

MM0

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

RW1

Presented by:

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Director of Energy Policy and Code

Stephanie Thomas-Rees

Engineered Wood Specialist/Territory Lead



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



2

Slide 1

MM0 Do you want to insert Matt's title under his name (like Stephanie)?
Michael McConnell, 2024-11-07T16:29:06.620

SR0 0 ok
Stephanie Rees, 2024-11-11T20:15:07.163

RW1 The webinar title needs to match what we submitted to AIA/ICC.

Resilient Construction with Engineered Wood: Sustainable,
Code-Compliant Solutions
Robin West, 2024-11-08T17:56:11.055

SR1 0 ok
Stephanie Rees, 2024-11-11T20:15:10.710

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3

MMO

Attendee Survey



Matt Brown



Stephanie Thomas-Rees



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

4

Slide 3

MM0 Add date

Michael McConnell, 2024-11-07T16:38:23.703

SR0 0 ok

Stephanie Rees, 2024-11-11T20:16:44.137

Slide 4

MM0 Add names under pictures

Michael McConnell, 2024-11-07T16:39:07.330

SR0 0 ok

Stephanie Rees, 2024-11-11T20:19:06.218

RK0

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.



5

5

RK0

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.



6

6

Slide 5

RK0 I added this slide

Robert A. Kuserk, 2024-11-05T21:05:20.193

MM1 insert space on both sides of em dash

Michael McConnell, 2024-11-07T16:39:56.738

SR1 0 ok

Stephanie Rees, 2024-11-11T20:20:03.860

MM2 Recommend breaking up this large block of text.

Michael McConnell, 2024-11-07T16:40:46.208

SR2 0 ok

Stephanie Rees, 2024-11-11T20:20:09.641

MM3 Insert paragraph break.

Michael McConnell, 2024-11-07T16:41:16.350

SR3 0 ok

Stephanie Rees, 2024-11-11T20:19:41.656

MM4 Suggest replacing "Participants" with "you" since it will be seen by people attending the presentation.

Michael McConnell, 2024-11-07T16:42:54.369

SR4 0 when recorded for on demand will this comment still be relevant?

Stephanie Rees, 2024-11-11T20:21:05.830

Slide 6

RK0 These are different than the AIA Learning Objectives.

Robert A. Kuserk, 2024-11-05T21:05:07.795

MM1 insert period after bullets

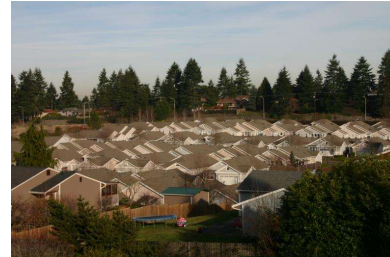
Michael McConnell, 2024-11-07T16:44:39.310

SR1 0 ok

Stephanie Rees, 2024-11-11T20:21:24.408

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



7

7

Why?

MM0

- 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.



8

Slide 7

MM0 "... Bad and Good" for consistency
Michael McConnell, 2024-11-07T16:46:17.689

AD0 0 This is different than other Agenda slides
Angie Dollar, 2024-11-08T23:18:03.184

SR0 1 made this agenda the default
Stephanie Rees, 2024-11-11T20:21:44.737

AD1 This is different than other Agenda slides
Angie Dollar, 2024-11-08T23:17:27.572

SR1 0 made this agenda the default
Stephanie Rees, 2024-11-11T20:21:54.190

Slide 8

MM0 Insert missing periods at ends of bullets
Michael McConnell, 2024-11-07T16:47:13.847

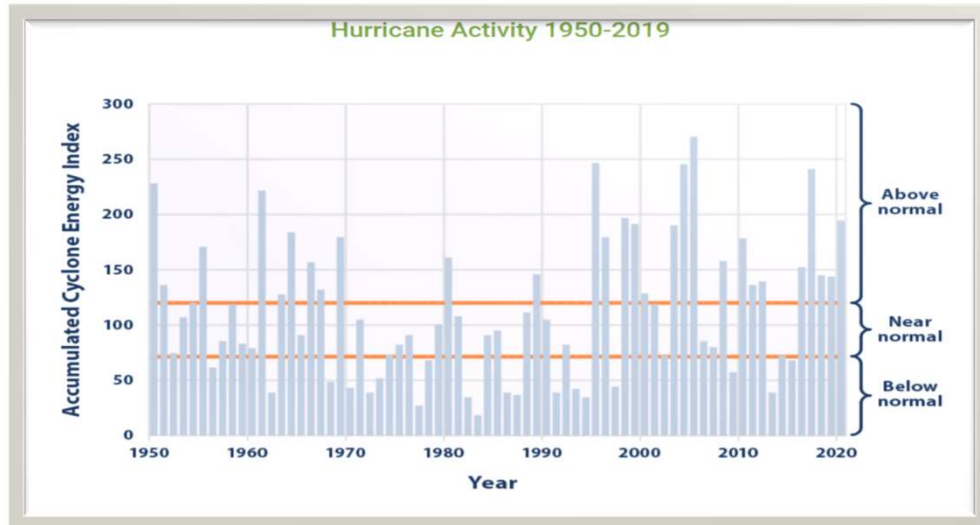
SR0 0 ok
Stephanie Rees, 2024-11-11T20:22:08.222

MM0

Why?

AD2

MM1



9

MM0

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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Slide 9

MM0 Will the "click" copy behind the graph automatically be invisible?
Michael McConnell, 2024-11-07T18:06:00.267

MM1 Headline says 2019 but graph goes to 2020
Michael McConnell, 2024-11-07T18:06:49.347

AD2 Suggest "Why?" like previous slides.
Angie Dollar, 2024-11-08T16:19:20.709

SR2 0 oik
Stephanie Rees, 2024-11-11T20:22:27.910

Slide 10

MM0 The copy for number 5 and 6 changed in this slide. Should be consistent
Michael McConnell, 2024-11-07T22:09:55.663

AD1 Suggest Title Caps like the rest
Angie Dollar, 2024-11-08T23:18:47.185

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.

MM1

re·sil·iency



11

MM1

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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12

Slide 11

MM0 insert "and" after "sustainability"

Michael McConnell, 2024-11-07T18:09:21.867

MM1 Replace "utilizing" with simpler "using"

Michael McConnell, 2024-11-07T18:12:02.138

MB1 0 I'm Hesitant to change this much, this definition was approved by the board.

Matthew Brown, 2024-11-13T16:16:53.451

MM1 1 [@Matthew Brown] OK. It means the same thing, just a less complicated way of saying it. I have a lot of small, "plain English" suggestions like that. But they're not worth sending back for board signoff.

Michael McConnell, 2024-11-13T16:39:43.278

Slide 12

MM0 Put No. 5 in title case for consistency

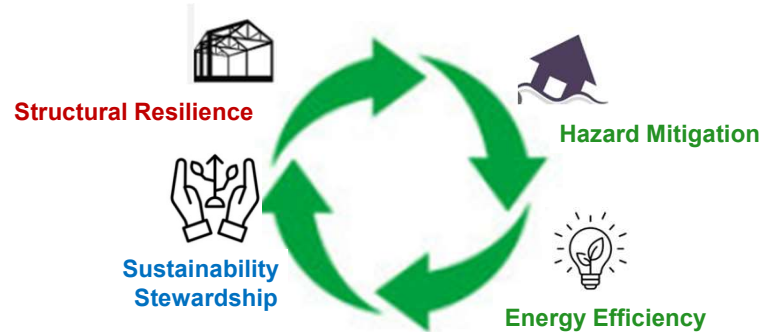
Michael McConnell, 2024-11-07T16:49:11.227

MM1 Cap D in Development

Michael McConnell, 2024-11-07T16:49:31.102

MMO

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



13

Structural Resilience



14

14

Slide 13

MMO This isn't the definition of "Resiliency Pillars," is it? "Pillars" plural but the definition reads as singular.

The definition is for a "pillar," right?

Michael McConnell, 2024-11-07T18:17:33.164

Structural Resilience

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

MM0



15

15

Structural Resilience

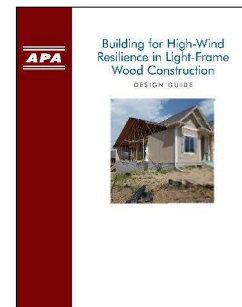
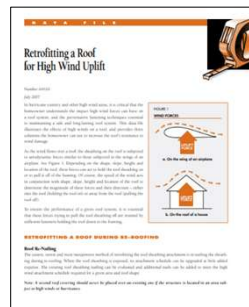
Wind/High Wind

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

Seismic

- Wall bracing or seismic
- FTAO
- Weight of materials

MM3



16

16

Slide 15

MM0 insert period after events

Michael McConnell, 2024-11-07T20:34:38.791

Slide 16

MM0 high-wind events

Michael McConnell, 2024-11-07T20:35:24.217

MM1 Lowercase B in bracing

Michael McConnell, 2024-11-07T20:35:43.515

MM2 Lowercase M in materials.

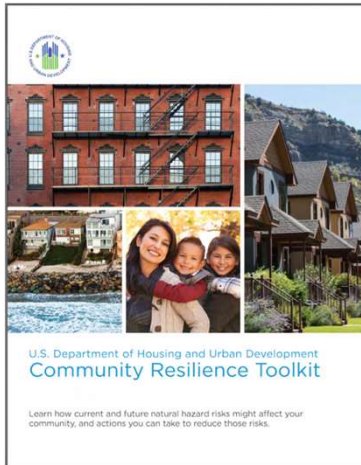
Michael McConnell, 2024-11-07T20:36:21.315

MM3 Make text the same size unless "Wall bracing" large font is intentional

Michael McConnell, 2024-11-07T20:37:09.193

MM0

Structural Resiliency- Programs



HUD Resiliency Guide for Wind

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


APA

17

17

Hazard Mitigation

Structural Fire

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

Flood

- Raised wood floors resMM0ce


APA

18

18

Slide 17

MMO Copy next to bullets is very small. Any space to increase visibility?

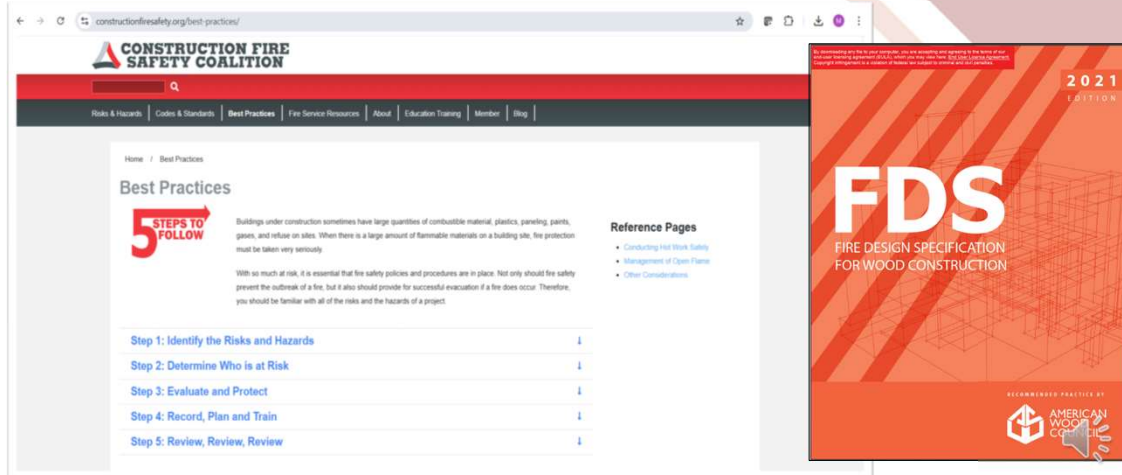
Michael McConnell, 2024-11-07T20:38:15.761

Slide 18

MMO This sounds awkward. Is the working correct? I think floor or resource should not have an S.

Michael McConnell, 2024-11-07T21:44:43.311

Structural Fire



19

19

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."

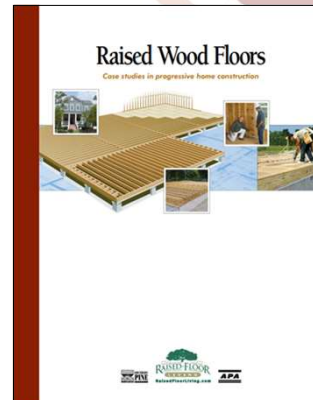
Since 1982, John Cooper of Cooper Homes has built homes and communities inspired by the architecture and style of Atlanta's historic neighborhoods. He prefers raised wood floors because they provide historic character to a house – a feature that is attractive to home buyers.

"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

20

20

ADO Suggest adding form # "APA Case Study: Form K110"
Angie Dollar, 2024-11-08T17:15:51.881

Sustainability

Green Building Programs

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

Sustainable

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



MM3



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21

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
(866) 767-2200
www.pacificwoodtech.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
 - 2008 LEED Credits for New Construction and Major Renovations
 - ASTM D5456-18, D5456-14, D5456-13, and D5456-08 recognized by the 2021 International Building Code (IBC) and International Residential Code (IRC), 2018 IRC and IRC, 2015 IRC and IRC, and 2012 IRC and IRC, respectively
 - APA W910, 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 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 5-1/2 inches, widths from 3-1/4 inches to 48 inches, and lengths up to 66'-12 inch. The veneer used in Pacific Woodtech LVL is verified under PEFC International Standards - Chain of Custody of Forest Management - Requirements for Non-Forest Products and Forest Management Plans (FSC) Chain of Custody. The adhesives used to manufacture Pacific Woodtech LVL are solvent-free adhesives meeting the requirements of ASTM D5456 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 where 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) The report is subject to re-examination in one year.

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Green Verification Report

Roseburg Structural Glued Laminated Timber GR-L251
Revised January 16, 2023

Product: Roseburg Structural Glued Laminated Timber
Roseburg, P.O. Box 20, 2009 Main Street, Springfield, OR 97147
(541) 746-8411
www.roseburg.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
 - 2008 LEED Credits for New Construction and Major Renovations
 - ANSI A190.1-2017, ANSI A190.1-2012, and ANSI A190.1-2007, recognized by the 2021 and 2018 International Building Code (IBC) and International Residential Code (IRC), 2018 IRC and IRC, and 2012 IRC and IRC, respectively
 - APA W910, 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 v4
 - APA Product Report PR-L251
 - Documentation supporting green product verification
2. Product description:

Roseburg glulam products are used as beams, headers, rafters, purlins, and columns, and are manufactured with the conventional log combinations with the exception that the tension and compression laminations of 2x4-VIMAQ, 2x6-EMASGP, and 2x8-EG2 are substituted by laminated veneer lumber (LVL) in accordance with ANSI A190.1. The LVL laminations are required by manufacturers recognized by APA and identified in Roseburg's in-plant manufacturing standard approved by APA. The LVL complies with the control values listed in the manufacturing standard and is manufactured in full-length and with laminations, and is thicknesses up to 2 inches from wood veneers. All veneer grain is parallel to the length of the lamination. The veneers are bonded with exterior-type adhesives, which comply with ASTM D2059 and ANSI A405.
3. Green product verification:

Roseburg 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) Roseburg glulam beams and columns listed in APA PR-L251 and recognized in this report are manufactured in accordance with the one-way design properties specified in PR-L251.
 - b) Roseburg 2x4-VIMAQ glulam beams shall have a minimum depth of 5-1/2 inches, 30%-EMASGP glulam beams shall have a minimum depth of 7-1/4 inches and a maximum length of 48 inches, and 2x6-EG2 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 RFP® Series I-Joists Roseburg Forest Products Company GR-L259
Revised May 31, 2022

Product: Roseburg RFP® Series I-Joists
Roseburg Forest Products Company, 3660 Gateway Street, Springfield, Oregon 97147
(800) 347-7200
www.roseburg.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
 - 2008 LEED Credits for New Construction and Major Renovations
 - 2008 LEED Credits for New Construction and Major Renovations
 - ASTM D5456-18, D5456-14, D5456-13, and D5456-08 recognized by the 2021 International Building Code (IBC) and International Residential Code (IRC), 2018 IRC and IRC, 2015 IRC and IRC, and 2012 IRC and IRC, respectively
 - ICC PS 2-18, Performance Standard for Wood Structural Panels
 - APA W910, 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 v4
 - APA Product Report PR-L259
 - Documentation supporting green product verification
2. Product description:

All RFP joists are made with laminated veneer lumber (LVL) flanges, with the exception of RFP-400, RFP-400S and RFP-800, which are made of solid flanges, and OSB webs 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 O320, and contain no added urea-formaldehyde. The adhesives used to manufacture RFP joists are exterior-type adhesives meeting the requirements of ASTM D5456 and contain no added urea-formaldehyde.
3. Green product verification:

RFP 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) RFP joists shall be designed in accordance with principles of mechanics using the design properties specified in APA Product Report PR-L259 and PR-L259S, or provided by the manufacturer.
 - b) RFP joists are limited to its service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16%.
 - c) RFP joists are produced at the Roseburg Forest Products Company facility in Ridge, Oregon, under a quality assurance program audited by APA.

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Slide 21

MM0 Lowercase S in standards
Michael McConnell, 2024-11-07T21:45:41.689

MM1 Change ampersand to "and"
Michael McConnell, 2024-11-07T21:46:02.595

MM2 Lowercase R in Recyclable, fix space:

Renewable/recyclable
Michael McConnell, 2024-11-07T21:46:58.316

MM3 Return on investment/affordability
Michael McConnell, 2024-11-07T21:47:35.849

APA

APA

Slide 24

MMO Does the audience understand these acronyms standing alone?
Replace & with "and"
Michael McConnell, 2024-11-07T21:48:52.977

SRO 0 ok
Stephanie Rees, 2024-11-11T20:33:23.065

MM3

Energy Efficiency

Codes

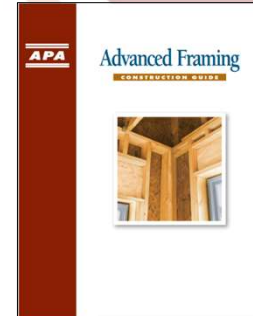
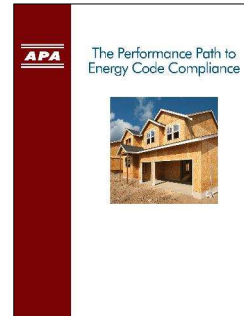
- Supporting cost-effective updates to energy codes and policies.

Survivability

- Maintain livable temperatures.

High-Energy Performance

- Maintain livable conditions without power or generation.



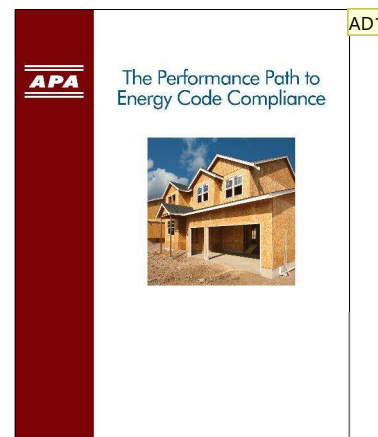
25

25

MM0

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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Slide 25

MM0 insert period after "temperatures"
Michael McConnell, 2024-11-07T21:49:33.713

MM1 High-Energy Performance
Michael McConnell, 2024-11-07T21:50:49.903

MM2 "Maintain..." font is smaller.
Michael McConnell, 2024-11-07T21:52:15.437

AD2 0 Fixed font sizes.
Angie Dollar, 2024-11-08T16:35:02.540

MM3 Does this list need to have bullets?
Michael McConnell, 2024-11-07T21:52:29.547

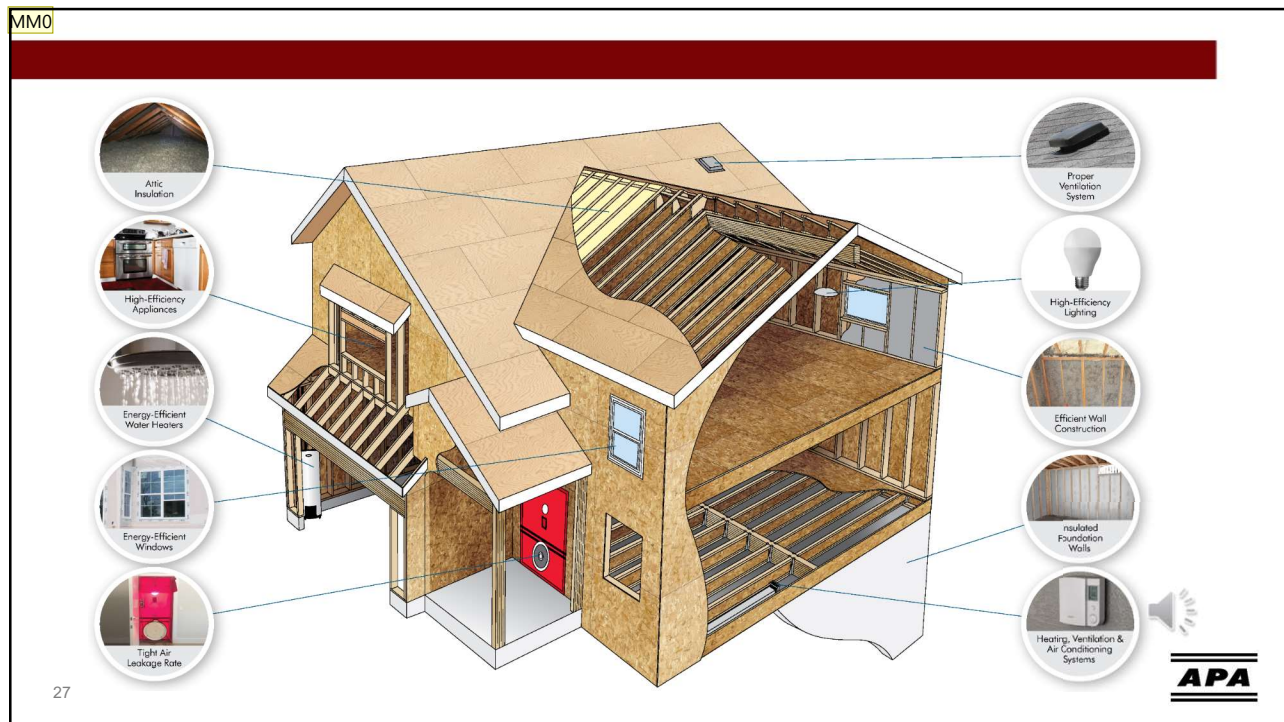
Slide 26

MM0 These bullets are square; others are round.
Michael McConnell, 2024-11-07T21:53:38.971

AD0 0 Square bullets are on brand - round bullets are not.
Angie Dollar, 2024-11-08T16:35:59.030

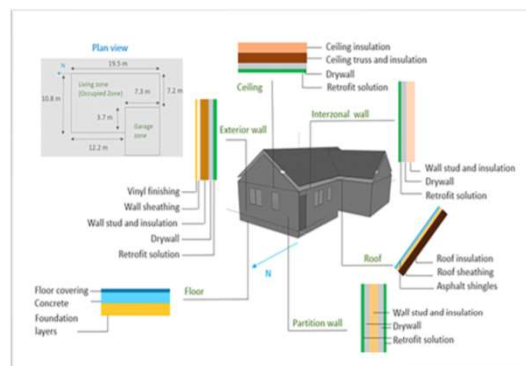
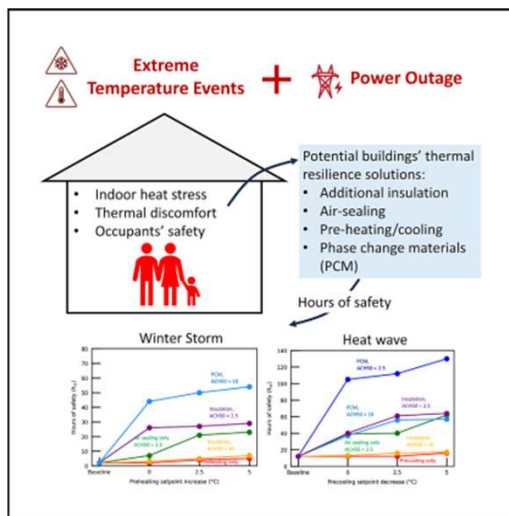
AD1 Suggest adding form # "APA Guide: Form R505"
Angie Dollar, 2024-11-08T17:13:47.871

MMO



27

Survivability



28

MMO A headline above house image?
Michael McConnell, 2024-11-07T21:54:25.864

MM2

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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MM4

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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Slide 29

MM0 Should there be more info besides "Version 1" like Manufactured, Single family, etc.?

Michael McConnell, 2024-11-07T21:55:52.273

MM1 High-Performance Energy

Michael McConnell, 2024-11-07T21:57:14.651

MM2 Is "Energy Star for Homes" the right name? I can't find a program with that official name.

Michael McConnell, 2024-11-07T21:59:39.563

MB2 0 Yes, that is the program name

Matthew Brown, 2024-11-13T16:38:18.045

MB2 1 https://www.energystar.gov/partner-resources/residential_new/abc

Matthew Brown, 2024-11-13T16:39:31.189

MM2 2 [@Matthew Brown] I don't see the exact phrase "Energy Star for Homes" in that page on in an online search. Is it possible that's the description or just what people call it? If it is not an official name, I would lowercase the H in "Homes."

Michael McConnell, 2024-11-13T16:57:12.671

Slide 30

MM0 Cap S P R under "Utility Incentives"

Michael McConnell, 2024-11-07T22:04:51.199

MM1 Energy Code Adoptions

Michael McConnell, 2024-11-07T22:05:18.262

MM2 Font is a different color and indented too far in last 2 bullets

Michael McConnell, 2024-11-07T22:05:48.842

SR2 0 ?

Stephanie Rees, 2024-11-11T18:30:21.425

MM3 "Pace" should be capped if it refers to the Medicare/Medicaid program

Michael McConnell, 2024-11-07T22:07:07.173

SR3 0 ??

Stephanie Rees, 2024-11-11T19:55:12.768

MM4 Utility Rebates in last bullet

Michael McConnell, 2024-11-07T22:07:23.892

MM0

Agenda

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



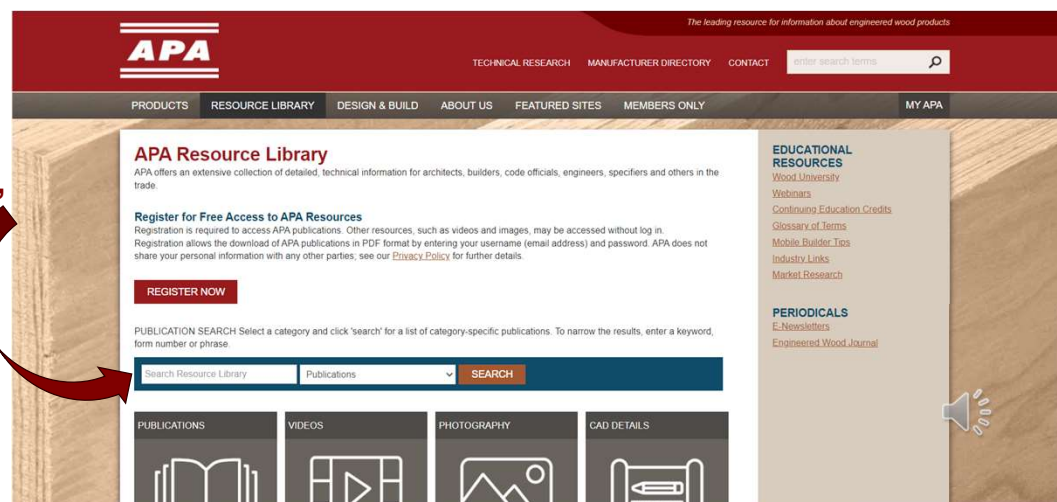
31



31

FTAO

Type
“FTAO”



32

32

Slide 31

MM0 I think "poorly resilient" is the wrong phrase. Something is or is not resilient.

Michael McConnell, 2024-11-07T22:11:46.480

AD1 Suggest Title Caps like the rest.

Angie Dollar, 2024-11-08T21:16:20.824

SR1 0 ok

Stephanie Rees, 2024-11-11T20:33:38.269

The leading resource for information about engineered wood products

APA

TECHNICAL RESEARCH MANUFACTURER DIRECTORY CONTACT enter search terms

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

Force Transfer Around Openings (FTAO)

VERSATILE SHEAR WALL DESIGN METHOD LEANS 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.

DOWNLOAD

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 uplift 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.

DOWNLOAD

Continuing Education Offerings
APA's Wood Academy is an online learning platform that provides continuing education credits. 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 on schedule with glulam and wood framed steel walls to keep framing costs manageable. When framing contractors for a new apartment complex in Buena Vista, California, came on high, developer Barbara Moroney of 18th Avenue didn't give up. "Instead of picking up and values have started to climb," said Moroney. The project had been on the shelf for a few years, waiting for the market to improve. But the numbers still looked good. So she had the project value engineered, and a switch to glulam and wood framed steel walls got everything back on track.

33

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.

APA

34

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 (0.10 CEU).



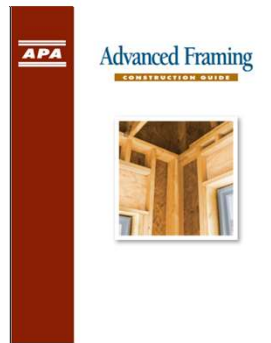
What is Advanced Framing?

Inside Advanced Framing: How to Build Energy-Saving Homes

The video series explores the components of advanced framing and how these techniques can be used to meet structural code and energy code requirements.



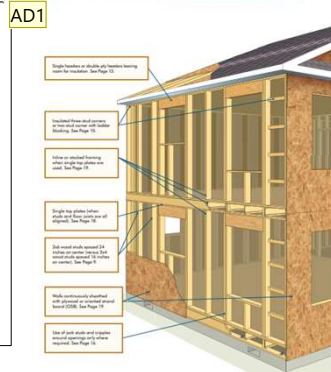
VIEW



APA Publication: M400



APA Publication: T110



35

35

2x6 Advanced Framing



APA Publication: M400

AD0



36

36

Slide 35

AD0 Add Form #s? "APA Construction Guide: Form M400" and "APA Case Study: Form T110"
Angie Dollar, 2024-11-08T17:09:33.685

SR00 ok
Stephanie Rees, 2024-11-11T19:55:22.534

AD1 Photos of this case study can be found on Bynder:
<https://assets.apawood.org/web/aa6a2f2b1cb78b5f/t110/>
Angie Dollar, 2024-11-08T17:10:08.090

Slide 36

AD0 Suggest "APA Construction Guide: Form M400"
Angie Dollar, 2024-11-08T22:56:42.084

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



37



37

Storm Assessment Publications

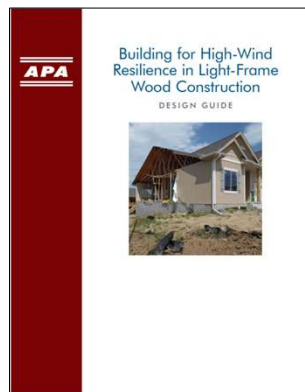
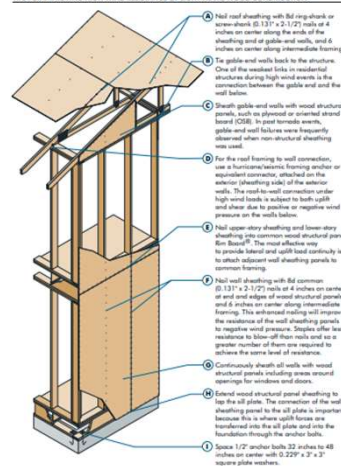


FIGURE 1
TIPS FOR IMPROVING HIGH-WIND RESISTANCE OF LIGHT-FRAME WOOD CONSTRUCTION



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



38

MM0

Best Practices for Sustainability

Less is more

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

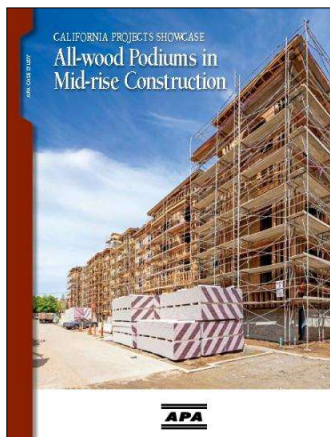

APA

39

39

MM0

All-wood Podiums in Mid-Rise Construction



APA Case Study, Form No. N110



AD2

AD1


APA

40

40

Slide 39

MM0 light-frame

Michael McConnell, 2024-11-07T22:33:25.855

Slide 40

MM0 Cap R in Mid-Rise

Michael McConnell, 2024-11-07T22:13:29.655

SR0 0 ok

Stephanie Rees, 2024-11-11T19:55:48.347

AD1 Suggest “APA Case Study: Form N110”

Angie Dollar, 2024-11-08T17:04:11.907

SR1 0 ok

Stephanie Rees, 2024-11-11T19:55:55.722

AD2 Find photos of this case study on Bynder:

<https://assets.apawood.org/web/d8c417b252b9ed5a/n110/>

Angie Dollar, 2024-11-08T17:05:56.726

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

41

41

Use Biophilic Design



APA Publication J140

AD0



APA

42

Slide 41

MM0 Renewable resource (no S)?
Michael McConnell, 2024-11-07T22:14:03.766

SR0 0 ok
Stephanie Rees, 2024-11-11T19:56:22.379

MM1 25-story
Michael McConnell, 2024-11-07T22:14:50.080

SR1 0 ok
Stephanie Rees, 2024-11-11T19:56:19.442

MM2 Cut WI after "Milwaukee"
Michael McConnell, 2024-11-07T22:15:08.471

SR2 0 ?
Stephanie Rees, 2024-11-11T19:56:16.536

Slide 42

AD0 Suggest "APA Case Study: Form J140"
Angie Dollar, 2024-11-08T17:02:52.577

SR0 0 ok
Stephanie Rees, 2024-11-11T19:56:33.630

MM0

Case Study: Environmental Nature Center

- LEED Platinum building
- Exposed structure



AD2



APA Publication: K115

AD1



43

43

Wood Shaft Walls

- Substitute Concrete/CMU shaft walls with wood



44



PHOTO COURTESY OF NORDIC STRUCTURES



44

Slide 43

MM0 Is "Expose your structure" right? Or should it be "Exposed structure"?

Michael McConnell, 2024-11-07T22:18:28.979

SR0 0 ok

Stephanie Rees, 2024-11-11T19:56:54.974

AD1 Suggest "APA Case Study: Form K115"

Angie Dollar, 2024-11-08T17:03:28.655

SR1 0 ok

Stephanie Rees, 2024-11-11T19:57:10.521

AD2 Added cover since there was room

Angie Dollar, 2024-11-08T23:07:16.092

SR2 0 ok

Stephanie Rees, 2024-11-11T19:57:03.052

RK0

Wall Framing

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

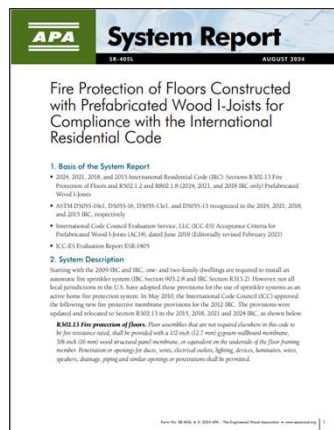


45



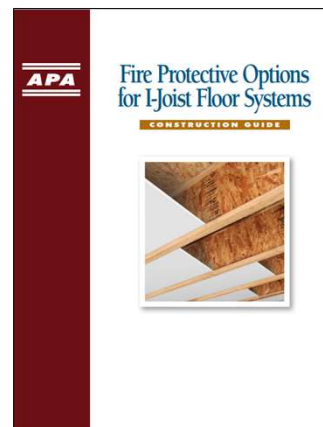
45

Fire Protection



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

46



Form 305
Fire Protective Options for I-Joist Floor



46

Slide 45

RK0 Can we find similar with LSL plates since we don't really have OSL plates. Also we shouldn't be promoting I-joist walls. If we do we need to be very careful about what we say.

Robert A. Kuserk, 2024-10-29T12:54:42.178

RK0 0 Let's delete. The top plate isn't critical. I suggest looking for other LSL and LVL stud pictures.

Robert A. Kuserk, 2024-11-06T18:46:58.348

AD0 1 There may be photos to replace on Bynder. Let me know if you need assistance.

Angie Dollar, 2024-11-08T16:55:54.067

AD1 Should be "I-joist"

Angie Dollar, 2024-11-08T16:56:59.403

SR1 0 ok

Stephanie Rees, 2024-11-11T19:57:36.100

Slide 46

AD0 Suggest removing title since it's on the pub cover. "APA System Report: SR-405" and "APA Construction Guide: Form R425"

Angie Dollar, 2024-11-08T16:59:48.573

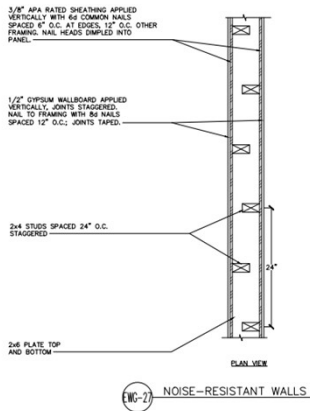
SR0 0 ok

Stephanie Rees, 2024-11-11T19:57:52.054

MM1

Examples-Details

Noise-Resistant Wall



47



47

Agenda

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

ADO

48



48

Slide 47

MM0 Noise-Resistant Wall
Michael McConnell, 2024-11-07T22:19:33.372

SR0 0 ok
Stephanie Rees, 2024-11-11T19:58:08.898

MM1 Recommend removing unnecessary "-Details"
Michael McConnell, 2024-11-07T22:19:55.998

SR1 0 ?
Stephanie Rees, 2024-11-11T19:58:27.023

Slide 48

AD0 Suggest Title Caps
Angie Dollar, 2024-11-08T17:24:57.622

SR0 0 ok
Stephanie Rees, 2024-11-11T19:59:29.491

Examples



Poor load path

49



49

Examples



50



50

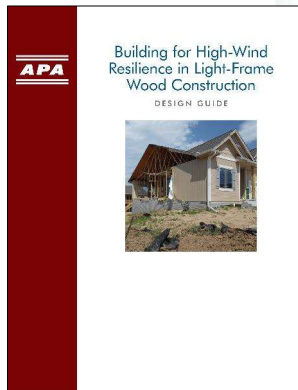
Slide 49

ADO Added better quality images
Angie Dollar, 2024-11-08T17:30:34.424

SRO 0 ok
Stephanie Rees, 2024-11-11T19:59:36.585

MM0

Examples – Roof Sheathing

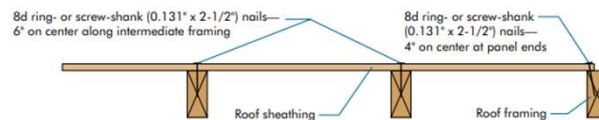


Wind Resistance M310

AD1



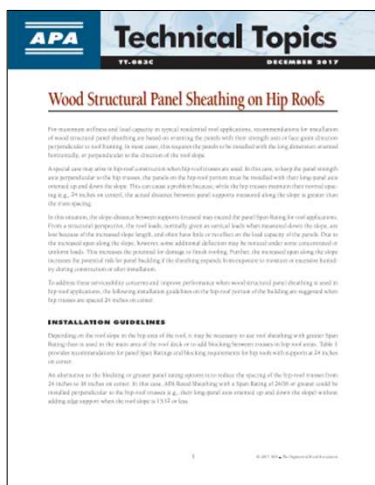
NAIL ROOF SHEATHING WITH 8D RING-SHANK OR SCREW-SHANK (0.131" x 2-1/2") NAILS AT 4" ON CENTER AT PANEL ENDS AND EDGES AND AT GABLE-END WALL, AND 6" ON CENTER ALONG INTERMEDIATE FRAMING



51

51

Examples – Roof Sheathing



52

52

Slide 51

MM0 I think you can remove "Examples" and the dash after the first 1 or 2. Just say "Roof Sheathing", etc.
Michael McConnell, 2024-11-07T22:27:17.201

AD1 Added cover. Suggest "APA Design Guide: Form M310"
Angie Dollar, 2024-11-08T17:34:49.519

SR1 0 ok
Stephanie Rees, 2024-11-11T20:00:38.992

RK0

Examples –Sheath Gable-End Walls



53

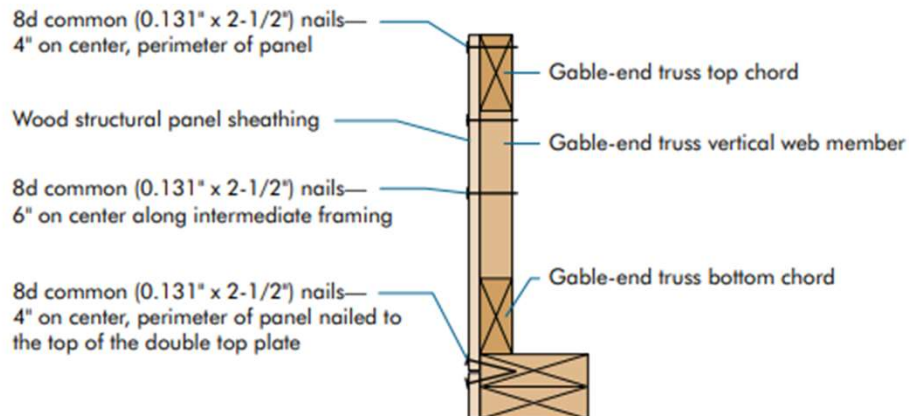


53

MM0

Examples –Sheath Gable-End Walls

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



54



54

Slide 53

RKO Make sure you mention that lack of puncture resistance of these type of walls.
Robert A. Kuserk, 2024-10-29T12:56:30.993

Slide 54

MMO Remove "Examples"
Michael McConnell, 2024-11-07T22:22:35.988

MM0

Examples –Sheath Gable-End Walls



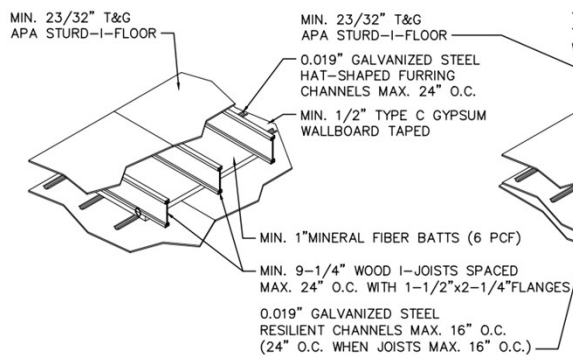
55



55

MM0

Examples - Fire



56



56

Slide 55

MMO Remove "Examples --"

Michael McConnell, 2024-11-07T22:28:18.563

Slide 56

MMO remove "Examples -"

Michael McConnell, 2024-11-07T22:23:18.864

MM0

Examples - WSP as an Air Barrier



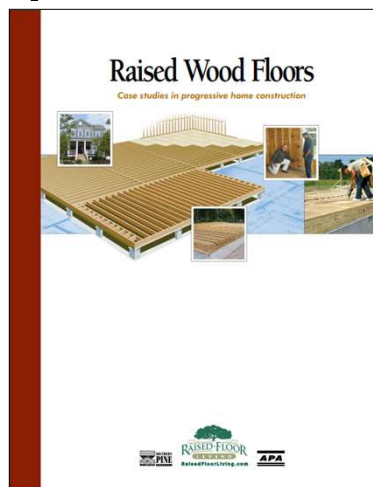
57

APA

57

MM0

Examples – Flood



Form K110

AD1



58

APA

58

Slide 57

MM0 Cut Examples -

Michael McConnell, 2024-11-07T22:26:01.980

Slide 58

MM0 Cut Examples

Michael McConnell, 2024-11-07T22:29:20.393

AD1 Suggest “APA Case Study: Form K110”

Angie Dollar, 2024-11-08T17:41:39.976

SR1 0 ok

Stephanie Rees, 2024-11-11T20:01:16.602

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.

59

Form L110

AD0

APA

59

Examples – Raised Floor



60

APA

60

Slide 59

ADO Suggest "APA Case Study: Form L110"
Angie Dollar, 2024-11-08T17:48:06.898

SRO 0 ok
Stephanie Rees, 2024-11-11T20:01:25.087

RK0

Examples – Raised Floor



61

APA

61

Examples – Raised Floors

**APA**

62

Slide 61

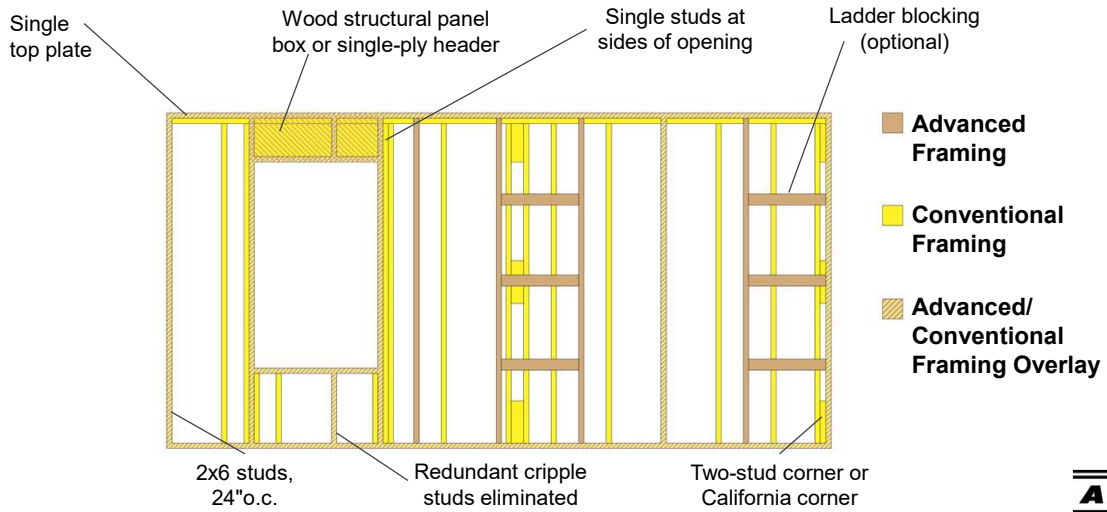
RK0 Do we somehow want to promote the FEMA coastal construction document that shows raised floors.

Robert A. Kuserk, 2024-10-29T12:57:45.613

SR0 0 It doesn't specify the type and mainly speaks to raising above freeboard, NFIP and BFE. Did you have a specific chapter in mind?

Stephanie Rees, 2024-11-04T20:06:01.303

Examples – Advanced Framing



63

Examples – Advanced Framing



64



64

MM0

Advanced Framing - Example

Insulating Corners and Headers

AD1


APA

65

Advanced Framing - Example

Negated Effects


APA

66

Slide 65

MM0 Use "and" if space
Michael McConnell, 2024-11-07T22:30:24.552

SR0 0 ok
Stephanie Rees, 2024-11-11T20:02:08.979

AD1 Suggest Title Caps on Titles/Headers
Angie Dollar, 2024-11-08T22:51:10.518

SR1 0 ok
Stephanie Rees, 2024-11-11T20:01:58.416

MM0

Examples – Modular/Panelized

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



67

67

MM0

Agenda

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

AD1

68



68

Slide 67

MMO Off-Site Solutions
Less Waste
On-site and at Plant
Michael McConnell, 2024-11-07T22:31:44.211

Slide 68

MMO Cap D in Code Development, ensure is same as No. 6 used in earlier slides (I think it only said "Moving Forward")
Michael McConnell, 2024-11-07T22:32:37.525

AD1 Suggest Title Caps
Angie Dollar, 2024-11-08T23:17:09.845

MM0

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.


APA

69

69

APA Lab


APA

70

70

Slide 69

MMO Should these be in title case for consistency? I think most bullets like this are (but not others)

Michael McConnell, 2024-11-07T22:34:42.905

CHOOSE RESPONSIBLE
CHOOSE RENEWABLE
CHOOSE WOOD



71

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



72

Questions?

Matthew Brown, CGP

Matthew.Brown@apawood.org

214-930-7075



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



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APA Field Staff

apawood.org/field-services

The screenshot displays the APA Field Staff website. The header features the APA logo and navigation links: TECHNICAL RESEARCH, MANUFACTURER DIRECTORY, CONTACT, and a search bar. Below the header is a secondary navigation bar with links: PRODUCTS, RESOURCE LIBRARY, DESIGN & BUILD, ABOUT US, FEATURED SITES, MEMBERS ONLY, and MY APA. The main content area has a large banner for an "UPDATED PUBLICATION" titled "Minimizing Buckling of Wood Structural Panels" with a "GET" button. To the left of the banner is a sidebar with four sections: "RECENT PUBLICATIONS" (listing 9.27.24 System Report, 8.19.24 Performance Path, 7.16.24 Technical Note, and 5.16.24 Diaphragms), "APA NEWS" (listing 10.15.24 Scott Finkle, 09.30.24 2024 Branson J. Lewis, 08.21.24 Updated Energy Code, and 06.18.24 APAs Members), "EDUCATION & EVENTS" (listing Wall Bracing Webinar, APA Webinars, and Back to Basics training), and "CODES & STANDARDS" (listing ANSI Standard Development, APA's accreditation, and various reports). A "REGISTER NOW" button is at the bottom of the sidebar. The APA logo is in the bottom right corner.

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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

TECHNICAL RESEARCH MANUFACTURER DIRECTORY CONTACT

PRODUCTS RESOURCE LIBRARY DESIGN & BUILD ABOUT US FEATURED SITES

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HELPFUL BUILDER RESOURCES

Basics of Construction

GO ►

RECENT PUBLICATIONS

3.5.24 Technical Note: Design for Force Transfer Around Openings (F-TAO)

1.31.24 ANSI/APA PRP 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

EDUCATION & EVENTS

Wall Bracing Webinar Series

Satisfying the wall bracing requirements of the 2018 IRC

APA Webinars

Upcoming and recorded webinars, including:

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.

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APA Update Newsletter (www.apawood.org)

The leading resource for information about engineered wood products

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TECHNICAL RESEARCH MANUFACTURER DIRECTORY CONTACT

PRODUCTS RESOURCE LIBRARY DESIGN & BUILD ABOUT US FEATURED SITES

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Basics
Const
GO ▶

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[Recover Password](#) [SIGN IN](#)

[Register](#)

RECENT PUBLICATIONS
3.5.24 Technical Note: Design for Force Transfer Around Openings (ETAG)
1.31.24 ANSI/APA DDP-210-2014 Standard for Performance-Rated Engineered Wood Joists

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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77

Help Desk

The leading resource for information about engineered wood products

APA

TECHNICAL RESEARCH MANUFACTURER DIRECTORY CONTACT

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APA Help Desk: Expert Support

The APA Product Support Help Desk, a free service, is available to answer your questions pertaining to the specifications and application of engineered wood products and systems. Staffed by specialists who have the knowledge to address a diverse range of inquiries related to engineered wood, the Help Desk receives hundreds of e-mails, faxes, and phone calls each week from a wide variety of users and specifiers of engineered wood products.

Contact the Help Desk
Use the contact form at right to submit your question.

Frequently Asked Questions

General

How do I interpret the stamp on APA-trademarked plywood and OSB?
The information contained on the APA trademark is explained in detail on the APA Trademark page. [GO >](#)

Do APA specification/use recommendations apply to products certified by other agencies?
No. Since the APA trademark appears only on products manufactured by member mills of APA – The Engineered Wood Association, it signifies that the products are subject to the Association's audit – the toughest and most comprehensive quality auditing program in the industry. The technical information and product use recommendations developed by APA are based on research and testing of APA trademarked products and therefore does not apply to panels certified by other agencies.

CONTACT THE HELP DESK
Representatives available from Monday to Friday 7:00 AM to 4:00 PM PST
Please make sure to provide brief details regarding the nature of your inquiry and type of product(s).

By Email: help@apawood.org

By Contact Form:
Please fill out form as required.

Full Name

Profession

Company Name

Email

Phone Number (optional)

City

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Thank you!



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



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Thank you for attending.



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