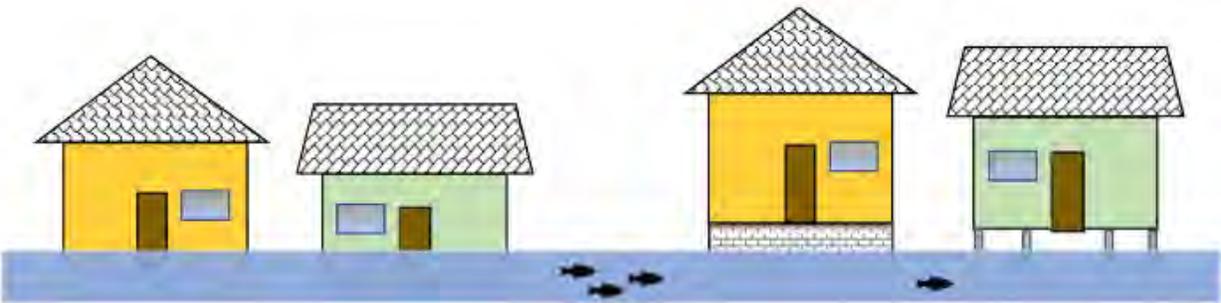


APALACHICOLA, FLORIDA

Nonstructural Flood Mitigation Assessment



February 2020

The flood mitigation assessment follows the vulnerability assessment as a process towards the flood hazard mitigation of the building. This brief overview of a nonstructural flood mitigation assessment provides the community and property owners an identified flood mitigation project, a scope of work and a preliminary budget.

3.1 Description of Structure Dataset

For this nonstructural assessment, information was collected for a sampling of 10 structures located throughout the study area. The structures assessed are summarized in Table 1.

Table 1
Apalachicola Structure Inventory Data

Structure ID #	Address	Structure Identity	Occupanc	Building Value (\$)	First Floor Elevatio	Ground Elevatio	1% Elevatio
FR00339	1 Ave E	Old City Hall	Public	314,770	6.4	5.6	AE 13
FR00339	86 Water St	HCA Warehouse	Public	--- ¹	6.5	6.0	AE 13
FR00288	1 Bay Ave	Popham Bldg.	Public	--- ¹	7.3	1.7	VE 13
FR00307	161 Commerce	Bowery Inn	Com	119,340	5.8	3.8	AE 12
FR00302	21 Ave E	Dixie Theatre	Com	316,595	7.4	7.3	AE 12
FR00282	247 Water St	Ice House Bldg.	Com	90,990	7.3	1.7	AE 13
FR00378	268 Water St	Net Factory Bldg.	Com	46,105	4.5	4.3	AE 13
FR00212	15 Commerce	Powers Bldg.	Com	160,325	7.4	6.6	AE 13
FR00329	15 Ave E	Sponge Exchange	Com	54,475	7.0	6.7	AE 12
FR00174	252 Water St	Wefing Marine Bldg.	Com	45,375	5.1	4.8	AE 13

¹Building Value was not available for this public structure at the time of report publication.

The inventory structure data was obtained through research conducted by Ducky Recovery through their sub-contractors L&R Resources, LLC and Behm Hazard Mitigation, LLC. Additional information and photographs were collected during the field investigation. The flood depths were obtained from data developed by FEMA for their floodplain mapping program. Ground elevations were obtained from FEMA Elevation Certificates for each building/site. The assessment conducted included proposed flood hazard mitigation project solutions of a combination of nonstructural measures such as elevation and dry flood proofing. The information produced by this report is sufficient to produce federal and state grant funding applications or private financing solutions. For this assessment, the level of detail from the data collected is sufficient to identify potential nonstructural measures which could be effective in reducing future flood risk, life loss and property damage.

8.1 Nonresidential Flood Insurance Premium Rates

Nonresidential buildings, otherwise known as commercial businesses, are located through the business district of Apalachicola and are at significant flood risk. Incorporating flood reduction mitigation measures, such as elevation, shown in Figure 7, will result in lower premiums as insurance rates become actuarial over time. Elevation of the entire structure as portrayed in the figure, elevating the interior of the structure, or utilizing dry flood proofing techniques can also result in reduced flood insurance premiums.

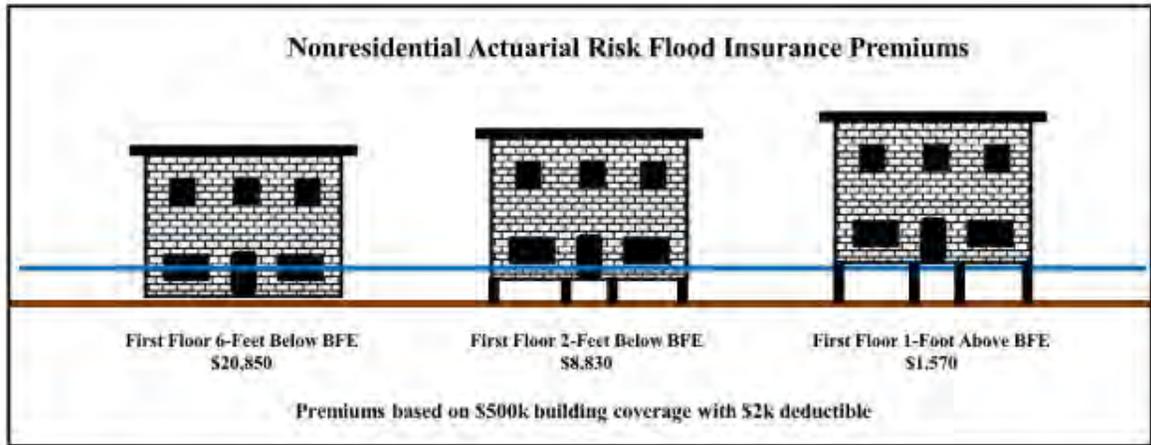


Figure 7
Nonresidential Actuarial Flood Insurance Premiums

8.2 Residential Flood Insurance Premium Rates

For residential buildings, elevation as a mitigation measure has the effect of reducing the flood insurance premium because the building is being moved away from the flood risk. If the residential structure is elevated to be above the 1% flood, there is still a possibility that a larger flood event could occur. Figure 8 illustrates the potential reduction in flood insurance premium for a sample structure elevated on extended foundation walls.

Flood insurance is moving toward actuarial rates and the benefit of elevating a residential building to above the flood risk will not only result in lower premiums, but will also result in lower flood damages for the frequent flood events.



Figure 8
Residential Actuarial Flood Insurance Premiums

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood

elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

FEMA was directed by Congress, under the Homeowner Flood Insurance Affordability Act of 2014 (HIFAA), to produce guidelines for building owners regarding alternative mitigation efforts, other than building elevation, acquisition, or relocation, to reduce flood risk to residential buildings which cannot be entirely elevated above the BFE due to external constraints. This request by Congress requires alternative forms of mitigation measures to be considered in the calculation of flood insurance premium rates. At the time of the publication of this report, the guidelines had not been finalized. It is anticipated that the guidelines will offer premium reductions for achieving first-floor elevations which are not able to achieve the full BFE height.

For nonstructural mitigation of commercial buildings, a reduction in flood insurance premiums may be obtainable if the flood risk for an individual building can be reduced through mitigation measures such as elevation or dry flood proofing. As discussed in section 2.4.2, dry flood proofing is the prevention of flood waters from entering a commercial structure through implementation of engineered systems.

If dry flood proofing is a consideration for reducing flood risk, it is recommended that the building owner employ closure barriers which have been certified through the National Flood Barrier Testing and Certification program. The program, established to measure the performance of flood fight products as described in ANSI 2510 guidance, has the goal of providing a standardized process for products in terms of their resistance to floodwaters, their material properties, and consistency of product manufacturing. The program was established in partnership between the Association of State Floodplain Managers, FM Approvals, and the US Army Corps of Engineers. Products are tested against water forces at the USACE Engineer Research and Development Center laboratory, tested against material forces in an FM Approval laboratory setting, and undergo periodic inspection of the manufacturing process for consistency of product.

Additional information regarding the certification program can be found at the following Association of State Floodplain Managers web site: <http://nationalfloodbarrier.org/>

10.0 Assessment Conclusions

The City of Apalachicola is located along the Apalachicola River and Apalachicola Bay on the eastern side of the Florida Panhandle. Numerous historic residential and nonresidential buildings reside within the 1% annual chance exceedance floodplain and are at risk of flooding. The City of Apalachicola received a grant from NOAA through Mississippi State University – Coastal Research & Extension Center and the Mississippi-Alabama Sea Grant Consortium to produce the flood mitigation assessment to identify proposed nonstructural measures on a sampling of 10 buildings which have incurred flood damages in the past.

As a function of this assessment, the primary characteristics of flooding, such as depth, velocity, duration, and areal extent were combined with structure attributes for each of the 10 sample buildings to determine the flood risk for the target 1% annual chance exceedance flood event. From this information, proposed nonstructural measures for each building were determined. The measures proposed were scaled to the flood risk for the individual building. As an example, if the 1% annual chance exceedance flood depth were no greater than a foot or two above the first floor elevation of a structure, elevating or dry flood proofing the building would significantly decrease the flood risk and ensure that the building remains active on the property tax rolls, and provides continuation of function soon after a flood event.

Since flooding within the assessment area could occur as a result of a tropical storm or hurricanes that produce a coastal flood event, this assessment also provides practical information for the implementation of temporary measures as a stop-gap consideration prior to implementing permanent measures. Materials and equipment needs are described in section 2.5 in an effort to provide the owner/tenant with enough background information to develop a successful temporary measures flood response plan.

With regards to the implementation of permanent nonstructural measures, the assessment identified one practical nonstructural flood risk reduction technique for each of the sample buildings, with a couple of price/equipment options and a scope of work, which could be implemented to reduce flood risk and increase resiliency. Table 4 provides a summary of the 10 assessment structures and Enclosure A contains copies of the individual assessment sheets for each of the buildings, identifying the proposed nonstructural measure for consideration.

Table 4
Apalachicola Structure Assessment Summary

Address	Structure Identity	Occupan	Building Value (\$)	Parcel Value (\$)	Total Value (\$)	Proposed Mitigation
1 Ave E	Old City Hall	Public	314,770	302,000	616,770	Option 1: Elevate
86 Water St	HCA Warehouse	Public	--- ¹	60,000	60,000	Option 1: Elevate
1 Bay Ave	Popham	Public	--- ¹	--- ¹	---	Elevate
161 Commerce St	Bowery Inn	Com	119,340	54,000	173,340	Elevate
21 Ave E	Dixie Theatre	Com	316,595	88,200	404,795	Dry Flood Proof
247 Water St	Ice House	Com	90,990	240,000	330,990	Wet and Dry Flood Proof
268 Water St	Net Factory	Com	46,105	54,000	100,105	Dry Flood Proof
15 Commerce St	Powers	Com	160,325	90,000	250,325	Elevate Interior
15 Ave E	Sponge	Com	54,475	60,000	114,475	Elevate Interior
252 Water St	Wefing Marine	Com	45,375	54,000	99,375	Option 1: Elevate

¹Building Value was not available for this public structure at the time of report publication.

²Parcel Value was not available for this public structure at the time of report publication.

The recent 2018 Hurricane Michael caused flood damages to many buildings with a high probability of recurrence for future damages. In addition, the rapid rise in flood insurance premiums on these pre-FIRM high flood risk buildings is creating issues of property value and property tax revenue losses. This assessment should be used as a tool to educate community officials, residents, and business owners about the risk of flooding as well as the potential opportunities for reducing the flood risk through the nonstructural techniques presented.

**1 Ave E, Apalachicola, FL
City Hall/Old Cotton Warehouse**

<u>Structure Information/Data</u>			
Structure Identifier Number	FR00339	Ceiling height (ft)	8
Occupancy type	Commercial	Freeboard (ft)	1
Number of Structural Corners	4	First Floor Elevation (FF) (ft)	6.4
Number of Stories	2	Lowest Adjacent Grade (LAG) (ft)	5.6
Building Construction Matl	Brick	Basement/Crawlspace Elevation	n/a
Foundation Material	Brick	Max 1% Flood Velocity	Stillwater

Slab/Crawlspace/Basement	Slab	Base Flood Elevation (BFE)	AE-13
Condition (Good/Fair/Poor)	Fair	FF minus BFE (ft)	-6.6
1st Floor Window Count	6	FF minus LAG (ft)	0.81
1st Floor Pedestrian Door Count	2	Flood Depth (BFE-LAG) (ft)	7.4
1st Floor Vehicle Door Count	0	Perimeter Distance (ft)	220



Front View



Side View



Side View



Rear View

Site Visit Observations

~~Floor at front of building 5" above grade~~

~~Dimensions 80'X30' Front window openings 73", Water St door opening 60.5", side window opening 63",~~

~~Rear entry door 64 inches~~

The City Hall building is one of two surviving 1830 era cotton warehouse buildings along the road adjacent to the docks of Apalachicola. The building is a contributing building to the National Register listed (1975) Apalachicola Historic District. The building was previously rehabilitated to house the Apalachicola City Hall.

The building is constructed of older historic bricks, creating a thick wall building on the ground floor. This building is 7.4 feet below the minimum flood mitigation elevation requirement, including the locally required 1-foot free board. The building needs some maintenance to the brick construction, called repointing, which refers to the mortar joint replacement common to this era construction. The interior finishes were removed to the 3-foot level from the finished floor after the flood event to enable flood recovery and repair of the building. This exposed the interior brick construction which revealed the need for re-pointing. Repointing of the mortar joints will enhance the building wall strength and resistance to water penetration.

The flood hazard mitigation assessment of the building requires an examination of multiple variables relating to the building and the flood elevation. The high flood elevation required at this site, AE-13, restricts the possible flood hazard mitigation techniques appropriate for the building due to the finished floor elevation of 7.4 feet. The un-reinforced brick walls of the building prevent dry flood proofing of the building exterior walls due to the potential of wall collapse due to hydrostatic pressures. The flood hazard mitigation of the building will require an elevation on site project including a new foundation with crawl space and flood venting. Stairs and an elevator will be required for access to the building. All utilities need to be elevated to the level of the top of the finished floor.

1 Avenue E, Apalachicola, FL Cotton Warehouse/City Hall Building

Proposed Flood Mitigation Project



Cotton Warehouse/City Hall building with BFE Illustrated

The City Hall/Cotton Warehouse building is a fireproof historic brick wall constructed building located on Water St across from the city docks. This building was constructed in 1840(circa), when Apalachicola was the third largest cotton shipping port in the US. The building is listed on the National Register of Historic Places and is one of only 2 remaining original cotton Warehouses located along Water Street. The building is 6.5 feet below BFE and has 4 double opening front and a rear single-entry door openings. The entry doors are at or just above grade. This level of flood depth doesn't afford the opportunity to dry flood proof the building, due to the fact that the unreinforced brick walls can't resist that level of hydrostatic pressures.

The flood mitigation assessment has investigated the existing building in relation to the FEMA flood map minimum elevation requirement. The assessment also analyzed the types of flood hazard mitigation techniques that could be considered for the building and which type of technique would result in an optimum flood risk reduction along with insurance savings. The elevation of the building is the best solution for reducing flood risk and flood insurance and come into compliance with the base flood elevation.

Proposed flood hazard mitigation project: The method of flood hazard mitigation selected for this building is to elevate the building. This type of flood mitigation project will reduce flood risk and flood insurance premiums when the project is completed.

Scope of work for the mitigation project:

1. Financing secured
2. Final designs are completed and estimates are sought
3. Contracts finalized
4. Permitting
5. Re-pointing of bricks to strengthen walls
6. Prepare for elevation, disconnect utilities, shore building, insert structural steel
7. Elevation of the building
8. Construction of new foundation, re-connection of building to new foundation
9. Reconnect plumbing, electrical
10. Build stairs and ADA facilities
11. Elevation Certificate updated after the project is completed
12. Local certificate of occupation and final certification of the flood proofing system

Proposed project budget

Pre-design plans:

Building elevations illustrating the flood mitigation system installed	\$	
Soil profile bore and evaluation	\$	
Designed construction plans	\$	
Subtotal	\$	

Post-design plans:

Permits	\$	
Porta toilet	\$	
Site soil stabilization	\$	
Brick courses re-pointing	\$	
Prep/elevate building, remove steel after building connected to new foundation	\$	
New foundation	\$	
Relocation of utilities to above BFE, install sewer backflow preventor	\$	
Build stairs and ADA facilities	\$	
Final Elevation Certificate	\$	
15% contingency	\$	

Subtotal
Total

\$ [REDACTED]
\$ [REDACTED]

86 Water St, Apalachicola, FL
HCA Warehouse/Museum

<u>Structure Information/Data</u>			
Structure Identifier Number	FR00339	Ceiling height (feet)	9
Occupancy type	Commercial	Freeboard (feet)	1
Number of Structural Corners	4	First Floor Elevation (FF) (feet)	6.5
Number of Stories	2	Lowest Adjacent Grade (LAG) (feet)	6
Building Construction Matl	Brick	Basement/Crawlspace Elevation	n/a
Foundation Material	Brick	Max 1% Flood Velocity	Stillwater
Slab/Crawlspace/Basement	Slab	Base Flood Elevation (BFE)	AE-13
Condition (Good/Fair/Poor)	Good to fair	FF minus BFE (feet)	-6.5
1st Floor Window Count	0	FF minus LAG (feet)	0.5
1st Floor Pedestrian Door Count	4 double	Flood Depth (BFE-LAG) (feet)	7
1st Floor Vehicle Door Count	0	Perimeter Distance (feet)	220



Front View



Side View



Side View



Rear View

Site Visit Observations

First floor at grade

80 foot x 30 foot foundation

Front openings 73.5 inches x 4-foot

The HCA Warehouse – Apalachicola museum building (1840 circa) is one of two surviving cotton warehouses that once lined the docks of Apalachicola in the decades prior to the Civil War. The building is constructed of older historic bricks, creating a thick wall building on the ground floor. This building is 7.4 feet below the minimum flood mitigation elevation requirement, including the locally required 1-foot free board. The building needs some maintenance to the brick construction, called repointing, which refers to the mortar joint replacement common to this era construction. The interior bricks are exposed which facilitates this important maintenance activity. Re-pointing of the mortar joints will enhance the building wall strength and resistance to water penetration.

The flood hazard mitigation assessment of the building requires an examination of multiple variables relating to the building and the flood elevation. The high flood elevation required at this site, AE-13, restricts the possible flood hazard mitigation techniques appropriate for the building due to the finished floor elevation of 6.5-feet. The nonreinforced brick walls of the building prevent dry flood proofing of the building exterior walls due to the potential of wall collapse due to hydrostatic pressures at the 7-foot flood elevation. The flood hazard mitigation of

the building will require an elevation on site project including a new foundation and pier construction enabling low value storage below the first floor. Stairs and an elevator will be required for access to the building. All utilities need to be elevated to the level of the top of the finished floor.

**86 Water St, Apalachicola, FL
HCA Warehouse/Apalachicola Museum Building**

Proposed Flood Mitigation Project



HCA Warehouse building with BFE Illustrated

The HCA Warehouse/Apalachicola Museum building is a fireproof historic brick wall constructed building located on Water St across from the city docks. This building was constructed in 1840(circa), when Apalachicola was the third largest cotton shipping port. The building is listed on the National Register of Historic Places. The HCA Warehouse/Museum building is one of only 2 remaining original cotton Warehouses along Water St. The building is 6.5-feet below BFE and has 4 double front door store front and a rear, single-entry door opening. All of the entry doors are at or just above grade. This level of flood depth doesn't afford the opportunity to dry flood proof the building due to the fact that the unreinforced brick walls can't resist that level of hydrostatic pressures.

The flood mitigation assessment has investigated the existing building in relation to the FEMA flood map minimum elevation requirement. The assessment also analyzed the types of flood hazard mitigation techniques that could be considered for the building and which type of technique would result in an optimum flood risk reduction along with insurance savings. The elevation of the building is the best solution for reducing flood risk and flood insurance and come into compliance with the base flood elevation.

Proposed flood hazard mitigation project: The method of flood hazard mitigation selected for this building is to elevate the building. This type of flood mitigation project will reduce flood risk and flood insurance premiums when the project is completed.

Scope of work presented for the mitigation project:

1. Financing secured
2. Final designs are completed and estimates are sought
3. Contracts finalized
4. Permitting
5. Re-pointing of bricks to strengthen walls
6. Prepare for elevation, disconnect utilities, shore building, insert structural steel
7. Elevation of the building
8. Construction of new foundation, re-connection of building to new foundation
9. Reconnect plumbing, electrical
10. Build stairs and ADA facilities
11. Elevation Certificate updated after the project is completed
12. Certificate of occupation

Proposed project budget

Pre-design plans:

Building elevations illustrating the flood mitigation system installed
Soil profile bore and evaluation
Designed construction plans

\$ [REDACTED]
\$ [REDACTED]
\$ [REDACTED]

Sub total \$ [REDACTED]

Post-design plans:

Permits \$ [REDACTED]

Porta toilet \$ [REDACTED]

Site soil stabilization \$ [REDACTED]

Re-pointing of bricks to strengthen walls \$ [REDACTED]

Prep/elevate building, remove steel after building connected to new foundation \$ [REDACTED]

New foundation \$ [REDACTED]

Relocation of utilities to above BFE, install sewer backflow preventor \$ [REDACTED]

Build stairs and ADA facilities \$ [REDACTED]

FEMA Elevation Certificate \$ [REDACTED]

15% contingency \$ [REDACTED]

Subtotal \$ [REDACTED]

Total \$ [REDACTED]