Optimizing Floor System Performance with Engineered Wood Products

Presented By: Cory McCambridge

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What is APA – The Engineered Wood Association?

1933: Douglas Fir Plywood Association
1994: APA – The Engineered Wood Association

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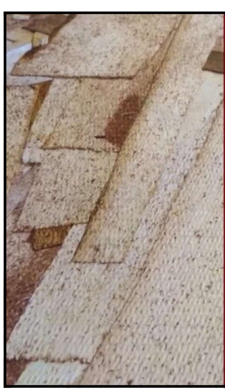

The Douglas Fir Plywood Association grew into the American Plywood Association, and later expanded to become APA – The Engineered Wood Association, as it's known today.

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CONTINUING EDUCATION

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Webinar Attendee Survey

https://www.apawood.org/presentation-survey

Today's Presenter

Cory McCambridge
Engineered Wood Specialist – Canada Observation Services Lead

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The Agenda

- Welcome & Introduction
- Why EWP Floor Systems?
- Product Overview
- System Design Principles, Best Practices & Examples
- APA Resources & Tools
- Q&A/Open Discussion

Learning Objectives

- Can identify the key benefits, applications, and sustainability attributes of engineered wood products (EWP) in residential floor systems.
- Can discuss key design principles — including span, deflection, vibration, fire resistance, and acoustics — that affect the performance of EWP floor systems.
- Can describe best practices for installation, field modification, and moisture protection to improve floor system durability and avoid common jobsite issues.
- Can identify APA tools, resources, and technical support that provide guidance on product selection, design decisions, and jobsite implementation.

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The Agenda

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Why Engineered Wood Products?

- Sustainable
- Predictable
- Performance
- Less Waste

The Agenda

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EWP Floor System Components

Product Overview: Structural Composite Lumber (SCL)

- Wood grain is primarily oriented in the same direction
- Excellent performance when face- or edge-loaded
- Consistent sizes
- Typically developed proprietarily

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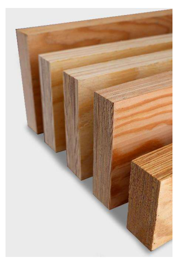
Product Overview: Laminated Veneer Lumber (LVL)

- Veneers bonded together
- Beams, headers, rafters, scaffold planking
- Common thicknesses: 1 1/2", 1 3/4", 3 1/2", 5 1/4"
- Secondary bonding enables thicker LVL



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Product Overview: Parallel Strand Lumber (PSL)

- Veneers clipped into long strands in a parallel formation and bonded together
- Strand length-to-thickness ratio is around 300:1
- Common uses: headers, beams, load-bearing columns
- Common thicknesses: 3 1/2", 5 1/4", 7"
- Typically developed proprietarily

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Product Overview: Laminated Strand Lumber (LSL)

- Flaked strand length-to-thickness ratio is around 150:1
- Common uses: beams, headers, studs, rim board, stair stringers
- Common thicknesses: 1 1/2", 1 3/4", and 3 1/2"

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Product Overview: Oriented Strand Lumber (OSL)

- Flaked strand length-to-thickness ratio is around 75:1
- Common uses: beams, headers, studs, rim board, millwork

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Product Overview: Glued Laminated Timber (GLT)/Glulam

- Wood laminations bonded together
- Wood grain runs parallel to the length of the member
- Common uses: purlins, ridge beams, floor beams, headers, arches, bridges, mass timber structures
- Typical widths: 1 3/4" to 10 3/4"

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Proper Design & Specification

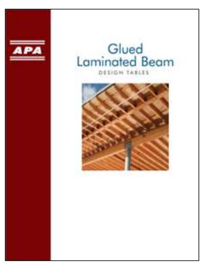
Member Type					
Stiffness Ranges	LVL	LSL	PSL	Glulam	Select Structural
➡ Low	2250/1.3 2250/1.5	1700/1.3 1750/1.35 2200/1.5 2325/1.55 2360/1.55	N/A	1600/1.5	SPF 1250/1.1 HF 1400/1.6
➡ Mid	2400/1.7 2600/1.9 2650/1.7 2650/1.9	2400/1.6 2600/1.7	N/A	2400/1.8	DF-Larch 1350/1.9 SP Dense 1950/1.9
➡ High	2800/2.0 2900/2.0 2950/2.0 3100/2.0	N/A	2900/2.0	3000/2.1	N/A

Proper Design & Specification: Glulam and SCL

Design Tools

- Manufacturer's Literature
  - PLF tables
  - Span, total load, live load, minimum required bearing, beam width and depth, load duration factor
- Glued Laminated Beam Design Tables (Form S475)

** PLF = pounds per lineal foot*



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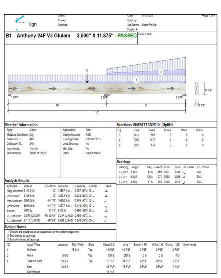
Proper Design & Specification: Glulam and SCL

- Manufacturer Software
- Third-Party Software

ENERCALC

Bentley

RISA TECHNOLOGIES



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Proper Design & Specification

Basic Beam Design Concepts

Proprietary

- Structural Composite Lumber (SCL)
  - LVL, LSL, OSL, PSL

Non-Proprietary

- Glulam Beams
  - CSA-086 – Canada
  - ANSI 117 – US
- Dimension Lumber
  - 2x4, 4x6, 8x8

Wood I-Joist: Depths & Series

- Standard Depths Include:
  - 9 1/2"
  - 11 7/8"
  - 14"
  - 16"
  - 18"
- Design values and limitations vary by manufacturer and series.

Wood I-Joist: Manufacturer Nomenclature

- AcuTruss Industries (ACJ)
- Boise Cascade Company (BCI)
- EACOM Timber Corporation (PJI)
- IB EWP Inc. (IB)
- Nordic Structures (NI)
- Pacific Woodtech Corporation (PWI / LPI)
- Resolute Engineered Wood (RSI)
- Roseburg Forest Products Company (RFPI)
- Stark Truss Company Inc. (SI)
- Weyerhaeuser (TJI)

I-Joist Design & Specification: Span Tables

a. Clear span applicable to multiple-span residential floor construction with a design dead load of 0.48 kPa (10 psf) and live load of 1.92 kPa (40 psf). The ultimate limit states are based on the factored loads of 1.25D + 1.50L. The serviceability limit states include the consideration for floor vibration and a live load deflection limit of span/480. The end spans shall be 40% or more of the adjacent span.

b. Spans are based on a composite floor with glued-nailed sheathing meeting the requirements for APA Rated Sheathing or APA Rated STURD-I-FLOOR conforming to PS 1, PS 2, CSA O121, CSA O151 or CSA O325, with a minimum thickness of 15 mm (19/32 inch) (40/20 or 20 oc) for a joist spacing of 488 mm (19.2 inches) or less, or 18 mm (23/32 inch) (48/24 or 24 oc) for a joist spacing of 610 mm (24 inches). Adhesive shall meet the requirements given in ASTM D3498 1/8" P/O Class. No concrete topping, gypsum ceiling or bridging element was assumed.

c. Minimum bearing length shall be 44 mm (1-3/4 inches) for the end bearings, and 89 mm (3-1/2 inches) for the intermediate bearings.

d. Web stiffeners are not required when I-joists are used with the spans and spacings given in this table, except as required by hanger manufacturers and over supports at load-bearing cantilever locations.

e. The ends of the joists shall be anchored to resist a factored uplift force of 0.48 kPa (10 psf) x joist spacing x largest span, due to pattern loading.

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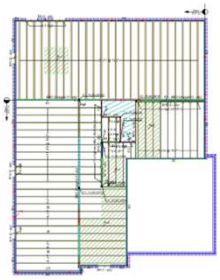
I-Joist Design: Floor System Layouts



Hanger

Label	Pcs	Description	Beam/Girder fasteners	Supported Member fasteners
Hg5	1	HUS410	8 16d	8 16d
Hg1	5	IUS1.81/11.88 (Min)	10 10d	
Hg3	7	MIU1.56/9 (Min)	16 10dx1 1/2	2 10dx1 1/2
Hg2	8	IUS2.37/11.88 (Min)	10 10d	
Hg6	18	LF1511	12 10dx1 1/2	1 #8x1 1/4WS

Ground Floor

Design Method	LSD (Canada)
Building Code	NBCC 2015 OBC 2012(2020 Update)
Floor	
Loads	
Live	40
Dead	15
Deflection Joist	
LL Span L/	480
TL Span L/	240
Deflection Flush Girder	
LL Span L/	480
TL Span L/	240
Deflection Dropped Girder	
LL Span L/	360
TL Span L/	240
Deflection Header	
LL Span L/	360
TL Span L/	240
Decking	
Decking	OSB
Thickness	23/32"
Fastener	Nailed & Glued
Vibration	

Second Floor

Design Method	LSD (Canada)
Building Code	NBCC 2015 OBC 2012(2020 Update)
Floor	
Loads	
Live	40
Dead	15
Deflection Joist	
LL Span L/	480
TL Span L/	240
Deflection Flush Girder	
LL Span L/	480
TL Span L/	240
Deflection Dropped Girder	
LL Span L/	360
TL Span L/	240
Deflection Header	
LL Span L/	360
TL Span L/	240
Decking	
Decking	OSB
Thickness	23/32"
Fastener	Nailed & Glued
Vibration	
Ceiling:	Gypsum 1/2"

Roof

Design Method	LSD (Canada)
Building Code	NBCC 2015 OBC 2012(2020 Update)
Roof	
Loads	
Live	0
Dead	10
Snow	21
Deflection Joist	
LL Span L/	480
TL Span L/	240
Deflection Flush Girder	
LL Span L/	360
TL Span L/	240
Deflection Dropped Girder	
LL Span L/	360
TL Span L/	240
Deflection Header	
LL Span L/	480
TL Span L/	240
Decking	
Decking	OSB
Thickness	7/16"
Fastener	Nailed Only

Line Loads PLF

Label	Live	Dead
LL3	120	45
LL5	120	45
LL4	40	15

Area Loads PSF

Label	Live	Dead
AL2	0	10
AL1	0	50
AL3	0	10
AL4	0	10

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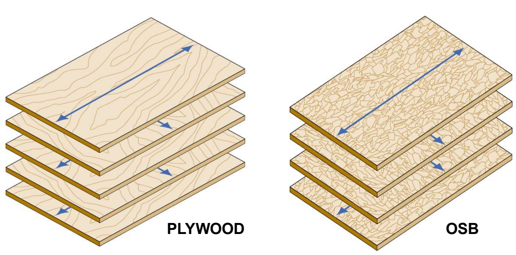
Wood Structural Panels: OSB and Plywood



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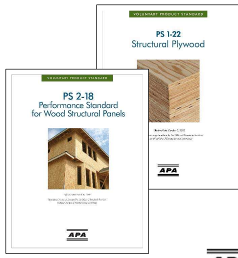
Wood Structural Panels: Manufacturing Standards

PS 1: Voluntary Product Standard
PRESCRIPTIVE Standard
(revised 2022)

PS 2: Voluntary Product Standard
PERFORMANCE Standard
(revised 2019)



Wood Structural Panels: Manufacturing Standards

Material must conform to:

- **CSA-O121 Douglas Fir Plywood**
- **CSA-O151 Canadian Softwood Plywood**
- **CSA-O153 Poplar Plywood**
- **CSA-O325 Construction Sheathing**

Subfloor Requirements – NBC 2020

Table 9.23.15.5.-A
Thickness of Subflooring
Forming Part of Sentences 9.23.15.5.(1) and 9.23.16.7.(1)

Maximum Spacing of Supports, mm	Minimum Thickness, mm			
	Plywood and OSB, O-2 Grade	OSB, O-1 Grade, and Waferboard, R-1 Grade	Particleboard	Lumber
400	15.5	15.9	15.9	17.0
500	15.5	15.9	19.0	19.0
600	18.5	19.0	25.4	19.0

Table 9.23.15.5.-B
Rating for Subfloor when Applying CSA O325
Forming Part of Sentences 9.23.15.5.(1) and 9.23.16.7.(1)

Maximum Spacing of Supports, mm	Panel Mark	
	Subfloor	Used with Panel-Type Underlay
400	1F16	2F16
500	1F20	2F20
600	1F24	2F24

Subfloor Requirements – NBC 2020

TABLE R503.2.1.1(1)

ALLOWABLE SPANS AND LOADS FOR WOOD STRUCTURAL PANELS FOR ROOF AND SUBFLOOR SHEATHING AND COMBINATION SUBFLOOR UNDERLAYMENT[a, b, c]

SPAN RATING	MINIMUM NOMINAL PANEL THICKNESS (inch)	ALLOWABLE LIVE LOAD (psf)[h, l]		MAXIMUM SPAN (inches)		LOAD (pounds per square foot, at maximum span)		MAXIMUM SPAN (inches)
		Span @ 16" o.c.	Span @ 24" o.c.	With edge support[d]	Without edge support	Total load	Live load	
Sheathing[e]				Roof[f]				Subfloor[j]
16/0	3/8	30	—	16	16	40	30	0
20/0	3/8	50	—	20	20	40	30	0
24/0	3/8	100	30	24	20[g]	40	30	0
24/16	7/16	100	40	24	24	50	40	16
32/16	15/32, 1/2	180	70	32	28	40	30	16[h]
40/20	19/32, 5/8	305	130	40	32	40	30	20[h, i]
48/24	23/32, 3/4	—	175	48	36	45	35	24
60/32	7/8	—	305	60	48	45	35	32
Underlayment, C-C plugged, single floor[e]				Roof[f]				Combination subfloor underlayment[k]
16 o.c.	19/32, 5/8	100	40	24	24	50	40	16[i]
20 o.c.	19/32, 5/8	150	60	32	32	40	30	20[i, j]
24 o.c.	23/32, 3/4	240	100	48	36	35	25	24
32 o.c.	7/8	—	185	48	40	50	40	32
48 o.c.	1 3/32, 1 1/8	—	290	60	48	50	40	48

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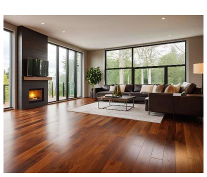
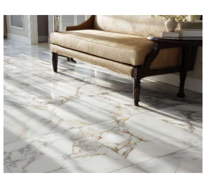
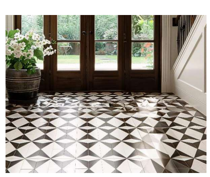
Design Considerations for Engineered Wood Floor Systems

Identify variables that will impact the performance of the floor system, such as:

- **Finished floor products**
  - (hardwood, ceramic tile, marble, LVT)







Design Considerations for Engineered Wood Floor Systems

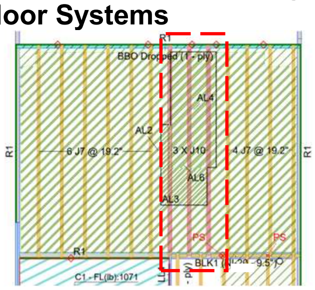
- Kitchen islands/soaker tubs/stone-clad fireplaces

Design Considerations for Engineered Wood Floor Systems

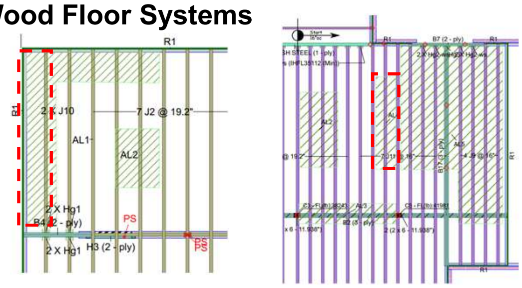
Without Kitchen Island Loading

With Kitchen Island Loading

Design Considerations for Engineered Wood Floor Systems



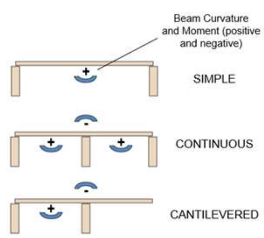
Design Considerations for Engineered Wood Floor Systems



Design Considerations for Engineered Wood Floor Systems

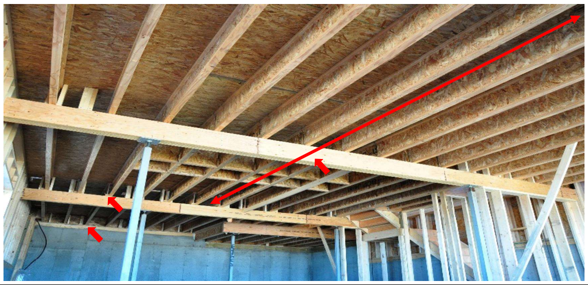
Span Conditions

- **Simple Span:**
  - Joist or beam spans between two supporting members
- **Continuous Span:**
  - Joist or beam has three or more supporting members and runs continuous across the middle support(s)
- **Cantilevered Span:**
  - Joist or beam spans between two supports but runs continuous across the second support



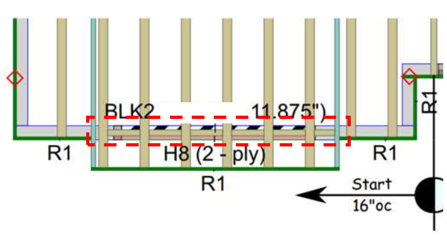
Span Conditions – Simple Span

Span Conditions – Simple vs. Continuous

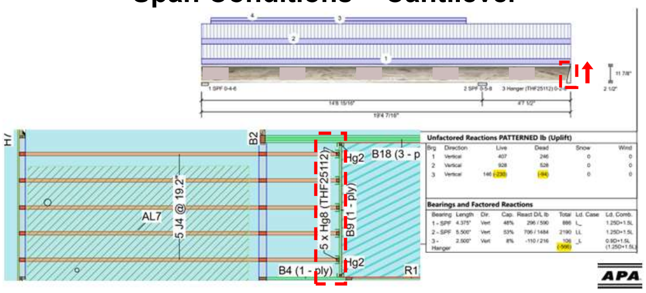


Span Conditions – Cantilever

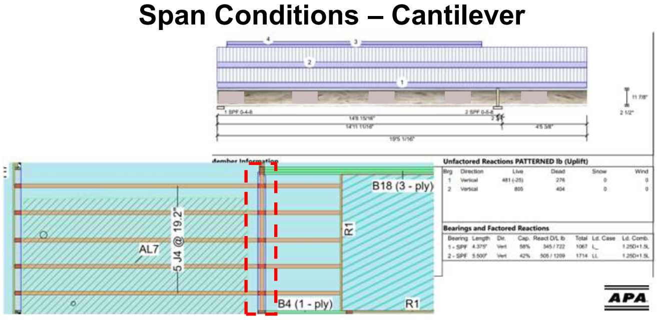
Span Conditions – Cantilever



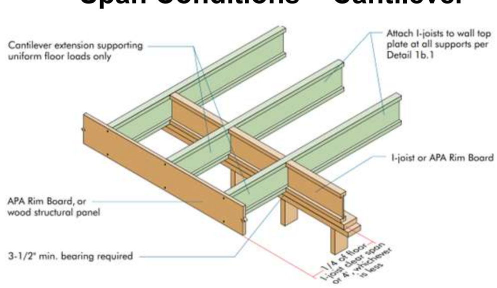
Span Conditions – Cantilever



Span Conditions – Cantilever

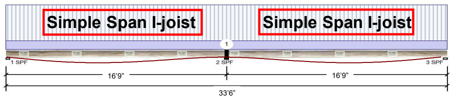


Span Conditions – Cantilever

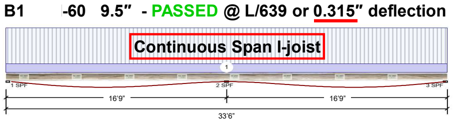


Simple Span vs. Continuous Span

B1 -60 9.5" - PASSED @ L/488 or 0.412" deflection



B1 -60 9.5" - PASSED @ L/639 or 0.315" deflection



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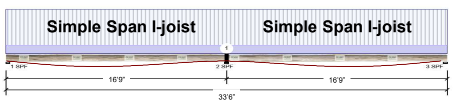
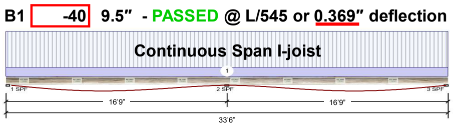
Simple Span vs. Continuous Span

B1 -60 9.5" - PASSED @ L/488 or 0.412" deflection



B1 -40 9.5" - PASSED @ L/545 or 0.369" deflection



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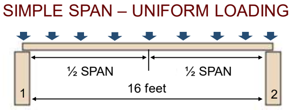
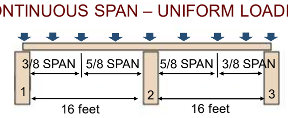
Design Considerations – Tributary Area

SIMPLE SPAN – UNIFORM LOADING



CONTINUOUS SPAN – UNIFORM LOADING



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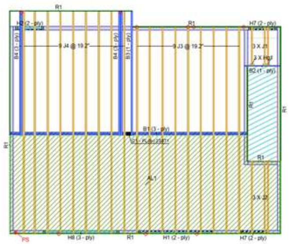
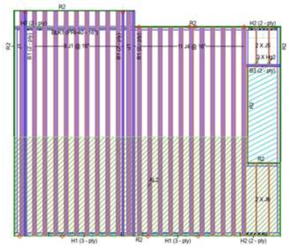
2nd Floor – 9 1/2" Option



I-Joists = Low series 9 1/2" spaced 19.2" o.c. with 23/32" OSB subfloor
Dropped Beam = 5.5" x 14" Glulam + post/pad

2nd Floor – 16" Option



I-Joists = Double high series 16" spaced 16" o.c. with 23/32" OSB subfloor (26' clear span)

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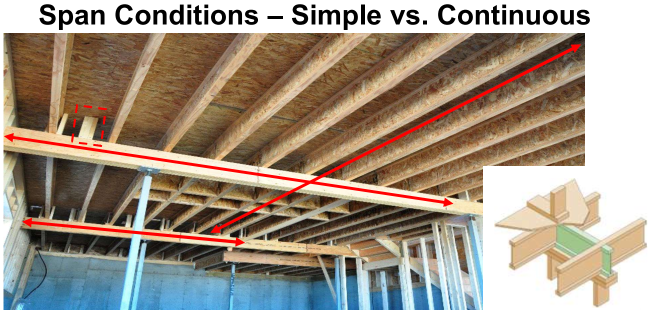
Span Conditions – Simple vs. Continuous



Lateral Support for I-Joists

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Lateral Support for I-Joists

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Allowable Holes in I-Joist Blocking Panel

- Holes in Blocking used in EWP Construction (Form TT-040)
  - Outlines the allowable size and placement of holes in the webs of I-joists or Rim Board when used as blocking for lateral restraint of floor and roof joists

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Allowable Holes in I-Joist Blocking Panel

- The maximum allowable hole size for lateral restraint only blocking is two thirds of the lesser dimension of blocking depth or length
- This assumes that the blocking member is longer than its height (depth)

Table 1. Maximum allowable hole diameter in blocking member (where blocking member is longer than its height).

I-joist or Rim Board blocking depth (in.)	Maximum allowable hole diameter (in.)
9-1/2	6-1/4
11-7/8	7-3/4
14	9-1/4
16	10-1/2

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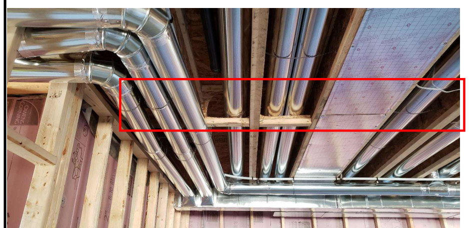
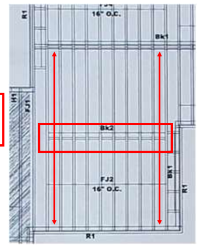
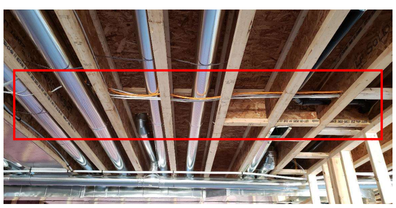
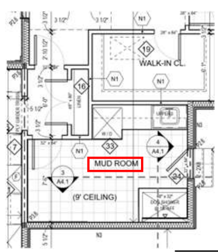
HVAC Interferences with Mid-Span Blocking





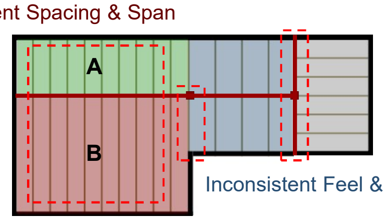
HVAC Interferences with Mid-Span Blocking





Design Considerations – Consistency Counts

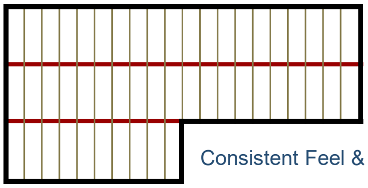
Inconsistent Spacing & Span



Inconsistent Feel & Performance

Design Considerations – Consistency Counts

Consistent Spacing & Span

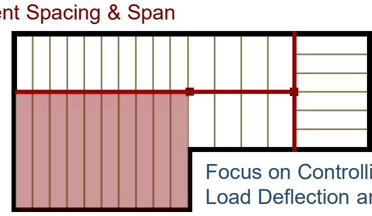


Consistent Feel & Performance

APA

Design Considerations – Live Load Deflection & Vibration

Inconsistent Spacing & Span



Focus on Controlling Live Load Deflection and Vibration

APA

Design Considerations for Engineered Wood Floor Systems

Identify variables that will impact the performance of the floor system, such as:

- Deflection Criteria & Vibration Control

TABLE R301.7ALLOWABLE DEFLECTION OF STRUCTURAL MEMBERS[b, c]

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3:12 with finished ceiling not attached to rafters	L/180
Interior walls and partitions	H/180
Floors	L/360
Ceilings with brittle finishes (including plaster and stucco)	L/360
Ceilings with flexible finishes (including gypsum board)	L/240
All other structural members	L/240
Exterior walls—wind loads[a] with plaster or stucco finish	H/360
Exterior walls—wind loads[a] with other brittle finishes	H/240
Exterior walls—wind loads[a] with flexible finishes	H/120[d]
Lintels supporting masonry veneer walls[e]	L/600

Live Load Deflection L/360 min. L/480 recommended

L = joist span in inches

- Example – span of 18' 0" = 18 feet x 12 inches per foot = 216"
  - 216/360 = 0.6" – allowable deflection
  - 216/480 = 0.45" – allowable deflection

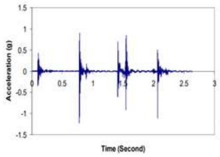
APA

Design Considerations – Vibration Control

CSA 086-19

Δ **5.4.5.2 Floor vibration**

For joisted floor systems that consist of a wood-based subfloor structurally attached to a series of equally-spaced floor joists, design shall consider vibration serviceability arising from normal human activities, such as walking action. Recommended design methods are provided in Clause A.5.4.5. The floor joist products include, but are not limited to, sawn lumber, glulam joists, prefabricated wood I-joists, parallel chord trusses, and structural composite lumber (SCL).



Design Considerations – Vibration Control

Minimizing Floor Vibration by Design & Retrofit (Form E710)

- This publication covers the subjective nature of vibration perception, fundamental natural frequency, and the criteria for floor vibration control, as well as guidelines to remedy floor vibration problems in existing buildings.

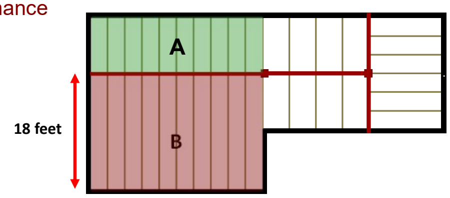
Design Considerations – Vibration Control

Construction Practices for Wood I-Joist Floor Vibration Retrofit (Form D720)

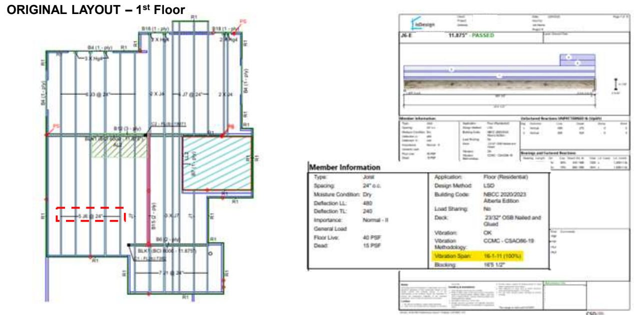
- This publication helps readers identify the causes of and remedies for excessive floor vibration.

Design Considerations – Live Load Deflection & Vibration

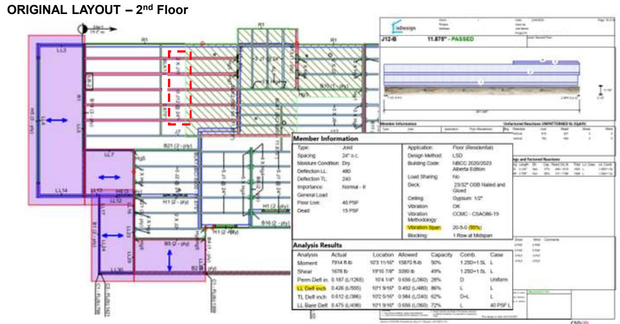
Control live load deflection and vibration for consistent performance



ORIGINAL LAYOUT – 1st Floor



ORIGINAL LAYOUT – 2nd Floor



Vibration Example 3

ORIGINAL LAYOUT – 1st Floor

J7-G 11.875" - PASSED

General Load	
Floor Live:	40 PSF
Dead:	15 PSF

Vibration:	OK
Vibration Methodology:	CCMC - CSAO86-19
Vibration Span:	19-3-15 (83%)
Vibration Span:	19-3-15 (99%)

Analysis Results

Analysis	Actual	Location	Allowed	Capacity	Comb.	Case
Neg Moment	-3102 ft-lb	16'1 15/16"	3545 ft-lb	88%	D+L	LL
Pos Moment	2384 ft-lb	27'2 7/8"	3545 ft-lb	67%	D+L	_L
Shear	995 lb	16'4 9/16"	1620 lb	61%	D+L	LL
LL Defl inch	0.310 (L/741)	26'2 15/16"	0.478 (L/480)	65%	L	_L
TL Defl inch	0.396 (L/580)	26'4 3/8"	0.957 (L/240)	41%	D+L	_L
LL Bare Defl	0.372 (L/617)	26'3 1/8"	0.638 (L/360)	58%	L	40 PSF L

APA

Vibration Example 3

OPTIMIZED LAYOUT – 1st Floor

J9-E PJI-60 11.875" - PASSED

General Load	
Floor Live:	40 PSF
Dead:	15 PSF

Vibration:	OK
Vibration Methodology:	CCMC - CSAO86-19
Vibration Span:	21-2-11 (79%)
Vibration Span:	21-2-11 (90%)

Analysis Results

Analysis	Actual	Location	Allowed	Capacity	Comb.	Case
Neg Moment	-3046 ft-lb	16'1 15/16"	6970 ft-lb	44%	D+L	LL
Pos Moment	2402 ft-lb	27'2 1/2"	6970 ft-lb	34%	D+L	_L
Shear	992 lb	16'4 9/16"	1650 lb	60%	D+L	LL
LL Defl inch	0.217 (L/1059)	26'2 1/2"	0.478 (L/480)	45%	L	_L
TL Defl inch	0.279 (L/822)	26'3 5/8"	0.957 (L/240)	29%	D+L	_L
LL Bare Defl	0.241 (L/952)	26'2 11/16"	0.638 (L/360)	38%	L	40 PSF L

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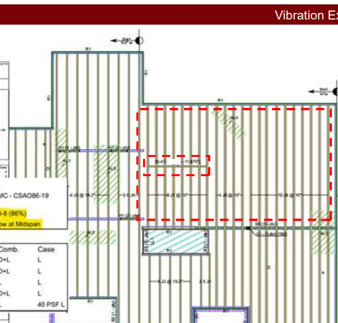
Vibration Example 3

OPTIMIZED LAYOUT – 1st Floor



J7-B PJI-60 11.875" - PASSED

General Load	
Floor Live:	40 PSF
Dead:	15 PSF

Vibration:	OK
Vibration Methodology:	CCMC - CSAO86-19
Vibration Span:	22-0-8 (86%)
Blocking:	1 Row at Midspan

Analysis Results

Analysis	Actual	Location	Allowed	Capacity	Comb.	Case
Moment	3296 ft-lb	9'9 3/8"	6970 ft-lb	47%	D+L	L
Shear	691 lb	19'2 7/16"	1650 lb	42%	D+L	L
LL Defl inch	0.286 (L/796)	9'9 7/16"	0.474 (L/480)	60%	L	L
TL Defl inch	0.393 (L/579)	9'9 7/16"	0.948 (L/240)	41%	D+L	L
LL Bare Defl	0.321 (L/709)	9'9 7/16"	0.632 (L/360)	51%	L	40 PSF L

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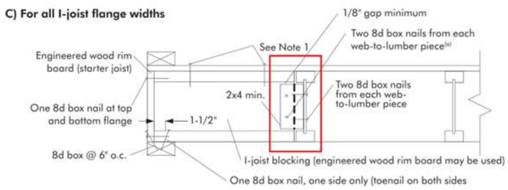
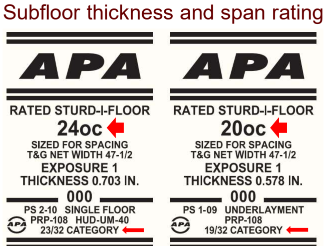
Mid-Span Blocking Connection Details



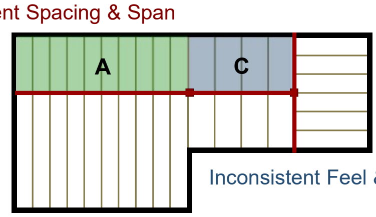
Design Considerations for Engineered Wood Floor Systems

Subfloor thickness and span rating



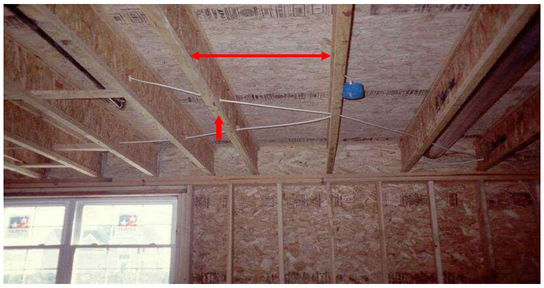
Design Considerations – Consistency Counts

Inconsistent Spacing & Span



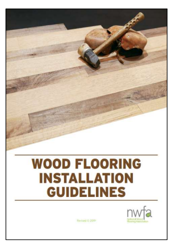
Inconsistent Feel & Performance

Design Considerations – Inconsistent Joist Spacing



Hardwood Floor – Underlayment?

Joist Spacing	Minimum Subfloor Performance Category	Minimum Span Rating
≤ 16"	19/32 plywood or 23/32 OSB	40/20 or 1F20 oc
> 16" and ≤ 19.2"	23/32 plywood or OSB	48/24 or 1F24 oc
> 19.2" and ≤ 24"	7/8 plywood or OSB	60/32 or 1F32 oc



Design Considerations for Engineered Wood Floor Systems

Glued and Nailed Subfloor

- Composite action increases floor stiffness
- Reduces potential for floor squeaks

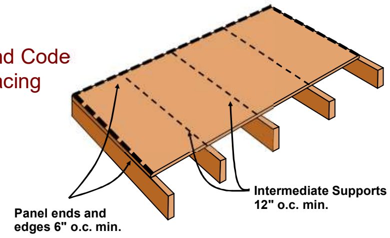

Technical Topics

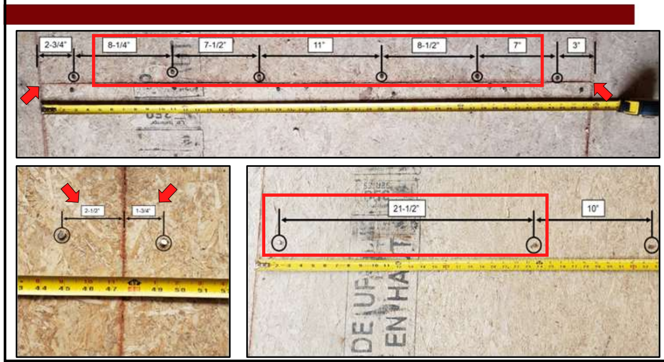
Design Example for APA Glued Floor System Using APA Rated Sturd-I-Floor Panels

Installation Recommendations – Floor Systems

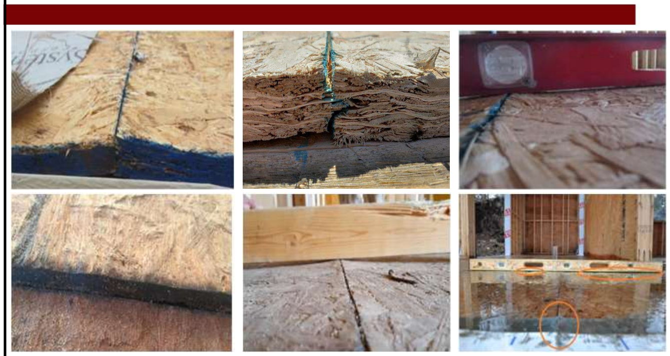
APA Recommended and Code Minimum Fastener Spacing

- **Panel ends & edges -** 6" on center
- **Intermediate/Field -** 12" on center
- **End/Edge distance -** 3/8 inch





Improper Connections – Fasteners Missing Framing Members



Building From the Ground Up – Floor Systems

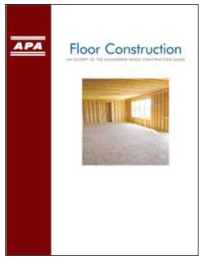
Performance Rated I-Joists Design & Construction Guide (Form Z725)

- Includes information on span ratings, installation details, cantilever designs, architectural specifications and engineering design properties for APA Performance Rated I-Joists

Building From the Ground Up – Floor Systems

Floors Design & Construction Guide (Form E30)

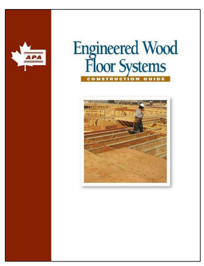
- Provides information on a variety of floor framing and wood structural panel products that can be used in floor construction



Building From the Ground Up – Floor Systems

Engineered Wood Floor Systems Design & Construction Guide (Form R300)

- Addresses floor design considerations for Canada
- Provides specification recommendations for plywood and OSB floor systems under carpet and pad, hardwood flooring, lightweight concrete, vinyl and ceramic tile.



Design Considerations for Engineered Wood Floor Systems

Directly applied ceiling:

- Increased mass and stiffness
- Increased damping – the ability of a material to absorb energy and reduce vibration
- Reduction in vibration and movement

Fire Protection of Engineered Wood Floors

Fire Protection of Floors Constructed with I-Joists for Compliance with IRC (Form SR-405)

- Provides guidance on fire protection of floors constructed with prefabricated wood I-joist assemblies that complies with 2015, 2018, 2021 and 2024 updates to the International Residential Code.

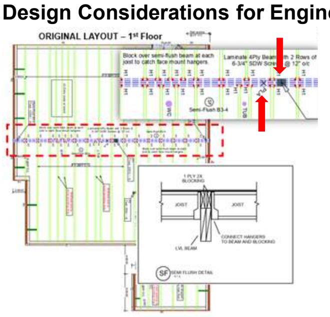

APA System Report

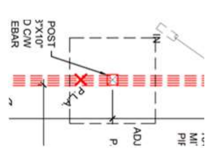
Fire Protection of Floors Constructed with Prefabricated Wood I-Joists for Compliance with the International Residential Code

Design Considerations for Engineered Wood Floor Systems

- Avoid offset point loads from girder trusses or beams where practical
- Identify plumbing and HVAC interference
- Do not mix EWPs with dimension lumber products
- Avoid changing I-joist direction
  - May create a "hump" in the floor
  - Easier to install subfloor/finished floor product
  - Easier to incorporate flush HVAC, plumbing and electrical systems
    - Pre-cut holes in I-joists
    - Flex-pipe systems work better in flush conditions

Design Considerations for Engineered Wood Floor Systems





Design Considerations for Engineered Wood Floor Systems

Pre-Design /Concept → Architectural → Structural → 3D Modeling

- **Early coordination with entire project team:** architect, engineer, framer, builder and HVAC designer is essential

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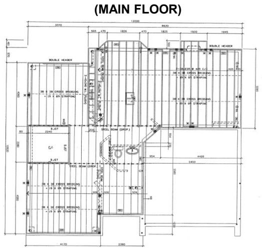
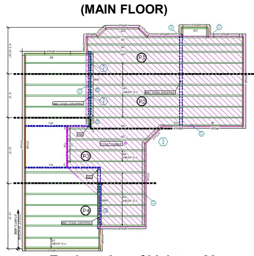
Optimize the Structure – Example 1

DIMENSION LUMBER LAYOUT (MAIN FLOOR)	VALUE ENGINEERED EWP LAYOUT (MAIN FLOOR)
	
Total number of joists = 83 **148 pcs. cross bridging** **108 lf strapping** **75 lf of steel**	**Total number of I-joists = 26** **0 pcs. cross bridging** **0 lf strapping** **42 lf of steel**

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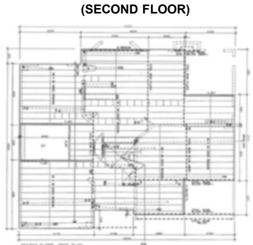
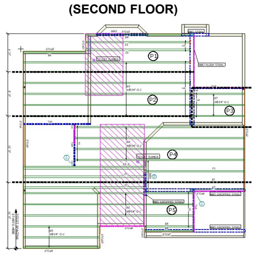
Optimize the Structure – Example 1

DIMENSION LUMBER LAYOUT (SECOND FLOOR)	VALUE ENGINEERED EWP LAYOUT (SECOND FLOOR)
	
Total number of joists = 91 **154 pcs. cross bridging** **127 lf of steel**	**Total number of I-joists = 32** **0 pcs. cross bridging** **91 lf of steel**

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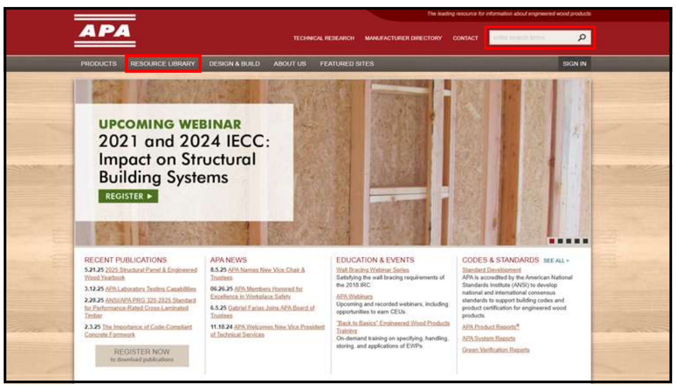
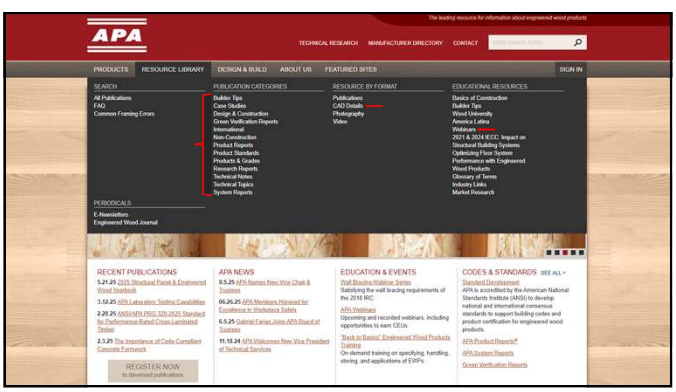
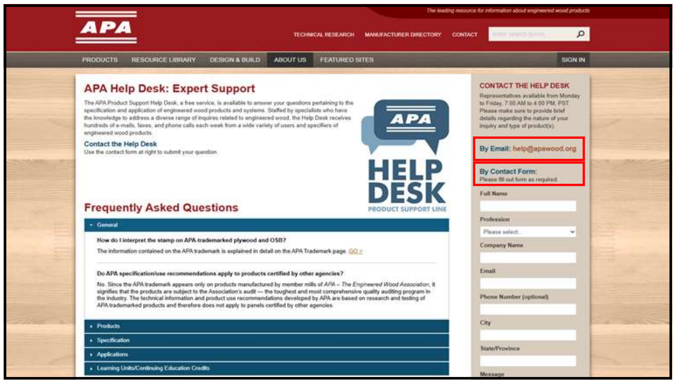
The Agenda

- Welcome & Introduction
- Why EWP Floor Systems?
- Product Overview
- System Design Principles, Best Practices, & Examples
- **APA Resources & Tools**
- Q&A/Open Discussion



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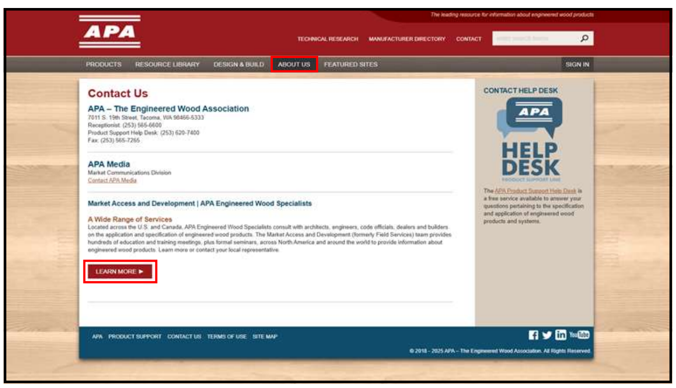
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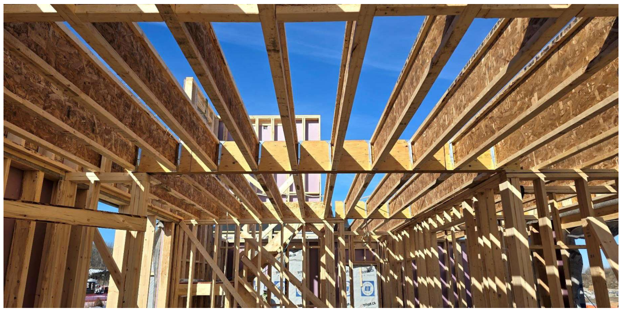

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Questions?

Please complete the survey.

?

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Thank you for attending!

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