The session will focus on programs and projects that demonstrate how to achieve resilience from hurricanes, storm surge, flooding, etc. in a coastal environment.

Topics Covered
- Building Science Branch (BSB)
- Mitigation Assessment Team Program (MAT)
- General trends in observations
- Resources
  - Mitigation Assessment Team Reports
  - Flood and Wind Publications
  - Codes and Training
Building Science Branch

• Technical services bureau for Mitigation and other FEMA components
• Mitigation Assessment Team (MAT) Program
• National Earthquake Hazards Reduction Program (NEHRP)
• National Windstorm Impact Reduction Program (NWIRP)
• Participate in the development and adoption of model building codes and standards
Building Science Branch Guidance Documents

- Publications, guidance, tools, technical bulletins and recovery advisories incorporating the most up-to-date **building codes and standards** for new construction or repairing existing buildings.

- State of the art guidance for **community and residential safe rooms** to help protect people in their homes, public buildings and schools in hurricane- and tornado-prone areas.
MAT Program Background

- Program managed by Building Science Branch
- Program started in 1992
- Observes building performance under severe hazard events (hurricanes, floods, tornados, snow storm, fire and earthquakes)
- Determines causes of building failures and successes
- Evaluates performance of mitigation projects
- Provides strategic recommendations for design and construction to reducing damage and protecting lives
- Supports building science / building code elements of NDRF
The MAT is collaborative (Example - Michael MAT Partners)

- All levels of government, design and construction, research, and other industry representation
Common MAT Products

- Recovery Advisories
- Building Performance Report
- Problem Focused Study
- Training and Outreach
- Technical Assistance

Best Practices for Minimizing Wind and Water Infiltration Damage

Mitigation Assessment Team Report
Hurricane Sandy in New Jersey and New York
Building Performance Observations, Recommendations, and Technical Guidance
FEMA P-942 / November 2013

https://www.fema.gov/mitigation-assessment-team-program
Example Code Proposals

- Design Flood Elevation/Freeboard (Coastal MATs since 1992)
  - Recognized in 1st consensus flood standard ASCE 24-98 and newer
  - Required in the IBC and IRC for all flood zones

- Incorporation of the Coastal A Zone concept
  - Investigations identified issues with Zone A being adjacent to Zone V and the damage that occurs in the adjacent Zone A areas
  - Integrated into ASCE 7-98, ASCE 24-05, and 2006 I-Codes and newer
Trends in Observations

- Elevation, foundation type, load path, & roof membranes matter
- Gradual risk reduction vs. lines on a map (floods don’t read maps)
  - Special Flood Hazard Area, Windborne debris region, etc.
- Water infiltration from wind driven rain
  - Newer construction might be structurally intact with minor exterior damage, however could have extensive interior water damage
  - Traditionally research/damage assessments focus on exterior evaluation
- You get what you Inspect, not what you Expect
- Testing standards
  - Some opportunities for improvement to better reflect built environment
- Building codes and hazard mitigation works when properly implemented
• The codes/standards provide minimum design values and we should be encouraging people to go above the minimum requirements
  • It is painful to underestimate the hazard
  • Maps represent current/historic conditions not the buildings life span

• Resist the wind and avoid the flood (flood loads can exceed wind loads by a factor of 100-1000 times)

• There is no partial credit in hazard resistant design and construction - details matter

• Passive mitigation (works on its own) always beats human intervention
MAT Resources

- 30 Building Performance Reports
- Hundreds of Conclusion and Recommendations
- Dozens of Recovery Advisories
- Special Projects

https://www.fema.gov/fema-mitigation-assessment-team-mat-reports
BSB Resources

- Representative Hurricane/Coastal **Flood** Publications

**Coastal Construction Manual**
FEMA P-55 / Volume I / August 2011

**Recommended Residential Construction for Coastal Areas**
Building on Strong and Safe Foundations

**Protecting Building Utility Systems From Flood Damage**
FEMA P-348, Edition 2 / February 2017

[https://www.fema.gov/building-science-publications](https://www.fema.gov/building-science-publications)
• Representative Hurricane/Coastal Wind Publications

- Wind Retrofit Guide for Residential Buildings
  FEMA P-804 / December 2010

- Home Builder’s Guide to Coastal Construction
  Technical Fact Sheet Series
  FEMA P-499 / December 2010

- Guidelines for Wind Vulnerability Assessments of Existing Critical Facilities
  FEMA P-2062 / September 2019

https://www.fema.gov/building-science-publications
Building Code Resources

- Approaches for **coordinating** the I-Codes and local floodplain management regulations
- Explains several **differences** between the NFIP and the I-Code requirements
- Describes modifications that can be adopted to incorporate **higher standards**
- **Model** code-coordinated floodplain management ordinances

[https://www.fema.gov/building-code-resources](https://www.fema.gov/building-code-resources)
Building Code Resources

- Flood Resistant Provisions of the International Codes®
- Highlights of ASCE 24 Flood Resistant Design and Construction
- Quick Reference Guide: Comparison of Select NFIP & Building Code Requirements for Special Flood Hazard Areas
• No Code No Confidence
  • [https://inspecttoprotect.org/](https://inspecttoprotect.org/)
• Flood Code Master
• Building Science Catalog
Upcoming Building Science Courses

- Emergency Management Institute
  - Advanced Building Science E2460
    - April 27 - 30
  - Residential Coastal Construction
    - September 21 – 24
  - Fundamentals of Building Science
    - August 31 – September 3
    - September 14 - 17

Catalog of FEMA Building Science Branch
Publications and Training Courses
FEMA P-787 / Fifth Edition / September 2016
Questions?

Flood/Wind Building Science Helpline:
FEMA-BuildingScienceHelp@dhs.gov
(866) 927-2104
http://www.FEMA.gov/Rebuild/BuildingScience