WOOD FRAMING – EFFECTS ON THE ENCLOSURE
Multi-Unit Low Rise Buildings

Matt Worster
Associate Principal
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Objectives

• Continuous Control: Water, Air, Vapor, and Heat.
• Wood framing impacts heat control strategy.
• Balconies and podiums present risk for a wood framed project.
• Mitigate water-related risk at balconies and podiums.
Multi-Unit Framing

- Multi-Story Buildings, Low rise
- Some Single Family
Control Layers

- Continuity
- Compatibility (and adhesion)
- Constructability
Control Layers – Continuity Tracing

- Water
- Thermal / Heat
- Vapor
- Air
Insulation Continuity with Wood Frame

R-7

R-19
Insulation

• “More wood is good.”

• Insulation R-Value
  • 2 pcf cc SPF R-6 per in.
  • Icynene R-6 per in.
  • XPS R-5 per in.
  • Batt Insulation ~R-3 per in.
  • Spruce-Pine-Fir ~R-1 per in.
  • Steel Stud R-not much
Insulation Discontinuity

• Motivation: Lower energy use
• Also – cold spots: condensation risk and dirt collectors
• Depending on climate, interior or exterior

New England
Framing Strategies

- Optimize wood framing
- Insulate where the wood is not
- www.apawood.org/advanced-framing
Optimize Framing

• 24 in. stud spacing
• Headers
• Two-Stud (California) Corners
• Ladder Backing
Size Headers Appropriately
Two Stud (California) Corners

Multi-Stud Corner

Two-Stud Corner

Missouri
Ladder Backing

California – No ladder backing

APA: Advanced Framing, 2016
Economize framing – but there are limits
Economize framing – but there are limits

California

California
Rebuttal: Continuous Insulation

• Simplest: Continuous exterior insulation
  • Standard approach/products
  • Dewpoint analysis

New England
CLT – When you use a lot of wood
Balcony and Podium Decks

• Probably the highest water-related risk of multi-unit housing
• Horizontal exposure to water: Balconies, podium decks, stairs landings
Balcony and Podium Decks
Balcony and Podium Decks

Protected Above, Open Above, Unoccupied Below, Occupied Below, Closed Soffits

Colorado

California
Balcony and Podium Decks

• Slope
  • ¼ in. per ft over occupied space.
    • It’s a roof.
    • Unoccupied? There is framing and sheathing below.
  • When you design flat, you don’t get flat
Slope

- Define drain zones
- Use 45 deg valley layout
  - Usually
  - Versatility
Deck Sheathing

• 3/4 in. min. thickness
• Tongue and grove
• Block the joints
• Ring shank nails
Membrane Selection

• None are perfect
• Select risk you can accommodate
• Design – Materials – Installation
Balcony and Podium Decks

• Slope where?
• Internal drain
  • Water fully collected
  • Needs Div 15: Drains, piping, etc.
Drainage - Edge

- Common
  - Higher risk than internal drain
- Framing: Slope to the edge
- Do not dump behind cladding
Handrails

- Keep penetrations off the deck
- Anchor to adjacent walls or posts or to deck edge
Scuppers - coordination

- Avoid
  - Hole in the wall
- Drain the membrane, not just the topping
- Bigger than you think
- Framing coordination
Scupper Location, Size
Balcony and Podium Decks

- Cantilevered balconies
- Interface with wall, particularly at door
Balcony and Podium Decks

• Trapped construction moisture
  • Multiple sheathing layers
  • CLT Decks
Review

• Framing:
  • Review details for continuity of control layers
  • Optimize wood framing for insulation
  • Use continuous insulation to overcome through-wood heat flow
Review

• Balconies, Podiums
  • Slope
  • Know the membrane, design and install accordingly
  • Edge drainage – slope completely to the exterior
  • Plan for construction phase moisture
Thank you
Paneling with Purpose

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Top 3 Panel Points

- Wood is Directional
- Moisture = Movement
- Panel Detailing

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Wood is Directional

Parallel
- Stronger

Perpendicular
- Weaker
Slide 7

Panels & Moisture

EXPOSURE 1
Exposure due to construction delays

EXTERIOR
Long term weather exposure

OR

Panels & Moisture

Moisture Content upon arrival
v.
Moisture Content upon installation
v.
Moisture Content in service

Panels & Moisture

APA-rated panels are manufactured well below 16% moisture content
Slide 10

Your design makes a difference!
The contractors' challenges are also your challenges.

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Slide 11

Panels & Moisture

L (after expansion) = 96.125
L = 96''

L (after expansion) = 48.125
L = 48''

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Slide 12

Panels & Moisture

There is A LOT of information on this topic.
**Panel Detailing**

*Installation Recommendations*

- Space panels 1/8" 1/8" min.

1. Increase in moisture content means increase in length and width of panels
2. Plan for panel movement

*Recommended spacing of floor underlayment panels = 1/32"*

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**Panel Detailing**

*Panel expansion in large structures*

- Panel expansion may accumulate through the framing of large, continuous floor or roof decks
- Provide temporary expansion joints to minimize displacement when building plan dimension exceeds 80'

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**Panel Detailing**

*Panel Expansion in Large Structures*

- Panel expansion may accumulate through the framing of large, continuous floor or roof decks
- Provide temporary expansion joints to minimize displacement when building plan dimension exceeds 80'
Panel Detailing

Provisions for large structures

Roofs:
- Sheath 80-foot sections, omitting a roof sheathing panel between sections
- Complete installation with fill-in panels immediately before sheathing is covered with roof underlayment

Top 3 Panel Points

Wood is Directional

+ Moisture = Movement

+ Panel Detailing

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Find your Local Field Services Representative
www.apawood.org/field-services
OR
help@apawood.org
www.apawood.org