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Resilient Construction with Engineered Wood: Sustainable, Code-Compliant Solutions

RW1

Presented by:

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.



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Attendee Survey



Matt Brown



Stephanie Thomas-Rees



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

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Course Description

Today's building codes and standards address many of society's top concerns regarding the built environment—from public health and safety to the environmental impacts of construction materials. As natural disasters become more frequent, severe and costly, the need for more resilient buildings is paramount.

This webinar explores the essential role of resilient construction methods in today's built environment and explains the various APA resources that can support resilient design. Learn how to meet and exceed code requirements using engineered wood products (EWPs) to build strong, sustainable and energy - efficient structures.

This session will cover key programs and standards that quantify resiliency, provide detailed construction drawings, and discuss installation best practices and which to avoid.

Participants will also learn how to showcase the value of EWPs to their clients. Ideal for designers, engineers, builders and other industry professionals, this webinar will empower you to enhance building performance and occupant safety while promoting environmental stewardship.

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Objectives

- Define and explain the importance and advantages of resilient construction methods promoting health and wellness in communities.
- Outline APA's resiliency focus and the resources available to enhance health and wellness of building occupants through resilient building practices in the built environment.
- Discuss code requirements, standards and certification programs that ensure resiliency.
- Identify design and construction techniques using engineered wood products that contribute to resilient and safe buildings.

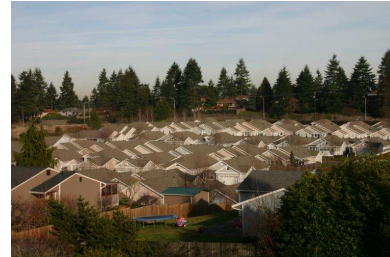
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Agenda

1. Why?
2. Definition
3. Pillars – Structural, Hazards, Sustainability, Energy
4. How? APA Resources MM0
5. Examples – Bad & Good
6. APA Moving Forward AD1



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Why?

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- Survive progressive changing climate and intensifying natural disasters.
- Promote sustainability and safeguard occupants using innovative solutions.
- Reduces risk assessment in investment evaluations.
- Codes are increasing energy efficiency and sustainability mandates.



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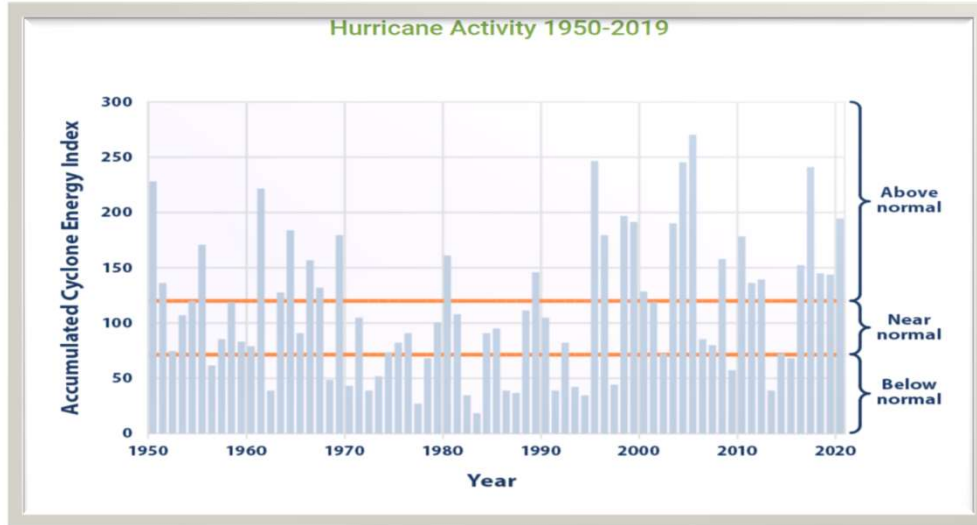
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Why?

AD2

MM1



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Agenda

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6. APA Moving Forward



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Definition

The ability to design and construct buildings that can withstand and recover from severe wind events, seismic activities, fire, and floods while promoting sustainability, and energy efficiency, utilizing engineered wood products. This is achieved through APA's four resiliency pillars: Structural Resilience, Hazard Mitigation, Sustainability/Stewardship, and Energy Efficiency.

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re·sil·iency



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Agenda

1. Why?
2. Definition
3. **Pillars – Structural, Hazards, Sustainability, Energy**
4. How? APA Resources
5. Examples – Bad & Good
6. APA Moving Forward

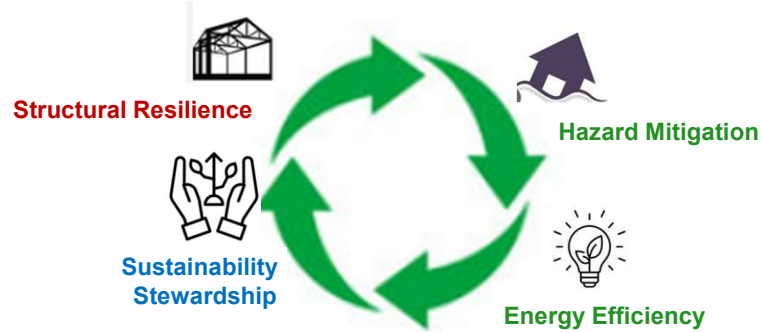


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Resiliency Pillars a person or thing regarded as reliably providing essential support for something.



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Structural Resilience



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Structural Resilience

- Promoting resilient, high-performing buildings capable of withstanding severe wind events.
- Seismic Resilience: Advocating for high-performance seismic design and construction.

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Structural Resilience

Wind/High Wind

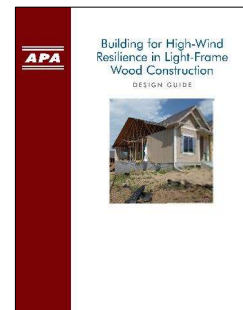
- Brace for high-wind events
- Maximize wall bracing using WSP

Seismic

- Wall bracing or seismic
- FTAO
- Weight of materials



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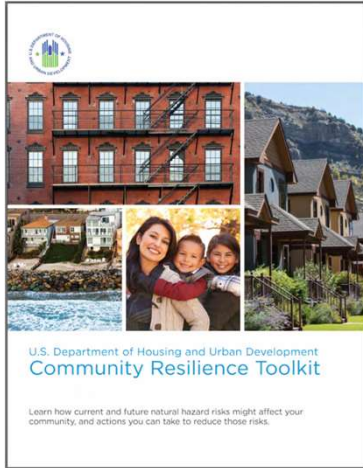


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Structural Resiliency- Programs



HUD Resiliency Guide for Wind

- Cites APA details and recommendations
- HUD – “A complete wrap of OSB or plywood on exterior”



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Hazard Mitigation

Structural Fire

- AWC's fire resources
- Wildland Urban Interface (WUI)

Flood

- Raised wood floors res^{MMO}orce



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Structural Fire

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Flood

Raised Wood Floor Case Study: Cooper Homes

John Cooper, Cooper Homes, Roswell, Georgia

Raised front porches provide historic character to John Cooper's homes. "The main thing is selling houses, and I've found that raised floors sell quicker."

Since 1982, John Cooper of Cooper Homes has built homes and communities inspired by the architecture and style of Atlanta's historic neighborhoods. He prefers raised wood floors because they provide historic character to a house – a feature that is attractive to home buyers.

"The main thing for me is the aesthetics and streetscape," says Cooper. "When a home is raised, people come up to it – and they may not really figure out exactly what it is – but they just know it is a better looking house. And the streetscape – having a raised front porch and stairs in front – is just much more comfortable for a community. You can sit out front and say hello to your neighbors. If you are flat on the ground, it just doesn't have the same feel. People notice that. If they don't pay more for the aesthetics) – which I think they do – the house will sell faster than a house that is on a slab."

Cooper's closed crawlspaces are semi-conditioned, keeping them dry and mildew-free, and can house mechanical equipment and ductwork for improved energy efficiency. Cooper says that finish siding over the foundation walls, such as brick or stone, is the kind of detailing that can have a significant visual impact. "That's a big dimension to cover the base, as opposed to a house that just comes down to the ground with siding. You can picture how much more pleasing it is to people who are looking for houses."

Cooper builds closed crawlspaces to better condition the main floor of the house and minimize moisture infiltration. He covers the dirt floor of the crawlspace with concrete for a more finished look. "You don't have to do a full 4-inch concrete floor," explains Cooper. "You can do 2 inches of concrete, which cuts your cost in half. You still get the same effect because you are not putting any weight on that floor. And that crawlspace is now dry and clean so it can be used for storage."

The finishing touches of a high-end raised floor home may cost a little more up front, but, according to Cooper, the builder will more than make up for it on the sale. "I've figured it out," Cooper says. "While it may cost me roughly \$5,000 more to build it, in a normal market I will definitely get \$10,000 to \$15,000 more for a raised home."



ADO



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Sustainability

Green Building Programs

- NGBS standards
- LEED H standards
- Integration of green practices and products

Sustainable

- Renewable/recyclable
- Carbon friendly
- Return of investment/affordability



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Green Verification Report

Green Verification Report
Pacific Woodtech Laminated Veneer Lumber GR-L233
 Revised December 1, 2021
 Product: Pacific Woodtech Laminated Veneer Lumber
 Pacific Woodtech Corporation, 1950 Park Lane, Burlington, Washington 98023
 (360) 797-2200
www.pacificwood.com

- 1. Basis of the green verification report:**
 - 2020, 2015, 2012 and 2008 National Green Building Standard, ICC 700
 - LEED v4 for New Construction and Major Renovations
 - 2009 LEED Credits for New Construction and Major Renovations
 - ASTM D5456-18, D5456-14, D5456-11, and D5456-08 recognized by the 2021 International Building Code (IBC) and International Residential Code (IRC), 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
 - APA W10, Green Verification Checklist – ICC 700-2020
 - APA T410, Green Verification Checklist – ICC 700-2015
 - APA G410, Green Verification Checklist – ICC 700-2012
 - APA L410, Green Verification Checklist – ICC 700-2008
 - APA L410, Green Verification Checklist – LEED
 - APA B410, Green Verification Checklist – LEED v4
 - APA Product Report PR-L233
 - Documentation supporting green product verification
- 2. Product description:**
 Pacific Woodtech LVL is made with wood veneers laminated with grain parallel to the length of the member in accordance with the in-plant manufacturing standard approved by APA. Pacific Woodtech LVL is available in thicknesses from 3/4 inch to 3-1/2 inches, widths from 1-1/4 inches to 6 inches, and lengths up to 60 feet. The entire plant in Pacific Woodtech LVL is certified under PEFC International Standard – Chain of Custody of Forest Products (COC) requirements (COC-C-107) and Sustainable Forestry Initiative (SFI) Chain of Custody (COC-C). The adhesives used to manufacture Pacific Woodtech LVL are solvent-free adhesives meeting the requirements of ASTM D3045 and contain no added urea-formaldehyde.
- 3. Green product verification:**
 Pacific Woodtech LVL products listed in this report are qualified for green construction with points specified in Tables 1, 2, 3, 4, 5, and 6, as independently verified by APA as meeting pertinent criteria of the referenced standards shown in Section 1.
- 4. Limitations:**
 - a) Pacific Woodtech LVL shall be designed in accordance with principles of mechanics using the design properties specified in APA Product Report PR-L233 or provided by the manufacturer.
 - b) Pacific Woodtech LVL is limited to its service conditions when the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
 - c) Pacific Woodtech LVL is produced at the Pacific Woodtech Corporation facility in Burlington, Washington, under a quality assurance program audited by APA.
 - d) This report is subject to re-evaluation in one year.

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Green Verification Report
Roseboro Structural Glued Laminated Timber GR-L251
 Revised January 16, 2022
 Product: Roseboro Structural Glued Laminated Timber
 Roseboro, 201 2nd St, 2009 Main Street, Springfield, OR 97147
 (541) 746-8411
www.roseboroltd.com

- 1. Basis of the green verification report:**
 - 2020, 2015, 2012 and 2008 National Green Building Standard, ICC 700
 - LEED v4 for New Construction and Major Renovations
 - 2009 LEED Credits for New Construction and Major Renovations
 - ANSI A950.1-2017, ANSI A108.1-2012, and ANSI/ATC A108.1-2007 recognized by the 2021 and 2018 International Building Code (IBC) and International Residential Code (IRC), 2018 IBC and IRC, and 2012 IBC and IRC, respectively
 - APA W210, Green Verification Checklist – ICC 700-2020
 - APA T410, Green Verification Checklist – ICC 700-2015
 - APA G410, Green Verification Checklist – ICC 700-2012
 - APA L410, Green Verification Checklist – ICC 700-2008
 - APA B410, Green Verification Checklist – LEED v4
 - APA L410, Green Verification Checklist – LEED
 - APA Product Report PR-L251
 - Documentation supporting green product verification
- 2. Product description:**
 Roseboro glulam products are used as beams, headers, rafters, purlins, and columns, and are manufactured with the conventional glue combinations with the exception that the tension and compression laminations of 2x4-VLW40DF, 2x6-VLW40DF, and 2x8-VLW40DF are substituted by laminated veneer lumber (LVL) in accordance with ANSI A950.1. The LVL laminations are supplied by manufacturers recognized by APA and certified in Roseboro's in-plant manufacturing standard approved by APA. The LVL complies with the control value listed in the manufacturing standard and is cut to full length and width with laminations, and is thicknesses up to 2 inches from wood veneers. All veneer grain is parallel to the length of the beam. The veneers are bonded with exterior-type adhesives, which comply with ASTM D3059 and ANSI 405.
- 3. Green product verification:**
 Roseboro glulam products listed in APA PR-L251 are qualified for green construction with points specified in Tables 1 through 6, as independently verified by APA as meeting pertinent criteria of the referenced standards shown in Section 1.
- 4. Limitations:**
 - a) Roseboro glulam beams and columns listed in APA PR-L251 are recognized in this report shall be designed in accordance with the code using the design properties specified in PR-L251 or glulam beams shall have a minimum depth of 12 inches, 2x6-EMDF glulam beams shall have a minimum depth of 7-1/4 inches and a maximum width of 48 inches, and 2x8-EMDF glulam beams shall have a minimum depth of 7-1/4 inches and a maximum depth of 26 inches.

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Green Verification Report
Roseburg RFPF® Series I-Joists Roseburg Forest Products Company GR-L259
 Revised May 31, 2022
 Product: Roseburg RFPF Series I-Joists
 Roseburg Forest Products Company, 3660 Gateway Street, Springfield, Oregon 97477
 (800) 747-7700
www.RFPFUSA.com

- 1. Basis of the green verification report:**
 - 2020, 2015, 2012 and 2008 National Green Building Standard, ICC 700
 - LEED v4 for New Construction and Major Renovations
 - 2009 LEED Credits for New Construction and Major Renovations
 - ASTM D5456-18, D5456-14, D5456-11, and D5456-08 recognized in the 2021 International Building Code (IBC) and International Residential Code (IRC), 2018 IBC and IRC, 2015 IBC and IRC, and 2012 IBC and IRC, respectively
 - ICC 700-218, Performance Standard for Wood Wood Structural Frames
 - CSA C1025-21 Construction Scheduling
 - APA PR-400, Performance Standard for Residential Joists
 - APA V410, Green Verification Checklist – ICC 700-2020
 - APA T410, Green Verification Checklist – ICC 700-2015
 - APA G410, Green Verification Checklist – ICC 700-2012
 - APA L410, Green Verification Checklist – ICC 700
 - APA B410, Green Verification Checklist – LEED v4
 - APA L410, Green Verification Checklist – LEED
 - APA Product Reports PR-L259 and PR-L260C1
 - Documentation supporting green product verification
- 2. Product description:**
 All RFPF joists are made with laminated veneer lumber (LVL) flanges, with the exception of RFPF-400, RFPF-400S and RFPF-500, which use made of solid sawn lumber, and OMS made in accordance with the in-plant manufacturing standard approved by APA. The bridge adhesives used for manufacture of the web materials meet the requirements of ICC-PS 2 and CSA O302, and contain no added urea-formaldehyde. The adhesives used to manufacture RFPF joists are exterior-type adhesives meeting the requirements of ASTM D3059 and contain no added urea-formaldehyde.
- 3. Green product verification:**
 RFPF joists listed in this report are qualified for green construction with points specified in Tables 1 through 6, as independently verified by APA as meeting pertinent criteria of the referenced standards shown in Section 1.
- 4. Limitations:**
 - a) RFPF joists shall be designed in accordance with principles of mechanics using the design properties specified in APA Product Reports PR-L259 and PR-L260C1, or provided by the manufacturer.
 - b) RFPF joists are limited to its service conditions when the average equilibrium moisture content of solid-sawn lumber is less than 16%.
 - c) RFPF joists are produced at the Roseburg Forest Products Company facility in Roseburg, Oregon, under a quality assurance program audited by APA.

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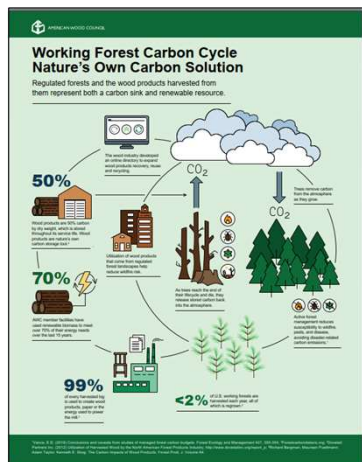
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Forest Certification and APA Members



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Life Cycle Analysis (LCA) and Environmental Product Declaration (EPD)



ENVIRONMENTAL PRODUCT DECLARATION

North American Oriented Strand Board
North American Structural and Architectural Wood Products

Accounting to ISO 14047, EN 15958, and ISO 21930:2017

EPD Provider and Provider Organization: US, Environment 380 Progress Road, Nashville, TN 37211
 Name: ANDREW LLOYD and REBECCA General Program Instructions 2.4 July 2018
 Website: www.us14047.com

DECLARATION NUMBER: 478842824 001

DECLARATION SYSTEM: North American Oriented Strand Board
 Functional Unit: 1 m³ of OSB (2000mm x 2500mm x 18mm)

RELEVANCE PCR and Version Number: US, Environmental Product Category Rules for Building-Related Products and Services, Part 1: OSB, Version 3.0, 2020

DESCRIPTION OF PRODUCT APPLICATIONS: OSB used in residential and commercial building construction (interior and exterior), furniture manufacture, and other.

DATE OF ISSUE: July 1, 2020

EXPIRES: 6 Years

EPD TYPE: Industry average

EPD SCOPE: Cradle-to-gate

MANUFACTURER'S PRESENT DATA: 2020/2018

LCA SOFTWARE & VERSION NUMBER: SimaPro 8.8.1 (4)

LCA INVENTORY SYSTEM VERSION: USLCA 2.0 (19) (4), Ecoinvent 3.10 (16), CMLite 2 (19) (2)

LCA METHODOLOGY & SYSTEMS: TRACI 2 (16)

This PCR Review was conducted by: US, Environment PCR Review Panel
 PCR Review Panel: ccr@environment.com

This declaration was independently verified in accordance with ISO 14055:2006
 EXTERNAL: Grant R. Martin, US, Environment
 Grant R. Martin, US, Environment

This PCR was independently verified in accordance with ISO 14055:2006
 INTERNAL: Thomas P. Gluck, National Building Collaborative

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Energy Efficiency

Codes

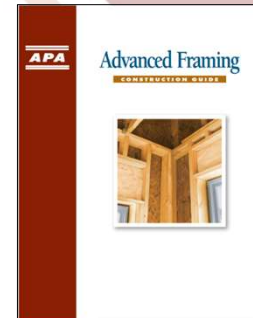
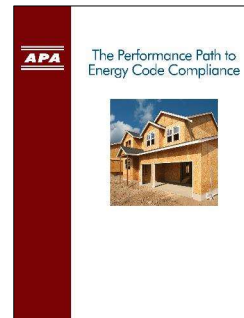
- Supporting cost-effective updates to energy codes and policies.

Survivability

- Maintain livable temperatures.

High-Energy Performance

- Maintain livable conditions without power or generation.



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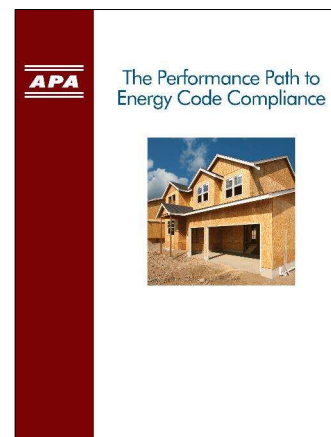

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Performance Energy Code Publication

- Intended to be a guide to generate conversations between raters and builders
- All assemblies must be modeled by an energy rater

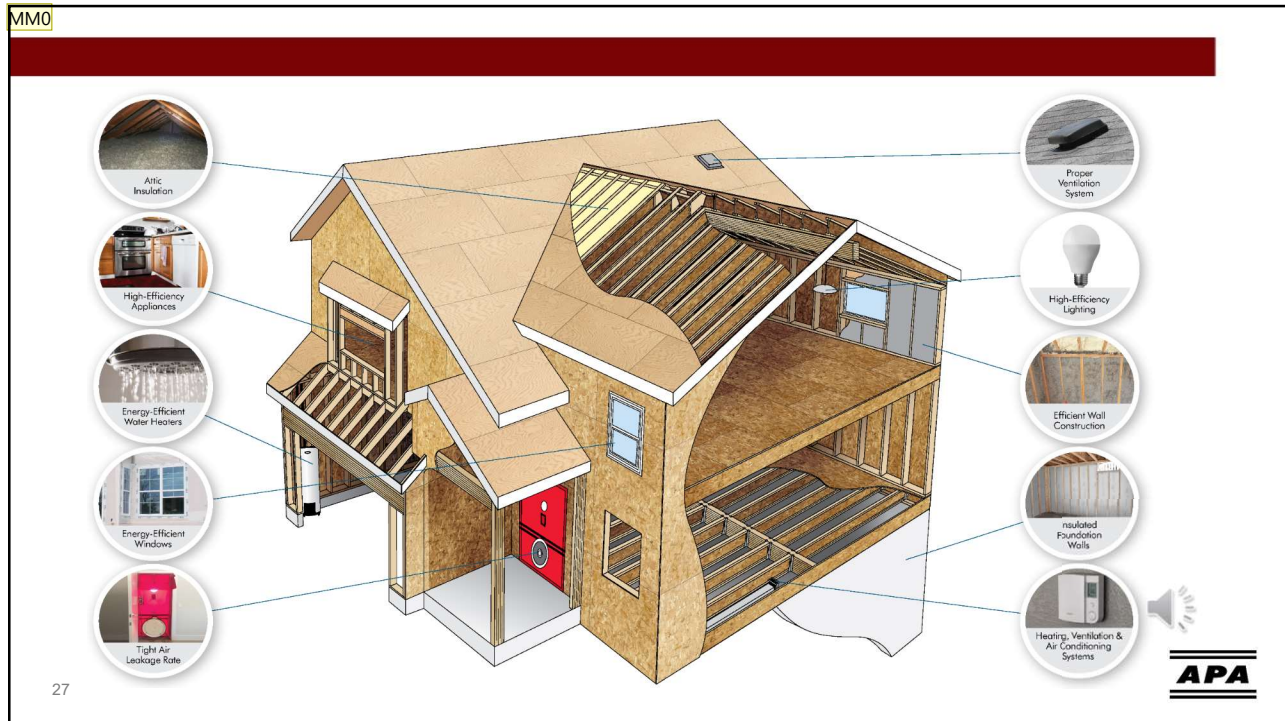


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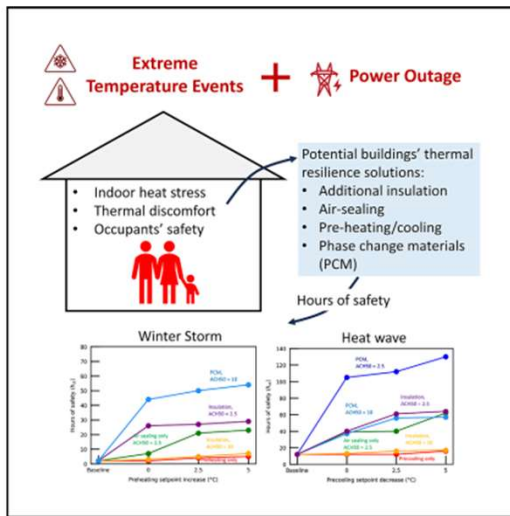
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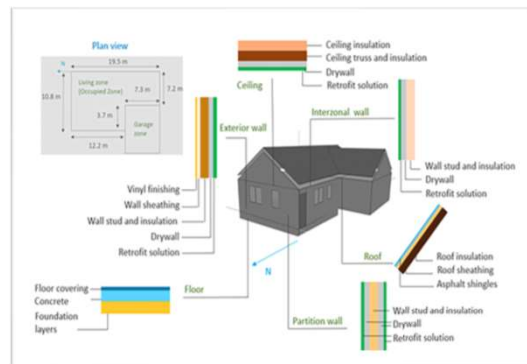
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Survivability



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Source: US DOE



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Incentives - Builder

- **Federal Tax Credits**
 - \$2500 per home for Energy Star Version 3.2
 - \$5000 per home for DOE Net Zero Energy Ready
- **Utility Incentives:**
 - Multiple state programs with rebates from \$200 to \$2800 per home, some incentivize continuous insulation.



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Incentives - Homeowner

- **Federal Tax Credits**
 - Energy Efficient Home Improvement Tax Credit
 - Residential Clean Energy Credit
- **Utility Incentives:**
 - Multiple State Programs with Rebates
- **State and Local Energy Code Adoptions**
 - Home Efficiency Rebates and Home Electrification and Appliance Rebates
- **Other Codes and Standards**
 - Pace Programs, Local Utility Rebates



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1. Why?
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3. Pillars – Structural, Hazards, Sustainability, Energy AD1
4. **How? APA Resources**
5. Examples – Bad & Good
6. APA Moving Forward



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FTAO

Type "FTAO"

The screenshot shows the APA Resource Library website interface. At the top, there is a red header with the APA logo and navigation links: TECHNICAL RESEARCH, MANUFACTURER DIRECTORY, CONTACT, and a search bar. Below the header is a dark grey navigation bar with links: PRODUCTS, RESOURCE LIBRARY, DESIGN & BUILD, ABOUT US, FEATURED SITES, MEMBERS ONLY, and MY APA. The main content area is titled "APA Resource Library" and includes a registration prompt: "Register for Free Access to APA Resources". Below this is a "PUBLICATION SEARCH" section with a search bar and a "SEARCH" button. A red arrow points from the text "Type 'FTAO'" to the search bar. On the right side, there are sections for "EDUCATIONAL RESOURCES" and "PERIODICALS". At the bottom, there are four icons representing different resource types: PUBLICATIONS, VIDEOS, PHOTOGRAPHY, and CAD DETAILS.

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The leading resource for information about engineered wood products

APA

TECHNICAL RESEARCH MANUFACTURER DIRECTORY CONTACT

PRODUCTS RESOURCE LIBRARY DESIGN & BUILD ABOUT US FEATURED SITES MEMBERS ONLY MY APA

Force Transfer Around Openings (FTAO)

VERSATILE SHEAR WALL DESIGN METHOD LEANS TOWARD GREATER FLEXIBILITY

Wood structural panel sheathed shear walls and diaphragms are primary lateral-load-resisting elements in wood-frame construction. As wood-frame construction is continuously evolving, designers in many parts of the U.S. are optimizing design solutions that require the understanding of force transfer between elements in the lateral load-resisting system.

Shear walls designed with force transfer around openings (FTAO) offer some advantages over other types of shear wall design:

- **More versatility**, because designing with FTAO allows for the use of narrower wall segments while meeting required height-to-width ratios, and
- A high likelihood that **fewer hold-downs** will be required.

Technical Note: Design for Force Transfer Around Openings
This technical note presents a rational analysis for applying FTAO to walls with asymmetric piers and walls with multiple openings. It is based upon APA modeling and testing and uses methodology that assists the design professional in solving for the required sheathing, nailing, hold-downs, straps and maximum deflection.

APA Force Transfer Around Openings Calculator
This calculator is an Excel-based tool for professional designers that uses FTAO methodology to calculate maximum hold-down force for split resistance, the required horizontal strap force for the tension straps above and below openings, the maximum shear force to determine sheathing attachment and the maximum deflection of the wall system. The calculator includes worksheets for shear walls with one, two and three openings and a design example.

Continuing Education Offerings
APA's Wood Community is an online platform for continuing education. It is accredited by the American Institute of Building Design and the American Institute of Architects for continuing education credits.

APA's Regional Engineered Wood Specialists frequently offer in-person seminars or webinars for large groups. [Learn More >](#)

Other opportunities to earn continuing education credit can be found at:

- [APA Webinars](#)
- [Education from American Wood Council](#)

APA CASE STUDY
Value Engineering Puts Apartment Project Back on Track

The Santa Barbara Apartments were an apartment with glass and wood framed steel studs being built with reimagined.

"When building contractors like a new apartment complex in Santa Barbara, come as high developer Barbara Manning of the business didn't give up. "I'm not down on picking up and value have started to climb," said Manning. The project had an on the shelf for a few years, waiting for the market to improve. But the numbers still needed to pencil out.

So she had the project value engineering, and a switch to glass and wood framed steel studs got everything back on track.

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Wall Bracing Calculator

APA Wall Bracing Calculator Quick Start Guide

The APA Wall Bracing Calculator developed by APA – The Engineered Wood Association is intended to simplify the design of residential structures that comply with 2021, 2018, 2015, 2012 and 2009 International Residential Code (IRC) wall bracing requirements. This Quick Start Guide provides basic instructions for using the calculator.

Visit www.apawood.org/calculator to launch the APA Wall Bracing Calculator.

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Advanced Framing

On-Demand Webinar
Converting to Advanced Framing: Learn from Experience
 As energy codes become stricter, builders and designers are seeking options for energy-efficient construction that maintain strength, durability, sustainability and cost-effectiveness. One effective solution is advanced framing, a system of construction framing techniques that optimize material use and increase energy efficiency. Join APA's Warren Hamrick as he discusses common advanced framing techniques, the benefits of the system and typical challenges that builders encounter during the conversion from traditional framing to advanced framing. **This course is approved by AIA (1 HSWLU) and ICC (6.10 CEU).**



What is Advanced Framing?
Inside Advanced Framing: How to Build Energy-Saving Homes
 The video series explains the concepts of advanced framing and how these techniques can be used to meet structural code and energy requirements.



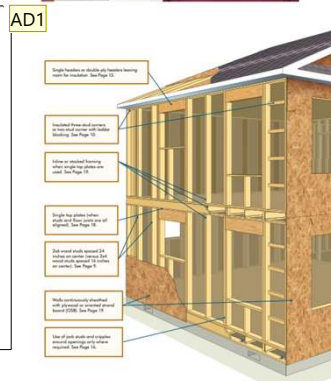
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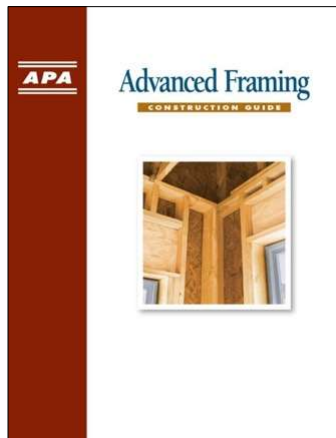
APA Publication: T110



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2x6 Advanced Framing



APA Publication: M400



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Advanced Framed Walls

IECC Climate Zones	2	3	4	5	6	7
2x6 Advanced Framing R-18	-4	-1	+2	+2	+2	+3
2x6 Advanced Framing R-20	-4	-1	+1	+2	+1	+2
2x6 Advanced Framing R-23	-4	-2	+1	+1	0	+1

Assumes 18% framing factor, double top plates and R-12 insulated headers



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Storm Assessment Publications

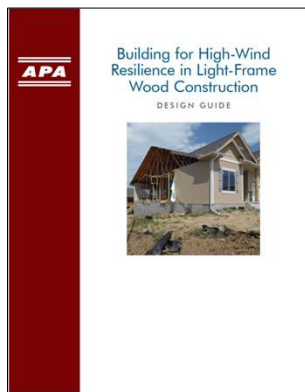
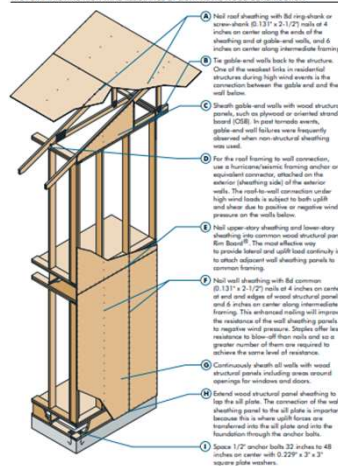


FIGURE 1
TIPS FOR IMPROVING HIGH-WIND RESISTANCE OF LIGHT-FRAME WOOD CONSTRUCTION



On-Demand Webinar
After the Storm: Building for High Wind Resistance
 APA Engineered Wood Specialist Mary Uher presents *After the Storm*, a webinar focusing on common structural failures observed during storm damage assessments. The presentation includes an overview of high wind forces, the importance of a continuous load path, and how good design and construction practices can improve the storm resistance of buildings.

Mary also discusses code requirements and APA's above-code recommendations for wind-resistant building, as well as how attention to connection details, understanding lateral load concepts, and recognizing common failure modes seen in storm damage assessments can help builders cost effectively build a safer home and reduce future storm damage. This course is approved by AIA (1 HSWLU) and ICC (0.10 CEU).

VIEW



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MM0

Best Practices for Sustainability

Less is more

- Use light-frame EWPs when you can
- Use mass timber EWPs instead of steel and concrete construction
- Use biophilic design
- Expose your structure
- Utilize advanced framing techniques



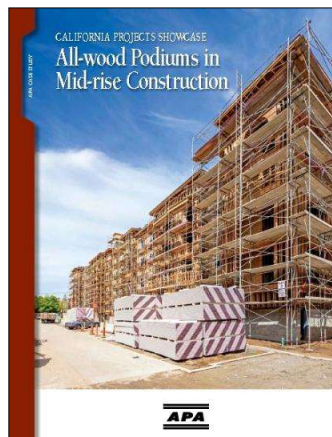
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All-wood Podiums in Mid-Rise Construction



APA Case Study, Form No. N110



AD2

AD1



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MM2

Mass Timber

- **Renewable resource**
- **Lower embodied energy**
- **2021 IBC allows 18-story construction**
- **Cost benefits**
- **Recent projects:**
 - 18-story student housing, Brock Commons (Vancouver, BC)
 - 25-story (19 = mass timber) apartment building, Ascent Tower (Milwaukee, WI)



Photo Credit: Thornton Thomasetti, Ascent Tower, Milwaukee, WI



Photo Credit: The University of British Columbia

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Use Biophilic Design



APA Publication J140

ADO



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Case Study: Environmental Nature Center

- LEED Platinum building
- Exposed structure

WOOD FRAMEWORK
Wood-framed Environmental Nature Center Inspires Sustainable Design

AD2

Project Summary
 Project: Environmental Nature Center
 Location: Grand Rapids, MI
 Client: Grand Rapids Parks & Recreation
 Architect: HOK
 Structural Engineer: HOK
 Construction Manager: HOK



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APA Publication: K115

AD1



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Wood Shaft Walls

- Substitute Concrete/CMU shaft walls with wood



PHOTO COURTESY OF NORDIC STRUCTURES



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RKO

Wall Framing

- OSL top plate & frame @ opening
- I-joist^{AD1} LVL studs
- Can use LSL/LVL studs 12' high
- Straight and bending strength

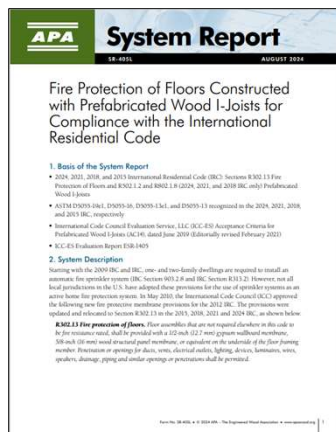


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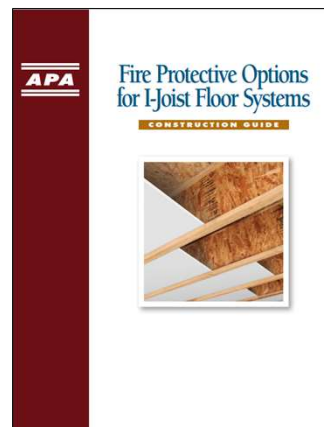
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Fire Protection



SR-405
APA System Report 405: Fire Protection of Floors Constructed with Prefabricated Wood I-Joists...

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Form 305
Fire Protective Options for I-Joist Floor

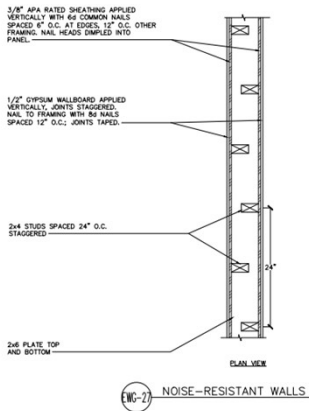


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MM1

Examples-Details

Noise-Resistant Wall



TECHNICAL NOTE

Acoustic Performance of All-Wood Floor Systems

Number: T230A
July 2017

1. INTRODUCTION

Lightweight concrete and gypsum toppings are frequently installed over engineered wood floor systems in multifamily and commercial construction. Such composite floor systems are typically constructed as the raised assembly with code-compliant fire and acoustic performance. In recent years, the wood structural panel (WSP) industry has developed all-wood floor systems that use single- or double-layer floor sheathing meeting both fire and acoustic performance requirements without the use of concrete or gypsum topping.

These all-wood floor systems employ thick cellulose sheathing, such as a single layer of 1.68 Performance Category Panel or double layers of 16/32 Performance Category top layer over 23/32 Performance Category base layer. Conventional light-frame floor construction is typically constructed with a single layer of 23/32 Performance Category floor sheathing. All-wood floor systems have the advantage of speedy construction because they eliminate construction delays caused by the installation of lightweight concrete or gypsum topping. In addition, these floors are stiffer than conventional light-frame floors.

In supporting the development of all-wood floor systems without lightweight gypsum or concrete topping, APA conducted a series of acoustic tests for code compliance based on sound transmission class (STC) and impact insulation class (IIC) ratings. Detailed descriptions for STC and IIC ratings are provided in APA Design Construction Guide Noise Rated Systems, Form W460. The results are presented in this publication. The double-layer floor assembly (16/32 Performance Category top layer over 23/32 Performance Category base layer) provides similar acoustic performance to the single layer 1.68 Performance Category floor assembly.

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Agenda

1. Why?
2. Definition
3. Pillars – Structural, Hazards, Sustainability, Energy
4. How? APA Resources
5. **Examples – Bad & Good**
6. APA Moving Forward

ADO



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Examples



Poor load path

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Examples



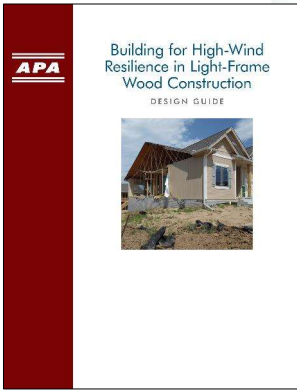
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Examples – Roof Sheathing

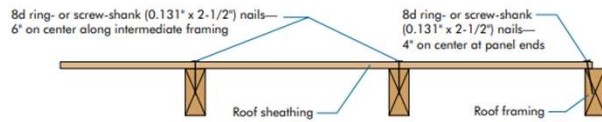


Wind Resistance M310

AD1



NAIL ROOF SHEATHING WITH 8D RING-SHANK OR SCREW-SHANK (0.131" x 2-1/2") NAILS AT 4" ON CENTER AT PANEL ENDS AND EDGES AND AT GABLE-END WALL, AND 6" ON CENTER ALONG INTERMEDIATE FRAMING



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Examples – Roof Sheathing



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RK0

Examples –Sheath Gable-End Walls



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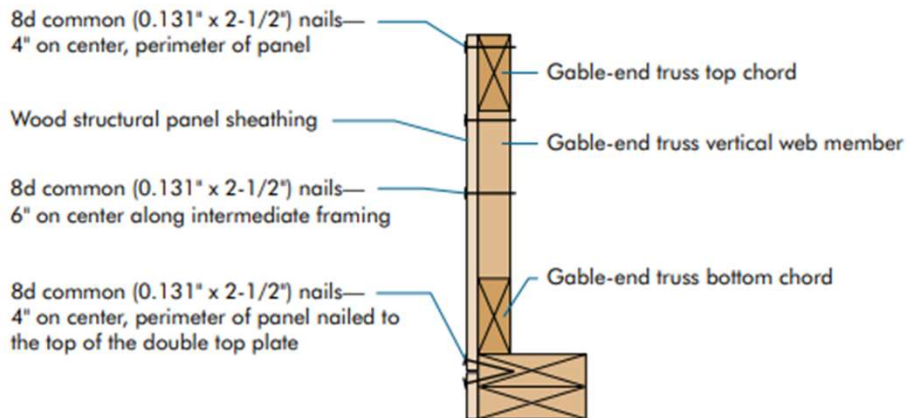


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Examples –Sheath Gable-End Walls

SHEATH GABLE-END WALLS WITH WOOD STRUCTURAL PANELS, SUCH AS PLYWOOD OR ORIENTED STRAND BOARD (OSB)



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Examples –Sheath Gable-End Walls



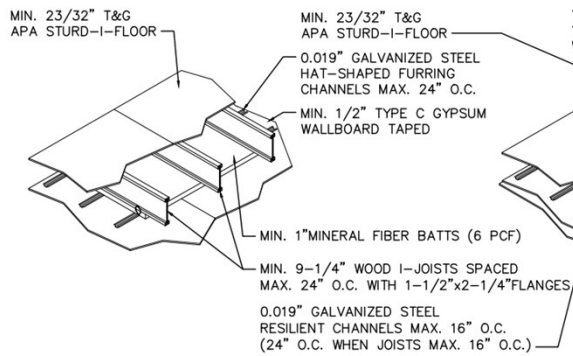
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Examples - Fire



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Examples - WSP as an Air Barrier



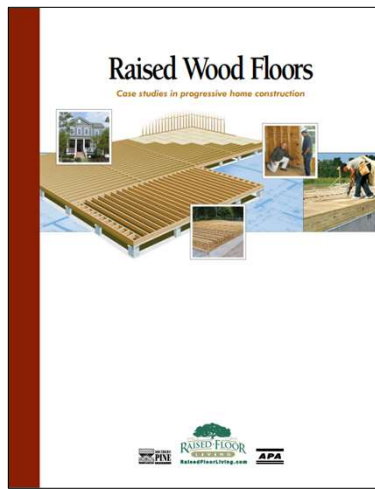
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Examples – Flood



Form K110

AD1



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Examples - Flood

Solution – Raised Floor System



Owner/builder Scott Murray's desire for a home with height and curb appeal led to his decision to build a raised wood floor system that is "characteristic of the historic architecture that I like."



The continuous stem wall foundation, constructed from eight-inch CMU blocks over a poured-in-place footing, encloses the crawl space.

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Form L110

AD0



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Examples – Raised Floor



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RKO

Examples – Raised Floor



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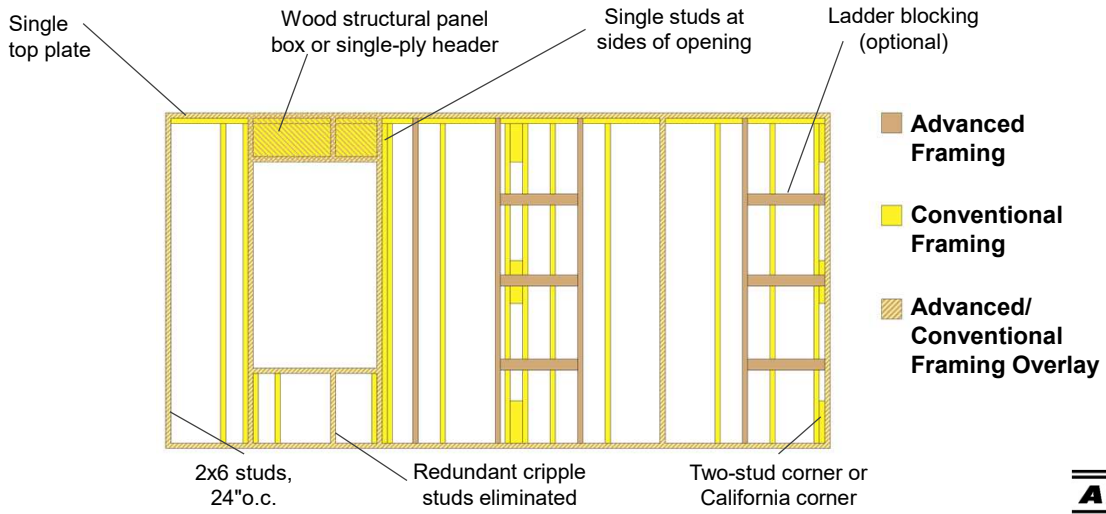
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Examples – Raised Floors



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Examples – Advanced Framing



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Examples – Advanced Framing



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Advanced Framing - Example

Insulating Corners and Headers

AD1



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Advanced Framing - Example

Negated Effects



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Examples – Modular/Panelized

- **Flexible**
- **Adaptable**
- **Off-site solutions**
- **Controllable**
- **Scalable**
- **Less waste**
 - On site & at plant



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MMO

Agenda

1. Why?
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5. Examples – Bad & Good
6. **APA Moving Forward**

AD1

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APA Moving Forward

- Be at the forefront of Energy and Resiliency changes
- Address embodied carbon, LCA, and energy trends within the IECC framework.

Mass timber buildings are roughly 25% faster to construct than concrete buildings.



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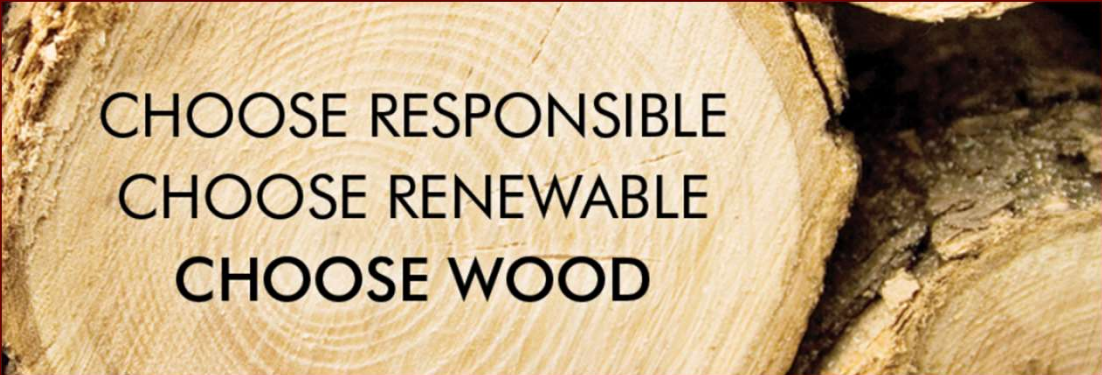
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APA Lab





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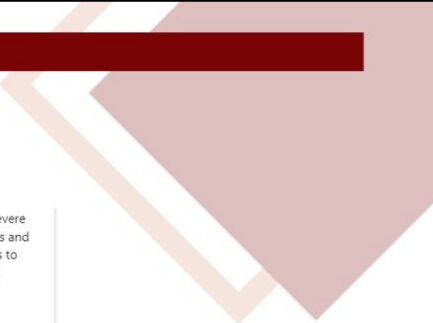
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CHOOSE RESPONSIBLE
CHOOSE RENEWABLE
CHOOSE WOOD





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Wood is the resilient choice for construction, especially in areas susceptible to severe weather conditions. Wood's strength, combined with its ability to absorb stresses and impacts, makes it a superior building material. We offer numerous free resources to help building professionals design and construct resilient homes that can better withstand severe weather conditions. Explore > apawood.ly/uQv850TfbtP

#ResilientConstruction #WindResilient



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Questions?

Matthew Brown, CGP

Matthew.Brown@apawood.org

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



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APA Field Staff

apawood.org/field-services

The screenshot shows the APA website's 'field-services' page. At the top is the APA logo and navigation links: TECHNICAL RESEARCH, MANUFACTURER DIRECTORY, CONTACT, and a search bar. Below the navigation is a main banner for 'UPDATED PUBLICATION: Minimizing Buckling of Wood Structural Panels' with a 'GET ▶' button. The page is divided into four columns: RECENT PUBLICATIONS, APA NEWS, EDUCATION & EVENTS, and CODES & STANDARDS. A 'REGISTER NOW' button is located at the bottom left of the page.

RECENT PUBLICATIONS

- 8.27.24 System Report: Fire Protection of Panels Constructed with Protected Wood Joists for Conformance with the International Residential Code
- 8.19.24 The Performance Path to Energy Code Conformance
- 7.16.24 Technical Note: Minimizing Buckling of Wood Structural Panels
- 5.16.24 Diaphragms and Shear Walls: Design and Construction Guide

APA NEWS

- 10.15.24 Scott Poole Joins APA Board of Trustees
- 09.30.24 2024 Bronson J. Lewis Winner
- 08.21.24 Updated Energy Code Compliance Guide Available From APA
- 06.18.24 APA Members Win Safety and Health Awards

EDUCATION & EVENTS

- 'Wall Bracing Webinar Series: Satisfying the wall bracing requirements of the 2018 IRC
- APA Webinars: Upcoming and recorded webinars, including opportunities to earn CEUs.
- 'Back to Basics': Engineered Wood Products Training: On-demand training on specifying, handling, storing, and applications of EWP's.

CODES & STANDARDS SEE ALL >

- ANSI Standard Development: APA is accredited by the American National Standards Institute (ANSI) to develop national consensus standards for engineered wood products.
- APA Product Reports®
- APA System Reports
- Green Verification Reports

REGISTER NOW
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APA Update Newsletter (www.apawood.org)



UPCOMING WEBINAR Designing Engineered Wood Diaphragm Systems

Wednesday, May 22 | 10-11 a.m. PDT
Diaphragms play a vital role in a building's lateral load path. Whether that lateral load is from seismic activity or wind forces, the diaphragm is responsible for distributing that lateral load to the shear walls. This session provides guidance on the proper design of engineered wood diaphragms.



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APA Update Newsletter (www.apawood.org)

The leading resource for information about engineered wood products

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<p>RECENT PUBLICATIONS 3.5.24 Technical Note: Design for Force Transfer Around Openings (FTAO) 1.31.24 ANSI/APA PRP 210-2024, Standard for Performance-Rated Engineered Wood</p>	<p>APA NEWS 02.27.24 Chris Seymour Joins APA Board of Trustees 12.19.23 APA Names Matthew Brown as the New Director of Energy Policy & Code</p>	<p>EDUCATION & EVENTS Wall Bracing Webinar Series Satisfying the wall bracing requirements of the 2018 IRC. APA Webinars</p>	<p>CODES & STANDARDS SEE ALL > ANSI Standard Development APA is accredited by the American National Standards Institute (ANSI) to develop national consensus standards for engineered wood products.</p>
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The leading resource for information about engineered wood products

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3.5.24 [Technical Note: Design for Force Transfer Around Openings \(T.FAO\)](#)

1.31.24 [ANSI/APA PRG 210-2024: Standard for Performance-Rated Engineered Wood Glues](#)

APA NEWS

02.27.24 [Chris Seymour Joins APA Board of Trustees](#)

12.19.23 [APA Names Matthew Brown as the New Director of Energy Policy & Code](#)

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Company Name

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Thank you!



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Thank you for attending.



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