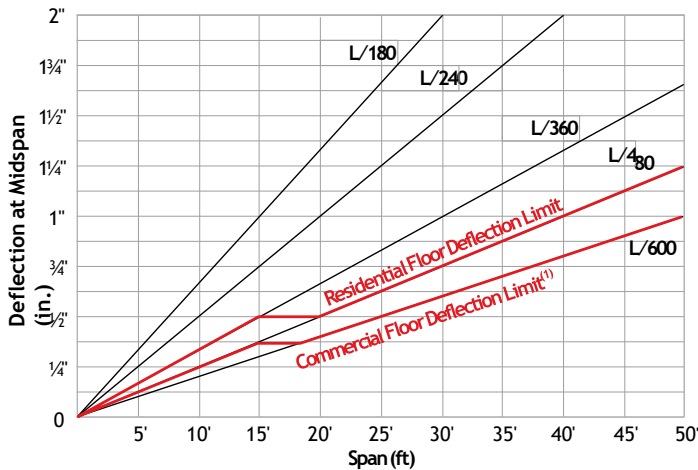
The graph below shows that the recommended deflection limit for residential and commercial floors is more restrictive than the minimum of L/360 required by building codes. The floor load portions of the tables shown on pages 7-9 were developed based on the **Commercial Floor Deflection Limit** shown in the graph below.

### Floors:

- Maximum deflection at live load limited as indicated below
- Movable partition loads need not be considered

### Roofs:

- Sloped Roofs—1/4" to 12" per foot, maximum deflection L/180 at total load
- Plaster Ceilings—Also check L/360 at live load



(1) For live load applications greater than 50 psf, check the L/600 deflection limit using a 50 psf live load, and check the code-prescribed deflection limit using the full live load.

Deflection criteria will vary by application. In a roof system, excessive deflection would be unsightly and could cause ceiling cracks and/or drainage problems. Floor systems, however, have entirely different—and usually much more restrictive—deflection requirements due to an occupant's perception of floor performance and feel.

The fundamental frequency of a floor system can be a good predictor of performance.

## Deflection Calculations

The deflection characteristics of I joists can be closely approximated by analyzing beams using the EI values for flexural deflections shown in the **Design Properties** table on page 5. The EI values selected from the **Design Properties** table must be determined by application (i.e., for roof applications use the EI for joists; for floor applications use the EI for nailed panels or glue-nailed panels).

For uniformly loaded simple spans, the mid-span deflection (in inches) can be calculated as shown below:

Joist Series	Mid-span Deflection Calculation*
I45	$\Delta = \frac{22.5wL^4}{EI} + \frac{2.67wL^2}{d \times 10^6}$
I65, I90, and I90H	$\Delta = \frac{22.5wL^4}{EI} + \frac{2.26wL^2}{d \times 10^6}$
I90HS	$\Delta = \frac{22.5wL^4}{EI} + \frac{2.00wL^2}{d \times 10^6}$

\* The first term represents bending deflection. The second term is shear deflection.

### Where:

- w = Uniform load, plf
- L = Span, feet
- d = Depth of I joist, inches
- EI = Value from the proper column in the **Design Properties** table (page 5), in<sup>2</sup>-lb

### Example Calculation

#### Condition:

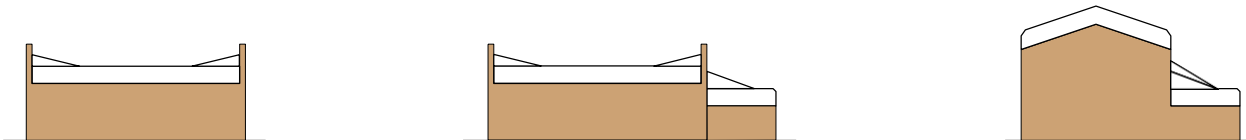
- 14" I65™ floor joist
- 20' span floor
- Nailed floor sheathing
- 100 plf uniform load

$$\Delta = \frac{22.5 \times 100 \times 20^4}{752 \times 10^6} + \frac{2.26 \times 100 \times 20^2}{14 \times 10^6} = 0.54"$$

In this same example, if the deck was glue-nailed to the I joists the deflection would reduce to:

$$\Delta = \frac{22.5 \times 100 \times 20^4}{821 \times 10^6} + \frac{2.26 \times 100 \times 20^2}{14 \times 10^6} = 0.50"$$

## SNOWDRIFT LOADING



Wind direction, site exposure, and roof type and shape are some of the factors that can dramatically influence the accumulation of snow on a roof structure. ASCE 7 (*Minimum Design Loads and Associated Criteria for Buildings and Other Structures*) and the applicable building code, as well as other local state and regional codes, provide guidelines for calculating snowdrift loadings on all types of building construction.

Drifts usually occur at locations of discontinuity in a roof, such as at parapet walls, valleys, or where a high roof meets a low roof. Closer on-center spacing or additional support may be required at these locations.

The examples above illustrate potential snowdrift conditions. The project design professional is responsible for determining any additional loads due to snow drifting.