

State of Florida Shelter Retrofit Report

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EXECUTIVE SUMMARY

The Division of Emergency Management (Division), as directed by section 252.385, Florida Statutes, publishes a shelter retrofit report annually. The report provides a list of facilities recommended to be retrofitted for use as public hurricane evacuation shelters. Retrofitting is the modification of an existing structure to make it stronger and more disaster resistant. For example, installing hurricane shutters on an existing building protects doors and windows from wind-borne debris. Such measures bring public shelters up to established safety criteria and increase the availability of public hurricane evacuation shelter spaces in the State of Florida.

Since 1999 significant progress has been made toward reducing the deficit of safe public hurricane shelter space and meeting the American Red Cross's *Standards for Hurricane Evacuation Shelter Selection* (ARC 4496, January 2002). A combination of existing building surveys, retrofitting and application of enhanced hurricane design and construction standards has increased available hurricane shelter spaces to a total of 1,073,009. Another 19,238 spaces (meeting ARC 4496 safety standards) are under retrofitting contracts at this writing. The expected minimum available shelter spaces for the public during this fiscal year is 1,092,247.

In preparation of the *2018 Shelter Retrofit Report*, the Division reviewed 431 projects submitted by county emergency management agencies in cooperation with other partner organizations (local American Red Cross chapters and school boards) that participate in hurricane shelter planning and operations. After careful evaluation of the proposed projects, the Division, by priority, recommends 278 projects for retrofitting. These projects alone will create an additional 108,104 risk recognized hurricane shelter spaces statewide at an estimated cost of \$23,189,218.

A significant increase in public hurricane shelter capacity has been achieved over the past 18 years. This is largely due to the availability of retrofit and mitigation-related dollars to fund these projects. Prior to 1999, the State lacked a dedicated funding source to meet the demands for public shelter space. Since 1999, however, the Governor and the Legislature have committed to fund the State's retrofit program on a recurring basis. Per section 215.559(1)(b), Florida Statutes, the Division is provided \$3 million per year to retrofit hurricane shelters as prioritized in the annually published *Shelter Retrofit Report*. The Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP) has provided approximately \$48 million to harden or retrofit public hurricane shelters during the history of the program. Table 1.1 summarizes the State's progress in creating needed public hurricane shelter space through retrofit of appropriate buildings

The Division's public hurricane shelter deficit reduction strategy focuses on five major components: 1) surveying hurricane shelter facilities in existing local inventories to identify unused space; 2) surveying facilities not currently listed in local inventories to identify additional capacity; 3) providing funding for cost-effective retrofit or other mitigation measures on existing buildings that can provide additional shelter capacity; 4) incorporating hurricane shelter design criteria into

new public building construction projects; and 5) reducing hurricane shelter demand through improved public information, education and behavioral analysis, and decreased evacuation need.

A significant component of the strategy to increase the availability of “safe” hurricane shelter space is construction of new school facilities that comply with the Public Shelter Design Criteria provisions of the Florida Building Code; also known Enhanced Hurricane Protection Area (EHPA) requirements. Table 2.1 illustrates a net gain of 506,686 hurricane shelter spaces since code adoption. Many Regional Planning Council (RPC) regional hurricane shelter space deficits have been eliminated, and consequently so has the requirement to design and construct new schools to the EHPA code provisions.

Since 1995, the state has made significant progress toward improving the safety and availability of public hurricane shelter space. On a statewide cumulative basis, the current capacity is about 14 percent greater than the estimated demand calculated in Table 2.1. The metrics are evidence that the comprehensive strategy is an effective means to eliminate shelter deficits. However, RPC regions 6, 7 and 8 currently have deficits per data from the *2018 Statewide Emergency Shelter Plan* (SESP). For Special Needs Shelters (SpNS) nearly all regions have a deficit.

Changes in Federal Emergency Management Agency flood and National Weather Service storm surge maps reduced the previously recognized quantity of hurricane evacuation shelter space in some regions. In addition, recent population and demographic trends reflected in evacuation studies caused an increase in shelter space demand for 2016 and beyond. These changes and their consequent impacts indicate an increased need for additional hurricane evacuation shelter space.

Specifically, forecasting for the five-year period indicates higher demand for special needs shelters. These demand figures do not take into account the aging of the current stock of public shelters nor the approaching end of the useful life of some of the original retrofit projects. As existing buildings constructed to older building codes continue to age, the Division will need to identify replacement facilities. Surveying and retrofitting, as necessary, new or recently constructed facilities is needed so that state shelter capacities meet current and future needs.

In summary, as the number of Floridians in areas vulnerable to hurricanes continues to grow, it is vitally important that construction of hurricane shelters and retrofitting of existing buildings continue. Full implementation of the Division’s shelter deficit reduction strategy will create a greater level of preparedness, a more efficient capability for responding to incidents and an increased ability to meet the needs of disaster survivors.

I. INTRODUCTION

Purpose

In an effort to continue to reduce the State's public hurricane shelter deficit, the Division of Emergency Management (Division) annually issues a *Shelter Retrofit Report*, which provides a list of facilities recommended to be retrofitted using state funds. See Sec.252.385, Florida Statutes. Each year the President of the Senate, the Speaker of the House of Representatives and the Governor receive this report. This report recommends and prioritizes facilities to retrofit based on each Regional Planning Council's (RPC) public hurricane evacuation shelter deficit. The RPC regions are established to coordinate planning for economic development, growth management, emergencies and other regional impacts. The report's objective is to improve relative safety and reduce the hurricane evacuation shelter space deficit in the state.

Shelter Retrofit Project Identification Procedure

In collaboration with local school boards, and public and private agencies, county emergency managers provided the data used for the *2018 Shelter Retrofit Report*. The Division recognizes that local officials are aware of facilities and are in a position to make recommendations that will best serve their communities. In order to identify potential shelter retrofit projects for inclusion in the *2018 Shelter Retrofit Report*, the Division provided general guidance for the development of proposals in a questionnaire-type format that the counties could use for project submittal.

The questionnaire was prepared to include sufficient information to determine if the facility could meet the Division's Least Risk Decision Making hurricane hazard safety guidelines, clearly define the project(s) to be undertaken and their impact upon hurricane shelter capacity and safety, and explain the interrelationship of the proposed project(s) and local and regional shelter strategies. The hurricane safety guidelines are found in Appendix C, *Standards for Hurricane Evacuation Shelter Selection* (ARC 4496, 2002). The cost estimates were generally provided by local agencies, commercial contractors, "rough orders of magnitude" (ROM), or in some cases, past experience in the retrofit program projects. Division staff then reviewed and ranked the projects according to assigned point value criteria found in Appendix H.

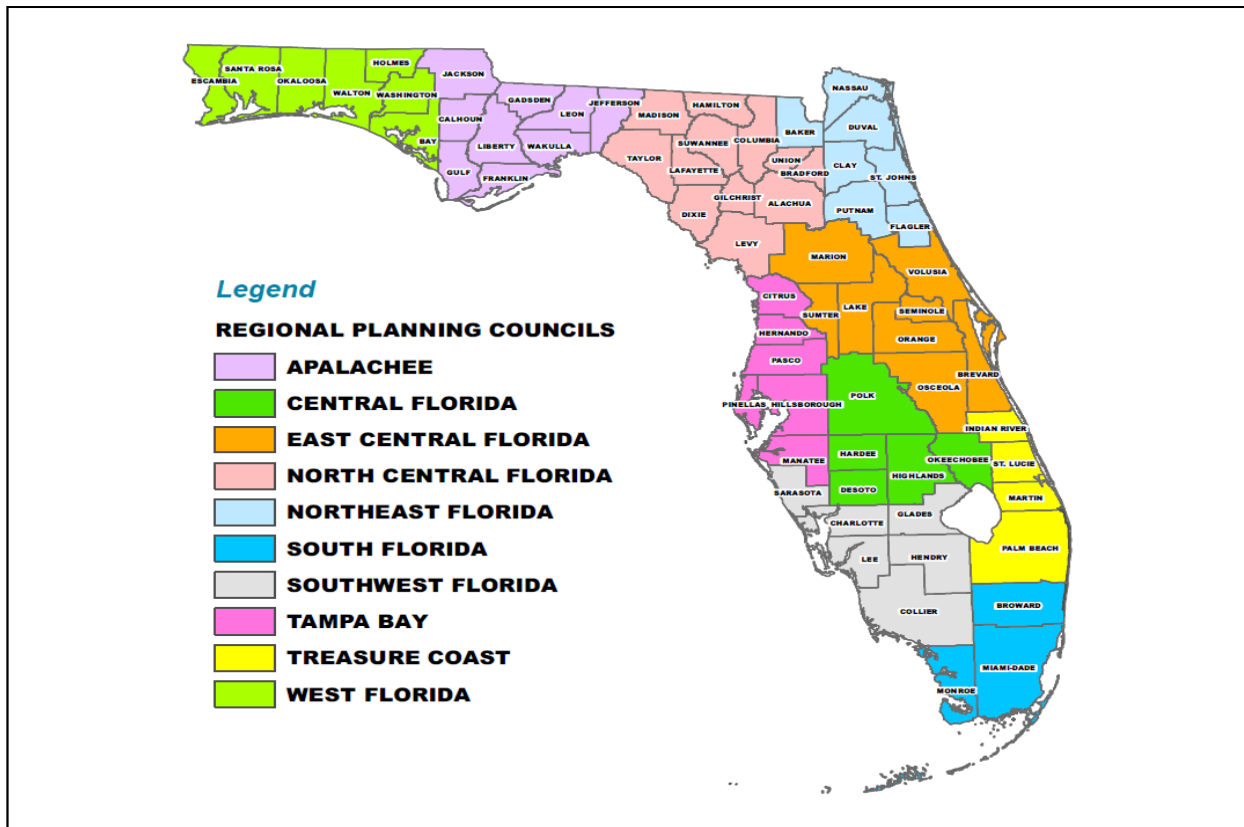
This Report includes projects originally submitted in previous Shelter Retrofit Reports. Previous projects have been re-ranked as appropriate.

The State's criteria consist of the following:

- Regional and Local Shelter Deficit Reduction
- Structural and Hazard Vulnerability Review

- Shelter Capacity Increase, Building Ownership and Availability, and Cost-Effectiveness Considerations
- Other Considerations / Demonstration of Impact Upon the State and Regional Shelter Deficit Situation

For more details on each criteria, please review *Methodology for Recommendation of Projects for Funding* attached hereto as Appendix D. Figure 1.1 below shows a map of the RPC regions across the State of Florida. The RPC regions are established to coordinate planning for economic development, growth management, emergencies, and other regional impacts.



**Figure 1.1 – Regional Planning Councils
Summary of Annual Reports**

The retrofit projects recommended for consideration in this report will, if funded, substantially improve state and local hurricane preparedness. As Table 1.1 illustrates, the Governor and the State Legislature have demonstrated a sustained commitment to reduce the deficit of safe public hurricane shelter space. From 1999 to 2018, approximately \$95 million in federal and state funds have been committed towards retrofitting suitable facilities, funding an estimated 552,896 hurricane shelter spaces.

Table 1.1 Historical Summary of Florida's Hurricane Shelter Retrofit Program					
Shelter Retrofit Report Year	Annual Shelter Retrofit Report Recommended Projects Cost \$ (without generators)	Annual Shelter Retrofit Report Potential Number of Spaces to Gain	Federal and State Funds Allocated to Shelter Retrofit Report Ranked and Recommended Projects	Shelter Retrofit Report Spaces gained	Cumulative Shelter Retrofit Report Spaces gained
1999	\$16,185,193	88,679	\$8,473,341	72,230	72,230
2000	\$36,399,457	250,362	\$25,572,795	119,087	191,317
2001	\$26,943,516	119,905	\$5,233,731	20,574	211,891
2002	\$26,959,668	157,326	\$4,735,113	41,710	253,601
2003	\$23,349,714	137,985	\$3,000,000	33,381	286,982
2004	\$13,457,737	93,967	\$7,500,000	68,765	355,747
2005	\$11,882,722	68,882	\$3,000,000	24,481	380,228
2006	\$8,683,049	54,415	\$3,000,000	13,820	394,048
2007	\$10,956,377	82,930	^b \$6,607,263	^a 25,645	419,693
2008	\$13,432,213	85,997	\$0	^c 0	419,693
2009	\$11,777,884	69,465	\$3,000,000	14,427	434,120
2010	\$15,634,282	120,447	\$1,750,000	^d 7,920	442,040
2011	\$20,337,203	109,308	\$2,250,000	14,974	457,014
2012	\$14,707,717	110,394	\$3,000,000	^e 14,408	471,422
2013	\$12,745,072	87,150	\$3,000,000	^f 14,810	486,232
2014	\$13,994,180	107,236	\$3,000,000	^g 13,333	499,565
2015	\$15,188,945	117,609	\$3,000,000	^h 13,333	512,898
2016	\$13,465,342	69,541	\$3,000,000	ⁱ 13,333	526,231
2017	\$13,794,763	65,303	\$3,000,000	^j 13,333	539,564
2018	\$23,189,218	108,104	\$3,000,000	^k 13,333	552,897
TOTAL	N/A	N/A	\$95,122,243	552,897	N/A

- a – 25,645 spaces were gained from HB 7121 & 1621X shelter retrofit projects
- b – \$6,607,263 was based on federal funds plus state funds match for HB7121 and non-federal matched projects from Special Appropriation 1621X
- c – For Fiscal Year 08-09, no funds were appropriated for the Shelter Retrofit Report list
- d – 7,920 reflects estimated gain from Specific Appropriation 1617 (FY 2010-2011 @ \$1,750,000)
- e – 14,427 reflects estimated gain from Specific Appropriation 1515A (FY 2011-2012 @ \$3,000,000)
- f – 14,810 reflects estimated gain from Specific Appropriation 2571 (FY 2013-2014 @ \$3,000,000)
- g – 13,333 is preliminary estimate of spaces to be gained from Specific Appropriation 2593 (FY 2014-2015 @ \$3,000,000) based upon \$225 a space
- h – 13,333 is preliminary estimate of spaces to be gained from Specific Appropriation 2581 (FY 2015-2016 @ \$3,000,000) based upon \$225 a space
- i – 13,333 is preliminary estimate of spaces to be gained from Specific Appropriation 2568 (FY 2016-2017 @ \$3,000,000) based upon \$225 a space
- j – 13,333 is preliminary estimate of spaces to be gained from Specific Appropriation 2597 (FY 2017-2018 @ \$3,000,000) based upon \$225 a space
- k – 13,333 is preliminary estimate of spaces to be gained from Specific Appropriation 2587 (FY 2018-2019 @ \$3,000,000) based upon \$225 a space

II. CURRENT SITUATION

During the last two decades, Florida has experienced major disasters with loss of life and property due to tropical storms, hurricanes and a wide array of other disasters. Of the state's sixty-seven (67) counties, thirty-five (35) of them lie along 8,426 miles of coastline, including tidal inlets, bays, and other waterways. The National Hurricane Center asserts that 40 percent of Florida residents live in areas vulnerable to storm surge.

The proximity of population concentrations along the Gulf of Mexico and the Atlantic Ocean, coupled with generally low coastal elevations, significantly increase the state's vulnerability to hurricane damage, tidal surges, and storm-related flooding. This vulnerability has manifested itself in the need for thousands of safe public hurricane shelter spaces.

The need for safe public shelter space is critical. Nearly 80 percent of Florida's population has settled in coastal areas, which are susceptible to hurricane force winds and damage caused by storm surge. The statewide sheltering deficit situation is not just a coastal phenomenon. The future safety of all our vulnerable citizens prior to and during a hurricane will require additions to the statewide public hurricane shelter inventory. Improved methodology in evacuation studies and a renewed emphasis on registration for persons with special needs created an increase in demand for risk shelters that can accommodate persons with a variety of special needs. Risk shelters for people with special needs require electrical generation capability and more space per client, so the retrofit process is more expensive and the resulting spaces do not contribute to deficit reduction as efficiently.

Since recognizing the American Red Cross standard 4496 as the minimum hurricane safety criteria, the Division has endeavored to eliminate the shelter deficit using a multifaceted approach. This approach includes: 1) surveying hurricane shelter facilities in existing local inventories to identify additional spaces 2) surveying facilities not currently listed in local inventories to identify unused capacity; 3) providing funding for cost-effective retrofit or other mitigation measures on existing buildings that can provide additional shelter spaces; 4) incorporating hurricane shelter design criteria into new public building construction projects; and 5) reducing hurricane shelter demand through improved public information, education and behavioral analysis, and decreased evacuation need.

Statewide Progress in Shelter Retrofitting and Enhanced Hurricane Protection Area Construction

Every spring county emergency management offices complete a report with information on their retrofit projects and/or new school facility Enhanced Hurricane Protection Area (EHPA) construction projects. Table 2.1 shows listings of retrofitted spaces, EHPA spaces created through June 2018, and projected gains (contracted or under construction) between September 2018 and August 2019. Additionally, Table 2.1 shows the estimated shelter demand for 2018-2019 (provided via the Division's evacuation studies), the hurricane shelter space adequacy/deficit in each county, and for the state as a whole. There is still need for further effort statewide even with the significant progress demonstrated.

All General Population hurricane shelter capacities are calculated based on 20 sq.ft. per evacuee and Persons with Special Needs (PSN) capacities on 60 sq.ft. per client.

Table 2.1								
Hurricane Evacuation Shelter Deficit Reduction Progress 2018-2019								
Shelter Capacity That Meets ARC 4496 Guidelines "Post - 1995 Success Stories"								
Regional Planning Council	Is the Region in Deficit?	County	1995-8/2018 Retrofit & As-Is Shelter Spaces	Cumulative New School EHPA Capacity	Retrofit Shelter Capacity Under Contract	Total Hurricane Shelter Capacity 08/31/2018	Category 5 Demand (General Population and SpNS)	2019 Capacity Sufficient Estimate
3	No	Alachua	9,733	1,600	1,642	12,975	13,064	(89)
4	No	Baker	1,675	1,612	0	3,287	2,697	590
1	No	Bay	14,944	956	1,828	17,728	8,155	9,573
3	No	Bradford	1,695	0	0	1,695	1,454	241
5	No	Brevard	30,381	12,063	0	42,444	33,559	8,885
10	No	Broward	500	60,005	0	60,505	29,576	30,929
2	No	Calhoun	2,239	172	0	2,411	1,110	1,301
8	Yes	Charlotte	0	0	0	0	13,366	(13,366)
7	Yes	Citrus	3,647	208	0	3,855	13,374	(9,519)
4	No	Clay	4,613	2,985	2,815	10,413	11,531	(1,118)
8	Yes	Collier	5,784	0	0	5,784	31,975	(26,191)
3	No	Columbia	4,949	4,105	0	9,054	5,099	3,955
6	Yes	Desoto	2,602	151	0	2,753	3,279	(526)
3	No	Dixie	2,562	1,256	0	3,818	1,974	1,844
4	No	Duval	35,630	15,343	0	50,973	45,064	5,909
1	No	Escambia	25,510	1,803	0	27,313	11,180	16,133
4	No	Flagler	24,608	3,034	0	27,642	6,555	21,087
2	No	Franklin	0	0	0	0	533	(533)
2	No	Gadsden	2,000	5,732	0	7,732	3,904	3,828
3	No	Gilchrist	3,129	0	0	3,129	1,199	1,930
8	Yes	Glades	567	388	83	1,038	1,613	(575)
2	No	Gulf	232	228	0	460	740	(280)
3	No	Hamilton	1,835	1,196	0	3,031	1,114	1,917
6	Yes	Hardee	139	4,623	146	4,908	2,203	2,705
8	Yes	Hendry	5,263	1,000	0	6,263	3,489	2,774
7	Yes	Hernando	1,416	8,051	1,422	10,889	11,609	(720)
6	Yes	Highlands	2,550	6,137	0	8,687	11,838	(3,151)
7	Yes	Hillsborough	27,004	65,699	1,400	94,103	55,243	38,860
1	No	Holmes	1,815	4,133	405	6,353	1,112	5,241
9	No	Indian River	10,507	0	0	10,507	6,306	4,201
2	No	Jackson	499	3,365	0	3,864	1,900	1,964
2	No	Jefferson	0	809	0	809	942	(133)
3	No	Lafayette	1,136	0	0	1,136	622	514
5	No	Lake	3,414	24,546	2,507	30,467	26,374	4,093
8	Yes	Lee	500	0	0	500	74,695	(74,195)
2	No	Leon	21,267	1,245	40	22,552	4,587	17,965
3	No	Levy	5,057	354	0	5,411	4,203	1,208
2	No	Liberty	836	822	0	1,658	742	916
3	No	Madison	4,236	0	0	4,236	1,326	2,910
7	Yes	Manatee	9,735	21,702	0	31,437	24,800	6,637
Page 1 Subtotals:			274,209	255,323	12,288	541,820	474,106	67,714

Table 2.1								
Hurricane Evacuation Shelter Deficit Reduction Progress 2018-2019								
Shelter Capacity That Meets ARC 4496 Guidelines "Post - 1995 Success Stories"								
Regional Planning Council	Is the Region in Deficit?	County	1995-8/2018 Retrofit & As-Is Shelter Spaces	Cumulative New School EHPA Capacity	Retrofit Shelter Capacity Under Contract	Total Hurricane Shelter Capacity 08/31/2018	Category 5 Demand (General Population and SpNS)	2019 Capacity Sufficient Estimate
5	No	Marion	7,930	10,257	0	18,187	19,166	(979)
9	No	Martin	11,383	10,047	0	21,430	5,731	15,699
10	No	Miami-Dade	77,529	26,454	0	103,983	100,572	3,411
10	No	Monroe	723	0	0	723	3,051	(2,328)
4	No	Nassau	1,822	4,554	0	6,376	5,526	850
1	No	Okaloosa	11,574	2,025	0	13,599	6,027	7,572
6	Yes	Okeechobee	1,891	1,175	0	3,066	8,615	(5,549)
5	No	Orange	2,530	28,678	0	31,208	31,752	(544)
5	No	Osceola	18,001	7,982	0	25,983	10,811	15,172
9	No	Palm Beach	22,793	48,355	0	71,148	32,274	38,874
7	Yes	Pasco	10,199	17,556	0	27,755	32,260	(4,505)
7	Yes	Pinellas	24,250	10,150	600	35,000	46,178	(11,178)
6	Yes	Polk	2,423	33,157	0	35,580	45,503	(9,923)
4	No	Putnam	3,495	1,196	825	5,516	4,848	668
4	No	Saint Johns	10,437	7,198	3,394	21,029	11,840	9,189
9	No	Saint Lucie	12,997	4,388	0	17,385	10,684	6,701
1	No	Santa Rosa	7,536	5,471	0	13,007	6,025	6,982
8	Yes	Sarasota	4,597	9,296	0	13,893	31,726	(17,833)
5	No	Seminole	30,220	1,206	2,131	33,557	12,195	21,362
5	No	Sumter	725	200	0	925	9,818	(8,893)
3	No	Suwannee	50	3,484	0	3,534	3,964	(430)
3	No	Taylor	2,582	2,424	0	5,006	1,776	3,230
3	No	Union	1,371	345	0	1,716	751	965
5	No	Volusia	15,291	8,879	0	24,170	39,601	(15,431)
2	No	Wakulla	0	400	0	400	944	(544)
1	No	Walton	4,028	5,269	0	9,297	1,957	7,340
1	No	Washington	5,737	1,217	0	6,954	1,696	5,258
Page 1 Totals:			274,209	255,323	12,288	541,820	474,106	67,714
Page 2 Totals:			292,114	251,363	6,950	550,427	485,291	65,136
Subtotals:			566,323	506,686				
Totals:			1,073,009		19,238	1,092,247		
Grand Totals:				1,092,247			959,397	132,850

III. SUMMARY OF PROJECT RECOMMENDATIONS

In fiscal year 2017-2018, the Division requested county emergency managers to submit new shelter retrofit projects and confirm or delete any shelter retrofit projects on the current Shelter Retrofit Report lists. Each proposed retrofit project is required to fall within the preferred or marginal category on the Least Risk Decision Making shelter report upon completion. The Division identified 365 (278 constructed/structural retrofits plus 87 generator) projects that would meet the standard after retrofitting. All projects were ranked using such factors as: local and regional shelter space deficit; greatest provision of space; cost efficiency per space; and vulnerability to winds and surge. See Appendices E and F for lists of recommended projects.

Table 3.1 provides a summary of the proposed shelter retrofit projects, the region served, the construction-related costs and the generator-related costs of the proposed projects, and the total hurricane shelter space capacity that will be created after completion of retrofits. See Figure 1.1 for a map of the State’s RPC regions.

Table 3.1				
2018 Shelter Retrofit Report County and Regional Recommended Project Totals				
August 31, 2018				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
1	BAY	\$170,000	494	\$0
1	ESCAMBIA	\$0	0	\$1,280,028
1	HOLMES	\$0	0	\$20,000
1	OKALOOSA	\$0	0	\$50,000
1	SANTA ROSA	\$0	0	\$0
1	WALTON	\$0	0	\$0
1	WASHINGTON	\$0	0	\$0
	Region 1 Totals:	\$170,000	494	\$1,350,028
2	CALHOUN	\$193,500	387	\$0
2	FRANKLIN	\$0	0	\$0
2	GADSDEN	\$538,223	1,957	\$0
2	GULF	\$0	0	\$0
2	JACKSON	\$0	0	\$72,318

Table 3.1				
2018 Shelter Retrofit Report County and Regional Recommended Project Totals				
August 31, 2018				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
2	JEFFERSON	\$371,290	1,964	\$0
2	LEON	\$940,150	4,376	\$0
2	LIBERTY	\$0	0	\$0
2	WAKULLA	\$1,173,825	5,217	\$0
	Region 2 Totals:	\$3,216,988	13,901	\$72,318
3	ALACHUA	\$860,740	3,654	\$0
3	BRADFORD	\$0	0	\$0
3	COLUMBIA	\$579,822	1,562	\$0
3	DIXIE	\$0	0	\$150,000
3	GILCHRIST	\$0	0	\$0
3	HAMILTON	\$674,100	2,996	\$0
3	LAFAYETTE	\$193,500	860	\$0
3	LEVY	\$0	0	\$0
3	MADISON	\$0	0	\$0
3	SUWANNEE	\$0	0	\$0
3	TAYLOR	\$412,720	1,876	\$0
3	UNION	\$0	0	\$0
	Region 3 Totals:	\$2,720,882	10,948	\$150,000
4	BAKER	\$0	0	\$0
4	CLAY	\$160,000	285	\$0
4	DUVAL	\$748,925	4,579	\$4,250
4	FLAGLER	\$1,033,085	5,666	\$180,000
4	NASSAU	\$928,975	4,662	\$405,000
4	PUTNAM	\$57,980	260	\$0

Table 3.1				
2018 Shelter Retrofit Report County and Regional Recommended Project Totals				
August 31, 2018				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
4	SAINT JOHNS	\$0	0	\$0
	Region 4 Totals:	\$2,928,965	15,452	\$589,250
5	BREVARD	\$0	0	\$3,796,377
5	LAKE	\$1,018,886	3,580	\$193,700
5	MARION	\$0	0	\$0
5	ORANGE	\$4,985,955	25,313	\$0
5	OSCEOLA	\$72,450	322	\$1,004,750
5	SEMINOLE	\$175,780	799	\$0
5	SUMTER	\$345,600	1,565	\$287,517
5	VOLUSIA	\$1,339,075	5,951	\$40,000
	Region 5 Totals:	\$7,937,746	37,530	\$5,322,344
6	DESOTO	\$138,375	615	\$40,000
6	HARDEE	\$437,150	1442	\$144,168
6	HIGHLANDS	\$31,875	490	\$0
6	OKEECHOBEE	\$0	0	\$25,650
6	POLK	\$324,120	2,246	\$124,000
	Region 6 Totals:	\$931,520	4,793	\$333,818
7	CITRUS	\$160,000	858	\$0
7	HERNANDO	\$172,450	426	\$0
7	HILLSBOROUGH	\$0	0	\$0
7	MANATEE	\$429,563	3,574	\$0
7	PASCO	\$188,750	1,450	\$1,535,171
7	PINELLAS	\$0	0	\$0
	Region 7 Totals:	\$950,763	6,308	\$1,535,171

Table 3.1				
2018 Shelter Retrofit Report County and Regional Recommended Project Totals				
August 31, 2018				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
8	CHARLOTTE	\$0	0	\$101,000
8	COLLIER	\$0	0	\$45,000
8	GLADES	\$52,875	235	\$0
8	HENDRY	\$0	0	\$0
8	LEE	\$2,022,965	9,191	\$0
8	SARASOTA	\$763,425	3,143	\$0
	Region 8 Totals:	\$2,839,265	12,569	\$146,000
9	INDIAN RIVER	\$216,989	818	\$0
9	MARTIN	\$571,100	3,031	\$728,255
9	PALM BEACH	\$111,500	500	\$1,290,000
9	SAINT LUCIE	\$0	0	\$972,404
	Region 9 Totals:	\$899,589	4,349	\$2,990,659
10	BROWARD	\$385,000	900	\$0
10	MIAMI-DADE	\$208,500	860	\$0
10	MONROE	\$0	0	\$0
	Region 10 Totals:	\$593,500	1,760	\$0
	Totals:	\$23,189,218	108,104	\$12,489,588

If funded, the projects listed in this report will provide an estimated increase of 108,104 hurricane shelter spaces at a cost of \$23,189,218 (construction-related costs). Costs reflected in the “Generator-related Costs” column usually reflect only generator purchase and installation costs. Projects that include a generator for emergency or standby electric power add to the overall functionality and sustainability of a shelter, but do not singularly increase shelter space capacity.

IV STRATEGY FOR PUBLIC SHELTER DEFICIT REDUCTION

The Division is responsible for developing a strategy to eliminate the deficit of “safe” public hurricane shelter space in Florida Statutes; *See* Secs. 252.35(2)(a)2 and 252.385(1), (2) and (3), Florida Statutes. The Division’s strategy includes the following components:

Component 1 –Develop and Implement Model Shelter Survey and Selection Guidelines

The Division is responsible for administering a survey program of existing schools, universities, community colleges, and other state, county and municipally-owned public buildings. Also, the Division is responsible for providing a list of facilities annually that are recommended to be retrofitted using state funds. To accomplish these tasks, the Division utilizes a Least Risk Decision Making (LRDM) survey. In 1997 the Division received confirmation from the American Red Cross that the LRDM met the intent of the ARC’s *Standards for Hurricane Evacuation Shelter Selection* (ARC 4496) as minimum safety criteria; *See* Appendix C. The criteria include safety standards for storm surge, rainfall flooding and wind hazards, plus a basic least-risk decision making process. However, to apply the criteria to field conditions and typical building stock, the Division expanded its interpretation of ARC 4496 into a *descriptive* least-risk decision making model. The model is qualitative and based largely upon building performance assessments following Hurricane Andrew. The performance assessments give preference to building qualities, or characteristics that performed well in Hurricane Andrew and avoids (or mitigates) those that performed poorly, and has been updated to accommodate modern building codes, standards, and practices.

Component 2 – Implement Shelter Survey Program

To date, the Division has completed the first statewide baseline survey, and initiated a second baseline survey to improve accuracy and capture changes in the statewide inventory. The results of the surveys are used by state and local agencies to prepare and implement strategies to reduce, and ultimately eliminate, the deficit of recognized hurricane evacuation shelter space. Between 1999 and 2018, more than 5,845 buildings were surveyed utilizing in house surveyors and private-sector consultants. The survey program has not only identified about 105,535 “as-is” spaces, but also directly, or in some cases indirectly, led to creation of more than 460,788 retrofitted shelter spaces. These totals combined with the EHPA construction of 506,686 spaces results in a total capacity of 1,073,009 spaces.

Component 3 – Retrofit appropriate facilities to meet Guidelines

Since 1999, the State Legislature has annually provided funds for retrofit projects listed in the annual *Shelter Retrofit Report*. The retrofit projects identified through the survey program, are recommended only when the retrofit can create spaces that meet the intent of ARC 4496 and the Division’s LRDM survey.

For Fiscal Year 2018-2019, the State Legislature appropriated \$3 million to structurally enhance or retrofit public hurricane evacuation shelters. Funding will create an estimated 13,333 spaces during the life of the appropriation.

Component 4 – New construction of public school facilities as Shelters

Florida Department of Education (FDOE) appointed a committee to develop a public shelter design criterion for use in new school facility construction projects. The committee included representatives from many stakeholder agencies (e.g., state and local emergency management, school board, community college and university officials, the American Red Cross, architects, engineers, etc.). The charge of the committee was to develop a set of practical and cost-effective design criteria to ensure that appropriate new educational facilities can serve as public shelters for emergency management purposes. The final criterion recommended by the committee was consistent with the intent of the hurricane safety criteria of ARC 4496.

The recommended wind design criterion was the American Society of Civil Engineers Standard 7 (ASCE 7) with a 40 mile per hour increase in basic map wind speed and an importance factor $I=1.00$. In addition, the hurricane shelter's exterior envelope (walls, roofs, windows, doors, louvers, etc.) must all meet a basic wind-borne debris impact standard (i.e., SSTD 12; 9lb 2x4 @ 34 mph). However, school board officials successfully protested the increase in base wind speed, so the minimum wind design criterion was reduced to ASCE 7 at basic map wind speed with an essential facility importance factor $I=1.15$. The 40 mile per hour increase in base wind speed was still recommended within the code, but not required. The criteria were promulgated into the State Requirements for Educational Facilities in April, 1997. The Division's model hurricane shelter evaluation criteria's preferred recognition was adjusted to be consistent with FDOE's public shelter design criteria (also known as the Enhanced Hurricane Protection Area or EHPA criteria).

Schools are funded primarily by state and local capital outlay funds, and school districts are generally reporting that the EHPA construction cost premium is about three to nine percent. Since 1997, EHPA construction has created 506,686 spaces (Table 2.1), which accounts for about 47 percent of the statewide risk recognized space inventory.

Component 5 – Shelter demand reduction through improved public information and education and through decreased evacuation

Hurricane evacuation studies have historically indicated that at least 25 percent of a vulnerable population would seek public shelter during an evacuation event. However, recent studies indicate that only about 15 percent will actually seek public shelter. This is consistent with the findings of recent post-storm assessments that indicate less than 10 percent of vulnerable populations seek public shelter.

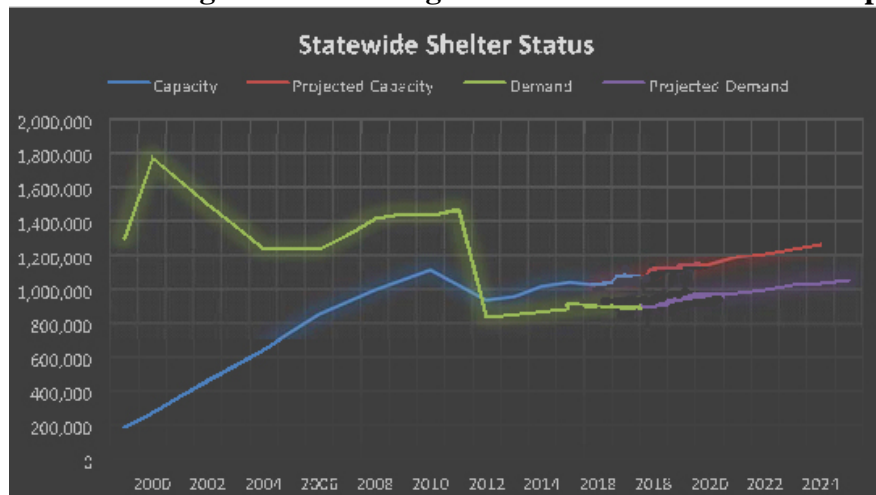
The public shelter demand resulting from hurricane evacuation was significantly reduced from 1995 to 2018 due to improvements in public education and information, and more accurate

storm surge/evacuation zone modeling with the use of the LiDAR (Light Detection and Ranging). However, changes in Federal Emergency Management Agency flood and storm surge maps coupled with recent population and demographic trends reflected in evacuation studies, created a significant increase in shelter demand for 2016, which continues to impact 2018. Forecasting for the five-year period indicates higher demand for special needs shelters, specifically. These demand figures do not take into account the aging of the current stock of public shelters nor the approaching end of the useful life of the original retrofit projects. The 2018 *Statewide Regional Evacuation Studies* (SRES) resulted in a small statewide aggregate hurricane evacuation shelter space decrease in demand spaces. Florida’s projected statewide hurricane evacuation shelter space demand for 2018 is 959,397 spaces.

Statewide Progress in Shelter Deficit Reduction

Since 1995, Florida has made significant progress toward improving the safety and availability of public hurricane shelter space. A comprehensive strategy of surveys, retrofitting, new construction, evacuation studies and public education is the basis for the success. An expansion in storm surge/evacuation zones, aging building stock and consequent decommissioned buildings plus changes in planned local use has resulted in a decrease of nearly 20 percent since 2012. Losing hard won space is difficult when the State of Florida has made so much progress in increasing the overall state capacity. However, the usable life of buildings and the aging of the retrofits provided is a factor impacting the program. For example, the minimum useful life of storm screen retrofits was determined to be about 15 years. It remains critical to ensure the safety of public hurricane shelter space by replacing the capacity of older buildings with those built to more recent codes, and retrofitting new projects with a longer life expectancy. Improved evacuation studies also benefitted the estimated total shelter demand with an aggregated reduction of more than 45 percent. This year, adequate public hurricane shelter space is available in 42 counties. RPC regions 6, 7 and 8, when standing alone, have a deficit in shelter space, even though the statewide availability of space is sufficient.

Figure 4.1 Florida’s Progress in Reducing Statewide Hurricane Shelter Space Deficit



V. CONCLUSION

The State of Florida recognizes the necessity of providing safe hurricane evacuation shelter space for its residents during disasters. Hurricane Andrew (1992) made the need clear and the Lewis Commission Report following Hurricane Floyd (1999) concurred. The State remains steadfast in its commitment to provide safe hurricane evacuation shelter space to all during a disaster. Through funding of the recommended *2018 Shelter Retrofit Report* projects, Florida will continue to see improvements in shelter capacity.

Since 1995 hurricane shelter spaces have been identified, or created through retrofitting of existing buildings or by new construction. In the past two years, some hurricane shelters have been decommissioned due to new storm surge mapping, age, remodeling or reuse that is incompatible with mass care shelter operations, deterioration or removal of window protection products, or other reasons. Changes in storm hazard maps (e.g., SLOSH, national flood insurance, etc.) also affect a site's ability to be risk recognized. Therefore, the *2018 Shelter Retrofit Report* of available and currently funded retrofit space totals 1,092,247 shelter spaces.

In 2015, an additional provision, Sec. 252.355 Florida Statutes, established new requirements for special needs registries under county emergency managers. Although shelters for persons with special needs have been available, the additional statutory provision increased demand because physicians have been encouraged to register their patients. Additionally, digital marketing is required for the registry. In 2016, and in the following years, changes in evacuation studies, demographics and public awareness increased the demand for shelters for persons with special needs. Special needs shelters require more space per client and additional physical accommodations compared to general population shelters. They are more expensive to retrofit, as the spaces generated per dollar invested are fewer. As a result, half of Florida's counties have a special needs deficit in 2018.

An additional 108,104 spaces could be created if the projects in this report are funded, resulting in 1,200,351 spaces available to be used for risk hurricane evacuation shelters. Some projects could receive greater funding for special needs retrofitting, reducing overall spaces but providing safe haven for Florida's most vulnerable population. Demand for general population shelters increased in FY 2017-2018 to 959,397.

In 2018 three (3) regions of the state still report a deficit of hurricane evacuation shelter space. Regions that have an adequate number of hurricane evacuation shelter spaces currently will need to maintain their inventory. Since 2017, more than 50,000 spaces previously risk recognized were removed from inventory due to changes in hazard maps (e.g., surge and flood maps) that will continue to affect a facilities' recognition of meeting hurricane safety criteria. Over time, more hurricane shelters will be decommissioned. Thus, even though the aggregate statewide deficit is reduced in the *2018 Shelter Retrofit Report*, a "maintenance level" of shelter space production will be necessary to avoid falling back into a deficit situation.