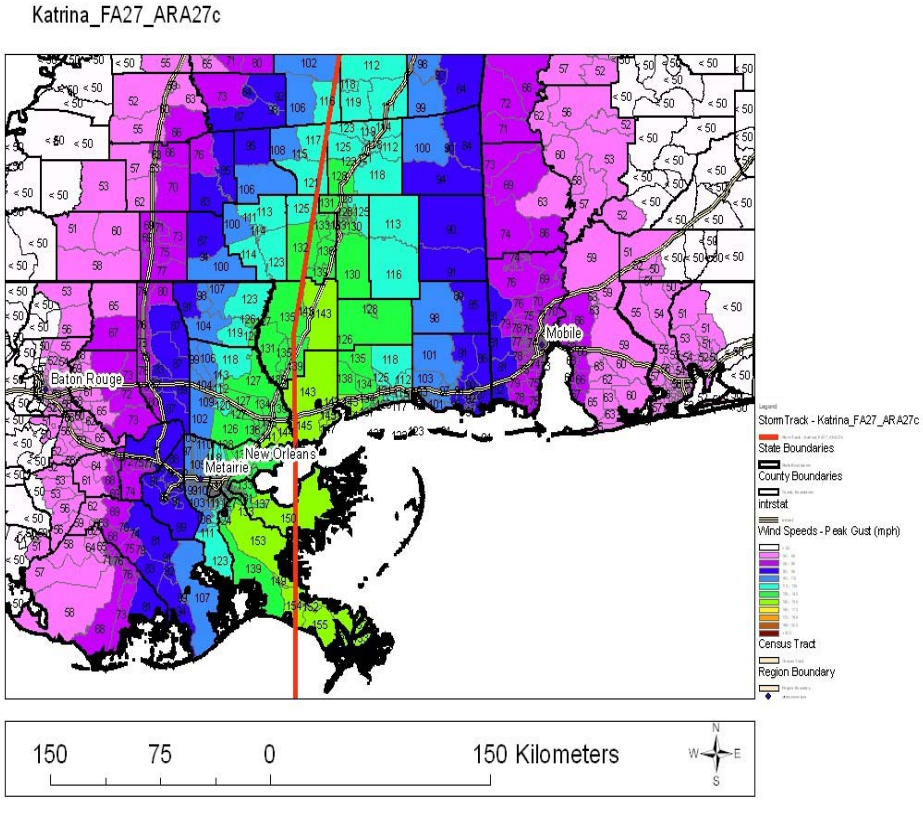
AF&PA Investigation of Structural Damage from Hurricane Katrina

SWST Annual Convention
Newport Beach, CA
June 25, 2006

Presented by John "Buddy" Showalter, P.E.
AF&PA American Wood Council

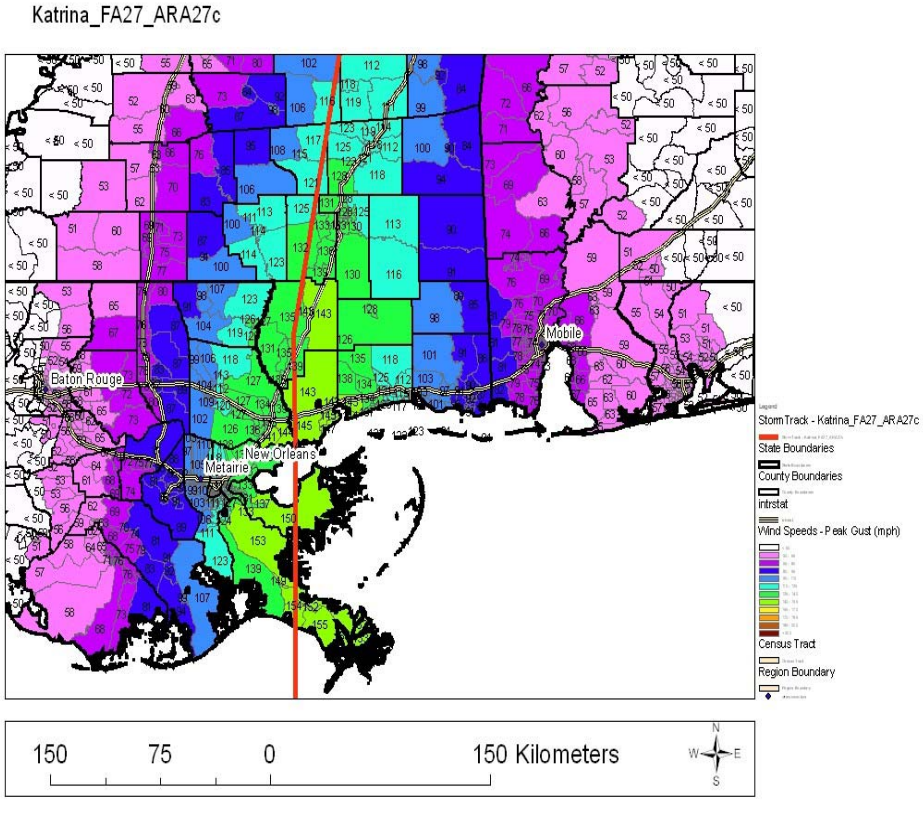
Impacts of Katrina

Storm for the Ages…



Impacts of Katrina

Katrina makes landfall…



Impacts of Katrina

Damage in three main categories:

- Storm surge
- Coastal flooding
- Wind damage

Impacts of Katrina

Storm Surge:

- Rising sea water onshore

Impacts of Katrina

Coastal Flooding:

- Water pushed inland by storm surge

Code Impacts of Katrina

Wind Damage:

- Connectors were a problem… mainly installation

Code Impacts of Katrina

Wind Damage:

- Lack of current code adoptions were a problem

Code Impacts of Katrina

Wind Damage:

- Loss of sheathing
- Sub code
- One nail per truss in some cases

Code Impacts of Katrina

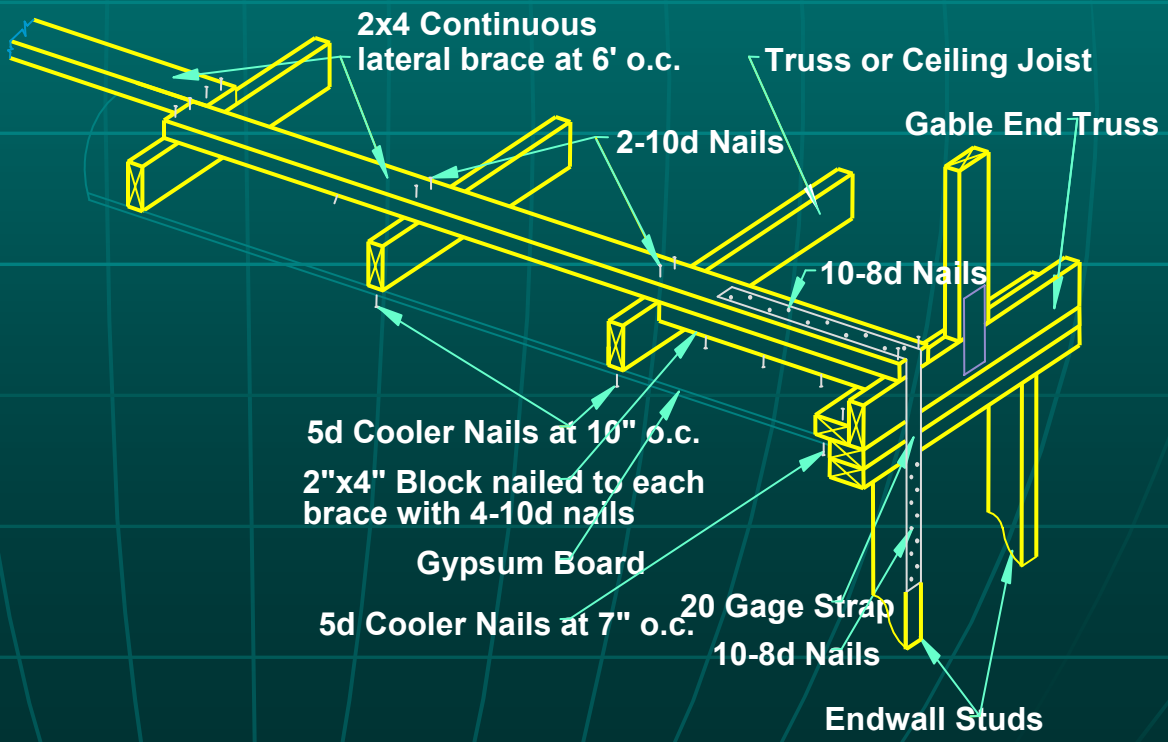
Wind Damage:

- Roof truss connection failures
- Minimal nailing

Code Impacts of Katrina

One example of what might have been...

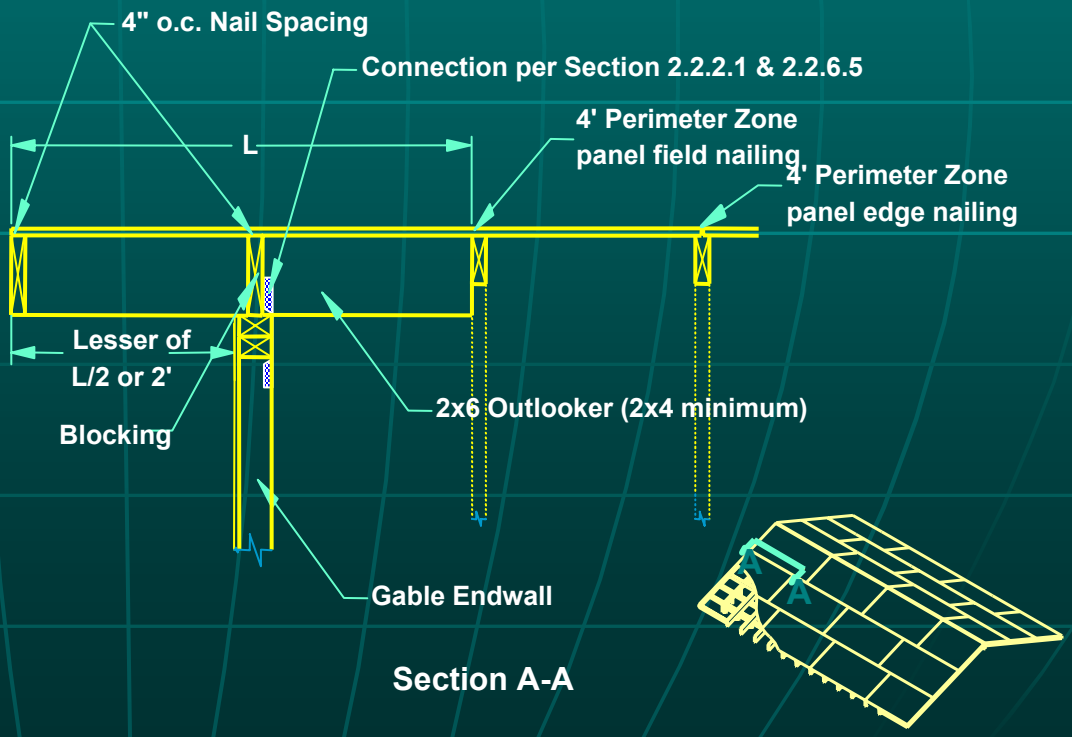
2001 WFCM



Code Impacts of Katrina

One example of what might have been...

2001 WFCM



Code Impacts of Katrina

Wind Damage:

- Right idea
- Inadequate nailing for uplift

Code Impacts of Katrina

Wind Damage:

- Connectors were a problem
- Inadequate nailing at top plate
- Nailing into end-grain of studs

Code Impacts of Katrina

Wind Damage:

- Walkway had cantilevered roof joists
- No uplift connectors

Code Impacts of Katrina

New Hope Wind Damage:

- In-fill insulation Panels
- Not code compliant

Code Impacts of Katrina

Biloxi Wind Damage:

- In-fill insulation panels
- Truss blow out

Impacts of Katrina

The GOOD news…

- Many newer homes above flooded areas performed well
  - Bay St Louis & Waveland

Impacts of Katrina

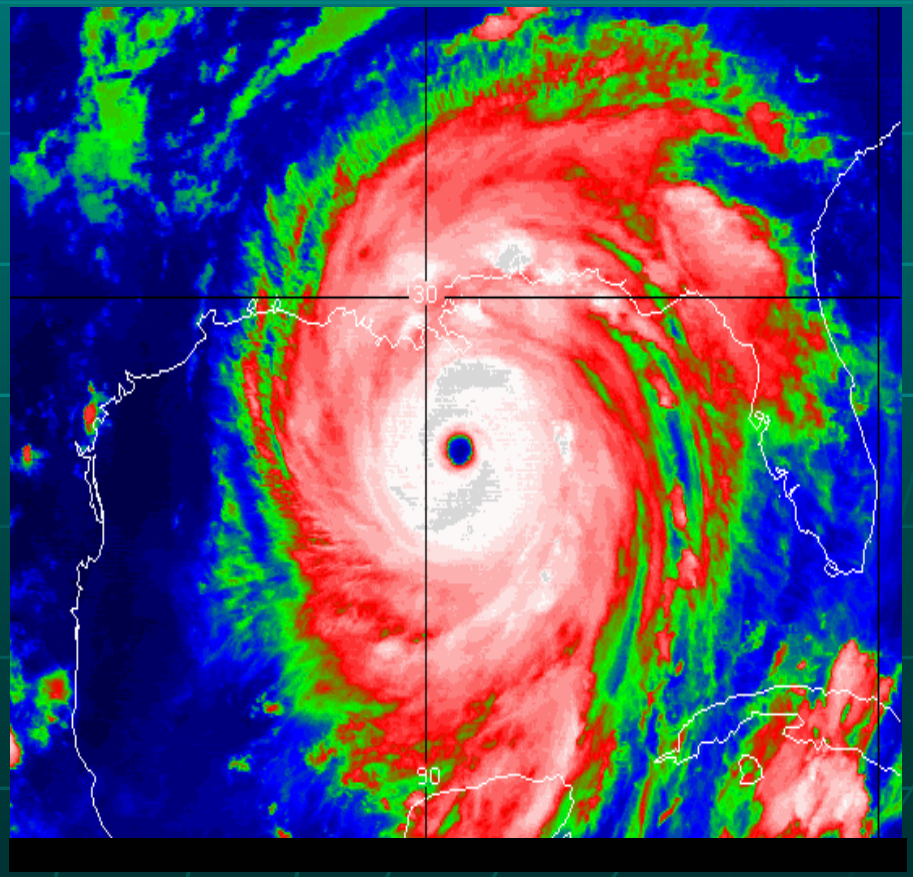
The GOOD news…

- Wood building products were not a failure point & performed well resisting wind

Impacts of Rita

On the heels of Katrina

- Landed along LA/TX border
- Damage primarily from flooding…
- 8’ storm surge breached weakened levies in New Orleans
- Trivia fact: 1st time two Cat 5 hurricanes in Gulf in one season
- Est. $4-5 Billion in losses



Upgrading the Codes

New IBC & IRC Adoptions

- Louisiana
  - Coastal areas
  - State-wide in Jan '07
- Mississippi
  - Coastal areas
- WFCM reference

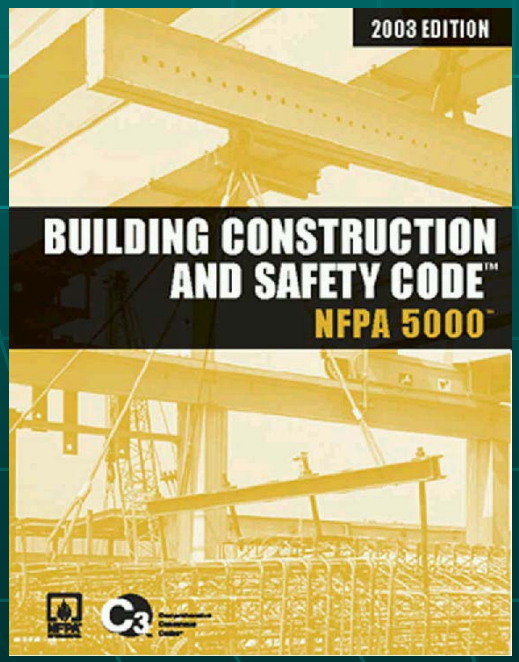
WFCM 2001

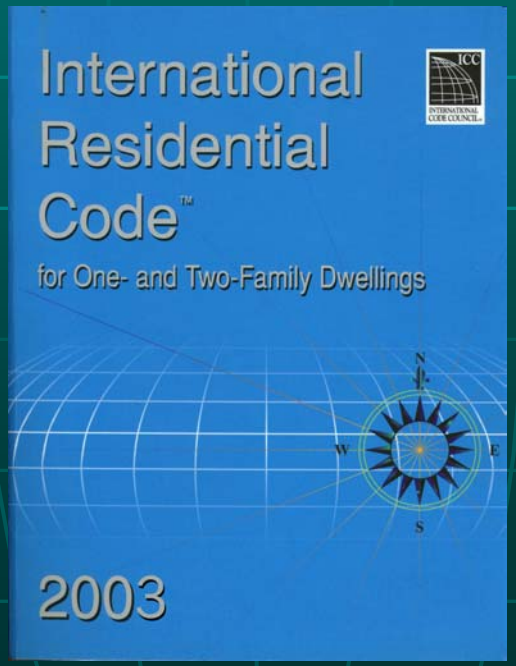
- based on 1997 NDS®
- updated for:
  - all wind
  - snow
  - seismic

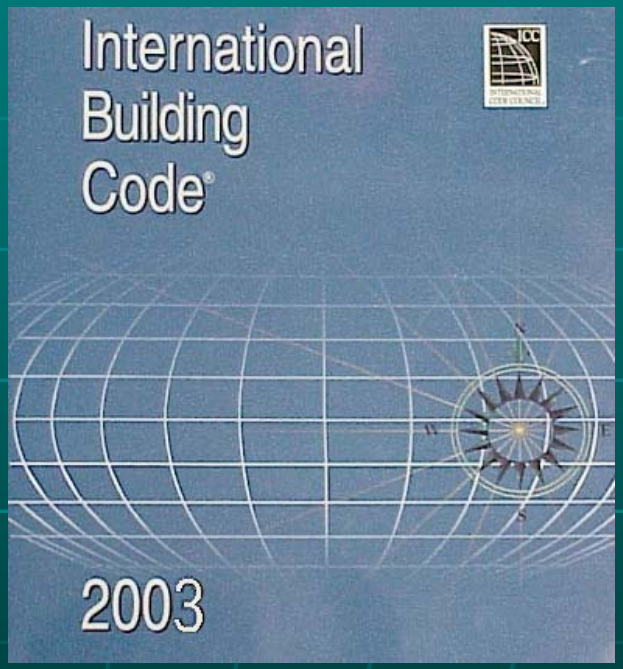
for one- and two-family wood frame dwellings …nationally

Model Code Acceptance

- 2003 IBC
- 2003 IRC
- 2003 NFPA







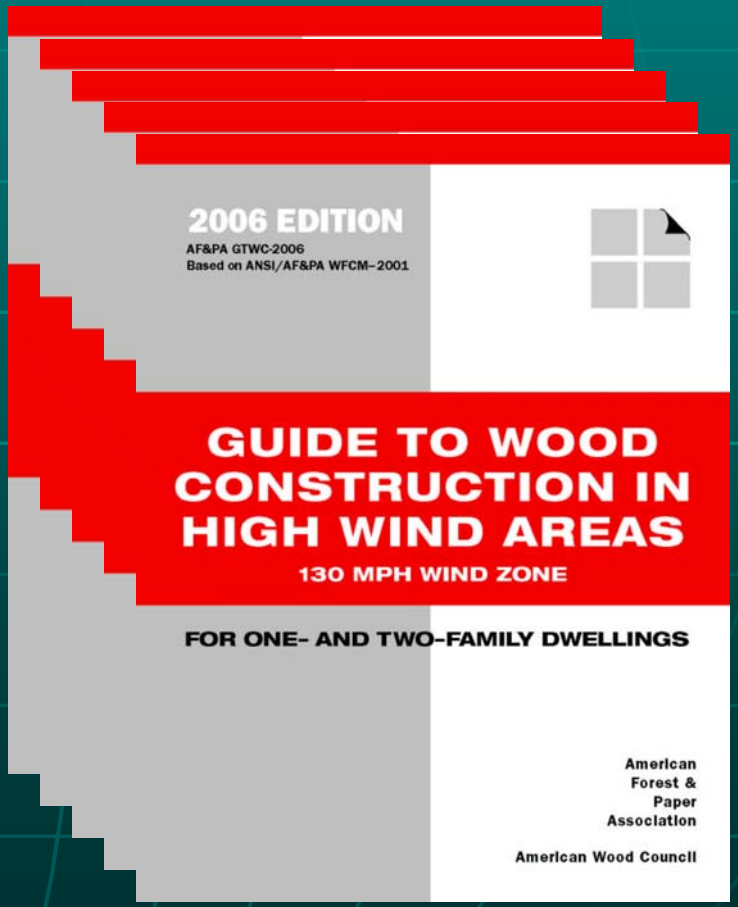
Evolving Standards

- Refine design solutions to minimize wind damage
- Eliminate weak points in design construction verification process

Design Solutions for High Wind

Key: Simplify Design

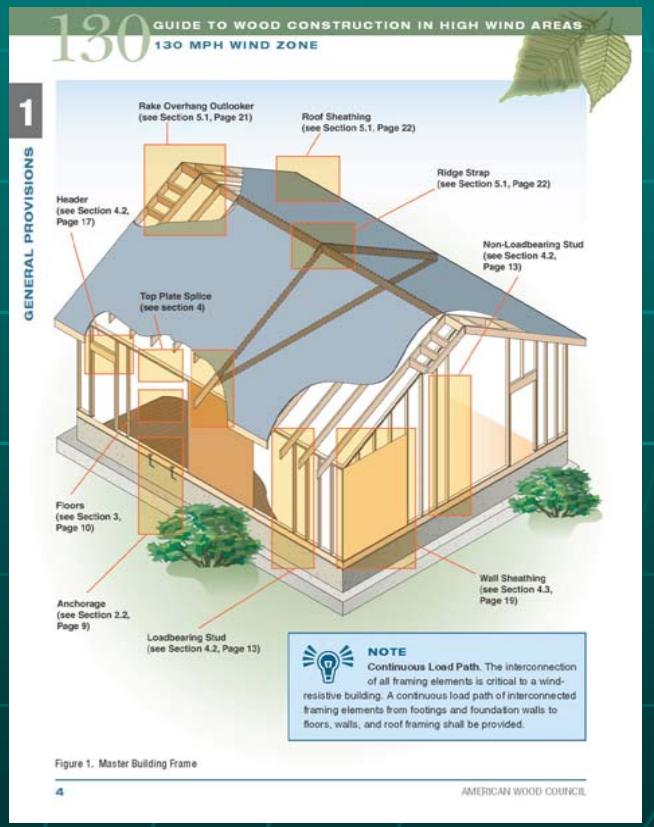
- Builder's Guides
- WFCM-based (ICC)
- IBHS, NAHB, ICC & AWC Collaboration
- 100-150 mph winds



Design Solutions for High Wind

Builder's Guide Series

- Fast tracking design to builders and code officials
- Available on AWC web site
  - www.awc.org
- Already adopted as the WFCM in I-codes



Technical Assistance for Design Solutions

AF&PA efforts

- Special “Impact” report for industry
- Copies of WFCM donated to gulf coast building officials
- Builder education in southeast on use of WFCM

Impact

A Report from the American Wood Council of the American Forest & Paper Association

October 7, 2005

SPECIAL REPORT
AF&PA Investigation of Structural Damage from Hurricane Katrina

On August 29, 2005, Hurricane Katrina made landfall in Plaquemines Parish, Louisiana, with 140 mph winds. Katrina made a second landfall four hours later on the Louisiana/Mississippi border with 125 mph winds. After the initial humanitarian effort concluded, AF&PA staff traveled on September 19-21 through the Central Gulf Coast area as part of Hurricane Katrina Damage Assessment teams organized by the Institute for Business & Home Safety (IBHS). These teams were assigned the task of assessing and reporting on residential wind damage along the coastal areas of Mississippi, eastern Louisiana, and Alabama. While the focus of the effort was on residential wind damage, information was also collected on the devastating effects of the storm surge along the coastal areas and from inland flooding.

For two days, the AF&PA team studied damage in the areas closest to the hurricane landfall, including the towns of Bay St. Louis, Waveland, Diamondhead, New Hope, Biloxi, and Pearlington, Mississippi; and Slidell and Pearl River, Louisiana. The eye of Hurricane Katrina made landfall near Pearlington, Mississippi, after briefly crossing the Mississippi River delta area south and east of New Orleans. Observed damage can be categorized in three groups: storm surge, coastal flooding, and wind damage.

Storm Surge

Damage from the storm surge, the onshore rush of water ahead of Hurricane Katrina, was visible throughout coastal areas of Alabama, Mississippi

Infrared image of Hurricane Katrina as the eye approaches land on August 29, 2005.

Photo 1: All that remains of a structure hit by storm surge near the coast—in the Bay St. Louis/Waveland, MS area.

and eastern Louisiana. In the Bay St. Louis/Waveland area, very near the hurricane landfall location, the storm surge was reported to have been over 26 feet. For at least a quarter mile inland from the coast, structures in the path of the storm surge were completely destroyed, with only piles and concrete slabs remaining (Photo 1). Most of

(continued on pg. 2)

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Lessons From Hurricanes Katrina and Rita

Summary:

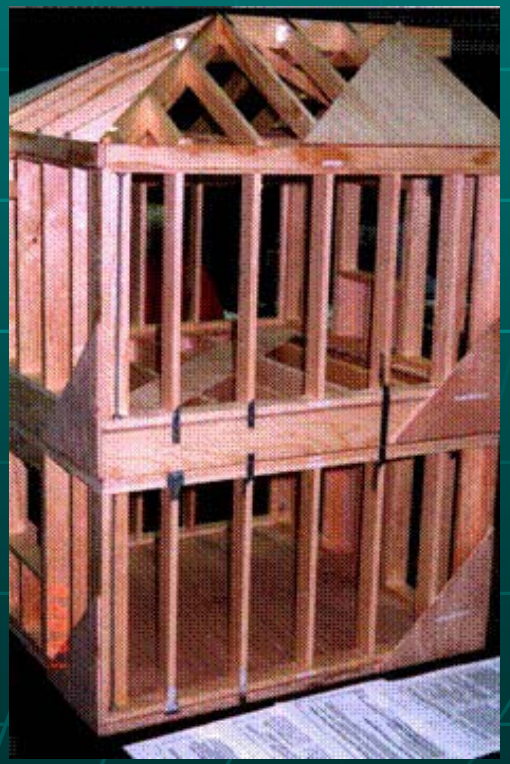
- Review forensics and update design protocols
- Improve inspection and approval protocols
- Develop cooperative relationships with stake holders

Lessons From Hurricanes Katrina and Rita

- Review forensics and update design protocols
  - Analyze and summarize reports from wind events and related research
  - Refine WFCM to incorporate state-of-the-art
  - Promote adoption of updated WFCM in ICC model codes

Lessons From Hurricanes Katrina and Rita

- Improve inspection/approval protocols
  - Problematic element of building
  - Better systems for ensuring communication of design details
  - Better system for validating connector details in the field that conform to approved building plans and specifications



Lessons From Hurricanes Katrina and Rita

- Develop cooperative relationships with stake holders
  - Associations of designers, engineers, code officials, contractors
  - AND sub contractors

Lessons From Hurricanes Katrina and Rita

QUESTIONS ?