

WOOD FRAMING – EFFECTS ON THE ENCLOSURE

Multi-Unit Low Rise Buildings

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Disclaimer: This presentation was developed by a third party and is not funded by WoodWorks or the Softwood Lumber Board.

SIMPSON GUMPERTZ & HEGER

Engineering of Structures
and Building Enclosures

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

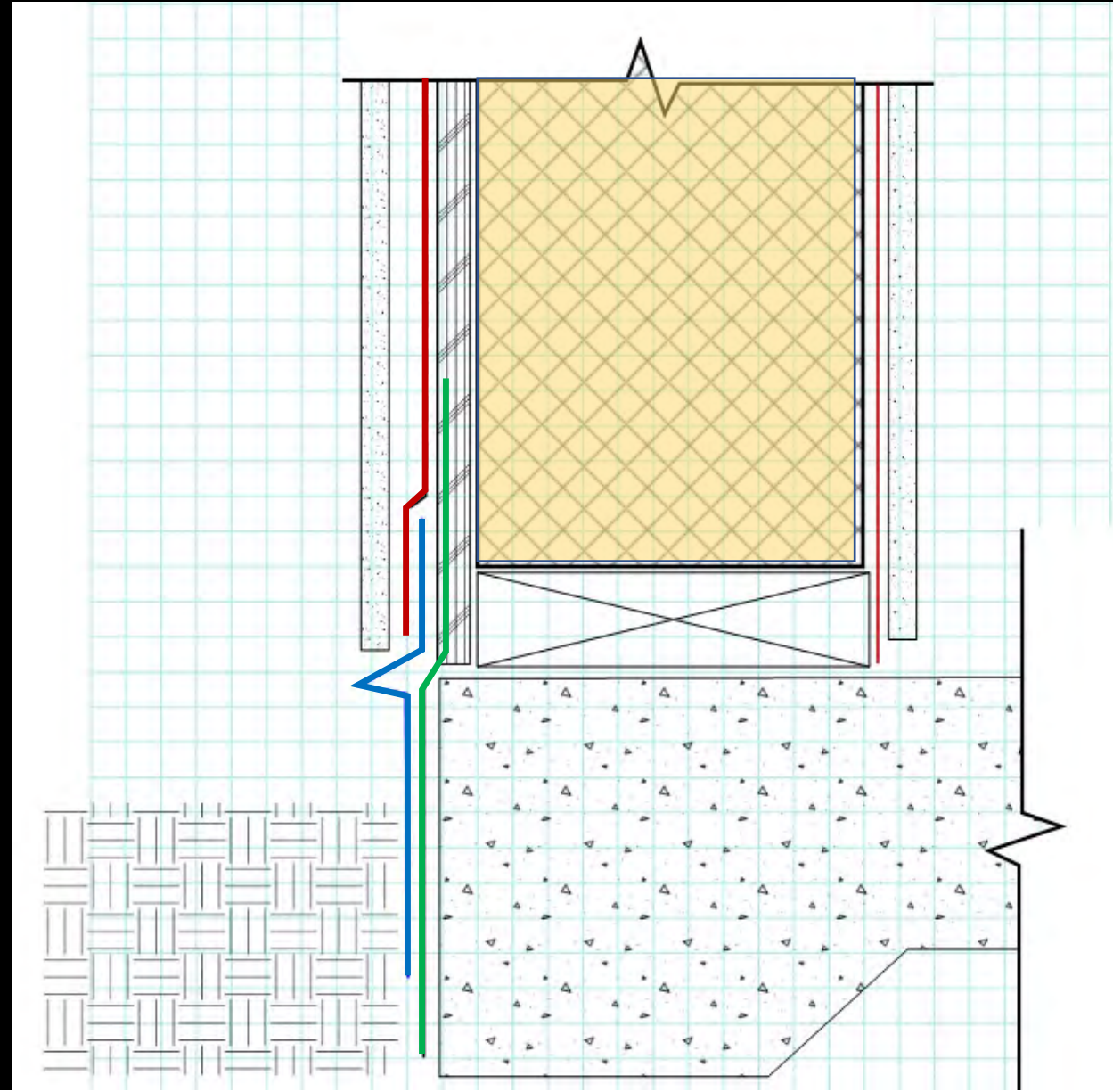


Control Layers

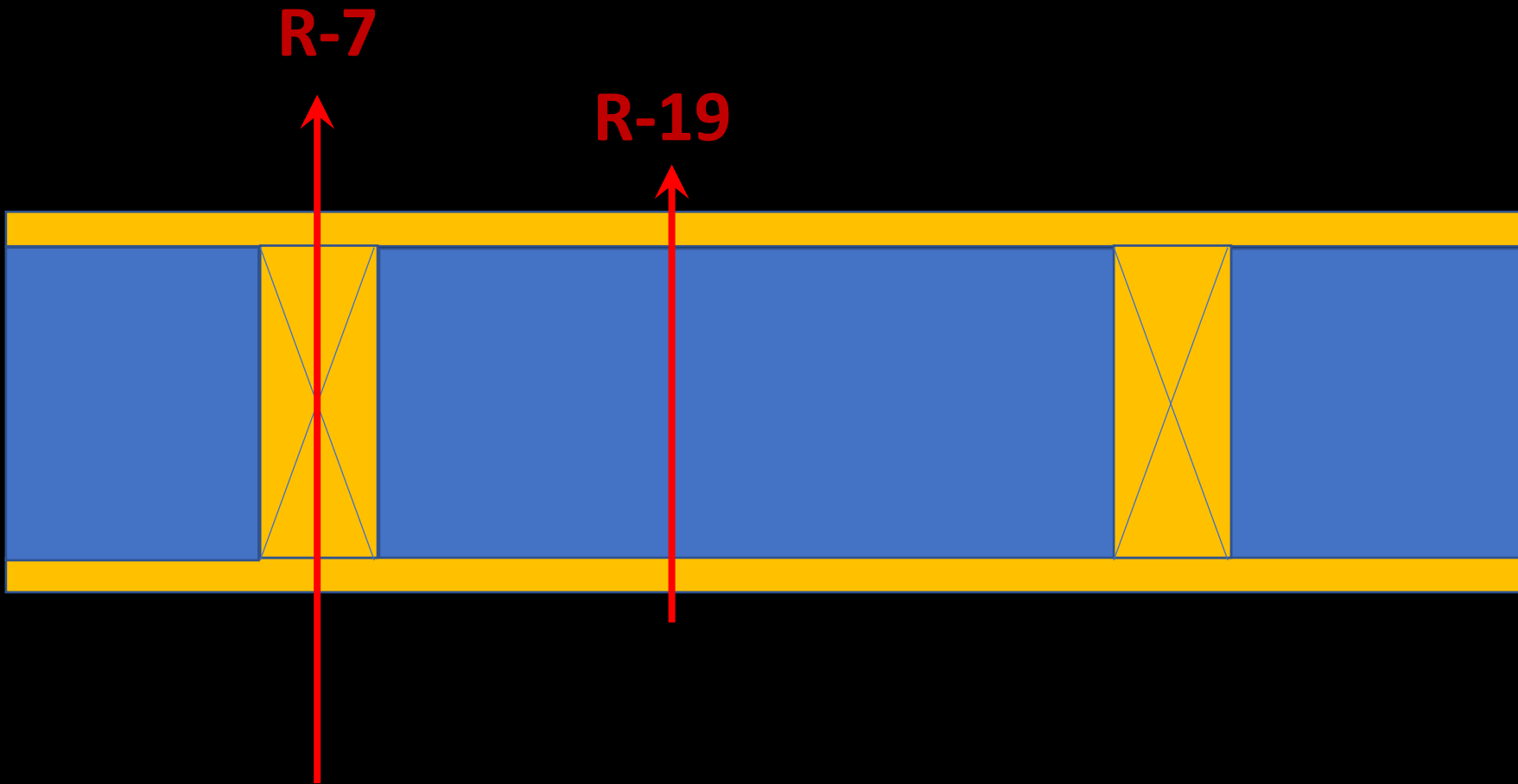
- Continuity
- Compatibility (and adhesion)
- Constructability

Control Layers – Continuity Tracing

- Water
- Thermal / Heat
- Vapor
- Air



Insulation Continuity with Wood Frame



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



Advanced Framing

CONSTRUCTION GUIDE



Optimize Framing

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

Size Headers Appropriately

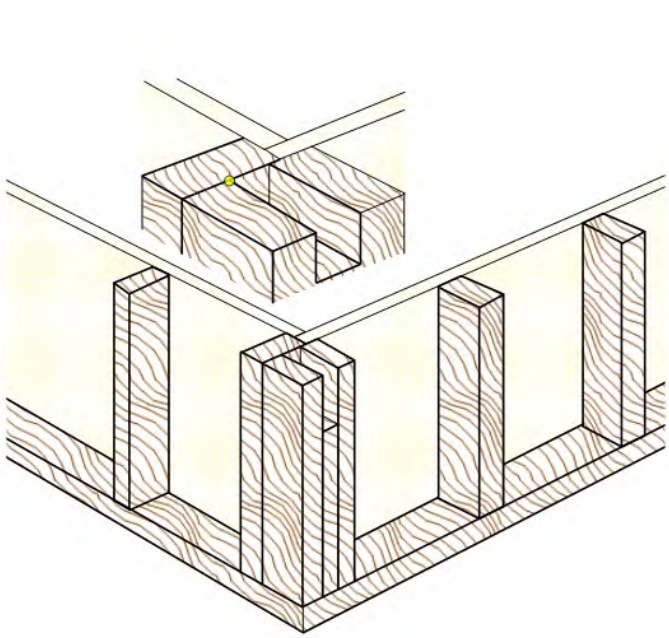


APA: Advanced Framing, 2016

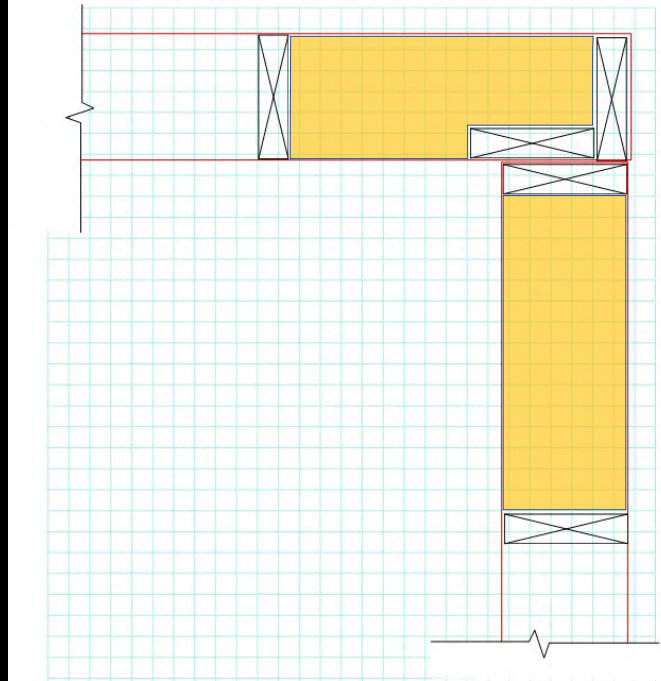


California

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



California

Economize framing – but there are limits



California



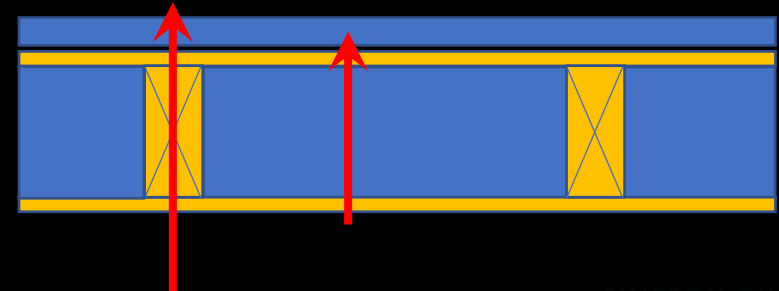
California

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



Rocky Mountains



California

Balcony and Podium Decks



Supported



Cantilever

Balcony and Podium Decks



Colorado



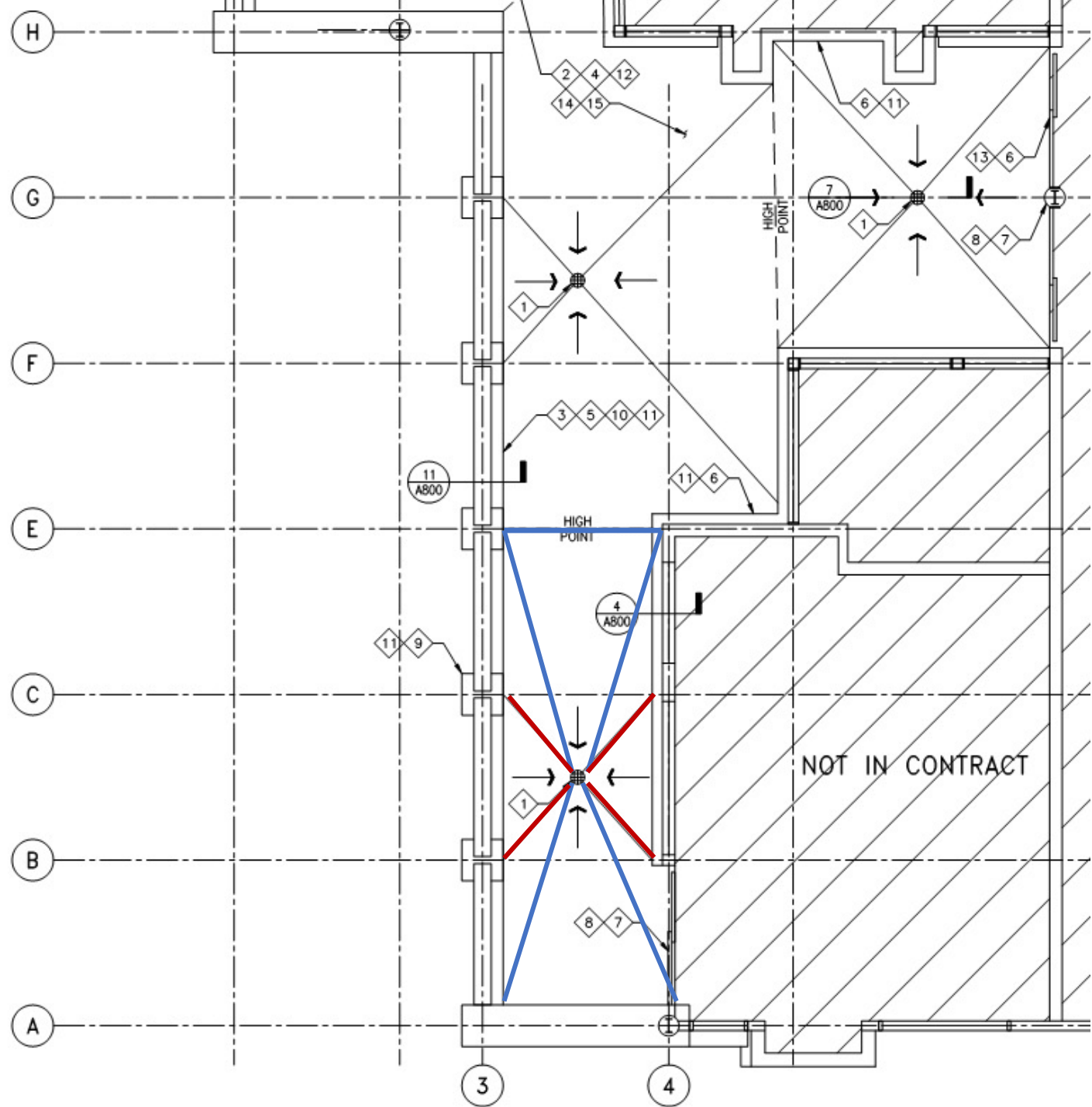
California

Balcony and Podium Decks

- Slope
- $\frac{1}{4}$ 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 groove
- Block the joints
- Ring shank nails

Membrane Selection

- None are perfect
- Select risk you can accommodate
- Design – Materials – Installation

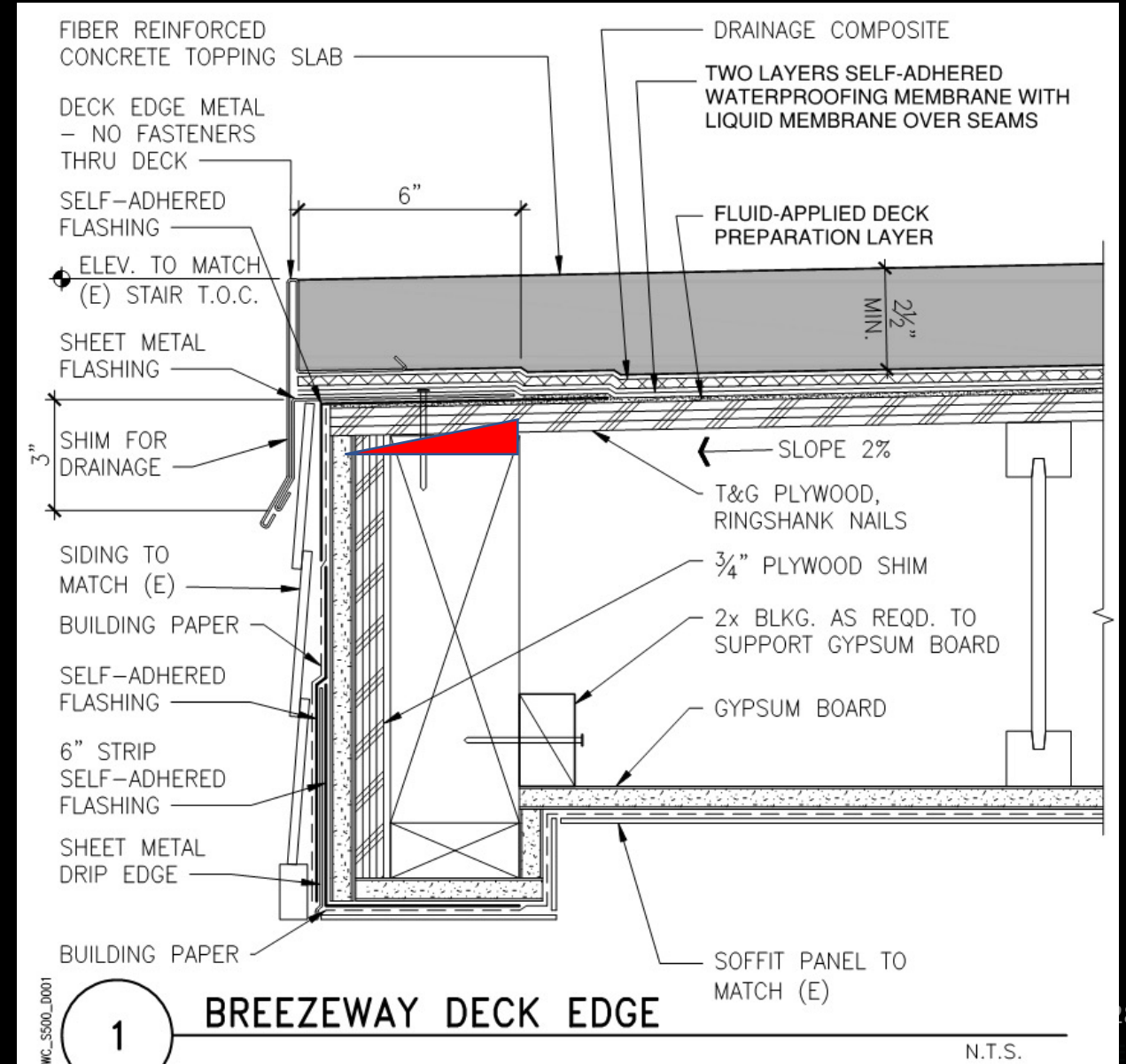
Balcony and Podium Decks

- 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

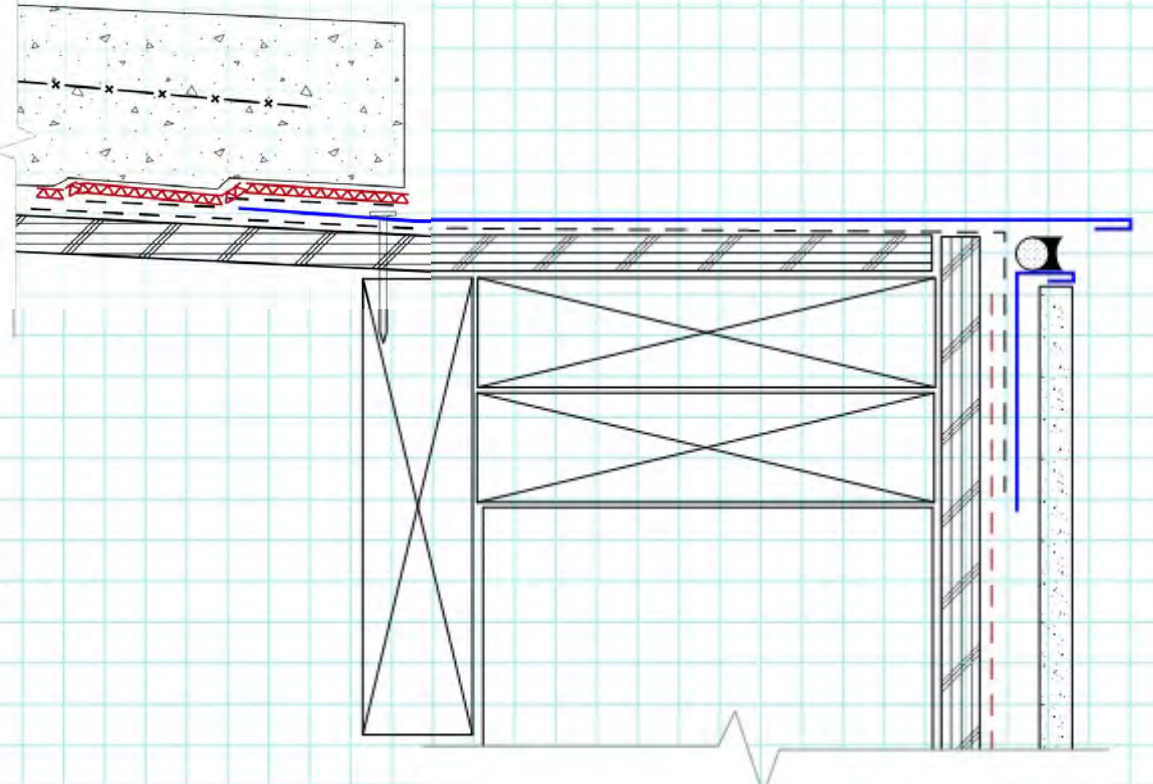
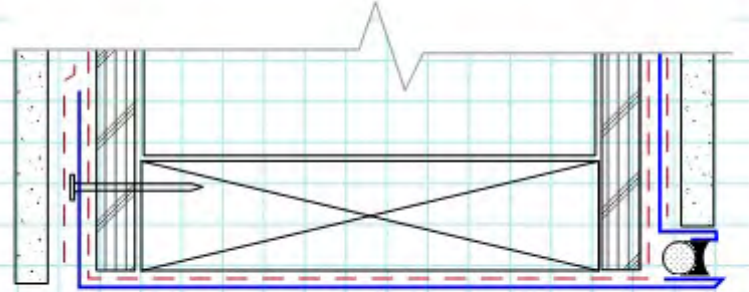
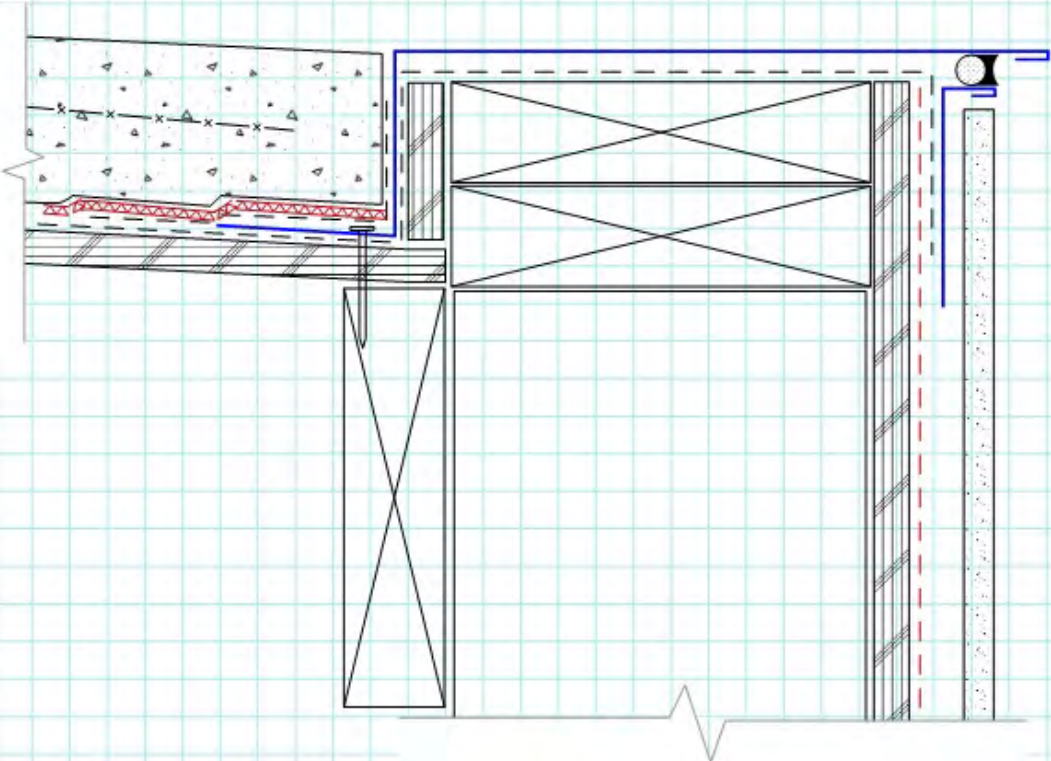
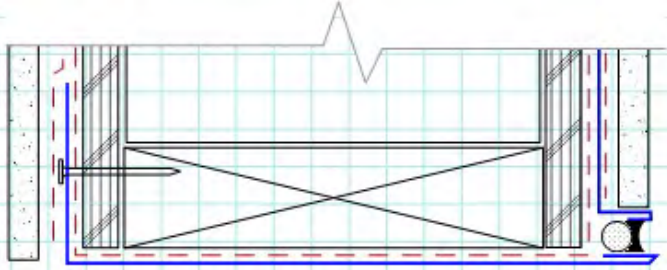


Scuppers - coordination

- Avoid
 - Hole in the wall
- Drain the membrane, not just the topping
- Bigger than you think
- Framing coordination

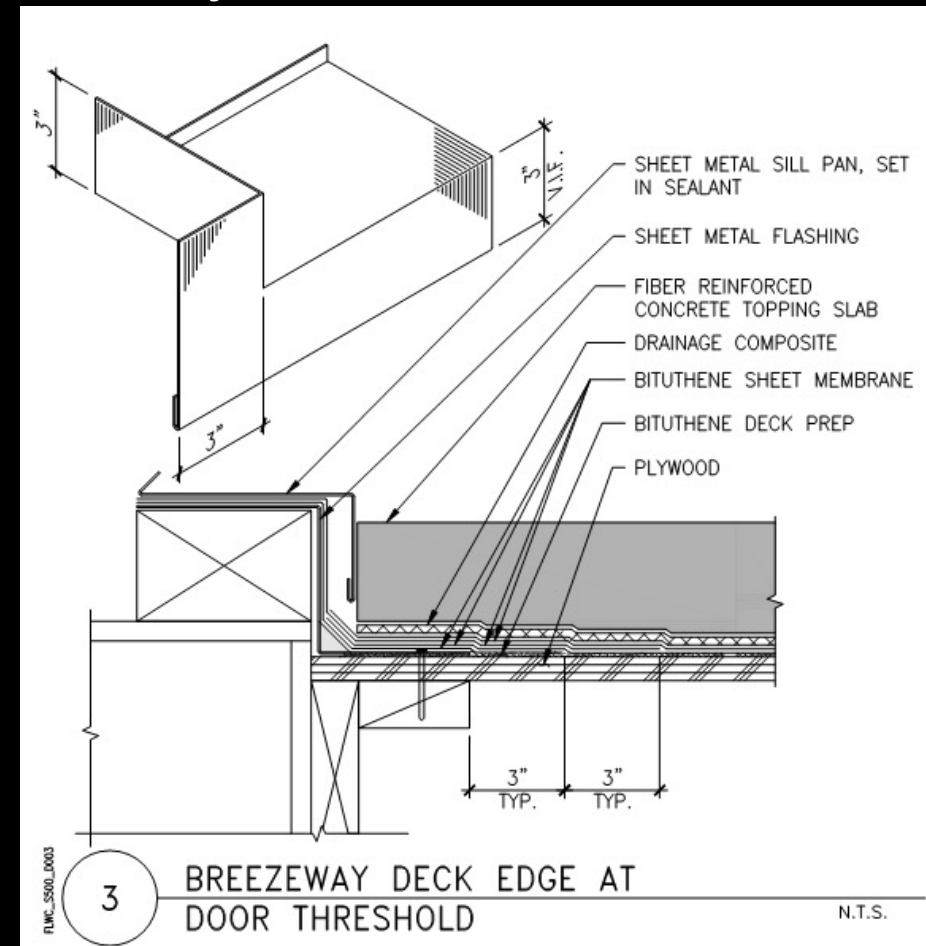
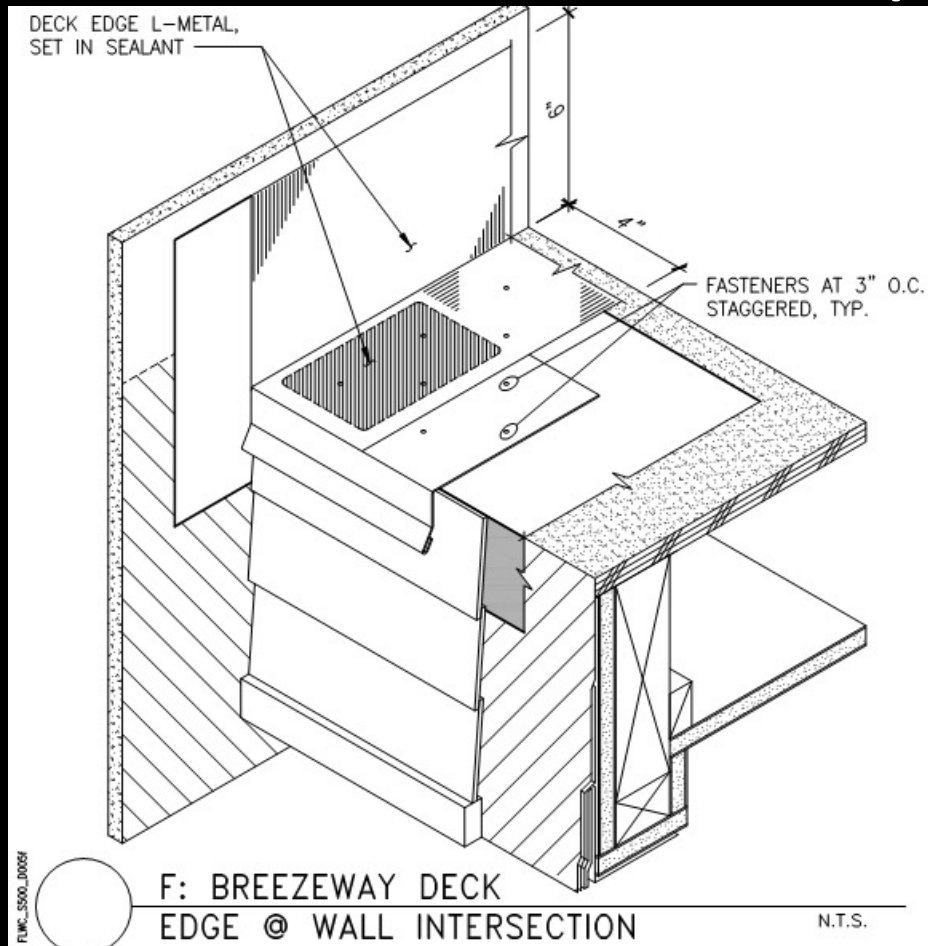


Scupper Location, Size



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

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Slide 1



Paneling with Purpose



Warren Hamrick

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Slide 2

Top 3 Panel Points

Wood is Directional

+

Moisture = Movement


+

Panel Detailing

Slide 3


Wood is Directional

Parallel



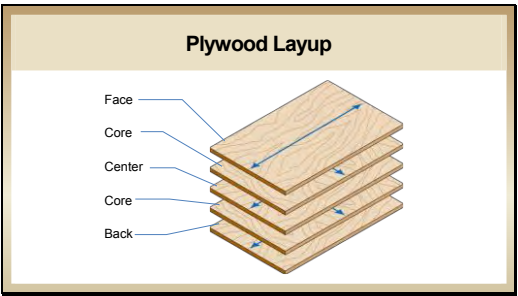
Stronger

Perpendicular



Weaker

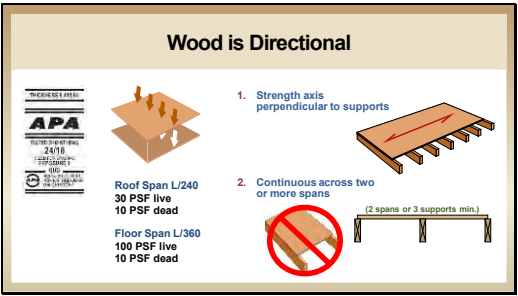
Slide 4



Slide 5



Slide 6



Slide 7

Panels & Moisture

EXPOSURE 1

Exposure due to construction delays

OR

EXTERIOR

Long term weather exposure

APA

RATED SHEATHING

32/16

SIZE FOR SPACING

EXPOSURE 1

THICKNESS 0.681 IN.

000

PS 2-10 BREATHING

PPR 100 T&G OR 40

100% CATEGORY

Slide 8

Panels & Moisture

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

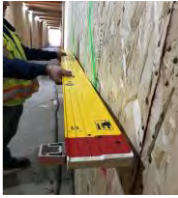
Slide 9

Panels & Moisture

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

Slide 10

Panels & Moisture

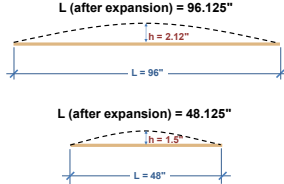


Your design makes a difference!

The contractors' challenges are also your challenges.

Slide 11

Panels & Moisture



L (after expansion) = 96.125"

L (after expansion) = 48.125"

Slide 12

Panels & Moisture



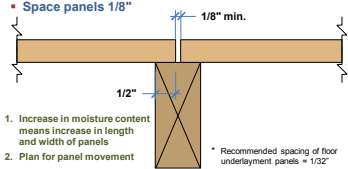
There is A LOT of information on this topic.

Slide 13

Panel Detailing

Installation Recommendations*

- Space panels 1/8"



- Increase in moisture content means increase in length and width of panels
- Plan for panel movement

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

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Panel Detailing

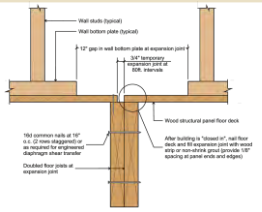
Panel expansion in large structures

- 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'



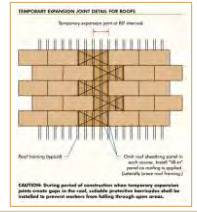
Slide 15

Panel Detailing



Slide 16

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

Slide 17

Top 3 Panel Points

Wood is Directional

+

Moisture = Movement

+

Panel Detailing

Slide 18



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