IV. STRATEGY FOR PUBLIC SHELTER DEFICIT REDUCTION

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

Component 1 – Develop and Implement Model Selection Guidelines

The agency responsible for administering a survey program of existing schools, universities, community colleges, and other state, county and municipally-owned public buildings is the Division of Emergency Management. The Division is also responsible for annually providing a list of facilities recommended to be retrofitted using state funds. To accomplish these tasks, the Division the American Red Cross’ Guidelines for Hurricane Evacuation Shelter Selection (ARC 4496) as a 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 stocks, the Division expanded its interpretation of ARC 4496 into a prescriptive least-risk decision making model. The model is qualitative and based largely upon building performance assessments following Hurricane Andrew (e.g., give preference to building qualities, or characteristics, that performed well in Hurricane Andrew, and avoid (or mitigate) those that performed poorly.) A condensed version of the model can be viewed at the following URL address: http://floridadisaster.org/bpr/Response/engineers/documents/CheatSheet.pdf.

Component 2 – Implement Shelter Survey Program

The field survey procedures to implement the safety criteria were then incorporated into a modified version of the Federal Emergency Management Agency’s (FEMA) Natural Hazard Vulnerability Survey Instructions (FEMA TR-84). This type of survey and evaluation can be performed at relatively low cost by building inspectors, construction technicians, architects and engineers. The typical cost per building surveyed ranges from about $500 to $1,500 (average of about $850).

By 1999, using a combination of in-house staff and engineering consultants, the Division had completed about 25 percent of the statewide baseline survey of public hurricane shelters. However, the results of the survey were not encouraging. About 95 percent of the surveyed hurricane shelter spaces could not meet the ARC 4496 criteria. As examples, 45 percent of the shelters had unreinforced masonry walls, 84 percent had unprotected windows, and 50 percent were located in buildings with uncertified long span light weight roofs. The Division also found that buildings designed and constructed prior to the mid-1980’s rarely met the ARC 4496 criteria, and often would have required major design and retrofit/mitigation renovations to meet ARC 4496. More than half of the hurricane shelters surveyed fell into this group. Modern
buildings constructed after the mid-1980s were often designed to ANSI A58 or ASCE 7 wind design standards, and in many cases just needed window protection to meet ARC 4496. Based upon the findings of the survey, Florida’s hurricane shelter capacity dropped from 988,378 spaces reported in 1995 to only about 186,910 spaces in 1999. By 2000, the statewide deficit stood at more than 1.5 million spaces. For the first time in Florida history, emergency managers, ARC and school board officials could quantify both the safety and available capacity of public hurricane shelters, instead of relying upon anecdotal concerns. Now that the scope of the challenge was known, the Division and its partner agencies began to implement an aggressive hurricane shelter deficit elimination program.

To date, the Division has completed the first statewide baseline survey, and initiated a second baseline survey. 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 ARC 4496 shelter space. The survey program has not only identified about 35,070 “as-is” spaces, but also directly, or in some cases indirectly, led to creation of more than 54 percent of the state’s retrofit capacity. Both state and federal resources have been used to fund the survey program. To date, the estimated total cost of surveys was about $3 million, or about $6.36 per “as-is” or retrofitted space.

Component 3 – Retrofit appropriate facilities to meet Guidelines

Since 1999, the State Legislature has annually provided funded for retrofit projects on the annual Shelter Retrofit Report. The retrofit projects are identified through the survey program, and are only recommended when the retrofit can create spaces that meet ARC 4496. Since 1999, Florida has invested around $26 million in state funds to retrofit existing buildings. An additional $34 million has been allocated through the Federal Hazard Mitigation Grant Program (HMGP). Through federal and state funding, Florida has created 396,531 ARC 4496 spaces at an average cost of $151 per space.

To reduce the retrofitting cost burden upon local governments, the HMGP retrofit/mitigation funds were often “global matched,” which eliminated a local cash match. Global matching is the pooling of resources to achieve a common goal. Projects funded by Florida’s hurricane shelter retrofit program that can concurrently meet HMGP’s benefit-cost and eligibility requirements are used to offset local match requirements for HMGP-funded retrofits. About 172,057 of the 396,531 federal and state funded retrofit spaces were created through global match. Local government and private sector agencies also created an additional 39,555 spaces through retrofitting. A total of 436,086 spaces (excludes 2007) have been created through retrofitting, which accounts for 51 percent of the statewide ARC 4496 space inventory.

For Fiscal Year 2006-2007, the State Legislature appropriated $15 million to structurally enhance or retrofit public hurricane evacuation shelters. See House bill 7121 (Chapter 2006-71).
Following a statewide grant process, the Division received 55 applications for retrofitting projects. It is estimated that the 38,076 spaces will be added to the State’s shelter capacity. The projects are expected to be initiated and completed over a 12 to 36 month period. Specific Appropriation 1621X (FY 07-08), provides $3 million in State funds for shelter retrofitting. Currently, these funds are being used to provide a “Global Cash Match” for the 55 HB7121 retrofit projects (See Appendix I).

**Component 4 – New construction of public school facilities as Shelters**

Florida Department of Education (FDOE) appointed a committee to develop a public shelter design criteria 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, ARC, architects, engineers, etc.) The charge to the committee was to develop a set of practical and cost-effective criteria. The final criteria recommended by the committee was consistent with the mass care provisions of the ARC’s *Mass Care—Preparedness and Operations* (ARC 3031), and 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 windborne 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).

Since 2001, where there was only about 65 percent compliance, EHPA shelter capacity has increased from an average of 35,000 spaces per year, to 63,000 spaces being constructed for 2004. 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 six percent. Since 1997, EHPA construction has created 393,982 spaces, which accounts for 46 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 generally indicated that at least 25 percent of a vulnerable population would seek public shelter during a sheltering event. Recent studies, however, 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.

Since 2000, Florida’s reported public hurricane shelter demand has been reduced by at least 540,200 spaces. This was accomplished through the use of more precise coastal mapping techniques, improved storm surge mapping, more accurate census data, and improvements in public education and hurricane evacuation study demand modeling. Under House bill 7121, funds were provided to update all eleven (11) regional evacuation studies. As part of the process, new coastal LIDAR (Light Detection and Ranging) data will be gathered to update coastal surge/flood modeling tools. As a result of the improved accuracy of elevation/topographical data and modeling, it is expected that the overall shelter demand will diminish further. The results of these studies will become part of the 2008 Statewide Emergency Shelter Plan, which is scheduled for publication in January 2008.

**Statewide Progress in Shelter Deficit Reduction**

Since 1995, Florida has made significant progress toward improving the safety and availability of public hurricane shelter space. This has been accomplished through a comprehensive strategy of surveys, retrofitting, new construction and evacuation studies. These aggressive initiatives have resulted in reducing the overall statewide shelter space deficit and creating a demonstrable surplus of public hurricane shelter spaces in twenty-three (23) counties. By 2011, the State’s deficit of hurricane shelter space should be eliminated. See Figure 4-1.
Figure 4-1. Graph of Florida’s progress in reducing the hurricane shelter deficit.