

Joint Evaluation Report

ESR-4733

Issued December 2020

This report is subject to renewal December 2021.

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES

Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:

SMARTLAM, LLC

EVALUATION SUBJECT:

SMARTLAM CROSS-LAMINATED TIMBER (CLT)

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)

For compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see [ESR-4733 LABC and LARC Supplement](#).

Property evaluated:

- Structural
- Fire Resistance

1.2 Evaluation to the following green code(s) and/or standards:

- 2019 California Green Building Standards Code (CALGreen), Title 24, Part 11
- 2015, 2012, and 2008 ICC 700 *National Green Building Standard*™ (ICC 700-2015, ICC 700-2012 and ICC 700-2008)

Attributes verified:

- See Section 3.1.

2.0 USES

SmartLam cross-laminated timber (CLT) panels are a certified engineered wood product and are used as a component in floors, roofs, and walls in Type III (interior floors only), Types IV and V Construction; and in roofs in Type I and II Construction of the IBC. The SmartLam CLT panels, when installed under the IRC, require an engineered design in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

The SmartLam CLT panels described in this evaluation report comply with requirements noted in Section 2303.1.4 of the 2018 and 2015 IBC, for allowable stress design (ASD) in accordance with 2018 IBC Section 2302.1(1) (2015, 2012

and 2009 IBC Section 2301.2(1)). The panels are fabricated with at least three planed softwood lumber laminations with adjacent laminations glued together at an angle of 90° except that the outermost two layers are permitted to be parallel to each other, as shown in Tables 2 and 3. The panels are fabricated with widths of 12 to 120 inches (305 to 3048 mm), thicknesses of 4¹/₈ to 12³/₈ inches (105 to 314 mm) and lengths up to 52 feet (15.8 m). The SmartLam CLT panels are fabricated by face-bonding each layer of laminations using a structural adhesive, complying with Section 3.2.2 of this evaluation report. The layers are placed in a press to form a dimensionally stable structural element. Refer to Tables 2 and 3 for SmartLam CLT panel layouts.

The attributes of the CLT panels have been verified as conforming to the provisions of (i) CALGreen Section A4.404.3 for efficient framing techniques; (ii) ICC 700-2015 Sections 608.1(b), 11.608(b), and 12(A).608.1(b) for resource-efficient materials; (iii) ICC 700-2012 Sections 608.1(2), 11.608.1(2) and 12(A).608.1 for resource-efficient materials; and (iv) ICC 700-2008 Section 607.1(2) for resource-efficient materials. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.2 Material:

3.2.1 Wood Laminations: Wood laminations used in fabricating SmartLam CLT panels must be in accordance with the approved in-plant manufacturing standard and are Spruce-pine-fir (SPF), Spruce-pine fir south (SPF-S), Hem-fir (HF), or Douglas fir-Larch (DF-L) lumbers having ASD reference design values provided in Table 1 of this evaluation report. The outermost SPF, SPF-S, or HF laminations may be permitted to be replaced by DF-L lumber with design properties that are equal to or greater than the corresponding SPF, SPF-S, or HF laminations.

3.2.2 Adhesives: Adhesives used to face-bond layers of SmartLam CLT panels and adhesives used for finger-joints of wood laminations are non-formaldehyde, one-component polyurethane based, exterior-type structural adhesives, conforming to ANSI/APA PRG 320-2019 and the product specifications in the approved quality documentation.

4.0 DESIGN AND INSTALLATION

4.1 General:

Design and installation of SmartLam CLT panels must be in accordance with this evaluation report, the applicable code provisions and the manufacturer's published design and installation instructions. The manufacturer's design and

installation instructions must be available at the jobsite at all times during installation. The requirements specified for allowable stress design (ASD) in accordance with 2018 IBC Section 2302.1(1) (2015, 2012 and 2009 IBC Section 2301.2(1)), and Chapter 10 of the 2018 or 2015 *National Design Specification® for Wood Construction* (NDS), are applicable to SmartLam CLT panels.

4.2 Reference Design Values:

Table 1 provides reference design values for laminations of lumber used in SmartLam CLT panels and shall be used in conjunction with the section properties analytically derived using the equations outlined in the ANSI/APA PRG 320 based on the actual layouts (Tables 2 and 3) used in manufacturing the CLT panel. Tables 4 and 5 provide, respectively, reference design values for bending and shear capacities of SmartLam balanced and unbalanced CLT panels. The reference design values in Tables 4 and 5 are intended for ASD and must be adjusted in accordance with Section 4.3 of this evaluation report. The unbalanced layouts listed in Table 5 can be only used in wall and simple span applications. The compression side of the unbalanced layouts, which consists of lumber laminations in the minor strength direction, must be stamped with the word "TOP", which shall be installed on the compression (top) side of the simple-span bending member. For unbalanced layout panels used in walls, the compression ("TOP") face may be faced either toward the inside or outside in accordance with the design professional on record. The lateral resistance of SmartLam CLT, when used as shearwalls or diaphragms, depends on the panel-to-panel connection and anchorage designs, and shall be designed by a registered design professional in consultation with the CLT manufacturer.

4.3 Adjustment Factors:

The reference design values in Table 1 are not permitted to be increased for the lumber flat use or size factor in accordance with the NDS. The reference design values in Tables 4 and 5 must be adjusted using the adjustment factors specified in Table 10.3.1 of the 2018 or 2015 NDS. The reference design values in Tables 4 and 5 must not be increased for the lumber size adjustment factor in accordance with the NDS. The time dependent deformation (creep) factor, K_{er} , of 2.0, as specified in Section 3.5.2 of the NDS must be used to calculate the total deflection due to long-term loading for SmartLam CLT panels used as components in floor and roof decks under dry service condition such as in most covered structures, where the moisture content in lumber in service is less than 16 percent, as specified in Section 10.1.5 of the 2018 or 2015 NDS.

4.4 Fire Resistance:

When fire performance is required, the fire resistance rating (FRR) of the exposed SmartLam CLT panels may be determined in accordance with Chapter 16 of the 2018 or 2015 NDS. As an alternate, SmartLam CLT panels must be tested in accordance with ASTM E119 with a fire resistance rating in accordance with the test results and the conditions of such tests, and such tests must be submitted to the building official for approval and are outside the scope of this evaluation report.

5.0 CONDITIONS OF USE

The SmartLam CLT panels described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Fabrication, design, and installation of SmartLam CLT panels must comply with this evaluation report and the manufacturer's published design and installation

instructions. In the event of a conflict between the manufacturer's published design and installation instructions and this evaluation report, the more restrictive requirements govern.

- 5.2** Use of SmartLam CLT panels must be limited to dry service conditions where the equilibrium moisture content in lumber in service is less than 16 percent, as in most covered structures.
- 5.3** Calculations and drawings demonstrating compliance with this evaluation report must be submitted to the code official. The calculations and drawings must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4** Connections of SmartLam CLT wall panels, floor panels and roof panels to each other and to other supporting members must be designed by a registered design professional in accordance with the NDS or proprietary connectors and fasteners recognized in an ICC-ES Evaluation Report. Connectors and fasteners must be completely specified, including size, length, dimension, fastener bearing length and location.
- 5.5** Cutting, drilling, and notching of SmartLam CLT panels when used as components in walls, floors and roofs, have not been evaluated and are outside the scope of this evaluation report.
- 5.6** SmartLam CLT panels used to resist out-of-plane transverse forces in walls must be accompanied by complete detailing and wall design that are acceptable to the code official.
- 5.7** Design properties for SmartLam CLT panels, when used as beams or lintels with loads applied parallel to the face-bond gluelines are beyond the scope of this report.
- 5.8** The installations of the unbalanced SmartLam CLT panel layouts must be in accordance with Section 4.2 of this evaluation report.
- 5.9** SmartLam CLT panel roofs must be covered with approved roof coverings secured to the building or structure in accordance with applicable provisions of IBC Chapter 15.
- 5.10** Special inspection must be conducted in accordance with the applicable requirements of Sections 1704 and 1705 of the IBC.
- 5.11** SmartLam CLT panels may be used as components in walls, floors and roofs under the IRC when an engineered design is submitted in accordance with Section R301.1.3.
- 5.12** SmartLam CLT panels are manufactured and fabricated at the SmartLam LLC facility located in Columbia Falls, Montana, under a quality program with inspections by ICC-ES and APA – The Engineered Wood Associations.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cross-laminated Timber Panels for Use as Components in Walls, Floors, and Roofs (AC455), dated February 2019 (editorially revised June 2020).

7.0 IDENTIFICATION

7.1 SmartLam CLT panels are identified with stamps noting the SmartLam, LLC name or logo (Figure 1), panel layout and designation, production date and shift, and ICC-ES evaluation report number (ESR-4733).

7.2 The report holder's contact information is the following:

SMARTLAM, LLC
610 3RD STREET WEST
COLUMBIA FALLS, MONTANA 59912
(406) 892-2241
www.smartlam.com

TABLE 1—ASD REFERENCE DESIGN VALUES FOR LUMBER LAMINATIONS USED IN SMARTLAM CLT PANELS¹

CLT GRADE	LAMINATIONS USED IN MAJOR AND MINOR STRENGTH DIRECTIONS						
	Grade and Species	F _b (psi)	E (10 ⁶ psi)	F _t (psi)	F _c (psi)	F _v (psi)	F _s (psi)
V1M2	No. 2 DF	900	1.6	575	1,350	180	60
V2M5	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45
V4M1	No.2 SPF-S ²	775	1.1	350	1,000	135	45
V5M1	No. 2 HF	850	1.3	525	1,300	150	50
V5M2	SS HF	1,400	1.6	925	1,500	150	50

For **SI**: 1 psi = 6,895 Pa

¹Tabulated values are allowable design values and not permitted to be increased for the lumber flat use or size factor in accordance with the NDS. The tabulated design values shall be used in conjunction with the section properties analytically derived using the equations outlined in the ANSI/APA PRG 320 based on the actual layup used in manufacturing the CLT panel (see Tables 4 and 5).

²No. 2 or higher grade HF is permitted to replace No. 2 SPF-S in this CLT grade.

TABLE 2—SMARTLAM BALANCED CLT PANEL LAYUPS

GRADE	LAYUP ¹	THICKNESS t _p ² (in.)	LAMINATION ACTUAL THICKNESS ³ (in.)								
				⊥		⊥		⊥		⊥	
V1M2	3-alt	4 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	4-maxx	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	5-alt	6 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-
	5-maxx	6 ⁷ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	6-maxx	8 ¹ / ₄	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	7-alt	9 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-
	7-maxx	9 ⁵ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	8-maxx	11	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	9-alt	12 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V2M5 ⁴	3-alt	4 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	4-maxx	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	5-alt	6 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-
	5-maxx	6 ⁷ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	6-maxx	8 ¹ / ₄	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	7-alt	9 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-
	7-maxx	9 ⁵ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	8-maxx	11	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	9-alt	12 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V4M1 ^{4,5}	3-alt	4 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	4-maxx	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-
	5-alt	6 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-
	5-maxx	6 ⁷ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	6-maxx	8 ¹ / ₄	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-
	7-alt	9 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-
	7-maxx	9 ⁵ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	8-maxx	11	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
	9-alt	12 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
9-maxx	12 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	

See footnotes on the next page.

TABLE 2—SMARTLAM BALANCED CLT PANEL LAYUPS (CONTINUED)

GRADE	LAYUP ¹	THICKNESS t _p ² (in.)	LAMINATION ACTUAL THICKNESS ³ (in.)									
				⊥		⊥		⊥		⊥		
V5M1 ⁴	3-alt	4 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-	
	4-maxx	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-	
	5-alt	6 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	
	5-maxx	6 ⁷ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-	
	6-maxx	8 ¹ / ₄	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-	
	7-alt	9 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-
	7-maxx	9 ⁵ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-
V5M2 ⁴	3-alt	4 ¹ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-	
	4-maxx	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	-	-	-	-	-	-	
	5-alt	6 ⁷ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	
	5-maxx	6 ⁷ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-	
	6-maxx	8 ¹ / ₄	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-	-	-	
	7-alt	9 ⁵ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-
	7-maxx	9 ⁵ / ₈	1 ³ / ₈ + 1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈ + 1 ³ / ₈	-	-	-	-

For SI: 1 in. = 25.4 mm

¹The panel layouts are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers and the layup series (alt or maxx).

²Gross thickness of CLT panels.

³Actual thickness of lamination after planing. “||”: Face laminations are oriented parallel to the major strength direction and “⊥”: Face laminations are oriented perpendicular to the major strength direction.

⁴The outermost laminations shall be permitted to be replaced by Douglas Fir-Larch lumber with design properties equal to or greater than that of the laminations specified for the layup.

⁵No. 2 or higher grade HF is permitted to replace No. 2 SPF-S in this CLT grade.

TABLE 3—SMARTLAM UNBALANCED CLT¹ PANEL LAYUPS

GRADE	LAYUP ²	THICKNESS t _p ³ (in.)	LAMINATION ACTUAL THICKNESS ⁴ (in.)								
				⊥		⊥		⊥		⊥	
V1M2	4-alt	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-
	6-alt	8 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-
	8-alt	11	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V2M5 ⁵	4-alt	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-
	6-alt	8 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-
	8-alt	11	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V4M1 ^{5,6}	4-alt	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-
	6-alt	8 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-
	8-alt	11	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V5M1 ⁵	4-alt	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-
	6-alt	8 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-
	8-alt	11	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈
V5M2 ⁵	4-alt	5 ¹ / ₂	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-	-	-
	6-alt	8 ¹ / ₄	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	-	-	-
	8-alt	11	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈	1 ³ / ₈

For SI: 1 in. = 25.4 mm

¹Unbalanced CLT layups can be only used in wall and simple span applications. The compression side, which consists of lumber laminations in the minor strength direction, must be stamped with the word “TOP”, which shall be installed on the compression (top) side of the simple-span bending member.

²The panel layouts are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers and the layup series (alt).

³Gross thickness of CLT panels.

⁴Actual thickness of lamination after planing. “||”: Face laminations are oriented parallel to the major strength direction and “⊥”: Face laminations are oriented perpendicular to the major strength direction.

⁵The outermost laminations shall be permitted to be replaced by Douglas Fir-Larch lumber with design properties equal to or greater than that of the laminations specified for the layup.

⁶No. 2 or higher grade HF is permitted to replace No. 2 SPF-S in this CLT grade.

TABLE 4—ASD REFERENCE DESIGN VALUES FOR SMARTLAM BALANCED CLT PANELS¹

GRADE	LAYUP ²	THICKNESS t_p^3 (in.)	MAJOR STRENGTH DIRECTION				MINOR STRENGTH DIRECTION			
			$(F_b S)_{eff,f,0}$ (lb _r -ft/ft)	$(EI)_{eff,f,0}$ (x10 ⁶ lb _r -in. ² /ft)	$(GA)_{eff,f,0}$ (x10 ⁶ lb _r /ft)	$V_{s,0}$ (lb/ft)	$(F_b S)_{eff,f,90}$ (lb _r -ft/ft)	$(EI)_{eff,f,90}$ (x10 ⁶ lb _r -in. ² /ft)	$(GA)_{eff,f,90}$ (x10 ⁶ lb _r /ft)	$V_{s,90}$ (lb/ft)
V1M2	3-alt	4 ¹ / ₈	2,090	108	0.60	1,980	285	4.2	0.60	660
	4-maxx	5 ¹ / ₂	3,400	234	0.71	2,650	1,130	33	1.2	1,320
	5-alt	6 ⁷ / ₈	4,825	415	1.2	3,300	2,460	108	1.2	1,980
	5-maxx	6 ⁷ / ₈	5,975	516	1.2	3,300	285	4.2	0.71	660
	6-maxx	8 ¹ / ₄	8,375	866	1.2	3,950	1,130	33	1.2	1,320
	7-alt	9 ⁵ / ₈	8,525	1,029	1.8	4,625	5,675	415	1.8	3,300
	7-maxx	9 ⁵ / ₈	10,950	1,322	1.8	4,625	2,460	108	1.3	1,980
	8-maxx	11	13,800	1,904	2.5	5,275	4,000	234	1.4	2,650
	9-alt	12 ³ / ₈	13,200	2,051	2.4	5,950	10,025	1,029	2.4	4,625
	9-maxx	12 ³ / ₈	16,950	2,634	2.4	5,950	5,675	415	1.9	3,300
V2M5 ⁴	3-alt	4 ¹ / ₈	2,030	95	0.52	1,490	275	3.6	0.52	495
	4-maxx	5 ¹ / ₂	3,300	205	0.62	1,980	1,100	29	1.1	990
	5-alt	6 ⁷ / ₈	4,675	363	1.1	2,480	2,390	95	1.1	1,490
	5-maxx	6 ⁷ / ₈	5,825	451	1.1	2,480	275	3.6	0.62	495
	6-maxx	8 ¹ / ₄	8,125	758	1.1	2,975	1,100	29	1.1	990
	7-alt	9 ⁵ / ₈	8,275	900	1.6	3,475	5,500	363	1.6	2,480
	7-maxx	9 ⁵ / ₈	10,650	1,157	1.6	3,475	2,390	95	1.1	1,490
	8-maxx	11	13,425	1,666	2.2	3,950	3,875	205	1.2	1,980
	9-alt	12 ³ / ₈	12,850	1,795	2.1	4,450	9,750	900	2.1	3,475
	9-maxx	12 ³ / ₈	16,500	2,305	2.1	4,450	5,500	363	1.6	2,480
V4M1 ^{4,5}	3-alt	4 ¹ / ₈	1,800	74	0.41	1,490	245	2.9	0.41	495
	4-maxx	5 ¹ / ₂	2,925	161	0.49	1,980	975	23	0.85	990
	5-alt	6 ⁷ / ₈	4,150	286	0.83	2,480	2,120	74	0.83	1,490
	5-maxx	6 ⁷ / ₈	5,150	355	0.85	2,480	245	2.9	0.49	495
	6-maxx	8 ¹ / ₄	7,200	596	0.83	2,975	975	23	0.83	990
	7-alt	9 ⁵ / ₈	7,325	707	1.2	3,475	4,875	286	1.2	2,480
	7-maxx	9 ⁵ / ₈	9,425	909	1.2	3,475	2,120	74	0.89	1,490
	8-maxx	11	11,875	1,309	1.7	3,950	3,425	161	0.97	1,980
	9-alt	12 ³ / ₈	11,375	1,410	1.7	4,450	8,625	707	1.7	3,475
	9-maxx	12 ³ / ₈	14,600	1,811	1.6	4,450	4,875	286	1.3	2,480
V5M1 ⁴	3-alt	4 ¹ / ₈	1,980	88	0.49	1,650	270	3.4	0.49	550
	4-maxx	5 ¹ / ₂	3,200	190	0.57	2,200	1,070	27	1.0	1,100
	5-alt	6 ⁷ / ₈	4,550	337	0.98	2,750	2,320	88	0.98	1,650
	5-maxx	6 ⁷ / ₈	5,650	419	1.0	2,750	270	3.4	0.57	550
	6-maxx	8 ¹ / ₄	7,900	704	0.98	3,300	1,070	27	0.98	1,100
	7-alt	9 ⁵ / ₈	8,050	836	1.5	3,850	5,350	337	1.5	2,750
	7-maxx	9 ⁵ / ₈	10,350	1,074	1.5	3,850	2,320	88	1.0	1,650
V5M2 ⁴	3-alt	4 ¹ / ₈	3,250	108	0.60	1,650	440	4.2	0.60	550
	4-maxx	5 ¹ / ₂	5,275	234	0.71	2,200	1,760	33	1.2	1,100
	5-alt	6 ⁷ / ₈	7,500	415	1.2	2,750	3,825	108	1.2	1,650
	5-maxx	6 ⁷ / ₈	9,300	516	1.2	2,750	440	4.2	0.71	550
	6-maxx	8 ¹ / ₄	13,025	866	1.2	3,300	1,760	33	1.2	1,100
	7-alt	9 ⁵ / ₈	13,250	1,029	1.8	3,850	8,800	415	1.8	2,750
	7-maxx	9 ⁵ / ₈	17,025	1,322	1.8	3,850	3,825	108	1.3	1,650

For SI: 1 in. = 25.4 mm; 1 ft. = 304.8 mm; 1 lb_r = 4.448 N

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD) and must be adjusted in accordance with Section 4.3.

²The CLT layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers and the layup series (alt or maxx).

³Gross thickness of CLT panels.

⁴The outermost laminations shall be permitted to be replaced by Douglas Fir-Larch lumber with design properties equal to or greater than that of the laminations specified for the layup.

⁵No. 2 or higher grade HF is permitted to replace No. 2 SPF-S in this CLT grade

TABLE 5—ASD REFERENCE DESIGN VALUES FOR SMARTLAM UNBALANCED CLT PANELS^{1,2}

GRADE	LAYUP ³	THICKNESS t_p ⁴ (in.)	MAJOR STRENGTH DIRECTION				MINOR STRENGTH DIRECTION			
			$(F_b S)_{eff,f,0}$ (lb _r -ft/ft)	$(EI)_{eff,f,0}$ (x10 ⁶ lb _r -in. ² /ft)	$(GA)_{eff,f,0}$ (x10 ⁶ lb _r /ft)	$V_{s,0}$ (lb _r /ft)	$(F_b S)_{eff,f,90}$ (lb _r -ft/ft)	$(EI)_{eff,f,90}$ (x10 ⁶ lb _r -in. ² /ft)	$(GA)_{eff,f,90}$ (x10 ⁶ lb _r /ft)	$V_{s,90}$ (lb _r /ft)
V1M2	4-alt	5 1/2	2,090	108	0.60	1,980	285	4.2	0.60	660
	6-alt	8 1/4	4,825	415	1.2	3,300	2,460	108	1.2	1,980
	8-alt	11	8,525	1,029	1.8	4,625	5,675	415	1.8	3,300
V2M5 ⁵	4-alt	5 1/2	2,030	95	0.52	1,490	275	3.6	0.52	495
	6-alt	8 1/4	4,675	363	1.1	2,480	2,390	95	1.1	1,490
	8-alt	11	8,275	900	1.6	3,475	5,500	363	1.6	2,480
V4M1 ^{5,6}	4-alt	5 1/2	1,800	74	0.41	1,490	245	2.9	0.41	495
	6-alt	8 1/4	4,150	286	0.83	2,480	2,120	74	0.83	1,490
	8-alt	11	7,325	707	1.2	3,475	4,875	286	1.2	2,480
V5M1 ⁵	4-alt	5 1/2	1,980	88	0.49	1,650	270	3.4	0.49	550
	6-alt	8 1/4	4,550	337	0.98	2,750	2,320	88	0.98	1,650
	8-alt	11	8,050	836	1.5	3,850	5,350	337	1.5	2,750
V5M2 ⁵	4-alt	5 1/2	3,250	108	0.60	1,650	440	4.2	0.60	550
	6-alt	8 1/4	7,500	415	1.2	2,750	3,825	108	1.2	1,650
	8-alt	11	13,250	1,029	1.8	3,850	8,800	415	1.8	2,750

For SI: 1 in. = 25.4 mm; 1 ft. = 304.8 mm; 1 lb_r = 4.448 N

¹The tabulated values are reference design values intended for Allowable Stress Design (ASD) and must be adjusted in accordance with Section 4.3. Tabulated values ignore the contribution of the outermost compression layer.

²Unbalanced CLT layups can be only used in wall and simple span applications. The compression side, which consists of lumber laminations in the minor strength direction, must be stamped with the word "TOP", which must be installed on the compression (top) side of the simple-span bending member. For unbalanced layup panels used in wall applications, the compression ("TOP") face may be faced either toward the inside or outside in accordance with the design professional on record.

³The CLT layups are developed based on the ANSI/APA PRG 320, using visually graded sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers and the layup series (alt).

⁴Gross thickness of CLT panels.

⁵The outermost laminations shall be permitted to be replaced by Douglas Fir-Larch lumber with design properties equal to or greater than that of the laminations specified for the layup.

⁶No. 2 or higher grade HF is permitted to replace No. 2 SPF-S in this CLT grade.



FIGURE 1—COMPANY LOGO FOR SMARTLAM, LLC

DISCLAIMER

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 17 19—Cross-laminated Timber

REPORT HOLDER:

SMARTLAM, LLC

EVALUATION SUBJECT:

SMARTLAM CROSS-LAMINATED TIMBER (CLT)

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the SmartLam Cross-Laminated Timber (CLT) panels, described in ICC-ES evaluation report [ESR-4733](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code* (LABC)
- 2020 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The SmartLam CLT panels, described in Sections 2.0 through 7.0 of the evaluation report [ESR-4733](#), comply with the LABC Chapters 6 and 23, and the LARC, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The SmartLam CLT panels, described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report [ESR-4733](#).
- The design, installation, conditions of use and identification are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report [ESR-4733](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.

This evaluation report supplement expires concurrently with the evaluation report ESR-4733, issued December 2020.