

Resilient By Design: Creating Hazard Resistant Multi-Family and Single Family Housing Stock

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The Coalition is Florida's affordable housing training and technical assistance provider.

Hotline: 1-800-677-4548

www.flhousing.org



Webinar Logistics

- Participants are muted
- Enter your questions in the box in your webinar panel
- Forgot to ask a question or want to ask privately?

Email chaney@flhousing.org

This webinar is being recorded and will be available at
www.flhousing.org

- A survey will immediately follow the webinar; ***please*** complete it!



Overview

- Designing for Hazards and Climate
- Multifamily Residential Design
 - Heat
 - Green stormwater infrastructure
 - Flood proofing
- Enhancing Single Family Home Resilience
 - Examples of home hardening
 - Funding sources available to fortify homes

Sharing examples, ideas, new technical guides – this is NOT technical training.

Type in the Chat

What are you working on?

What are your information needs?



Creating Permanent Affordability *and* Livability

New housing built to last 75+
years = 2100

1. proximity to necessities
2. proximity to amenities
3. distance from hazards
4. designed for extreme heat
and flooding



Why Resilient Housing Matters

Increasing frequency and severity of extreme weather events — driven by climate change — damage millions of homes and exacerbate the housing crisis.

Due to climate change, rainfall intensity and extreme heat are expected to worsen.

- Design/construction standards and materials/technology continue to evolve.
- Affordable housing programs that integrate new standards and design will be more resilient to extreme weather and disasters — save money and better protect residents.
- Support more rapid recovery



NOAA NCEI Hurricane Ian was the most costly disaster in 2022: \$112.9B





The Fundamentals of Resilient & Climate Adaptive Design

Buildings and communities are subjected to destructive forces from natural and human-caused hazards. The forces affecting the built environment are evolving with climate change, environmental degradation, population growth, and migration. Apply these eight design principles to reduce harm and property damage, adapt to evolving conditions, and more readily, effectively, and efficiently recover from adverse events.



PLACE BASED

Understand and communicate the project's local hazard and climate risks as well as social, environmental and economic challenges and opportunities.



RISK PREPARED

Incorporate a project's hazard and climate risk, or building vulnerability assessment, when developing a strategy to avoid, mitigate, or reduce damage over the building's service life. Explore the potential for maladaptation that may unintentionally increase vulnerability.



EQUITABLE

Consider all populations to be serviced by the project. Remove barriers to access and service while promoting inclusive social, environmental, and economic benefits for the community.



PRECAUTIONARY

Select durable, low-maintenance building systems and materials that reduce negative consequences such as the release of toxics or wind/waterborne debris if the building or site is damaged.



SYSTEM CENTRIC

Recognize that buildings are part of a community system with inherent interdependencies, opportunities, and potential for unintended consequences. Explore the impacts of the project at the building and community scale and harmonize solutions.



READY

Plan for disruptions. Support the operation and occupants of the building, including its role in the community during an emergency, outage, or other disruption. Consider emergency preparations, safe shelter, physical protection, and mental well-being.



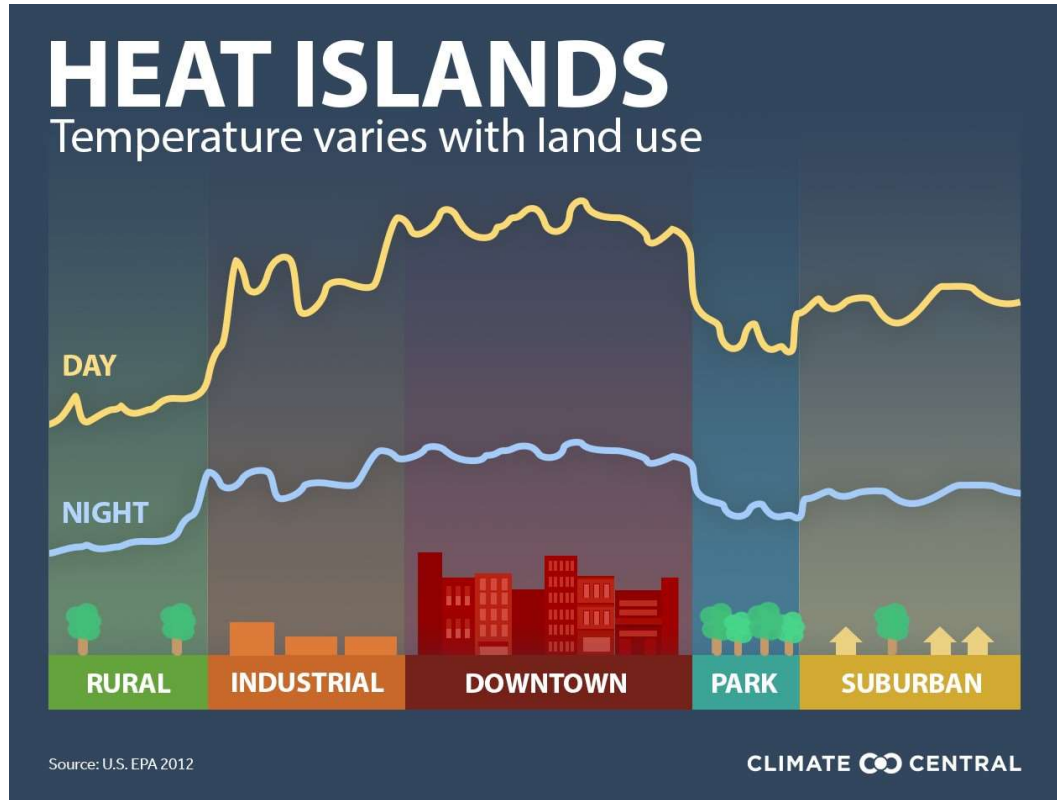
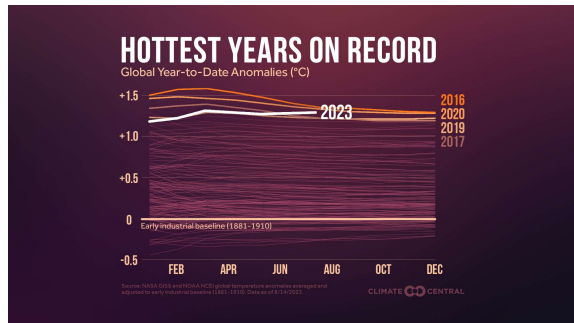
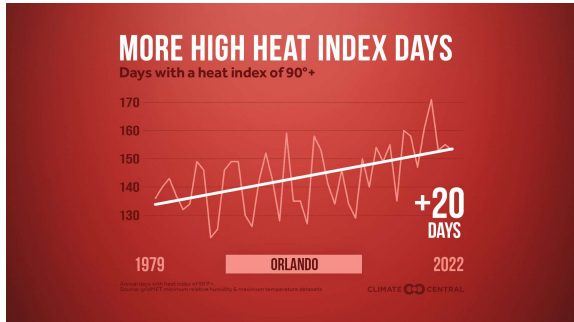
SERVICE-LIFE FOCUSED

Ensure design choices support building performance throughout the project's intended lifecycle; balancing first costs and long-term value.



ADAPTIVE

Design the project to accommodate and adapt to changing social, economic, and environmental conditions throughout its anticipated service life.



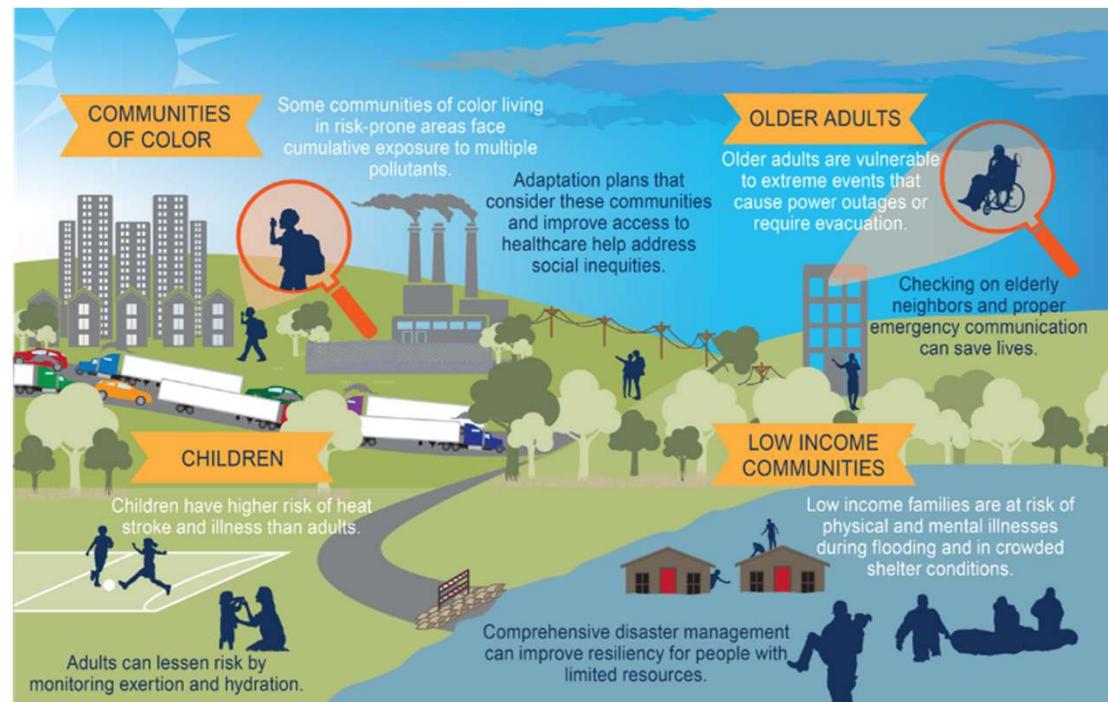
Heat, Housing and Health Impacts

In some communities, low-income residents are

- exposed to particulate air pollution levels 35% higher than average.
- may spend more than 10% of annual income on energy as a result of older, less energy efficient homes and proportionately lower income

Housing/site risk factors include

- heat trapping concrete, dark asphalt
- lack of trees and shade
- dense concentration of buildings
- located near industry and heavy traffic
- temperature differential of up to 7 degrees daytime and 5 degrees at night, compared with surrounding areas.



Cool Housing – Designing For Heat

Integrated approach to designing new or retrofitting existing properties.

- Minimize heat exposure and heat gain and reduce energy consumption.
 - Reduce heat gain from windows and doors – exterior shade structures
 - Create cool roofs
 - Increase green, natural surfaces and reduce concrete/asphalt
 - Add shade structures for outdoor spaces



Cool Housing Designing: Heat and Disasters

Hurricane/storm survivors are at increased health risks due to long-term power outages and damaged properties

Older, disabled and high floor residents are at more risk to heat

New multi-family energy resilience for disaster preparedness:

- Design community rooms to serve as cooling spaces, include refrigerators for medicine
- Ensure elevator functionality
- Clean energy backup power for 96 hours
- Design split electrical system to support those systems
- Contact Solar Energy Loan Fund (SELF) funded projects

Community Room at Terwilliger Place AH for Veterans VA



California Developer National CORE Property with Solar and EE



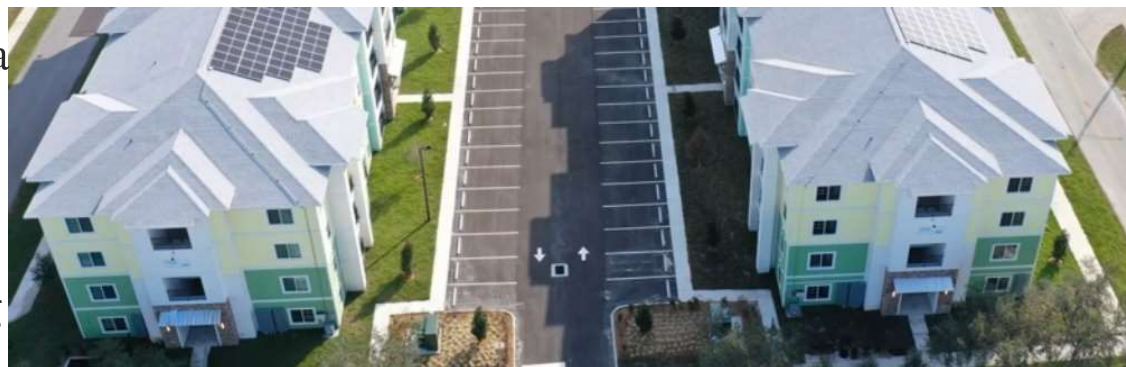
Creating Cool Communities: Roof Color, Slope and Products

The Heat Island Group at Lawrence Berkeley National Laboratory estimates a clean white roof will stay 55 degrees cooler than a darker one.

Corporate studies indicate that new colored roofing products are performing better than in the past.

Advanced cooling roofing materials sell at a modest premium, or even price parity.

Learn about product performance and costs.



City of Largo's Grand Oak

<https://heatisland.lbl.gov/coolscience/cool-roofs>



Shade Systems Reduce Heat Gain to Windows and Doors

Interior blinds, drapes and shutters allow heat to enter the unit.

Exterior devices can prevent interior heat gain

- Awnings, shutters and louvres
- Overhangs and porches

Must design for wind/hurricane requirements





Affordable Housing Example

- Three-story building for working families with incomes 50% and 60% of the median in the area (Brewer, Maine).
 - Strict construction budget restraints
 - Used double-stud exterior walls insulated with cellulose to R-40 and roof insulated with polyisocyanurate to R-57
 - Enhanced windows and metal sunshades were added to the **south and west elevations**
- HVAC system was downsized to account for building envelope upgrades
- Total added cost was only \$243,277
- The key takeaway: improvements in some elements may enable savings in others

Prioritizing South and West Sides

- Four sides do not need to be equal
- Focus on the sides exposed to the greatest amount of sun
- Create “hyper-performance facade” and devote most resources



Parking Lot Best Practice: Garage Green Roof Creates Green Space



- Jamboree Housing Corporation one of California's largest affordable housing developers created 70 affordable rental apartment homes in 4 story property
- Designed **Park Landing** to achieve a LEED® for Homes Silver rating and used New Block™ urban village design concept
- Surface parking is covered by a green roof structure, reduces heat buildup.
- Economically feasible to build and maximize density on in-fill properties previously deemed too small for development
- Designed to meet the local requirements for the 2.2 acre site: min. of 14,000 sq ft open space

Shade Structures + Green Spaces = Cool Spaces



- Design spaces for SUMMER in Florida
- Provide shade for multiple seating areas, address the hottest hours and protect from rain
- Plant native, heat/drought tolerant vegetation and trees
- Enable early morning and evening use with solar and LED lighting



Heat-Related Mitigation: Insulating Attics and Walls

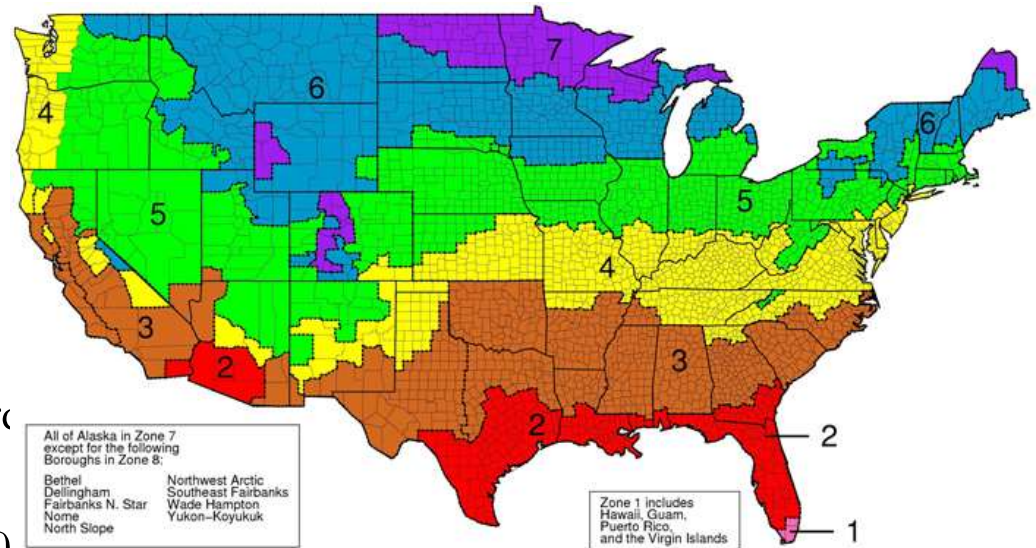
Practical Fixes: Attic and Building Insulation

Most older buildings don't have enough insulation.

Florida min requirements: R-30

DOE Energy Star Program

- Zone 1: Monroe, Miami-Dade, Broward, Palm Beach, Collier = R-Value 30-49
- Zone 2: Rest of Florida R-Value 30-60 for an uninsulated attic



Energy Star [recommendations for home insulation](#)

Ideas for Creating a "Cool Buildings"

Consider these actions...

- Meet with Building Department and Sustainability team to review LEED, FBC and other updated standards
- Develop/include specifications in your contracts for new Affordable Housing construction and retrofit
- Create a Technical Amendment to the FBC for new residential and commercial buildings;
- Require government-owned and publicly assisted buildings to upgrade within X years;
- Create construction design guides based on LEED, other parameters;
- Establish a sustainability fund for the collection of ordinance waiver fees.
- [In 2014 Miami Beach in 2014 created a Cool Roof Tool Kit and Ordinance](#)

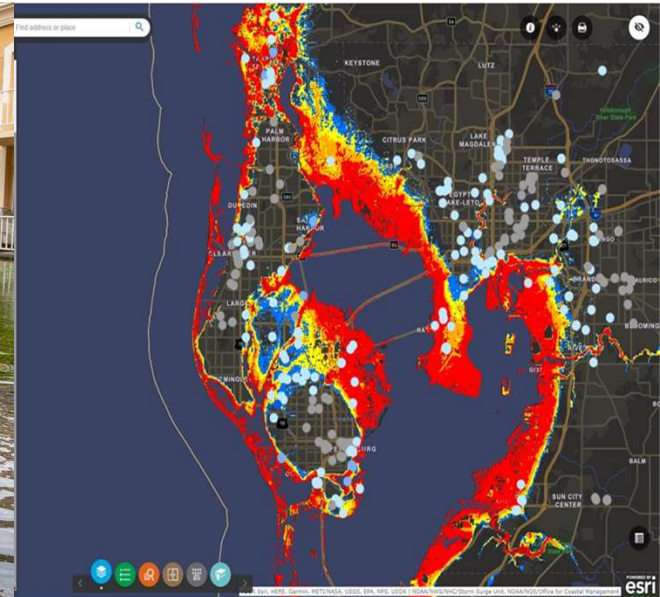


Resources: Heat and Energy Building Standards

- [2023 Florida Building Code, Energy Conservation, Eighth Edition](#)
- [Leadership in Energy and Environmental Design \(LEED\)](#): U.S. Green Building Council's voluntary green building certification system.
- [Florida Green Building Coalition \(FGBC\)](#) processes, standards, reference guides, checklists, and list of projects.
- [Energy Star Roofing Program](#)
- [Department of Energy Zero Energy Ready Home Program](#)
- HUD and USDA will update release minimum energy efficiency requirements

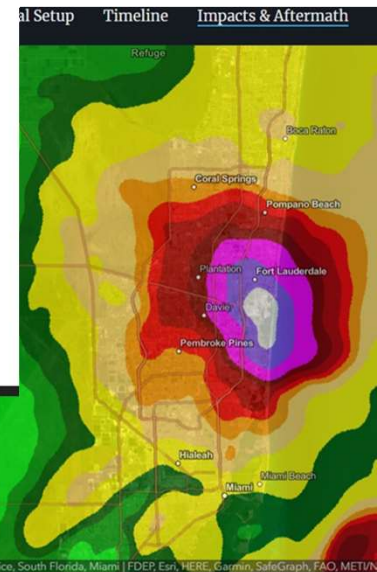
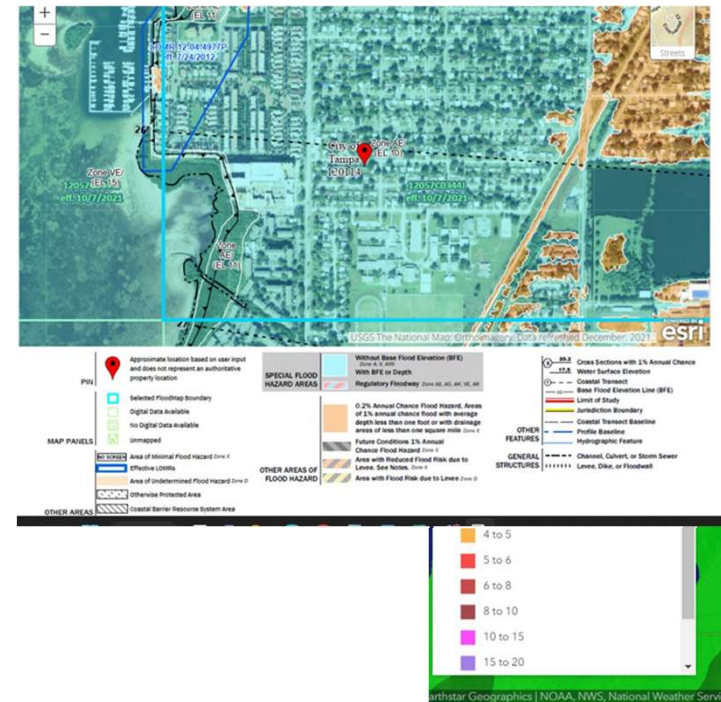


Flooding



Designing For Location-Based Flood Risk

- Flood zones – Special Flood Hazard Area, Coastal High Hazard Areas
- Extreme rain: past events and future conditions
- Riverine flooding
- Tropical Storms/Hurricane – TS to Cat. 3
- Compound events – surge+king tides

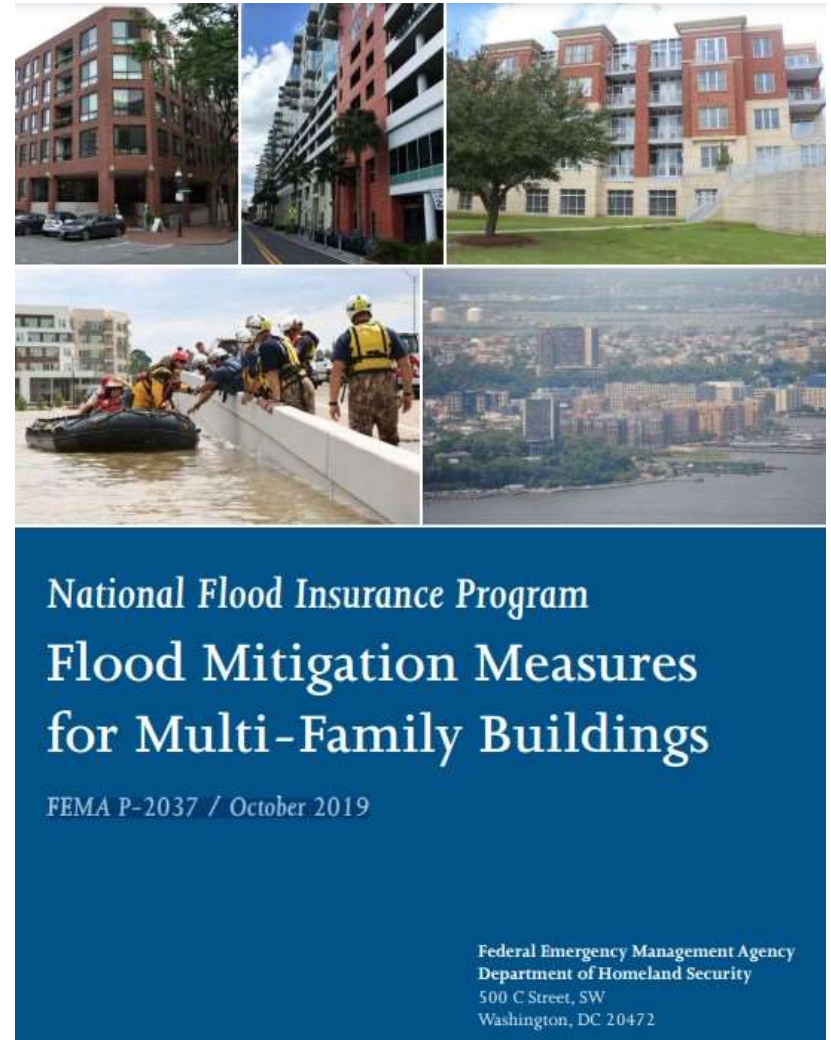


Hurricane Ian dropped 17+ inches of rain in Orlando area and April 2023 storm in Fort Lauderdale, Hollywood, and Dania Beach dropped 25+ inches of rain in less than 24 hours.



National Flood Insurance Program (NFIP) Flood Mitigation Measures for Multi-Family Buildings

- For mid and high-rise but can be applied to low-rise buildings.
- Residential and mixed use/commercial on first floor
- Audience: building owners, designers, builders, contractors, housing agencies, property managers responsible for operating, designing, constructing, or maintaining multi-family buildings, and local officials responsible for enforcing floodplain management regulations or building codes.



National Flood Insurance Program Flood Mitigation Measures for Multi-Family Buildings

FEMA P-2037 / October 2019

Federal Emergency Management Agency
Department of Homeland Security
500 C Street, SW
Washington, DC 20472

NFIP Minimum Requirements for New Construction and Substantially Improved Buildings

NFIP performance requirements for new construction and substantial improvement or repair of substantial damage of existing construction in SFHAs specify:

- Elevation – BFE, no first floor
- Designed and adequately anchored to prevent flotation, collapse, or lateral movement resulting from hydrodynamic and hydrostatic loads.
- Materials resistant to flood damage.
- Construction practices which minimize flood damage – breakaway walls, vents etc.
- Electrical, HVAC, plumbing, and other services are designed and/or elevated to prevent water from entering components.

Consult guides for specific technical requirements, depending on flood zone and location flood characteristics.



Resources & Innovations

READY TO RESPOND

Strategies for Multifamily Building Resilience



Disaster Preparedness
for Affordable
Housing Organizations



https://keepsafeguide.enterprisecommunity.org/sites/default/files/strategies-for-multifamily-building-resilience_1.pdf?fid=2154&nid=4325

Protection 14

Strategies to reduce a building's vulnerability to extreme weather.

1	Wet Floodproofing	15
2	Dry Floodproofing	21
3	Site Perimeter Floodproofing	28
4	Resilient Elevators	34
5	Backwater Valves	40
6	Sump Pumps	46

Adaptation 51

Strategies that improve a facility's ability to adapt to changing climate conditions.

7	Envelope Efficiency	52
8	Elevated Equipment	59
9	Elevated Living Space	65
10	Surface Stormwater Management	70
11	Window Shading	76
12	Distributed Heating and Cooling	82

Backup 87

Strategies that provide critical needs for when a facility loses power or other services.

13	Maintaining Backup Power to Critical Systems	88
14	Emergency Lighting	96
15	Access to Potable Water	101

Design & Wet Flood Proofing

Key principle: Allow flood waters to move in and out/around the structure without damaging the property.

- Use flood resistant materials below Base Flood Elevation (BFE)
 - concrete, stone, masonry block, ceramic, clay tile, metal, special resistant lumber etc
- Flood vents reduce hydrostatic pressure
- Elevated mechanicals
- Free of obstruction requirements -- breakaway walls and breakaway stairs
 - [FEMA Free of Obstruction Guide 2020](#)



Flood Damage-Resistant Materials Requirements

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

Technical Bulletin 2 / August 2008

Lower portion of wall is masonry and includes several flood vents



https://www.fema.gov/sites/default/files/2020-07/fema_tb_2_flood_damage-resistant_materials_requirements.pdf

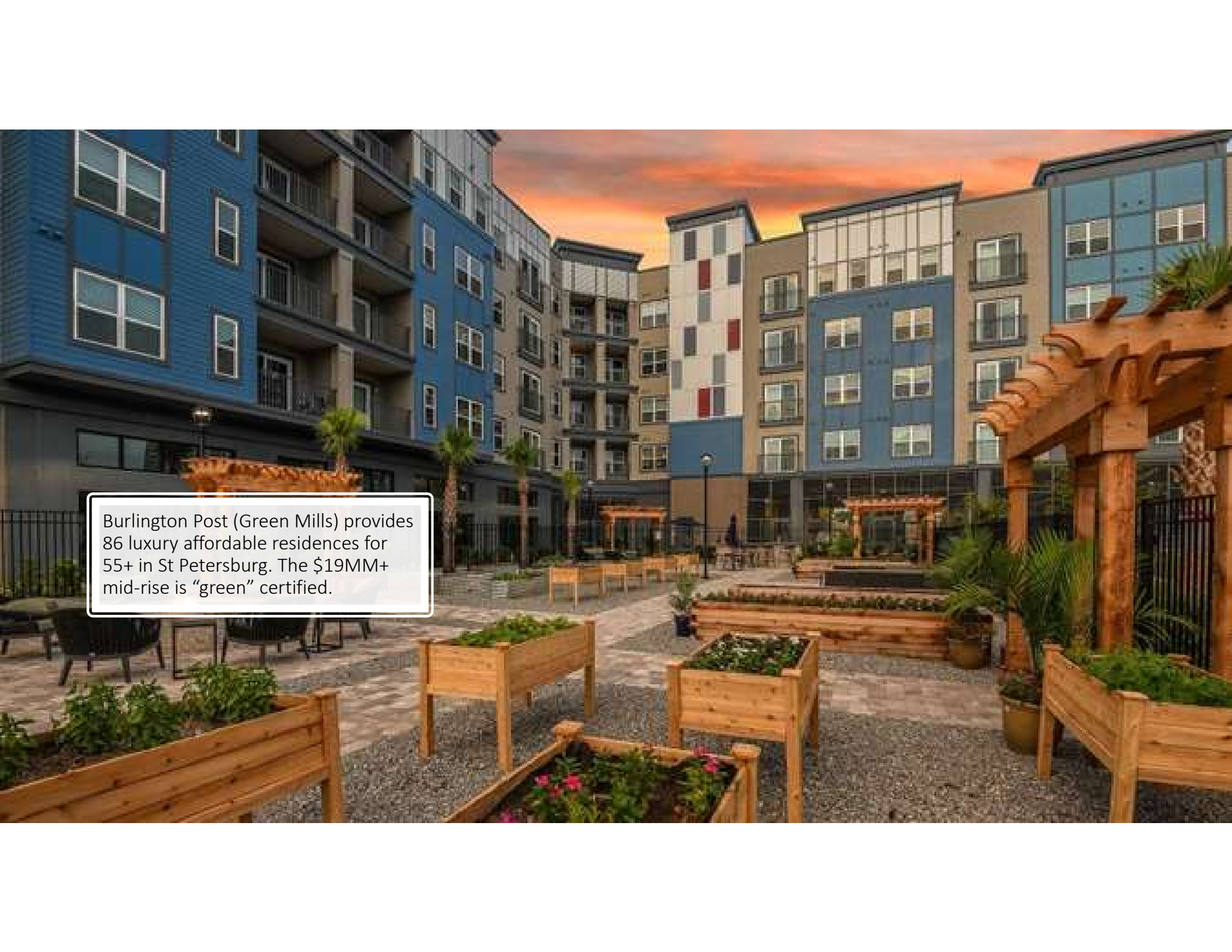
Green Infrastructure to Reduce Site Flooding

- Combines traditional stormwater engineering with natural landscape architectural strategies to address flood risks and needs of the site.

Benefits include

- Reducing volume to stormwater systems and streets.
- Green spaces amenities for residents.
- Reduces heat gain to nearby properties.
- Improved water quality, ecosystem health
- Maintenance is different, not more costly





Burlington Post (Green Mills) provides 86 luxury affordable residences for 55+ in St Petersburg. The \$19MM+ mid-rise is “green” certified.

New HUD Resource for Builders and Developers

May 2023 U.S. Department of Housing and Urban Development (HUD) published

Designing for Natural Hazards: A Resilience Guide for Builders & Developers

- Single family residential construction
- Hazard Task Groups identified typical damage that happens; reviewed vetted resources and defined most relevant resilient construction content to be included.
- One pagers identify specific components that can be improved to achieve above-code performance to make residential buildings and other community assets more resilient.



Five volume series focused on a major hazard category.



Enhancing Single Family Home Resilience



The Disaster Management Cycle: Housing

- **Preparedness/Planning:** pre-disaster recovery planning
- **Mitigation:** reduce future vulnerability, lessen the impact of disasters
- **Response:** actions that must be carried out when an emergency exists or is imminent
- **Recovery:** bring a community back to a new normal after disaster



What is Housing Mitigation?

The act of retrofitting structures and the site with the purpose of reducing vulnerability to natural hazards.

- Mitigation is based on a risk assessment of hazards and vulnerability of **social structure, geography, and structural housing stock**
- Residents are able to shelter in place in strengthened homes
- Homes may qualify for reduced insurance



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Housing Mitigation

INVEST IN
BUILDING
STRENGTH



Home Insurance: Wind and Flood

- Homes without mortgages in flood zones are vulnerable to catastrophic loss.
- Insurance supports resilience, allowing repairs and rebuild post disaster.
- The State Insurance of last resort- Citizens Wind Insurance- will be insolvent if two \$50B storms occur in one year. Irma was a \$50B storm.



Mitigation Considerations for Rehab Programs

- FIRST: Monitor SHIP rehab & new construction for code compliance
- NEXT: Mitigation involves Hardening, Resiliency, and Sustainability



What are the Mitigation Features of Your Housing Assistance Programs?



Wind Mitigation Features



Key components of protecting structural integrity:

- Roofing protections
- Protect Openings
- A continuous load path



Examples of Mitigation Features

- Roof/Wall/Foundation Connections
- Opening Protection
- Re-Roofing
- Elevation
- Relocation



Example of Mitigation Features

Brace Bottom Chord
of the Gable End

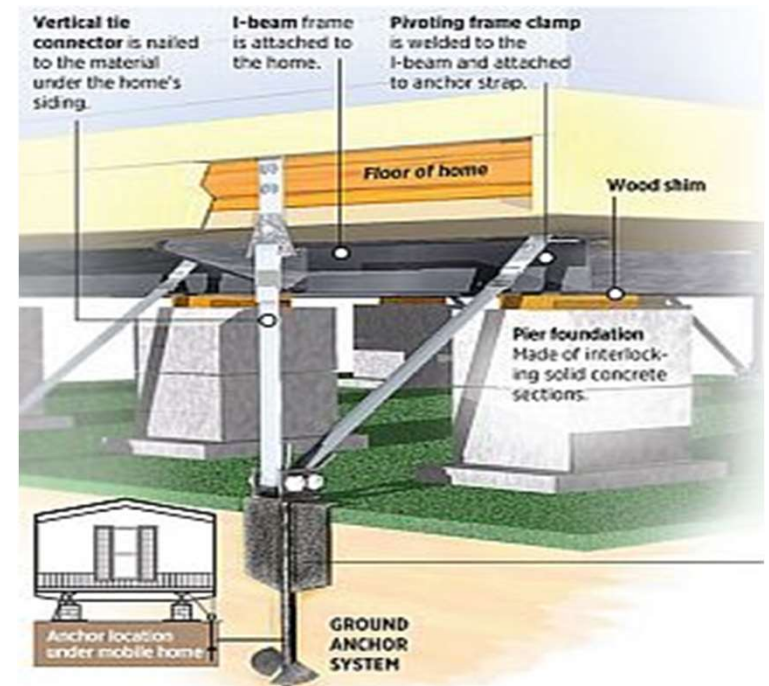


Generator



Mobile Homes Tie-Downs and Enhancements

- Replace older mobiles homes (pre-1994) with modern manufactured housing that meets current building codes.
- Make newer mobiles homes resilient with tie-downs, window films, and carport anchoring.



Source: Underhome Armor. Mobile Home Tie Downs.

Disaster Mitigation for a Group Home

- ARC Group Homes in Marion County
- Two buildings renovated in 2010 & 2012 with CDBG funding
- 2019 Mitigation paid with SHIP



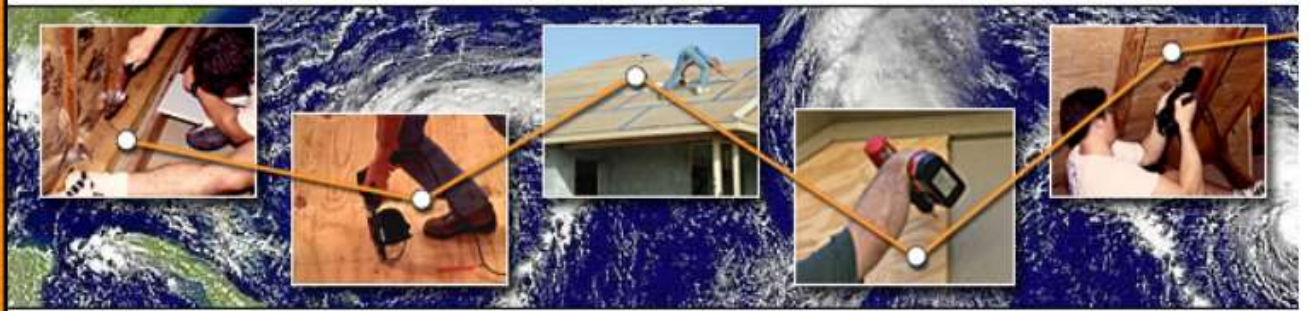
Florida Residential Retrofit Guide

A resource from FDEM related to:

- Roofs and water intrusion
- Window, doors and shutters
- Walls
- Porches and attached structures
- Equipment and loose objects

<http://www.floridadisaster.org/hrg/>

Hurricane
Retrofit
Guide





When a garage door fails, it provides not only an entry point for water, but also allows for the wind to get under the roof and lift it off the structure.



water intrusion if shingles blow away. Secure all boards with an 8d ring shank nail, which includes grooves in the nail that provide a more secure grip. Use shingles with a high standard. The highest standard is currently for over 130 miles per hour winds and should be installed using the number of fasteners recommended by the manufacturer for high-wind areas.

Roofing Repairs. A roof of a home that does not require roof replacement or any major roofing repairs may also be strengthened by re-nailing the sheathing using 8d ringed shank nails and providing a water barrier on the underside of the roof deck.

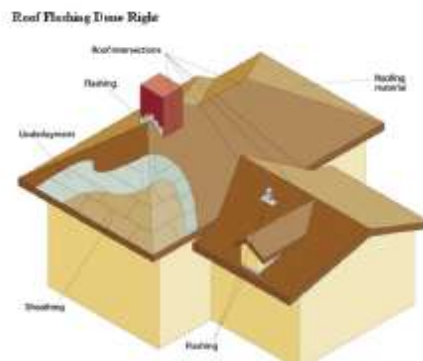
Exterior Doors. When completing the rehabilitation

with a bolt lock that should be 1" long to extend far into the frame and hold the door closed. French doors or double doors should be shuttered.

Flashing. The purpose of flashing on pitched roofs is to direct the flow of water that leaks into the intersection down and away from the structure's interior.

Contractors must always lap flashing and other moisture barriers properly. Do not rely on sealant as a substitute for proper lapping. In addition, the following steps are recommended:

- Use fasteners that are compatible with the flashing material.
- Use flashing cement at joints to help secure flashing.
- At roof-to-wall intersections,



Mitigation

What are the Mitigation Features of Your Housing Assistance Programs?



Funding Housing Mitigation



SHIP can pay for Mitigation Measures

- Single Family: incorporate into Rehabilitation Strategy
- Also incorporate in new construction projects
- Multifamily: Follow SHIP Rental Rule: Monitor newly constructed or repaired rental units
 - Monitor income and rent affordability annually for at least 15 years



SHIP Income and Rent Limits Chart

County (Metro)	Percentage Category	Income Limit by Number of Persons in Household									
		1	2	3	4	5	6	7	8	9	10
Hernando County (Tampa-St.Petersburg- Clearwater MSA) Median: 89,400	30%	18,250	20,850	24,860	30,000	35,140	40,280	45,420	50,560	Refer to HUD	
	50%	30,450	34,800	39,150	43,450	46,950	50,450	53,900	57,400	60,830	64,306
	80%	48,650	55,600	62,550	69,500	75,100	80,650	86,200	91,750	97,328	102,890
	120%	73,080	83,520	93,960	104,280	112,680	121,080	129,360	137,760	145,992	154,334
	140%	85,260	97,440	109,620	121,660	131,460	141,260	150,920	160,720	170,324	180,057

Rent Limit by Number of Bedrooms in Unit					
0	1	2	3	4	5
456	488	621	814	1,007	1,199
761	815	978	1,130	1,261	1,391
1,216	1,303	1,563	1,807	2,016	2,224
1,827	1,957	2,349	2,712	3,027	3,339
2,131	2,283	2,740	3,164	3,531	3,895

Rent for a Unit Built or Repaired with SHIP cannot exceed Rent Limits Chart amount per Income Category



Amount of SHIP Available for Rental Mitigation

100 % Allocation

- 65% Homeownership Set aside
- 10% Admin

25% of Allocation Available for

Rental New Construction or Rehabilitation

+ PLUS all Program Income





FUNDING: CDBG-DR

- Mitigation is part of recent CDBG-DR Allocations
- CDBG-DR may be spent on Multifamily Housing Rehabilitation
- More information: Contact Florida Department of Commerce (formerly Dept of Economic Opportunity) at <https://floridajobs.org/>
- Hurricane Ian allocation article: <https://www.hud.gov/states/florida/stories/2023-06-26>
- Hurricane Ian allocation Federal Register # 888 FR 32046 published May 23, 2023

FUNDING: CDBG-DR

\$2.7 billion for Hurricane Ian

- \$910 million to Florida Dept of Commerce

Local grants:

- \$1,107,881,000 to Lee County, \$144,506,000 for mitigation
- \$219,712,000 to Orange County, \$28,658,000 for mitigation
- \$201,535,000 to Sarasota County, \$26,287,000 for mitigation
- \$ 328,910,000 to Volusia County, \$42,901,000 for mitigation





<https://mysafehome.com/>

“Funds for home inspections are still available”

My Safe Florida Home Program

- Provides mitigation inspections and grants for home strengthening
- Homeowners receive a free inspection report detailing the strength of their home against hurricanes

Legislative Session: As of July 1

- 1) Increases maximum grant for low-income homeowners to \$10,000
- 2) Funds program at \$100 million



Hurricane Loss Mitigation Program

Program Overview

Only Single Family Housing

Created after the devastation brought by Hurricane Andrew. Annual appropriation of \$10 million

\$3 million to retrofit existing facilities/hurricane shelters

\$2.8 million for Mobile Home Tie Down Program

\$700,000 to the Florida International University center dedicated to hurricane research

\$3.5 million to be used to improve the resiliency of residences through wind and flood mitigation grants.



THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT



RFP and Contact

The Request for Proposal is usually published in March.
The performance period runs from July 1st (or upon contract execution) through June 30th of the following year.

For more information or to be notified when the RFP is posted,
please email HLMP@em.myflorida.com



THE FLORIDA DIVISION OF EMERGENCY MANAGEMENT



Building Resilient Infrastructure and Communities (BRIC) program from FEMA

PRIORITIES:

- Incentivize natural hazard risk reduction to mitigate risk to infrastructure
- **Prioritize benefits to economically disadvantaged communities**
- **Mitigate risk to one or more community lifelines**
- Incorporate nature-based solutions
- Enhance climate resilience and adaptation
- Increase funding to applicants that facilitate the adoption and enforcement of the latest published editions of building codes



BRIC Housing Related Activities

- Property Acquisition and Demolition
- Property Acquisition and Relocation
- Structure Elevation
- Mitigation Reconstruction
- Dry Floodproofing of Historic Residential Structure
- Generator/Emergency Power Pack Up



More BRIC Housing Related Activities



- Localized Flood Risk Reduction
- Structural Retrofitting
- Wind Retrofit
- Hazard Mitigation Planning
- Technical Assistance
- Capacity and Capability Building
- **Project Scoping and Building Code projects**

BRIC Projects Must:

- Be cost-effective- **Benefit Cost Analysis**
- Reduce/eliminate risk and damage from future natural hazards
- Meet latest two consensus codes (i.e. 2015 or 2018 international building code)
- Align with Hazard Mitigation Plan- Local Mitigation Plan
- Meet all environmental and historic preservation requirements
- Applications are scored- points for partnerships and cost benefit analysis



Please complete the evaluation!



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