

# 2017 Shelter Retrofit Report

September 2017



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Governor



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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 1,056,283. Another 27,071 spaces (meeting ARC 4496 safety standards) are expected to be available to the public in 2018.

In preparation of the *2017 Shelter Retrofit Report*, the Division reviewed a total of 303 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 150 projects for retrofitting. These projects alone will create an additional 65,303 ARC 4496 hurricane shelter spaces statewide at an estimated cost of \$13,794,763.

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 \$45 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 499,670 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. Only one new EHPA school is under construction in the 2017-2018 cycle.

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 13 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 and 8 currently have deficits per data from the *2016 Statewide Emergency Shelter Plan* (SESP). For Special Needs Shelters (SpNS) nearly all regions have a deficit.

However, 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. The hurricane shelter space figures also 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. 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, replacement facilities, such as new construction or retrofit of recently constructed facilities, will be needed to ensure that state shelter capacities meet both current and future needs.

In summary, as the number of Floridians in areas vulnerable to hurricanes continue 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 RPC region's public hurricane evacuation shelter deficit. 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 American Red Cross (ARC) Chapters, school boards, and other public and private agencies, county emergency management agencies provided the data used for the *2017 Shelter Retrofit Report*. The Division recognizes that local officials are aware of underutilized 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 *2017 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. Accurate and thorough completion of the questionnaire (*see Appendix H*) guided those that prepared the project proposals through the shelter selection and retrofit proposal development process.

The questionnaire was prepared to include sufficient information to determine if the facility could meet the American Red Cross' 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 *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.

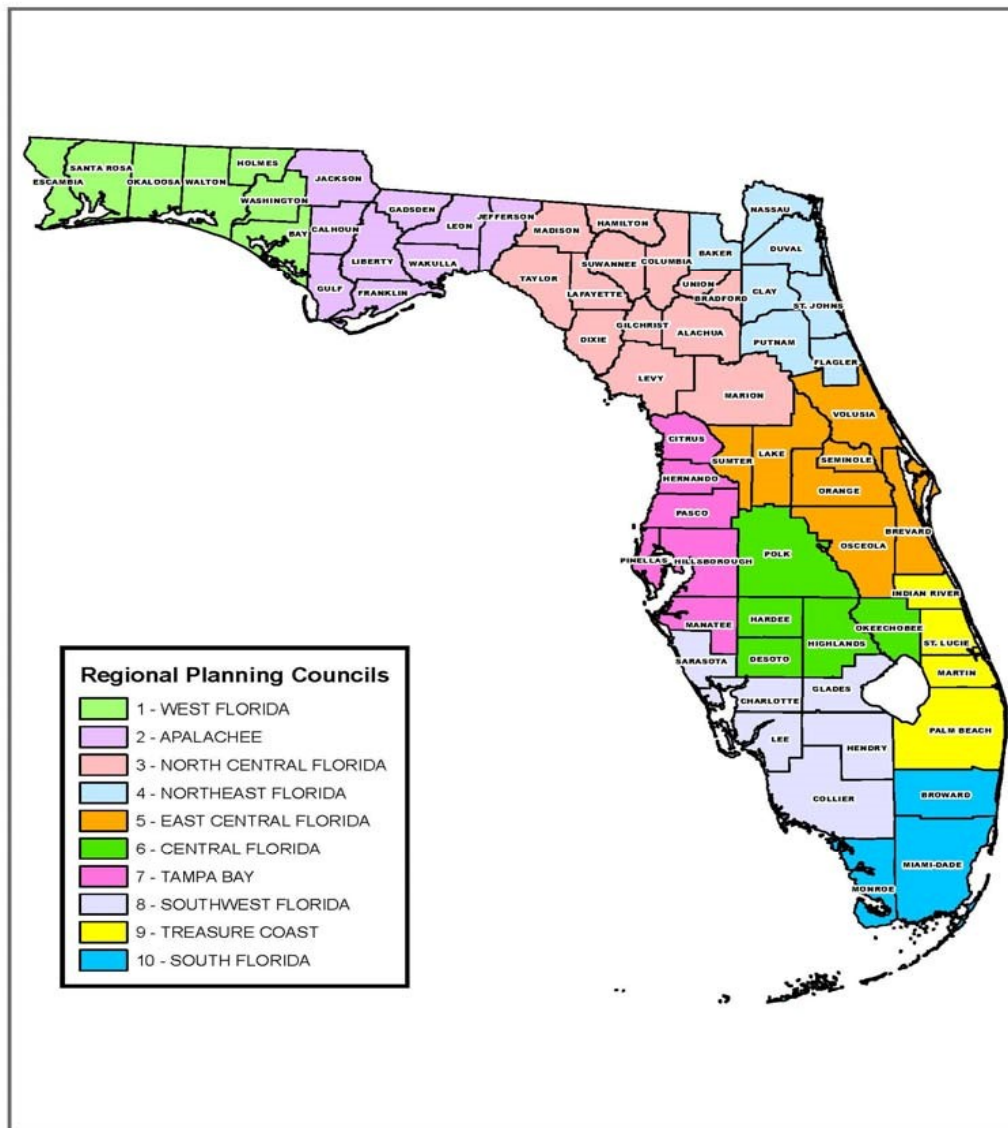
This Report includes projects originally submitted in previous Shelter Retrofit Reports. Previous projects have been re-ranked as appropriate.

The State's criteria consist of the following:

- Regional and Local Shelter Deficit Reduction

- Structural and Hazards Vulnerability Review (ARC 4496)
- 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 2017, approximately \$92 million in federal and state funds have been committed towards retrofitting suitable facilities, funding an estimated 529,450 hurricane shelter spaces.

<b>Table 1.1 Historical Summary of Florida's Hurricane Shelter Retrofit Program</b>					
Shelter Retrofit Report Year	Annual Shelter Retrofit Report Recommended Cost \$ (without generators)	Annual Shelter Retrofit Report Projected Number of Spaces Gained	Federal and State Funds Allocated to Shelter Retrofit Report 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	<sup>b</sup> \$6,607,263	<sup>a</sup> 25,645	419,693
2008	\$13,432,213	85,997	\$0	<sup>c</sup> 0	419,693
2009	\$11,777,884	69,465	\$3,000,000	<sup>d</sup> 13,055	432,748
2010	\$15,634,282	120,447	\$1,750,000	<sup>e</sup> 4,861	437,609
2011	\$20,337,203	109,308	\$2,250,000	<sup>f</sup> 9,531	447,140
2012	\$14,707,717	110,394	\$3,000,000	<sup>g</sup> 14,810	461,950
2013	\$12,745,072	87,150	\$3,000,000	<sup>h</sup> 13,500	475,450

2014	\$13,994,180	107,236	\$3,000,000	<sup>i</sup> 13,500	488,950
2015	\$15,188,945	117,609	\$3,000,000	<sup>j</sup> 13,500	502,450
2016	\$13,465,342	69,541	\$3,000,000	<sup>k</sup> 13,500	515,950
2017	\$13,794,763	65,303	\$3,000,000	<sup>l</sup> 13,500	529,450
<b>TOTAL</b>	<b>N/A</b>	<b>N/A</b>	<b>\$92,122,243</b>	<b>529,450</b>	

- <sup>a</sup> – 25,645 spaces were gained from HB 7121 & 1621X shelter retrofit projects.
- <sup>b</sup> – \$6,607,263 was based on federal funds plus state funds match for HB7121 and non-federal matched projects from Special Appropriation 1621X
- <sup>c</sup> – For Fiscal Year 08-09 no funds were appropriated for the Shelter Retrofit Report list
- <sup>d</sup> – 13,055 reflects estimated gain from Specific Appropriation 1496 (FY 2009-2010)
- <sup>e</sup> – 4,861 reflects estimated gain from Specific Appropriation 1617 (FY 2010-2011)
- <sup>f</sup> – 9,531 reflects Spaces completed / under contract from Specific Appropriation 1515A (FY2011-2012)
- <sup>g</sup> – 14,810 reflects Spaces under contract / offered to be gained from Specific Appropriation 2624 (FY2012-2013)
- <sup>h</sup> – 13,500 is preliminary estimate of spaces to be gained from accepted & offered + remaining funds averaged at rate based upon \$220 a space from Specific Appropriation 2571 (FY2013-2014)
- <sup>i</sup> – 13,500 is preliminary estimate of spaces to be gained from offered + remaining funds averaged at rate based upon \$220 a space from Specific Appropriation 2593 (FY2014-2015)
- <sup>j, k, l</sup> – 13,500 is preliminary estimate of spaces to be gained from an average rate based upon 2012, 2013 & 2014 for 2015-2017 Appropriation





## 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 in 2017 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 guidance 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 2017, and projected gains (contracted or under construction) between September 2017 and August

2018. Additionally, Table 2.1 shows the estimated shelter demand for 2017-2018 (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.

<b>Table 2.1</b>									
<b>Hurricane Evacuation Shelter Deficit Reduction Progress 2017-2018</b>									
<b>Shelter Capacity That Meets ARC 4496 Guidelines "Post - 1995 Success Stories"</b>									
<b>Region al Plannin g Council</b>	<b>Is the Region in Deficit ?</b>	<b>County</b>	<b>1995- 8/2017 Retrofit &amp; As-Is Shelter Capacity</b>	<b>Cumulati ve New School EHPA Capacity</b>	<b>Project ed Retrofi t Shelter Capacit y Under Contra ct</b>	<b>Project ed New School EHPA Capacit y</b>	<b>Total Hurrica ne Shelter Capacit y 08/31/2 018</b>	<b>Categor y 5 Demand (Genera l Populati on and SpNS)</b>	<b>2018 Capacit y Sufficie nt or Deficit Estima te</b>
3	No	Alachua	9,733	1,600	1,088	0	12,421	13,076	(655)
4	No	Baker	1,675	1,612		0	3,287	2,699	588
1	No	Bay	14,944	956	329	0	16,229	8,177	8,052
3	No	Bradford	1,695	0		0	1,695	1,457	238
5	No	Brevard	30,381	12,063		0	42,444	33,578	8,866
10	No	Broward	500	60,005		0	60,505	29,587	30,918
2	No	Calhoun	1,810	172		0	1,982	1,112	870
8	Yes	Charlotte	0	0		0	0	13,386	(13,386)
7	No	Citrus	3,647	208		0	3,855	13,386	(9,531)
4	No	Clay	4,613	2,985	2,815	0	10,413	11,540	(1,127)
8	Yes	Collier	5,784	0		0	5,784	32,010	(26,226)
3	No	Columbia	4,949	4,105		0	9,054	5,111	3,943
6	Yes	Desoto	2,602	151		0	2,753	3,296	(543)

3	No	Dixie	2,562	1,256		0	3,818	1,977	1,841
4	No	Duval	32,036	15,343		0	47,379	45,127	2,252
1	No	Escambia	25,510	1,803		0	27,313	11,591	15,722
4	No	Flagler	24,608	3,034		0	27,642	6,561	21,081
2	No	Franklin	0	0		0	0	534	(534)
2	No	Gadsden	1,917	5,732		0	7,649	3,924	3,725
3	No	Gilchrist	3,129	0		0	3,129	1,200	1,929
8	Yes	Glades	408	388	1,461	0	2,257	1,613	644
2	No	Gulf	232	228		0	460	742	(282)
3	No	Hamilton	0	1,196		0	1,196	1,116	80
6	Yes	Hardee	139	4,623		0	4,762	2,211	2,551
8	Yes	Hendry	5,263	1,000		0	6,263	3,494	2,769
7	No	Hernando	1,416	8,051	3,935	0	13,402	11,617	1785
6	Yes	Highlands	2,451	6,137		0	8,588	11,854	(3,266)
7	No	Hillsborou gh	27,004	65,699	3,400	0	96,103	55,284	40,819
1	No	Holmes	179	1,191		0	1,370	1,114	256
9	No	Indian River	10,507	0		0	10,507	6,337	4,170
2	No	Jackson	499	3,365		0	3,864	1,902	1,962
2	No	Jefferson	0	809		0	809	948	(139)
3	No	Lafayette	1,136	0		0	1,136	622	514
5	No	Lake	3,414	24,546	778	0	28,738	26,452	2,286
8	Yes	Lee	500	0		0	500	74,751	(74,251)
2	No	Leon	28,002	1,245		0	29,247	4,590	24,657
3	No	Levy	5,057	354		0	5,411	4,206	1,205
2	No	Liberty	836	822		0	1,658	750	908

<b>Table 2.1 continued</b>									
<b>Hurricane Evacuation Shelter Deficit Reduction Progress 2017-2018</b>									
<b>Shelter Capacity That Meets ARC 4496 Guidelines "Post - 1995 Success Stories"</b>									
<b>Regional Planning Council</b>	<b>Is the Region in Deficit?</b>	<b>County</b>	<b>1995-8/2017 Retrofit &amp; As-Is Shelter Capacity</b>	<b>Cumulative New School EHPA Capacity</b>	<b>Projected Retrofit Shelter Capacity Under Contract</b>	<b>Projected New School EHPA Capacity</b>	<b>Total Hurricane Shelter Capacity 08/31/2018</b>	<b>Category 5 Demand (General Population and SpNS)</b>	<b>2018 Capacity Sufficient or Deficit Estimate</b>
3	No	Madison	4,236	0		0	4,236	1,327	2,909
7	No	Manatee	9,735	21,702		0	31,437	24,593	6,844
3	Yes	Marion	7,039	10,257		0	17,296	19,185	(1,889)
9	No	Martin	11,383	10,047		0	21,430	5,755	15,675
10	No	Miami-Dade	73,448	22,499		0	95,947	100,631	(4,684)
10	No	Monroe	723	0		0	723	3,051	(2,328)
4	No	Nassau	326	4,081		0	4,407	5,529	(1,122)
1	No	Okaloosa	11,574	2,025		0	13,599	6,043	7,556
6	Yes	Okeechobee	1,891	1,175		0	3,066	8,671	(5,605)
5	No	Orange	2,530	28,678		0	31,208	31,804	(596)
5	No	Osceola	18,001	7,982	3,159	0	29,142	10,821	18,321
9	No	Palm Beach	22,793	48,355		0	71,148	32,351	38,797
7	No	Pasco	10,199	17,556		0	27,755	32,316	(4,560)
7	No	Pinellas	24,250	10,150		0	34,400	46,274	(11,874)
6	Yes	Polk	2,423	33,157		0	35,580	45,620	(10,040)
4	No	Putnam	3,495	1,196	80	0	4,771	4,848	(77)
4	No	Saint Johns	10,437	7,198	6,820	`	24,455	11,846	12,609
9	No	Saint Lucie	12,997	4,388		0	17,385	10,737	6,648
1	No	Santa Rosa	7,536	5,471		0	13,007	6,041	6,966

8	Yes	Sarasota	4,597	9,296		0	13,893	32,854	(18,961)
5	No	Seminole	30,220	1,206	2,131	0	33,557	12,199	21,358
5	No	Sumter	711	200		0	911	9,824	(8,913)
3	No	Suwannee	50	3,484		0	3,534	3,,966	-432
3	No	Taylor	2,582	2,424		0	5,006	1,777	3,229
3	No	Union	1,371	345	1,039	0	2,755	752	2,003
5	No	Volusia	15,291	8,879		0	24,170	39,650	(15,480)
2	No	Wakulla	0	800		0	800	953	(153)
1	No	Walton	4,028	5,269		0	9,297	1,962	7,335
1	No	Washington	3,609	1,171	36	0	4,816	1,700	3,116
<b>Page 2 Totals:</b>			297,475	268,991	13,265	<b>0</b>	579,731	513,080	66,651
<b>Page 1 Totals:</b>			259,138	230,679	13,806	<b>0</b>	503,623	448,932	54,691
<b>Subtotals</b>			<b>556,613</b>	<b>499,670</b>					
<b>Totals: *</b>			<b>1,056,283</b>		<b>27,071</b>		<b>1,083,354</b>		
<b>Grand Totals:</b>			<b>1,083,354</b>					<b>962,012</b>	<b>121,342</b>

\* For simplicity, 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. PSN spaces have been multiplied by a factor of 3 accordingly (e.g., 1,000 PSN spaces = 3,000 General Population spaces).

### III. SUMMARY OF PROJECT RECOMMENDATIONS

In March 2017, 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 meet ARC 4496 upon completion. The Division identified 237 (150 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. The RPC regions are established to coordinate planning for economic development, growth management, emergencies and other regional impacts. See Figure 1.1 for a map of the State's RPC regions.

<b>Table 3.1</b>				
2017 Shelter Retrofit Report County and Regional Recommended Project Totals				
August 31, 2017				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
1	BAY	\$422,200	2,114	\$0
1	ESCAMBIA	\$0	0	\$1,280,028
1	HOLMES	\$160,000	730	\$20,000
1	OKALOOSA	\$0	0	\$50,000
1	SANTA ROSA	\$0	0	\$0
1	WALTON	\$0	0	\$0
1	WASHINGTON	\$0	0	\$0
	<b>Region 1 Totals:</b>	<b>\$582,200</b>	<b>2,844</b>	<b>\$1,350,028</b>
2	CALHOUN	\$0	0	\$0
2	FRANKLIN	\$0	0	\$0
2	GADSDEN	\$182,523	803	\$0
2	GULF	\$0	0	\$0
2	JACKSON	\$0	0	\$72,318
2	JEFFERSON	\$115,768	435	\$0

2	LEON	\$562,850	1,801	\$0
<b>Table 3.1 continued</b>				
Region	County	Construction-related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
2	LIBERTY	\$0	0	\$0
2	WAKULLA	\$0	0	\$0
	<b>Region 2 Totals:</b>	<b>\$861,141</b>	<b>3,039</b>	<b>\$72,318</b>
3	ALACHUA	\$1,025,740	3,748	\$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	\$428,505	998	\$0
3	LAFAYETTE	\$0	0	\$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
	<b>Region 3 Totals:</b>	<b>\$2,446,787</b>	<b>8,184</b>	<b>\$150,000</b>
4	BAKER	\$0	0	\$0
4	CLAY	\$160,000	285	\$0
4	DUVAL	\$200,000	834	\$4,250
4	FLAGLER	\$749,320	4,265	\$180,000
4	NASSAU	\$778,750	4,517	\$405,000
4	PUTNAM	\$208,408	897	\$0
4	SAINT JOHNS	\$269,000	1,223	\$0
	<b>Region 4 Totals:</b>	<b>\$2,365,478</b>	<b>12,021</b>	<b>\$589,250</b>
5	BREVARD	\$0	0	\$3,796,377

5	LAKE	\$291,210	1,678	\$193,700
5	MARION	\$0	0	\$0
5	ORANGE	\$3,186,641	18,661	\$0
<b>Table 3.1 continued</b>				
Region	County	Construction Related Costs, \$	Hurricane Shelter Capacity Gained, spaces	Generator-related Costs, \$
5	OSCEOLA	\$0	0	\$1,004,750
5	SEMINOLE	\$175,780	799	\$0
5	SUMTER	\$409,600	1,796	\$287,517
5	VOLUSIA	\$79,425	363	\$40,000
	<b>Region 5 Totals:</b>	<b>\$4,142,656</b>	<b>23,297</b>	<b>\$5,322,344</b>
6	DESOTO	\$0	0	\$40,000
6	HARDEE	\$214,365	220	\$144,168
6	HIGHLANDS	\$0	0	\$0
6	OKEECHOBEE	\$0	0	\$25,650
6	POLK	\$274,120	1,246	\$124,000
	<b>Region 6 Totals:</b>	<b>\$488,485</b>	<b>1,466</b>	<b>\$333,818</b>
7	CITRUS	\$160,000	858	\$0
7	HERNANDO	\$343,090	1,114	\$0
7	HILLSBOROUGH	\$0	0	\$0
7	MANATEE	\$429,563	3,574	\$0
7	PASCO	\$20,000	700	\$1,535,171
7	PINELLAS	\$160,000	600	\$0
	<b>Region 7 Totals:</b>	<b>\$1,112,653</b>	<b>6,846</b>	<b>\$1,535,171</b>
8	CHARLOTTE	\$0	0	\$101,000
8	COLLIER	\$0	0	\$45,000
8	GLADES	\$0	0	\$0
8	HENDRY	\$0	0	\$0
8	LEE	\$176,000	850	\$0



8	SARASOTA	\$0	0	\$0
	<b>Region 8 Totals:</b>	<b>\$176,000</b>	<b>850</b>	<b>\$146,000</b>
9	INDIAN RIVER	\$315,863	1,366	\$0
9	MARTIN	\$272,000	890	\$728,255
9	PALM BEACH	\$1,031,500	4,500	\$1,290,000
9	SAINT LUCIE	\$0	0	\$972,404
	<b>Region 9 Totals:</b>	<b>\$1,619,363</b>	<b>6,756</b>	<b>\$2,990,659</b>
10	BROWARD	\$0	0	\$0
10	MIAMI-DADE	\$0	0	\$0
10	MONROE	\$0	0	\$0
	<b>Region 10 Totals:</b>	<b>\$0</b>	<b>0</b>	<b>\$0</b>
	<b>Totals:</b>	<b>\$13,794,763</b>	<b>65,303</b>	<b>\$12,489,588</b>

If funded, the projects listed in this report will provide an estimated increase of 65,303 hurricane shelter spaces at a cost of \$13,794,763 (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 the American Red Cross’s *Standards for Hurricane Evacuation Shelter Selection* (ARC 4496, 2002) as minimum safety criteria; *See* Appendix C. ARC 4496 provides safety criteria 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 avoid (or mitigate) those that performed poorly, and have been updated to accommodate modern building codes and practices. A condensed version of the model can be viewed at the following URL address: <http://www.floridadisaster.org/Response/engineers/HES/Manual/ARC4496-PrescriptiveSummary-Table.pdf>

### **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 ARC 4496 hurricane shelter space. Between 1999 and 2017, more than 5,637 buildings were surveyed utilizing in house surveyors and private-sector consultants. The survey program has not only identified about 92,283 “as-is” spaces, but also directly, or in some cases indirectly, led to creation of more than 464,330 retrofitted shelter spaces. These totals combined with the EHPA construction of 499,670 spaces results in a total capacity of 1,056,283 spaces. The 2017 capacity is greater than the 2016 capacity of 1,046,662 spaces, but is less of an increase than the historical average of spaces gained annually. Over the past year, decommissioning of 37,966 formerly recognized risk space occurred due to new storm surge maps, changes in room use compatibility, and deterioration or removal of protection products.

### **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 ARC 4496.

For Fiscal Year 2017-2017, the State Legislature appropriated \$3 million to structurally enhance or retrofit public hurricane evacuation shelters. Funding will create an estimated 13,500 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 to 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 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 is 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 rankings were 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 seven percent. Since 1997, EHPA construction has created 499,670 spaces (Table 2.1), which accounts for about 47 percent of the statewide ARC 4496 space inventory.

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

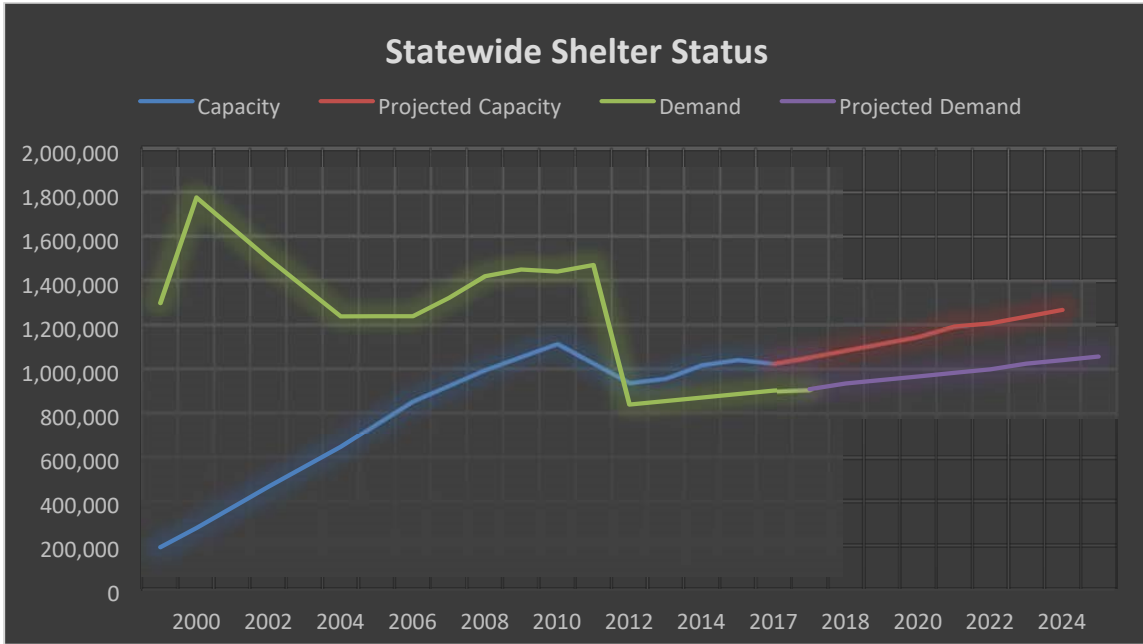
Hurricane evacuation studies have historically indicated that at least 25 percent of a vulnerable population would seek public shelter during an evacuation event. However, recent studies indicate that only about 15 percent will actually seek public shelter. This is consistent with the findings of recent 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 2017 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 2017. 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 *2017 Statewide Regional Evacuation Studies* (SRES) resulted in a statewide aggregate hurricane evacuation shelter space demand increase of 54,063 spaces. Florida's projected statewide hurricane evacuation shelter space demand for 2017 is 962,012.

### **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. 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 retrofits provided is a factor to be expected 20 plus years into the program. For example, the minimum useful life of storm screen retrofits was determined to be 15 years. As the retrofit materials and the buildings themselves show their age, it remains critical to ensure the safety of public hurricane shelter space by replacing the capacity of older buildings and retrofits with new projects with a longer life expectancy. Improved evacuation studies also benefitted the estimated total shelter demand with a reduction of more than 44 percent. This year, adequate public hurricane shelter space is available in 41 counties. RPC regions 6 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 *2017 Shelter Retrofit Report* projects, Florida will continue to see improvements in shelter capacity.

Since 1995 hurricane evacuation shelter spaces have been identified, or created through retrofitting of existing buildings or through new construction. In the past year, some hurricane shelter buildings 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 meet hurricane safety criteria. Therefore, the *2017 Shelter Retrofit Report* of available and currently funded retrofit capacity is 1,083,354 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 are encouraged to register their patients. Additionally, digital marketing is required for the registry. In 2016, changes in evacuation studies and demographics increased the demand for shelters for persons with special needs. Special needs shelters require more space per client and additional physical accommodations than general population shelters. Consequently, they are more expensive to retrofit, the funding is restricted regarding which items can be retrofit, and the spaces generated per dollar invested are fewer. As a result, two-thirds of Florida's counties have a special needs deficit in the 2016 SESP.

An additional 65,303 spaces would be created if the projects in this report are funded, resulting in 1,148,657 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 2016-2017 to 962,012. By contrast, the demand for hurricane evacuation shelter spaces in the 2000 SESP was 1,776,606.

In 2017 two (2) regions of the state still report a deficit of hurricane evacuation shelter space. Regions that currently have an adequate number of hurricane evacuation shelter spaces will need to maintain their inventory. In 2017, 37,966 spaces in previously recognized hurricane evacuation shelters were decommissioned and removed from inventory. Over time, additional hurricane evacuation shelters will be decommissioned due to age and other issues. Additional changes in storm hazard maps (e.g., SLOSH, national flood insurance maps, etc.) could affect a facilities' recognition of meeting hurricane safety criteria. Thus, even though the aggregate statewide deficit is reduced in the *2017 Shelter Retrofit Report*, a "maintenance level" of shelter space production will be necessary to avoid falling back into a deficit situation.