

Coastal Construction Manual (FEMA P-55, 4th edition) Online Course



Federal Emergency Management Agency



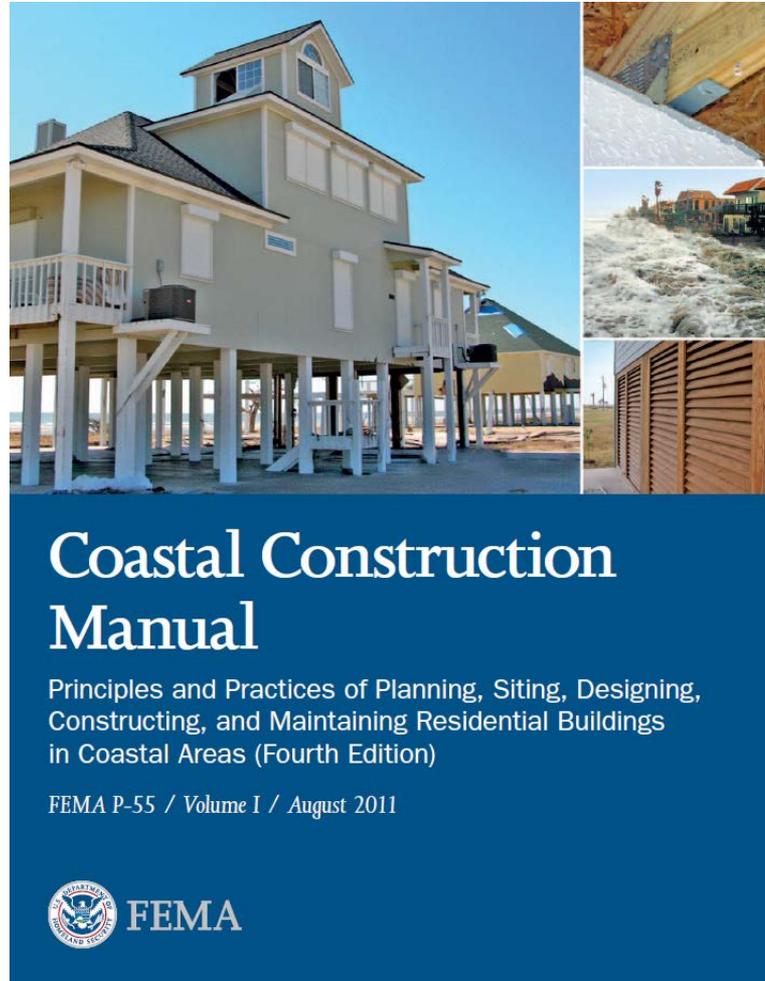
FEMA

Building Science Branch

Course Overview

- Describe Coastal Construction Manual (CCM, FEMA 55) history
- Describe updates made from the 3rd to 4th editions of CCM
- Define the scope and use of the 4th edition of CCM
- Overview the content of each chapter of the 4th edition of CCM
- Describe other coastal construction resources
- Summary

What is the CCM?



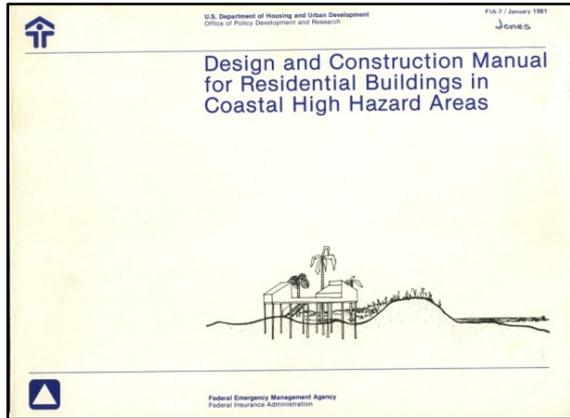
What is CCM?

- A **best practices document** for design and construction for a coastal environment
 - **Best practices** are techniques that exceed the minimum requirements of model building codes; design and construction standards; or Federal, State, and local regulations
 - When best practices exceed minimum requirements, this is noted in the manual
 - The coastal construction environment has unique design and construction requirements with regards to inland development

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CCM History

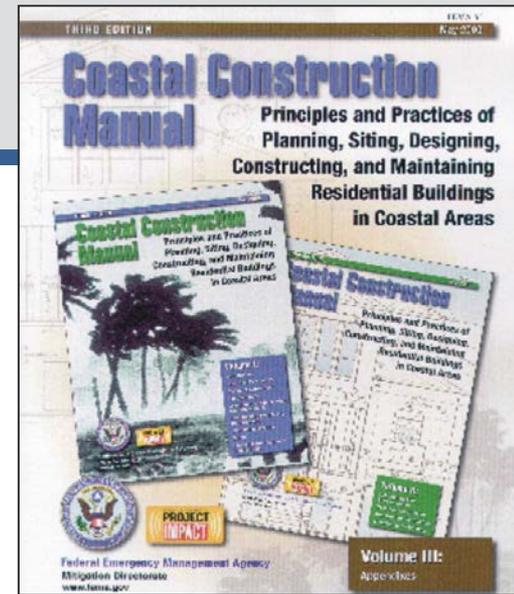
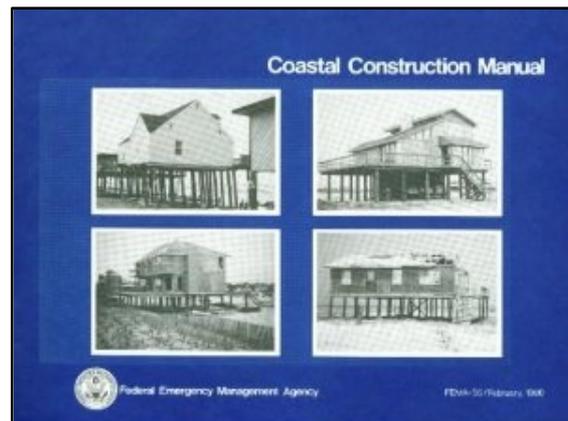


1981, 1st edition

1980

1990

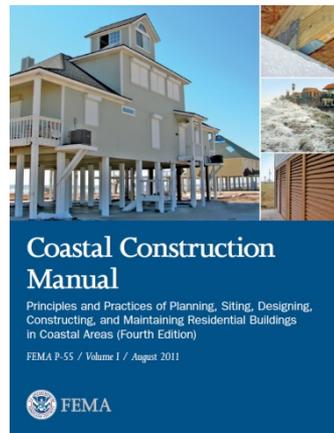
1986, 2nd edition



2000, 3rd edition

2000

CCM History



2011

2011, 4th edition

- **Newest edition**

- Released in August 2011
- 2 Volume publication
- CCM Resources provided online on the Residential Coastal Construction Website <http://www.fema.gov/residential-coastal-construction>

4th Edition of CCM

- The 2011 CCM, Fourth Edition (FEMA P-55), is a 2-volume publication:
 - Provides a comprehensive approach to planning, siting, designing, constructing, and maintaining/retrofitting homes in the coastal environment
 - Focus on 1-4 Family structures, up to three stories in height



Hurricane Katrina, 2005
Dauphin Island, AL

(Figure 10-3, FEMA P-55)

4th Edition of CCM

- The 2011 CCM, Fourth Edition (FEMA P-55), is a 2-volume publication:
 - **Volume I** provides information about: hazard identification, siting decisions, regulatory requirements, economic implications, and risk management
 - **Volume II** contains in-depth descriptions of design, construction, and maintenance practices
 - **CCM Resource Website** contains supplemental materials



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4th Edition of CCM: Changes and Updates



- Volume I
 - Descriptions of recent coastal storm events
 - Updated information on flood hazard identification
 - Expanded discussion of sea and lake level rise
 - New chapter on fundamentals of risk analysis and risk reduction
 - References to updated building codes and standards



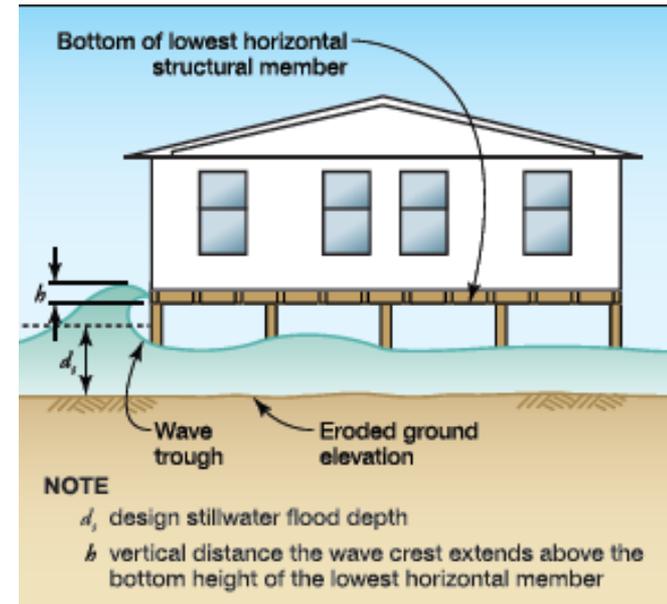
**Hurricane Katrina, 2005
Long Beach, MS**

(Figure 2-5, FEMA P-55)

4th Edition of CCM: Changes and Updates



- Volume II
 - New chapter on pre-design considerations
 - New chapter on retrofitting for natural hazards
 - References to updated building codes and standards
 - New guidance on calculating wave slam on elevated buildings
 - Improved calculations for flood-borne debris impact
 - Improved guidance on foundation scour
 - Expanded and updated example problems



(Figure 8-12, FEMA P-55)

4th Edition of CCM: Changes and Updates



- Volume II Continued
 - Updated and expanded guidance on load combination calculations
 - New prescriptive wind load tables
 - Updated and expanded guidance on calculating wind loads
 - New mitigation techniques for the building envelope
 - New mitigation techniques for enhanced performance of the main wind force resisting system



**Hurricane Charley, 2004
Florida**

(Figure 11-45, FEMA P-55)

4th Edition of CCM: Changes and Updates

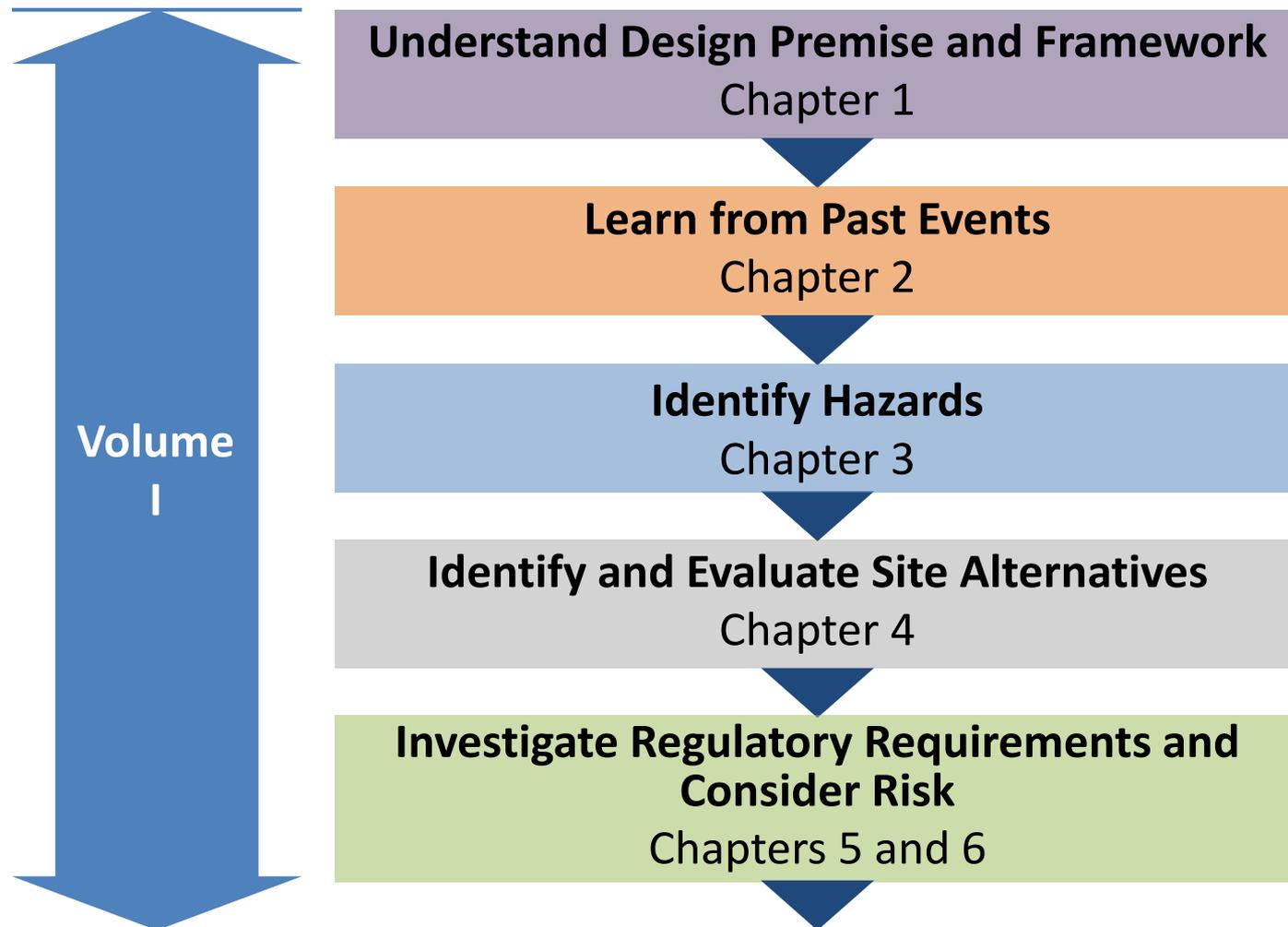
- CCM 4th edition references:
 - 2012 I-Codes
 - ASCE 7-10
 - ASCE 24-05
- CCM 3rd edition referenced:
 - 2000 I-Codes
 - ASCE 7-98
 - ASCE 24-98



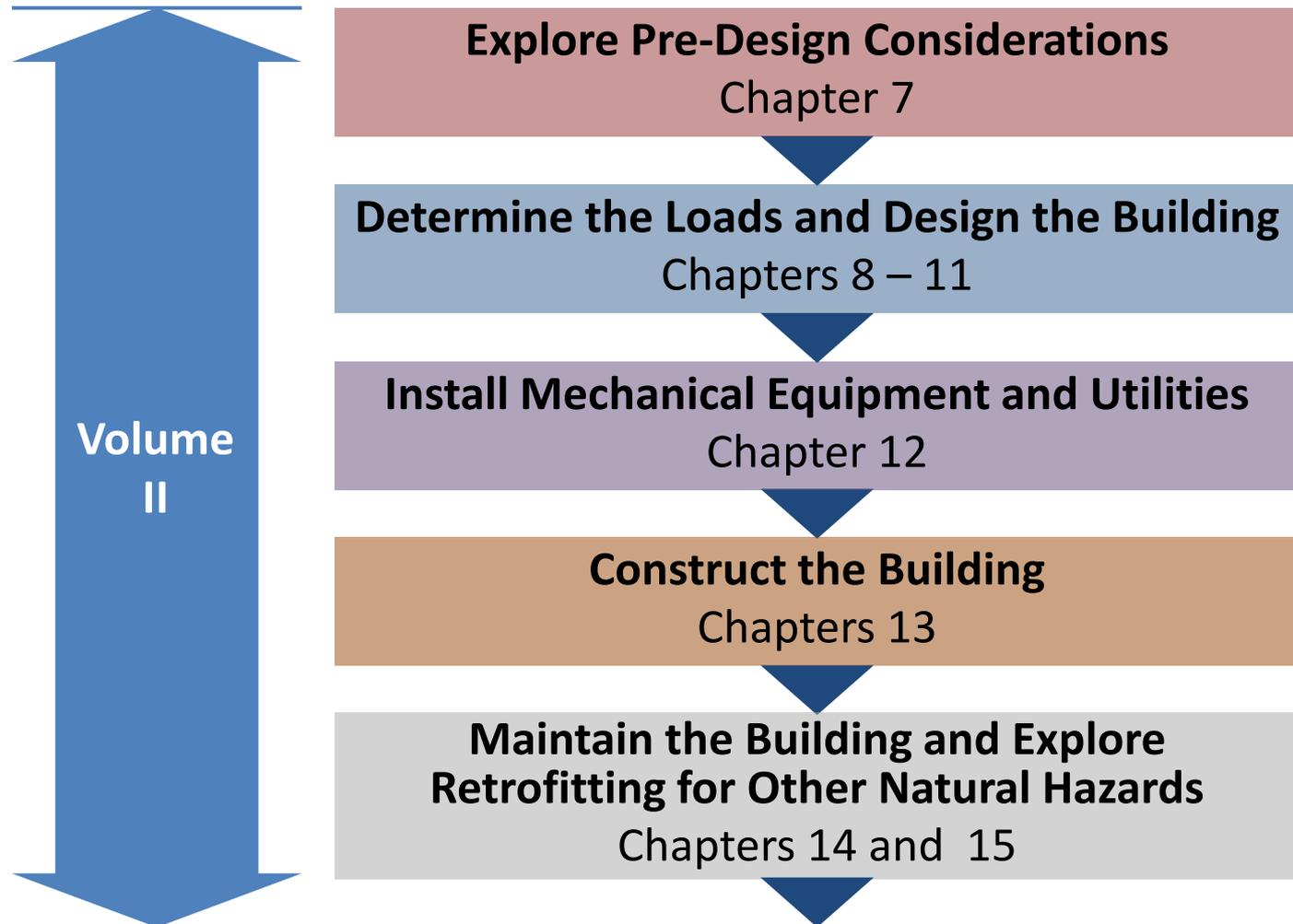
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Coastal Construction Process: CCM Chapters



Coastal Construction Process: CCM Chapters



Residential Coastal Construction Website

CCM Resources

- For resources that augment the guidance and other information in the *Coastal Construction Manual*, see <http://www.fema.gov/residential-coastal-construction>



The screenshot shows the FEMA website's "Residential Coastal Construction" page. At the top, there is a navigation bar with links for "Mobile Resources", "Contact Us", "A-Z Index", "FAQs", "Español", and "Additional Languages". Below this is a search bar with a "Go" button and an "Advanced Search" link. A secondary navigation bar includes "Blog", "Photos", "Videos", and "Email Updates". The main navigation menu features "Home", "Plan & Prepare", "Recover & Rebuild", "Apply for Assistance", "Disasters & Maps", "FEMA Audiences", and "About FEMA". A "News & Media" section is also present, along with social media icons for Facebook, Twitter, YouTube, and RSS, and a "Print Preview" button.

The page content is organized into a sidebar and a main area. The sidebar on the left contains links for "MAT Program", "Frequently Asked Questions", "MAT News and Updates", "MAT Recruiting", "Technology Transfer", and "MAT Reports". The main content area features a heading "Residential Coastal Construction" followed by a bulleted list of links: "FEMA P-55 Coastal Construction Manual", "Coastal Construction Manual Resources", "Contact and Information", and "Additional Coastal Construction Resources". Below this is a paragraph of text: "Investigations conducted by FEMA and other organizations after major coastal disasters have consistently shown that properly sited, well-designed, and well-constructed coastal residential buildings generally perform well. This updated Coastal Construction Manual—prepared by FEMA with assistance from other agencies, organizations, and professionals involved in coastal construction and regulation—is intended to help designers and contractors identify and evaluate practices that will improve the quality of construction in coastal areas and reduce the economic losses associated with coastal disasters."

Further down, there is a section titled "FEMA P-55, Coastal Construction Manual" with a link to "Download the full Coastal Construction Manual". A "Back To Top" link is provided. The final section is "Coastal Construction Manual Resources", which includes a bulleted list of links: "Acknowledgments", "Glossary", "Coastal Flood and Wind Event Summaries", "Web Sites for Information about Storms, Big Waves and Water Levels", "Dune Walkover Guidance", "Material Durability in Coastal Environments", "Galvanized Roofing Attachment", and "Swimming Pool Design Guidance". A second "Back To Top" link is located at the bottom of this section.

Planning, Building Standards, Design, and Construction Make a Difference



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Chapter 1: *Introduction* addresses...

- Background
- Purpose
- Objectives
 - Properly plan for construction
 - Build a successful disaster-resistant structure
- Organization and use of CCM



Cover, FEMA P-804



Terminology



Warnings



Notes



Examples



Equations

Chapter 1: What is a Successful Building?

- Chapter 1 defines a **successful building**
- In coastal areas, a building is **successful** if after a design-level event:
 - Foundation is intact and functional
 - Building envelope (floors, walls, openings, and roof) is structurally sound and able to minimize penetration of wind, rain, and debris
 - Floodwaters did not enter
 - Utility connections are intact
 - Building is accessible and habitable
 - Any damage below the lowest floor did not result in damage to other parts of the building



FEMA file photo

Chapter 1: Planning for Construction

- CCM outlines the tasks prior to construction of a successful building:
 - Evaluate suitability of land for residential construction
 - Identify regulatory, environmental and other constraints on construction and development
 - Evaluate site-specific hazards
 - Evaluate techniques to mitigate hazards
 - Identify risk, insurance, and financial implications of siting, design, and construction decisions



Chapter 2: *Historical Perspective* addresses...

- Historical overview of past storm events
- Lessons learned from coastal flood and high wind events
- Importance of breaking the disaster-rebuild-disaster cycle

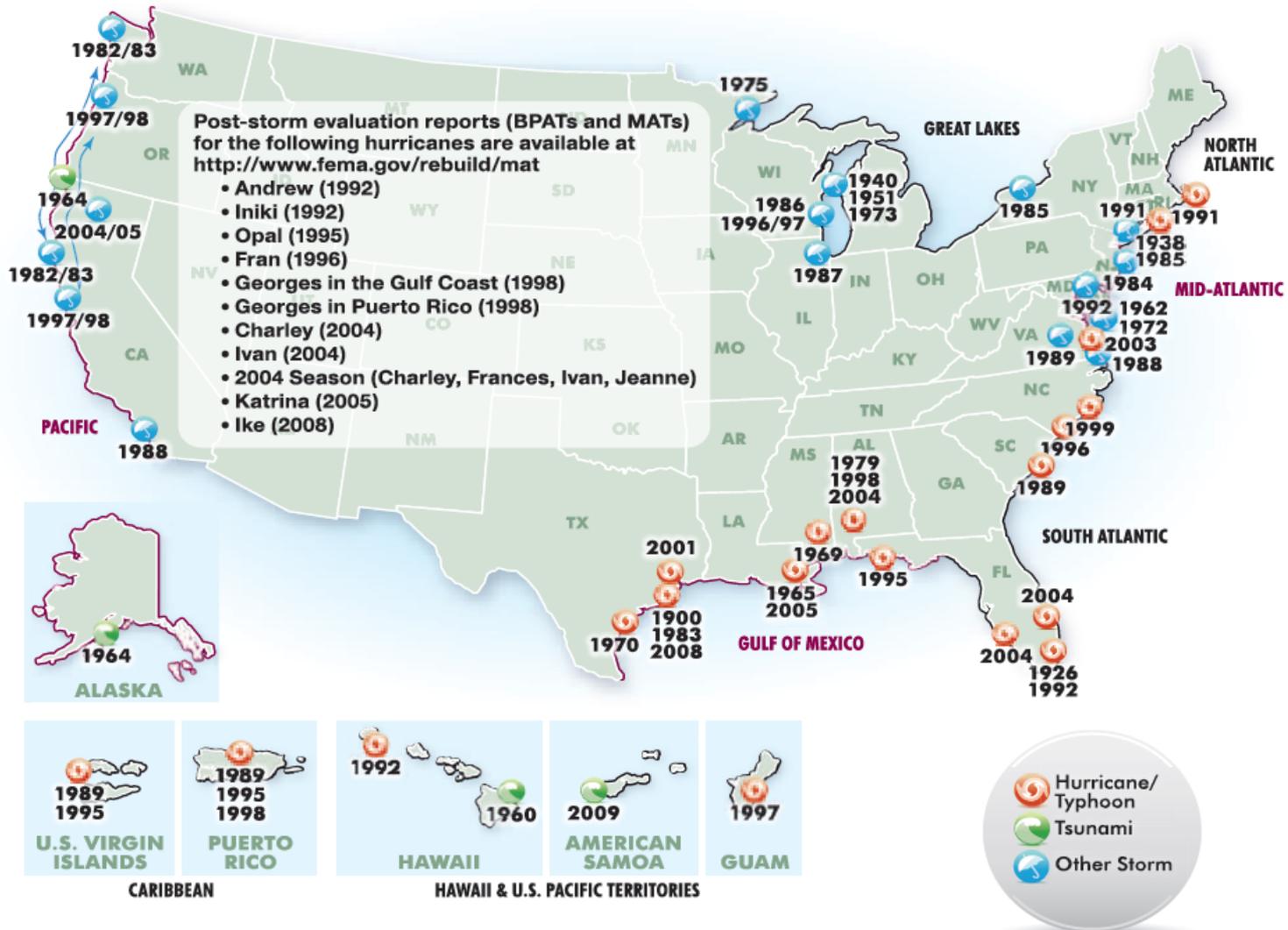


**Hurricane Ike, 2008
Galveston Island Beach,
TX**

(Figure 2-11, FEMA P-55)

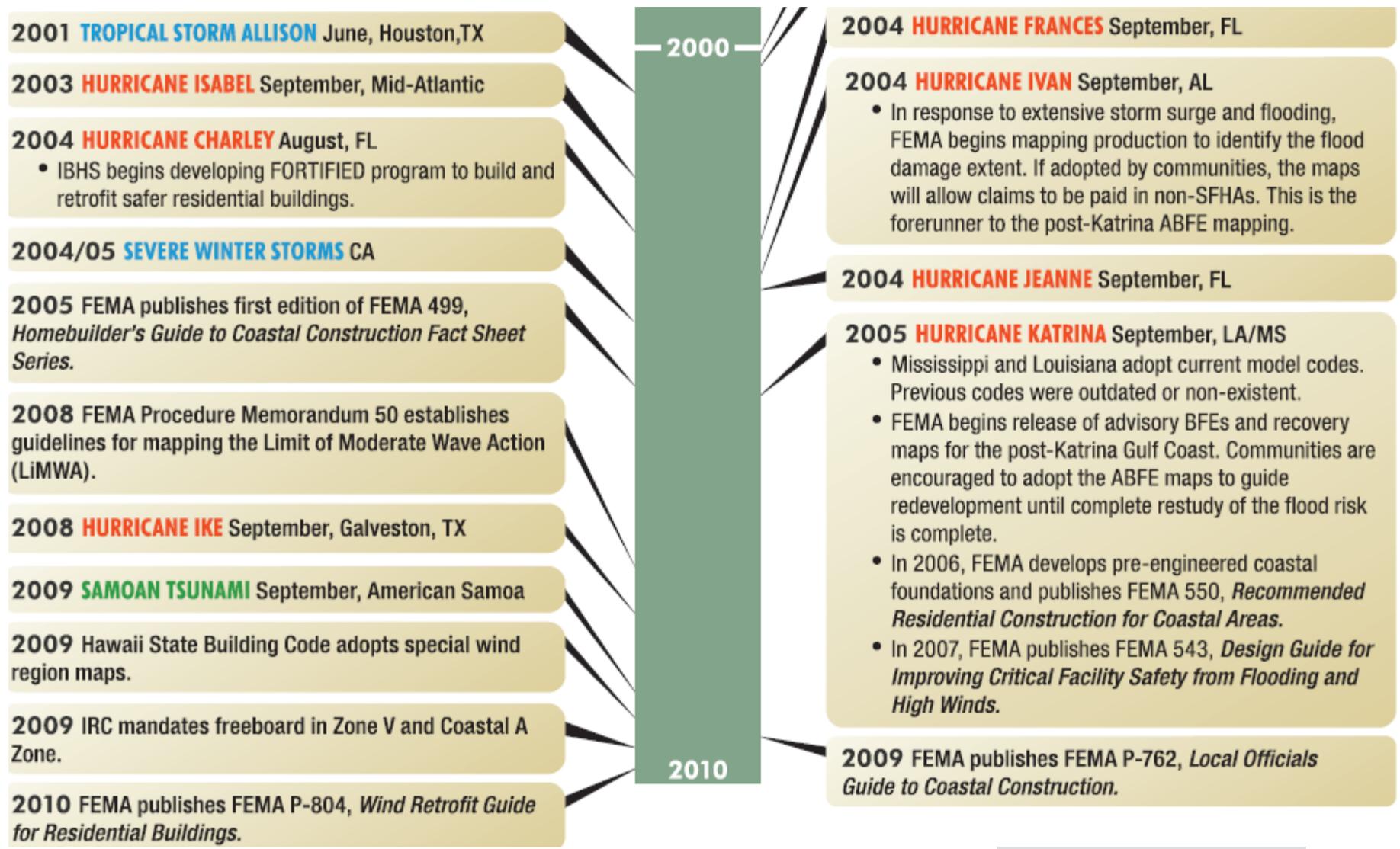


Chapter 2: Coastal Storm Events





Chapter 2: Lessons Learned



(Figure 2-1, FEMA P-55)

Chapter 2: Breaking the Disaster-Rebuild Cycle

- Lessons learned from past events should be incorporated to avoid repeating past mistakes

Hurricane Ivan,
2004
Pensacola, FL

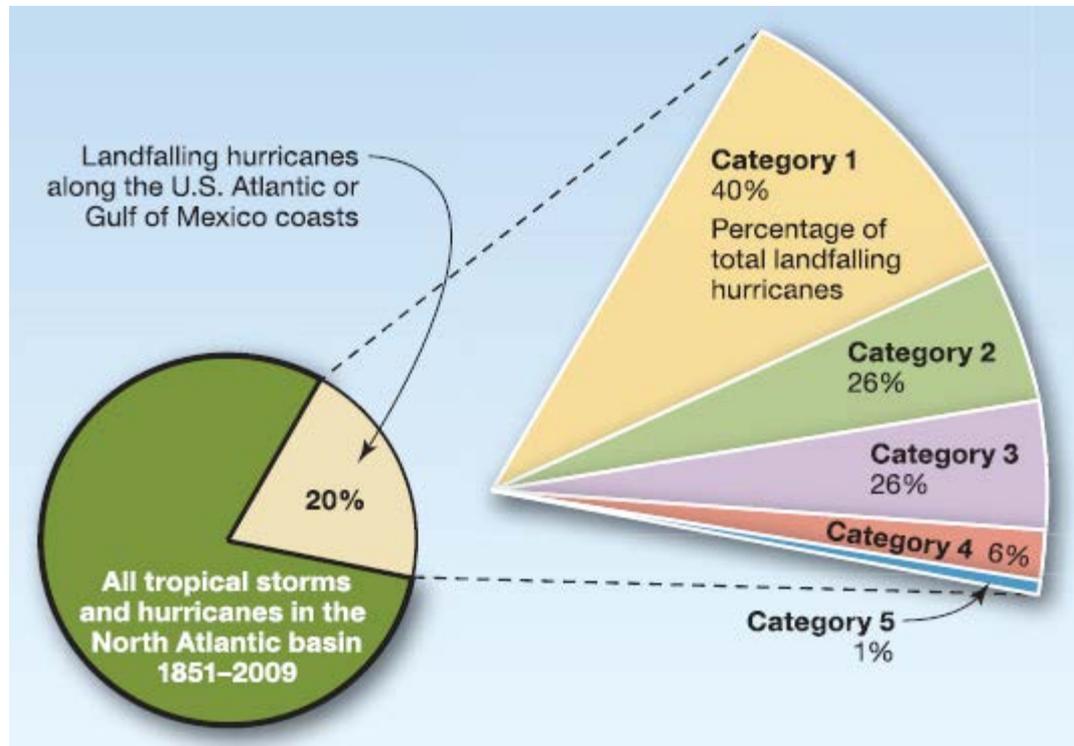
(Figure 2-15, FEMA
P-55)



A FIRM (Flood Insurance Rate Map) generally shows a community's base flood elevations, flood zones, and floodplain boundaries. They are continually updated as new data is available.

Chapter 3: *Identifying Hazards* addresses...

- Coastline characteristics
- Coastal storm events
- Coastal hazards
- Coastal flood effects
- Erosion
- National Flood Insurance Program (NFIP) Flood Hazard Zones
- Flood hazard assessments for design purposes
- Milestones of FEMA Coastal Flood Hazard Mapping Procedures and FIRMS



(Figure 3-5, FEMA P-55)

Chapter 3: Common Oversights when Identifying Hazards

- Failure to identify all potential flood hazards (high water, wave action, high-velocity flow, erosion, scour, debris impact)
- Failure to check if FIRM accurately reflects current flood hazards
- Failure to account for future conditions:
 - Effects of multiple storms
 - Long-term erosion
 - Tidal inlet movement
 - Sea level rise

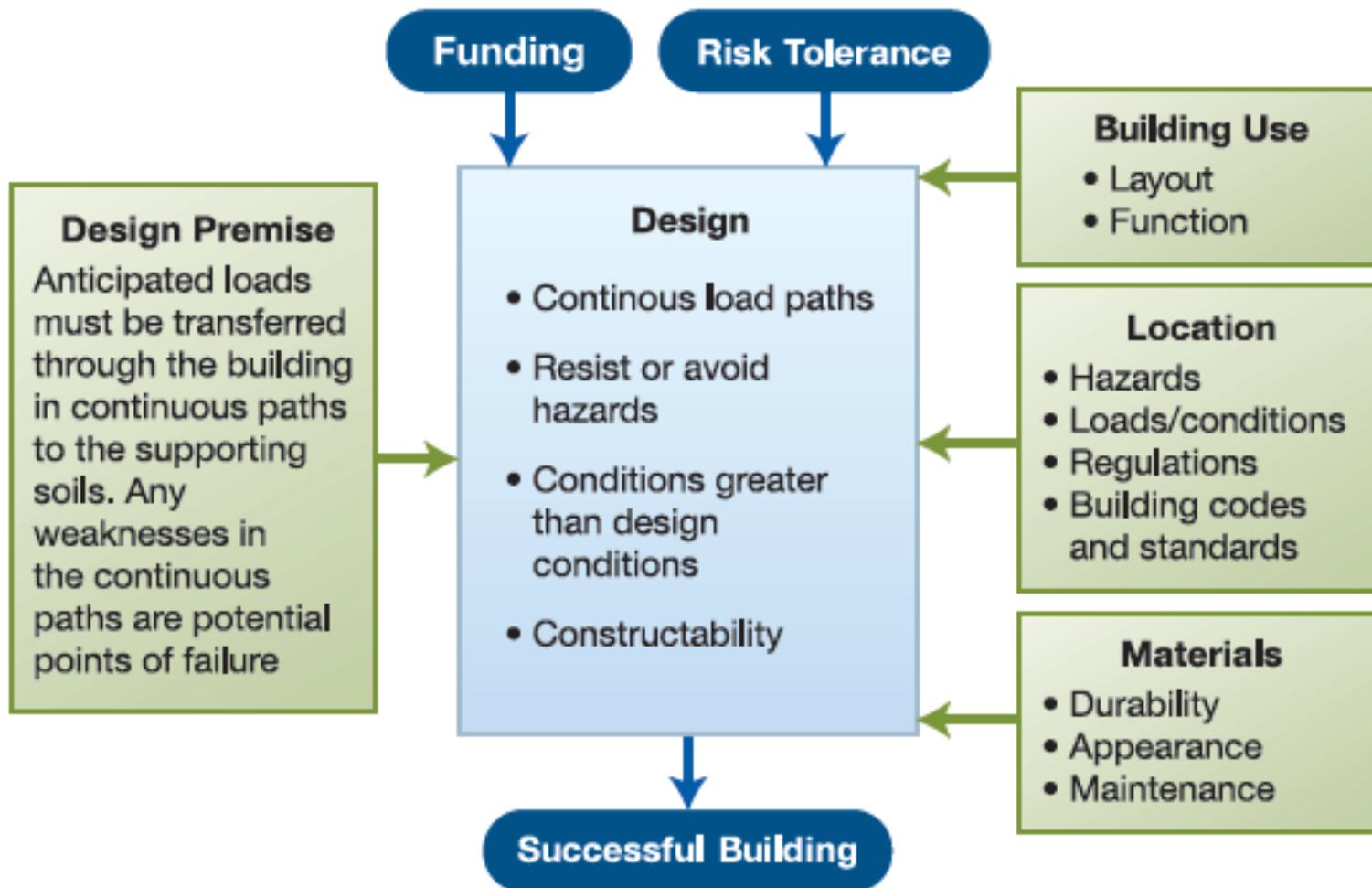


Hurricane Floyd,
1999
Oak Island, NC

(Figure 3-33, FEMA
P-55)

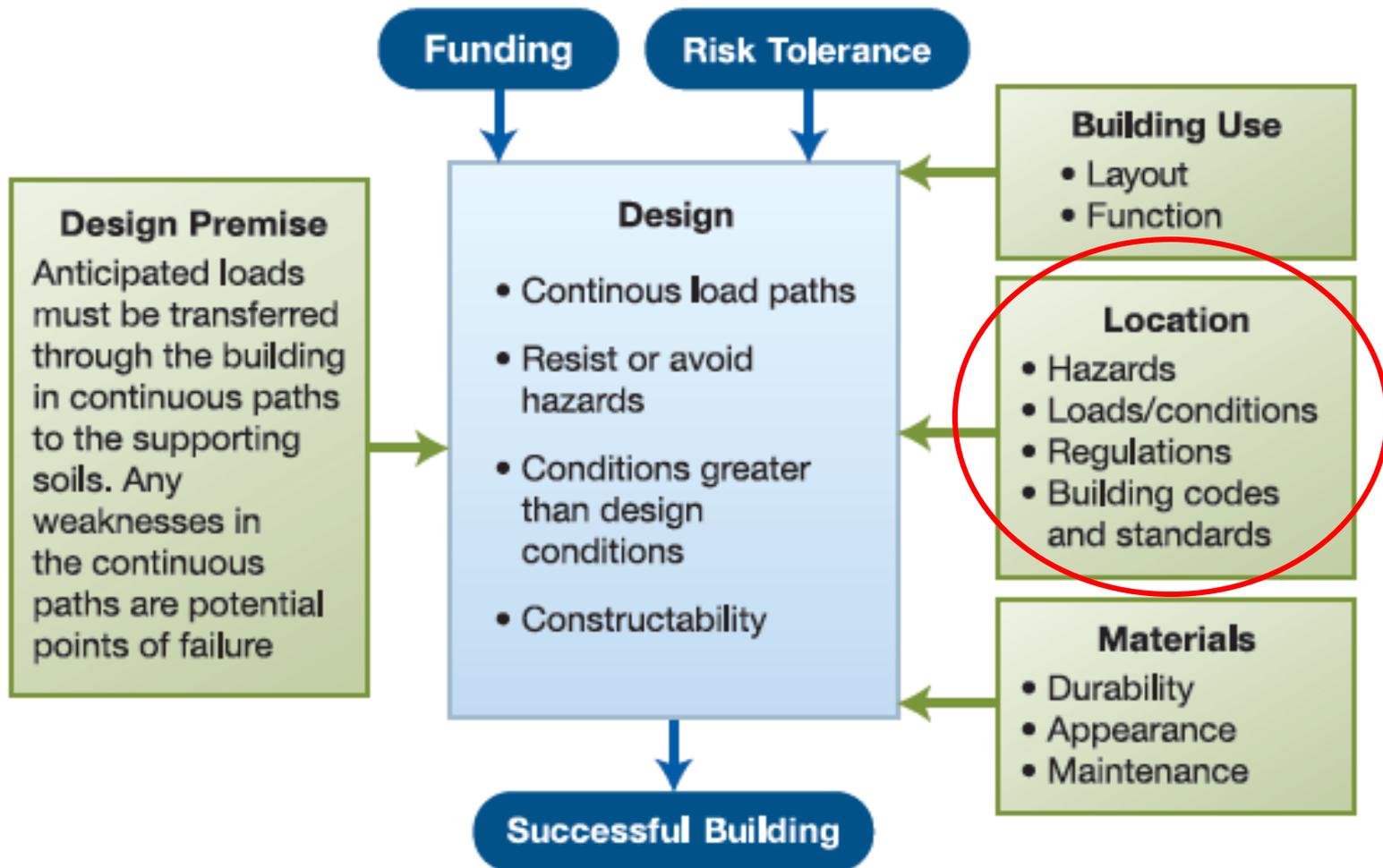


Chapter 3: Design Framework

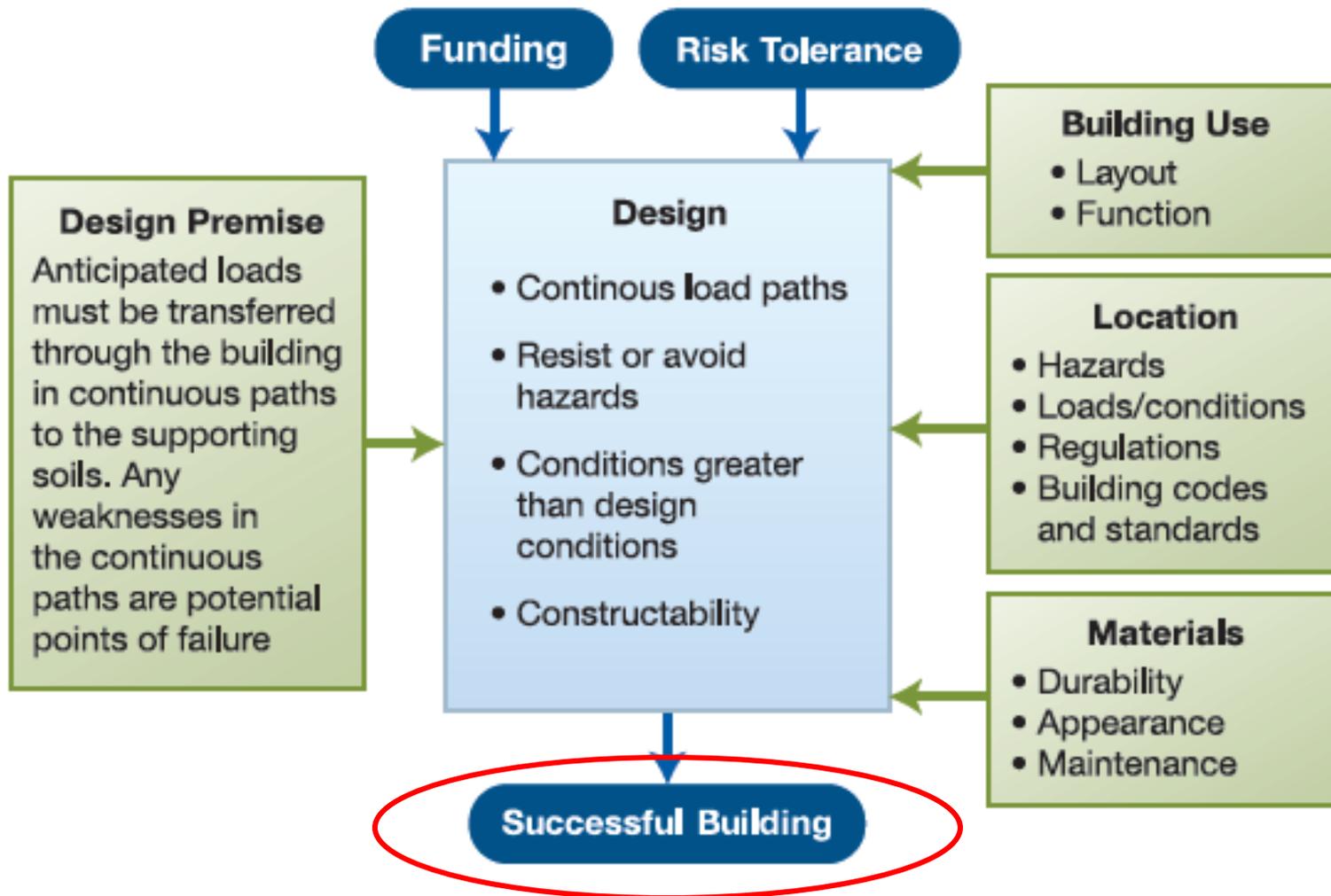


CCM p. 1-4 and 7-3

Chapter 3: Identifying Hazards is Important



Chapter 3: Identifying Hazards is Important



Chapter 4: *Siting* addresses...

- Identifying suitable property for coastal residential structures
- Compiling information on coastal property
- Evaluating hazards and potential vulnerability
- General siting considerations
- Raw land development guidelines
- Development guidelines for existing lots
- Influence of beach nourishment and dune restoration on siting decisions



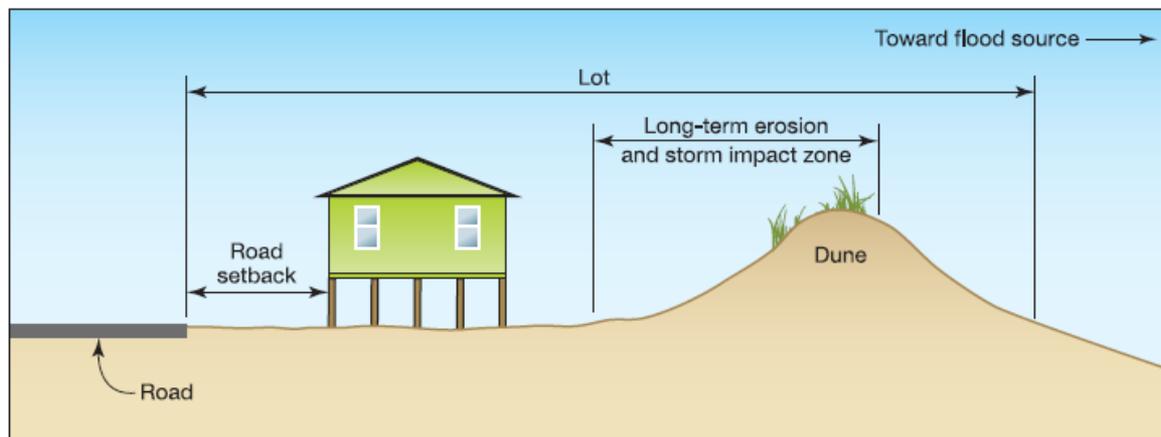
**Hurricane Dennis,
1999**

Kitty Hawk, NC

(Figure 4-3, FEMA
P-55)

Chapter 4: Common Oversights when Siting

- Locating buildings too close to:
 - Shoreline
 - Other buildings
 - Protective structures
- Locating buildings and infrastructure on erodible dunes and bluffs
- Locating buildings and infrastructure near tidal inlets
- Not including **setback** from identified high hazard areas

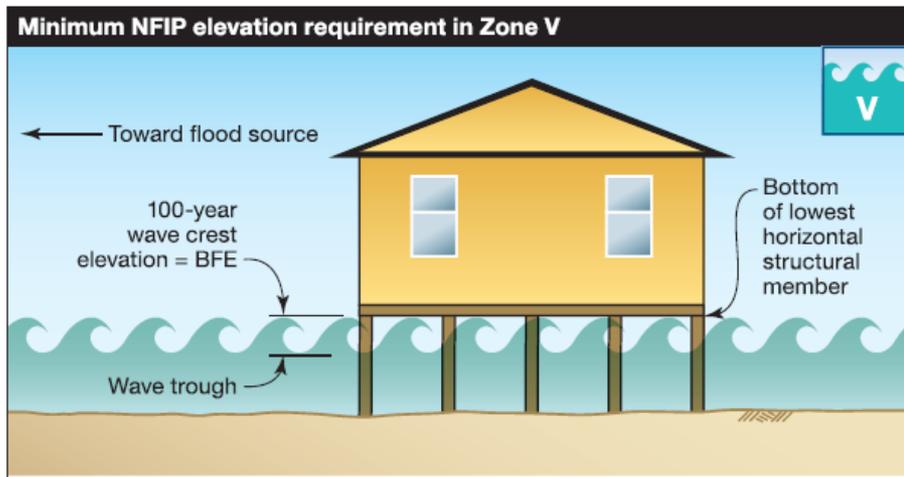


CCM p. 4-4

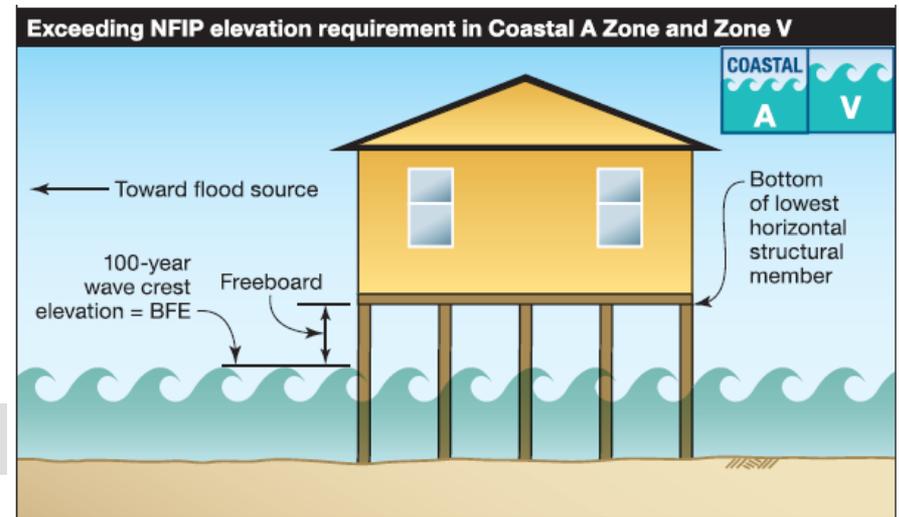
(Figure 4-12, FEMA P-55)

Chapter 5: Investigating Regulatory Requirements addresses...

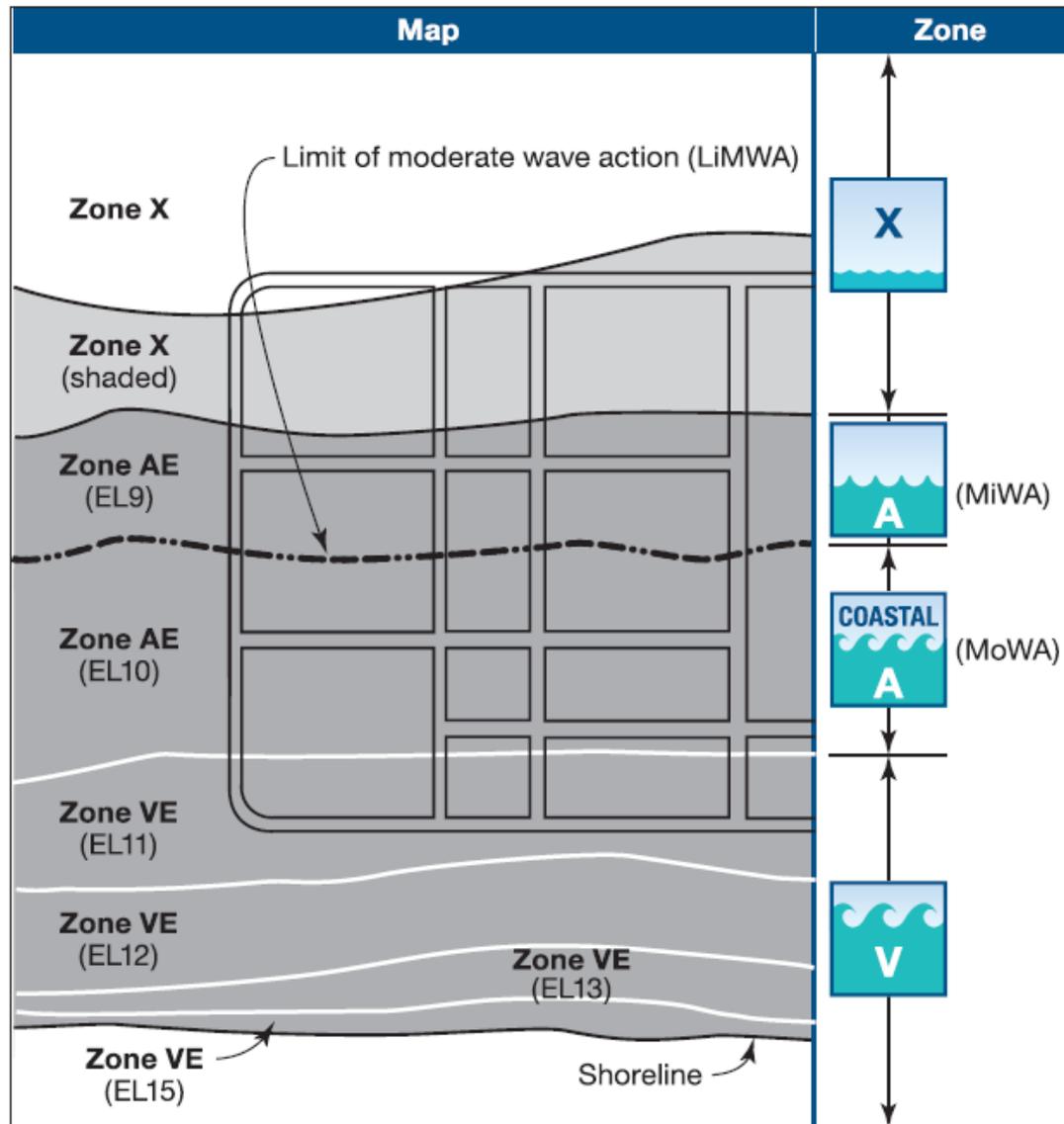
- Land use regulations
- National Flood Insurance Program
- Building codes and standards
- Best practices for exceeding minimum NFIP regulatory requirements



(Figure 5-2, FEMA P-55)



Chapter 5: Flood Hazard Zones



(Figure 3-52, FEMA P-55)

Chapter 5: Coastal vs. Riverine Flood Events

Riverine Flooding (Zone A):
inundation, velocity, debris,
duration



FEMA file photo

Coastal Flooding (Zone V, Coastal A Zone):
waves, velocity, erosion,
debris, scour, inundation,
high wind



Hurricane Frederic,
1979
NOAA

Chapter 5: Common Oversights with Regulatory Requirements

- Treating all Zone A's the same
 - Failure to account for the Coastal A Zone loads and conditions
- Believing long-term erosion setbacks render a building “safe” from future erosion
- Believing minimum standards (FIRM, NFIP, building code) automatically result in successful buildings



**Hurricane Opal,
1995**

(Figure 4-8, FEMA
P-55)

Chapter 5: Best Practices for Exceeding Minimum NFIP Regulatory Requirements



- Table 5-2. Summary of NFIP Regulatory Requirements and Recommendations for Exceeding the Requirements
 - Good tool for floodplain managers, designers, and local authorities having jurisdiction

	 Zone V		 Coastal A Zone		 Zone A	
	Recommendations and Requirements ^(a)	Cross Reference ^(b)	Recommendations and Requirements	Cross Reference	Recommendations and Requirements	Cross Reference
GENERAL REQUIREMENTS						
Siting	<p>Recommendation: Define and evaluate vulnerability to all coastal hazards, including short- and long-term erosion, and site building as far landward as possible.</p> <p>Requirement: New construction is landward of the reach of mean high tide. Manmade alterations of sand dunes and mangrove stands that increase potential flood damage are prohibited.</p>	<p>NFIP: 60.3(e)(3), 60.3(e)(7)</p> <p>IRC: R322.3.1</p> <p>IBC: App. G401.2, App. G103.7</p> <p>ASCE 24: 4.3</p> <p>FEMA P-55: 2.3.2, Ch. 4, 7.5.1</p> <p>FEMA P-499: 2.1, 2.2</p>	<p>Recommendation: Follow Zone V recommendations and requirements.</p> <p>Requirement: Buildings governed by IRC – meet Zone A requirements (unless authority having jurisdiction has adopted ASCE 24 for buildings governed by IRC). Buildings governed by IBC – follow Zone V requirements.</p>	<p>IBC: 1804.4</p> <p>ASCE 24: 4.3</p> <p>FEMA P-55: 2.3.2, Ch. 4</p> <p>FEMA P-499: 2.1, 2.2</p>	<p>Recommendation: Site building outside of SFHA or on highest and most stable part of lot.</p> <p>Requirement: For floodways, fill is permitted only if it has been demonstrated that the fill will not result in any increase in flood levels during the base flood.</p>	<p>NFIP: 60.3(d)(3)</p> <p>IRC: R301.2.4, R322.1, R322.1.4.2</p> <p>IBC: 1612.3.4, 1804.4, App. G 103.5, App. G 401.1</p> <p>ASCE 24: 2.2</p> <p>FEMA P-55: 2.3.2, Ch. 4</p>

Chapter 6: *Fundamentals of Risk Analysis and Risk Reduction* addresses...

- Assessing risk
- Reducing risk
- Communicating risk to clients



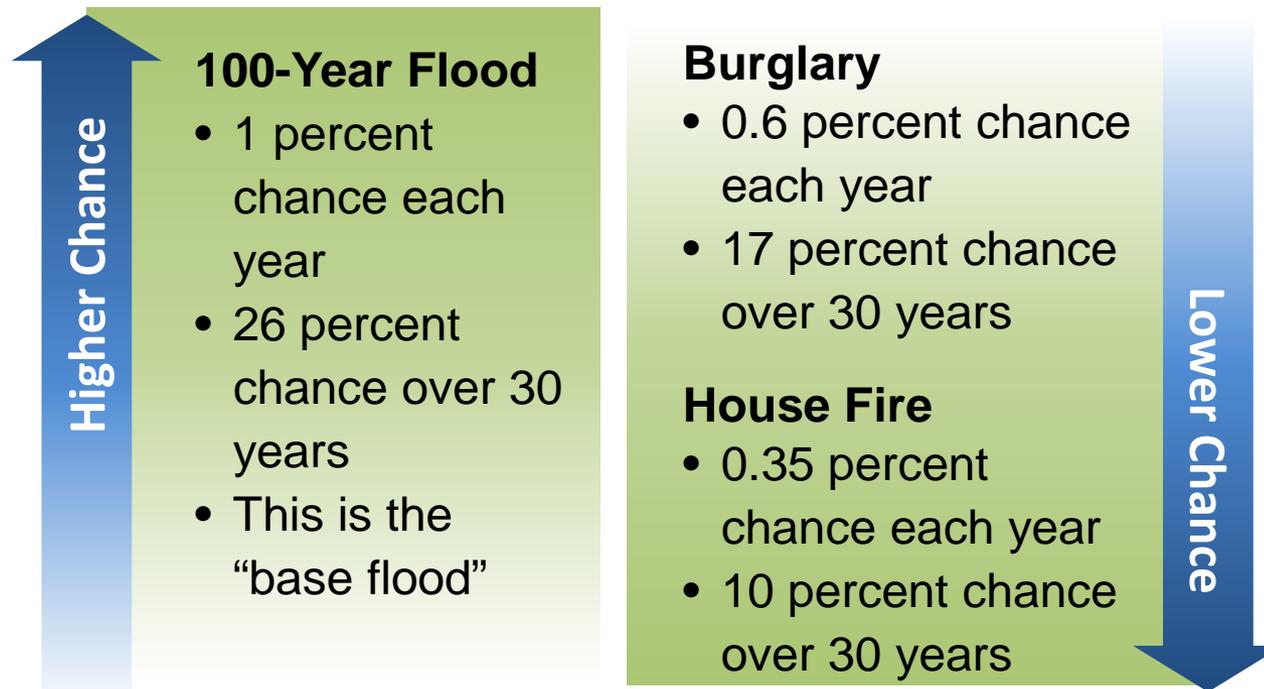
Chapter 6: Common Oversights with Risk Analysis

- Misunderstanding the “100-year flood” (1% annual chance flood) concept
- Failure to understand how risks accumulate over time
 - Cumulative probabilities
- Not understanding ways to manage or reduce risk



FEMA file photo

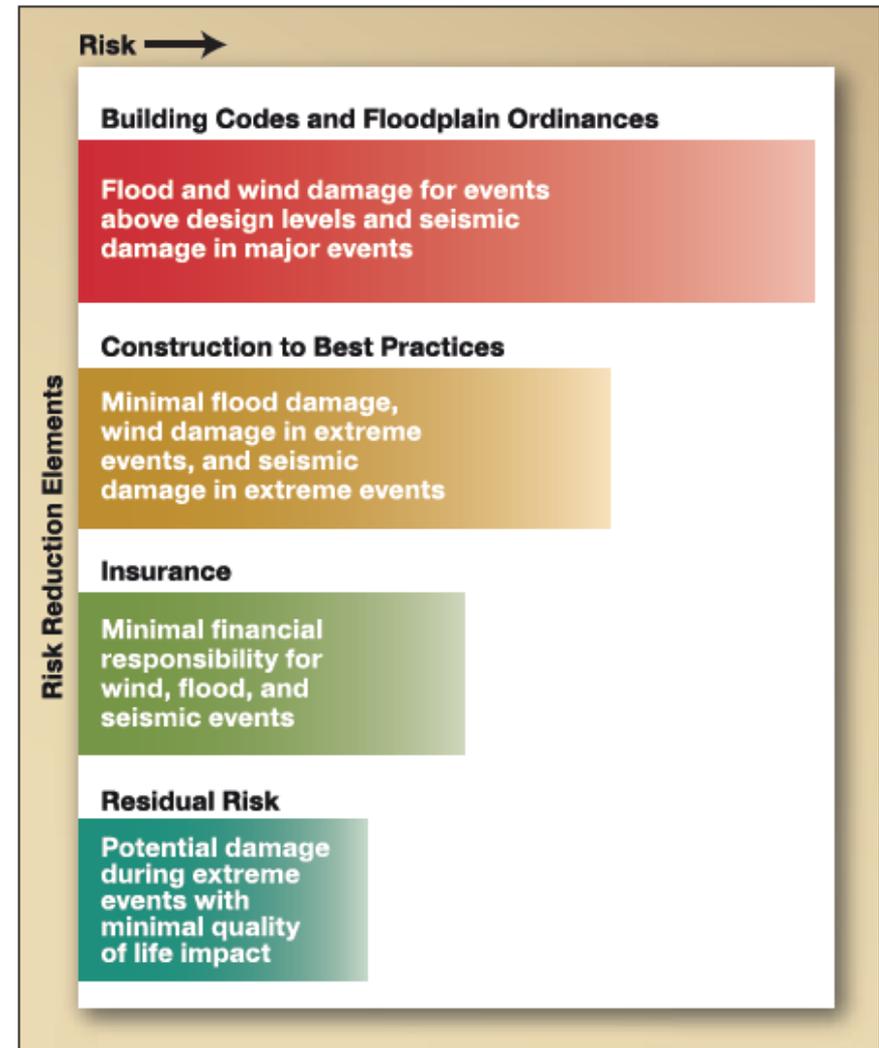
Chapter 6: Misunderstanding the “100-Year Flood” and Accumulative Risk Over Time



- Homeowners protect against burglary even though a flood is more likely if they live in a SFHA
- Fire is even less likely (10 percent chance over 30 years), yet homeowners protect against fire too

Chapter 6: Understand how to Manage Risk

- Risk reduction is a combination of:
 - Physical measures, such as design and construction using building codes and best practices
- Residual risk still remains, but is significantly less than initial risk
- Insurance can help manage risk
 - Can help recover damaged personal property



(Figure 6-1, FEMA P-55)

Chapter 7: *Pre-Design Considerations* addresses...

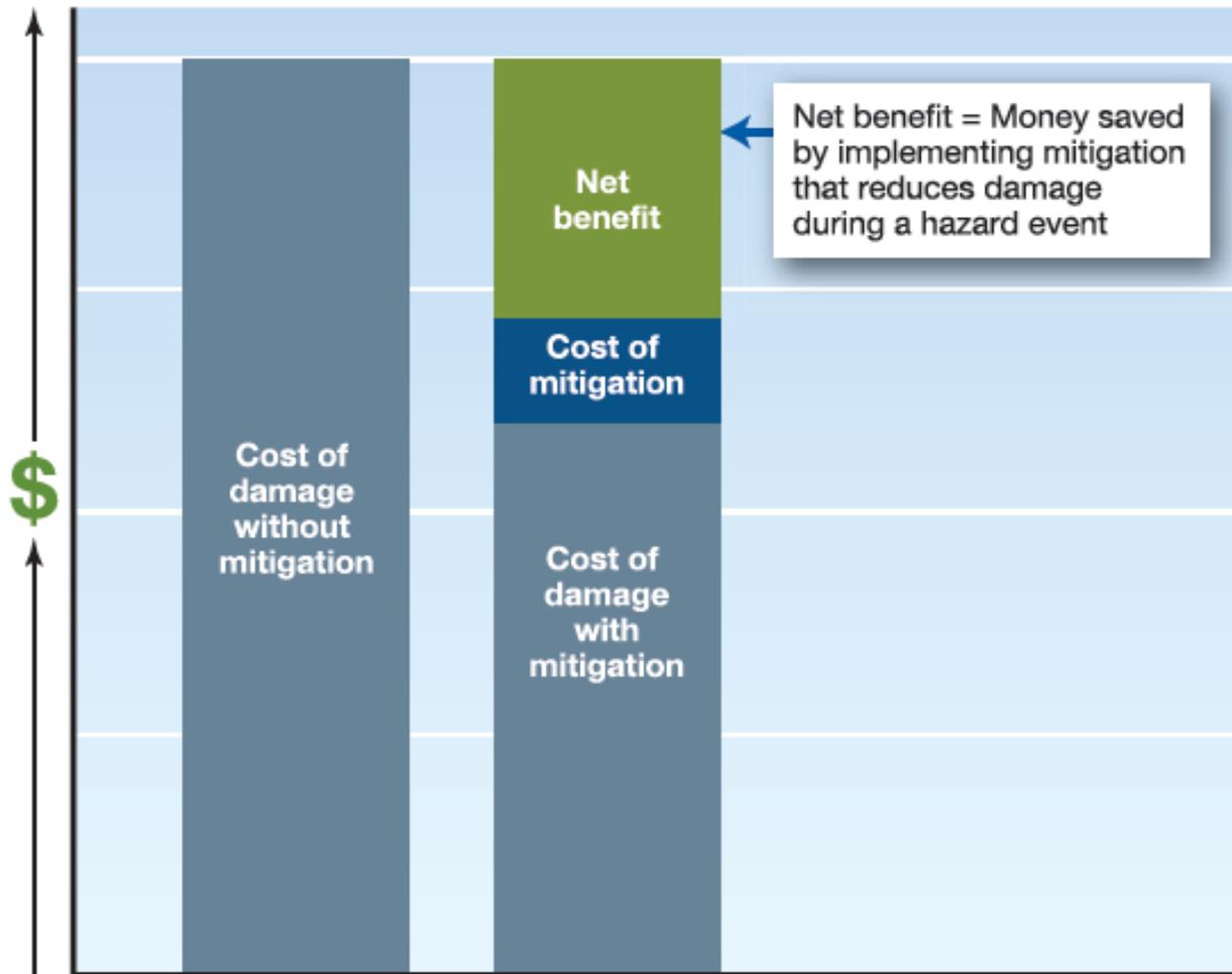


- The design process
- Design requirements
- Determining the natural hazard risk
- Losses due to natural hazards in coastal areas
- Initial, long-term, and operational costs
- Hazard insurance
- Sustainable design considerations
- Inspection considerations



(Textbox p. 7-10, FEMA P-55)

Chapter 7: Benefit-Cost



(Figure 7-3, FEMA P-55)

Chapter 7: Benefit-Cost

- Higher building elevation results in larger savings in insurance premiums

Floor Elevation above BFE	Reduction in Annual Flood Premium	Annual Premium	Savings
0	0%	\$ 1,622	\$ 0
1 foot	45%	\$ 897	\$ 725
2 feet	61%	\$ 638	\$ 984
3 feet	66%	\$ 548	\$ 1,074
4 feet	67%	\$ 530	\$ 1,092

Sample NFIP Flood Insurance Premiums for Buildings in Zone A; \$250,000 Building/\$100,000 Contents Coverage

(Table 7-2, FEMA P-55)

Floor Elevation above BFE	Reduction in Annual Flood Premium	Annual Premium	Savings
0	0%	\$ 7,821	\$ 0
1 foot	33%	\$ 5,256	\$ 2,565
2 feet	55%	\$ 3,511	\$ 4,310
3 feet	65%	\$ 2,764	\$ 5,057
4 feet	71%	\$ 2,286	\$ 5,535

Sample NFIP Flood Insurance Premiums for Buildings in Zone V Free of Obstruction Below the Lowest Floor;

\$250,000 Building/\$100,000 Contents Coverage

(Table 7-3, FEMA P-55)

Chapter 8: *Determining Site-Specific Loads* addresses...

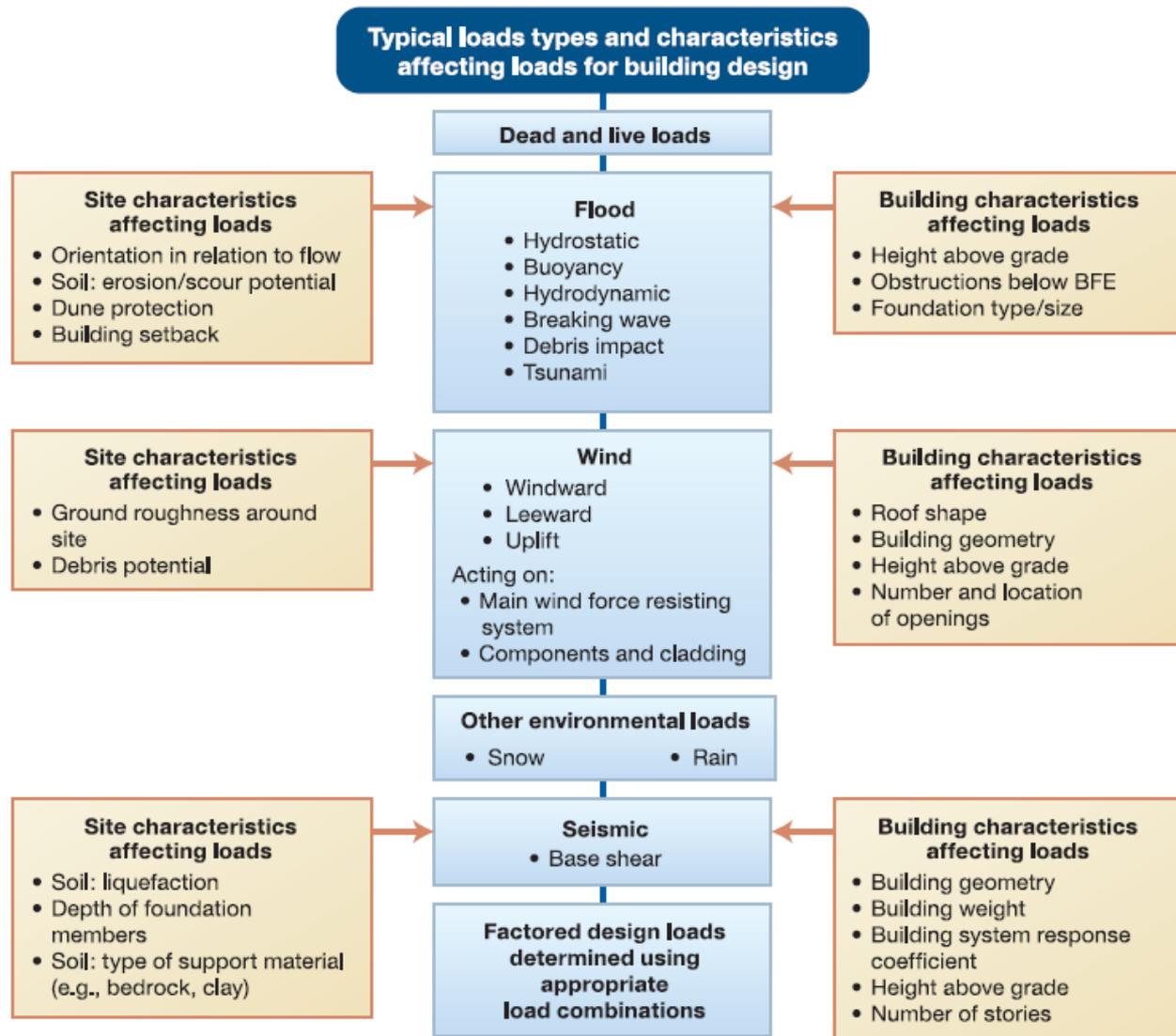
- Dead loads
- Live loads
- Tributary area
- Application of loads to buildings
- Flood loads
- Wind loads
- Seismic load
- Load combinations



**Hurricane Ike, 2008
Bolivar Peninsula,
TX**

(Figure 8-15, FEMA
P-55)

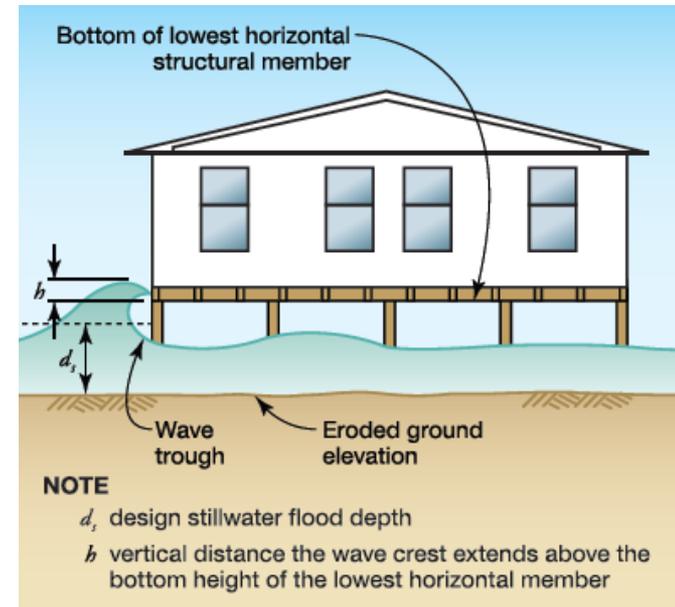
Chapter 8: Site-Specific Loads



(Figure 8-1, FEMA P-55)

Chapter 8: Flood Loads

- CCM covers:
 - Design flood elevation
 - Design stillwater flood depth
 - Designing breaking wave height
 - Design flood velocity
 - Hydrostatic loads
 - Wave loads
 - Breaking wave loads
 - Wave slam
 - Hydrodynamic loads
 - Debris impact loads
 - Localized scour
 - Flood load combinations



(Figure 8-12, FEMA P-55)



EQUATION 8.7. LATERAL WAVE SLAM

$$F_s = f_s w = \frac{1}{2} \gamma_w C_s d_s h w$$

where:

F_s = lateral wave slam (lb)

f_s = lateral wave slam (lb/ft)

C_s = slam coefficient incorporating effects of slam duration and structure stiffness for typical residential structure (recommended value is 2.0)

γ_w = unit weight of water (62.4 lb/ft³ for fresh water and 64.0 lb/ft³ for saltwater)

d_s = stillwater flood depth (ft)

h = vertical distance (ft) the wave crest extends above the bottom of the floor joist or floor beam

w = length (ft) of the floor joist or floor beam struck by wave crest

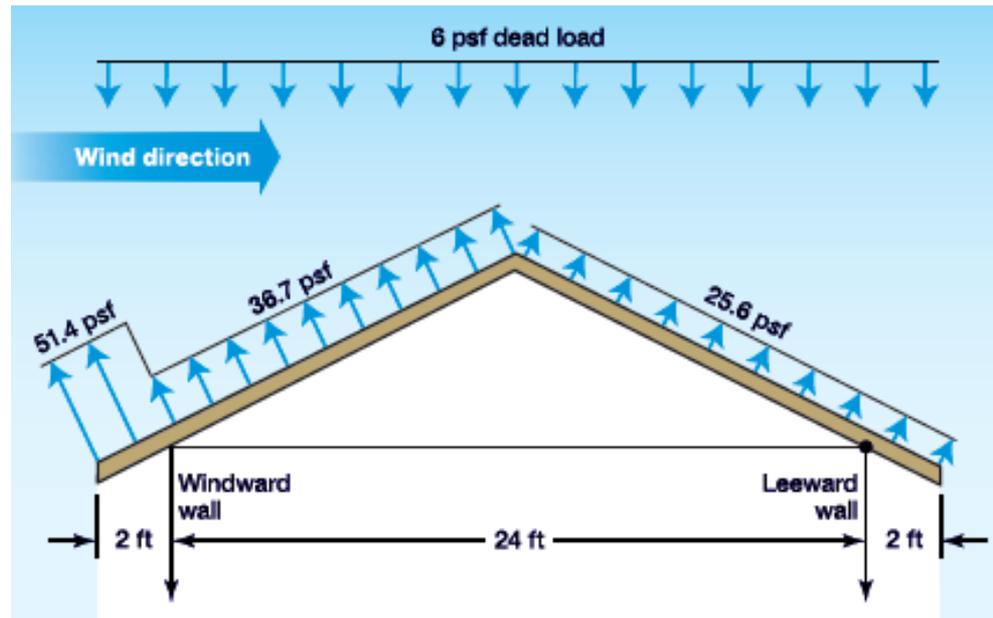


(Eq. 8.7)

CCM p. 8-5

Chapter 8: Wind Loads

- CCM covers:
 - Determining wind loads using ASCE 7-10
 - Main Wind Force Resisting System
 - Components and Cladding
 - Tornado loads

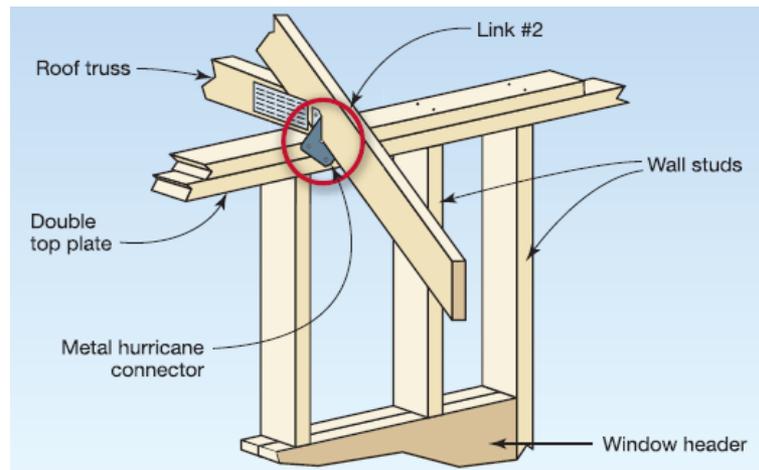


CCM p. 8-47

(Example 8.5, Illustration A,
FEMA P-55)

Chapter 9: *Designing the Building addresses...*

- Continuous load path
- Other load path considerations
 - Uplift due to shear wall overturning
 - Gable wall support
 - Connection choices
 - Building eccentricities
 - Framing system
- Breakaway wall enclosures
- Building materials
- Appurtenances



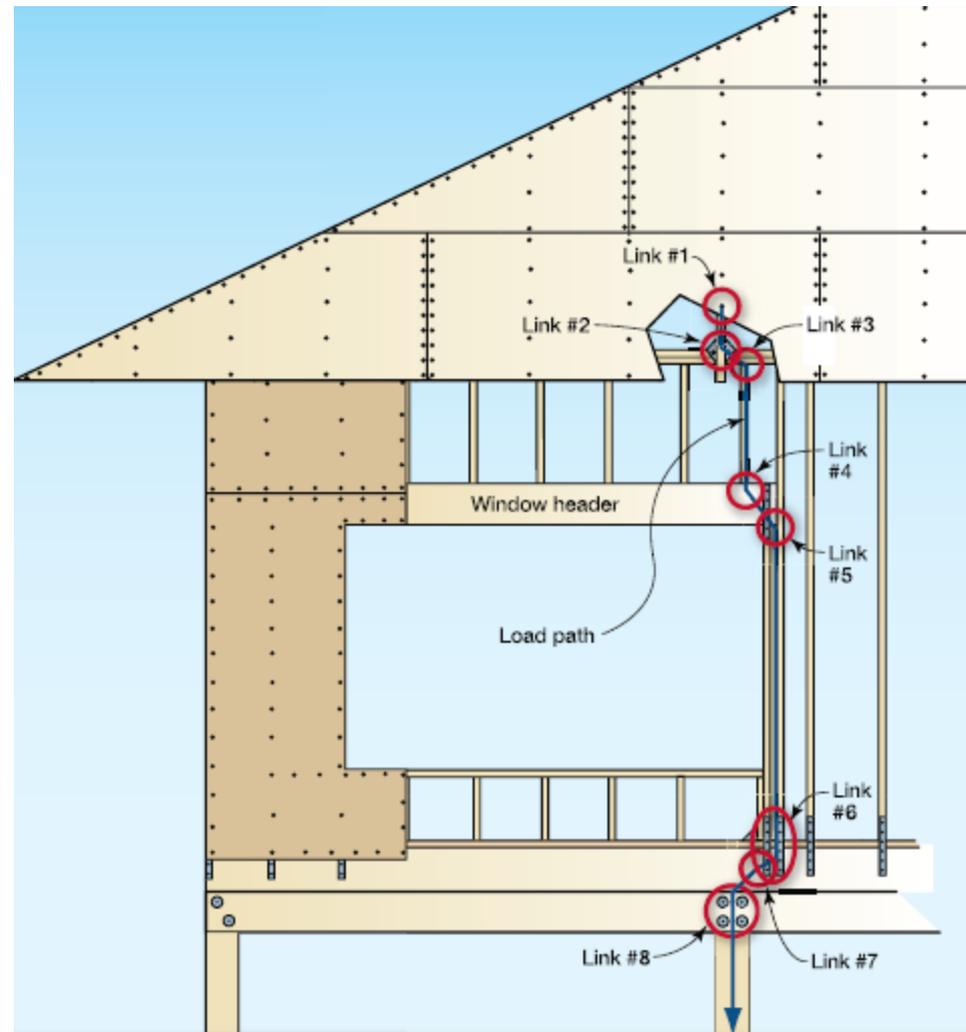
**Hurricane Hugo,
1989
South Carolina**

(Figure 9-28, FEMA P-55)

(Figure 9-2,
FEMA P-55)

Chapter 9: Importance of Continuous Load Path

- The load path must be continuous
- Each link in the load path “chain” must be strong enough to transfer loads without breaking
- Any weakness in the chain can cause damage or structural failure
- Load paths must always take the loads into the ground
- CCM walks through Links #1 through #8 on the example load path shown

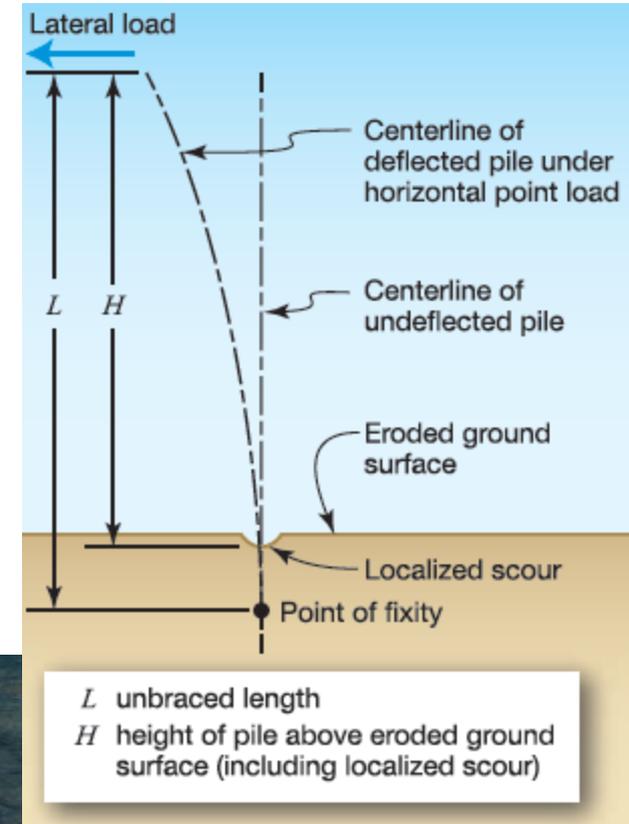


(Figure 9-6,
FEMA P-55)

Chapter 10: *Designing the Foundation* addresses...

- Foundation design criteria
- Foundation styles
 - Open
 - Closed
 - Shallow
 - Deep
- Foundation design requirements and recommendations
- Design process
- Pile foundations
- Pier foundations

(Figure 10-4, FEMA P-55)



Hurricane Katrina, 2005
Belle Fontaine Point, MS

(Figure 10-7, FEMA P-55)

Chapter 10: Foundation Styles

Shallow

Closed



Open



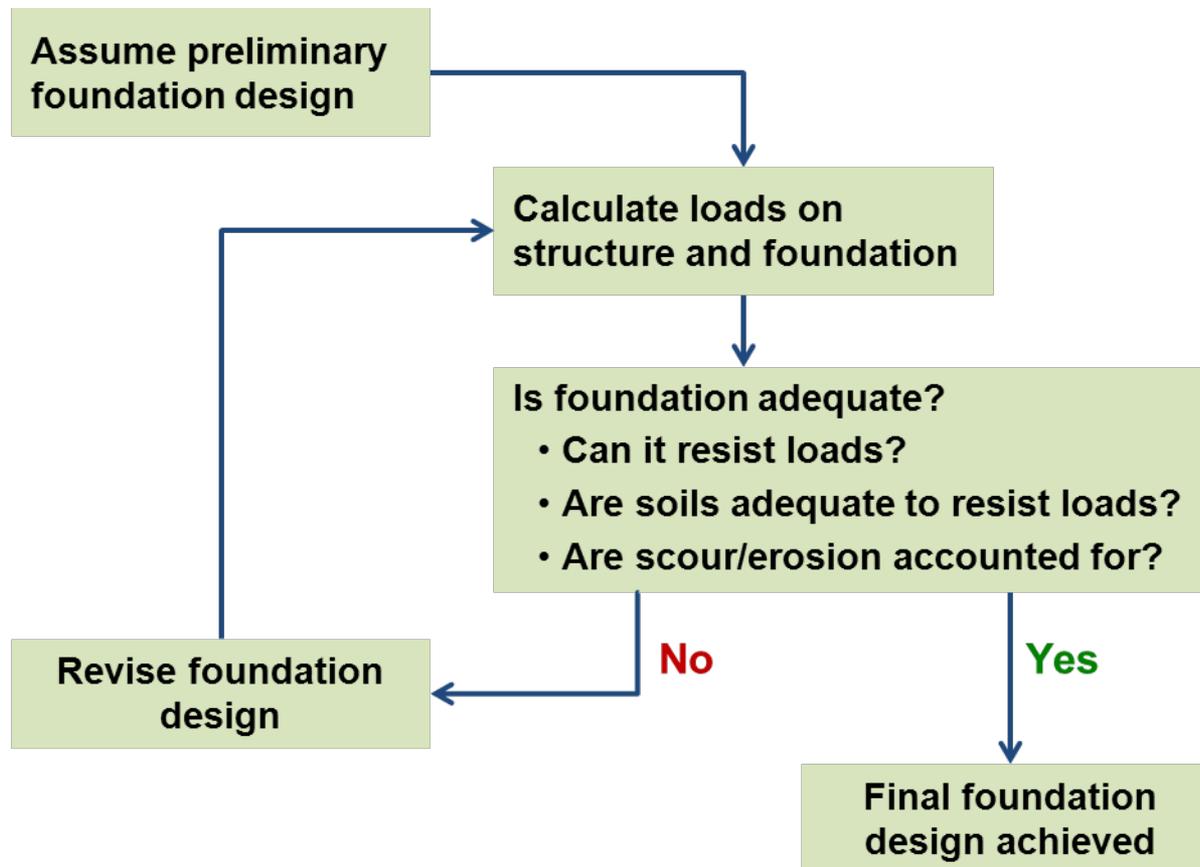
Deep



CCM p. 10-2

Chapter 10: Foundation Design Process

- CCM walks readers through the foundation design process



CCM p. 10-4

Chapter 11: *Designing the Building Envelope* addresses...

- Floors in elevated buildings
- Exterior doors
- Windows and skylights
- Non-load-bearing walls, wall coverings, and soffits
- Roof systems
- Attic vents
- Additional environmental considerations

Hurricane Katrina,
2005
Louisiana

(Figure 11-25,
FEMA P-55)



Chapter 11: Roof Systems

- CCM discusses the hazards and damage to, and best practices for mitigating:
 - *Asphalt shingles*
 - *Fiber-cement shingles*
 - *Liquid-applied membranes*
 - *Tiles*
 - *Metal panels and metal shingles*
 - *Slate*
 - *Wood shingles and shakes*
 - *Low-slope roof systems*



(Figure 8-6, FEMA P-762)

CCM p. 10-24



**Northridge Earthquake, 1994
California**
(FEMA P-55, Figure 11-51)

**Hurricane Ike, 2008
Texas**
(FEMA file photo)

Chapter 12: *Installing Mechanical Equipment and Utilities addresses...*

Guidance on installation and protection from natural disaster for:

- Elevators
- Exterior-mounted mechanical equipment
- Interior mechanical equipment
- Electric utility, telephone, and cable TV systems
- Water and wastewater systems



(Figure 12-2,
FEMA P-55)

(Figure 12-3,
FEMA P-55)



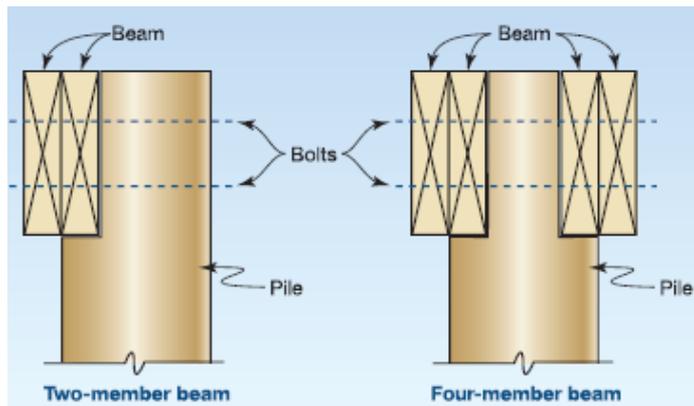
Chapter 13: Constructing the Building addresses...

Issues faced by builders when constructing:

- Foundations
- Structural framing
- Building envelope

Issues addressed include:

- Common challenges
- Substitution of materials
- Inspection points



(Figure 13-18, FEMA P-55)



(Figure 13-6, FEMA P-55)

Chapter 14: *Maintaining the Building* addresses...

- Effects of the coastal environment on the built environment
 - Corrosion
 - Moisture
 - Weathering
 - Termites
- Building elements that require frequent maintenance
- Hazard-specific maintenance techniques



(Figure 14-1,
FEMA P-55)

Chapter 15: *Retrofitting Buildings for Natural Hazards* addresses...



- Some key points and FEMA resources regarding retrofitting
- Retrofitting techniques for natural hazards
 - Flood
 - High wind
 - Seismic
 - Wildfire
- Multi-hazard retrofitting



(Figure 15-3,
FEMA P-55)



(Figure 15-17,
FEMA P-55)

Chapter 15: What is Retrofitting?

Retrofitting

- Combination of adjustments or additions to existing building features
- Intended to eliminate or reduce the potential for damage from natural hazards

Retrofitting is a specific type of hazard mitigation activity

Chapter 15: FEMA Retrofitting Resources



Engineering Principles and Practices

for Retrofitting Flood-Prone Residential Structures
(Third Edition)

FEMA P-259 / January 2012



Wind Retrofit Guide for Residential Buildings

FEMA P-804 / December 2010



Home Builder's Guide to Construction in Wildfire Zones

Technical Fact Sheet Series

FEMA P-737 / September 2008



Federal Emergency Management Agency
U.S. Department of Homeland Security
560 C Street, Southwest
Washington, DC 20472



Earthquake Safety Guide for Homeowners

FEMA 530 / September 2005



Homebuilders' Guide to Earthquake Resistant Design and Construction

FEMA 232 - June 2006



Chapter 15: Multihazard Retrofitting

Architects, engineers, and code officials must recognize...

It is important to approach retrofitting with a multi-hazard perspective!

- Retrofitting for one hazard may affect how a structure reacts to other types of hazards
- Retrofitting to withstand only one hazard may impair the structure's resistance to other hazard types
 - Example: Elevating high on piles to mitigate flood hazard makes the building less resistant to seismic forces (if not properly addressed in the design)

Course Overview

- Describe CCM history
- Describe updates made from the 3rd to 4th editions of CCM
- Define the scope and use of the 4th edition of CCM
- Overview the content of each chapter of the 4th edition of CCM
- **Describe other coastal construction resources**
- Summary

Other Resources

- There are numerous resources besides CCM that coastal designers should use...
 - FEMA NFIP Technical Bulletins (TB)
 - FEMA P-499
 - FEMA P-550
 - FEMA Mitigation Assessment Team Reports
 - FEMA P-787
 - Other design and construction standards





FEMA NFIP Technical Bulletins

- A series of 12 technical bulletins that provide guidance concerning the how to comply with the building performance standards of the NFIP
- Some of the more recently updated include:
 - TB 1, *Openings in Foundation Walls and Walls of Enclosures*
 - TB 2, *Flood Damage-Resistant Materials Requirements*
 - TB 4, *Elevator Installation*
 - TB 5, *Free-of-Obstruction Requirements*
 - TB 9, *Design and Construction Guidance for Breakaway Walls*



Free-of-Obstruction Requirements

for Buildings Located in Coastal High Hazard Areas in accordance with the National Flood Insurance Program

Technical Bulletin 5 / August 2008



Elevator Installation

for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program

Technical Bulletin 4 / November 2010



Design and Construction Guidance for Breakaway Walls

Below Elevated Buildings Located in Coastal High Hazard Areas in accordance with the National Flood Insurance Program

Technical Bulletin 9 / August 2008





FEMA P-499, *Home Builder's Guide to Coastal Construction*



- A series of 37 technical fact sheets
- Provides technical guidance and recommendations concerning the construction of coastal residential buildings
- Information is aimed at improving the performance of buildings subject to coastal flood and wind forces
- Updated in 2010



Home Builder's Guide to Coastal Construction

Technical Fact Sheet Series

FEMA P-499 / December 2010



FEMA

FEMA P-550, *Recommended Residential Construction for Coastal Areas*



- A design manual that provides recommended designs and guidance for rebuilding homes destroyed by hurricanes in the Gulf Coast
- Prescriptive foundation designs are included
- Updated in 2009 to keep pace with developing codes and standards



Recommended Residential Construction for Coastal Areas

Building on Strong and Safe Foundations

FEMA P-550, Second Edition / December 2009

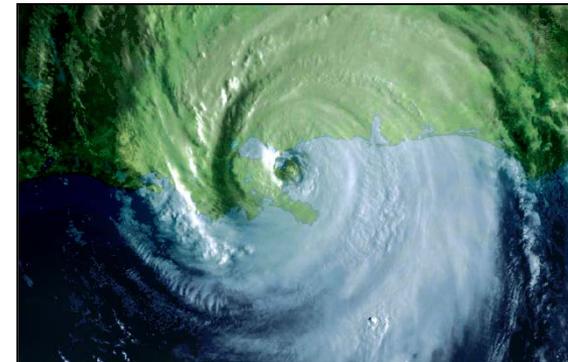




FEMA Mitigation Assessment Team (MAT) Reports



- Following a natural or manmade disaster, FEMA may deploy a MAT to assess key damage and document and building and infrastructure performance
 - Helps identify strategic national and local opportunities
- MAT reports are then written detailing the observations, conclusions, and recommendations for improving building and infrastructure performance in the face of a manmade or natural disaster
- There are currently 16 publically available MAT Reports



Hurricane Katrina in the Gulf Coast

Mitigation Assessment Team Report
Building Performance Observations
and Technical Guidance
FEMA 549 / July 2006



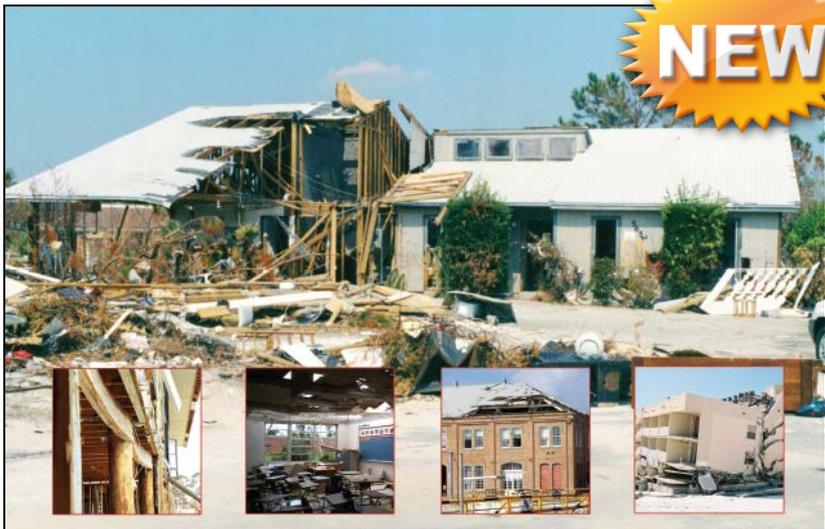
Hurricane Charley in Florida

Mitigation Assessment Team Report
Observations, Recommendations,
and Technical Guidance
FEMA 488 / April 2005



FEMA P-787, *Catalog of FEMA Wind, Flood, and Wildfire Publications, Training Courses, and Workshops*

- A catalog with brief descriptions of publications, courses, and workshops developed by the Building Science Branch of FEMA
 - Wind
 - Flood
 - Wildfire
- Updated in 2012



NEW

Catalog of FEMA Wind, Flood, and Wildfire Publications, Training Courses, and Workshops

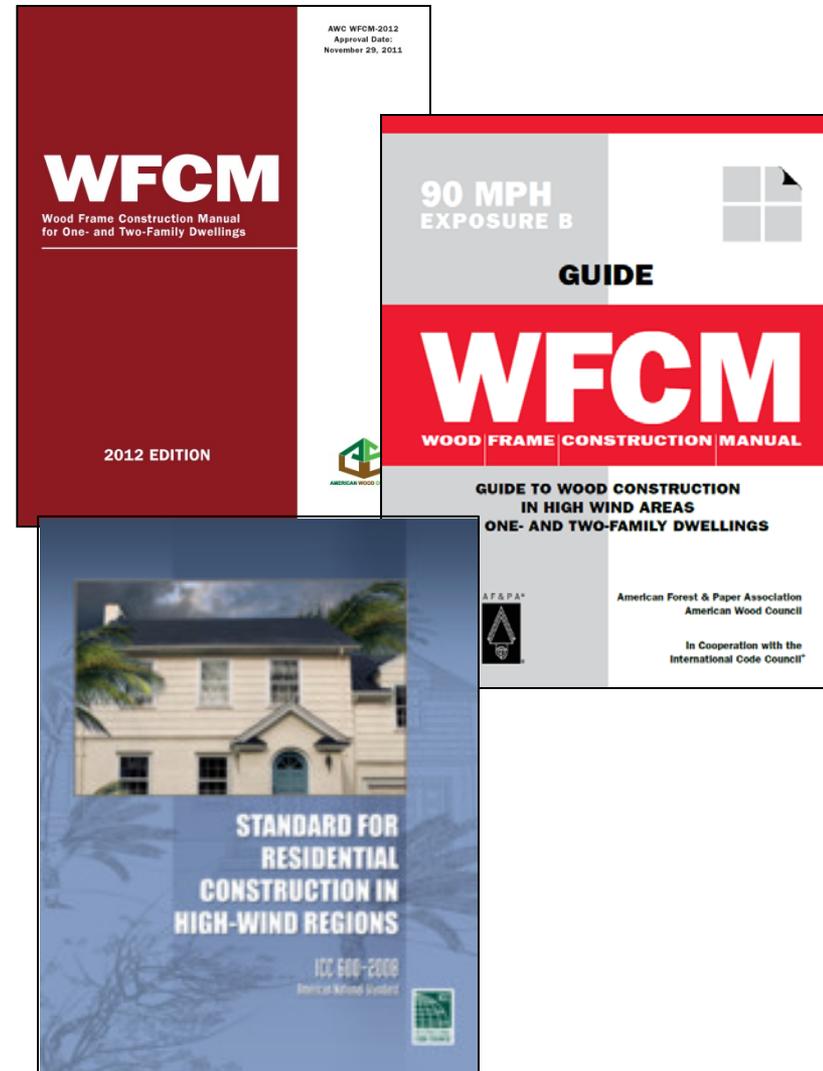
FEMA P-787 / Third Edition / January 2012

 **FEMA** Federal Insurance and Mitigation Administration

Other Design and Construction Standards



- *Wood Frame Construction Manual for One- and Two-Family Dwellings* (AF&PA, 2012)
- *Wood Frame Construction Manual: Guide to Wood Construction in High Wind Areas for One- and Two-Family Dwellings* (AF&PA, 2012)
- *Standard for Residential Construction in High-Wind Regions* (ICC, 2008)



Course Overview

- Describe CCM history
- Describe updates made from the 3rd to 4th editions of CCM
- Define the scope and use of the 4th edition of CCM
- Overview the content of each chapter of the 4th edition of CCM
- Describe other coastal construction resources
- **Summary**

Summary

- You should now be able to:
 - Describe CCM history
 - Describe updates made from the 3rd to 4th editions of CCM
 - Define the scope and use of the 4th edition of CCM
 - Have a general understanding of the content of each chapter of the 4th edition of CCM
 - Describe other coastal construction resources

Sign Up Today for the 2-Day or 4-Day Residential Coastal Construction Courses!

- Visit the Emergency Management Institute's (EMI) website at <http://training.fema.gov/> to sign up today!
- Also, visit the EMI website for a list of upcoming courses and course descriptions



For More Information

Visit FEMA's Building Science webpage at <http://www.fema.gov/building-science>

Questions?

Visit the Frequently Asked Questions webpage at <http://www.fema.gov/frequently-asked-questions>

If you need additional information contact the Building Science Helpline at (866) 927-2104 or email FEMA-Buildingsciencehelp@fema.dhs.gov. Please allow up to 5 business days for a response.



FEMA