BUILDING INNOVATION
Conference

Resilience and Innovation in Modern Roof Design

Strategies for Sustainable Success

May 21, 2025 ~ McLean, Virginia

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#1307034

Learning objectives:

By the end of the session, participants will be able to:

1. Explain the six primary facts about roofing systems, including their role in sustainability, resilience, drainage, attachment, fire safety, and decarbonization ensuring a foundational understanding of modern roofing assemblies.
2. Discuss practical considerations for integrating resilience and sustainability principles into roofing portfolios, with a focus on advocating for improvements to code provisions that enhance lifecycle performance.
3. Evaluate how design decisions impact roof performance and prioritize key factors and design considerations for resilient roofing systems.
4. Analyze how resilient roofing strategies, such as improved drainage systems and wind uplift resistance, contribute to the longevity and performance of roofing assemblies within the built environment.

Introduction

Introduction

- Welcome and session goals
- Importance of roofing in building performance, risk management, and resilience
- Focus: low-slope commercial roofing—commonly referred to as *flat roofs*, though they are/should be intentionally sloped

Speakers

Ellen Breipohl Thorp, M.A., CAE
Managing Director

COSUR
COALITION FOR SUSTAINABLE ROOFING

- Executive Leadership, Strategic Planning, External Affairs for AECOM Associations
- 16 Years of Experience, Niche Roof Policy Expert

Jason Wilen, AIA, NCARB, CDT, RRO
Associate Principal

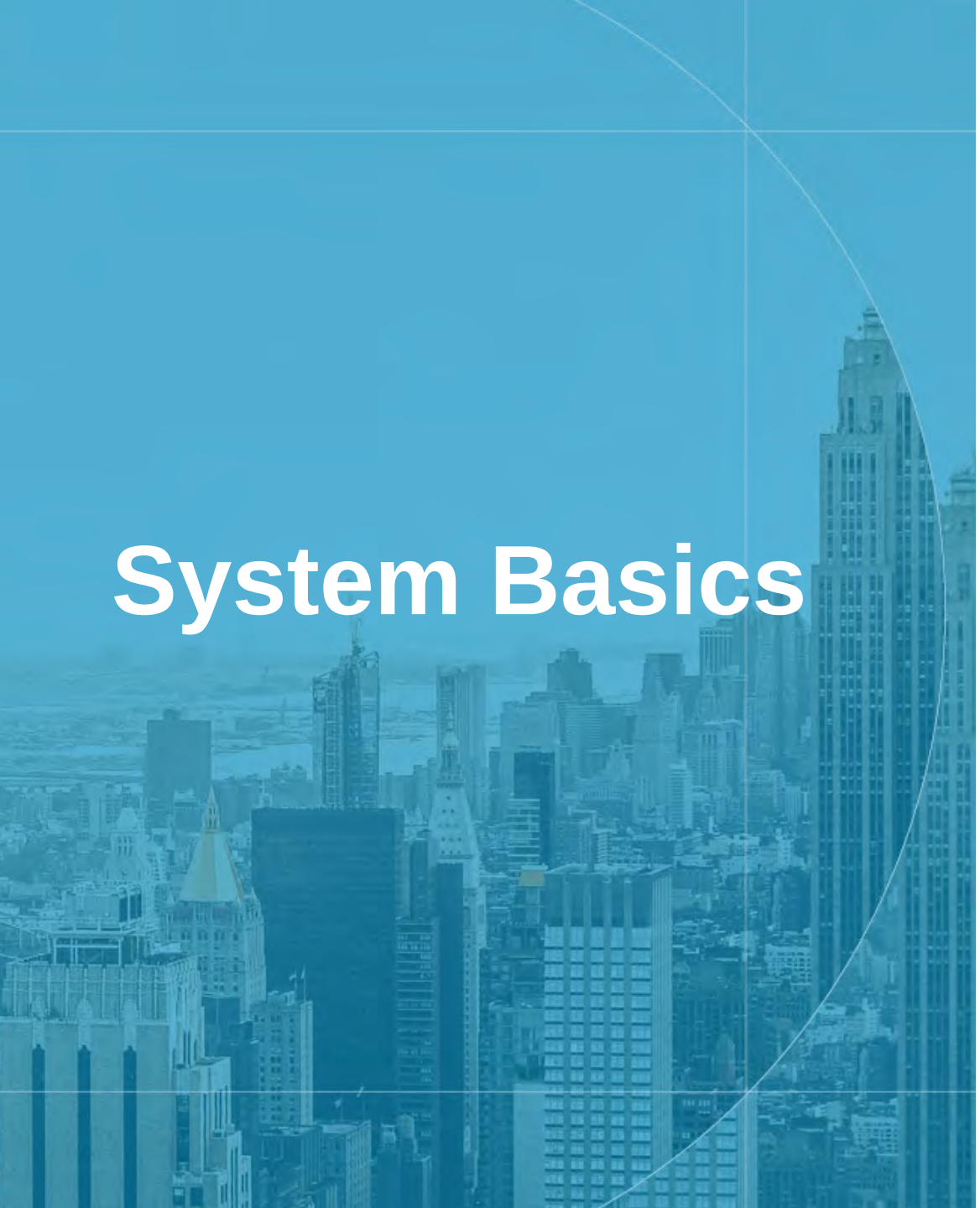
Klein&Hoffman
ARCHITECTURAL & STRUCTURAL ENGINEERING

- Licensed Architect in Ten States, Specializing in Forensics
- 30+ Years of Experience, Roof System Design Expert

Roofing 101: Built Environment

Roofs in the Building Ecosystem

- Roof design influenced by building type, Risk Category I–IV, and exposure.
- Building height, use, and rooftop equipment /overburden effect minimum requirements.
- Exposure to hurricanes, wind events, snow loads
- Codes and insurance requirements aimed at reducing risk



System Basics

- All roofs should have slope, water travels on the drainage plane
- Single-ply systems and modern roof assemblies
- Importance of primary and secondary drainage systems for storm drainage response
- Drainage design is non-optional—gravity is free and “magic”

Compliance Framework: The Three System Tests

1. Fire classification:
ASTM E108 or UL 790

2. Wind uplift pressure resistance:
FM 4474, UL 580, UL 1897

3. Energy code compliance:
IECC or ASHRAE 90.1

- Tested as integrated systems in I-Codes
- Design tradeoffs must be balanced, not layered

The Truth About the Roof

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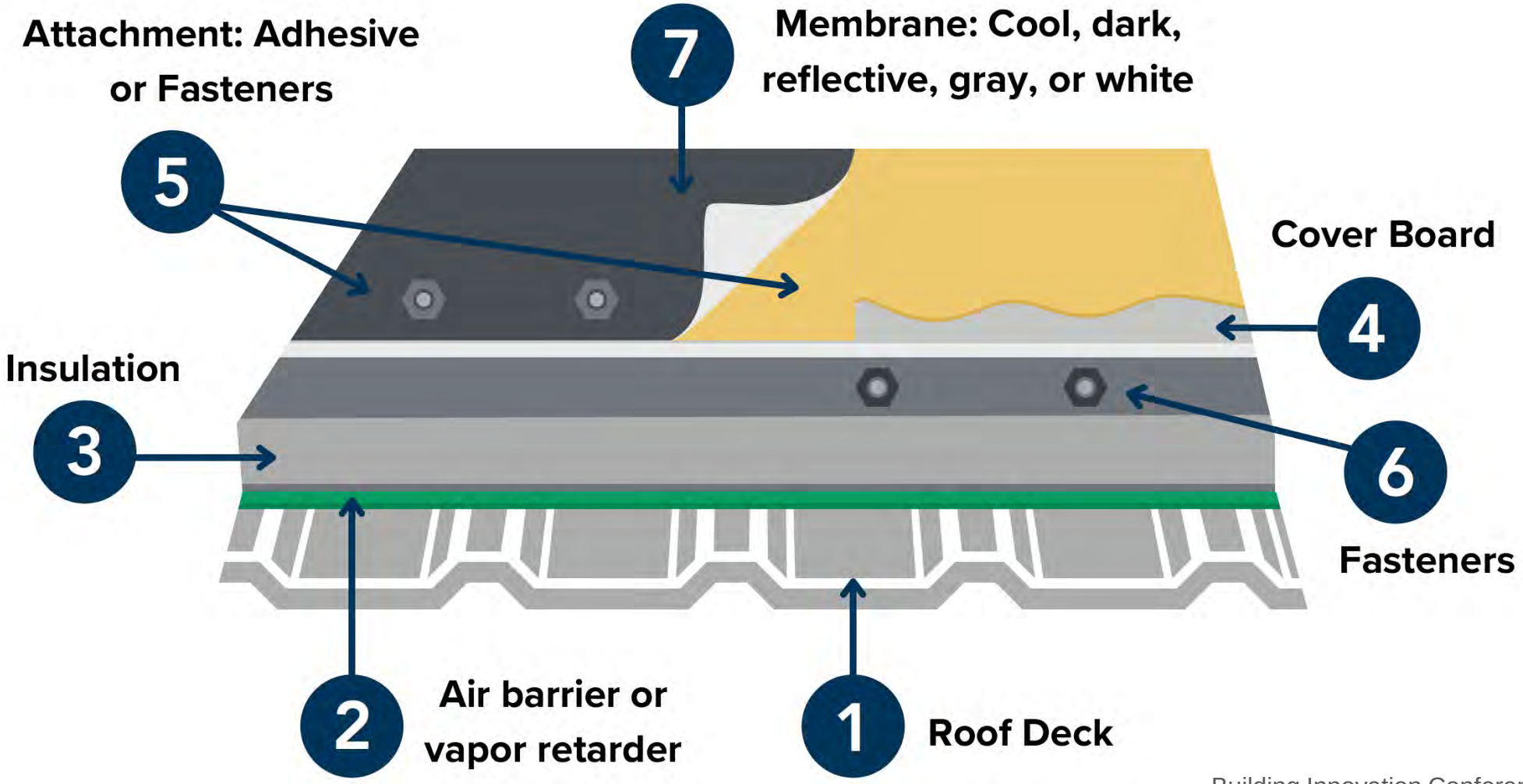

Poll Question:

Do you have a favorite kind of roof?

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Do you have a favorite kind of roof?

Six Essential Roofing Facts

Six Essential Roofing Facts

1. Roofs are a building's first line of resilience
2. Drainage is a design imperative—not a feature
3. Attachment method affects durability, storm survival, and lifecycle ROI
4. Fire resistance is fundamental and codified
5. Sustainability = performance over time, not just …
6. Roofing longevity minimizes waste, emissions, and cost

Poll Question:

Which fact was most unfamiliar before today?

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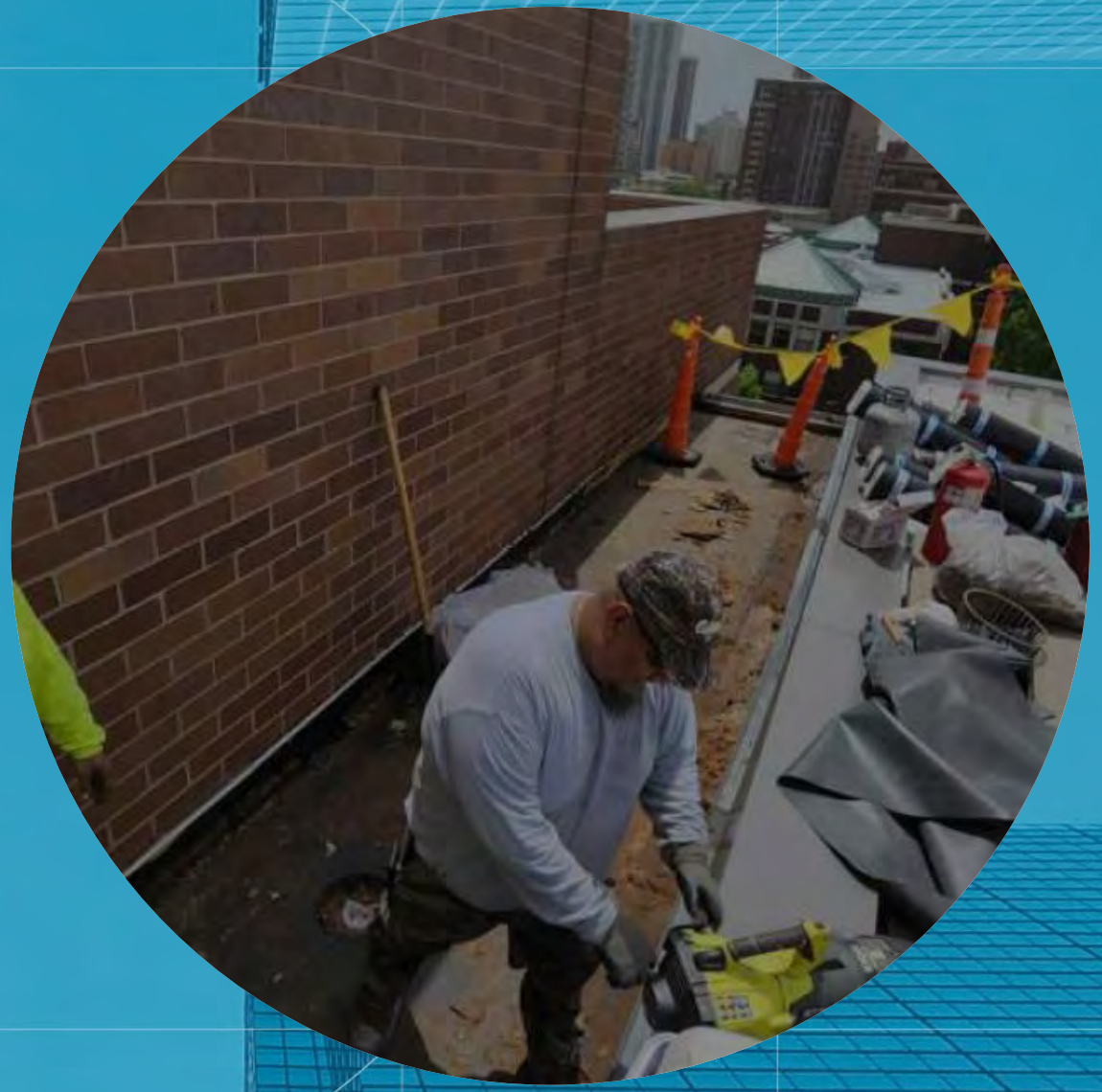
Which fact was most unfamiliar before today?

Designing for Resilience



The role of the roof in resilience:

- DHS: Adapt, withstand, recover
- NIBS: anticipate, absorb, adapt to, recover
- 2023: Plan, absorb, recover, adapt
- Respond to catastrophic events: 1st line of defense
- Protection from the elements
- As a platform
- … Produce

Six critical factors:

1. Robust design
2. Judicious material selection
3. Dynamic performance testing
4. Smart attachment/bonding methods
5. Attention to drainage paths
6. Proper installation

Resilient roofing systems must:

- Resist hail, UV, and thermal stress
- Perform under ASTM testing through full warranty term
- Maintain durable seams/joints and be regularly inspected
- Deliver dual performance: survive extreme events and last for decades

Poll Question:

Which event or condition most challenges a building's resilience?

Acute hazards, chronic stressors, or systemic risks

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Which event or condition most challenges a building’s resilience? Options: acute hazards, chronic stressors, or systemic risks?

Resilience + Sustainability: Finding the Balance

Resilience + Sustainability: Finding the Balance

- Sometimes green and resilient goals clash
  - Insulation depth vs. slope
  - Reflectivity vs. durability
- New code clarifications on minimum vs. average R-value
- Custom solutions based on building function (e.g., schools vs. hospitals)
- Consider environmental response of materials (UV, precipitation, hail, thermal swing)

Poll Question:

Are resilience and sustainability similar or distinctly different?

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Are resilience and sustainability similar or distinctly different?

On the Horizon

On the Horizon

- Development of a methodology to determine PSL – predicted service life
- Return to life cycle cost, not just cost at first install
- Sophistication of roof albedo modeling
- Holistic perspective on sustainability
- Off-site and modular construction

Poll: Design Dilemmas

Would you trade R-value for added drainage slope?

Which feature delivers the most resilience over a 20-year period?

Would you trade R-value for added drainage slope?

Which feature delivers the most resilience over a 20-year period?

Tools & Takeaways

Takeaways

- Roofs in the Building Ecosystem
- Roof Assembly Basics
- Compliance Framework: Three Tests
- Six Essential Roofing Facts
- Role of the Roof in Resilience
- Six Critical Factors for R.R.
- Resilient Roofing Assemblies
- Resilience + Sustainability: Balance
- On the Horizon

Tools

- Quick-reference resilience checklist
- Framework for lifecycle cost analysis
- This presentation

www.COSUR.org

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Wrap-Up

Resilience is fundamental.

Ultimate sustainability is longevity.

Ultimate resiliency is redundancy.

Thank You

Ellen Breipohl Thorp, M.A., CAE
Managing Director
ellen@cosur.org

COSUR
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Jason Wilen, AIA, NCARB, CDT, RRO
Associate Principal
jwilen@kleinandhoffman.com

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