NYC Department of Buildings
280 Broadway, New York, NY 10007
Patricia Lancaster, FAIA, Commissioner
(212) 566-5000, TTY: (212) 566-4769

Report of Materials and Equipment Acceptance Division

Pursuant to Administrative Code Section 27-131, the following equipment or material has been found acceptable for use subject to the terms and conditions contained herein.

MEA 89-96-E Vol.3

Manufacturer:	Weyerhaeuser, P.O. Box 8449. Boise, Idaho 83707
Trade Name(s):	TimberStand® LSL
Product:	Laminated strand lumber
Pertinent Code Section(s):	27-617 through 27-624
Prescribed Test(s):	ASTM D198, Flexure (allowable bending stress). Allowable tension parallel to grain stress. Allowable compression parallel to grain stress, beam shear, shear block, shear parallel to grain test. Allowable compression perpendicular to grain and perpendicular to wide face of strand, etc.
Laboratory:	PFS Corporation and Design tables were certified by Gary R. Schweizer, P. E., New York State License Number 062261-1.
Test Report(s):	Determination of Allowable Compression Perpendicular to Grain Stresses for Timberland® LSL, by B. A. Craig, dated May 24, 1995. Quality Assurance Data Summary and Analysis, TimberStrand® LSL, Deerwood and East Kentucky Plants, January through September 2000, Including Derivation of *1.7E* TimberStrand® LSL Trus Chord Design Tension, dated April 2001. TimberStrand® LSL Design Stress Derivation, updated December 2004. East Kentucky Plant Quality Assurance Data for *1-3/8* inch Through *1-3/4* Inch Thick TimberStrand®

LSL Manufactured During October 2003 Through September 2004.

East Kentucky Plant Quality Assurance Data for *2-1/2* Inch Through 3-1/2 Inch Thick TimberStrand® LSL Manufactured During October 2003 Through September 2004.

East Kentucky Plant Quality Assurance Data for *1.6E, 1-3/8* Inch Thick TimberStrand® LSL Manufactured During October 2003 Through September 2004.

Beograd® ZB MSDS.

AWPA P18-04, Nonpressure Preservatives.

AWPA Use Category System, UCS-U1-04, pages 1 through 3.

AWPA N2-04, Standard for the Preservative Treatment of Composite Wood Products by Nonpressure Processes.

Soil Block Decay of Aspen plus Mixed Northern Hardwoods and Yellow Poplar Laminate Strand Lumber with ZB Emulsion or Powder, at Michigan Technological University, dated September 29, 1997.

Soil Block Testing of StrandGuard™ ZB5/6 (TJ#4), by Michigan Technological University, dated September 14, 2001.

Soil Block Decay Testing of TimberStrand® LSL Mill Produced and Treated with StrandGuard ZB5/6, by Michigan Technological University, dated September 14, 2001.

Structural Properties of TimberStrand® LSL Treated with Zinc Borate, by Dan C. Wainwright and Bruce A. Craig, dated November 25, 1999.

Plank Orientation Compression Perpendicular-to-Grain Performance of 1.3E Zinc Borate Treated TimberStrand® LSL, CRC Experiment Number 1890, dated January 2004.

White Birch/Red Maple/Aspen TimberStrand® LSL Qualification Test Results and Analysis, by Bruce Craig, dated March 1994.

Yellow Poplar TimberStrand® LSL Qualification Test Report by Bruce Craig, dated September 20, 1994.

Verification for Use of Cucumber Tree in TimberStrand® LSL Manufactured at East Kentucky Plant, by Bruce Craig, dated March 24, 1997.

East Kentucky TimberStrand® LSL Alternate Species Testing Program Phase I.

Phase II, CRC Experiment Number X-1327, dated September 3, 1996.

East Kentucky TimberStrand® LSL-1.9E and 2.1E Grade Alternate Species (Red Maple, Sycamore) Verification, by B. A. Craig, dated December 1996.

Evaluation of the Long Term Load Performance of Yellow Poplar TimberStrand® LSL, by Dan C. Wainwright and Bruce A Craig, dated September 24, 1997.

1-1/4" TimberStrand® LSL Rim Board Qualification East Kentucky and Deerwood Plants, CRC Experiment Numbers 1415 and 1416, dated March 11, 1998, revised April 9, 1998.

1.3E TimberStrand® LSL Rim Board Qualification at the Kenora Plant, by Chris Serbyn, dated December 13, 2002.

1.3E and 1.5E 3-1/2 Inch Thick TimberStrand® LSL Qualification at the Kenora Plant, by Chris Serbyn, dated May 8, 2003.

Qualification of 1-3/4 Inch Thick 1.7E TimberStrand® LSL at the Kenora Plant, by Dan Wallace, dated December 3, 2003.

Qualification of 3.5 Inch Thick 1.7E TimberStrand® LSL at the Kenora Plant by Dan Wallace, dated April 20, 2004, and follow up 1.7E TimberStrand LSL (3-1/2 Inch Thickness) at the Kenora Plant, by Dan Wallace, dated May 4, 2004.

CRC Experiment Number X-1171/Z1251, "18.E WS Microllam® LVL, 2.0E DF Parallam® PSL and 1.5E TimberStrand® LSL Dowel Bearing Strength, dated March 7, 1996". Note: Microllam® LVL and Parallam® PSL data excluded.

Closet on Center Nail Spacing for TimberStrand® LSL Parallel to Wide Face of Strand (WFS), CRC Experiment Numbers: X-1296, dated February 6, 1996; X-1170, dated March 1996: X-1170, dated August 12, 1995; X-1170, dated March 4, 1994.
Letter from Ted Osterberger, P.E, of Trus Joist, to Kurt Stochlia, P. E. of ICC-ES, dated August 21, 2003.

Evaluation of TimberStrand® LSL Nail Withdrawl, Performance, Boise Technology Center Reference Number X-1860A, dated August 21, 2003.

Aspen TimberStrand® LSL Nail Regression Analysis, Report Number X-1860B, dated August 21, 2003.

Qualification Testing of 1-1/8 " Thick TimberStrand® LSL Core 38 Material Manufactured at Deerwood, MN, used as 1-1/8" Thick iLevel™ Rim Board, Experiment Number 1998, dated January 31, 2006

Qualification Testing of 1-1/8" Thick Weyerhaeuser Structurwood Edge Gold® OSB, Manufactured at Elkin, NC, used as 1-1/8" Thick iLevel™ Rim Board, Experiment Number 1997, dated January 31, 2006.

Linear Regression of TimberStrand® LSL Design Properties.

ICC-ES Report ESR 1387, Reissued January 1, 2006, Revised March 2006.

TimberStrand® LSL Manufacturing Standard, Version 02/06.

Description – TimberStrand LSL is manufactured from strands of a single wood species or a combination of wood species blended with an isocyanate-based adhesive. The wood species, species combinations and adhesive used to manufacture TimberStrand LSL are specified in the approved TimberStrand LSL quality control manual and manufacturing standard prepared by Weyerhaeuser. TimberStrand LSL is produced with the wood strands oriented in a direction parallel to the length of the structural composite lumber and has finished lengths up to 64 feet (19 500 mm), thickness up to 5 ½ inches (40mm), and depths up to 48 inches (1219 mm). TimberStrand LSL treated with zinc borate (ZB), in accordance with the TimberStrand LSL quality control manual and manufacturing standard prepared by Weyerhaeuser, may be used within the building envelope, such as sill plates supported by masonry or concrete footings, foundations or slabs; including where preservative-treated lumber is required within the building envelope in accordance with the American Wood Preservers' Association (AWPA) "Use Category UC2". TimberStrand LSL treated with ZB shall not be used in exposed exterior or ground-contact applications. Daily quality control checks and periodic third party inspections are conducted to assure product quality and performance.

TABLE 1 – TimberStrand® LSL STRUCTURAL FRAMING LUMBER DESIGN STRESSES [1,2,3,4]
(pounds per square inch)

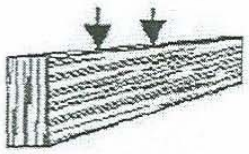
Grade MOE (x 10^6)	Axial		Joist/Beam (Edge Loading)			Plank (Face Loading)		
	Ft[6]	Fc	Fb[7,8]	Fv	Fc⊥[9]	Fb[5]	Fv	Fc⊥[9]
1.3	1075	1400	1700	400	680	1900	150	435[11]
1.5	1500	1950	2250	400	775	2525	150	475
1.55	1600	2050	2325	400	800	2615	150	485
1.6	1700	2150	2400	400	825	2700	150	490
1.7	1825[10]	2380	2600	400	880	2900	150	510
1.9	2150	2850	3075	400	880	3450	150	510
2.1	2500	3275	3500	400	880	3925	150	510

1. See figure below for description of strand orientation.
2. Allowable stresses are based on covered, dry conditions of use, defined as those environmental conditions represented by sawn lumber with equilibrium moisture content less than or equal to 16%.
3. For uniformly loaded simple span beams, deflection is calculated as follows:

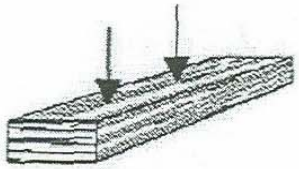
$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8WL^2}{Ebd}$$

Where:

Δ	= Deflection, inches	W	= Uniform load, plf
L	= Span, feet	b	= Beam width, inches
d	= Beam depth, inches	E	= Modulus of Elasticity, psi



EDGE LOADING - parallel to wide face of strands (WFS)



FACE LOADING - perpendicular to wide face of strands (WFS)

4. Values shown are structural framing lumber design stresses. When applicable, application design shall account for cross sectional geometry and modifications, such as holes, notches, and tapered end cuts. See section 5.6 of this report.
5. Values shown are for thicknesses up to 3.5 inches.
6. The Ft values in the table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions. The Ft values for TimberStrand LSL may be higher when approved by Weyerhaeuser for use as a component of engineered products, which are manufactured under a recognized quality control program.
7. For depths other than 12 inches regardless of thickness, table values must be multiplied by $(12/d)^{0.052}$. Adjustments for common depths are shown below. For depths less than 3.5 inches, the factor for the 3.5 inch depth must be used.

Depth (inches)	3.5	5.5	7.25	9.25	12.0	16.0	20.0	24.0
Multiplier	1.12	1.07	1.05	1.02	1.00	0.97	0.95	0.94

8. When structural members qualify as repetitive members in accordance with the applicable code, a four percent increase in accordance with NDS is permitted for Fb, in addition to the increases permitted in Footnote 6, above.
9. Compression perpendicular to grain values (Fc⊥) may not be increased for duration of load.
10. When 1.7E grade TimberStrand LSL is used as truss chords and webs of engineered wood trusses the design axial tension is 2050 psi. This value includes an adjustment for length effect. The TimberStrand LSL material must be marked as "Truss Chord Grade", and the engineered wood trusses must be manufactured under a recognized quality control program. The plate tooth-holding values for TimberStrand LSL web and chord members are as recognized in other evaluation reports.
11. The allowable compression perpendicular-to-grain, plank orientation, for zinc borate (ZB) treated 1.3E TimberStrand LSL shall be 625 psi, for plate applications.

TABLE 2 – TimberStrand® LSL FASTENER DETAILS

Fastener	Description	Comments
Lateral Nail and Wood Screw Capacity	Edge: Parallel and Perpendicular to grain Face: Parallel and Perpendicular to grain	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch).
Nail Withdrawal Capacity	Edge	For all grades 1.3E and higher use specific gravity of 0.42 (S-P-F). For all grades 1.3E and higher of Yellow Poplar[6] TimberStrand LSL use specific gravity of 0.55 (Southern Pine).
	Face	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch). For all grades 1.3E and higher of Yellow Poplar[6] TimberStrand LSL use specific gravity of 0.55 (Southern Pine).
Bolt Capacity - Bolt parallel to WFS:		Not evaluated
Bolt capacity - Bolt perpendicular to WFS [1]	Load parallel to grain	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch).
	Load perpendicular to grain	For all grades 1.3E and higher use a specific gravity of 0.58 (Red Maple).
Lag bolt capacity- 1/2 inch diameter bolt perpendicular to WFS	Load: Parallel and Perpendicular to grain	400 lbs. [2]
Note: Nail and bolt design values are developed using the specific gravity shown, in accordance with the applicable code.		

Closest On Center Nail Spacing Parallel To WFS Orientation [3,4,5] (inches)								
Common Nail Size	Member Thickness (inches)							
	1 1/4	1 1/2 and 1 3/4		2 1/2		3 1/2		
	1 row	1 row	2 rows	1 row	2 rows	1 row	2 rows	3 rows
8d	4	3	3	3	3 1/2	3	3	3
10d	4	4	4	3	3 1/2	3	3	3
16d	6	6	6	3 1/2	3 1/2	3 1/2	3 1/2	–

1. When loading at an angle to grain, the lateral capacity is calculated using the Hankinson formula using an equivalent specifi gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.55 for load perpendicular to grain.
2. 400 pounds is the lateral load permitted for 1/2 inch diameter lag bolt in 1 1/2 inch thick main and side members with full penetration into the main member. Lateral load capacities for other lag bolt sizes and conditions to be evaluated in accordance with the ANSI/AF&PA National Design Specification (NDS), using an equivalent specific gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.55 for load perpendicular to grain. For capacities at an angle to grain refer to Footnote 1, above. Capacities in withdrawal have not been evaluated.
3. The closest on center spacing for nails perpendicular to WFS is the same as permitted by the code for sawn lumber.
4. Multiple rows to be staggered and the minimum spacing between rows must be 1/2 inch.
5. Multiple rows to be equally spaced from the centerline of the narrow face axis.
6. TimberStrand LSL identified with a circled 45 (plant number) as part of the product label.

TABLE 3 – 1.3E TimberStrand® LSL RIM BOARD [1,2,3]

Thickness (inches)	Allowable Vertical Load (PLF)[4]	Depth Range (inches)
1.25 [5]	4250	16 and less
1.25 [5]	3450	over 16 up to 20
1.50 and 1.75	4140	up to 24

1. The allowable shear values in pounds per foot for horizontal wood structural panel diaphragms with framing of nominal 2 inch thick Douglas fir-larch or southern pine are applicable to: (1) 1.25 inch thick TimberStrand LSL Rim Board, unblocked diaphragms only, and (2) 1.50 and 1.75 inch thick TimberStrand LSL Rim Board, unblocked and blocked diaphragms.
2. TimberStrand LSL Rim Board must be laterally supported at the top and continuously supported at the bottom, and the gravity loads must be uniformly applied along the top, in lieu of design by a design professional for other conditions.
3. Fastener capacities for TimberStrand LSL Rim Board are as given in Table 2, except as provided in Footnote 5, below.
4. Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.
5. The allowable lateral load capacities for 1/4 inch, 3/8 inch and 1/2 inch diameter lag screws installed perpendicular to the wide face of strands, and loaded perpendicular-to-grain are 250 lbs., 400 lbs. and 475 lbs. respectively.

TABLE 4 - iLevel™ RIM BOARD CAPACITIES[1,2,3]

Thickness (inches)	Allowable Vertical Load (plf)	Allowable Lateral Load (plf)	Depth Range (inches)
1-1/8	4000	180	9-1/2 to 16

1. Compression perpendicular to grain value may not be increased for duration of load.
2. iLevel Rim Board shall be laterally supported at the top and continuously supported at the bottom, and the gravity loads shall be uniformly applied along the top, in lieu of design by a design professional for other conditions.
3. Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.

TABLE 5 – iLevel™ RIM BOARD FASTENER DETAILS

Fastener	Description	Comments
Lateral Nail and Screw Capacity	Edge: Parallel and perpendicular	See footnote 1
	Face: Parallel and perpendicular	Specific gravity of 0.50 (Douglas fir-larch)
Nail Withdrawal Capacity	Face	Specific gravity of 0.38
Lateral Bolt Capacity [2]	Face: Parallel and perpendicular	Specific gravity of 0.50 (Douglas fir-larch)
Lag Bolt Capacity [3]	Face: Perpendicular-to-grain	1/2 inch dia.: 350 lbs. [3]

1. iLevel Rim Board is permitted for use as rim board material in structures complying with the conventional construction requirements as defined in Section 2320 of the UBC, Section 2308 of the IBC and Section R502 of the IRC.
2. When loading at an angle to grain, the lateral capacity is calculated using the Hankinson formula.
3. 350 pounds is the lateral load permitted for 1/2 inch diameter lag bolt in iLevel Rim Board main members and 1 1/2 inch thick side members with full penetration into the main member with a 3/8 inch gap between main and side members.

TABLE 6 – iLevel™ RIM BOARD CLOSEST ON CENTER NAIL SPACING PARALLEL TO WFS ORIENTATION [1] (inches)

Nail Size	BOX	Common
8d (2 1/2")	6	6
10d (3")	6	6
12d (3 1/4")	6 [2]	6 [2]
16d sinker (3 1/4")	16 [3]	16 [3]
16d (3 1/2")	16 [3]	16 [3]

1. The closest on center spacing for nails perpendicular to WFS is the same as permitted by the code for sawn lumber.
2. When nailing through the wall sill plate and floor sheathing, the closest on center nail spacing is 4 inches (1 3/8 inch maximum penetration).
3. When nailing through the wall sill plate and floor sheathing, the closest on center nail spacing is 5 inches (1 3/8 inch maximum penetration).

Terms and Conditions: The TimberStrand LSL lumber, as described above, is accepted on the following conditions:

1. All uses, locations and installations comply with the applicable requirements of the New York City Building Code.

2. The design provisions and specifications as listed in the above table shall apply.

3. Structures designed using TimberStrand LSL lumber shall conform to the manufacturer's design specifications except that appropriate design load(s), deflection limitation(s) and other performance standards of the New York City Building Code shall apply.

4. TimberStrand LSL lumber shall be for interior use only and stamped "INTERIOR MEA 89-96-M, Vol. 3" on each beam.

5. TimberStrand LSL lumber, when stored out-of-doors, or exposed to wetting weather conditions, during construction shall be inspected by the user for separating and for swelling or warping and replaced, if so damaged.

6. Beams less than 1-1/2 inch thick shall be firestopped every 500 square feet in floor construction.

7. The adhesive used in the manufacture of TimberStrand LSL shall not delaminate during a fire.

8. TimberStrand LSL is identified with a stamp noting the name of the manufacturer (Weyerhaeuser) and the plant number; the product trade name (TimberStrand® LSL); the production date, the grade, and the name of the quality control agency (PFS Corporation).

9. Length and depth dimensions of TimberStrand LSL may be cut to size for the required application. Depth shall not be cut to less than 3½" (89mm). Thickness dimension of TimberStrand LSL may be cut to a minimum of 1¾" (44.5 mm). For all material used in structural applications, the product identification shall be maintained on all material, or the material shall be re-stamped with the appropriate identification only under the approval and direction of PFS Corporation or Intertek Testing Services. Additionally, TimberStrand LSL may be notched, drilled, or tapered-end cut, provided design is by a design professional.

Note: In accordance with Section 27-131(d), all materials tested and accepted for use shall be subject to periodic retesting as determined by the Commissioner; and any material which upon retesting is found not to comply with Code requirements or the requirements set forth in the approval of the Commissioner shall cease to be acceptable for the intended use. During the period for such retesting, the Commissioner may require the use of such material to be restricted or discontinued if necessary to secure safety.

Final Acceptance October 16, 2006

Examined by