

<p style="text-align: center;">DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Housing—Federal Housing Commissioner</p> <p>TO: DIRECTORS, HOUSING DIVISION DIRECTORS, MULTIFAMILY DIVISION DIRECTORS, SINGLE FAMILY DIVISION</p>	<p>Series and Series Number: MATERIALS RELEASE NO. 1242c (Supersedes issue dated April 6, 1998)</p>
	<p>ISSUE DATE February 23, 2000</p>
	<p>REVIEW DATE February 23, 2003</p>
<p>SUBJECT:</p> <p>1. Product: BCI Joists</p> <p>2. Name and Address of Manufacturer: Boise Cascade Corporation P.O. Box 2400 White City, OR 97503-0400</p>	

Data on the nonstandard product described herein have been reviewed by the Department of Housing and Urban Development (HUD) and determination has been made that it is considered suitable from a technical standpoint for the use indicated herein. This Release does not purport to establish a comparative quality or value rating for this product as compared to standard products normally used in the same manner.

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USE: Floor joists and roof joists.

DESCRIPTION:

The BCI joist is fabricated from Douglas Fir Laminated Veneer Lumber (LVL) flanges and Plywood or Oriented Strand Board (OSB) webs. Flange widths are 1.5, 1.75, 2.3 or 3.5 inches (38.1, 44.5 58.4 or 88.9mm). Flange thickness is either 1.3 or 1.5 inches (33 or 38.1mm). Joist depths range from 9.5 to 20 inches (241 to 508mm). Joists are available in lengths up to 66 feet (1.7m). Refer to Table 2 for flange grades, flange dimensions, web material, and the range of depths associated with various series of joists.

The joist webs are 3/8 inch (9.5mm) in thickness. The web sections are installed in 4 ft. (1.22m) lengths with the face grain perpendicular to the length of the flanges. The web-to-web edges are finger jointed and glued. The flanges are routed to accept the web. The web and flange are pressure glued in a continuous operation.

REQUIREMENTS:

Adhesives are of the types specified in the Boise Cascade Corporation manufacturing standards and which comply with ASTM D 2559, Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.

Plywood web material shall conform to U.S. Product Standard PS1, Construction and Industrial Plywood. Plywood for joists 12 inches (305mm) in depth or less shall be C-D Structural 1 panels. Plywood for joist depths greater than 12 inches (305mm) shall be C-C Structural 1 panels.

All OSB webs shall conform to U.S. Product Standard to PS-2, Performance Standard for Wood-Based Structural-Use Panels. OSB for all depths of joists shall be Exposure 1 panel having a span rating of 24/0.

The LVL flanges shall be manufactured to meet the requirements set forth in Materials Release 1241c.

DESIGNS:

Design of BCI joists shall be in accordance with the current Boise Cascade Engineered Wood Products Specifier Guide and this Materials Release (MR). The allowable design properties for BCI joists listed in Tables 1 and 3 of this MR shall not be exceeded. Minimum distances from supports for various web hole sizes in joists subjected to uniformly loaded simple-span conditions are shown in Tables 5, 6, 7 and 8. Equations are included in the footnotes of each table for calculating the reduction in allowable shear due to the presence of holes in the webs of the BCI joists. Allowable floor spans for certain specific conditions are noted in Table 9. Minimum bearing length for simple-spans shall be 1¾ inches (44.5mm). Minimum bearing length at intermediate support points for multiple-span joists shall be 3¾ inches (89 mm).

When joists are used as simple-span members, the design shear shall be equal to the end reaction.

A 4 percent repetitive member increase of the allowable moment is applicable for joists either in contact or spaced not more than 24 inches (610mm) on center, not less than three in number, and joined by an approved load distributing elements adequate to support the design load, such as approved wood structural panels.

The compression flange shall be laterally supported in accordance with the design. Joist ends shall be restrained to prevent rollover as by diaphragm sheathing attached to the top flange and to an end wall or shear transfer panel, or blocking or cross-bracing capable of transferring the larger of 50 pounds per foot (730N/m) or the required shear force due to wind, seismic or soil conditions. Bridging, as required by the Minimum Property Standards (MPS) for wood frame construction, is not required in BCI floor and roof joist applications.

Adjustments for duration of load provided for wood members and their connections shall be in accordance with the MPS.

Total I-joist deflection is caused by two types of stresses, bending and shear. Bending deflection shall be calculated using standard engineering formulae. Shear deflection in BCI joists shall be calculated using the formula: $D=8M/K$ where D is the deflection in inches, M is the maximum applied moment in inch-pounds, and the value for K is given in Table 1.

Minimum on-center spacing for nails installed in the flange of BCI joists is shown in Table 4. Allowable lateral and withdrawal values for nails installed perpendicular or parallel to the flange glue lines shall be as provided in the MPS for nails installed in solid-sawn lumber having a specific gravity of 0.50, such as Douglas fir-larch. Nails installed perpendicular to the flange glue lines are assigned the same allowable shear values for horizontal wood diaphragms as those provided in the MPS for nails installed in solid-sawn lumber having a specific gravity of 0.50.

INSTALLATION AND LIMITATIONS:

Installation of BCI joists shall be in accordance with the current Boise Cascade Engineered Wood Products Specifier Guide. Plans shall include loading conditions, joist sizes, spans, support conditions, stiffener locations, connections and web hole locations. When conditions differ from those described in the Specifier Guide and Table 9 of this report, design calculations shall accompany the plans.

BCI joists shall be restricted to covered installation with dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber in which the moisture content is less than 16 percent. Web stiffeners, when required, shall be installed by as shown in Figure 1. Fire resistive and sound rated assemblies shall be constructed in accordance with Figure 2.

TABLE 1 - DESIGN PROPERTIES FOR BCI JOISTS ⁽¹⁾															
SERIES	DEPTH (in)	ALLOW. MOM. (ft-lbs)	EI ⁽²⁾ x 10 ⁶ (in ² -lbs)	K ⁽²⁾ x 10 ⁶ (in-lb/in)	VERT. SHEAR (lbs)	END REACTION (lbs)				STIFF. ⁽⁵⁾ NAILS	INTERMEDIATE REACTION (lbs)				STIFF. ⁽⁶⁾ NAILS
						1 3/4" ⁽³⁾		3 1/2"			3 1/2" ⁽³⁾		5 1/4"		
						NO ⁽⁴⁾	YES ⁽⁴⁾	NO ⁽⁴⁾	YES ⁽⁴⁾		NO ⁽⁴⁾	YES ⁽⁴⁾	NO ⁽⁴⁾	YES ⁽⁴⁾	
40	9 1/2	2388	155.5	2.75	870	870	N/A	870	N/A	N/A	1740	N/A	N/A	N/A	N/A
	11 7/8	3187	265.0	3.37	1080	1000	N/A	1080	N/A	N/A	2000	N/A	N/A	N/A	N/A
	14	3907	390.2	3.94	1150	1100	N/A	1150	N/A	N/A	2200	N/A	N/A	N/A	N/A
45	9 1/2	3019	189.3	2.78	870	870	N/A	870	N/A	N/A	1740	N/A	N/A	N/A	N/A
	11 7/8	4031	321.6	3.41	1080	1000	N/A	1080	N/A	N/A	2000	N/A	N/A	N/A	N/A
	14	4844	472.1	3.98	1150	1100	N/A	1150	N/A	N/A	2200	N/A	N/A	N/A	N/A
	16	5807	642.5	4.53	1350	1280	N/A	1350	N/A	N/A	2560	N/A	N/A	N/A	N/A
60	11 7/8	5348	418.3	3.46	1080	1000	N/A	1080	N/A	N/A	2000	N/A	N/A	N/A	N/A
	14	6563	612.2	4.04	1150	1100	N/A	1150	N/A	N/A	2200	N/A	N/A	N/A	N/A
	16	7710	830.8	4.59	1350	1280	1350	1350	N/A	2-8d	2560	2700	N/A	N/A	2-8d
	18	8862	1085.4	5.14	1550	N/A	1550	N/A	1550	3-8d	N/A	3100	N/A	N/A	3-8d
	20	10015	1377.1	5.70	1750	N/A	1750	N/A	1750	3-8d	N/A	3500	N/A	N/A	3-8d
400	9 1/2	2158	144.8	5.10	1375	950	1125	1125	1275	2-8d	2050	2350	2500	2750	2-8d
	11 7/8	2853	246.1	6.34	1825	950	1425	1425	1475	2-8d	2200	2850	2650	3250	3-8d
	14	3490	362.6	7.45	1825	1025	1525	1475	1725	2-8d	2200	3450	2700	3650	5-8d
450	9 1/2	2537	167.6	5.16	1375	1025	1125	1125	1275	2-8d	2200	2350	2575	2750	2-8d
	11 7/8	3356	284.0	6.41	1825	1025	1425	1425	1475	2-8d	2325	2850	2650	3250	3-8d
	14	4094	417.1	7.53	1825	1025	1525	1525	1725	2-8d	2350	3450	2700	3650	5-8d
	16	4781	568.6	8.58	1875	1025	1625	1525	1875	2-8d	2400	3650	2750	3750	6-8d
600	11 7/8	4806	384.7	6.52	1825	1175	1425	1425	1475	2-8d	2550	2850	2900	3250	3-8d
	14	5864	562.1	7.65	1825	1175	1525	1625	1725	2-8d	2650	3450	2925	3650	5-8d
	16	6864	762.7	8.72	1875	1175	1625	1625	1875	2-8d	2750	3650	2950	3750	6-8d
	18	7867	997.1	9.78	2275	N/A	1750	N/A	2175	3-8d	N/A	3950	N/A	4550	7-8d
	20	8870	1266.5	10.85	2375	N/A	1900	N/A	2250	3-8d	N/A	4200	N/A	4750	8-8d
40X	9 1/2	2388	156.7	5.13	1375	950	1125	1125	1275	2-8d	2050	2350	2500	2750	2-8d
	11 7/8	3187	268.0	6.36	1825	950	1425	1425	1475	2-8d	2200	2850	2650	3250	3-8d
	14	3907	395.9	7.47	1825	1025	1525	1475	1725	2-8d	2200	3450	2700	3650	5-8d
45X	9 1/2	2803	181.7	5.20	1375	1025	1125	1125	1275	2-8d	2200	2350	2575	2750	2-8d
	11 7/8	3743	309.9	6.43	1825	1025	1425	1425	1475	2-8d	2325	2850	2650	3250	3-8d
	14	4590	456.5	7.55	1825	1025	1525	1525	1725	2-8d	2350	3450	2700	3650	5-8d
	16	5392	623.4	8.60	1875	1025	1625	1525	1875	2-8d	2400	3650	2750	3750	6-8d
60X	11 7/8	4968	402.0	6.55	1825	1175	1425	1425	1475	2-8d	2750	2850	3200	3250	3-8d
	14	6084	589.9	7.67	1825	1175	1525	1625	1725	2-8d	2750	3450	3200	3650	5-8d
	16	7160	802.7	8.74	1875	1175	1625	1625	1875	2-8d	2750	3650	3200	3750	6-8d
	18	8229	1051.3	9.81	2275	N/A	1750	N/A	2175	3-8d	N/A	3950	N/A	4550	7-8d
	20	9300	1337.1	10.88	2375	N/A	1900	N/A	2250	3-8d	N/A	4200	N/A	4750	8-8d
60XL	11 7/8	5348	421.3	6.55	1825	1175	1425	1425	1475	2-8d	2750	2850	3200	3250	3-8d
	14	6563	617.8	7.67	1825	1175	1525	1625	1725	2-8d	2750	3450	3200	3650	5-8d
	16	7710	840.1	8.74	1875	1175	1625	1625	1875	2-8d	2750	3650	3200	3750	6-8d
	18	8862	1099.8	9.81	2275	N/A	1750	N/A	2175	3-8d	N/A	3950	N/A	4550	7-8d
	20	10015	1398.0	10.88	2375	N/A	1900	N/A	2250	3-8d	N/A	4200	N/A	4750	8-8d
90XL	11 7/8	8224	632.3	6.69	2150	1425	1850	1900	1950	3-16d	3375	3700	4000	4300	3-16d
	14	10095	923.5	7.83	2225	1450	1950	1950	2150	5-16d	3400	3850	4100	4450	5-16d
	16	11865	1250.9	8.91	2350	1475	2150	2000	2350	6-16d	3425	4000	4200	4650	6-16d
	18	13639	1631.3	9.99	2550	N/A	2300	N/A	2550	7-16d	N/A	4150	N/A	4750	7-16d
	20	15417	2085.7	11.07	2650	N/A	2500	N/A	2650	8-16d	N/A	4300	N/A	4850	8-16d

For S: 1 inch = 25.4 mm; 1 ft-lb = 1.36 N-m; 1 in²-lb = 179 mm²-N; 1 in-lb/in = 4.4 N-mm/mm; 1 lb = 4.45 N; 1 lb/R = 14.8 N/m.

⁽¹⁾ For joist descriptions see TABLE 2.

⁽²⁾ Calculate bending and shear deflection as described in "DESIGNS".

⁽³⁾ Minimum bearing length required.

⁽⁴⁾ No web stiffener required.

⁽⁵⁾ Web stiffener required see FIGURE 1.

⁽⁶⁾ Number of nails required in web stiffener.

JOIST SERIES	FLANGE		WEB MATERIAL	RANGE OF JOIST DEPTHS (Inches)
	MATERIAL ¹	DIMENSIONS		
		(depth x width) (Inches)		
BCI/40	24 Fb DF LVL	1.5 x 1.5	3/8" PLY	9 1/2 to 14
BCI/45	28 Fb DF LVL	1.5 x 1.75	3/8" PLY	9 1/2 to 16
BCI/60	28 Fb DF LVL	1.5 x 2.3	3/8" PLY	11 7/8 to 20
BCI/400	24 Fb DF LVL	1.3 x 1.5	3/8" OSB	9 1/2 to 14
BCI/450	24 Fb DF LVL	1.3 x 1.75	3/8" OSB	9 1/2 to 16
BCI/600	28 Fb DF LVL	1.3 x 2.3	3/8" OSB	11 7/8 to 20
BCI/40X	24 Fb DF LVL	1.5 x 1.5	3/8" OSB	9 1/2 to 14
BCI/45X	24 Fb DF LVL	1.5 x 1.75	3/8" OSB	9 1/2 to 16
BCI/60X	24 Fb DF LVL	1.5 x 2.3	3/8" OSB	11 7/8 to 20
BCI/60XL	28 Fb DF LVL	1.5 x 2.3	3/8" OSB	11 7/8 to 20
BCI/90XL	28 Fb DF LVL	1.5 x 3.5	3/8" OSB	11 7/8 to 20

For St: 1 Inch = 25.4 mm

¹ Laminated Veneer Lumber (LVL) as described in MR 1241

SERIES	DEPTH (In)	VERT. CAP. (lb/ft)		SERIES	DEPTH (In)	VERT. CAP. (lb/ft)		SERIES	DEPTH (In)	VERT. CAP. (lb/ft)	
		STIFFENER				STIFFENER				STIFFENER	
		NO	YES ⁽²⁾⁽³⁾			NO	YES ⁽²⁾⁽³⁾			NO	YES ⁽²⁾⁽³⁾
BCI/40	9 1/2	2800	N/A	BCI/400	9 1/2	2400	N/A	BCI/40X	9 1/2	2650	N/A
BCI/45	11 7/8	2550	N/A	BCI/450	11 7/8	2250	N/A	BCI/45X	11 7/8	2500	N/A
BCI/60	14	2350	N/A	BCI/600	14	2100	N/A	BCI/60X	14	2400	N/A
	16	2150	N/A		16	2000	N/A	BCI/60XL	16	2300	N/A
	18	N/A	3000		18	N/A	2600	BCI/90XL	18	N/A	2700
	20	N/A	3000		20	N/A	2600	20	N/A	2700	

For St: 1 Inch = 25.4 mm; 1 lb/ft = 14.6 N/m

⁽¹⁾ Panel shall be continuously supported

⁽²⁾ Web stiffener required see FIGURE 1.

⁽³⁾ 3 - 8d nails required in web stiffeners for blocking panels.

CONNECTOR SIZE	NAILS PERPENDICULAR TO THE GLUE LINE		NAILS PARALLEL TO THE GLUE LINE	
	O.C. SPACING	END OF JOIST	O.C. SPACING	END OF JOIST
	(Inches)	(Inches)	(Inches)	(Inches)
8d BOX	2	1.5	4	1.5
8d COMMON	2	1.5	4	3
10d & 12d BOX	2	1.5	4	3
16d BOX	2	1.5	6	4
10d & 12d COMMON	3	2	6	4
16d SINKER	3	2	6	4
16d COMMON	3	2	6	4
SIMPSON A35F	—	—	USE 8d x 1.5	
SIMPSON ITT 29.5	—	—	USE 10d x 1.5	

For St: 1 Inch = 25.4 mm

TABLE 5 - HOLE CHART FOR BCI JOISTS (PLYWOOD WEB)					
JOIST DEPTH (in)	CIRCULAR HOLE DIAMETER (in)				
	COL #1	COL #2	COL #3	COL #4	COL #5
9 1/2	---	2	3	4	5
11 7/8	2	3	4 1/2	5 1/2	7
14	2	3 1/2	5 1/2	7	8 1/2
16	2 1/2	4 1/2	6 1/2	8 1/2	10 1/2
18	3	5	7 1/2	9 1/2	12
20	3	6	8 1/2	11	13 1/2
SPAN (ft)	MIN. DISTANCE FROM SUPPORT (ft-in)				
10	1' - 0"	1' - 0"	1' - 7"	2' - 2"	2' - 8"
12	1' - 0"	1' - 3"	1' - 11"	2' - 7"	3' - 3"
14	1' - 0"	1' - 5"	2' - 3"	3' - 0"	3' - 9"
16	1' - 0"	1' - 8"	2' - 7"	3' - 5"	4' - 4"
18	1' - 0"	1' - 10"	2' - 10"	3' - 10"	4' - 10"
20	1' - 2"	2' - 1"	3' - 2"	4' - 3"	5' - 5"
22	1' - 3"	2' - 3"	3' - 6"	4' - 8"	5' - 11"
24	1' - 4"	2' - 6"	3' - 10"	5' - 1"	6' - 5"
26	1' - 6"	2' - 8"	4' - 2"	5' - 6"	7' - 0"
28	1' - 7"	2' - 11"	4' - 6"	6' - 0"	7' - 6"
30	1' - 9"	3' - 1"	4' - 9"	6' - 5"	8' - 1"
32	1' - 10"	3' - 4"	5' - 1"	6' - 10"	8' - 7"
34	1' - 11"	3' - 6"	5' - 5"	7' - 3"	9' - 2"
36	2' - 1"	3' - 9"	5' - 9"	7' - 8"	9' - 8"
38	2' - 2"	3' - 11"	6' - 1"	8' - 1"	10' - 3"
40	2' - 3"	4' - 2"	6' - 5"	8' - 6"	10' - 9"

For St: 1 inch = 25.4 mm, 1 foot = 304.8 mm

NOTES:

1. Shear reduction is calculated by the equation: % RED. = ((Hole dia./Joist depth - 3)^{0.73} - 0.05
2. Table is based on simple span, uniform loading, and maximum allowable shear stresses from Table 1.
3. End distance may be reduced proportionally for lesser shear stresses. Minimum end distance is 1'-0".
4. For multiple span or concentrated loads, shear at the hole location must not exceed what a uniform load would produce at the distance shown in the table.
5. Where more than one hole is desired, the length of web between holes must equal or exceed twice the diameter of the largest hole.
6. A 1 1/2" diameter hole may be cut anywhere in the web of the joist. Flanges must never be cut.

INSTRUCTIONS:

1. Use the joist depth and desired hole diameter to determine the column to use.
2. Use the joist span in the lower half of the table and read the dimension from the selected column. The dimension selected is the minimum distance from the centerline of the support to the center of the hole.
3. Values in-between those listed may be found by interpolation.

EXAMPLE: 14" joist with a 7" diameter hole and a 26' span length.

1. From the upper half of the table select Column 4.
2. For a 26' span and Column 4, reading the lower half of the table, the center of the hole must be a minimum of 5'-6" from the centerline of the nearest support.

TABLE 6 - HOLE CHART FOR BCI JOISTS (PLYWOOD WEB)									
JOIST DEPTH (in)	RECTANGULAR HOLE DIMENSIONS (height x length) (in)								
	COL #1	COL #2	COL #3	COL #4	COL #5	COL #6	COL #7	COL #8	COL #9
9 1/2	2 x 6	4 x 6	6 1/2 x 6	2 x 12	4 x 12	6 1/2 x 12	2 x 18	4 x 18	6 1/2 x 18
11 7/8	3 x 6	6 x 6	8 7/8 x 6	3 x 12	6 x 12	8 7/8 x 12	3 x 18	6 x 18	8 7/8 x 18
14	4 x 6	7 x 6	11 x 6	4 x 12	7 x 12	11 x 12	4 x 18	7 x 18	11 x 18
16	4 x 6	9 x 6	13 x 6	4 x 12	9 x 12	13 x 12	4 x 18	9 x 18	13 x 18
18	5 x 6	10 x 6	15 x 6	5 x 12	10 x 12	15 x 12	5 x 18	10 x 18	15 x 18
20	6 x 6	12 x 6	17 x 6	6 x 12	12 x 12	17 x 12	6 x 18	12 x 18	17 x 18
SPAN (ft)	MIN. DISTANCE FROM SUPPORT (ft-in)								
10	2' - 1"	3' - 4"	4' - 5"	3' - 2"	3' - 4"	4' - 5"	4' - 5"	4' - 5"	4' - 5"
12	2' - 6"	4' - 0"	5' - 3"	3' - 10"	4' - 0"	5' - 3"	5' - 3"	5' - 3"	5' - 3"
14	2' - 11"	4' - 8"	6' - 2"	4' - 5"	4' - 8"	6' - 2"	6' - 2"	6' - 2"	6' - 2"
16	3' - 4"	5' - 4"	7' - 0"	5' - 1"	5' - 4"	7' - 0"	7' - 0"	7' - 0"	7' - 0"
18	3' - 9"	6' - 0"	7' - 11"	5' - 9"	6' - 0"	7' - 11"	7' - 11"	7' - 11"	7' - 11"
20	4' - 2"	6' - 8"	8' - 9"	6' - 4"	6' - 8"	8' - 9"	8' - 9"	8' - 9"	8' - 9"
22	4' - 7"	7' - 4"	9' - 8"	7' - 0"	7' - 4"	9' - 8"	9' - 8"	9' - 8"	9' - 8"
24	5' - 0"	8' - 0"	10' - 6"	7' - 7"	8' - 0"	10' - 6"	10' - 6"	10' - 6"	10' - 6"
26	5' - 5"	8' - 8"	11' - 5"	8' - 3"	8' - 8"	11' - 5"	11' - 5"	11' - 5"	11' - 5"
28	5' - 10"	9' - 3"	12' - 3"	8' - 11"	9' - 3"	12' - 3"	12' - 3"	12' - 3"	12' - 3"
30	6' - 3"	9' - 11"	13' - 2"	9' - 6"	9' - 11"	13' - 2"	13' - 2"	13' - 2"	13' - 2"
32	6' - 8"	10' - 7"	14' - 0"	10' - 2"	10' - 7"	14' - 0"	14' - 0"	14' - 0"	14' - 0"
34	7' - 1"	11' - 3"	14' - 11"	10' - 10"	11' - 3"	14' - 11"	14' - 11"	14' - 11"	14' - 11"
36	7' - 6"	11' - 11"	15' - 10"	11' - 5"	11' - 11"	15' - 10"	15' - 10"	15' - 10"	15' - 10"
38	7' - 11"	12' - 7"	16' - 8"	12' - 1"	12' - 7"	16' - 8"	16' - 8"	16' - 8"	16' - 8"
40	8' - 4"	13' - 3"	17' - 7"	12' - 8"	13' - 3"	17' - 7"	17' - 7"	17' - 7"	17' - 7"

For St: 1 inch = 25.4 mm, 1 foot = 304.8 mm

NOTES:

1. Shear reduction is calculated by the equation: % RED. = $(0.73 * X) - 0.15$. Where X is the maximum value determined by the equation: $X = (\text{Hole height} / (\text{Joist depth} - 3))$; or $X = (\text{Hole length} / 18)$.
2. Table is based on simple span, uniform loading, and maximum allowable shear stresses from Table 1.
3. End distance may be reduced proportionally for lesser shear stresses. Minimum end distance is 1'-0".
4. For multiple span or concentrated loads, shear at the hole location must not exceed what a uniform load would produce at the distance shown in the table.
5. Where more than one hole is desired, the length of web between holes must equal or exceed twice the greatest dimension of the largest hole.
6. A 1 1/2" diameter hole may be cut anywhere in the web of the joist. Flanges must never be cut.

INSTRUCTIONS:

1. Use the joist depth and desired hole dimensions to determine the column to use.
2. Use the joist span in the lower half of the table and read the dimension from the selected column. The dimension selected is the minimum distance from the centerline of the support to the center of the hole.
3. Values in-between those listed may be found by interpolation.

EXAMPLE: 14" joist with a 4-inch by 12-inch hole and a 26' span length.

1. From the upper half of the table select Column 4.
2. For a 26' span and Column 4, reading the lower half of the table, the center of the hole must be a minimum of 8'-3" from the centerline of the nearest support.

TABLE 7 - HOLE CHART FOR BCI JOISTS (OSB WEB)					
JOIST DEPTH (in)	CIRCULAR HOLE DIAMETER (in)				
	COL #1	COL #2	COL #3	COL #4	COL #5
9 1/2	—	2	3	4	5
11 7/8	2	3	4 1/2	5 1/2	7
14	2	3 1/2	5 1/2	7	8 1/2
16	2 1/2	4 1/2	6 1/2	8 1/2	10 1/2
18	3	5	7 1/2	9 1/2	12
20	3	6	8 1/2	11	13 1/2
SPAN (ft)	MIN. DISTANCE FROM SUPPORT (ft-in)				
	COL #1	COL #2	COL #3	COL #4	COL #5
10	1' - 5"	1' - 10"	2' - 4"	2' - 10"	3' - 5"
12	1' - 8"	2' - 2"	2' - 10"	3' - 5"	4' - 1"
14	1' - 11"	2' - 7"	3' - 3"	4' - 0"	4' - 9"
16	2' - 2"	2' - 11"	3' - 9"	4' - 7"	5' - 5"
18	2' - 6"	3' - 3"	4' - 3"	5' - 2"	6' - 1"
20	2' - 9"	3' - 8"	4' - 8"	5' - 9"	6' - 9"
22	3' - 0"	4' - 0"	5' - 2"	6' - 3"	7' - 5"
24	3' - 4"	4' - 4"	5' - 8"	6' - 10"	8' - 2"
26	3' - 7"	4' - 9"	6' - 1"	7' - 5"	8' - 10"
28	3' - 10"	5' - 1"	6' - 7"	8' - 0"	9' - 6"
30	4' - 2"	5' - 5"	7' - 1"	8' - 7"	10' - 2"
32	4' - 5"	5' - 10"	7' - 6"	9' - 2"	10' - 10"
34	4' - 8"	6' - 2"	8' - 0"	9' - 9"	11' - 6"
36	5' - 0"	6' - 7"	8' - 5"	10' - 3"	12' - 2"
38	5' - 3"	6' - 11"	8' - 11"	10' - 10"	12' - 10"
40	5' - 6"	7' - 3"	9' - 5"	11' - 5"	13' - 7"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

NOTES:

1. Shear reduction is calculated by the equation: % RED. = $\left(\frac{\text{Hole dia.}}{\text{Joist depth} - \text{Flange height}}\right) \cdot 0.69 + 0.12$.
2. Table is based on simple span, uniform loading, and maximum allowable shear stresses from Table 1.
3. End distance may be reduced proportionally for lesser shear stresses. Minimum end distance is 1'-0".
4. For multiple span or concentrated loads, shear at the hole location must not exceed what a uniform load would produce at the distance shown in the table.
5. Where more than one hole is desired, the length of web between holes must equal or exceed twice the diameter of the largest hole.
6. A 1 1/2" diameter hole may be cut anywhere in the web of the joist. Flanges must never be cut.

INSTRUCTIONS:

1. Use the joist depth and desired hole diameter to determine the column to use.
2. Use the joist span in the lower half of the table and read the dimension from the selected column. The dimension selected is the minimum distance from the centerline of the support to the center of the hole.
3. Values in-between those listed may be found by interpolation.

EXAMPLE: 14" joist with a 7" diameter hole and a 26' span length.

1. From the upper half of the table select Column 4.
2. For a 26' span and Column 4, reading the lower half of the table, the center of the hole must be a minimum of 7'-5" from the centerline of the nearest support.

TABLE 8 - HOLE CHART FOR BCI JOISTS (OSB WEB)									
JOIST DEPTH (in)	RECTANGULAR HOLE DIMENSIONS (height x length) (in)								
	COL #1	COL #2	COL #3	COL #4	COL #5	COL #6	COL #7	COL #8	COL #9
9 1/2	2 x 6	4 x 6	6 1/2 x 6	2 x 12	4 x 12	6 1/2 x 12	2 x 18	4 x 18	6 1/2 x 18
11 7/8	3 x 6	6 x 6	8 7/8 x 6	3 x 12	6 x 12	8 7/8 x 12	3 x 18	6 x 18	8 7/8 x 18
14	4 x 6	7 x 6	11 x 6	4 x 12	7 x 12	11 x 12	4 x 18	7 x 18	11 x 18
16	4 x 6	9 x 6	13 x 6	4 x 12	9 x 12	13 x 12	4 x 18	9 x 18	13 x 18
18	5 x 6	10 x 6	15 x 6	5 x 12	10 x 12	15 x 12	5 x 18	10 x 18	15 x 18
20	6 x 6	12 x 6	17 x 6	6 x 12	12 x 12	17 x 12	6 x 18	12 x 18	17 x 18
SPAN (ft)	MIN. DISTANCE FROM SUPPORT (ft-in)								
	3' - 0"	3' - 6"	3' - 11"	3' - 6"	3' - 11"	4' - 4"	4' - 0"	4' - 5"	4' - 10"
10	3' - 7"	4' - 2"	4' - 8"	4' - 2"	4' - 9"	5' - 3"	4' - 9"	5' - 4"	5' - 10"
12	4' - 2"	4' - 10"	5' - 5"	4' - 10"	5' - 6"	6' - 1"	5' - 7"	6' - 3"	6' - 9"
14	4' - 9"	5' - 7"	6' - 3"	5' - 7"	6' - 4"	7' - 0"	6' - 4"	7' - 1"	7' - 9"
16	5' - 5"	6' - 3"	7' - 0"	6' - 3"	7' - 1"	7' - 10"	7' - 2"	8' - 0"	8' - 9"
18	6' - 0"	6' - 11"	7' - 9"	6' - 11"	7' - 11"	8' - 9"	7' - 11"	8' - 11"	9' - 8"
20	6' - 7"	7' - 8"	8' - 7"	7' - 8"	8' - 8"	9' - 7"	8' - 9"	9' - 9"	10' - 8"
22	7' - 2"	8' - 4"	9' - 4"	8' - 4"	9' - 6"	10' - 6"	9' - 6"	10' - 8"	11' - 8"
24	7' - 9"	9' - 0"	10' - 1"	9' - 0"	10' - 3"	11' - 4"	10' - 4"	11' - 6"	12' - 7"
26	8' - 5"	9' - 9"	10' - 10"	9' - 9"	11' - 1"	12' - 3"	11' - 1"	12' - 5"	13' - 7"
28	9' - 0"	10' - 5"	11' - 8"	10' - 5"	11' - 10"	13' - 1"	11' - 11"	13' - 4"	14' - 7"
30	9' - 7"	11' - 1"	12' - 5"	11' - 1"	12' - 8"	14' - 0"	12' - 8"	14' - 2"	15' - 6"
32	10' - 2"	11' - 10"	13' - 2"	11' - 10"	13' - 5"	14' - 10"	13' - 6"	15' - 1"	16' - 6"
34	10' - 9"	12' - 6"	14' - 0"	12' - 6"	14' - 3"	15' - 9"	14' - 3"	16' - 0"	17' - 6"
36	11' - 4"	13' - 2"	14' - 9"	13' - 2"	15' - 0"	16' - 7"	15' - 1"	16' - 10"	18' - 5"
38	12' - 0"	13' - 11"	15' - 6"	13' - 11"	15' - 10"	17' - 6"	15' - 10"	17' - 9"	19' - 5"
40									

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm

NOTES:

1. Shear reduction is calculated by the equation: % RED. = (((Hole height / (Joist depth - Flange height))^0.28) + ((Hole length / 18)^0.28) + 0.40.
2. Table is based on simple span, uniform loading, and maximum allowable shear stresses from Table 1.
3. End distance may be reduced proportionally for lesser shear stresses. Minimum end distance is 1'-0".
4. For multiple span or concentrated loads, shear at the hole location must not exceed what a uniform load would produce at the distance shown in the table.
5. Where more than one hole is desired, the length of web between holes must equal or exceed twice the greatest dimension of the largest hole.
6. A 1 1/2" diameter hole may be cut anywhere in the web of the joist. Flanges must never be cut.

INSTRUCTIONS:

1. Use the joist depth and desired hole dimensions to determine the column to use.
2. Use the joist span in the lower half of the table and read the dimension from the selected column. The dimension selected is the minimum distance from the centerline of the support to the center of the hole.
3. Values in-between those listed may be found by interpolation.

EXAMPLE: 14" joist with a 4-inch by 12-inch hole and a 26' span length.

1. From the upper half of the table select Column 4.
2. For a 26' span and Column 4, reading the lower half of the table, the center of the hole must be a minimum of 8'-0" from the centerline of the nearest support.

TABLE 9 - BCI ALLOWABLE FLOOR SPANS^{1,2,3,4,5,6,7}

O.C. Spacing	40 Series			45 Series				60 Series				
	9 1/2"	11 7/8"	14"	9 1/2"	11 7/8"	14"	16"	11 7/8"	14"	16"	18"	20"
12"	18' 3"	21' 9"	24' 8"	19' 4"	23' 0"	26' 1"	28' 11"	24' 10"	28' 2"	31' 2"	34' 1"	36' 11"
16"	16' 8"	19' 10"	22' 1"	17' 7"	20' 11"	23' 9"	26' 3"	22' 7"	25' 7"	28' 4"	30' 11"	33' 6"
19.2"	15' 8"	18' 2"	20' 2"	16' 7"	19' 8"	22' 4"	24' 7"	21' 3"	24' 1"	26' 8"	29' 1"	31' 6"
24"	14' 1"	16' 3"	18' 0"	15' 5"	18' 4"	20' 3"	22' 0"	19' 8"	22' 0"	24' 8"	27' 0"	28' 10"
32"	12' 0"	13' 10"	15' 4"	13' 1"	15' 0"	16' 6"	18' 8"	15' 0"	16' 6"	19' 2"	23' 1"	24' 6"

O.C. Spacing	400 Series			450 Series				600 Series				
	9 1/2"	11 7/8"	14"	9 1/2"	11 7/8"	14"	16"	11 7/8"	14"	16"	18"	20"
12"	18' 2"	21' 7"	24' 1"	18' 11"	22' 6"	25' 6"	28' 3"	24' 7"	27' 11"	30' 10"	33' 9"	36' 6"
16"	16' 5"	18' 10"	20' 10"	17' 4"	20' 6"	22' 7"	24' 5"	22' 6"	25' 5"	28' 2"	30' 9"	33' 3"
19.2"	15' 0"	17' 3"	19' 0"	16' 3"	18' 8"	20' 8"	22' 4"	21' 2"	24' 0"	26' 7"	28' 7"	30' 4"
24"	13' 5"	15' 5"	17' 0"	14' 6"	16' 9"	18' 5"	20' 0"	19' 8"	22' 1"	23' 6"	25' 7"	27' 2"
32"	11' 5"	13' 1"	14' 5"	12' 4"	14' 2"	15' 4"	15' 4"	17' 0"	17' 8"	17' 8"	21' 9"	23' 1"

Spacing	40X Series			45X Series				60X Series				
	9 1/2"	11 7/8"	14"	9 1/2"	11 7/8"	14"	16"	11 7/8"	14"	16"	18"	20"
12"	18' 6"	22' 1"	25' 6"	19' 4"	23' 1"	26' 2"	29' 0"	24' 11"	28' 4"	31' 4"	34' 3"	37' 1"
16"	16' 11"	19' 11"	22' 1"	17' 8"	21' 1"	23' 11"	25' 11"	22' 9"	25' 10"	28' 7"	31' 3"	33' 10"
19.2"	15' 9"	18' 2"	20' 2"	16' 9"	19' 9"	21' 10"	23' 8"	21' 6"	24' 4"	26' 11"	29' 3"	31' 1"
24"	14' 1"	16' 3"	18' 0"	15' 3"	17' 8"	19' 7"	20' 6"	20' 0"	22' 6"	23' 6"	26' 2"	27' 10"
32"	12' 0"	13' 10"	15' 4"	13' 0"	15' 0"	15' 4"	15' 4"	17' 3"	17' 8"	17' 8"	22' 3"	23' 7"

O.C. Spacing	60XL Series					90XL Series				
	11 7/8"	14"	16"	18"	20"	11 7/8"	14"	16"	18"	20"
12"	25' 4"	28' 8"	31' 9"	34' 9"	37' 7"	28' 8"	32' 6"	35' 11"	39' 3"	42' 5"
16"	23' 1"	26' 2"	28' 11"	31' 8"	34' 3"	26' 1"	29' 7"	32' 8"	35' 8"	38' 7"
19.2"	21' 9"	24' 8"	27' 4"	29' 10"	32' 3"	24' 7"	27' 10"	30' 9"	33' 7"	36' 4"
24"	20' 3"	22' 11"	23' 6"	27' 2"	28' 10"	22' 10"	25' 10"	28' 7"	31' 3"	33' 9"
32"	17' 8"	17' 8"	17' 8"	23' 1"	24' 6"	20' 9"	21' 9"	22' 2"	28' 5"	30' 5"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 psf = 47.9 Pa.

¹Span table is based on a residential floor load of 40 psf live load and 10 psf dead load.

²Spans are measured from middle of bearing length to middle of bearing length (1 3/4 inch minimum bearing).

³Span table is based on minimum 23/32-inch-thick sheathing, glued and nailed to BCI Joists.

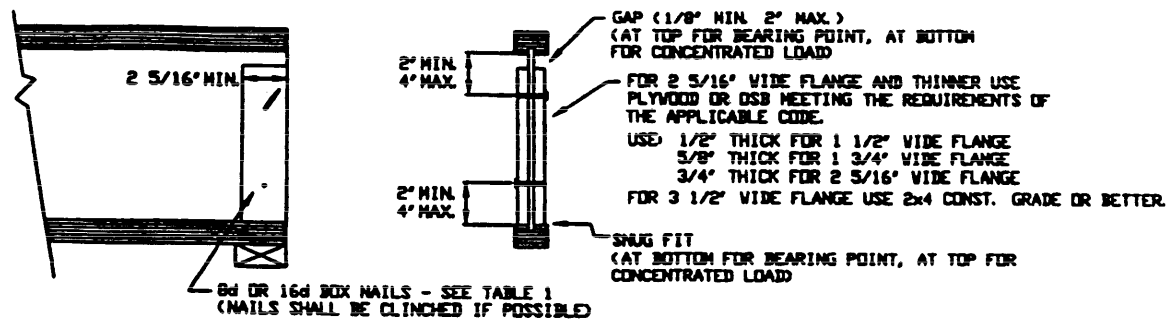
The type and spacing of the fasteners shall comply with the code.

⁴Span table is based on L/360 live load deflection and L/240 total load deflection.

⁵Repetitive loading increase has been included, where applicable.

⁶Values represent simple spans.

⁷Span table based on 1 3/4 inch end reaction values with no web stiffeners (except for 18 inch & 20 inch joist depths where web stiffeners are required).



NOTES:

1. WEB STIFFENERS SHALL BE INSTALLED AT BEARING POINTS AS REQUIRED BY TABLE 1.
2. WEB STIFFENERS ARE REQUIRED AT CONCENTRATED LOADS EXCEEDING 1000 POUNDS.
3. WEB STIFFENERS SHALL BE INSTALLED AT EACH END OF BLOCKING PANELS AS REQUIRED BY TABLE 1.
4. WEB STIFFENERS ARE REQUIRED ON ALL JOISTS SUPPORTED BY U-TYPE HANGERS WHEN THE SIDES OF THE HANGER DO NOT EXTEND UP FAR ENOUGH TO SUPPORT THE TOP FLANGES OF THE JOIST LATERALLY.
5. NAILS SHALL BE EQUALLY SPACED VERTICALLY.

FIGURE 1 WEB STIFFENER DETAIL (For SI: 1 inch = 25.4 mm)

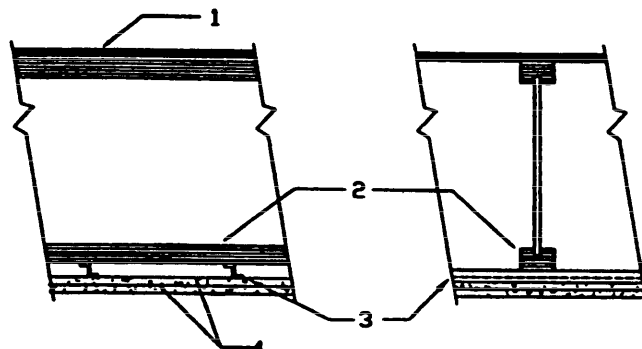


FIGURE 2 ONE-HOUR FIRE-RESISTIVE AND SOUND RATED ASSEMBLY (For SI: 1 inch = 25.4 mm)

1. **FINISHED FLOORING:** A MINIMUM OF 3/4" THICK T&G FLOOR SHEATHING ATTACHED TO THE JOISTS AS DESCRIBED IN THE APPLICABLE CODE FOR RESIDENTIAL APPLICATIONS. A CONSTRUCTION ADHESIVE SHALL BE APPLIED BETWEEN THE SHEATHING AND THE JOISTS. ALL T&G JOINTS SHALL FALL ON FRAMING MEMBERS.
2. **STRUCTURAL MEMBERS:** DCI JOISTS SPACED A MAXIMUM OF 24 INCHES ON-CENTER.
3. **CHANNELS:** RESILIENT CHANNELS INSTALLED PERPENDICULAR TO THE JOISTS, SPACED A MAXIMUM OF 16 INCHES ON-CENTER. THE CHANNELS ARE ATTACHED TO THE BOTTOM FLANGE OF EACH JOIST USING A 1 1/4-INCH-LONG STEEL SCREW.
4. **GYPSUM WALLBOARD CEILING:** TWO LAYERS OF 1/2-INCH-THICK TYPE 'C' GYPSUM WALLBOARD.

THE FIRST LAYER APPLIED, OR BASE LAYER, SHALL BE INSTALLED WITH THE SHORT DIMENSION JOINTS FALLING ON RESILIENT CHANNELS. SHORT DIMENSION JOINTS SHALL BE STAGGERED A MINIMUM OF 32 INCHES. THE BASE LAYER IS ATTACHED USING 1 1/4-INCH-LONG TYPE 'S' SCREWS SPACED A MAXIMUM OF 12 INCHES ON-CENTER. MINIMUM EDGE DISTANCE ALONG THE LONG DIMENSION IS 1 1/2 INCHES. MINIMUM EDGE DISTANCE ALONG THE SHORT DIMENSION IS 3/8 INCHES.

THE SECOND LAYER APPLIED, OR FACE LAYER, SHALL BE INSTALLED IN THE SAME DIRECTION AS THE BASE LAYER. THE LONG DIMENSION JOINTS SHALL BE OFFSET A MINIMUM OF 24 INCHES FROM THE BASE LAYER JOINTS. THE SHORT DIMENSION JOINTS SHALL BE STAGGERED A MINIMUM OF 32 INCHES, OFFSET FROM THE BASE LAYER JOINTS. THE FACE LAYER IS ATTACHED USING 1 5/8-INCH-LONG TYPE 'S' SCREWS SPACED A MAXIMUM OF 12 INCHES ON-CENTER. MINIMUM EDGE DISTANCE ALONG THE LONG DIMENSION IS 1 1/2 INCHES. MINIMUM EDGE DISTANCE ALONG THE SHORT DIMENSION IS 3/8 INCHES.

A ROW OF 1 1/2-INCH-LONG TYPE 'G' SCREWS SHALL BE INSTALLED ALONG BOTH EDGES OF THE SHORT DIMENSION FACE LAYER JOINTS. TYPE 'G' SCREWS SHALL BE SPACED A MAXIMUM OF 12 INCHES ON-CENTER WITH A MINIMUM EDGE DISTANCE OF 1 1/2 INCHES, EXCEPT THE CORNER SCREWS SHALL BE PLACED A MINIMUM OF 2 INCHES FROM EITHER EDGE. THE FACE LAYER SHALL BE FINISHED WITH JOINT TAPE AND COMPOUND.

SOUND ASSEMBLY COMPONENTS:

- ADD CARPET & PAD TO THE ASSEMBLY: **STC=53 IIC=64** OR
- ADD 3 1/2" GLASS FIBER INS. TO THE ASSEMBLY: **STC=53 IIC=44** OR
- ADD AN ADDITIONAL LAYER 5/8" T&G SHEATHING AND 9 1/2" GLASS FIBER INS. TO THE ASSEMBLY: **STC=61 IIC=50**

QUALITY CONTROL:

The quality control program for the BCI joists shall conform to the requirements of the Manufacturing Standards/Quality Control Manual for Prefabricated Wood I-Joists by the PFS Corporation on file with HUD.

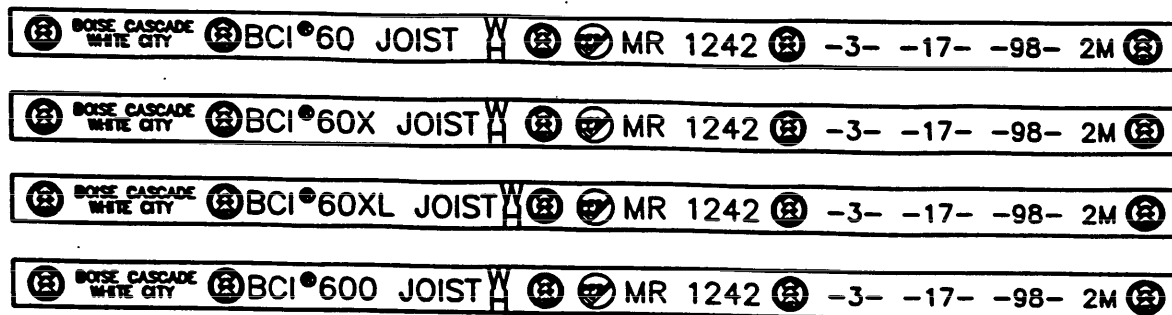
CERTIFICATION AND IDENTIFICATION:

Boise Cascade Corporation shall certify that each BCI joist conforms to the requirements of this Materials Release (MR). PFS Corporation shall validate the manufacturer's certification that the joists meet the requirements of this MR. Each certified joist shall be marked with the following information:

1. Boise Cascade.
2. Identification of manufacturing plant, White City.
3. Product designation.
4. Registered PFS validation mark.
5. HUD MR 1242c.
6. Date of manufacture.

*HUD MR 1242b may be used instead of HUD MR 1242c if the joists are date stamped.

SAMPLE STAMPS



WARRANTY:

Boise Cascade Corporation, warrants the BCI joists against faulty performance resulting from faulty materials or workmanship in the manufacturing process for a period of twenty (20) years from the date of installation.

The liability of Boise Cascade Corporation, under this warranty shall be limited to the replacement of defective members and the cost of installation or, at the option of Boise Cascade Corporation, payment of same in lieu thereof.

This warranty is limited and applies to any materials failure due to the manufacturing of the BCI joist used and it does not extend to, nor will the manufacturer be liable for, any damage due to misuse, improper installation or any damage resulting from fire, lightning, or other cause beyond the manufacturer's control.

This manufacturer's warranty does not, in any way, relieve the builder of responsibility under the terms of the Builder's Warranty required by the National Housing Act, or under any provisions applicable to any other housing program. A copy of this warranty shall be furnished by the builder to the owner.

MANUFACTURER'S RESPONSIBILITIES:

Issuance of this Materials Release (MR) commits the manufacturer to fulfill, as a minimum, the following:

1. Produce, label and certify the material, product or system in strict accordance with the terms of this MR.
2. Provide necessary corrective action in a timely manner for all cases of justified complaint, poor performance or failure reported by HUD.
3. When requested, provide the Office of Consumer and Regulatory Affairs, Manufactured Housing and Standards Division, HUD Headquarters, with a representative list of properties, in which the material, product or system has been used, including complete addresses or descriptions of locations and dates of installation.
4. Inform HUD in advance of changes in production facilities, methods, design of the product, company name, ownership or mailing address.

EVALUATION:

This MR shall be valid for a period of three years from the date of initial issuance or most recent renewal or revision, whichever is later. The holder of this MR shall apply for a renewal or revision 90 days prior to the Review Date printed on this MR. Submittals for renewal or revision shall be sent to HUD Headquarters. Appropriate User Fee shall be sent to:

U.S. Department of Housing and Urban Development
Technical Suitability of Products Fees
P.O. Box 954199
St. Louis, MO 63195-4199

The holder of this MR may apply for revision at any time prior to the Review Date. Minor revisions may be in the form of a supplement to the MR.

If the Department determines that a proposed renewal or supplement constitutes a revision, the appropriate User Fee for a revision will need to be submitted in accordance with Code of Federal Regulations 24 CFR 200.934, "User Fee System for the Technical Suitability of Products Program," and current User Fee Schedule.

CANCELLATION:

Failure to apply for a renewal or revision shall constitute a basis for cancellation of the MR. HUD will notify the manufacturer that the MR may be canceled when:

1. conditions under which the document was issued have changed so as to affect production of, or to compromise the integrity of the accepted material, product, or system,
2. the manufacturer has changed its organizational form without notifying HUD, or
3. the manufacturer has not complied with responsibilities it assumed as a condition of HUD's acceptance.

However, before cancellation, HUD will give the manufacturer a written notice of the specific reasons for cancellation, and the opportunity to present views on why the MR should not be canceled. No refund of fees will be made on a canceled document.

This Materials Release is issued solely for the captioned firm,
and is not transferable to any person or successor entity.
