MONROE COUNTY, FLORIDA
BOARD OF COUNTY COMMISSIONERS
RESOLUTION NO. 065 -2020

A RESLOUTION OF THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA ADOPTING THE MONROE COUNTY REPETITIVE LOSS AREA ANALYSIS AS REQUIRED TO ADVANCE IN THE COMMUNITY RATING SYSTEM.

WHEREAS, Monroe County is currently a participating community in the National Flood Insurance Program (NFIP); and

WHEREAS, Monroe County became eligible and entered the NFIP Community Rating System (CRS) in 2016; and;

WHEREAS, Monroe County's voluntary participation in the NFIP's Community Rating System (CRS) provides residents of unincorporated Monroe County with a 25% discount on a standard NFIP flood insurance policy in the Special Flood Hazard Area (SFHA); and

WHEREAS, each improvement in CRS Class rating (starting from a Class 10) translates into a 5% premium discount on qualifying NFIP policy-holders within the SFHA, meaning that a CRS Class 4 status makes qualified policy-t within the community eligible for a 30% total premium discount; and

WHEREAS, Monroe. County is currently rated as a CRS Class 5% community and achieving CRS Class 4 status would result in an additional 5% discount for qualified policy-holders within the SFHA; and

WHEREAS, the Monroe County Commission supports the goal of a CRS Repetitive Loss Area Analysis to provide guidance on how to reduce damage from repetitive flooding and outlining appropriate mitigation measures;

NOW THREFORE BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MONROE COUNTY, FLORIDA:

Section 1. The Board hereby adopts the Monroe County Repetitive Loss Area Analysis, a copy of which is attached hereto.

Section 2. This Resolution shall become effective immediately upon adoption

PASSED AND ADOPTED by the Board of County Commissioners of Monroe County, Florida, at a regular meeting of the Board held on the 19th day of February 2020.

Mayor Heather Carruthers	Yes
Mayor Pro Tem Michelle Coldiron	Yes
Commissioner Craig Cates	Yes
Commissioner David Rice	Yes
Commissioner Sylvia Murphy	Yes

(SEAL)

BOARD OF COUNTY COMMISSIONERS
OF MONROE COUNTY, FLORIDA

BY_____
Mayor Heather Carruthers

ATTEST: KEVIN MADOK, CLERK

By_____
Deputy Clerk

MONROE COUNTY ATTORNEY
APPROVED AS TO FORM:
STEVEN T. WILLIAMS
ASSISTANT COUNTY ATTORNEY
Date 2/3/20

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MONROE COUNTY, FLA.

Monroe County

Repetitive Loss Area Analysis

February 1, 2020

LORI LEHR INC.

Repetitive Loss Area Analysis
Monroe County, Florida

Executive Summary

Monroe County is subject to periodic flooding from rain, sea level rise, and storm surge. One measure of the intensity and impact of these floods is flood insurance claims. Between 1978 and 2017, there were 11,205 flood insurance claims paid in unincorporated Monroe County. Of those, 10,896 (97%) were from the six major storms discussed in Chapter 2. The average claim payments for the last two, Wilma and Irma, were over $30,000 and $35,000, respectively.

Many properties in the County have been subject to repetitive floods. Nationally, the cost of paying repetitive insurance claims have made them a priority for the National Flood Insurance Program. Under FEMA's definition of a repetitive loss property, only a little more than 1% of the County's flood insurance polices account for 19% of the claim payments since 1978. Repetitive flooding is therefore a major concern in Monroe County.

Analysis

Instead of focusing on just the 391 officially designated repetitive loss properties that have flooded two times or more in the past, this analysis looks at repetitive loss *areas*. An "area" has the repetitive loss properties designated by FEMA and other nearby properties that are exposed to the same flood risk (often called "repetitive loss properties in waiting"). Monroe County has 60 repetitive loss areas which have from one to 699 properties with a total of 9,546 properties.

Appendix A has maps and summary data on the 60 repetitive loss areas in unincorporated Monroe County. The data come from a windshield survey, claims data, and County Appraiser files. The exact location of the 391 FEMA-designated repetitive loss properties cannot be identified because of the Privacy Act. For this analysis, there is no differentiation between FEMA repetitive loss, single loss, insured but no claim payments, and uninsured properties. All properties exposed to the repetitive flood hazard deserve attention. The table below has summary data on the 60 areas.

Area	RLs	Historic Loss	Similarly Situated	Total
1	1			1
2	2			2
3	14	130	346	490
4	1	25	129	155
5	1	3	63	67
6	1	8	51	60
7	3	63	307	373
8	1			1
9	7	49	178	234
10	1			1
11	1	2	2	5
12	4	7	92	103
13	7	30	187	224
14	1			1
15	1	3	54	58
16	13	4	98	115
17	1		1	2

Area	RLs	Historic Loss	Similarly Situated	Total
18	1	4	8	13
19	5	15	236	256
20	1			1
21	1			1
22	2	3	7	12
23	1		2	3
24	2			2
25	3	13	24	40
26	1	2	1	4
27	7	89	309	405
28		16	29	45
29	17	73	137	227
30	21	66	98	185
31	5	11	36	52
32	1	119	302	422
33	1	2	1	4
34	2	43	107	152
35	1	6	22	29
36	4	38	225	267
37	2	55	141	198
38	3	78	101	182
39	1	4	4	9
40	16	98	250	364
41	2	8	35	45
42	56	113	500	669
43	29	181	179	389
44	24	150	298	472
45	9	60	209	278
46	6	98	147	251
47	9	120	278	407
48	2	9	15	26
49	3	58	89	150
50	25	25	108	158
51	3	9	26	38
52	7	33	146	186
53	3	177	419	599
54	2	16	34	52
55	1	198	247	446
56	2	4	9	15
57	5	3	13	21
58	4		21	25
59	1			1
60	19	53	478	550
	[1]370	2,374	6,799	9,543

[1] FEMA's Repetitive Loss List contains 391 properties. Twenty-one addresses on the list are properties with multiple buildings located on one Monroe County parcel ID. The information provided by FEMA is not sufficient to determine which building on such parcels is the one on FEMA's list.

Solutions

Chapter 2 of this report reviews past floods and their impacts on people and property. Chapter 3 discusses alternative mitigation projects to address these impacts. They are organized under two approaches:

Flood control projects	Nonstructural projects
Beach structures	Acquisition
Seawalls	Elevation
Beach and dune nourishment	Mitigation reconstruction
Drainage improvements	Barriers
	Dry floodproofing
	Wet floodproofing

Different projects do better in different situations, so Chapter 4 identifies ways to determine the best approaches to mitigate the impacts of repetitive flooding. Chapter 5 concludes with recommendations for the County and for repetitively flooded property owners. County actions focus on protecting critical facilities and roads and helping property owners with information, technical assistance, and funding. Recommended property owner actions include learning about nonstructural measures that they can implement and sources of financial assistance and maintaining flood insurance coverage.

Chapter 1. Introduction

Monroe County is subject to periodic flooding from rain, sea level rise, and storm surge. While one flood is bad enough, many areas of the County have been subject to repetitive floods, which take their toll and leave residents worrying about the next flood.

This report is an analysis of the repetitive flood problem in the unincorporated areas of Monroe County. It reviews past floods, their impacts on people and property, alternative ways to address these impacts, and concludes with recommendations for County officials and property owners who want to be proactive to address their future risk of flooding.

Background

The majority of the buildings in Monroe County are in a coastal floodplain. Many were built before January 1975, when Monroe County adopted its first floodplain regulations, which means they were likely built without any flood protection considerations. The following table shows this data:

Built before 1/1/1975	Built after 1/1/1975
4,490	9,472

Nearly 14,000 properties in the County's unincorporated areas are covered for flood damage with a flood insurance policy under the National Flood Insurance Program (NFIP). Of these, 437 meet the NFIP's definition of a repetitive loss property and 7 meet the NFIP's definition of a severe repetitive loss property (see box).

Repetitive loss property: a property that has had two or more claims of more than $1,000 paid by the National Flood Insurance Program within any 10-year period since 1978. Although some of these properties have had mitigation measures applied to them, most remain at risk of flooding.
–*CRS Coordinator's Manual*, p. 120-7

Severe Repetitive Loss property: As defined in the Flood Insurance Reform Act of 2004, those 1–4 family properties that have had four or more claims of more than $5,000 or two to three claims that cumulatively exceed the building's value. For the purposes of the CRS, non-residential buildings that meet the same criteria as for 1–4 family properties are considered Severe Repetitive Loss properties.
–*CRS Coordinator's Manual*, p. 120-8

The NFIP has been faced with the task of paying claims while trying to keep the price of flood insurance at an affordable level. It has a particular problem with repetitive flood loss properties, which are estimated to have cost $13 billion nationwide since 1978. Repetitive loss properties represent only 1.3% of all flood insurance policies, yet historically they have accounted for nearly 25% of the claims nationally. Monroe County's repetitive loss properties also represent only about 1.3% of all flood insurance policies but they account for 6.6% of the more than $282 million in historic claims payments in the unincorporated areas of the County.

Because of this, the NFIP encourages reducing the repetitive loss problem and they offer mitigation programs to do so. Mitigating these repeatedly flooded properties will reduce the overall costs to the program, to the communities in which they are located, and to the individual homeowners. Ultimately, mitigating repeatedly flooded properties benefits everyone.

While the primary objective of this analysis is to help the residents of Unincorporated Monroe County, it also meets a requirement of the Community Rating System (CRS). The CRS is a

voluntary program that recognizes and encourages floodplain management activities that exceed the minimum NFIP requirements. Communities receive credit for their floodplain management activities, such as land use regulations, public information programs, and flood warning and response plans. Plans and projects that address repetitive loss properties are an important credit.

Unincorporated Monroe County is currently a CRS Class 5 which provides a 25% discount on NIFIP flood insurance policies issued in the Special Flood Hazard Area (see Appendix C for floodplain management terminology). A Class 5 rating means NFIP insurance policy holders in the unincorporated areas of the County save approximately 5.2 million dollars each year.

As a participant in the CRS, Monroe County is obligated to map and address its repetitive loss areas. It can receive additional CRS credit if it undertakes an analysis of the problem that identifies appropriate activities that can mitigate the impact of repetitive flooding. This document meets the criteria for a CRS-accredited Repetitive Loss Area Analysis (RLAA).

Repetitive Loss Areas

Properties on FEMA's repetitive loss list are not the entire problem – they are an indicator of a repetitive flooding problem that can also affect other properties. As described in the *CRS Coordinator's Manual*,

> It is important to note that the only reason a property appears on FEMA's list is because the structure had flood insurance and received two or more claims of at least $1,000 during any given 10-year period. These properties are merely representative of the community's overall repetitive flooding problem.
>
> Other structures near the ones listed by FEMA may have been uninsured during the floods, may have had single flood insurance claims, or may have had multiple claims under different policies that the system did not recognize as being the same repetitively flooded address. From a community perspective, it is not fair to single out those properties that happen to be on FEMA's list. All properties with the same exposure to repeated flood damage should be addressed. – *CRS Coordinator's Manual*, page 500-10.

The CRS requires communities to look at repetitive loss *areas*. Repetitive loss areas consist of neighboring buildings (including uninsured ones) that were subject to the same flood as those on the FEMA list. A line must be drawn to include the properties on FEMA's list and all other nearby properties with buildings exposed to the same repetitive floods.

Privacy Act: All use of flood insurance data must abide by the Privacy Act (5 U.S.C. § 552a). "Personally identifiable information" such as the names or addresses of specific properties that are covered by flood insurance or have received flood insurance claims, the amounts of such claims, etc., may not be released outside of local government agencies or to the public.

General or aggregated information, such as total claims paid for a community or an area or data not connected to a particular property may be made public. For example, a community may publish a map showing a repetitive loss area or a list of addresses in that area, provided that it does not show which individual addresses or parcels are covered by a flood insurance policy or received insurance claim payments.

Therefore, this report and the database described in Chapter 4, do not include information on flood insurance policies. Non-NFIP information, such as building foundation types and assessed value, can be used and released. The addresses in the repetitive loss area can be publicized, but the list will not identify which properties had or have a flood insurance policy, which are listed as repetitive loss properties, or how much a particular property received in insurance claims.

Monroe County's Repetitive Loss Areas: The Planning & Environmental Resources Department's GIS office mapped repetitive loss properties, properties that received a single flood insurance claim, and all similarly situated properties. This information was used to identify and delineate the repetitive loss areas.

There are 60 repetitive loss areas in Monroe County. They have from one to 699 properties with a total of 9,545 properties in the 60 repetitive loss areas. There are seven areas that have only one property, i.e., there are no other similarly situated structures nearby. The exact location of these seven properties is not shown in this report, but their general areas are mapped. For the other areas, there is no differentiation between repetitive loss, single loss, insured but no claim payments, and uninsured properties. An example of an area map is to the right.

Example Repetitive Loss Area

Repetitive loss area 16 has 13 properties on FEMA's repetitive loss list, 4 properties that received one claim, and 98 similarly situated properties, for a total of 115 properties in the repetitive loss area. More information on the 60 areas is in Appendix A.

Most of the areas include buildings that have been elevated or otherwise protected from repetitive flooding. While these buildings are less likely to experience interior flooding, they have repetitively flooded properties nearby and the street flooding often causes building access issues. Therefore, they are included in the repetitive loss areas.

The Process

The analysis was prepared following a standard five step planning process. The process is also needed to meet the CRS credit criteria, as shown in quotes for each step.

Step 1: "Advise all the properties in the repetitive loss areas that the analysis will be conducted and request their input on the hazard and recommended actions." – This was completed with a letter sent by Adam Ferguson, Administrator of the County's Floodplain Program. The letter went to all residents of the County in the Summer of 2017, advising that there would be staff conducting visual surveys of the buildings in their neighborhoods. It had this note:

> The RLAA work that the County is doing would be much more effective with any additional data residents in these areas may be able to provide. You are encouraged to participate in the planning process by providing historical information concerning floods that have impacted your property. Be part of the solution and help us improve the analysis by completing a questionnaire…Your participation will be used to help determine the appropriate flood protection measure(s) to be considered for properties in your area.

The field surveying started, but work was put on hold after the County was hit by Hurricane Irma in September 2017. It restarted in 2019 and a second notice was distributed with the County's annual outreach project in September 2019 (right). The questionnaire is included as Appendix B to this report.

Only 20 people took advantage of this opportunity. Their comments are included in the information on their repetitive loss areas in Appendix A.

Step 2: "Contact agencies or organizations that may have plans or studies that could affect the cause or impacts of the flooding." – The RLAA planners contacted the following offices. The findings and comments from these contacts are incorporated into the various chapters of this document.

- → Monroe County Disaster Recovery Department
- → Monroe County Engineering, Roads & Bridges Department
- → Monroe County Land Authority
- → Monroe County Planning and Environmental Resources Department
- → Monroe County Sustainability & Projects Department
- → Florida Department of Economic Opportunity

Monroe County is conducting an analysis of areas that have repetitively flooded. You can help by telling us of your experiences. Go to www.monroecounty-fl.gov/repetitivelosssurvey and give us your thoughts.

Step 3: "Visit each building in the repetitive loss area and collect basic data. The site visit must collect data sufficient to do a preliminary determination of the cause of the repetitive flooding and of the mitigation measures that would be appropriate…. The person conducting the visit should not have to enter the property—adequate information should be collected from observations from the street."

Several approaches were used to collect data. County staff visited every area and recorded key information on each building. Items collected (to the extent that things could be seen from the street) included:

- – Use (single family home, commercial, etc.)
- – Number of stories
- – Foundation type
- – Foundation condition
- – Wall type
- – Wall condition
- – HVAC location
- – Estimated height above grade

Dates from the Monroe County Property Appraiser, such as date of construction, were also included.

Flood insurance data were reviewed but not included in the same database due the Privacy Act requirements. Data on each building was collected in a database that is explained in Chapter 4. The causes of the repetitive damage are covered in Chapter 2 and appropriate mitigation measures are reviewed in Chapters 3 and 4.

Step 4: "Review alternative approaches and determine whether any property protection measures, or drainage improvements are feasible." – Both structural flood control and nonstructural building mitigation measures were reviewed. Property protection measures and drainage improvements are in Chapter 3. Feasibility is covered in Chapter 4.

Step 5: "Document the findings." – All of this information and the repetitive loss area maps are included in this document, Monroe County's Repetitive Loss Area Analysis.

The draft of this document was posted for public review. The annual outreach project sent to the repetitive loss areas in December of 2019, encouraged the recipients to access the draft online and review it. Questions or comments on the draft as well as other flood protection topics were encouraged. While the initial request for public input in Step 1 brought comments, no comments were received on the draft document by the comment deadline.

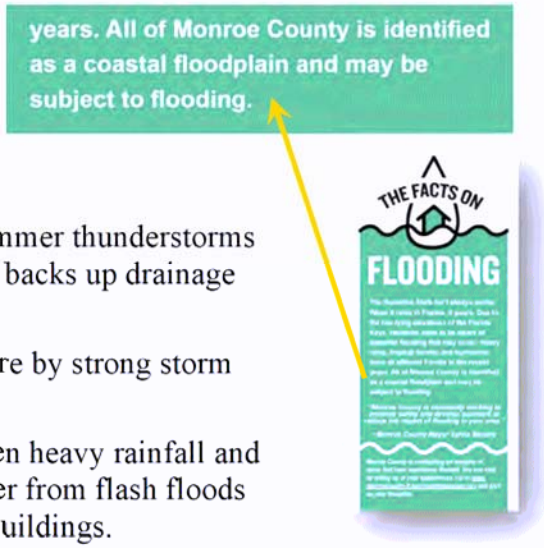
The draft of this document was presented to the Monroe County Board of County Commissioners at the January 22nd meeting. The Commissioners and public were given an opportunity to ask questions and make comments. While there were no questions or comments from the public, the Commissioner asked quite a few very relevant questions. The questions related to:

- → The viability of residential floodproofing,
- → The process for inclusion of similarly situated structures in the repetitive loss areas, and
- → Providing more data to the public on individual properties, such as adding the elevation of the lowest floor to the data in the next iteration.

Overall, the Commissioners' comments were positive in nature. They agreed that it is of benefit to the community to look at repetitive loss areas to access possible mitigation to reduce future loss.

Chapter 2. The Flood Problem

As noted in the County's outreach projects (right) "All of Monroe County is identified as a coastal floodplain and may be subject to flooding."



Flooding in Monroe County comes in four ways:

→ Heavy Rains: Hurricanes, tropical storms, and summer thunderstorms have the potential to unload heavy rainfall, which backs up drainage systems and causes flooding.

→ Storm Surge: Water that is pushed toward the shore by strong storm winds, can cause severe flooding in coastal areas.

→ Flash Flooding: Flash flooding is caused by sudden heavy rainfall and can occur in just a few hours or less. Moving water from flash floods can lift rocks and debris and damage homes and buildings.

→ King Tides: These especially high tides can flood streets and low lying areas. They are occurring more frequently due to sea level rise.

Historical Floods

All of these types of floods contributed to repetitive building damage and the subsequent flood insurance claims. However, a review of the claims found that the repetitive loss claims in Monroe County can be tied almost exclusively to tropical storms and the associated storm surge.

There were six major storms over the past 2 decades that account for the bulk of the damage and claims. In fact, 97% of all the paid claims in the unincorporated portions of Monroe County came from these six storms. They are summarized in the table below.

Major Storm Summary

Name	Landfall	Category[1]	Paid Claims[2]	$ Claims[2]
Georges	Sept. 1998	3	3,055	$ 37,066,289
Mitch	Nov. 1998	Trop. Storm	41	$ 244,287
Irene	Oct. 1999	1	396	$ 3,859,108
Rita	Sept. 2005	2	171	$ 4,074,089
Wilma	Oct. 2005	3	4,070	$ 123,466,400
Irma	Sept. 2017	4	3,163	$ 110,714,342
		Totals	10,896	$ 279,424,515

1. Category is the category on the Saffir-Simpson Hurricane Scale when the storm hit Monroe County.
2. Claims figures are for all of unincorporated Monroe County, not just the repetitive loss areas.

The following review shows the variations in the storms and their impacts, but they consistently resulted in flood insurance claims. It should be noted that the tropical storm or hurricane category is a relative indicator of the severity of a storm, but not a measure of storm surge or flood levels, which varied throughout the County.

Hurricane Georges, September 1998: On September 16, a depression was upgraded into Tropical Storm Georges and further into Hurricane Georges the next day. The eye of the storm passed near Key West about midday on September 24.

Wind: The storm reached its peak intensity on September 20 with winds of 155 mph, just below Category 5 status on the Saffir-Simpson Hurricane Scale. Wind gusts near the center of the storm over the Keys reached 125 mph.

Rain: Rainfall amounts amounted to a maximum of 8.41 inches in Tavernier and 8.38 at Key West International Airport.

Storm surge: Upon making landfall, Hurricane Georges brought a storm surge of up to 12 feet in Tavernier, with similar but lesser amounts along the rest of the Keys. Waves up to 10 feet put many parts of the Overseas Highway under water.

Damage: Strong winds downed palm trees and power lines, leaving all of the Keys without power. The most severe damage was sustained between Sugarloaf Key and Big Pine Key in the Lower Keys. Georges' waves overturned 2 boats in Key West. 1,536 houses were damaged with 173 homes destroyed, many of which were mobile homes (right).

This mobile home and its addition suffered substantial damage from Hurricane Georges because it was built too low.
– Building Performance Assessment Report, Hurricane Georges in the Gulf Coast, FEMA 338, 1999

Flood insurance claims: Based on claim locations, Hurricane Georges was predominantly a Middle and Lower Keys event.

Number of paid claims:	3,055
Total payments:	$37,066,289
Average payment:	$12,133

Hurricane Mitch, November 1998: Mitch formed in the western Caribbean Sea on October 22. It drifted to Central America, where it caused a great deal of damage and killed more than 9,000 people. Mitch then weakened, moved back, and struck Florida as a strong tropical storm on November 5.

Wind: Key West International Airport reported peak wind gusts of 55 mph and sustained winds of 40 mph, the only report of tropical storm force in the state.

Rain: Hurricane Mitch caused moderate rainfall.

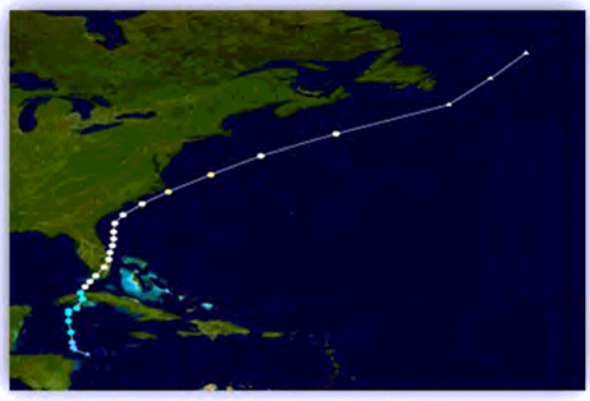
Storm surge: Hurricane Mitch caused a storm surge of up to 4 feet in the Lower Keys before making landfall on the Florida west coast.

Damage: In the Florida Keys, multiple buildings that had been damaged by Hurricane Georges were leveled by Hurricane Mitch.

Flood insurance claims: Hurricane Mitch was a relatively isolated event, judged by flood claims:

Number of paid claims:	41
Total payments:	$ 244,287
Average payment:	$ 5,958

Hurricane Irene, October 1999: Not to be confused with a larger storm in 2011, this Hurricane Irene developed in the western Caribbean Sea on October 13 and moved northward, hitting western Cuba. The storm strengthened over the Florida Straits, attaining hurricane status on October 15. It passed over Key West, turned more to the north-northeast, and struck mainland Florida at Cape Sable.



Rain: Hurricane Irene was a wet Florida hurricane, dropping 12 inches of rain on Key West. The rainfall flooded roads throughout the Keys, prompting officials to close 50 miles of U.S. Highway 1.

Storm surge: While moving through the Florida Keys, Hurricane Irene produced a storm surge of up to 2.3 feet in Key Vaca, while Key West reported a surge of 1.5 feet.

Damage: Hurricane Irene had moderate wind gusts that caused power outages throughout the Keys, but overall damage was minor.

Flood insurance claims: Hurricane Irene largely appeared to be an Upper Keys event, with most of the claims in Key Largo or Tavernier.

Number of paid claims:	396
Total payments:	$ 3,859,108
Average payment:	$ 9,745

Hurricane Rita, September 2005:

Hurricane Rita was the fourth-most intense Atlantic hurricane ever recorded and the most intense tropical cyclone ever observed in the Gulf of Mexico. Part of the record-breaking 2005 Atlantic hurricane season, which included three of the six most intense Atlantic hurricanes ever recorded (along with #1 Wilma and #6 Katrina).

Hurricane Rita formed near the Bahamas on September 18 and moved through the Florida Straits. Upon entering the Straits of Florida on September 20, Hurricane Rita strengthened into a Category 1 hurricane. After passing south of Key West, Hurricane Rita turned northwest into the Gulf and intensified into a Category 5. It was a Category 3 when it hit Louisiana's Gulf coast.

Wind: The highest sustained winds were recorded in Key West at 62 mph.

Rain: Hurricane Rita produced rainfall of 2-4 inches in the lower and middle Keys with greater than 6 inches estimated by radar in portions of the Upper Keys.

Storm surge: A maximum storm surge of 5 feet was recorded in Key West. Storm surge along portions of the Atlantic shores of the middle and upper Keys were recorded at 3-4 feet.

Flood insurance claims: Hurricane Rita was another Upper Keys storm in terms of flood insurance claims paid. Most of the paid claims were located in Key Largo and Tavernier.

Number of paid claims:	171
Total payments:	$ 4,074,089
Average payment:	$ 23,825

Hurricane Wilma, October 2005:

Hurricane Wilma was the most intense tropical cyclone ever recorded in the Atlantic basin. After impacting Central America and Mexican Yucatan Peninsula, a powerful trough turned the hurricane to the northeast and accelerated its forward motion.

Wind: Wilma hit Cape Romano, Florida, as a 120 mph major hurricane. Overall, average winds across the inhabited Lower Keys were estimated at 70 to 80 mph with gusts up to 90 mph.

Rain: Rainfall across the Lower Keys was fairly light but typical for a fast-moving hurricane, 1.50 inches measured at Pennekamp State Park in Key Largo.

Storm surge: Low-lying areas of the Keys received several feet of water that flooded homes. The Lower Keys experienced an unusual flood: it occurred twice. First, as the storm approached Florida, it pushed water across the keys from south to north.

Flooding of Fifth Street in Key West during Hurricane Wilma.
– CityofKeyWest.gov

As the storm finally crossed into the Everglades, all the water that had been pushed by the storm was released as Wilma crossed the peninsula. This caused additional flooding and costly damage, from a "backwash" of up to 8 feet; this second round of flooding constituted the peak of the storm surge.

"Storm surges of 4 to 5 ft were observed over much of the lower and middle Florida Keys, locally to near 7 ft. However, a storm surge of near 9 ft was estimated visually in the Marathon area. Storm surges were generally in the 4 to 5 ft range over the upper Keys. This resulted in considerable flooding over substantial portions of the Keys." – "Tropical Cyclone Report – Hurricane Wilma," NOAA National Hurricane Center, 2006

Flood insurance claims: Hurricane Wilma affected the entire county with a wide distribution of flood claims. It affected the Middle and Lower Keys at a higher ratio per developed property.

Number of paid claims:	4,070
Total payments:	$ 123,466,400
Average payment:	$ 30,336

Hurricane Irma, September 2017

Hurricane Irma made landfall at Cudjoe Key on September 10. It then hit Marco Island and moved on to Georgia[2].

[2] (Quotes in this section are from the County's webpage, www.monroecounty-l.gov/726/Hurricane-Irma-Recovery, *Hurricane Irma in Florida*, Mitigation Assessment Team Report, ("MAT Report") FEMA P-2023, 2018, and *Tropical Cyclone Report, Hurricane Irma*, NOAA-National Hurricane Center, 2017.)

Wind: Cudjoe Key had maximum winds near 130 mph. "Buildings designed and constructed to comply with the Florida Building Code met expectations by performing well structurally." – MAT Report

Rain: "…rainfall totals of 10 to 15 inches were common across the peninsula and the Keys..." NOAA

Storm surge: "The combined effect of storm surge and the tide produced maximum inundation levels of 5 to 8 ft above ground level for portions of the Lower Florida Keys from Cudjoe Key eastward to Big Pine Key and Bahia Honda Key… Maximum inundation levels of 4 to 6 ft above ground level occurred across the Middle and Upper Keys." – NOAA

Storm surge during Hurricane Irma.

– Phys.org

"Although inundation alone was a significant source of damage, some of the more dramatic structural failures observed were a result of the added force of wave action and scour." – MAT Report

Damage: "In unincorporated Monroe County, approximately 727 homes were destroyed and another 1,034 homes are considered to have substantial damage …the hardest-hit areas were the mobile homes, manufactured homes and RVs." – County website.

Floods bring more than water. Debris and wave action can cause as much or more damage to a structure, as witnessed by this boat in Big Pine Key during Irma.

– Mitigation Assessment Team Report, Hurricane Irma in Florida, FEMA P-2023, 2018

"Hurricane Irma dramatically demonstrated the benefit of investment in a hardened infrastructure. The primary roadway system, water, and wastewater systems remained largely resilient to these natural forces. The electrical grid and the communications system, however, remain highly vulnerable to wind and storm surge." – County webpage.

"Some of the structures destroyed by the storm were MH units located in the floodplain. Very few of these houses were elevated to the base flood elevation. Buildings constructed at or near grade were subject to deeper and more damaging flooding from either storm surge or rainfall-induced flooding." – MAT Report

Flood insurance claims: There were more than 4,600 claims submitted from Monroe County policy holders following Hurricane Irma.

Number of paid claims:	3,163
Total payments:	$ 110,714,342
Average payment:	$ 35,003

The average residential claim was $30,578 and the average non-residential claim was $89,254. The average payments were certainly higher overall than from the previous storms.

Future Flooding

"Due to the impacts of climate change and sea level rise, … the frequency and severity of flooding conditions are expected to increase in the future. Surge heights are predicted to be greater due to sea level rise and climate change is expected to periodically cause more intense rainfall which will exacerbate freshwater flooding." – *Monroe County Local Mitigation Strategy*, (2015 Update) Section 5.2.1, page 5-5.

"Monroe County is ground zero for experiencing the impacts of global climate change and sea level rise. Along the chain of islands that is barely above the sea, many streets already are flooding numerous times throughout the year from extreme fall and spring tides.

"Habitat for wildlife that once was high and dry continues to have seawater encroach on the lands. Rising seas have begun to affect some roads and other County infrastructure, as well as some homes and businesses – and will continue to do so into the future." – www.monroecounty-fl.gov/803/Sustainability

In short, given that sea levels will rise and severe weather will become more common, we can expect future flooding to be worse that what has been experienced in the past.

In response to these concerns, the Board of County Commissioners has initiated several programs and projects to address the impact of climate change. These include adopting an Energy and Climate Element into the Comprehensive Plan, creating a Sustainability office, participating in the Southeast Florida Regional Compact for Climate Change, and funding projects to raise critical infrastructure and roads flooded during high tides.

Impact of Flooding

Water covering a barrier island is a flood, but not necessarily a flood problem. Flood problems arise when the water inundates streets and houses and closes schools and businesses.

The number and average amounts of flood insurance claim payments have increased over the years. One reason for this is that more people are purchasing flood insurance, which is a good thing. However, simply looking at the insurance claims numbers does not tell the whole story of how flooding impacts people.

Building damage: First, it is important to note that an insurance claim does not pay for all the damage to a building. The property owner or tenant must pay for:

→ The deductible, which has normally been $1,000 in recent years, but many policy holders opt for larger deductibles to save on premiums;

→ Repairs to damage that cost more than the policy's amount of coverage;

→ Damage to the contents of the building (unless the owner or tenant has taken out contents coverage); and

→ Damage to property not covered by flood insurance, such as landscaping, vehicles, items kept outdoors, and currency.

Second, much of the property damage is hidden. A building may look sound after the water goes down, but wood will swell when wet. Plywood can come apart. Gypsum wallboard will fall apart if it is bumped before it dries out. The longer these materials are wet, the more moisture, sediment and pollutants they will absorb. To properly clean a building requires weeks of stripping, drying (right), cleaning, and rebuilding. If a building is not properly cleaned (often because it wasn't covered by insurance), a health hazard remains hidden behind the walls.

Machinery like appliances and gasoline engines may look like they just got wet, but the sediments and chemicals in the water mean they will not work safely unless they are properly dried and cleaned. Other contents, such as mattresses and upholstered furniture, are usually not worth the cost of restoring them to a useful and safe condition.

Life safety: Shallow, slow moving, floodwaters usually do not cause much damage to buildings. However, it doesn't take deep water to be dangerous to people. A car will float in shallow moving water (right). This is one reason floods kill more people trapped in vehicles than anywhere else. To help reduce this hazard, the County is making a major effort to raise roads that flood during high tides and heavy storms.

Electrocution is the number two cause of flood deaths, claiming lives in a flooded area that is carrying a live current created when electrical components short. People also die of heart attacks, especially from exertion during a flood fight.

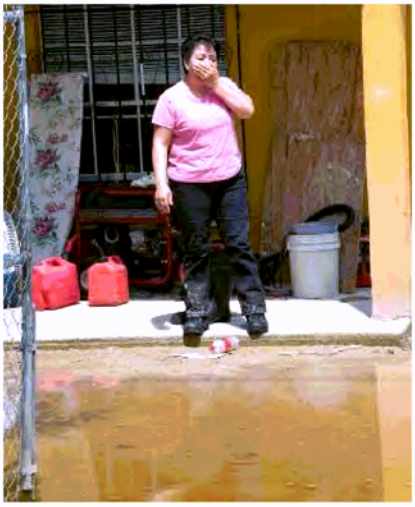
Floods can damage gas lines, floors and stairs, creating secondary hazards such as gas leaks and unsafe structures. They can extinguish pilot lights and short circuit electrical wiring—causing conditions ripe for a fire. Fire equipment may not be able to reach a burning building during high water.

Health: Three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the runoff picked up, including dirt, oil, animal waste, and lawn and industrial chemicals. The water can be a breeding ground for bacteria, such as E. coli, and other disease causing agents.

The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew. A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

These health problems can be aggravated when air conditioning ducts in a forced-air system are not properly cleaned after inundation. When the air conditioner is turned on, the *sediments* left in the ducts are circulated throughout the building and breathed in by the occupants.

The third health problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.



For all these reasons, repetitive flooding has an impact on people that a flood insurance policy will not prevent.

Problem Statement

All of Monroe County is considered to be in a coastal floodplain and flooding is not uncommon. One measure of the frequency of floods is FEMA's repetitive loss standard: two floods in any ten year period that result in flood insurance claims for more than $1,000 each.

Since 1998, 21 years ago, the County has experienced six major storms that have resulted in much larger claim payments. The primary cause of flood damage has been storm surge flooding during these major storms. Heavy rain and subsequent drainage problems have contributed to the flood damage, but their impact is hard to measure when entire areas are flooded by storm surge.

Between 1978 and 2017, there were 11,205 flood insurance claims paid in unincorporated Monroe County. The average paid claim was for $21,413. Of those, 10,896 (97%) were from the six major storms discussed in this chapter. The average claim payments for the last two, Wilma and Irma, were over $30,000 and $35,000, respectively. Clearly, addressing repetitive losses will go a long way to addressing the problems of flooded buildings in Monroe County.

Insurance claims do not tell the full story of the impact of flooding, not even the full cost of repairing and replacing damaged property. There are also safety, health, and mental health impacts, as discussed in this chapter. While this analysis focusses on damage to property, other County programs are working to lessen all the impacts of flooding. Reducing damage to insurable buildings will have spin off benefits on the safety, health, and mental health issues, too.

Chapter 3. Mitigation Measures

This chapter reviews the things that can be done about repetitive flood damage. There are two general approaches. The most popular approach is to control the water – keep it away from people and property. In a typical riverine situation, this involves building structures like dams and floodwalls to store flood waters away from development or levees, channelization and drainage improvements to move or divert waters away from developed areas.

In a coastal area, there are few options to control flooding from the ocean. Structures, such as groins and seawalls have an impact on smaller storms, but are usually not big enough to control all floods. Generally, these "structural projects" are on public property and are funded by a government agency.

There are many situations where structural projects will not work or do not make economic sense. There is an alternative to controlling water and that is to modify the affected property so the water does not cause a problem. This approach is called nonstructural projects, which include moving buildings out of the hazard area, raising the damage prone parts above flood levels and other modifications to eliminate or reduce the potential for damage. These projects are on private property and are usually the responsibility of the property owner, although there are government funding programs.

It should be noted that Monroe County and its property owners are not faced with an "either/or" decision. It is not a case of doing one or the other. One can be more effective than the other in different situations, so both approaches should be pursued.

Structural Projects

Beach Structures

Beaches and sand dunes that form naturally over time provide a measure of protection to inland property. If a building is far enough back from the water, the waves break on the beach and dissipate inland. Monroe County does not have many natural beaches, so there are not many places where structures will impact inland flooding. Plus, they have several limitations, as discussed below.

Beach structures help preserve the natural protection provided by beaches and dunes. Jetties, groins, and breakwaters are built out into the ocean to direct water or sand to an area to be protected or catch sand that is moved along the shoreline by a lateral current. They are made of large boulders, concrete, steel, wood, or a combination of these materials. Other structures have the same impact on the movement of sand (photo).

These structures north of Islamorada have caught sand carried by a lateral current that flows from the right.
– Google Earth photo

Advantages of beach structures:

→ They can collect sand in front of the building(s) to be protected if there is a natural or artificial source upcurrent.

Disadvantages of beach structures:

→ These structures keep sand from flowing naturally along the shoreline.

> Sand builds up on one side of the groin (updrift accretion) at the expense of the other side (downdrift erosion). If the current direction is constant all year long, a groin "steals" sand that would normally be deposited on the downdrift end of the beach. The amount of sand on the beach stays the same. A groin merely transfers erosion from one place to another further down the beach….
>
> As soon as one groin is built, property owners downdrift of it may start clamoring for the government to build groins to save "their" beach. Eventually, the beach may become lined with groins. Since no new sand is added to the system, groins simply "steal" sand from one part of the beach so that it will build up on another part. There will always be beach erosion downdrift of the last groin. – http://beachapedia.org/Shoreline_Structures

→ They can adversely impact natural functions and essential habitat, especially for sea turtles and birds.

→ They require continual expenditures for maintenance

Regulatory restrictions on beach structures:

→ The County's Year 2030 Comprehensive Plan Policy 102.7.3 reads "Shoreline hardening structures, including seawalls, bulkheads, groins, rip-rap, etc., shall not be permitted along shorelines of CBRS units." Coastal Barrier Resource System areas can be seen on the Flood Insurance Rate Maps for the County at https://msc.fema.gov.

→ Policy 212.5.1 states: "No new bulkheads, seawalls or other hardened vertical shoreline structures shall be permitted on open water (unaltered shorelines)." There are additional criteria for such structures that would protect existing development, but they generally limit the works to the use of natural vegetation, replacement of existing structures, or severely eroding areas.

→ Policy 212.5.4 states: "Shoreline structures shall be designed to protect tidal flushing and circulation patterns. Any project which may produce changes in circulation patterns shall be approved only after sufficient hydrographic information is available to allow an accurate evaluation of the possible impacts of the project." Because the purpose of a structure to catch sand is to change circulation patterns, these projects are contrary to County policy.

→ Because of the problems structural measures cause to other properties, they are generally discouraged. For example, the Florida Department of Environmental Protection's Coastal Armoring Policy and Guidelines states "Coastal armoring, however, may negatively impact the integrity and natural functioning of the beach and dune system, and it may also increase the vulnerability of adjacent unarmored properties to storm damage." The policy limits these structures to certain situations, such as protecting "significant public infrastructure.

Seawalls

As with jetties and groins, seawalls are also structures made of boulders, concrete, etc. Instead of jutting into the water, they run parallel to the shore. They are usually constructed to stop erosion from undermining a building rather than to stop waves or flooding, but they can serve both purposes.

Advantages of seawalls:

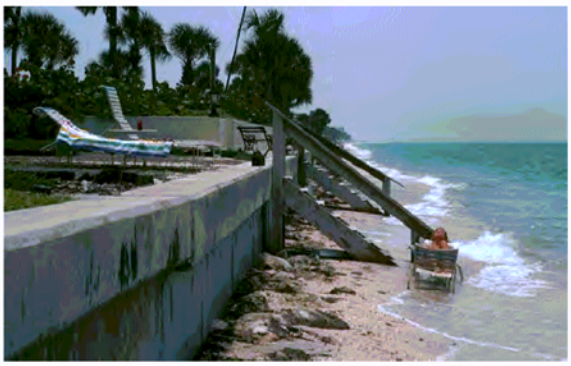
→ The area behind the wall is protected from smaller storms.

Disadvantages of seawalls:

→ As with jetties and groins, seawalls can transfer the problem to the adjacent areas that do not have a wall ("flanking erosion").

→ Seawalls can be expensive, especially if a long stretch of beach is to be protected.

→ Walls, especially vertical walls, aggravate beach erosion. Waves that hit the walls take sand with them when they wash back. An example of this is in the photo above.



This seawall is in Clearwater. There was a subsequent beach nourishment project.
– *National Assessment Of Shoreline Change, US Geological Survey, 2004*

→ People want to cut down mangroves to install seawalls, adversely impacting natural functions and essential habit and destroying the protection provided by mangrove stands.

Regulatory restrictions on seawalls:

→ Most seawall designs will create an obstruction to flow and would be prohibited in V Zones.

→ See also the regulatory restrictions for beach structures on page 21.

→ The County's Comprehensive Plan Policy 210.1.6 reads "Seawalls shall be prohibited on any beach or open water (unaltered) shoreline."

Beach Nourishment

Instead of, or in addition to, structures, some communities bring sand in to rebuild an eroding beach or line of dunes. This is especially popular where tourism and the beach are a vital part of the local economy. It requires the right kind of sand that matches what is currently on the beach and that does not erode too fast. The sand is usually pumped in from an offshore supply, but sometimes trucked in from another location.

Advantages of beach nourishment:

→ The protection provided by the beach is increased.

→ Restores habitat for turtles and other threatened and endangered species that live or nest on beaches.

Disadvantages of beach nourishment:

→ There are few places in the County with beaches protecting structures. Most beaches are in public parks or natural areas.

→ Beach nourishment can be very expensive. Most major projects are funded by the US Army Corps of Engineers, which requires lots of lead time for planning and appropriating the federal funds. There can still be a substantial local cost share.

→ It is a temporary solution. The natural erosion process is not stopped. In some cases another nourishment project may be needed in ten years or sooner. Panama City Beach (above) has had projects in 1998, 2005 (to replace sand lost to Hurricane Ivan), 2011, and 2017, although not all at the same locations.

→ These projects send people the message that areas behind beaches will always be protected, leading many to double-down on development, tearing down small cottages and replacing them with big structures.

→ Nourishment projects are generally disruptive to beach life for some period. Trucking sand in can mean weeks of dump-trucks damaging roads. Most projects include tractors driving up and down beaches. Plants and animals that live on the beach get smothered and the water is muddied.

Regulatory restrictions on beach nourishment:

→ Each project gets approval from several state and federal agencies that ensure that the project will not have adverse impacts.

This view of Long Key shows typical areas that (1) have no beach, (2) have beaches that protect vacant lands, or (3) have single family homes behind the beaches, which don't warrant the millions of dollars needed to pay for a nourishment project. As a result, it is difficult in many areas to justify the expense of such a project.

Natural Resource Protection

The County has several programs that are designed to protect natural resources that have a spin off benefit on flood mitigation. For example, the County has undertaken some coral reef restoration projects, funded under the RESTORE Act with money from the BP oil spill. The spin off benefit is that reefs in good condition will help reduce the impact of waves on nearby beaches.

This open space area is one of the parcels purchased by the Land Authority on Big Pine Key

Another program is acquisition of sensitive lands. The top priorities for land to be purchased by the Monroe County Land Authority include designated natural areas, habitat for threatened or endangered species, and habitat buffer areas.

There are also regulations to protect natural features, such as seagrass and mangrove stands. Like healthy coral reefs, these areas reduce the impacts of waves, protecting inland areas.

Advantages of natural resource protection:

→ These activities are funded and administered by different offices, extending the number of programs that benefit floodprone properties.

→ The resulting open space has little to no development to be damaged by a flood and provides a natural buffer from water and waves.

Disadvantages of natural resource protection:

→ Because the thrust is to protect natural areas, many of the areas affected are not built on so there may be minimal benefits to floodprone buildings.

Regulatory restrictions on natural resource protection

→ Restrictions would generally be to limit adverse impacts on natural functions, such as critical habitat. For example, the area could not be graded to build a seawall or other flood protection measure.

Drainage Improvements

Due to the topography and small size of the islands and the rural character of the unincorporated areas, Monroe County does not have a master drainage system that collects stormwater with underground storm drains and delivers it to larger pipes which discharge it into the ocean. Instead, surface runoff flows to the streets which carry it to the ocean. Close to the discharge point in many locations, the surface water is directed into outfall pipes.

> In some king tide events, the tidewater inundation of outfall pipes has caused reverse conveyance of saltwater through stormwater systems and an associated discharge from stormwater inflow structures into low-lying roads and yards. Although such flooding has often been observed – and is perhaps most obvious – on days without rainfall (i.e., "sunny days"), more severe flooding will inevitably result from the co-occurrence of large rainfall events with high tides that impede the regular functioning of stormwater discharge systems. – *Monroe County Watershed Management Plan*, 2019

This system handles small drainage areas that do not collect enough stormwater to create much of a drainage problem for buildings, although there are some instances of buildings flooded during heavy rains. While there is "nuisance" flooding, the biggest concern with the drainage system is the flooding of roads.

In cooperation with the Department of Engineering, Roads & Bridges, the County's Sustainability office is initiating the Roads Adaptation Plan. This is a program to protect roads from flooding during high tides, which are expected to get worse over time with sea level rise. These projects may improve drainage if the higher roads act as levees and keep shallow floodwaters away from properties.

Construction on two pilot projects will start in 2020. One is in repetitive loss area 27, the Sands Subdivision. More information about the master analysis and maps of problem sites and project locations will be produced in 2020. Each project will be different, so property owners should check any that will be in their area to see how they may address local drainage conditions.

Advantages of drainage improvements:

→ They reduce nuisance flooding and help keep the roads open during high water.

Disadvantages of drainage improvements:

→ The projects planned by the County may not be large enough to affect larger flows that flood buildings.

→ County projects address flooding on roads and County property. Private property owners need to fund projects on their own property.

This can be a typical scene in Repetitive Loss Area 7, Twin Lakes.

– Monroe County News Release, 9/4/2019

Flooded road in Repetitive Loss Area 22, The Sands Subdivision.

Regulatory restrictions on drainage improvements:

→ All construction that affects the ground surface in the SFHA is considered development and needs a floodplain development permit. The applicant needs to be sure that the project will not redirect or increase flows onto neighbors.

Nonstructural Projects

While structural projects are the focus of most repetitive loss area analyses, Monroe County does not offer many opportunities for their application. There are few beaches that provide protection to buildings and, in most places, drainage systems on private property are too small to warrant public expenditures. The natural resource protection measures do apply to many areas throughout the County, but, as with beaches, they do not always correlate with repetitively flooded buildings. These shortcomings do not mean these measures should not be pursued, but that other approaches may be more effective for more properties.

Nonstructural mitigation projects address each building separately. There are two types of nonstructural projects: those for all flooding hazards and those limited to drainage and shallow flood problems:

Deeper flooding	Shallow flood depths
Acquisition	Barriers
Elevation	Dry floodproofing
Mitigation reconstruction	Wet floodproofing

Protection from deeper flooding and protection to at least the base flood elevation is preferred. However, not every repetitively flooded building is subject to deep flooding. Even with deep coastal storm surge, there are inland areas where the water was shallow. Of 4,375 paid flood insurance claims in the 60 repetitive loss areas, 2,802 (64%) were under $10,000. Of the 3,152 claims paid in the County after Irma, 1,536 (49%) were under $10,000. To be designated a repetitive loss property by FEMA, there only needs to be two claims, each over $1,000.

Buildings with such small claim payments were probably not flooded more than a foot or two over the first floor. This opens up the County's options for addressing repetitive flooding – not every building needs to be acquired or elevated if other less expensive measures can reduce the risk of flood damage in areas of shallow flooding.

Nonstructural projects are usually initiated by the property owner, so this section is written with the owner as the reader. See Chapter 4 for guidance on selecting which measures are appropriate for different building types and depth of flooding. Sources of funding for these measures is covered next.

Mitigation Funding

There are several State, FEMA, and HUD grant programs that the County has and may still apply for, either in an annual application cycle or after a disaster declaration. Most of these require a local cost share, which is usually assumed by the benefitting property owner. Most are provided to local governments, not directly to the property owner.

On page 29 is a matrix summarizing the programs and the types of projects they fund.

Federal Grants

Hazard Mitigation Grant Program: HMGP grants are provided to communities following a Presidential Disaster Declaration. They are administered by FEMA. The key purpose of this grant program is to enact mitigation measures that reduce the risk of loss of life and property from future disasters. Grants are typically 75% FEMA and 25% non-Federal. The latter share can be funded by the state, the community, or, most often, by the property owner. For more information: www.fema.gov/hazard-mitigation-grant-program.

Flood Mitigation Assistance Grant Program: FMA provides funds to assist communities implement measures that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insured under the National Flood Insurance Program. Applicant properties must be covered by flood insurance because the NFIP funds these grants. Funds are typically made available by FEMA on an annual basis; a disaster declaration is not required. The cost share is similar to HMGP. For more information: www.fema.gov/flood-mitigation-assistance-grant-program.

Pre-Disaster Mitigation: This FEMA program provides funds to states and communities for hazard mitigation planning and the implementation of mitigation projects for any natural hazard. As with FMA, PDM follows an annual competitive application process and is not tied to a disaster declaration. For more information: www.fema.gov/pre-disaster-mitigation-grant-program

Community Development Block Grant: There are two parts of this grant which is funded by the US Department of Housing and Urban Development (HUD) and administered through the Florida Department of Economic Opportunity (DEO). One has an annual appropriation and application process and funds projects that benefit low and moderate income families. The other CDBG program provides funds to the state after a disaster declaration. The current version of this is Rebuild Florida, described below. For more information: www.hud.gov/program_offices/comm_planning/communitydevelopment/programs

State Grants

Rebuild Florida: This is a program of DEO to help Florida's long-term recovery efforts from Hurricanes Irma and Michael. It funds demolition, repair, reconstruction and elevation of primary homes. Monroe County has received Rebuild Florida funds and manages them under the Voluntary Home Buyout Program, which is described on the next page.

Florida Forever: This program is the state's main funder of acquisition of conservation and recreation lands. It is administered by the Department of Environmental Protection which passes appropriated funds to a variety of other state agencies that acquire lands for their programs, such as the Division of Recreation and Parks and water management districts. The Legislature has not appropriated funds every year.

The Florida Keys Environmental Stewardship Act was passed in 2016. It sets aside funds from Florida Forever for projects in the Keys.

For more information: https://floridadep.gov/lands/environmental-services/content/florida-forever and www.monroecounty-fl.gov/721/Florida-Keys-Stewardship-Act.

Local Programs

Voluntary Home Buyout Program: This is a County-managed program supported by funds from Rebuild Florida. It is described in more detail in the box below.

Voluntary Home Buyout Program

In September 2019, Monroe County submitted an application to the state for this disaster recovery program. Its objective is to acquire residential property in high flood-risk areas impacted by Hurricane Irma.

Under this program, the County will purchase properties at the pre-Hurricane Irma fair market value for both the land and the structure. Priority properties are located in low- and moderate-income areas. Any existing structures will be demolished, and the property will be used for permanent open space, conservation, recreation, or stormwater management systems in perpetuity.

The County's submittal had 62 properties that owners voluntarily signed up for. The total cost was estimated at more than $25 million. To date, the State has allocated only $15 million to the County, so a point prioritization system was approved by the Board of County Commissioners:

- 5 points for homes that were substantially damaged as a result of Hurricane Irma;
- 5 points for homes that are located in the V Zone;
- 5 points for repetitive loss structures as designated by the NFIP;
- 10 points for severe repetitive loss structures as designated by the NFIP, and
- 5 points for high probability of sea level rise inundation as detailed in the maps in the County's GreenKeys Plan.

It should be noted that repetitive loss and severe repetitive loss structures are those specifically designated by FEMA based on flood insurance claims. It does not include other properties located in the mapped repetitive loss areas that only had one or no insurance claims.

Property owners may still apply in case more funds are made available. For more information, see www.monroecounty-fl.gov/1133/Voluntary-Home-Buyout-Program

Land Authority acquisition program: This is a program to acquire designated natural areas, habitat and habitat buffer areas for threatened or endangered species, sites to build resilient affordable housing, designated V zone properties, areas for recreational facilities, and areas with deteriorated infrastructure where the cost of maintaining and/or repairing the infrastructure exceeds the value of private lands." (Year 2030 Comprehensive Plan Policy 102.4.2) Sales must be voluntary.

Monroe County Density Reduction Lot acquisition program: This is a voluntary program to retire development rights for certain properties. The County purchases the property from willing sellers. Purchased lots can be sold, but they come with a deed restriction to prohibit the development of the property with new housing units. The revenue derived from the sale of these deed restricted properties can help replenish the program's funds.

Monroe County Less Than Fee acquisition program: This is another voluntary program to retire building rights. The County purchases the right to build a house on a vacant property from adjacent property owners. The owners retain ownership of their vacant property, but they can only use it for legally allowed accessory uses like a swimming pool, open yard or garage.

Flood Insurance

A flood insurance claim is paid directly to the policy holder after a flood. It can help fund nonstructural projects in two ways. The first is to incorporate mitigation measures in the repairs and reconstruction funded by a claim payment. For example, an area can be wet floodproofing by replacing a flooded wooden floor with a tile or concrete floor that can be flooded again without being damaged.

The second tool is Increased Cost of Compliance. This comes automatically with all flood insurance policies. Up to $30,000 is available as an additional claim payment to help pay for a mitigation measure that is required by law. For example, if a flooded house was deemed to be substantially damaged, it would be required to be elevated. ICC can help fund the mandated project. It can also be used toward the non-Federal match of a FEMA or HUD grant. As a flood insurance claim tool, it can only be used if the damage was caused by a flood. For more information: www.fema. gov/increased-cost-compliance-coverage

Eligible Activities by Funding Program

	Acquisition of Vacant Land	Acquisition of Buildings	Elevation	Mitigation Reconstruction	Barriers (1)	Dry Floodproofing	Wet Floodproofing	Drainage Improvements
Hazard Mitigation Grant Program		✓	✓	✓		2		✓
Flood Mitigation Assistance Grant		✓	✓	✓		2		✓
Pre-Disaster Mitigation		✓	✓	✓		2		✓
Community Development Block Grant		✓	✓	✓				
Rebuild Florida			✓	✓				
Florida Forever		✓						
Voluntary Home Buyout Program		✓						
Land Authority acquisition program	✓	✓						
Density Reduction Lot acquisition	✓							
Less Than Fee acquisition	✓							
Flood insurance claim payment						✓	✓	
Increased Cost of Compliance			✓	✓				

1. While no program's description identifies barriers as eligible projects, barriers can be one of the most inexpensive measures, so full funding support may not be needed.
2. Only funds dry floodproofing of nonresidential buildings

Acquisition

This mitigation measure involves buying the repetitive loss property and clearing the site. This is particularly useful in areas where the cost to rebuild private properties and public infrastructure exceeds the value of properties in the area. The biggest constraint to use of this approach is funding: while it is the most effective nonstructural measure, it is also the most expensive.

There are several grant programs that fund acquisition, as noted in the previous section. Some of the programs currently administered in the County have other objectives, such as supporting affordable housing. There are two programs that specifically support flood mitigation: the Voluntary Home Buyout Program and the Monroe County Land Authority.

Acquiring repetitively flooded properties supports the "managed retreat" approach, which is the voluntary buyout of homes to allow the shoreline to move inland. High-risk areas are identified where this type of policy is the best long term solution. Then acquisition, planning, and regulatory techniques are used to reduce or stop development in the areas and relocate existing development out of harm's way.

Advantages of acquisition:

→ It is the best way to avoid building damage: remove the building from harm's way

→ Depending on the funding source, the land can be reused for a public benefit, such as a park, habitat, stormwater basin, or drainage improvements.

→ Land Authority priorities take growth pressures off of flood prone areas, sensitive lands and critical areas.

→ Create more open space that may handle flood waters or restore vegetation as a buffer.

Disadvantages of acquisition:

→ If FEMA funds are used, the owner must be a willing seller. If there are unwilling sellers, a project will result in a checkerboard pattern of empty lots next to lots with buildings whose owners did not want to sell (right).

→ If FEMA funds are used, the parcel must be deeded to a public agency that agrees to keep it in open space. There is a concern about the County owning and being responsible for maintenance of a number of small lots scattered around the County There is a related concern about the loss of property tax revenue.

This aerial photo shows the checkerboard pattern after an acquisition project: vacant lots next to houses that remain because the owners did not want to sell.

– Google Earth photo

→ Acquisition at fair market value can be very expensive. It is not usually done without outside funding. This adds time and work to the process.

Regulatory restrictions on acquisition:

→ There are no restrictions on removing a building from a hazard area. There may be restrictions if the structure will be physically moved to another site.

Elevation

Getting the building and utilities above the flood level on its existing site is considered the most effective approach to mitigating on site. All damageable portions of the building and its contents are high and dry during a flood, which flows under the building instead of into it. The effectiveness of elevation after a storm is shown in the pictures from Big Pine Key below.

House near shoreline and subject to wave action/ high water velocity was washed off its foundation and destroyed.

Inundation, water velocity, and debris damage to buildings situated farther from the shoreline.

Inundation, water velocity, and debris damage to buildings situated farther from the shoreline.

Minor enclosure damage to newer, elevated house situated away from the shoreline.

"Figure 3-3: Typical range in flood damage observed along Avenue D, in order along the street as indicated (Big Pine Key, FL)" from page 3-4 of *Hurricane Irma in Florida, Mitigation Assessment Team Report*, ("MAT Report") FEMA P-2023, 2018

If a residential building is substantially improved or substantially damaged beyond 50% of its pre-storm value, the County's ordinance and National Flood Insurance Program regulations require the building to be elevated above the base flood elevation (see "Terminology" and "County Code Definitions," Appendix C).

New and substantially improved buildings in the VE Zone have the bottom of the lowest supporting member of the lowest floor elevated at or above the base flood elevation plus one foot. Enclosures must be 299 square feet or less and able to break away during a storm. This worked in the above case. Buildings in the AE Zone can have floodable enclosures below the elevated floor, as in the case of the photo 4 on the next page.

— *Hurricane Irma in Florida*, FEMA P-20233, 2018

Depending on the foundation type, elevation can also be the most expensive measure. Most of the cost to elevate a building is in the preparation and foundation construction. The cost to elevate six feet is little more than the cost to go up two feet. Elevating an existing building is usually cost-effective for wood frame buildings on posts/piles or crawlspace because it is easiest to get lifting equipment under the floor and disruption to the habitable part of the house is minimal. Elevating a slab house is much more costly and disruptive.

There are several grant programs that can support elevation projects. The County has applied for and may still apply under FEMA's PDM and FMA programs at any time. Three properties were elevated with these funds recently. Further, after Irma, the State initiated Rebuild Florida funded by HUD and set aside $50 million for projects such as this.

Advantages of elevation:

→ Best protection for a building left on site

→ Will bring a substantially damaged structure up to code requirements

→ Can reduce flood insurance premiums for buildings in the SFHA

→ Eligible for most mitigation grants (provided the lowest floor is elevated at least two feet above the base flood elevation)

Disadvantages of elevation:

→ Projects can be very expensive, especially for slab foundations (e.g., > $100,000)

→ The area below the elevated floor must remain floodable (see "wet floodproofing," page 37)

→ Owners may resist because the appearance of the structure will change or they have trouble with stairs.

Regulatory restrictions on elevation projects:

→ The project should meet all regulatory requirements for a new elevated building in the SFHA (found at www.monroecounty-fl.gov/692/Building-Requirements). This will also qualify the structure for lower flood insurance premiums.

→ Enclosed areas below elevated buildings are limited to 299 square feet.

→ There are zoning restrictions on the height of the peak of the roof.

→ There may be issue with meeting setback requirements with additions of stairs, landings and utilities.

Mitigation Reconstruction

This approach is based on the determination that the building is in bad shape and is not worth the cost of elevating or retrofitting. The building is torn down and a new one is constructed on the site. As a new building, it must meet all the flood and building code standards in force at the time. In effect, the owner obtains a new home and the community replaces a damage-prone house for one that meets all the mitigation criteria.

Advantages of mitigation reconstruction:

→ Best protection short of removing the building from the flood hazard area

→ Will replace a substantially damaged structure for one that meets code requirements

→ Will reduce flood insurance premiums for buildings in the SFHA

→ Eligible for most mitigation grants, including Rebuild Florida

Disadvantages of mitigation reconstruction:

→ Can be expensive. It may be difficult for the owner of a dilapidated building to afford a new residence.

→ The cost of construction in the County is well above average, reducing the number of people who can afford this measure.

Regulatory restrictions on mitigation reconstruction:

→ The new building would have to meet all code requirements for a new building. Some of these are discussed under Elevation regulatory restrictions.

Barriers

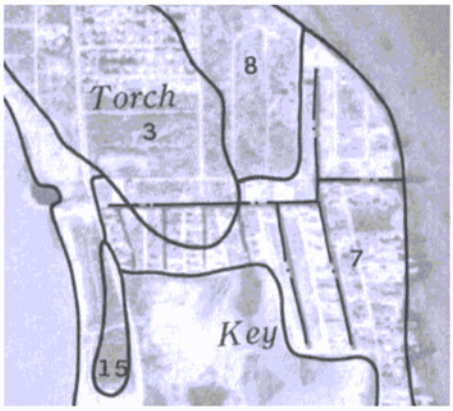
Small floodwalls or berms constructed around one or more properties are more dependable if flood depths are less than 3 feet and floodwaters rise and fall quickly. Levees and berms are more suitable for larger lots, and small floodwalls that are located close to the house are appropriate for Monroe County neighborhoods with limited front and side yard space.

The following provisions need to be considered in the design of a barrier:

→ There should be minimal openings in the barrier. These generally require "human intervention," meaning someone needs to be available to put sandbags or a moveable gate in the gap and have enough lead time to take action.

→ If floodwaters remain for several hours or days, there will likely be seepage under the barrier. The more permeable the soil, the more floodwaters seep under the barrier. The *Soil Survey of Monroe County, Keys Area, Florida*, US Natural Resources Conservation Service, 1995, identifies 19 soils types in the County. All but two are listed as Hydrologic Group D, which is described as Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Soils 7 (Udorthents) and 16 (Bahiahonda) are in Hydrologic Group B, which "have a moderate rate of water transmission." In effect, most of the soil types in the County would be appropriate for barriers with limited under seepage. However, the soil type should be checked for each location. One can access the Soil Survey and the maps (example, right) at https://ufdc.ufl.edu/UF00025712/00001/88x



Even if a property is not located in soils 7 or 16, it is still a good idea to have a soil sample checked by an engineer to determine the rate of permeability.

→ A system may be needed to prevent sanitary sewer backup from flowing into the building.

Advantages of barriers:

→ Lower cost. A berm of earth can be built by the owner.

→ No need to alter or modify the building.

Disadvantages of barriers:

→ Will not fit on small lots with no room to set the barrier back from the property line.

→ If human intervention is needed, there needs to be someone available on short notice to close openings, etc.

When flooding is very shallow, a barrier may only be needed to keep water away from a low area. The owner of this house built a floodwall around the patio at the back of his house. The opening allows people to walk over the wall so there is no need for human intervention.

→ Inspections and maintenance needed to fix holes or cracks that may develop over time.

→ If overtopped, the flood damage will be the same as if there was no mitigation measure.

→ Will not bring a substantially damaged structure up to code requirements

→ Does not reduce flood insurance premiums

→ Not eligible for most mitigation grants

Regulatory restrictions on barriers:

→ The Florida Building Code prohibits diverting water onto someone else's land. It can be difficult to set a barrier far enough back from the property line to meet this requirement.

→ Solid walls and filling projects of a size large enough to control flooding are not allowed in V Zones.

→ As structures, barriers would need to meet setbacks and open space and clearing allowances.

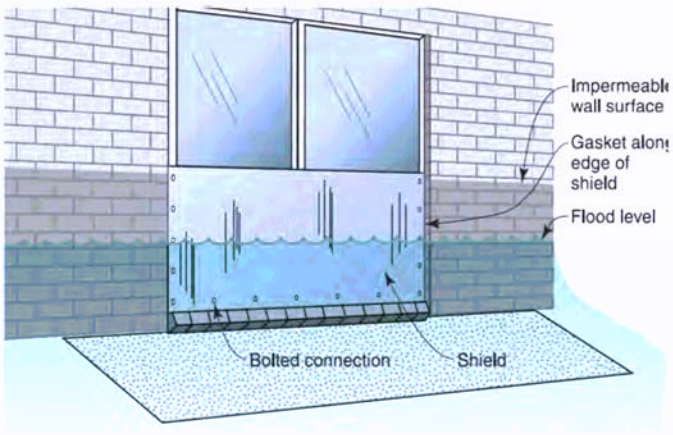
→ No filling is permitted in mangroves, wetlands or submerged lands.

Dry Floodproofing

This technique involves making the building walls watertight and capable of withstanding water pressures. In effect, the walls and floor are the barrier to water. Therefore, it only works for a building with a waterproof floor, i.e., a building on a slab foundation.

The following provisions need to be considered in a dry floodproofing design:

→ Make sure there are no cracks in the slab.



For dry floodproofing, the walls are made watertight and all openings are protected with permanent or removable shields.

– *Floodproofing Non-Residential Buildings*, FEMA

→ Make the walls watertight. This is easiest to do for concrete or masonry walls. The walls can be covered with a waterproof sealant and with a brick or stucco veneer to camouflage the sealant. Houses with wood, vinyl, or metal siding need to be wrapped with plastic sheeting to make the walls watertight, and then covered with a veneer to protect the plastic sheeting.

→ Do not attempt to dry floodproof more than 2 – 3 feet above the slab. A house is not built strong enough to withstand a lot of lateral pressure. Even if the building is in sound condition, tests by the Army Corps of Engineers have shown that water pressure on a typical house can collapse the walls and/or buckle the floor.

→ Account for sewer backup and other sources of water entering the building. For shallow flood levels, this can be done with a floor drain plug, standpipe, or backup valve.

→ Provide closures, such as removable shields or sandbags, for the openings; including doors, windows, dryer vents, and weep holes.


Floor drain float plug

→ Not all parts of a structure need to be dry floodproofed. It is difficult to floodproof a garage door, for example, so some owners let the garage flood and floodproof the walls between the garage and the rest of the house. Appliances, electrical outlets, and other damage-prone materials located in the garage should be elevated above the expected flood levels (see example, page 37).

Advantages of dry floodproofing:

→ Lower cost

→ Does not divert water problems to the neighbors

→ Will bring a substantially damaged nonresidential structure up to code requirements

→ Can reduce flood insurance premiums for a nonresidential structure in the SFHA

→ Eligible for most mitigation grants for nonresidential buildings

Disadvantages of dry floodproofing:

→ Not effective for elevated buildings or buildings on crawlspaces

→ If human intervention is needed, there needs to be someone available on short notice to close openings, etc.

→ Will not bring a substantially damaged residential structure up to code requirements

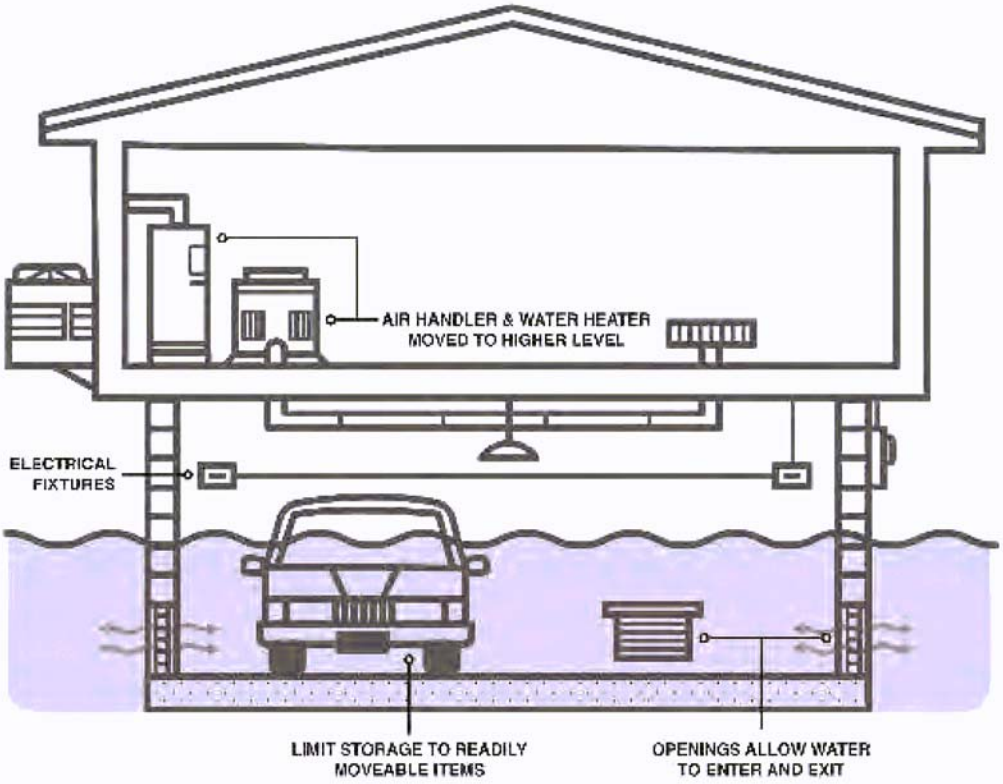
→ Does not reduce flood insurance premiums for a residential building

→ Not eligible for most mitigation grants for residential buildings

Regulatory restrictions on dry floodproofing: If the building is substantially damaged or the project is a substantial improvement in the SFHA, then this measure is only allowed for nonresidential buildings.

Wet Floodproofing

The wet floodproofing approach allows water into the building so there is no water pressure on the walls and floor. Everything that could be damaged by a flood is removed or elevated above the flood level. Structural components below the flood level are replaced with materials that are not subject to water damage. For example, concrete block walls are used instead of wooden studs and gypsum wallboard. The air-conditioning components and water heater are permanently relocated to a higher floor.



It can be seen that wet floodproofing only works for two types of buildings:

→ Buildings with a second floor. There must be a level above the flooded area for everything that needs to stay dry.

→ Elevated buildings and buildings on crawlspaces with air-conditioning components, ductwork, or other utilities below the first floor, where the area below the first floor is wet floodproofed.

Advantages of wet floodproofing:

→ No matter how little is done, flood damage is reduced. See the examples below.

→ Lower cost

→ Does not divert water problems to the neighbors

→ Because the building will effectively be an elevated structure, wet floodproofing has the same benefits as elevation if the elevated floor is at or above the BFE:

- Will bring a substantially damaged structure up to code requirements
- Can reduce flood insurance premiums for a structure in the SFHA
- Eligible for most mitigation grants for buildings

Disadvantages of wet floodproofing:

→ The owner loses what might be a finished floor. While the area can still be used, there should be no carpeting, furniture, insulation, and other materials subject to water damage that cannot be removed in time.

→ If items are kept or stored in the floodable area, there needs to be adequate warning time to remove damageable contents.

→ Clean up after the flood is still required.

Regulatory restrictions on wet floodproofing:

→ Generally there are no permits required for moving things out of a floodable area. However, altering the electrical system or installing openings in the building walls may need permits. Therefore, check with Building & Permitting for permit requirements for a specific project.

Thousands of dollars in damage can be prevented by simply elevating appliances in a garage or raising an air conditioning unit on blocks, above the flood level.

Flood Insurance

Although not a measure that mitigates property damage from a flood, a National Flood Insurance Program flood insurance policy has the following advantages for the homeowner or renter:

→ A smaller flood may not result in a disaster declaration. Flood insurance may be the only source of assistance to help owners of damaged property pay for cleanup and repairs.

There are more private flood insurance policies on the market today. This section only applies to policies sold under the National Flood Insurance Program.

→ A policy is always in effect − there is no need for human intervention.

→ It is an excellent "backup" for a flood protection project where the flood is higher than the protection level.

→ Coverage is available for the contents of a home as well as for the structure.

→ Renters can buy contents coverage, even if the building owner does not buy coverage for the structure itself.

→ Policy holders may be eligible for funding for a mitigation project after a flood through Increased Cost of Compliance (see www.fema.gov/increased-cost-compliance-coverage).

Flood insurance premiums are based on several factors, including the flood zone of the building, the age of the structure, and how high the lowest floor is above or below the base flood elevation. Properties in Zone X, outside the Special Flood Hazard Area, generally have the lowest premiums, but properties in the SFHA with the lowest floor a foot or more above the BFE can actually have lower premiums because their flood protection level is documented.

Comparison of Insurance Premiums

Type	Zone	Elevation *	Premium
Pre-1970	AE	N/A	$1,030
Elevation Rated	AE	3 feet > BFE	$283
Elevation Rated	AE	2 feet > BFE	$365
Elevation Rated	AE	1 feet > BFE	$597
Elevation Rated	AE	At BFE	$1,235
Elevation Rated	AE	1 feet < BFE	$2,793
Out of SFHA	X	N/A	$910

Premiums are for an primary residence one story single family house, on a slab foundation, $100,000 coverage on the structure, no contents coverage, $1,500 deductible, CRS Class 5. A second home or rental property would have a higher premium.

* The BFEs is found on the County's Flood Insurance Rate Map. See Appendix C

– Source: October 2019 *Flood Insurance Manual.*

Premiums are going up for all buildings, especially buildings that are not primary residences, severe repetitive loss properties, and those buildings constructed before the County joined the National Flood Insurance Program in June 1973. The County is in the NFIP's Community Rating System as a Class 5, which provides a 25% reduction in premiums on SFHA properties.

The best way to reduce the cost of flood insurance is to elevate the building above the base flood elevation. Nonresidential structures that have been dry floodproofed to one foot above the BFE can also benefit from lower premiums. The reduction in premiums for buildings that are higher than the base flood elevation ("> BFE") can be seen in the Comparison of Insurance Premiums table above. The rates and premiums are different for other types of buildings.

For more information on National Flood Insurance Program insurance policies, see https://www.fema.gov/national-flood-insurance-program and https://www.floodsmart.gov/

References

General References

- → *Homeowner's Guide to Retrofitting*, 3rd Edition, FEMA (2014), FEMA P-312, https://www.fema.gov/media-library/assets/documents/480 (Covers all the measures discussed in Chapter 7)
- → *Flood proofing: How to evaluate your options*, US Army Corps of Engineers, 1993, https://cdm16021.contentdm.oclc.org/digital/collection/p16021coll11/id/356
- → *Reducing Flood Risk to Residential Buildings That Cannot Be Elevated*, FEMA, 2015, FEMA P-1037, https://www.fema.gov/media-library/assets/documents/109669

Elevation

- → *Raising and moving the slab-on-grade house with slab attached*, FEMA, 1990, https://cdm16021.contentdm.oclc.org/digital/collection/p16021coll11/id/4
- → *Crawlspace Construction for Buildings Located in Special Flood Hazard Areas*, FEMA, 2001, Technical Bulletin 11, https://www.fema.gov/media-library/assets/documents/3527
- → *Protecting Manufactured Homes from Floods and Other Hazards*, FEMA , 2009, FEMA P-85, https://www.fema.gov/media-library/assets/documents/2574

Dry Floodproofing

- → *Floodproofing Non-Residential Buildings*, FEMA, 2013, FEMA P-936, https://www.fema.gov/media-library/assets/documents/34270
- → *Non-Residential Floodproofing - Requirements and Certification*, FEMA, 1993, Technical Bulletin 3, https://www.fema.gov/media-library/assets/documents/3473

Wet Floodproofing

- → *Wet Floodproofing Requirements*, FEMA, 1993, Technical Bulletin 7, https://www.fema.gov/media-library/assets/documents/3503
- → *Protecting Building Utility Systems From Flood Damage*, FEMA, 2017, FEMA P-348, https://www.fema.gov/media-library/assets/documents/3729
- → *Flood Damage-Resistant Materials Requirements*, FEMA, 2008, Technical Bulletin 2, https://www.fema.gov/media-library/assets/documents/2655
- → *Openings in Foundation Walls and Walls of Enclosures*, FEMA, 2008, Technical Bulletin 1, https://www.fema.gov/media-library/assets/documents/2644

Chapter 4. Selecting Mitigation Measures

Chapter 3 reviews two kinds of mitigation measures: structural flood control projects that work to keep water away from a building and nonstructural measures that reduce a building's vulnerability to damage by flood waters. Flood control projects are typically implemented by a government agency on public property and building mitigation measures are usually implemented by the building owner.

As noted at the beginning of Chapter 3, it is not a case of doing one or the other. Each can be more effective in different situations, so both approaches should be pursued. However, since the measures are usually the responsibility of different parties, this Chapter does treat them separately, i.e., how should the County proceed and what should a property owner do.

County Projects

The review of flood control projects in Chapter 3 identifies two general types of projects: beach protection (beach structures, beach nourishment, and seawalls) and drainage improvements.

Beach projects: The County should review its existing policies on beach projects. It should review the advantages and disadvantages, regulatory restrictions, and the predictions on sea level rise and determine whether current policies need to be revisited.

This is consistent with the County's Year 2030 Comprehensive Plan, Policy 1503.1.8 which directs the County to evaluate and develop potential stabilization options:

> Within five (5) years after the adoption of the 2030 Comprehensive Plan [2016], Monroe County shall develop a shoreline stabilization strategy to protect and enhance the built and natural environments from erosion and sea level rise impacts prioritizing natural green infrastructure approaches. Monroe County shall assure shoreline stabilization strategies are found to be in the public interest in light of that area's vulnerability to climate change impacts. Monroe County shall also consider public access to beaches, minimizing adverse impacts to coastal processes and resources, impacts to neighboring properties, and the values and functions of beaches and coastal/marine systems, relative to shoreline stabilization strategies.

Drainage improvements: The County's drainage improvements are all related to projects on County property, especially County roads. These are being implemented with available funds in a priority order based on need and road conditions. The program to raise roads to protect them from high tides and sea level rise has started with an analysis of all known problem sites. It will identify which projects to prioritize based on the inundation risk, including nuisance flooding.

The analysis of flooded roads has begun.
It will identify the priority sites for attention.
– Monroe County Documents Center

In short, the County is already reviewing and selecting flood control measures that meet County policies and standards for public funding.

Nonstructural Projects

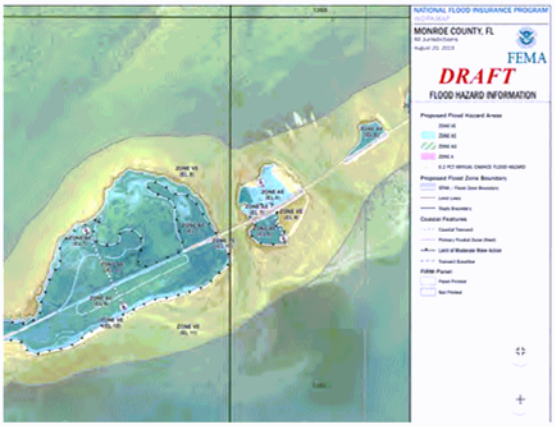
Elevation, floodproofing, and the other nonstructural projects are done on private property, typically by the owner, or at least with the owner's initiative and involvement. There are 9,545 buildings in the repetitive loss areas. Each building is different and the County's database does not have complete data on all of them. Therefore, this section provides a step-by-step process that owners (and County staff) can use to select the appropriate measure or measures. It is written in second person, addressed to the owners.

Step 1. Know your hazard: Start with a clear idea of where your floodwaters come from and how high they may go. Check with your neighbors who have lived there longer than you. How high did past floods go?

Often past floods did not go as high as the National Flood Insurance Program's or the County's flood protection levels. NFIP premium reductions start for buildings with the lowest floor at or above the base flood elevation (BFE). Premium rates are reduced if the building is protected to a higher level.

The County and the Florida Building Code require new construction and substantial improvements to be at least one foot above the BFE. It is recommended that a voluntary mitigation project protect to at least that level. Why protect to the last flood if going one or two feet higher will provide better protection and, possibly, help reduce your flood insurance premium?

You can find information on the flood hazard and the base flood elevation at the Monroe County Planning and Environmental Resources Department. Base flood elevations are shown on the County's Flood Insurance Rate Map (FIRM). You can see the current effective FIRM at http:/msc.fema.gov.



FEMA has published draft revisions to the FIRM, which can be seen at www.monroecounty-fl.gov/1151/New-Draft-Coastal-Flood-Maps. An example is to the right. The drafts may show higher elevations that will take effect in the near future. Both the current and draft FIRMs are on aerial photo base maps, so you can locate your house on the flood hazard map.

For more information on FIRMs, see Appendix C and the County's "Know Your Flood Risk" webpage, http://www.monroecounty-fl.gov/1084/Know-Your-Flood-Risk

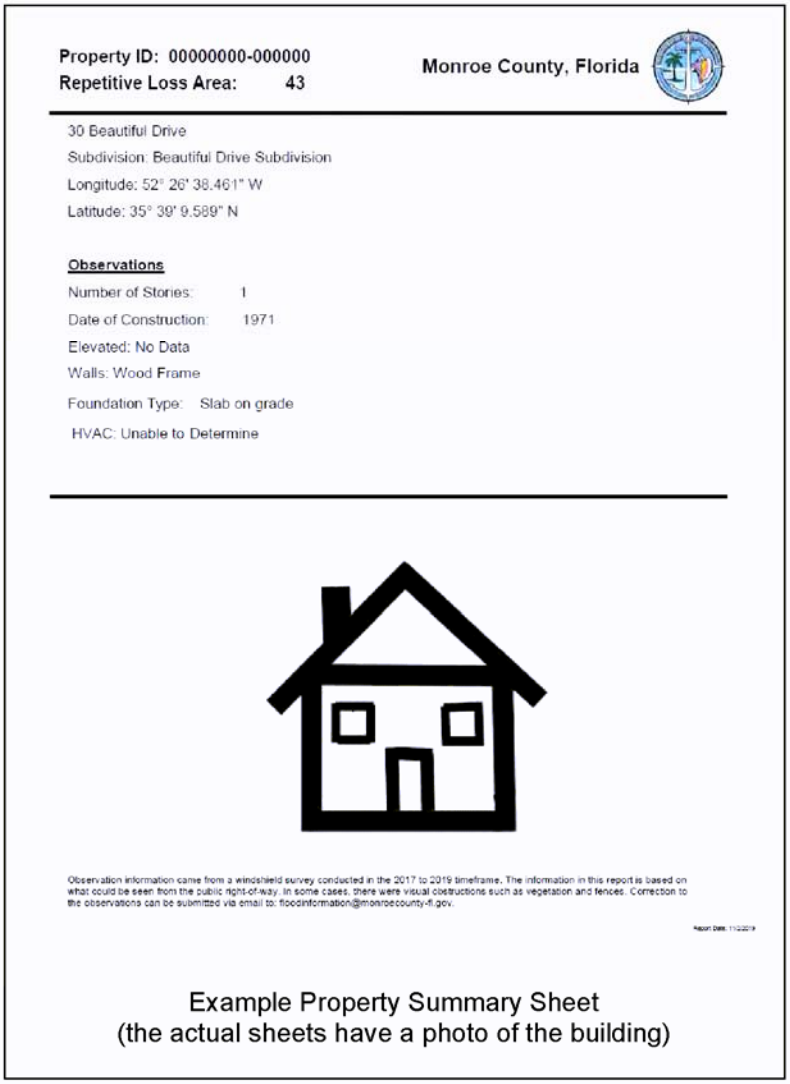
Step 2. Know your building: The most important factor in selecting mitigation measures is the foundation. What type is it? Is it in sound condition? Other information is identified in the Mitigation Selection Matrix on page 45. The field surveying work by the County in 2017 and 2019 collected this information and recorded it in a database used for this report.

The database is open to the public and can be accessed at https://mcgis4.monroecounty-fl.gov/MCGIS/CRS/CRS_RLAA_Public.html. You can download a summary sheet for any property like the generic one illustrated here.

Note that the sheet may have entries such as "No Data" or "Unable to Determine." The summary sheet shows what the surveyor could see.

There were many occasions where the field surveyor could not see an item from the street. Two examples of this problem are shown below.

It is also possible that the information collected in 2017 is no longer correct or the field surveyor did not see the whole structure. It would be helpful for the County's efforts if the correct information was provided by the owner. To get the database updated and correct, email Floodinformation@monroecounty-fl.gov or call (305) 407-5685



Property ID: 00000000-000000
Repetitive Loss Area: 43

Monroe County, Florida

30 Beautiful Drive
Subdivision: Beautiful Drive Subdivision
Longitude: 52° 26' 38.461" W
Latitude: 35° 39' 9.589" N

Observations

Number of Stories: 1
Date of Construction: 1971
Elevated: No Data
Walls: Wood Frame
Foundation Type: Slab on grade
HVAC: Unable to Determine

Observation information came from a windshield survey conducted in the 2017 to 2019 timeframe. The information in this report is based on what could be seen from the public right-of-way. In some cases, there were visual obstructions such as vegetation and fences. Correction to the observations can be submitted via email to: floodinformation@monroecounty-fl.gov.

Example Property Summary Sheet
(the actual sheets have a photo of the building)

These are examples of photos on the summary sheets where the field surveyor could not see all the items that were needed. For example, one cannot verify the foundation type for the building on the left.

Step 3. Determine the building condition: If the structure is in bad shape, is it worth a mitigation project to protect it? Should you pursue an acquisition project or tear it down and build a new building that meets all the flood protection code standards? There are programs that might be able to provide financial assistance for these options.

If it is on a slab-on-grade foundation, is the slab in good shape? Are there any cracks that would mean that a dry floodproofing project would leak?

If the building is on an elevated foundation or crawlspace, are the supports and floor joists in good condition? Are there cracks in the walls or other signs of settling? These don't mean you cannot do a mitigation project, but an engineer or contractor should be aware of any weaknesses when they plan the project.

Step 4. Go through the Mitigation Selection Matrix: On the next page is a matrix to help select the most appropriate mitigation measure. This process is not an absolute determinant. It does not replace an onsite inspection by an architect, engineer, or experienced contractor. It is designed to give you the more likely cost-effective mitigation approaches for your building.

Step 5. Check on regulatory requirements: Start with getting familiar with the basic rules which are summarized on the Building and Permitting Department's website:

→ http://www.monroecounty-fl.gov/692/Building-Requirements and

→ http://www.monroecounty-fl.gov/693/Build-ResponsiblyProtect-Your-Property

Some of the rules are different for properties in the Special Flood Hazard Area (see "Terminology" In Appendix C) and some of the standards in V Zones are different from those in A Zones.

Sit down with a permit official. Contact information is provided in the above websites. See if there are limitations to what you'd like to do. If so, discuss what options there are. Limitations don't mean you cannot do something, it means that there may need to be adjustments to, for example, ensure that you don't increase a flooding problem on a neighbor.

The most important regulatory requirement is the substantial improvement or the "50% rule." It only applies to properties in the SFHA, but that includes most of the County. If the cost of your project is more that 50% of the value of your existing building, then it will be considered a substantial improvement. For a residence, this means that elevation, acquisition, or mitigation reconstruction are your only options. For a nonresidential building, dry floodproofing would be one more allowable option, too. In both cases, you will have to protect the building to one foot above the BFE.

After a flood, fire, or other damage to the building, if the cost to repair the building equals or exceeds the value of the building before the damage, then it is considered substantially damaged and the substantial improvement rule applies, too. The above websites have links to more information on these requirements.

Step 6. Check out funding possibilities: Chapter 3 identifies some funding sources and which measures are eligible or not eligible. A flood insurance policy can help after a flood. Certain kinds of disaster assistance can help after a disaster that is large enough to warrant a disaster declaration, but it makes more sense to mitigate before the next big storm. The Floodplain Management and Emergency Management offices may know of more recent opportunities.

Building Mitigation Selection Matrix

Building Mitigation Selection Matrix						
	Acquisition	Elevation	Mit. Reconstruction	Barriers	Dry floodproofing	Wet floodproofing
Dilapidated building	1		1			
Flood depth < 2' over the first floor						
Manufactured, modular housing	4	1	4	2		3
Piers, posts, open elevated foundation	3	1	3	2		
Crawlspace or elevated w/enclosure	4	1	4	2		3
Slab-on-grade, concrete or masonry walls	3	4	3	1	2	
Slab-on-grade, other types of walls	2	4	2	1		
Flood depth ≥ 2' over the first floor						
Manufactured, modular housing	3	1	3			2
Piers, posts, open elevated foundation	2	1	2			
Crawlspace or elevated w/enclosure	3	1	3			2
Slab-on-grade, one story	2	1	2			
Slab-on-grade, two or more stories	3	2	3			1
V Zone regulatory restrictions				X		
Residential substantial improvement in SFHA				X	X	X
Nonresidential substantial improvement in SFHA				X		X
Residential eligible for Funding?	$	$	$			
Nonresidential eligible for Funding?	$	$	$		$	
Numbers are 1st choice, 2nd choice, etc. X = not permitted. See the "regulatory restrictions" headings in Chapter 3. $ = eligible for most grant programs, provided protection is to the BFE "Substantial improvement" includes substantially damaged buildings						

This matrix provides a preliminary recommendation for mitigation measures based on summary information on the building. It is designed to provide guidance on where to start. It does not replace a site inspection by a qualified engineer or architect.

If the building is in good condition, determine the depth of past flooding over the first floor. What is the highest the water has gotten? There are more possible approaches to protecting a building to a flood depth of less than two feet over the first floor (< 2'), including barriers and dry floodproofing. The options for buildings that have been or can expect to be in deeper floodwaters (≥ 2' over the first floor) are generally limited to elevation, acquisition, and letting the lower area flood (wet floodproofing).

After you've identified the flood depth, check the type of construction or foundation. Manufactured homes and buildings on crawlspaces are relatively easy to raise to a higher level, so the first choice is to elevate them. This is shown by the number "1" in the "Elevation" column.

The matrix shows the second choice ("2"), third choice ("3"), etc. These are not as effective or may be more expensive than the first choice, but they can still help reduce the risk of damage.

There may also be a regulatory restriction on a measure. For example, if a residential building in the Special Flood Hazard Area is substantially damaged or being substantially improved, it can only be elevated or moved out of harm's way. County and NFIP regulations do not allow barriers or floodproofing under these conditions. This is shown by the "X" in the column for those measures.

Step 7. Implement what you decide to do.

Step 8. Maintain or obtain a flood insurance policy. Except for acquisition, no mitigation measure is a 100% guarantee against a higher flood in the future. Your premiums may well be lowered by your project and if there is substantial damage from a flood, your policy will help cover the cost of a more secure mitigation measure.

Chapter 5. Recommendations

As noted in Chapters 3 and 4, there are two main categories of measures to address the County's repetitive flooding: flood control projects implemented by the County and building mitigation projects initiated by the property owners. The following recommendations are therefore organized by the lead entity.

County Actions

1. Adopt this Area Analysis according to the process detailed in the *CRS Coordinator's Manual*.

    a. Lead office: Building Department/Monroe County BOCC

    b. Timeline: January 2020

    c. Funding: Staff time and/or with assistance from consultants

    d. Note: For continued CRS credit, there must be an annual evaluation report and an update every three years, so there will be a need for some staff or consultant time every year.

2. Complete the Shoreline Stabilization Strategy proposed in the 2030 Comprehensive Plan.

    a. Lead office: Planning & Environmental Resources Department

    b. Timeline: To be initiated in 2020 and completed by April 2021.

    c. Funding: To be determined (this may be done by in-house staff or with the assistance of a consultant)

    d. Note: This will provide guidance and set priorities for County beach nourishment and other shoreline protection projects.

3. Complete the analysis of repetitively flooded critical facilities, roads, and stormwater locations pursuant to the Roads Adaptation Plan.

    a. Lead office: Sustainability

    b. Timeline: Initiated in 2019, to be completed in 2020.

    c. Funding: No new funds are needed for this analysis as this project has already been budgeted.

    d. Note: This will provide guidance and set priorities for County projects to protect critical facilities, raise roadways above expected future flood levels, and improve stormwater facilities.

4. Encourage and assist the owners of repetitively flooded structures to pursue mitigation measures including: acquisition, elevation, mitigation reconstruction, barriers, and floodproofing.

    a. Lead office: Building Department

b. Timeline: Ongoing

c. Funding: Staff time and or with assistance from consultants

d. Note: This is currently being done under credited CRS outreach projects that provide information and technical assistance to property owners on mitigation measures. The projects also advise the reader to contact the Monroe County Building Department for advice on potential mitigation resources. Other than revising the information provided by these projects, there is no expected need for new resources.

5. Develop a website devoted to the property mitigation measures recommended by this Analysis.

   a. Lead office: Building Department/Floodplain Management

   b. Timeline: 2020

   c. Funding: Staff time

   d. Note: This site would include summaries of the measures, the Mitigation Selection Matrix in Chapter 4, and links to more information, County staff contacts, and financial assistance programs. It would qualify for the CRS' website credit.

6. Continue to assist interested property owners in applying for mitigation grants.

   a. Lead office: Building Department/Floodplain Management

   b. Timeline: Ongoing

   c. Funding: Staff time and/or with assistance from consultants

Property Owner Actions

7. Learn about property mitigation and funding sources and pursue one or more mitigation projects in accordance with the seven steps outlined in Chapter 4.

   a. Lead: Property owners

   b. Timeline: Ongoing

   c. Funding: Personal time for research. Personal funds for implementation (except those projects that are eligible for funding assistance).

   d. Note: County Actions 4, 5, and 6 would provide support for this task.

8. Purchase or maintain a flood insurance policy on the building and/or contents.

   a. Lead: Property owners and renters

   b. Timeline: Ongoing

   c. Funding: Personal funds to pay the insurance premiums.

   d. Note: See the discussion and website links at the end of Chapter 4.

9. Stay up to date with what Monroe County is doing in regard to flood protection, including announcements on available financial assistance.

    a. Lead: Property owners and renters

    b. Timeline: Ongoing

    c. Funding: Personal time for periodically checking the mitigation measures website that will be developed (County Action 5).

Appendix A. Repetitive Loss Area Summaries

There are 60 repetitive loss areas in Monroe County. They are numbered 1 – 27 and 29 – 61. The original Area 28 was a single repetitive loss property. During the analysis it was concluded that the property better fits in an adjacent repetitive loss area, so it was merged into that other area. It was decided to not renumber all the rest of the areas because the databases were already tied to the numbers.

Questionnaire responses: The notice to residents about the upcoming repetitive loss area analysis went to the Upper Keys on June 8 and to the Lower Keys August 30, 2017, just before Hurricane Irma. This timing explains why 15 of the returned questionnaires came from the Upper Keys and none were submitted from properties in the Lower Keys. Therefore, the invitation was distributed again with the County's annual outreach project, which is shown on page 5. Only one response was received this time, also from the Upper Keys.

Of the 20 questionnaires received from both of these efforts, four of them were outside the 60 repetitive loss areas. The rest came from six of the areas – 4, 7, 9, 12, 13, and 16. Their comments are summarized on the pages for those areas.

Of the 20, only seven reported having been flooded. Fourteen carry a National Flood Insurance Program policy and 15 responded "yes" to the question "Are you interested in learning more about flood mitigation (methods of reducing the risk of flooding to a building and its contents)?"

Maps: This Appendix has a map for each of the 60 areas. The area boundaries were drawn to include three types of properties:

- → Properties on the original FEMA repetitive loss list,
- → Nearby properties with one flood insurance claim. Some of these properties had two flood insurance claims that did not qualify as repetitive losses (e.g., two claims more than ten years apart), and
- → Other similarly situated properties exposed to the same flood hazard.

The numbers for each type are shown in the tables on the following pages.

As explained in Chapter 1, the Privacy Act of 1974 (5 U.S.C. § 552a) requires that "personally identifiable information" such as the addresses of properties that are covered by flood insurance or have received flood insurance claims cannot be shown on maps that are made public. Therefore, the maps only show the streets and the boundaries of each area.

There are ten areas where all the properties mapped are the ones on the FEMA repetitive loss list or have had other claims. Showing these areas would reveal information contrary to the Privacy Act. The property or area boundary is not shown on the maps for these ten areas. Instead, their maps only show their general location.

Area Summary Tables, top rows: The top rows of information in the following tables provide general statistics about the properties. In some cases, there is "no data" for some of the entries. For example, it is difficult to determine if a building is occupied, especially after Irma, during the summer when the owners may live up north, or if the surveyor looked at a rental unit during the week it was empty. Rather than guess, the surveyor would leave the item blank.

The land use data came from the County Property Appraiser's database. There are 9,545 properties in the 60 areas, broken down as follows:

9,359	Residential
132	Commercial
22	Institutional
18	Industrial
12	Government
2	Other

Ninety-eight percent (98%) of the repetitive loss area properties are residential and, based on field data, the vast majority of the residential properties are single-family homes.

Flood insurance claim data: The number of flood insurance claims is the number of all claims submitted. There were 17,190 claims submitted from these 60 areas since 1978. Thirty-five percent (5,985) of these claims were "closed without payment." This does not mean that those properties were not flooded. The most common reasons for not paying a claim are:

- → The flood damage occurred during a new flood insurance policy's 30-day waiting period;
- → The claims adjuster concluded that the eligible damage was less than the policy's deductible; or
- → The water damage was not caused by a qualifying event, which is defined in a flood insurance policy as "A general and temporary condition of partial or complete inundation of 2 or more acres of normally dry land area or of 2 or more properties from (a) Overflow of inland or tidal waters, (b) Unusual and rapid accumulation or runoff of surface waters from any source…"

This last reason means that there is no coverage for flooding from a broken pipe or sewer backup. Similarly, there is no flood insurance coverage if a windstorm breaks a window and rain gets contents wet. Windstorm damage is not a covered peril on homeowners policies in Florida's coastal counties, so some people submit a flood insurance claim. If the only damage was originally caused by a windstorm, the claim would be closed without payment (there is separate windstorm insurance available).

This analysis considers all claims submitted as a good measure of the number and frequency of flooding problems, even if some claims were not paid. The claims closed without payment were not included in calculating the average claim payments. For example in Area 1, there were four claims submitted. One was closed without payment. The payments for the other three totaled $75,022 for an average payment of $25,007.

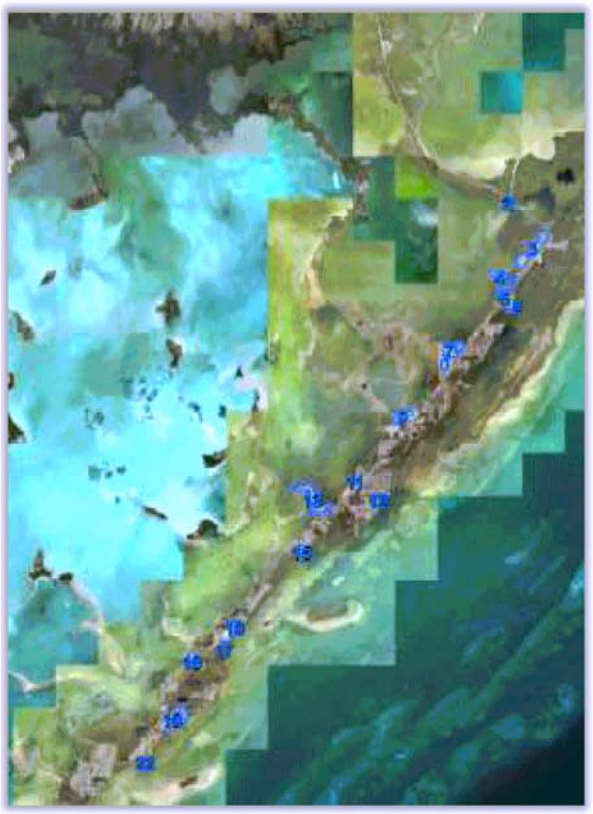
Area Summary Tables, bottom rows: The bottom rows have information that guides the selection of appropriate building mitigation measures:

- → Buldings with more than one story have a wet floodproofing option.
- → Buildings on piers, posts, walls, or crawlspaces are the easiest to elevate. Those on walls or crawlspaces have wet floodproofing requirements. Buildings on slab-on-grade foundations are the only ones that can be dry floodproofed.
- → Buildings with floors elevated eight feet or more may already be adequately mitigated.
- → Wood frame walls, modular housing, and manufactured homes are best for elevation. Concrete and masonry walls on slab foundations are the best for dry floodproofing.

These factors are included in the Building Mitigation Selection Matrix in Chapter 4,

Area Location Maps

Areas 1 – 22 are on or near Key Largo.



This analysis does not include repetitive loss areas in the incorporated cities, between Tavernier and Big Pine Key. Area 23 is on West Summerland Key. The most westernmost repetitive loss area, 60, is just east of the Key West city limits.

Area 1

Key Largo

As a single property repetitive loss area on northern Key Largo, the exact location is not shown on a map.

Area 1 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	4	Residential	1	Yes	1
Other claims		Total payments	$75,022	Commercial		No	
Similarly situated		Average payment	$25,007	Institutional		No data	
No data							
Total buildings	1						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	1	Piers, posts, etc.		< 8 feet		Concrete	
2		Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	1
4		Slab-on-grade	1			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 2

Key Largo

Both properties in northern Key Largo are on FEMA's repetitive loss list, so the exact location is not shown on a map.

Area 2 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	2	Claims submitted	25	Residential		Yes	2
Other claims		Total payments	$884,607	Commercial	2	No	
Similarly situated		Average payment	$52,036	Institutional		No data	
No data							
Total buildings	2						

Stories		Foundation		Elevated Floors		Walls	
1	1	Piers, posts, etc.		< 8 feet		Concrete	2
2	1	Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	2			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 3

Key Largo: Lake Surprise Estates and Sexton Cove Estates

Area 3 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	14	Claims submitted	255	Residential	487	Yes	438
Other claims	130	Total payments	$2,535,917	Commercial	1	No	11
Similarly situated	346	Average payment	$11,686	Institutional	2	No data	41
No data							
Total buildings	490						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	381	Piers, posts, etc.	279	< 8 feet	334	Concrete	44
2	79	Enclosed walls	111	8-12 feet	60	Wood frame	12
3	30	Crawlspace	38	> 12+ feet	40	Masonry	2
4		Slab-on-grade	17		434	Modular housing	80
No data		Other	14			Manufact. home	326
		No data	31			Other	9
						No data	17

See page A-1 for more information on these entries.

Area 4

Key Largo: Paradise Point Cove, Stillwright Point

Five questionnaires were completed by Area 4 residents. Only one reported having been flooded. That was in the yard in 2005 and 2012 by tropical storms and in 2019 by a king tide.

Two of the properties had been wet flood-proofed and a third owner had regraded the yard for drainage protection. All three reported that their projects had been "beneficial."

Two respondents listed locations of chronic street flooding needing County action.

Area 4 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	59	Residential	155	Yes	150
Other claims	25	Total payments	$1,153,219	Commercial		No	1
Similarly situated	129	Average payment	$28,127	Institutional		No data	4
No data							
Total buildings	155						

Stories		Foundation		Elevated Floors		Walls	
1	23	Piers, posts, etc.	7	< 8 feet	14	Concrete	99
2	93	Enclosed walls	127	8-12 feet	110	Wood frame	46
3	39	Crawlspace	5	> 12+ feet	15	Masonry	1
4		Slab-on-grade	8		139	Modular housing	6
No data		Other	2			Manufact. home	
		No data	6			Other	
						No data	3

See page A-1 for more information on these entries.

Area 5

Key Largo: Riviera Village

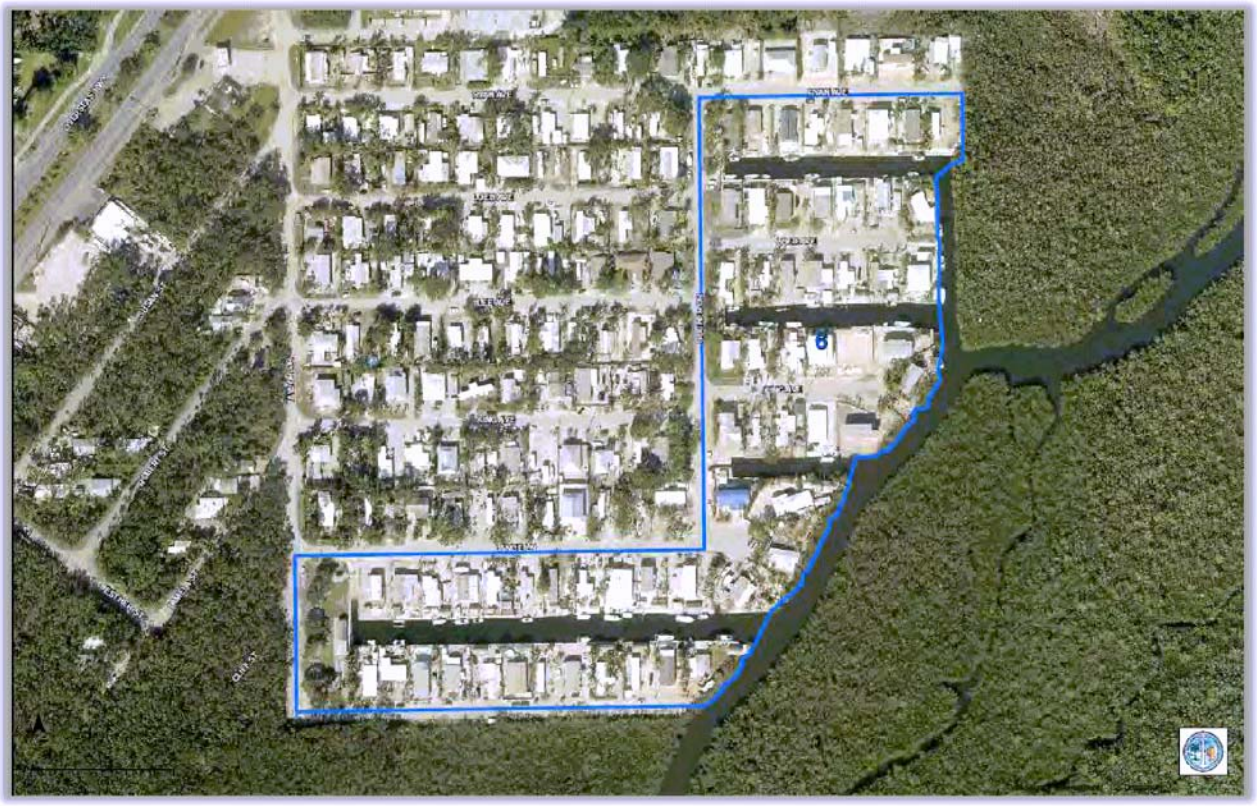
Area 5 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	9	Residential	67	Yes	65
Other claims	3	Total payments	$195,905	Commercial		No	
Similarly situated	63	Average payment	$32,651	Institutional		No data	2
No data							
Total buildings	67						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	35	Piers, posts, etc.		< 8 feet	7	Concrete	45
2	25	Enclosed walls	22	8-12 feet	16	Wood frame	17
3	7	Crawlspace	2	> 12+ feet	1	Masonry	2
4		Slab-on-grade	35		24	Modular housing	
No data		Other	5			Manufact. home	
		No data	3			Other	
						No data	3

See page A-1 for more information on these entries.

Area 6

Key Largo: Key Largo Mobile Homesites



Area 6 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	15	Residential	59	Yes	58
Other claims	8	Total payments	$72,527	Commercial		No	
Similarly situated	51	Average payment	$5,579	Institutional		No data	2
No data				Other	1		
Total buildings	60						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	55	Piers, posts, etc.	3	< 8 feet	4	Concrete	4
2	4	Enclosed walls	8	8-12 feet	3	Wood frame	
3		Crawlspace		> 12+ feet	4	Masonry	
4		Slab-on-grade			11	Modular housing	1
No data		Other				Manufact. home	54
		No data	49			Other	
						No data	1

See page A-1 for more information on these entries.

Area 7

Key Largo: Bermuda Shores, Cross Key Waterways, and Twin Lakes

Two Area 7 residents completed the questionnaire described in Chapter 1, step 1. Neither had been flooded and neither had installed any mitigation measures.

Area 7 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	3	Claims submitted	100	Residential	373	Yes	317
Other claims	63	Total payments	$1,251,811	Commercial		No	6
Similarly situated	307	Average payment	$15,846	Institutional		No data	50
No data							
Total buildings	373						

Stories		Foundation		Elevated Floors		Walls	
1	246	Piers, posts, etc.	14	< 8 feet	9	Concrete	270
2	83	Enclosed walls	106	8-12 feet	51	Wood frame	74
3	29	Crawlspace	2	> 12+ feet	62	Masonry	2
4	5	Slab-on-grade	16		122	Modular housing	13
No data	10	Other	3			Manufact. home	14
		No data	232			Other	
						No data	

See page A-1 for more information on these entries.

Area 8

Key Largo:

As a single property repetitive loss area on central Key Largo, the exact location is not shown on a map.

Area 8 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	3	Residential	1	Yes	1
Other claims		Total payments	$59,912	Commercial		No	
Similarly situated		Average payment	$19,971	Institutional		No data	
No data							
Total buildings	1						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1		Piers, posts, etc.		< 8 feet	1	Concrete	
2	1	Enclosed walls	1	8-12 feet		Wood frame	1
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade				Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 9

Key Largo: Trailer Village

One questionnaire came from an Area 9 resident. That address had been flooded twice in the yard (2012 (tropical storm) and 2016 (heavy rain)). It had also been flooded over the first floor before 2005.

That property had a mitigation project: the air conditioning unit had been elevated. It was reported to have been beneficial.

The respondent voiced concerns that a flood insurance policy was covering fewer items than before, such as siding or skirting not attached to the structure.

Area 9 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	7	Claims submitted	80	Residential	234	Yes	169
Other claims	49	Total payments	$829,556	Commercial		No	6
Similarly situated	178	Average payment	$11,061	Institutional		No data	59
No data							
Total buildings	234						

Stories		Foundation		Elevated Floors		Walls	
1	187	Piers, posts, etc.	12	< 8 feet	35	Concrete	31
2	32	Enclosed walls	41	8-12 feet	9	Wood frame	1
3	13	Crawlspace	18	> 12+ feet	27	Masonry	1
4		Slab-on-grade	8		71	Modular housing	9
No data	2	Other	2			Manufact. home	182
		No data	153			Other	
						No data	10

See page A-1 for more information on these entries.

Area 10

Key Largo: Buttonwood Shores

As a single property repetitive loss area on central Key Largo, the exact location is not shown on a map.

Area 10 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	N/A	Residential	1	Yes	1
Other claims		Total payments	N/A	Commercial		No	
Similarly situated		Average payment	N/A	Institutional		No data	
No data							
Total buildings	1						

Stories		Foundation		Elevated Floors		Walls	
1	1	Piers, posts, etc.		< 8 feet		Concrete	1
2		Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 11

Key Largo: Sunset Cove

Area 11 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	10	Residential	1	Yes	3
Other claims	2	Total payments	$223,159	Commercial	4	No	
Similarly situated	2	Average payment	$22,316	Institutional		No data	2
No data							
Total buildings	5						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	3	Piers, posts, etc.	1	< 8 feet	1	Concrete	3
2	2	Enclosed walls		8-12 feet		Wood frame	1
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	3			Modular housing	
No data		Other				Manufact. home	
		No data	1			Other	
						No data	1

See page A-1 for more information on these entries.

Area 12

Key Largo:
Key Largo Beach

There was one completed questionnaire described in Chapter 1, step 1. The owner had been flooded over the first floor by Hurricane Wilma in 2005. The respondent reported "no damage other than rugs but water was only 3-4 inches inside."

The respondent does have a flood insurance policy.

Area 12 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	4	Claims submitted	28	Residential	103	Yes	97
Other claims	7	Total payments	$209,505	Commercial		No	
Similarly situated	92	Average payment	$11,027	Institutional		No data	6
No data							
Total buildings	103						

Stories		Foundation		Elevated Floors		Walls	
1	12	Piers, posts, etc.	2	< 8 feet	4	Concrete	84
2	72	Enclosed walls	51	8-12 feet	27	Wood frame	9
3	14	Crawlspace		> 12+ feet	22	Masonry	3
4		Slab-on-grade	38		53	Modular housing	
No data	5	Other				Manufact. home	1
		No data	12			Other	
						No data	6

See page A-1 for more information on these entries.

Area 13

Key Largo: Buccaneer Point
Pirates Cove

Five Area 13 residents completed the questionnaire. Two had been flooded, both in 2005. One had water over the first floor and the other only had it in the yard. The former had also had yard flooding from heavy rain in 2017.

Two respondents provided a list of frequent street flooding sites. They also noted "we need help."

A third resident reported that they had not been flooded in the 30 years they had lived there.

Area 13 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	7	Claims submitted	66	Residential	223	Yes	110
Other claims	30	Total payments	$1,744,812	Commercial		No	1
Similarly situated	187	Average payment	$33,554	Institutional		No data	113
No data				Other	1		
Total buildings	224						

Stories		Foundation		Elevated Floors		Walls	
1	37	Piers, posts, etc.	6	< 8 feet	4	Concrete	63
2	121	Enclosed walls	153	8-12 feet	92	Wood frame	34
3	63	Crawlspace		> 12+ feet	63	Masonry	
4		Slab-on-grade	42		159	Modular housing	5
No data	3	Other	1			Manufact. home	
		No data	22			Other	
						No data	122

See page A-1 for more information on these entries.

Area 14

Key Largo: Mandalay Bay Area

As a single property repetitive loss area on southern Key Largo, the exact location is not shown on a map.

Area 14 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	N/A	Residential		Yes	1
Other claims		Total payments	N/A	Commercial	1	No	
Similarly situated		Average payment	N/A	Institutional		No data	
No data							
Total buildings	1						

Stories		Foundation		Elevated Floors		Walls	
1		Piers, posts, etc.		< 8 feet		Concrete	1
2	1	Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 15

Key Largo: The Harborage

Area 15 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	8	Residential	58	Yes	57
Other claims	3	Total payments	$18,167	Commercial		No	
Similarly situated	54	Average payment	$3,633	Institutional		No data	1
No data							
Total buildings	58						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	43	Piers, posts, etc.	1	< 8 feet	37	Concrete	6
2	6	Enclosed walls	14	8-12 feet	12	Wood frame	
3	9	Crawlspace	34	> 12+ feet		Masonry	
4		Slab-on-grade			49	Modular housing	9
No data		Other	3			Manufact. home	40
		No data	6			Other	2
						No data	1

See page A-1 for more information on these entries.

Area 16

Key Largo: Sunrise Point

There were two questionnaires completed from this area. Neither had been flooded. One had elevated the utilities and reported it was beneficial. He also reported not carrying flood insurance.

Area 16 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	13	Claims submitted	49	Residential	111	Yes	111
Other claims	4	Total payments	$701,546	Commercial	3	No	1
Similarly situated	98	Average payment	$18,462	Institutional	1	No data	3
No data							
Total buildings	115						

Stories		Foundation		Elevated Floors		Walls	
1	30	Piers, posts, etc.	11	< 8 feet	31	Concrete	94
2	65	Enclosed walls	79	8-12 feet	51	Wood frame	15
3	19	Crawlspace		> 12+ feet	8	Masonry	
4	1	Slab-on-grade	22		90	Modular housing	1
No data		Other	1			Manufact. home	
		No data	2			Other	4
						No data	1

See page A-1 for more information on these entries.

Area 17

Key Largo: *With only two properties in this area on southern Key Largo, the exact location is not shown on a map.*

Area 17 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	5	Residential	2	Yes	2
Other claims		Total payments	$17,506	Commercial		No	
Similarly situated	1	Average payment	$5,835	Institutional		No data	
No data							
Total buildings	2						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	2	Piers, posts, etc.		< 8 feet		Concrete	1
2		Enclosed walls		8-12 feet		Wood frame	1
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	2			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 18

Key Largo: Sunset Gardens

Area 18 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	6	Residential	13	Yes	12
Other claims	4	Total payments	$205,376	Commercial		No	
Similarly situated	8	Average payment	$34,229	Institutional		No data	1
No data							
Total buildings	13						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	10	Piers, posts, etc.	1	< 8 feet	1	Concrete	11
2	2	Enclosed walls	2	8-12 feet	2	Wood frame	
3	1	Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	8		3	Modular housing	1
No data		Other				Manufact. home	
		No data	2			Other	1
						No data	

See page A-1 for more information on these entries.

Area 19

Tavernier: Blue Water Trailer Village & Tavernier Ocean Shores

Area 19 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	5	Claims submitted	82	Residential	255	Yes	237
Other claims	15	Total payments	$339,930	Commercial		No	
Similarly situated	236	Average payment	$10,623	Institutional		No data	19
No data				Industrial	1		
Total buildings	256						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	130	Piers, posts, etc.	26	< 8 feet	147	Concrete	70
2	94	Enclosed walls	109	8-12 feet	88	Wood frame	12
3	32	Crawlspace	100	> 12+ feet		Masonry	1
4		Slab-on-grade	6		235	Modular housing	3
No data		Other				Manufact. home	148
		No data	15			Other	4
						No data	18

See page A-1 for more information on these entries.

Area 20

Tavernier: Tavernier Harbor

As a single property repetitive loss area on southern Key Largo, the exact location is not shown on a map.

Area 20 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	4	Residential		Yes	1
Other claims		Total payments	$103,217	Commercial	1	No	
Similarly situated		Average payment	$51,609	Institutional		No data	
No data							
Total buildings	1						

Stories		Foundation		Elevated Floors		Walls	
1		Piers, posts, etc.		< 8 feet		Concrete	1
2	2	Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1			Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 21

Tavernier: Tavernier Heights

As a single property repetitive loss area on southern Key Largo, the exact location is not shown on a map.

Area 21 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	3	Residential	1	Yes	1
Other claims		Total payments	$67,925	Commercial		No	
Similarly situated		Average payment	$22,642	Institutional		No data	
No data							
Total buildings	1						

Stories		Foundation		Elevated Floors		Walls	
1		Piers, posts, etc.		< 8 feet		Concrete	
2	1	Enclosed walls		8-12 feet		Wood frame	1
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade				Modular housing	
No data		Other	1			Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 22

Tavernier: Largo Beach

Area 22 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	13	Residential	12	Yes	12
Other claims	3	Total payments	$86,717	Commercial		No	
Similarly situated	7	Average payment	$8,672	Institutional		No data	
No data							
Total buildings	12						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	3	Piers, posts, etc.	1	< 8 feet	5	Concrete	8
2	6	Enclosed walls	8	8-12 feet	5	Wood frame	4
3	3	Crawlspace	1	> 12+ feet		Masonry	
4		Slab-on-grade	2		10	Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 23

West Summerland Key: Spanish Harbor Key

Area 23 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	14	Residential		Yes	1
Other claims		Total payments	$308,293	Commercial		No	1
Similarly situated	2	Average payment	$25,691	Institutional	2	No data	1
No data				Government	1		
Total buildings	3						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	1	Piers, posts, etc.	1	< 8 feet	2	Concrete	2
2	2	Enclosed walls	1	8-12 feet		Wood frame	1
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			2	Modular housing	
No data		Other				Manufact. home	
		No data	1			Other	
						No data	

See page A-1 for more information on these entries.

Area 24

Big Pine Key

With only two properties in this area southern Big Pine Key, *the exact location is not shown on a map.*

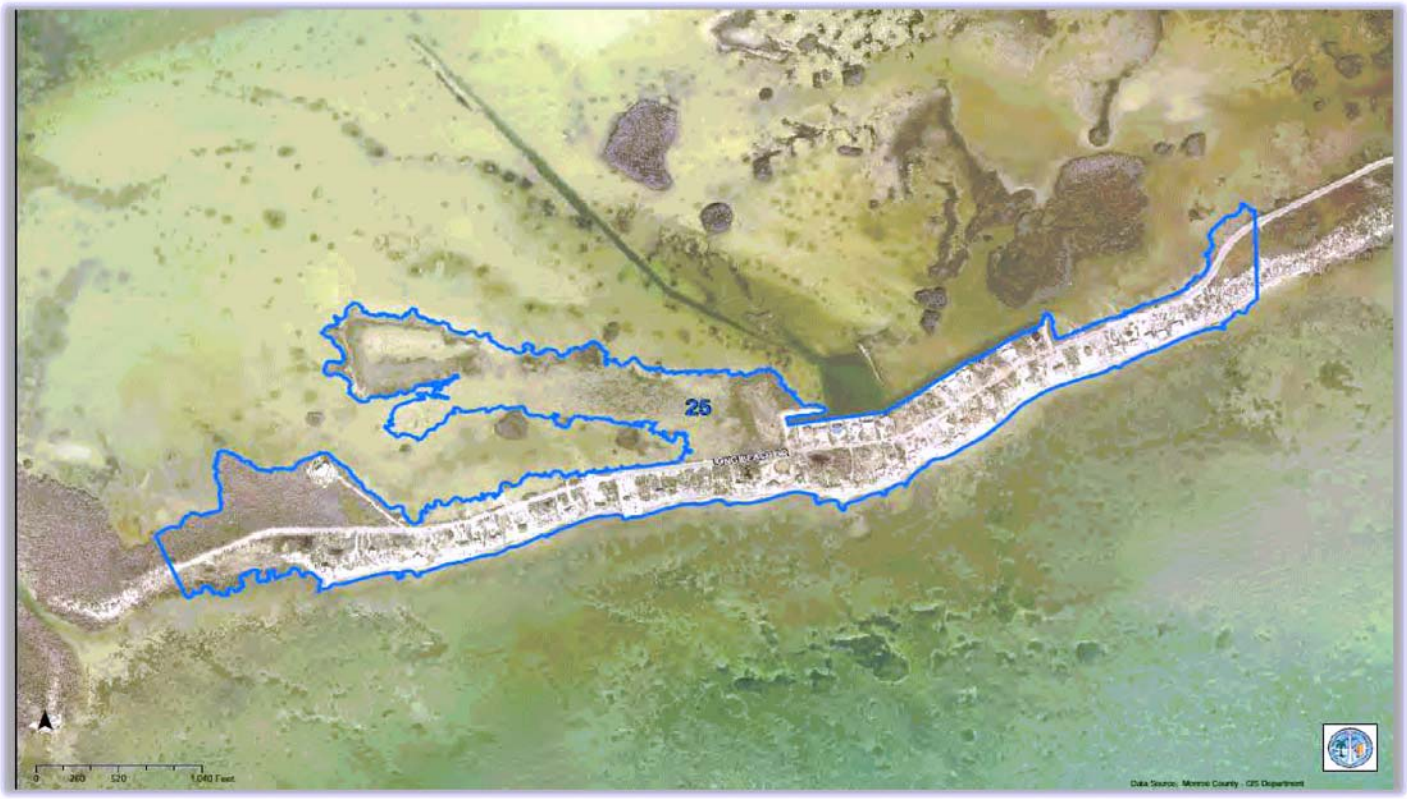
Area 24 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	3	Residential		Yes	1
Other claims		Total payments	$34,908	Commercial	2	No	
Similarly situated		Average payment	$17,454	Institutional		No data	1
No data							
Total buildings	2						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1		Piers, posts, etc.		< 8 feet	1	Concrete	1
2	1	Enclosed walls	1	8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			1	Modular housing	
No data	1	Other				Manufact. home	
		No data	1			Other	
						No data	1

See page A-1 for more information on these entries.

Area 25

Big Pine Key: Long Beach Estates



Area 25 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	3	Claims submitted	29	Residential	38	Yes	32
Other claims	13	Total payments	$549,010	Commercial	2	No	
Similarly situated	24	Average payment	$21,960	Institutional		No data	8
No data							
Total buildings	40						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	3	Piers, posts, etc.	2	< 8 feet	7	Concrete	31
2	31	Enclosed walls	31	8-12 feet	24	Wood frame	5
3	3	Crawlspace		> 12+ feet	2	Masonry	
4		Slab-on-grade	4		33	Modular housing	1
No data	3	Other	1			Manufact. home	
		No data	2			Other	
						No data	3

See page A-1 for more information on these entries.

Area 26

Big Pine Key: Warner Street

Area 26 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	7	Residential	4	Yes	4
Other claims	2	Total payments	$48,891	Commercial		No	
Similarly situated	1	Average payment	$8,149	Institutional		No data	
No data							
Total buildings	4						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	2	Piers, posts, etc.	1	< 8 feet	3	Concrete	1
2	2	Enclosed walls	2	8-12 feet		Wood frame	2
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			3	Modular housing	1
No data		Other				Manufact. home	
		No data	1			Other	
						No data	

See page A-1 for more information on these entries.

Area 27

Big Pine Key: Sands Subdivision, Atlantis, Grieser, Hollerich, Whispering Pines, Ross Haven

Area 27 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	7	Claims submitted	191	Residential	397	Yes	
Other claims	89	Total payments	$1,654,017	Commercial	5	No	
Similarly situated	309	Average payment	$11,486	Institutional		No data	405
No data				Government	1		
Total buildings	405			Industrial	2		

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	342	Piers, posts, etc.	177	< 8 feet		Concrete	93
2	35	Enclosed walls	138	8-12 feet		Wood frame	131
3	1	Crawlspace	1	> 12+ feet		Masonry	
4	1	Slab-on-grade	62	No Data	405	Modular housing	37
No data	26	Other				Manufact. home	116
		No data	27			Other	2
						No data	26

See page A-1 for more information on these entries.

Area 28

Big Pine Key: Whispering Pines

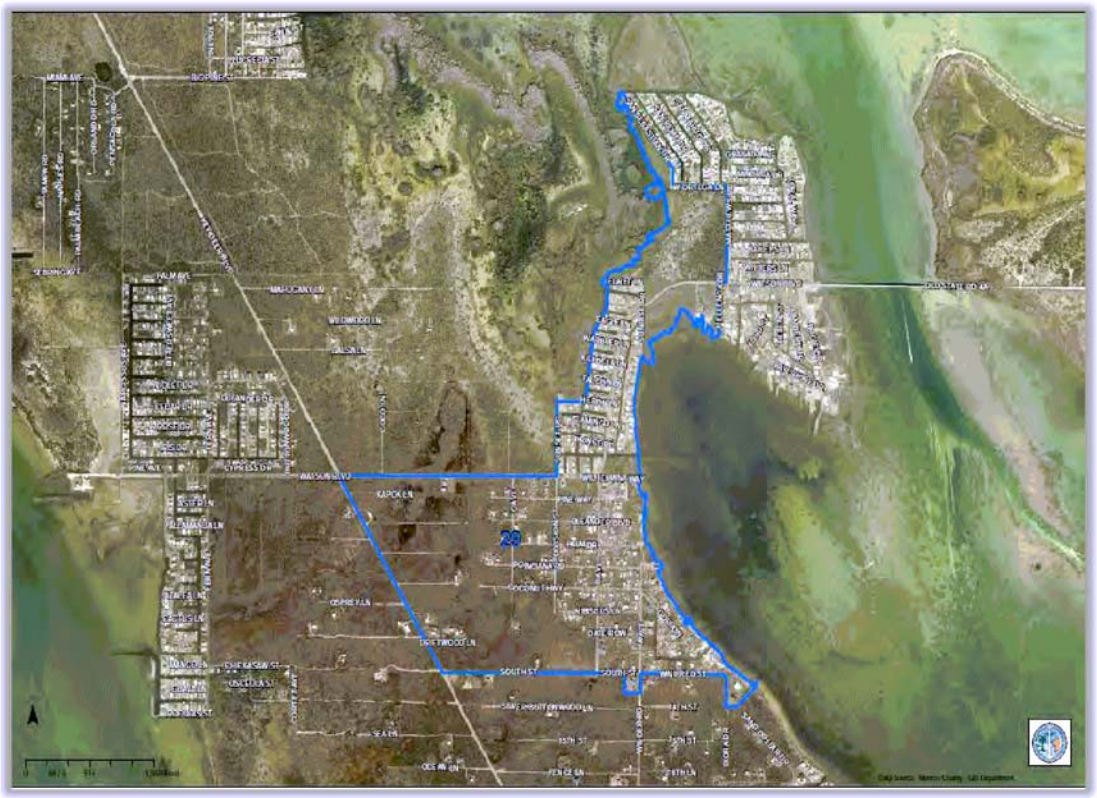
Area 28 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss		Claims submitted	28	Residential	44	Yes	
Other claims	16	Total payments	$296,265	Commercial		No	
Similarly situated	29	Average payment	$17,427	Institutional		No data	45
No data				Government	1		
Total buildings	45						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	32	Piers, posts, etc.	11	< 8 feet		Concrete	12
2	11	Enclosed walls	25	8-12 feet		Wood frame	31
3	1	Crawlspace		> 12+ feet		Masonry	1
4		Slab-on-grade	7	No data	45	Modular housing	1
No data	1	Other	1			Manufact. home	
		No data	1			Other	
						No data	

See page A-1 for more information on these entries.

Area 29

Big Pine Key: Palm Villa, Tropical Bay



Area 29 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	17	Claims submitted	171	Residential	227	Yes	
Other claims	73	Total payments	$3,014,565	Commercial		No	
Similarly situated	137	Average payment	$23,551	Institutional		No data	227
No data							
Total buildings	227						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	209	Piers, posts, etc.	26	< 8 feet		Concrete	35
2	13	Enclosed walls	96	8-12 feet		Wood frame	74
3		Crawlspace	15	> 12+ feet		Masonry	96
4		Slab-on-grade	86	No data	227	Modular housing	16
No data	5	Other				Manufact. home	1
		No data	4			Other	1
						No data	4

See page A-1 for more information on these entries.

Area 30

Big Pine Key: Doctor's Arm, Punta Brisa

Area 30 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	21	Claims submitted	162	Residential	182	Yes	
Other claims	66	Total payments	$2,628,854	Commercial	2	No	
Similarly situated	98	Average payment	$21,031	Institutional	1	No data	185
No data							
Total buildings	185						

Stories		Foundation		Elevated Floors		Walls	
1	126	Piers, posts, etc.	13	< 8 feet		Concrete	1
2	51	Enclosed walls	89	8-12 feet		Wood frame	82
3		Crawlspace	10	> 12+ feet		Masonry	93
4		Slab-on-grade	70	No data	185	Modular housing	3
No data	8	Other				Manufact. home	
		No data	3			Other	6
						No data	

See page A-1 for more information on these entries.

Area 31

Big Pine Key: Big Pine Shores, Koehn's

Area 31 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	5	Claims submitted	28	Residential	51	Yes	16
Other claims	11	Total payments	$199,716	Commercial		No	
Similarly situated	36	Average payment	$9,986	Institutional	1	No data	36
No data							
Total buildings	52						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	28	Piers, posts, etc.	8	< 8 feet	9	Concrete	9
2	16	Enclosed walls	19	8-12 feet	7	Wood frame	20
3		Crawlspace	2	> 12+ feet	36	Masonry	20
4		Slab-on-grade	14			Modular housing	1
No data	8	Other	2			Manufact. home	
		No data	7			Other	
						No data	5

See page A-1 for more information on these entries.

Area 32

Big Pine Key: Eden Pines Colony

Area 32 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	238	Residential	419	Yes	
Other claims	119	Total payments	$2,228,487	Commercial		No	
Similarly situated	302	Average payment	$16,507	Institutional	2	No data	422
No data				Government	1		
Total buildings	422						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	367	Piers, posts, etc.	34	< 8 feet		Concrete	18
2	52	Enclosed walls	293	8-12 feet		Wood frame	277
3	1	Crawlspace	29	> 12+ feet		Masonry	106
4		Slab-on-grade	65	No data	422	Modular housing	18
No data	2	Other				Manufact. home	
		No data	1			Other	2
						No data	1

See page A-1 for more information on these entries.

Area 33

Big Pine Key: Pond Lane

Area 33 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	4	Residential	2	Yes	4
Other claims	2	Total payments	$29,297	Commercial	2	No	
Similarly situated	1	Average payment	$7,324	Institutional		No data	
No data							
Total buildings	4						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	1	Piers, posts, etc.	2	< 8 feet	3	Concrete	2
2	3	Enclosed walls	1	8-12 feet		Wood frame	2
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1		3	Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 34

Big Pine Key: Cahill Pines and Palms

Area 34 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	97	Residential	139	Yes	
Other claims	43	Total payments	$589,541	Commercial	11	No	
Similarly situated	107	Average payment	$10,719	Institutional		No data	152
No data				Industrial	1		
Total buildings	152			Government	1		

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	123	Piers, posts, etc.	25	< 8 feet		Concrete	1
2	24	Enclosed walls	107	8-12 feet		Wood frame	92
3		Crawlspace	4	> 12+ feet		Masonry	34
4		Slab-on-grade	13	No data	152	Modular housing	18
No data	5	Other				Manufact. home	2
		No data	3			Other	5
						No data	

See page A-1 for more information on these entries.

Area 35

Big Pine Key: Piney Point

Area 35 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	30	Residential	28	Yes	28
Other claims	6	Total payments	$840,868	Commercial		No	
Similarly situated	22	Average payment	$44,256	Institutional	1	No data	1
No data							
Total buildings	29						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	10	Piers, posts, etc.	3	< 8 feet	5	Concrete	25
2	18	Enclosed walls	15	8-12 feet	13	Wood frame	4
3	1	Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	11		18	Modular housing	
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 36

Little Torch Key: Jolly Roger Estates

Area 36 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	7	Claims submitted	114	Residential	265	Yes	
Other claims	38	Total payments	$611,225	Commercial	2	No	
Similarly situated	225	Average payment	$11,754	Institutional		No data	267
No data							
Total buildings	267						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	191	Piers, posts, etc.	10	< 8 feet		Concrete	26
2	72	Enclosed walls	225	8-12 feet		Wood frame	153
3		Crawlspace	1	> 12+ feet		Masonry	53
4		Slab-on-grade	25			Modular housing	28
No data	3	Other				Manufact. home	
		No data	6			Other	4
						No data	3

See page A-1 for more information on these entries.

Area 37

Little Torch Key: Ladies Acres, Mates Beach,

Area 37 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	121	Residential	195	Yes	
Other claims	55	Total payments	$1,925,214	Commercial	3	No	
Similarly situated	141	Average payment	$22,919	Institutional		No data	198
No data							
Total buildings	198						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	165	Piers, posts, etc.	12	< 8 feet		Concrete	4
2	25	Enclosed walls	103	8-12 feet		Wood frame	72
3	1	Crawlspace	46	> 12+ feet		Masonry	31
4		Slab-on-grade	30	No data	198	Modular housing	35
No data	7	Other				Manufact. home	38
		No data	7			Other	16
						No data	2

See page A-1 for more information on these entries.

Area 38

Little Torch Key: Coral Shores Estates

Area 38 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	3	Claims submitted	121	Residential	182	Yes	181
Other claims	78	Total payments	$1,425,418	Commercial		No	
Similarly situated	101	Average payment	$14,848	Institutional		No data	1
No data							
Total buildings	182						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	161	Piers, posts, etc.	140	< 8 feet	148	Concrete	4
2	19	Enclosed walls	20	8-12 feet	20	Wood frame	12
3	1	Crawlspace	9	> 12+ feet	1	Masonry	1
4		Slab-on-grade	1		169	Modular housing	12
No data	1	Other				Manufact. home	151
		No data	12			Other	
						No data	2

See page A-1 for more information on these entries.

Area 39

Big Torch Key: Dorn's

Area 39 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	4	Residential	9	Yes	9
Other claims	4	Total payments	$10,321	Commercial		No	
Similarly situated	4	Average payment	$2,580	Institutional		No data	
No data							
Total buildings	9						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1		Piers, posts, etc.		< 8 feet	3	Concrete	3
2	9	Enclosed walls	9	8-12 feet	6	Wood frame	5
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			9	Modular housing	1
No data		Other				Manufact. home	
		No data				Other	
						No data	

See page A-1 for more information on these entries.

Area 40

Ramrod Key: Breezeswept Beach,

Area 40 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	16	Claims submitted	233	Residential	361	Yes	
Other claims	98	Total payments	$1,608,423	Commercial	3	No	
Similarly situated	250	Average payment	$10,245	Institutional		No data	364
No data							
Total buildings	364						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	265	Piers, posts, etc.	40	< 8 feet		Concrete	
2	80	Enclosed walls	288	8-12 feet		Wood frame	213
3	2	Crawlspace	2	> 12+ feet		Masonry	79
4		Slab-on-grade	26	No data	364	Modular housing	64
No data	17	Other	1			Manufact. home	
		No data	7			Other	5
						No data	3

See page A-1 for more information on these entries.

Area 41

Ramrod Key: Ramrod Shores

Area 41 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	24	Residential	45	Yes	43
Other claims	8	Total payments	$482,401	Commercial		No	
Similarly situated	35	Average payment	$34,457	Institutional		No data	2
No data							
Total buildings	45						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	22	Piers, posts, etc.	7	< 8 feet	6	Concrete	9
2	22	Enclosed walls	21	8-12 feet	22	Wood frame	29
3	1	Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	15		28	Modular housing	5
No data		Other	1			Manufact. home	
		No data	1			Other	
						No data	2

See page A-1 for more information on these entries.

Area 42

Cudjoe Key: Summerland Beach, Summerland Cove Isles, Summerland Estates, Summerland Key Cove

Area 42 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	56	Claims submitted	362	Residential	643	Yes	
Other claims	113	Total payments	$4,879,876	Commercial	24	No	
Similarly situated	500	Average payment	$18,988	Institutional	1	No data	669
No data				Industrial	1		
Total buildings	669						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	474	Piers, posts, etc.	59	< 8 feet		Concrete	292
2	172	Enclosed walls	492	8-12 feet		Wood frame	169
3	20	Crawlspace	6	> 12+ feet		Masonry	117
4		Slab-on-grade	107	No data	669	Modular housing	71
No data	3	Other	2			Manufact. home	12
		No data	3			Other	3
						No data	5

See page A-1 for more information on these entries.

Area 43

Cudjoe Key: Venture Out

Area 43 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	29	Claims submitted	461	Residential	389	Yes	371
Other claims	181	Total payments	$4,255,769	Commercial		No	1
Similarly situated	179	Average payment	$10,037	Institutional		No data	17
No data							
Total buildings	389						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	274	Piers, posts, etc.	267	< 8 feet	265	Concrete	
2	110	Enclosed walls	109	8-12 feet	110	Wood frame	
3	1	Crawlspace		> 12+ feet	1	Masonry	1
4		Slab-on-grade	1		376	Modular housing	
No data	4	Other				Manufact. home	375
		No data	12			Other	
						No data	13

See page A-1 for more information on these entries.

Area 44

Cudjoe Key: Cudjoe Ocean Shores, Cutthroat Harbor

Area 44 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	24	Claims submitted	338	Residential	454	Yes	
Other claims	150	Total payments	$1,979,770	Commercial	13	No	
Similarly situated	298	Average payment	$8,425	Institutional	1	No data	472
No data				Industrial	4		
Total buildings	472			No data	472		

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	399	Piers, posts, etc.	67	< 8 feet		Concrete	125
2	71	Enclosed walls	383	8-12 feet		Wood frame	144
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	19	No data	482	Modular housing	192
No data	2	Other				Manufact. home	
		No data	3			Other	3
						No data	8

See page A-1 for more information on these entries.

Area 45

Cudjoe Key: Cudjoe Gardens Sacarma

Area 45 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	9	Claims submitted	138	Residential	269	Yes	
Other claims	60	Total payments	$2,036,505	Commercial	9	No	
Similarly situated	209	Average payment	$25,142	Institutional		No data	278
No data							
Total buildings	278						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	222	Piers, posts, etc.	51	< 8 feet		Concrete	244
2	52	Enclosed walls	74	8-12 feet		Wood frame	
3	1	Crawlspace	1	> 12+ feet		Masonry	
4		Slab-on-grade	149	No data	278	Modular housing	31
No data	3	Other				Manufact. home	1
		No data	3			Other	
						No data	2

See page A-1 for more information on these entries.

Area 46

Sugarloaf Key: Gulf Shores, Indian Mound Estates, Vacation Harbor

Area 46 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	6	Claims submitted	168	Residential	240	Yes	
Other claims	98	Total payments	$6,032,204	Commercial	9	No	
Similarly situated	147	Average payment	$49,853	Institutional	2	No data	251
No data				Government	1		
Total buildings	251						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	193	Piers, posts, etc.	92	< 8 feet		Concrete	90
2	55	Enclosed walls	109	8-12 feet		Wood frame	
3		Crawlspace	1	> 12+ feet		Masonry	2
4		Slab-on-grade	47	No data	251	Modular housing	135
No data	3	Other				Manufact. home	19
		No data	2			Other	
						No data	5

See page A-1 for more information on these entries.

Area 47

Sugarloaf Key: Sugarloaf Shores

Area 47 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	9	Claims submitted	217	Residential	406	Yes	
Other claims	120	Total payments	$3,535,402	Commercial	1	No	
Similarly situated	278	Average payment	$23,888	Institutional		No data	407
No data							
Total buildings	407						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	304	Piers, posts, etc.	18	< 8 feet		Concrete	269
2	95	Enclosed walls	338	8-12 feet		Wood frame	
3	1	Crawlspace	1	> 12+ feet		Masonry	2
4	1	Slab-on-grade	49	No data	407	Modular housing	131
No data	6	Other				Manufact. home	
		No data	1			Other	
						No data	5

See page A-1 for more information on these entries.

Area 48

Sugarloaf Key: Sugarloaf Beach

Area 48 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	20	Residential	26	Yes	21
Other claims	9	Total payments	$516,745	Commercial		No	
Similarly situated	15	Average payment	$27,197	Institutional		No data	5
No data							
Total buildings	26						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	5	Piers, posts, etc.	4	< 8 feet	11	Concrete	16
2	13	Enclosed walls	16	8-12 feet	6	Wood frame	8
3	7	Crawlspace		> 12+ feet	3	Masonry	
4		Slab-on-grade	4		20	Modular housing	
No data	1	Other	1			Manufact. home	
		No data	1			Other	2
						No data	

See page A-1 for more information on these entries.

Area 49

Saddlebunch Key: Bay Point

Area 49 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	3	Claims submitted	154	Residential	150	Yes	
Other claims	58	Total payments	$3,766,393	Commercial		No	
Similarly situated	89	Average payment	$37,291	Institutional		No data	150
No data							
Total buildings	150						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	114	Piers, posts, etc.	51	< 8 feet		Concrete	62
2	34	Enclosed walls	82	8-12 feet		Wood frame	
3	1	Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	16	No data	150	Modular housing	62
No data	1	Other				Manufact. home	25
		No data	1			Other	1
						No data	

See page A-1 for more information on these entries.

Area 50

Big Coppitt Key: Boca Chita

Area 50 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	25	Claims submitted	160	Residential	158	Yes	151
Other claims	25	Total payments	$9,432,211	Commercial		No	
Similarly situated	108	Average payment	$18,886	Institutional		No data	7
No data							
Total buildings	158						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	150	Piers, posts, etc.	146	< 8 feet	145	Concrete	
2	4	Enclosed walls	4	8-12 feet	5	Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			150	Modular housing	
No data	4	Other				Manufact. home	152
		No data	8			Other	
						No data	6

See page A-1 for more information on these entries.

Area 51

Geiger Key: Boca Chita Ocean Shores

Area 51 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	3	Claims submitted	35	Residential	37	Yes	36
Other claims	9	Total payments	$555,925	Commercial	1	No	
Similarly situated	26	Average payment	$26,473	Institutional		No data	2
No data							
Total buildings	38						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	8	Piers, posts, etc.	2	< 8 feet	5	Concrete	18
2	28	Enclosed walls	26	8-12 feet	23	Wood frame	20
3	2	Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	8			Modular housing	
No data		Other	1			Manufact. home	
		No data	1			Other	
						No data	

See page A-1 for more information on these entries.

Area 52

Geiger Key: Geiger Mobile Homes Tamarac Park

Area 52 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	7	Claims submitted	87	Residential	186	Yes	180
Other claims	33	Total payments	$477,623	Commercial		No	
Similarly situated	146	Average payment	$8,845	Institutional		No data	6
No data							
Total buildings	186						

Stories		Foundation		Elevated Floors		Walls	
1	153	Piers, posts, etc.	85	< 8 feet	120	Concrete	5
2	26	Enclosed walls	33	8-12 feet	31	Wood frame	2
3	5	Crawlspace	33	> 12+ feet		Masonry	
4		Slab-on-grade			151	Modular housing	29
No data	2	Other				Manufact. home	148
		No data	35			Other	
						No data	2

See page A-1 for more information on these entries.

Area 53

Big Coppitt Key: Coppitt Subdivision, Johnsonville, Porpoise Point, Similar Sound

Area 53 Data Summary

Type		Insurance		Use		Occupied	
Repetitive loss	3	Claims submitted	370	Residential	569	Yes	2
Other claims	177	Total payments	$11,213,882	Commercial	14	No	1
Similarly situated	419	Average payment	$40,483	Institutional	8	No data	596
No data				Industrial	3		
Total buildings	599			Government	5		

Stories		Foundation		Elevated Floors		Walls	
1	357	Piers, posts, etc.	114	< 8 feet	235	Concrete	264
2	172	Enclosed walls	277	8-12 feet	159	Wood frame	107
3	55	Crawlspace	9	> 12+ feet	6	Masonry	2
4		Slab-on-grade	169		400	Modular housing	145
No data	15	Other	3			Manufact. home	66
		No data	27			Other	2
						No data	13

See page A-1 for more information on these entries.

Area 54

Big Coppitt Key: Rockland Village

Area 54 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	44	Residential	50	Yes	20
Other claims	16	Total payments	$267,408	Commercial	2	No	7
Similarly situated	34	Average payment	$10,696	Institutional		No data	25
No data							
Total buildings	52						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	23	Piers, posts, etc.	16	< 8 feet	15	Concrete	29
2	23	Enclosed walls	27	8-12 feet	28	Wood frame	8
3	4	Crawlspace	2	> 12+ feet	2	Masonry	
4		Slab-on-grade	5		45	Modular housing	1
No data	2	Other				Manufact. home	12
		No data	2			Other	
						No data	2

See page A-1 for more information on these entries.

Area 55

Key Haven

Area 55 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	1	Claims submitted	277	Residential	446	Yes	14
Other claims	198	Total payments	$15,664,460	Commercial		No	
Similarly situated	247	Average payment	$75,310	Institutional		No data	432
No data							
Total buildings	446						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	321	Piers, posts, etc.	1	< 8 feet		Concrete	427
2	113	Enclosed walls	128	8-12 feet	3	Wood frame	
3	6	Crawlspace	4	> 12+ feet		Masonry	8
4		Slab-on-grade	304	No data	443	Modular housing	2
No data	6	Other				Manufact. home	
		No data	9			Other	
						No data	9

See page A-1 for more information on these entries.

Area 56

Stock Island: Maloney Subdivision

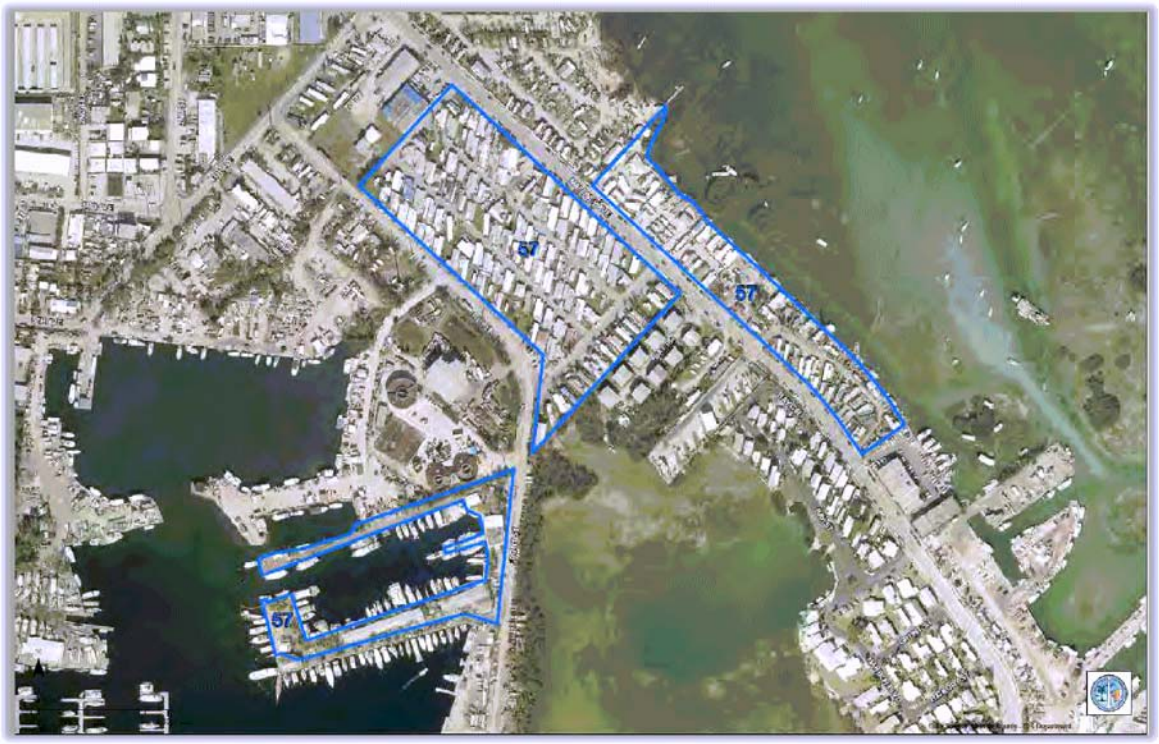
Area 56 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	2	Claims submitted	13	Residential	7	Yes	15
Other claims	4	Total payments	$521,359	Commercial	3	No	
Similarly situated	9	Average payment	$40,105	Institutional	1	No data	
No data				Industrial	4		
Total buildings	15						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	10	Piers, posts, etc.		< 8 feet	1	Concrete	9
2	5	Enclosed walls	1	8-12 feet	1	Wood frame	2
3		Crawlspace	1	> 12+ feet		Masonry	
4		Slab-on-grade	11		2	Modular housing	1
No data		Other				Manufact. home	
		No data	2			Other	3
						No data	

See page A-1 for more information on these entries.

Area 57

Stock Island: Maloney Ave #1



Area 57 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	5	Claims submitted	62	Residential	15	Yes	18
Other claims	3	Total payments	$638,931	Commercial	6	No	
Similarly situated	13	Average payment	$12,528	Institutional		No data	3
No data							
Total buildings	21						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	19	Piers, posts, etc.	14	< 8 feet	14	Concrete	1
2	2	Enclosed walls	1	8-12 feet	1	Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1			Modular housing	
No data		Other	2			Manufact. home	20
		No data	3			Other	
						No data	

See page A-1 for more information on these entries.

Area 58

Stock Island: Maloney Ave #2

Area 58 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	4	Claims submitted	48	Residential	25	Yes	24
Other claims		Total payments	$614,168	Commercial		No	
Similarly situated	21	Average payment	$14,283	Institutional		No data	1
No data							
Total buildings	25						

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	25	Piers, posts, etc.	23	< 8 feet	23	Concrete	
2		Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade			23	Modular housing	
No data		Other				Manufact. home	23
		No data	2			Other	
						No data	2

See page A-1 for more information on these entries.

Area 59

Stock Island

As a single property repetitive loss area on Stock Island, the exact location is not shown on a map.

Area 59 Data Summary

00

Type		Insurance		Use		Occupied	
Repetitive loss	1	Claims submitted	N/A	Residential		Yes	1
Other claims		Total payments	N/A	Commercial	1	No	
Similarly situated		Average payment	N/A	Institutional		No data	
No data							
Total buildings	1						

Stories		Foundation		Elevated Floors		Walls	
1	1	Piers, posts, etc.		< 8 feet		Concrete	
2		Enclosed walls		8-12 feet		Wood frame	
3		Crawlspace		> 12+ feet		Masonry	
4		Slab-on-grade	1			Modular housing	
No data		Other				Manufact. home	
		No data				Other	1
						No data	

See page A-1 for more information on these entries.

Area 60

Stock Island: Stuart Subdivision

Area 60 Data Summary							
Type		**Insurance**		**Use**		**Occupied**	
Repetitive loss	19	Claims submitted	95	Residential	543	Yes	464
Other claims	53	Total payments	$1,552,835	Commercial	5	No	1
Similarly situated	478	Average payment	$21,871	Institutional		No data	85
No data				Industrial	1		
Total buildings	550			Government	1		

Stories		**Foundation**		**Elevated Floors**		**Walls**	
1	406	Piers, posts, etc.	218	< 8 feet	288	Concrete	153
2	99	Enclosed walls	120	8-12 feet	56	Wood frame	22
3	39	Crawlspace	8	> 12+ feet	2	Masonry	
4		Slab-on-grade	148		346	Modular housing	157
No data	6	Other				Manufact. home	199
		No data	56			Other	4
						No data	15

See page A-1 for more information on these entries.

Appendix B. Input Questionnaire

This appendix is the questionnaire for resident input as it appeared on the County's website.

RLAA - Public Input Questionnaire

Your responses to the questions below will help the County identify and offer flood damage reduction activities for individual homeowners. It is very important that you answer as many questions as possible, and that you provide specific details where possible. The more complete picture we have of past flooding events and their consequences, the better range of mitigation opportunities we can provide. Each questionnaire submitted plays an important part in building a more resilient and informed Monroe County. This questionnaire is also a critical step toward helping the County achieve its goal of obtaining a Community Rating System (CRS) Class 4, which will result in a 30% savings on National Flood Insurance Program (NFIP) policies issued in the flood zone (AE or VE-zones); smaller discounts are available for policies covering structures outside of the floodplain. We also encourage you to utilize the comments section to share your thoughts and opinions on the RLAA, flooding risks, and flood insurance maps in Monroe County in general. Thank you again for your support in this process, and please do not hesitate to contact the County Floodplain Program with any questions or concerns.

Address1*

Do you Own or Rent this home/structure?

-- Select One --

What type of foundation does the home/structure have?

-- Select One --

If "Other" selected above, enter detail here.

How many stories does the building have?

-- Select One --

Has this home/structure ever flooded before to your knowledge?

-- Select One --

FLOOD EVENT ONE

Please enter the flood event year (enter 4 digit year value, i.e. 1980).

Please indicate which of the following locations where flooding occurred relative to your home/structure. Check all that apply.

- ☐ In the Yard
- ☐ Over the First Floor
- ☐ Beneath the Floor
- ☐ Don't Know

What do you believe was the primary cause of the flooding at your property?

-- Select One --

What length of time were the flood waters were present in these same areas?

-- Select One --

FLOOD EVENT TWO

Please enter the flood event year (enter 4 digit year value, i.e. 1980).

Please indicate which of the following locations where flooding occurred relative to your home/structure. Check all that apply.

- ☐ In the Yard
- ☐ Over the First Floor
- ☐ Beneath the Floor
- ☐ Don't Know

What do you believe was the primary cause of the flooding at your property?

-- Select One --

What length of time were the flood waters were present in these same areas?

-- Select One --

FLOOD EVENT THREE

Please enter the flood event year (enter 4 digit year value, i.e. 1980).

Please indicate which of the following locations where flooding occurred relative to your home/structure. Check all that apply.

- ☐ In the Yard
- ☐ Over the First Floor
- ☐ Beneath the Floor
- ☐ Don't Know

What do you believe was the primary cause of the flooding at your property?

-- Select One --

What length of time were the flood waters were present in these same areas?

-- Select One --

SECTION TWO

Have you, or any previous owner or tenant, installed any flood proofing or protection on the property?

○ Yes ○ No ○ Unsure

If you answered "Yes" to the previous question, please indicate which measures you believe to have been implemented at your home/structure or property. Check all that apply:

- ☐ Elevated Utilities
- ☐ Water-Proofed Outside Walls
- ☐ Re-Graded Yard or Landscaping Designed Remove/Redirect Flood Waters
- ☐ [Permanently] Removing or Relocating Contents Above Anticipated Flooded Areas
- ☐ Sandbagged Perimeter of Structure
- ☐ Elevated Building
- ☐ Other: Please Detail

If "Other" selected please provide detail:

If you made any selections under the previous Question, do you believe that these activities benefited your building/structure?

○ Yes ○ No ○ Unsure

If you made any selections under Question 8, and you believe they were successful, please share why you feel this way:

Is the building/structure currently covered by a flood insurance policy?

- ◯ Yes - A National Flood Insurance Program (NFIP) policy
- ◯ Yes - A private flood insurance policy
- ◯ No
- ◯ Not Sure

Are you interested in learning more about flood mitigation (methods of reducing the risk of flooding to a building and its contents)?

- ◯ Yes
- ◯ No
- ◯ Unsure

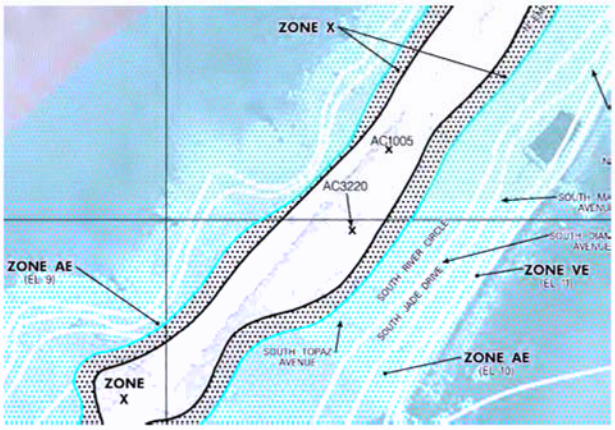
If you answered "YES' to the previous question, please provide a method/detail how you may be contacted:

Please feel free to share any comments, questions, or feedback you have regarding this Questionnaire, flood mitigation, or the NFIP in general.

Appendix C. Flood Insurance Terminology

These terms are used throughout this repetitive loss area analysis.

Flood Insurance Rate Map (FIRM): The map published by FEMA that identifies the Special Flood Hazard Area and provides other information for insurance rating and regulating new construction. Monroe County's FIRM can be found at https://msc.fema.gov



Special Flood Hazard Area (SFHA): The area mapped on the FIRM as subject to the base flood (also called the 1% chance or 100-year flood). It is the shaded area designated with the letters "AE" or "VE" on the FIRM. In the example from the County's FIRM on the right, the SFHA is the light blue **Zones AE and VE**. The grey areas are "**Zone X**," outside the SFHA.

The SFHA is subject to development and construction regulations and the Federal requirement that flood insurance be purchased as a condition of Federal aid (including mortgages from Federally-regulated or insured lenders). The **VE Zones** are coastal high hazard areas subject to damage by wave action, where construction regulations are more stringent than for A Zones.

Base Flood Elevation (BFE): The elevation of the base flood in relation to sea level. In the example from the County's FIRM above, the elevation is in parentheses after the Zone designation. "EL 9" means the BFE is nine feet above sea level. There is no BFE in Zone X, outside the SFHA because the ground is higher than the BFE.

County Code Definitions: The flood rules for the County's unincorporated areas are in Chapter 122 of the County's Code of Ordinances. Most of the rules are required as a condition of participating in the National Flood Insurance Program. The following provisions are for properties in the SFHA.

> ***Substantial damage*** means damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. All structures that are determined to be substantially damaged are automatically considered to be substantial improvements, regardless of the actual repair work performed. If the cost necessary to fully repair the structure to its before damage condition is equal to or greater than 50 percent of the structure's market value before damages, then the structure must be elevated (or flood proofed if it is nonresidential) to or above the base flood elevation (BFE), and meet other applicable NFIP requirements. – Section 122-3.
>
> ***Substantial improvement*** means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. – Section 122-3.