The Tie That Binds: Strengthen Your Home Against Strong Winds

National Tornado Summit
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Session Outline

• Storm Damage
• Building Better Buildings
• Narrowing the Damage Path
• Strong Continuous Load Paths
Storm Damage

• In the past 5 years
  – Wind and hail claims across the nation have accounted for almost 40% of all insured losses
  – Losses average approximately $15 billion annually
  – 223 deaths occurred due to tornadoes
In 2017

- 8 wind/hail/tornado events each exceeding $1.1 billion in costs
- These events alone accounted for $30 billion in costs, and 32 fatalities

Traditional Paradigm: Response
New Paradigm: Resilience
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BUILDING BETTER BUILDINGS: IBHS’ FORTIFIED HOME™
What is FORTIFIED?

Voluntary, superior construction standards designed to build and retrofit stronger, safer buildings that are more disaster-resistant

• Grounded in IBHS research
• Technical standards
• Inspection-based
FORTIFIED Risk Map

- Hurricane
- High Wind (Minimum required in all areas that are not Hurricane)
- High Wind & Hail (Recommended in these areas)
FORTIFIED Home Eligibility

- New and existing homes
- Single-family detached, site-built
- Townhouses and quadplexes
- Manufactured/modular single-family homes
Program Basics

• Independent verification required
  — Certified FORTIFIED Home Evaluator (cost varies by evaluator)

• Upgrades, if applicable (0%–3% of hard costs depending on SOP and designation level)

• Designations valid for 5 years

• Re-designation focuses on the roof, requires evaluation by certified FORTIFIED Home Evaluator
Benefits to Insurers

- Write better risks
- Know that properties have been professionally verified and audited by IBHS
- Potential to lower loss costs
- Potential to lower ALE post cat
Benefits to Homeowners

• Peace of mind
• Protection of family heirlooms, irreplaceable items
• When damage occurs, lesser extent, quicker return to home
• Insurance credits, easier/cheaper building permits in some jurisdictions
• Improved sales value of home
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NARROWING THE DAMAGE PATH
Why FORTIFIED?

• Reduce property damages and insurance claims

• Protect business operations and livelihoods

• Win-win situation for homeowners, communities, business owners, their customers, insurance companies, and society
The Tornado EF-Scale categorizes tornado damage into five levels:

**EF-0 (Minor Damage):** Shingles blown off, or parts of roof peeled off, damage to gutters, siding, windows broken, shallow roots toppled.

**EF-1 (Moderate Damage):** More significant roof damage, windows broken, exterior doors damaged, or lost, mobile homes overturned or badly damaged.

**EF-2 (Considerable Damage):** Roof torn off well-constructed homes, homes tilted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.

**EF-3 (Severe Damage):** Interiors of well-constructed homes destroyed, significant damage done to large buildings, homes with weak foundations can be blown away, trees begin to lose their tops.

**EF-4 (Extreme Damage):** Well-construction homes are leveled, cars are thrown significant distances, top story exterior walls of masonry buildings would likely collapse.

**EF-5 (Massive/Incredible Damage):** Well-constructed homes are swept away, steel-reinforced concrete structures are critically damaged, trees are usually detached and snapped.

*Source: NOAA*
Narrowing the Path, Reducing Damage

May 20, 2013 Newcastle-South OKC-Moore EF-5 Tornado

EF-0
EF-1
EF-2
EF-3
EF-4
EF-5
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STRONG CONTINUOUS LOAD PATHS
Severe Storm Protection Systems

High Wind

Roof System (deck type and thickness, nailing pattern, underlayment, drip edge, wind-rated roof cover)

Gables, Porches, Carports and Chimneys

Garage Doors and Structure (Continuous Load Path)

Location and Design Wind Speed are key determining factors in deciding which standard(s) apply.
Key to Wind Resistance
Need for a Strong Continuous Load Path
Strong Continuous Load Path Research
Strong Continuous Load Path Demonstration
Instrumentation

- 330 pressure sensors
- 55 load cells supporting roof
- 8 truss load sensors
- 60 strain gauged anchor bolts
Key Findings: Garage Doors

- At present garage doors FAIL PREMATURELY
  - 47 mph without garage being drywalled
  - 90 mph with garage being drywalled
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**Test Cell (Load vs Deflection)**

- **Double Base Plate Double A.B.**
- **8d ringshank, 4" & 6"**

![Graph showing Load vs Deflection with different tests and conditions.](image-url)
Key Findings: Anchor Bolts

• The anchor bolt data is still being reviewed
  • 6 ft. spacing vs. 3 ft. spacing
• But there was no obvious anchor bolt failures at 6 ft spacing
  • Seems to suggest that the IRC anchor bolt provisions are sufficient
Key Findings: Framing Details

• Roof framing at 24” O.C. with proper detailing can achieve desired performance.

• Framing and structural sheathing nail patterns for IBHS Gold achieve desired performance.

• City of Moore, OK framing and structural sheathing nail patterns are probably overly conservative
Thank You

Questions?