

## Chapter VI

### SAMPLE SHELTER SURVEY REPORT

#### 6.0 General

- This chapter contains samples and recommendations for preparation of a formal report of the findings of the HES surveys.
  - Section 6.1 explains the procedure for writing a formal report.
  - Section 6.2 shows various recommended backup documents.
  - Section 6.3 covers suggested general retrofit recommendations.

#### 6.1 Preparation of a Formal Report

- Once the data collection form is completed use it to complete the LRDM table. Utilizing the LRDM table should facilitate writing a formal descriptive report on the potential HES building. This report should briefly describe the building, its location and surrounding, the observations made, and the various considerations for use as an HES. The report should clarify the LRDM entries, specify any special points of interest and address the following:
  - *Building Location:* Include the building's physical address, latitude and longitude, and access routes to the building. Generally describe the campus/complex, citing quantities and construction types, construction history, etc. Discuss which buildings are being surveyed and those that were not surveyed and why. Give a brief description of the surroundings, such as adjacent buildings, topography, trees and whether they pose a lay-down threat to the building and potential sources of windborne debris.
  - *Infrastructure and Electrical Systems Considerations:* The type of emergency generator (if present), its specifications, fuel type, and any required mitigation measures should be explained. Describe the water supply and sanitary systems and whether alternate provisions for water supply and sanitation are present.
  - *Surge Inundation:* Mention building elevation and source for data -- always confirm elevations. Be careful about determining elevations based solely on site drawings. Often the same drawings are used repeatedly to build similar facilities at different locations. The elevations are not always corrected when this is done. Also, many drawings will use "benchmark" elevations, which may not indicate elevation relative to mean sea level. It is important that the correct elevation be established. Otherwise a facility may be deemed above an expected flood or surge

level when it is actually below the level, thus placing HES occupants at risk. If applicable, indicate surge inundation level in the building using SLOSH maps. Mention the same for the access routes.

- *Rainfall Flooding:* Indicate the FIRM zone for the building, including the FIRM panel number and date. Indicate the building's elevation and potential flood hazards. Mention the existence and condition of storm drainage systems and if there is any history of flooding in the area.
- *Hazardous Materials:* Discuss possible threats of hazardous materials located within the building and any hazardous material/nuclear facilities located close enough to pose a potential threat to the building.
- *Structural Considerations:* Mention all the structural considerations observed, reviewed and noted, such as superstructure, roofs, and walls. Note possible softspots or hazards and details of walls (reinforced, concrete, etc.), roofs (long spans, steep, etc.), and window area.
- *Mass Care Considerations:* Indicate usable floor space area, which is computed after deducting areas for walls, walkways, projections, and other fixed furnishings. Mention the shelter capacity in square feet (square feet allocated per person may vary from area to area). Indicate the primary areas to be used as HES areas and those that may be available for post-storm mass care operations. Give a brief description of the rooms to be used as host areas, access and security considerations for the rooms, and any possible modifications to the rooms.
- *Conclusion:* Include concluding remarks derived from this survey. Indicate whether this HES is compliant or non-compliant with ARC 4496 HES guidelines, and the reasons for deeming compliant or non-compliant. The pertinent LRDM table should follow the conclusion.
- *Retrofit Recommendations:* Include general retrofit recommendations to upgrade the HES to meet ARC 4496 guidelines.
- *Backup Documentation:* See Section 6.2 for recommended backup documentation.

## 6.2 Backup Documentation

Appropriate backup documentation should be provided with each report to demonstrate clearly the justification for decisions in the areas of surge, rainfall flooding, area usage, etc. Surge maps and FIRM maps are reissued with changes over periods of time and buildings are modified through various repair and maintenance programs. The backup documentation will show which maps/plans were used in the evaluation of the potential HES building at the time of the survey. The documentation will also enable a reviewer to quickly perform quality control checks on the survey. As a minimum recommend the following should be attached to the report: *(Note: see Appendix H for examples of the following documents)*

- A photocopied page (8.5" x 11") showing the building location and access route on the pertinent USGS map. (Show USGS map designation also.) An access route will consist of a paved road or combination of paved roads that lead from the building to a major U.S. Highway or Interstate, or other access route designated by the local emergency management agency.
- A photocopied page (8.5" x 11") showing the building location and access route on the pertinent Storm Surge Atlas plate. Ensure that the Surge Atlas date, county, and plate numbers are shown on the page and that the access route can be seen on the map.
- A photocopied page (8.5" x 11") showing the building location and access route on the pertinent FIRM map page. Ensure that the FIRM map date, title, and panel numbers are shown on the page.
- A page-sized photocopy of the site map, with the potential HES building clearly identified.
- A page-sized photocopy of the floorplan(s) of the potential HES building, with areas targeted for use as shelter areas clearly marked.
- Similar page-sized photocopy sheets showing typical wall sections, roof sections, and foundation plan.
- A completed (at least Parts I & II) Survey Checklist
- A completed LRDM table

### 6.3 Sample Retrofit Recommendations

Below are some sample retrofit recommendations for common deficiencies found in many potential HES buildings.

- For unprotected windows, skylights, other exterior glazings, and overhead doors:

*Recommend installation of shutters or other protective systems on the windows/exterior glazing/overhead doors. These protective systems should meet the wind load and impact resistance standards in the SBC Standard SSTD 12-94, or the Dade County version of the South Florida Building Code (Sections 2314.1, 2314.5, and 2315.1-2315.4). This will reduce vulnerability of the windows and building to windborne debris and subsequent interior damage.*

- For potential HES buildings without generators/pre-wiring and having ventilation systems without emergency backup power:

*Inside the building there should be ceiling or portable fans provided for adequate air movement. These fans, lights in the shelter areas, and the kitchen area (in particular the electric burners), as well as any other electrical loads which are identified as being essential to the use of the building as a shelter, should be connected to an emergency generator/power system. This could be accomplished by pre-wiring the essential circuits of the building to a single connection point, with a compatible interface connection for portable generators. In the event that power is lost to the facility, a generator could be brought to the site and temporarily installed to provide emergency power for these circuits.*

- For open span roof systems or flat, lightweight roof systems:

*A structural engineer should evaluate the roof system (especially the open span roof area) and determine what additional bracing is needed to enable the roof system to withstand the uplift and reverse bending forces expected in a major hurricane.*

- For unreinforced masonry exterior walls:

*A structural engineer should evaluate the unreinforced masonry walls and determine what reinforcement techniques should be used upgrade the walls to the level defined as fully reinforced in ACI 530, or to the levels defined as partially reinforced in NCMA TEK 63 (1975). This will probably involve a major retrofit effort.*

- For facilities with only public water and sanitary sewage systems:

*The complex has only municipal water and sanitary sewage systems available. Such systems are often disrupted during hurricanes, sometimes for extended periods. Alternative*

*backup provisions should be planned.*

- If a nonpotable well or an abandoned septic tank, or a wastewater/water treatment plant is available on/near the site, consider retrofitting those utilities for use in emergencies.
- **Generally, structural deficiencies will require the attention of a structural engineer to analyze and determine the proper mitigation measures and this should be recommended.**
- Mass care issues can usually be met by backup provisions (portable toilets, bottled water, etc.).
- Emergency power deficiencies are usually best met with prewiring of the HES for quick hookup of an emergency generator.
  - This is less costly than installing an on-site generator and does not expose the generator to the impact of the hurricane.
  - In those cases where the need for emergency power is immediate and continuous (i.e., special needs shelters), consideration should be given to installing or arranging to rapidly install emergency generators.
  - If a generator is to be on-site prior to the arrival of a hurricane, then the generator should be hazard protected against the wind forces and windborne debris expected under hurricane conditions.

