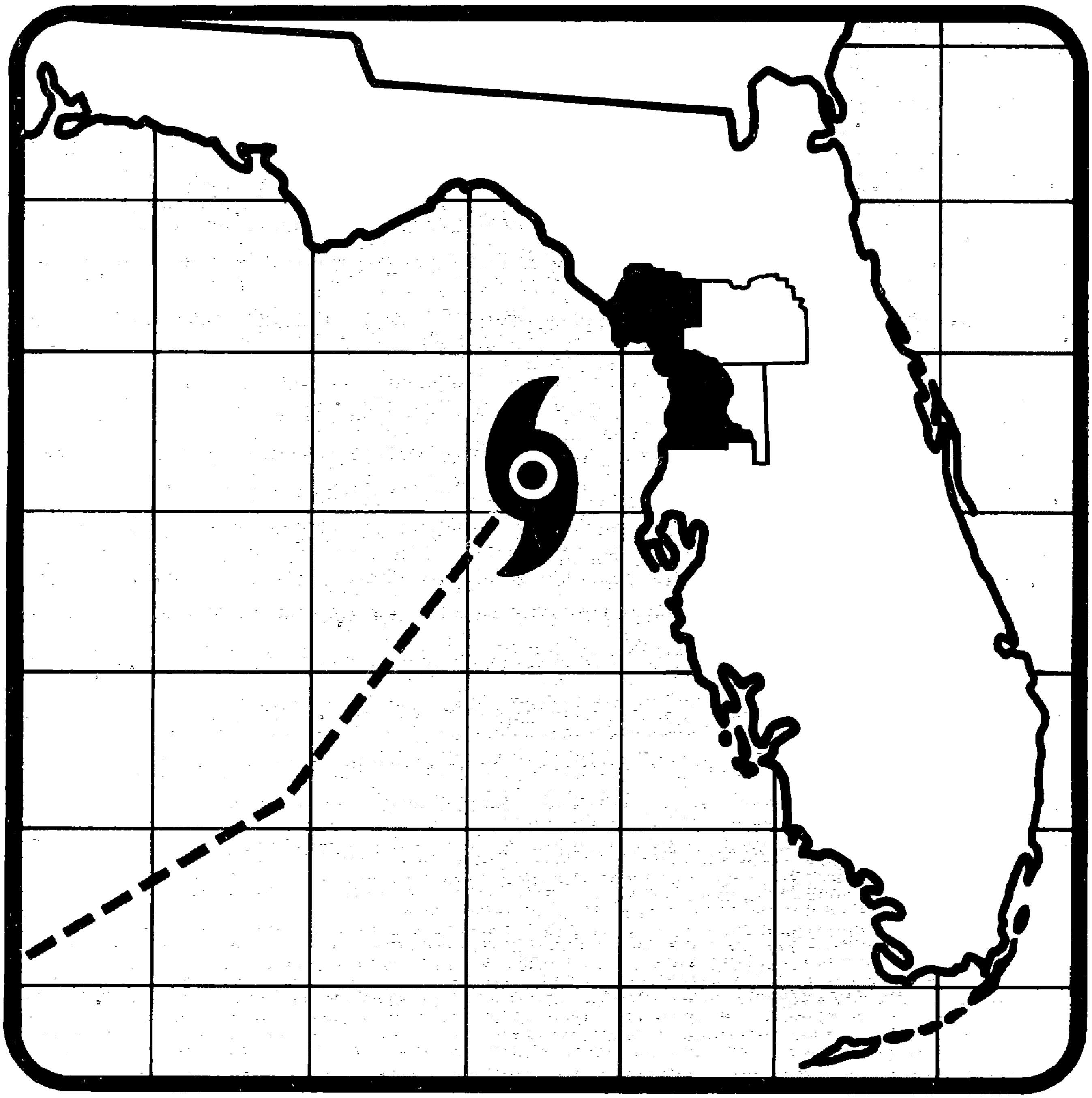
TECHNICAL DATA REPORT

WITHLACOOCHEE HURRICANE EVACUATION STUDY



Prepared by the WITHLACOOCHEE REGIONAL PLANNING COUNCIL
July, 1984

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EXECUTIVE SUMMARY

The Withlacoochee Regional Hurricane Evacuation Study is a two-year program which analyzes how many persons in the coastal counties are vulnerable to hurricane hazards, how long it takes for this vulnerable population to evacuate and how to manage the evacuation from a regional perspective.

The following is a brief summary of the findings of the study:

I. Hazard Analysis

A. Hazard Description

There are two principal hurricane hazards which necessitate evacuation. The first is hurricane force winds which are defined to be 74 mph or greater. Mobile homes are particularly vulnerable because of their lightweight construction and flat sides and ends. As a result, the National Weather Service recommends that all mobile home residents should evacuate in the event that an evacuation order is issued.

The second hazard is the storm surge which is the rising wall of ocean water, mainly produced by the hurricane force winds, which impacts on the coastal fringe. Due to the potential for damage and loss of life from this hazard, it is recommended that all residents within areas vulnerable to storm surge should evacuate.

B. History of Hurricane Activity

Since 1886, 31 hurricanes have passed within 120 nautical miles and 11 hurricanes have passed within 60 nautical miles of the city of Crystal River, Florida.

C. Hazard Analysis Results

A computer program, developed by the National Weather Service, was used to analyze the hurricane hazards affecting the Withlacoochee region. Surge heights were found to range from 4 to 33 feet in the Withlacoochee region, depending on the intensity of the storm and where it strikes. Peak wind speeds were found to range from 84 to 174 mph, depending on storm intensity.

II. Vulnerability Analysis

A. Delineation of Surge Vulnerable Areas

Areas in the coastal counties vulnerable to storm surge were delineated using surge height information. These areas are shown in Map 4, according to storm intensity.

B. Population Data

The number of persons residing in the surge-vulnerable areas and in mobile homes outside these areas were calculated for each of the coastal counties. The results are as follows: Citrus - 29,261, Levy - 13,919 and Hernando - 25,597. The aforementioned results were for higher intensity storms.

A statistically significant survey of vulnerable residents in the Withlacoochee region was conducted by the consulting firm of H. W. Lochner, Inc. (see Appendix B). One of the questions was in regard to evacuation destination: public shelter, friend or relative, or hotel/motel.

Using the results of this survey, and consultations with the Regional Disaster Preparedness Advisory Committee, the following evacuation destination distribution was developed for the vulnerable population of the coastal counties: public shelter - 30.6%, friend or relative - 40.6%, hotel/motel - 28.8%. Based on these results, 21,046 persons in the coastal counties may need public shelter.

III. Evacuation Zones and Scenarios

An evacuation network was developed as part of a transportation model of a hurricane evacuation of the Withlacoochee region (see Appendix I). Maps 5 to 7 display these evacuation routes for each of the coastal counties.

Evacuation zones were also developed to model evacuation traffic. These are presented in Maps 15 to 19.

Evacuation scenarios were developed for each of the coastal counties and the entire Withlacoochee region (including inland counties). County evacuation scenarios listed the population-at-risk in each county according to storm intensity. This information can be found in tables 14 to 16.

Regional evacuation scenarios also varied according to storm intensity. In addition, it is possible that both the Withlacoochee and Tampa Bay regions may have to simultaneously evacuate. A certain number of Tampa Bay evacuees are expected to enter the Withlacoochee region.

There are three regional scenarios developed for this report. The first is for storms of lower intensities. The second is for storms of higher intensities. The third includes the expected influx of Tampa Bay evacuees.

The population-at-risk for each regional scenario is shown below:

Regional Scenario	Population-At-Risk
A	98,742
B	112,232
C	255,742

The difference between regional scenarios A and B is a larger coastal fringe area vulnerable to storm surge.

IV. Coastal Shelter Analysis

A survey of public schools, primary shelters, and churches, secondary shelters, for use as a public shelter was conducted in each of the coastal counties. Shelters were evaluated for capacity and feasibility.

The results of the survey indicate that there is sufficient primary shelter capacity to accommodate coastal county evacuees. Secondary shelters will have to be used if both the Withlacoochee and Tampa Bay regions are ordered to evacuate.

V. Evacuation Times

The evacuation times represent the minimum amount of time before the hurricane strikes in which vulnerable residents must evacuate.

These times consist of two parts. The first component is the pre-landfall hazard time. This is the amount of time required to avoid hurricane hazards prior to a hurricane strike. The second component is the clearance time. This is the amount of time required for vulnerable residents to reach their evacuation destinations. This second component was calculated as part of the transportation model.

Evacuation times for the coastal counties range from 8 to 34 hours, depending on the county, storm intensity and whether or not there is an accompanying Tampa Bay evacuation.

VI. Warning System and Evacuation Procedures

This information is presented in Chapter VI and should be read in detail.

INTRODUCTION

A hurricane is a tropical cyclonic storm in which winds spiral inward at speeds greater than 73 mph. These winds can produce coastal surges which can flood and cause devastation to coastal fringe areas and threaten inland mobile-home residents.

The hurricane is intrinsically a regional event. This is not only due to the size of the storm; but, also, because of the prediction error as to where the hurricane will strike. As a result of this prediction error, up to 250-300 miles of coastline can be put under a hurricane warning. A warning means that hurricane conditions can be expected within 24 hours and that evacuation procedures should be initiated.

This large "warning area" means that disaster preparedness agencies and organizations will need information on how many persons in the Withlacoochee region are vulnerable to hurricane hazards and how long it will take them to evacuate. In addition, they will need to know, from a regional perspective, how the evacuation will be coordinated. These are the objectives of this technical data report which focuses on the coastal counties of the Withlacoochee region.

Specifically, the report consists of six parts: hazard analysis, vulnerability analysis, evacuation zones and scenarios, evacuation times, and warning system and evacuation procedures.

The hazard analysis presents a description of the hazards associated with a hurricane, a history of the hurricane activity affecting the Withlacoochee region and the hazard analysis concept and assumptions used in the report. In addition, the results of a computerized model used to analyze certain of the hurricane hazards are presented.

The vulnerability analysis uses the results of the hazard analysis to designate the areas of the Withlacoochee region vulnerable to the hurricane hazards and to estimate the number of persons who will be required to evacuate these areas. In addition, an estimation is made of the number of vehicles used during evacuation, the number of persons requiring public shelter, and the number of persons requiring special assistance during evacuation.

The vulnerable population calculated in the vulnerability analysis is separated into evacuation zones which are used to model the hurricane evacuation. Evacuation scenarios are also developed which indicate the extent of the population-at-risk according to the forecasted intensity of the hurricane and the size of the area to be evacuated.

The shelter analysis consists of a determination of the capacity of designated primary public shelters in the coastal counties of the Withlacoochee region and an analysis of the suitability of the shelters for hurricane evacuation purposes. In addition, a comparison is made with the number of persons requiring public shelter in the coastal counties with the available primary shelter capacity in order to determine the need for additional shelters.

Evacuation times are calculated to see how long it takes to safely evacuate the coastal counties. These times consist of two components. The first component is the amount of time required to avoid hurricane hazards. The second component is the amount of travel time it takes for vulnerable residents to reach their evacuation destinations.

The warning system and evacuation procedures provides the framework for alerting disaster preparedness agencies and the general public as to the need for evacuation. In addition, proposed procedures for assigning evacuees to public shelters and regional evacuation management are presented.

In summary, the results of the aforementioned analyses will provide the following disaster preparedness information:

- the areas vulnerable to hurricane hazards
- the number of persons requiring public shelter
- the amount and location of suitable public shelter capacity
- the time in which to issue the evacuation order
- a general regional framework for evacuation management.

CHAPTER I

HAZARD ANALYSIS

The hazard analysis consists of four parts: a description of the hazards associated with a hurricane, a history of the hurricane activity affecting the Withlacoochee region, the hazard analysis concept and assumptions used in this report and the results of the hazard analysis.

Hazard Description

A hurricane is a tropical cyclonic storm in which winds spiral inward at great speeds, caused by extremely low barometric pressure. Heavy rains usually accompany the storm as well. Associated with the storm are three natural hazards which necessitate or affect the evacuation of the population at risk: hurricane force winds, storm surge and rainfall.

Hurricane Force Winds

Technically, a tropical cyclonic storm is defined to be a hurricane when the sustained one-minute average wind speeds are 74 mph or greater. These wind speeds have been recorded as high as 190 mph. In addition, the hurricane is capable of producing peak gusts at much higher speeds.

The impact of sustained one-minute average wind speeds on building structures has been modeled; the same is not true, however, for peak gusts. But regardless of the speed, it is clear that hurricane force winds can cause roof failure, the outward collapse of walls and glass openings and enormous agricultural losses. It should be noted that, in the absence of an earlier rupture or weakening by rising water, the impacts of hurricane force winds on new structures can be substantially mitigated through compliance with building codes such as the Southern Standard Building Code.

Mobile homes are particularly vulnerable to hurricane force winds because of their lightweight construction and flat sides and ends. Although local regulations require that mobile homes be anchored so as to withstand high winds, the anchorage systems are usually not designed to withstand wind speeds in excess of 70 to 100 mph. In addition, mobile homes are more vulnerable to flying debris. As a result of this vulnerability to hurricane force winds, the National Weather Service recommends that all mobile home residents should evacuate in the event of a hurricane.

Hours before the arrival of hurricane force winds, which occur closer to the center of the storm, come gale force winds which are further away from the center. Gale force winds are defined as those occurring at speeds of 39 to 73 mph. Although these winds do not have as much destructive potential as hurricane force winds, they can still impede evacuation by scattering limbs from trees and other debris on roadways and create difficult driving conditions in their own right. This, in turn, can affect the timing of the hurricane evacuation in that the evacuation should be completed prior to the onset of gale force winds (that is, when the wind reaches 39 mph).

Storm Surge

As the eye of the hurricane strikes the coast or makes its closest point of approach from the sea, the stress of hurricane force winds produces a rising wall of water which impacts upon the coast. This is known as the storm surge. Since the winds of a hurricane spin counterclockwise about its center, the storm surge is largely limited to the area south of where the eye approaches the Gulf coast. The peak surge of a hurricane occurs approximately at the radius to maximum winds which typically varies from 15 to 30 miles. The peak surge value has been recorded as high as 24 feet in the United States.

The effect of the hurricane surge is devastating, causing 9 out of 10 hurricane-related deaths. In addition, it by far possesses the greatest damage potential, capable of rendering complete destruction in areas of lower elevation, especially where trees and other barriers to wind stresses are sparse or lacking. And as the height of the surge rises, so does its damage potential. Due to the potential detrimental effects of the storm surge, all persons residing within areas projected to be flooded by storm surge should evacuate.

The variables governing surge height and the extent of the coastline subject to surge are the storm intensity, the forward speed of the hurricane, the radius of maximum winds, the angle of the storm path, the shape of the coastline, and the bathymetry or depth of the ocean off the coast.

The surge will generally be higher for more intense hurricanes. The surge will also be higher if the path of the hurricane to the coast is more perpendicular than at other angles. Generally, shallow water locally off the coast where the hurricane comes ashore increases the surge height. Bays and other coastal inlets produce a "funneling effect" and a higher surge than along relatively smooth sections of coastline. The radius to maximum winds has minimal effect on peak surge height, but does increase the length of coastline subject to surge as the radius increases. The speed of the storm essentially governs how long a particular area will be subject to surge, although faster moving storms produce a slightly higher surge.

Not only does the surge affect the extent of the evacuation, it affects the timing of the evacuation as well. The maximum height of the surge will occur approximately when the eye of the storm strikes or makes its closest point of approach to the coast. However, before this time, the surge may be at a height sufficient to flood coastal roadways and thereby impede evacuation. Evacuation must be completed before this time.

Rainfall

Approximately 6 to 12 inches of rainfall can be expected to accompany a hurricane. Rainfall has comparatively little damage potential and essentially poses no hazard in and of itself.[1/] Also, the addition of rainfall has little if any effect on surge levels. However, heavy rains can affect the timing of the evacuation by the flooding of coastal roadways before the hurricane reaches its point of closest approach.

History of Hurricane Activity

The Withlacoochee region has had 31 hurricanes pass within 120 nautical or 138 statute miles and 11 hurricanes pass within 60 nautical or 69 statute miles of the city of Crystal River, Florida since 1886. This information is displayed in tables 1 and 2. Figure 1 shows the paths of several of these hurricanes. Wind speeds have reached as high as 125 mph within 120 nautical miles of Crystal River and 118 mph within 60 nautical miles.

In addition, studies of the intensities of hurricanes have been made, based on the Saffir/Simpson scale (see Appendix A). The Saffir/Simpson scale ranges from intensity category 1 through 5, with 3 through 5 being the most severe, in terms of both surge height and wind speed. Based on this scale, 5 hurricanes reaching intensities 3 through 5 have passed within 120 nautical miles of Crystal River since 1886, or one every 19.2 years; only one hurricane reaching intensity 3 passed within 60 nautical miles. Twenty-six hurricanes reaching intensity 1 or 2 have passed within 120 nautical miles or one every 3.1 years; and 10 have passed within 60 nautical miles or one every 9.6 years.

[1/] Some flooding due to rainfall may occur in low-lying and lake and riverine areas. These flooding events will probably be isolated and do not warrant a mass evacuation prior to hurricane landfall. However, residents of these areas should evacuate if a hurricane warning is issued for their area.

TABLE 1

HURRICANES PASSING WITHIN 120 NAUTICAL MILES
OF CRYSTAL RIVER: 1886-1981

Date at Closest Point of Approach	Distance to Closest Point of Approach (nautical miles)	Wind[1] Speed (mph)	Storm[2] Intensity Category
1886-June 21	104	95	1
1886-July 1	48	97	2
1886-July 19	42	98	2
1888-Oct. 11	10	97	2
1893-June 16	39	86	1
1893-August 27	89	119	3
1894-Sept. 26	74	100	2
1894-Oct. 9	85	102	2
1896-Sept. 29	22	107	2
1898-Aug. 2	89	75	1
1898-Oct. 2	108	98	2
1899-Aug. 2	96	77	1
1921-Oct. 26	87	101	2
1925-Dec. 1	99	81	1
1926-July 28	19	81	1
1928-Sept. 17	32	118	3
1935-Sept. 4	43	95	1
1939-Aug. 12	77	79	1
1941-Oct. 7	112	87	1
1944-Oct. 19	45	75	1
1945-June 24	49	97	2
1945-Sept. 16	50	93	1
1947-Oct. 15	111	76	1
1949-Aug. 27	16	87	1
1950-Sept. 7 (Easy)	37	125	3
1950-Oct. 19 (King)	9	76	1
1960-Sept. 11 (Donna)	77	116	3
1964-Sept. 10 (Dora)	7	115	3
1966-June 10 (Alma)	67	98	2
1968-Oct. 19 (Gladys)	47	81	1
1979-Sept. 4 (David)	87	98	2

Notes: 1 - Maximum sustained wind speed near storm center while storm center is within 120 nautical miles of Crystal River. This is not necessarily the wind speed recorded at Crystal River.

2 - Highest storm intensity category achieved within 138 statute miles of Crystal River.

Source: National Hurricane Center, Miami.

TABLE 2

HURRICANES PASSING WITHIN 60 NAUTICAL MILES
OF CRYSTAL RIVER: 1886-1981

Date of Closest Point of Approach	Distance to Closest Point of Approach (nautical miles)	Wind[1] Speed (mph)	Storm[2] Intensity Category
1886-July 1	48	94	1
1886-July 19	42	98	2
1888-Oct. 11	10	92	1
1893-June 16	39	81	1
1896-Sept. 29	22	103	2
1928-Sept. 17	32	99	2
1935-Sept. 4	43	86	1
1945-June 24	49	82	1
1950-Sept. 7 (Easy)	37	118	3
1964-Sept. 10 (Dora)	7	109	2
1968-Oct. 19 (Gladys)	47	81	1

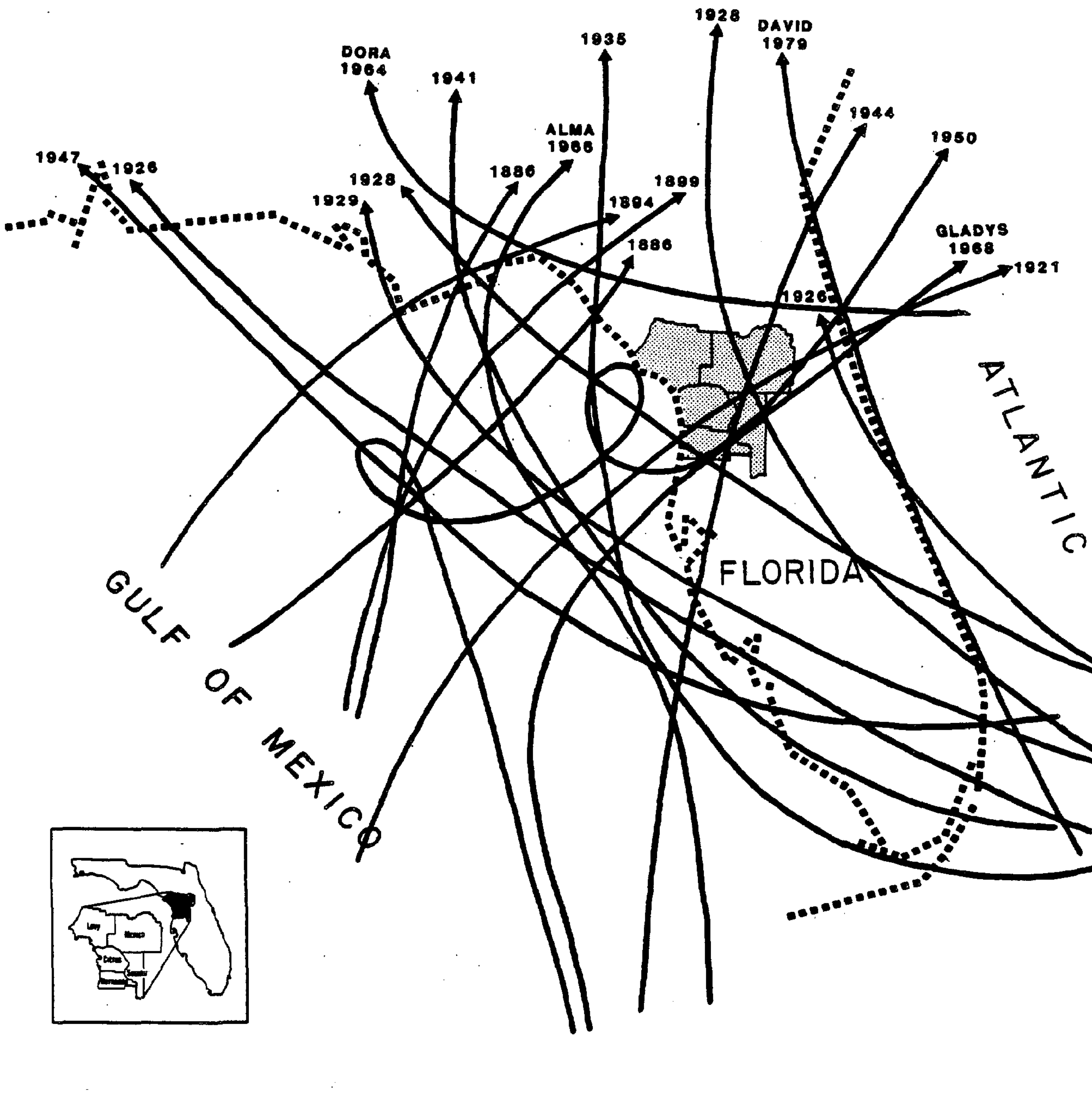
Notes: 1 - Same as Table 1

2 - Same as Table 1

Source: National Hurricane Center, Miami.

Figure 1

HISTORY OF HURRICANE ACTIVITY IN THE WITHLACOOCHEE REGION



SOURCE: Federal Emergency Management Agency Flood Insurance Studies.

In sum, based on available historical data, a hurricane has passed within 120 nautical miles of Crystal River once every 3.1 years since 1886 and once every 8.7 years within 60 nautical miles, regardless of hurricane intensity. It should also be noted that hurricanes of higher intensities, although rare, have occurred in the vicinity of the Withlacoochee region in the past and, therefore, should be concluded to be possible events.

Hazard Analysis Concept and Assumptions

The hazard analysis concept used for this report is to be prepared for the worst case situation for each hurricane intensity category on the Saffir/Simpson scale. This means that the Withlacoochee region must be prepared for the predicted peak surge heights and wind speeds at every point along the coast for each storm intensity category. This concept must be used because the accuracy in predicting where the hurricane will strike or make its closest point of approach (CPA) is limited and will continue to be so for some time in the future. Currently, the mean CPA projection error is 46 statute miles at 24 hours before CPA, which is when hurricane warnings are issued. This means that usually 250 to 300 miles of coastline is under warning, regardless of the storm intensity category.

This concept is used to analyze three types of hurricanes: landfalling, or those which directly strike the coast; paralleling, or those which parallel the coast; and exiting, or those which cross over land and move into the Gulf of Mexico.

The objectives of the hazard analysis are to provide information regarding the effects of the hurricane on the extent of the evacuation and the timing of the evacuation. The extent of the evacuation refers to the number of persons vulnerable to hurricane force winds and storm surge under different hurricane intensity categories. This information is necessary to determine the amount of shelter and other resources required for evacuation. This chapter is concerned with presenting the quantitative methods and assumptions used to analyze the hazards which affect the extent of the potential hurricane evacuation of the Withlacoochee region. Delineation of the areas vulnerable to hurricane hazards and the calculation of the population-at-risk within these areas are the subjects of Chapter III, Vulnerability Analysis.

The timing of the evacuation refers to the amount of time it takes for those persons vulnerable to hurricane force winds to safely reach their shelter destinations. This information is necessary to know when to employ the resources needed for evacuation and when to issue the evacuation order. This chapter is concerned with the analysis of the hazards of the hurricane, principally storm surge and gale force winds, which affect the timing of the evacuation order. The amount of travel time from vulnerable areas to shelter destinations is addressed in Chapter V, Evacuation Times.

In order to ascertain this information, quantitative methods and assumptions are used.

Quantitative Methods

The principal quantitative tool used in this analysis is a computer program developed by the National Weather Service entitled Special Program to List the Amplitude of Surges from Hurricanes (SPLASH). SPLASH provides two important types of information. First, it lists the surge heights generated from hurricanes following user-specified, hypothetical storm tracks for each storm intensity category. Figure 2 displays the landfalling, paralleling and exiting tracks used for this analysis. Second, it provides the hourly values of surge heights and wind speeds for up to 12 hours before and 12 hours after the specified CPA along each track.

The list of surge heights is used to determine the extent of the area vulnerable to surge. The hourly values of surge heights and wind speeds are used to determine the amount of time before the hurricane strikes or makes its closest point of approach in which coastal evacuation routes become inundated by storm surge and gale force winds impede evacuation, hereafter referred to as the pre-landfall hazard times.

Assumptions

Two important assumptions have to be made for this analysis. The first regarding rainfall and the second regarding the extent of evacuation due to hurricane force winds.

No predictive tool for determining the rate and geographic distribution of rainfall accompanying a hurricane is available. However, the combination of heavy rains and gale force winds will provide a definite impediment to evacuation. Therefore, it is assumed that the timing hazard brought forth by rainfall will parallel the pre-landfall hazard time due to gale force winds.

There is also no predictive method for determining the frictional drag on hurricane force winds once the hurricane proceeds inland. Since mobile homes are highly vulnerable to hurricane force winds, it is assumed that all mobile home residents located within the approach of a hurricane should evacuate, regardless of the storm intensity category.

Hazard Analysis Results

The results of the hazard analysis consist of the results of the SPLASH model. This includes the input parameters to the SPLASH model, the list of surge heights, and the hourly values of surge heights and wind speeds.

Input Parameters

There are two types of input parameters for the SPLASH model; those which are user-specified and those which are incorporated into the model itself. The user-specified parameters consist of the decline in barometric pressure, in millibars; the radius to maximum winds from the storm center, in statute miles; and latitude-longitude coordinates of the landfall or closest points of approach at 6 and 12 hours before and after CPA. The speed and direction of the hurricane are calculated from the latitude-longitude coordinates. All the aforementioned information, except the latitude-longitude coordinates, is displayed for each storm intensity category along each hypothetical hurricane track in table 3. Figure 2 shows the specified latitude-longitude coordinates along each hypothetical storm track.

The principal variable affecting wind speed and surge height is the decline in barometric pressure which ranges from 30 millibars for storm intensity category 1 to 100 millibars for category 5. As stated in the hazard description section, the radius to maximum winds and forward storm speed have minimal effect on peak surge height, and are therefore held constant at 20 miles and 15 mph; respectively. The radius to maximum winds is changed to 12 miles for intensity

TABLE 3

HURRICANES GENERATED BY SPLASH

Identification	Input Parameters: Pressure Drop (millibars)	Input Parameters: Storm Speed (m.p.h.)	Input Parameters: Radius Of Maximum Winds (miles)	Input Parameters: Direction (degrees clockwise from North)	Results: Peak Surge Height (ft.)	Results: Peak Wind Speed (m.p.h.)
NOR-01-LS040	30	15	20	45	9.6	86
NOR-01-LS020	30	15	20	45	11.6	86
NOR-01-RS000	30	15	20	45	11.6	86
NOR-01-RS020	30	15	20	45	9.8	86
NOR-01-RS040	30	15	20	45	8.7	86
NOR-01-RS060	30	15	20	45	7.4	86
NOR-02-LS040	40	15	20	45	13.0	99
NOR-02-LS020	40	15	20	45	15.6	99
NOR-02-RS000	40	15	20	45	16.0	99
NOR-02-RS020	40	15	20	45	12.9	99
NOR-02-RS040	40	15	20	45	11.8	99
NOR-02-RS060	40	15	20	45	10.0	99
NOR-03-LS040	60	15	20	45	19.6	121
NOR-03-LS020	60	15	20	45	23.6	121
NOR-03-RS000	60	15	20	45	24.2	121
NOR-03-RS020	60	15	20	45	20.2	121
NOR-03-RS040	60	15	20	45	17.9	121
NOR-03-RS060	60	15	20	45	15.2	121
NOR-04-LS040	80	15	20	45	26.4	140
NOR-04-LS020	80	15	20	45	31.8	140
NOR-04-RS000	80	15	20	45	32.6	140
NOR-04-RS020	80	15	20	45	27.2	141
NOR-04-RS040	80	15	20	45	24.2	140
NOR-04-RS060	80	15	20	45	20.5	140

TABLE 3 (cont.)

HURRICANES GENERATED BY SPLASH

	Input Parameters				Results	
Identification	Pressure Drop (millibars)	Storm Speed (m.p.h.)	Radius Of Maximum Winds (miles)	Direction (degrees clockwise from North)	Peak Surge Height (ft.)	Peak Wind Speed (m.p.h.)
NOR-05-LS040	100	15	12	45	24.8	174
NOR-05-LS020	100	15	12	45	26.0	172
NOR-05-RS000	100	15	12	45	33.1	172
NOR-05-RS020	100	15	12	45	29.2	174
NOR-05-RS040	100	15	12	45	23.6	174
NOR-05-RS060	100	15	12	45	21.4	174
PAR-01-LS060	30	15	20	120	8.2	86
PAR-01-LS040	30	15	20	120	8.3	86
PAR-01-LS020	30	15	20	120	8.0	86
PAR-01-RS000	30	15	20	120	7.3	82
PAR-01-RS020	30	15	20	120	5.2	73
PAR-02-LS060	40	15	20	120	11.1	99
PAR-02-LS040	40	15	20	120	11.2	100
PAR-02-LS020	40	15	20	120	11.0	99
PAR-02-RS000	40	15	20	120	10.1	95
PAR-02-RS020	40	15	20	120	7.3	86
PAR-03-LS060	60	15	20	120	16.8	122
PAR-03-LS040	60	15	20	120	17.1	122
PAR-03-LS020	60	15	20	120	15.7	122
PAR-03-RS000	60	15	20	120	15.8	118
PAR-03-RS020	60	15	20	120	11.5	108
PAR-04-LS060	80	15	20	120	22.6	141
EXT-01-LS015	30	15	20	165	5.2	84
EXT-01-RS000	30	15	20	165	5.7	84
EXT-01-RS015	30	15	20	165	4.0	86

TABLE 3 (cont.)

HURRICANES GENERATED BY SPLASH

	Input Parameters				Results	
Identification	Pressure Drop (millibars)	Storm Speed (m.p.h.)	Radius Of Maximum Winds (miles)	Direction (degrees clockwise from North)	Peak Surge Height (ft.)	Peak Wind Speed (m.p.h.)
EXT-01-RS030	30	15	20	165	3.9	86
EXT-01-RS045	30	15	20	165	3.6	86
EXT-02-LS015	40	15	20	165	7.4	99
EXT-02-RS000	40	15	20	165	8.0	98
EXT-02-RS015	40	15	20	165	5.7	99
EXT-02-RS030	40	15	20	165	5.5	99
EXT-02-RS045	40	15	20	165	5.1	99

Key for identification:

NOR - Path of hurricane normal or perpendicular to Gulf Coast
PAR - Path of hurricane parallel to Gulf Coast
EXT - Path of hurricane from point inland to Gulf Coast

01 to 05 - Hurricane intensity level based on Saffir/Simpson scale

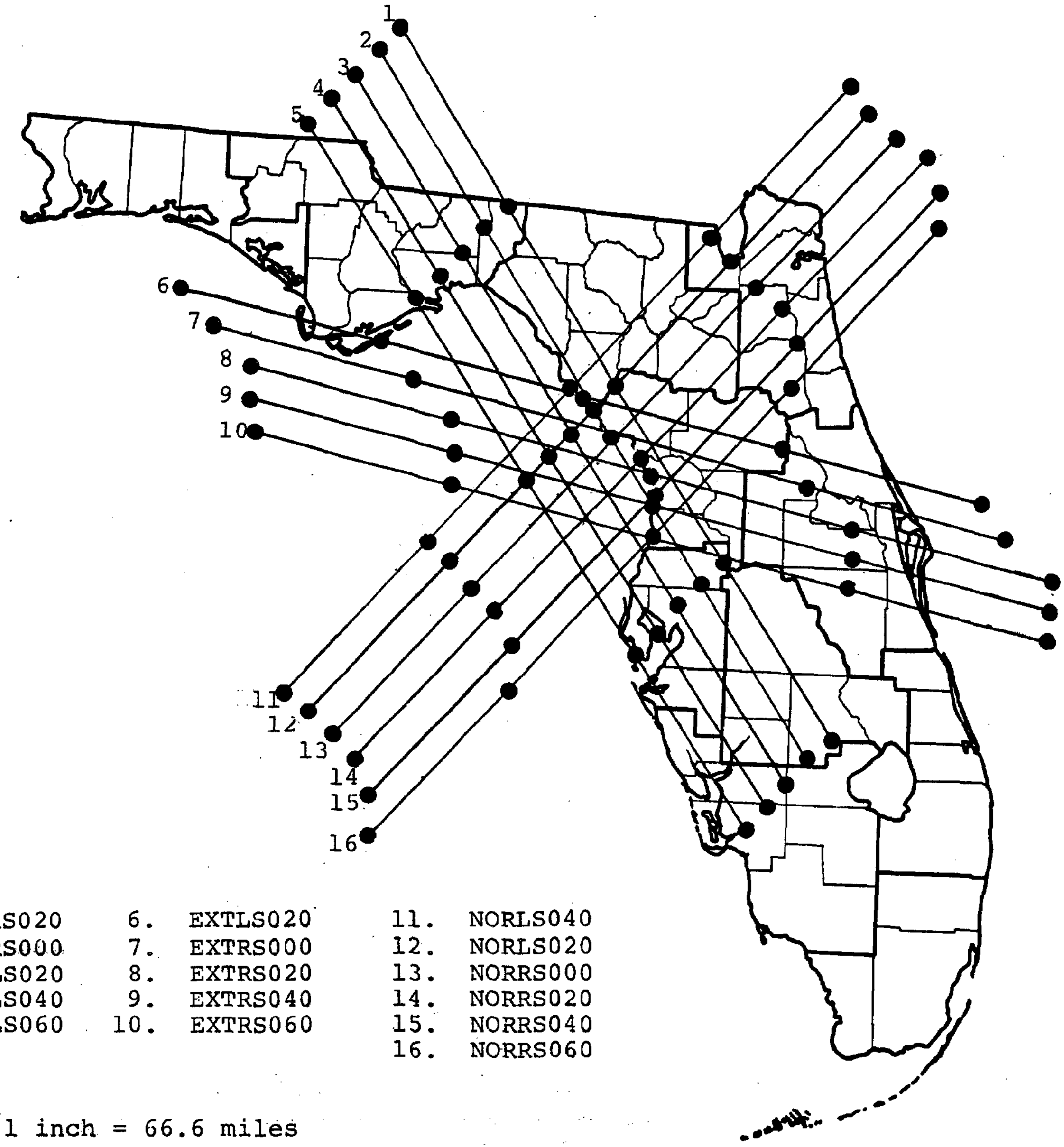
LS, RS - Path of hurricane located to the left side or right side of Cedar Key, facing the Gulf Coast

000 to 060 - Distance of path of hurricane to the left or right from Cedar Key in miles

Source: SPLASH II computer output

FIGURE 2

HYPOTHETICAL HURRICANE TRACKS*



Scale: 1 inch = 66.6 miles

*See table 3 for key to track identification.

category 5 because only small radii to maximum winds have been observed for this category of hurricane. The direction of the storm defines the hurricane type: landfalling, paralelling and exiting. At this point, it should be noted that only intensity categories 1 through 3 were considered for the paralelling tracks, except for the outermost one in which a category 4 was analyzed, and 1 and 2 for the exiting. This is because these tracks travel over land which results in a loss in intensity. Finally, the latitude-longitude coordinates are used to compute the surge height and wind speed values.

The variables incorporated into the SPLASH model are the bathymetry and a smoothed shape of the coastline. The coastline is modelled as a "vertical-wall side boundary". These variables affect surge height as described in the hazard description section.

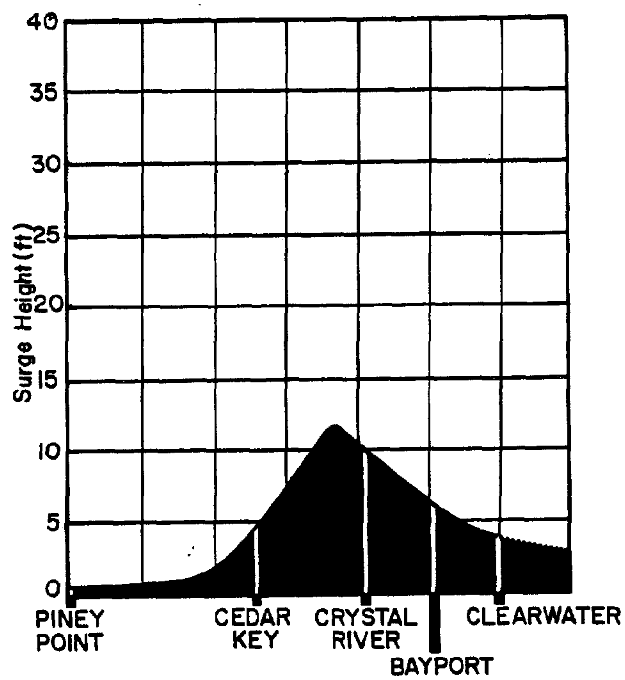
Surge Heights

SPLASH presents two types of information regarding surge heights, surge profiles and hourly values of surge heights. A surge profile is a graph of the list of surge heights at 8-mile intervals along the coast generated by SPLASH for each hypothetical hurricane listed in table 3. Figures 3 and 4 display the surge profiles for a hurricane landfalling at Cedar Key for storm intensity categories 1 (NOR-01-RS000) and 5 (NOR-05-RS000), respectively. A comparison of these figures show a significant difference in surge height from peak to peak. This is primarily due to the difference in storm intensity. It is also in part due to the "funneling effect" brought forth by the Waccasassa Bay. These figures also show that the peak surge height occurs south of the landfall point, roughly corresponding to the radius of maximum winds.

The peak surge heights associated with each hurricane generated by SPLASH are displayed in table 3. As can be seen, generally, surge height increases with storm intensity. Surge values are also generally higher for different storm types; landfalling being the highest, followed by paralleling and exiting. These differences are due to the directness of the approach in regard to the landfalling and paralleling and the amount of time the surge has to "build up" in regard to the exiting and other storm types. The differences in surge height between each track, within each intensity category, are due to changes in the bathymetry and the shape of the coastline for landfalling and exiting storms and the distance of the hypothetical storm track from the coast for paralleling storms.

FIGURE 3

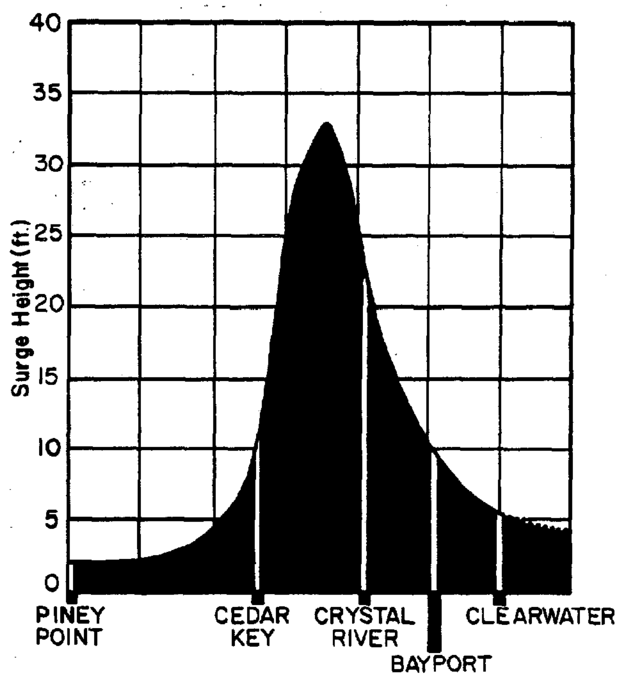
SURGE PROFILE OF HURRICANE
LANDFALLING AT CEDAR KEY:
INTENSITY CATEGORY 1



Source: SPLASH II computer output

FIGURE 4

SURGE PROFILE OF HURRICANE
LANDFALLING AT CEDAR KEY:
INTENSITY CATEGORY 5



Source: SPLASH II computer output

At this point, it should be noted that the surge heights generated by the SPLASH model for each storm intensity category do not correspond with the range in surge height set by the Saffir/Simpson scale as shown below:

Storm Intensity Category	Saffir/Simpson Range	SPLASH[2/] Range
1	4-5 ft.	3.6 - 11.6 ft.
2	6-8	5.1 - 16.0
3	9-12	11.5 - 24.0
4	13-18	20.5 - 32.6
5	18+	21.4 - 33.1

The principal reason for these differences is that the bathymetry of the coastal waters of the Withlacoochee region is much more shallow than in other coastal areas. From this point forward in the report, the SPLASH ranges shall be used instead of the Saffir/Simpson ranges for each storm intensity category as regards to surge height.

The second type of surge information generated by SPLASH is the hourly value of surge heights at 4-mile intervals along the coast. Table 4 shows the time-history of surge values at selected points for an intensity level 5 hurricane landfalling at Cedar Key (NOR-05-RS000). This table shows that the surge level decreases north of the landfall point due to the counter-clockwise motion of the winds. It also shows, for the points subject to surge, that the surge increases up to the approximate point of maximum winds and then declines.

From this information, the pre-landfall hazard time, or the time before landfall in which coastal evacuation routes become inundated by surge, can be calculated. This is done by comparing the elevation of the road to the surge value as shown in table 4. This procedure will be elaborated upon in Chapter V, Evacuation Times.

Wind Speeds

SPLASH also computes hourly values of wind-speeds as shown in table 5 for the same hurricanes used in table 4. This table shows that wind speeds increase from the point of landfall to the radius of maximum winds, then decline.

[2/] Range expressed in terms of peak surge height for each storm type.

TABLE 4

TIME HISTORY OF SURGE HEIGHTS FOR HURRICANE LANDFALLING AT CEDAR KEY: INTENSITY LEVEL 5

	Hour	LS020	RS000 (Cedar Key)	RS020	RS040
	0600	0.6 ft.	0.8 ft.	0.7 ft.	0.7 ft.
	0700	0.6	1.0	1.1	1.3
	0800	1.0	1.6	2.0	2.6
Pre-landfall hazard time	0900	1.1	2.4	3.6	4.9
Pre-landfall hazard time	1000	0.4	4.0	7.2	8.6
Pre-landfall hazard time	1100	-1.9	7.0	17.6	14.2
Landfall	1200	-7.6	7.4	31.9	17.7

Source: SPLASH II computer output.

TABLE 5

TIME HISTORY OF WIND SPEEDS FOR HURRICANE LANDFALLING
AT CEDAR KEY: INTENSITY LEVEL 5

	Hour	LS020	RS000 (Cedar Key)	RS020	RS040
	0100	25 mph	27 mph	25 mph	29 mph
	0200	27	29	28	32
	0300	30	33	31	36
	0400	34	37	35	41
	0500	38	43	40	47
	0600	44	51	46	55
Pre-landfall	0700	52	62	55	66
hazard time	0800	62	79	67	80
	0900	77	107	86	94
	1000	98	153	116	100
	1100	121	113	152	96
	1200	128	154	162	82
	1300	107	119	129	68
	1400	85	85	96	56
Shelter	1500	66	64	72	47
Duration	1600	53	50	56	40
Period	1700	43	41	45	34
	1800	36	35	38	30
	1900	32	31	33	27
	2000	29	28	30	25
	2100	26	26	27	23
	2200	24	23	25	21

Source: SPLASH II computer output.

Table 3 shows the peak wind speed associated with each hurricane generated by SPLASH. Peak wind speeds are shown to be constant for each storm intensity. This is because the only variable affecting peak wind speed is the drop in barometric pressure.

From the hourly values of wind speeds, the pre-landfall hazard time for gale force winds can be calculated. This is done by determining the number of hours before landfall in which gale force winds, defined to be 39 to 73 mph are achieved, as shown in table 5. Additionally, the hourly wind speeds can be used to calculate the shelter duration period. This is defined as the period of time in which persons vulnerable to hurricane hazards must remain in designated shelters in order to avoid the hazards of a hurricane. This is assumed to be the period of time before and after landfall, or closest point of approach, that a point is subject to gale force winds. Shelter duration periods are also shown in Table 5. This procedure is further described in Chapter V, Evacuation Times.

CHAPTER II

VULNERABILITY ANALYSIS

The purpose of the vulnerability analysis is twofold. First, to delineate the area vulnerable to hurricane hazards using the information generated by the hazard analysis. Second, to enumerate the population-at-risk in the vulnerable areas.

Delineation of Surge-Vulnerable Areas

This section describes the methodology used to designate coastal fringe areas subject to flooding from storm surge. This analysis consists of two steps: the projection of surge heights inland, and the determination of levels of vulnerability.

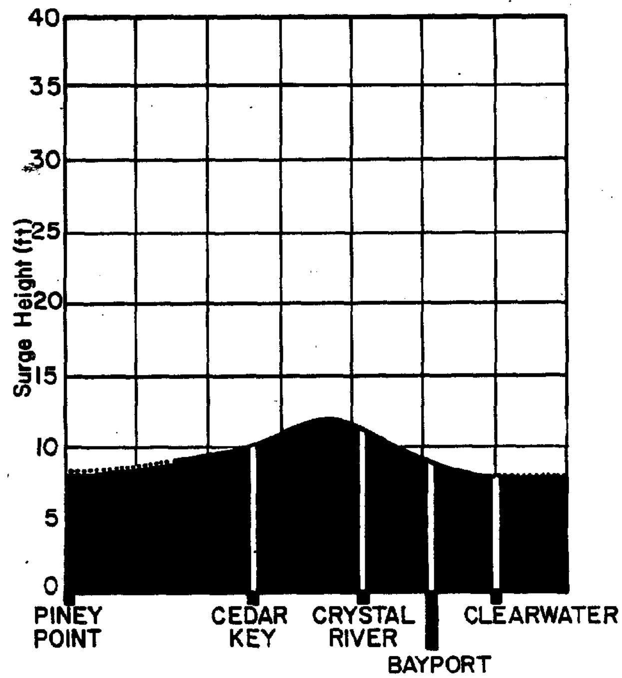
Surge Height Projection

As displayed in figures 3 and 4, surge profiles generated by SPLASH indicate the variation in surge height for a single hypothetical hurricane. However, in keeping with the hazard analysis concept, the peak surge heights along the coast generated by all hurricanes for each storm type and intensity are needed. This is accomplished by plotting the peaks of the surge profiles generated along each hypothetical storm track for each intensity of each storm type on a single graph and connecting the peaks. The resultant graph represents an envelope of peak surge heights for all hurricanes striking or making their closest point of approach along the coast of the region. This envelope of peak surge heights is referred to as the regional hurricane surge profile. Figure 5 displays the regional hurricane surge profile for the landfalling hurricane tracks of storm intensity category 1; figure 6, the same for storm intensity category 5.

Using the regional hurricane surge profile, the peak surge height is projected inland based on an inland routing method provided by the National Hurricane Center. This method

FIGURE 5

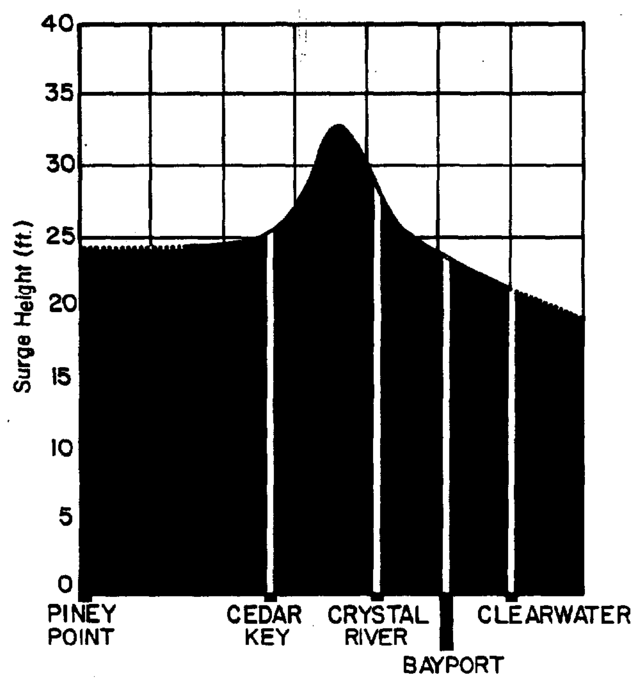
REGIONAL HURRICANE SURGE
PROFILE OF LANDFALLING STORMS
INTENSITY CATEGORY 1



Source: SPLASH II computer output

FIGURE 6

REGIONAL HURRICANE SURGE
PROFILE OF LANDFALLING STORMS
INTENSITY CATEGORY 5



Source: SPLASH II computer output

is based on previous analysis which indicates that the surge will decline from its maximum height at the coast to zero at a distance of 15 miles inland. Incorporated in this analysis was the general relationship that the rate of decline of the surge increases as the surge height increases. Also incorporated in the analysis is the average decrease in wind stress on the surge provided by trees and other barriers.

To determine the actual distance the surge travels inland, the projected surge height must be compared with the land elevation; as the surge heights are expressed in terms of feet above mean sea level. To do this, cross sections of topography were graphed from U.S.G.S. topographic maps at several points along the Withlacoochee region. Cross sections were made where there were changes in the contour of the inland area and the shape of the coastline. Maps 1, 2, and 3 show the location of the cross sections made for Levy, Citrus and Hernando counties; respectively.

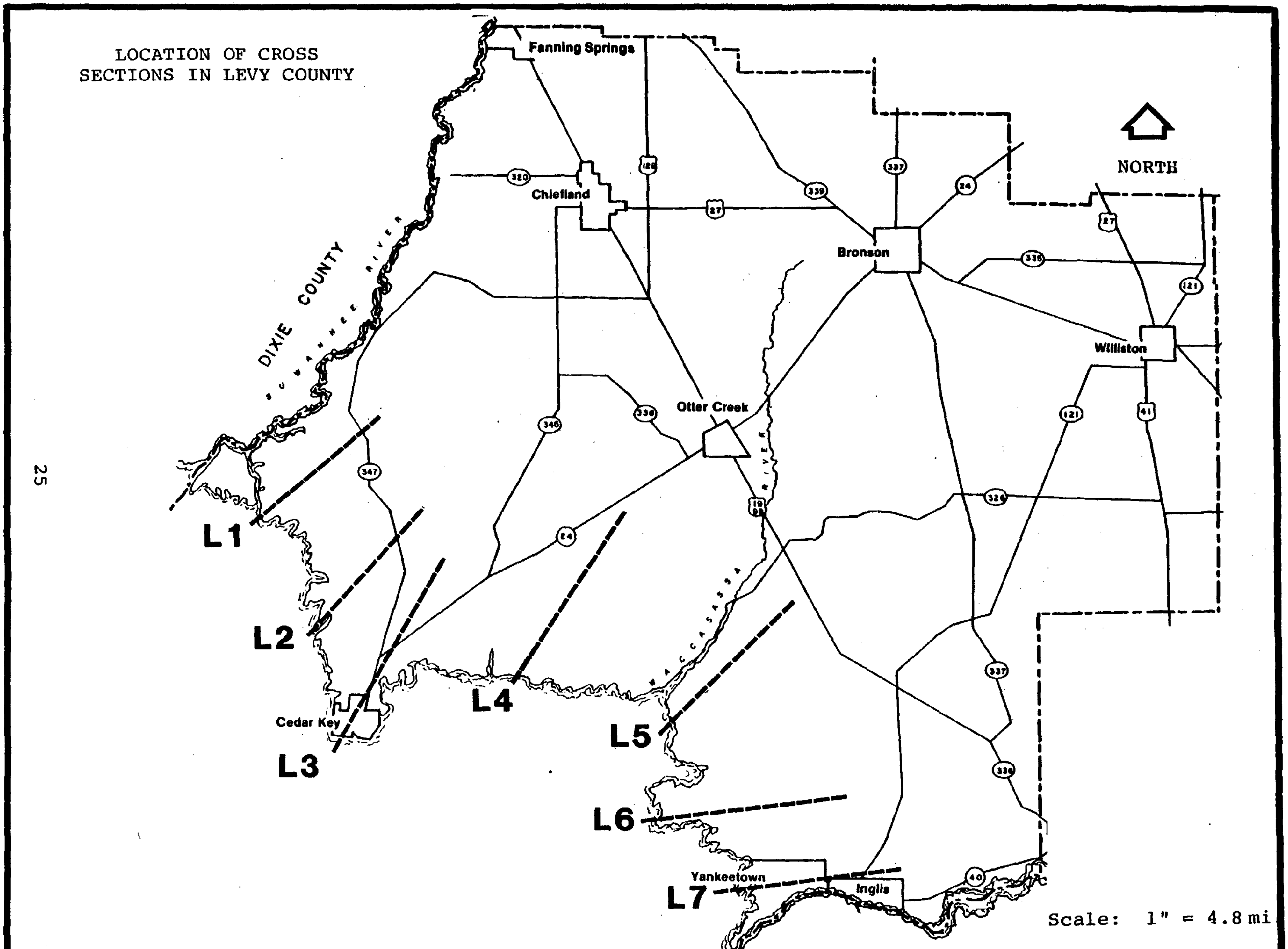
The surge heights for each storm type and intensity are projected inland against the cross sections. Where the projected surge height and the slope of the land elevation intersect indicates the extent to which the surge travels inland at that particular point. This procedure is displayed in figures 7, 8, and 9 for selected cross sections in Levy, Citrus and Hernando counties. By mapping the distances in which the surge travels inland along each cross section and connecting these points, the surge-vulnerable areas for each intensity of each storm type are delineated.

It should be noted that the purpose of this analysis is not to indicate how high the surge will be at a certain point inland, but rather to determine the extent of the evacuation due to surge flooding for different storm types and intensities. It is assumed that the extent of the evacuation due to surge will parallel where the projected surge height and land elevation intersect.

Levels of Vulnerability

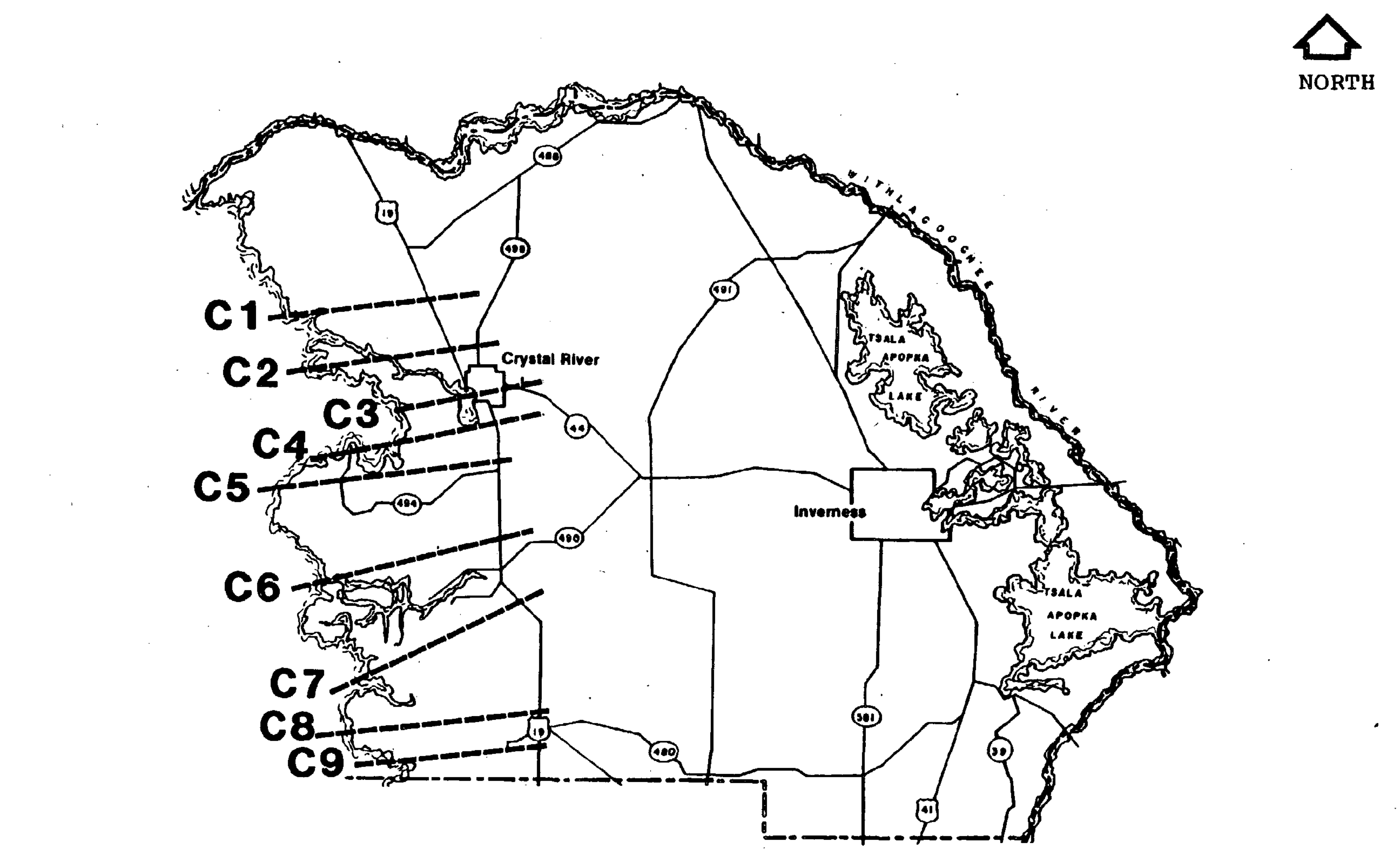
As displayed in figures 7 through 9, the additional distance in which the surge travels inland is very small for certain storm types and intensities. Therefore, these storms are consolidated into two vulnerability levels as shown below:

MAP 1


LOCATION OF CROSS
SECTIONS IN LEVY COUNTY
NORTH
Fanning Springs
Chiefland
Bronson
Williston
Otter Creek
Cedar Key
Yankeetown
Inglis
DIXIE COUNTY
SUWANNEE RIVER
WACCASASSA RIVER
L1
L2
L3
L4
L5
L6
L7
Scale: 1" = 4.8 mi

MAP 2

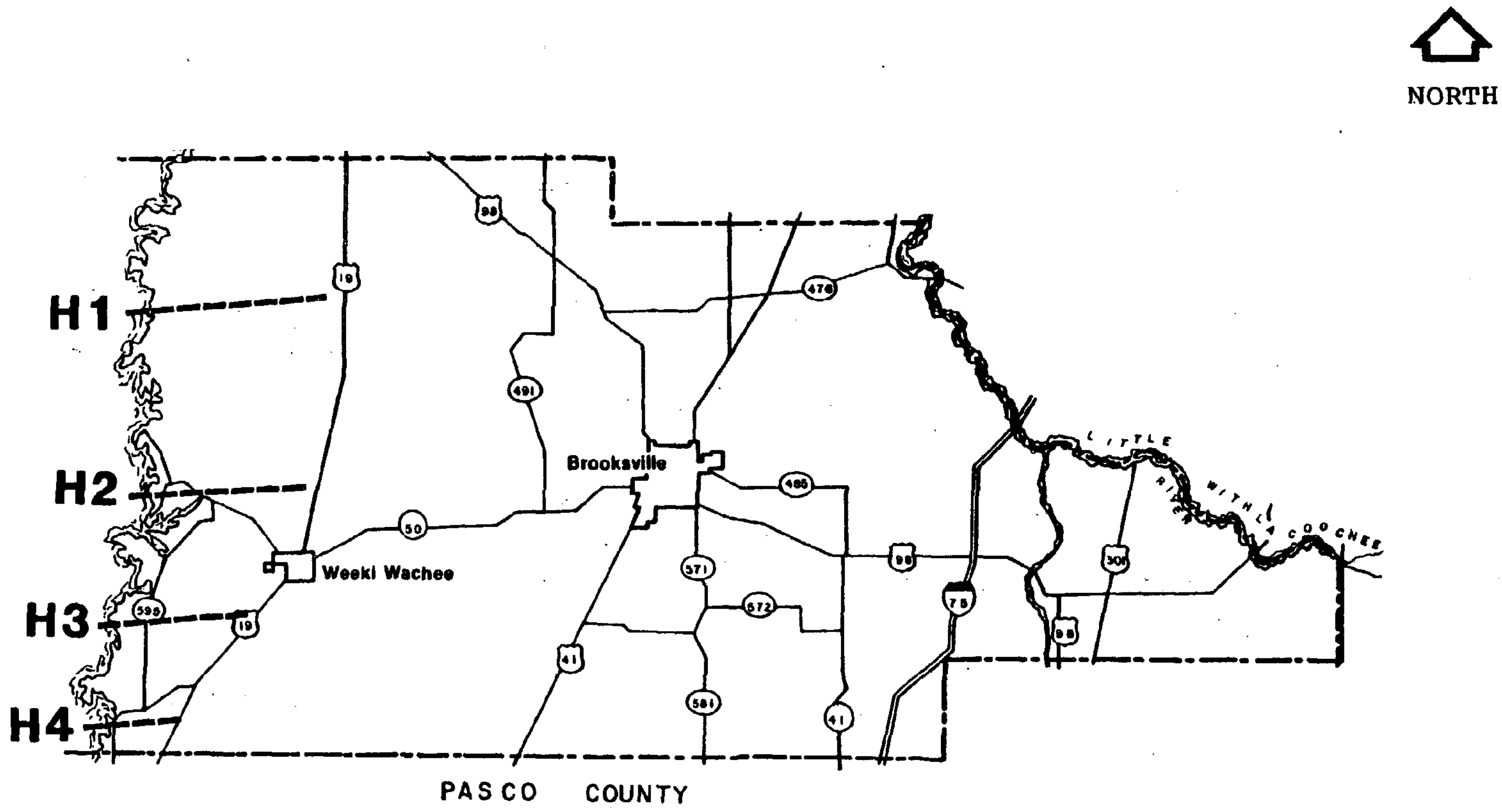
LOCATION OF CROSS SECTIONS IN CITRUS COUNTY



Scale: 1" = 4.8 mi.

MAP 3

LOCATION OF CROSS SECTIONS IN HERNANDO COUNTY



Scale: 1" = 4.8 miles

FIGURE 7

SURGE PROJECTION OF CROSS SECTION L3

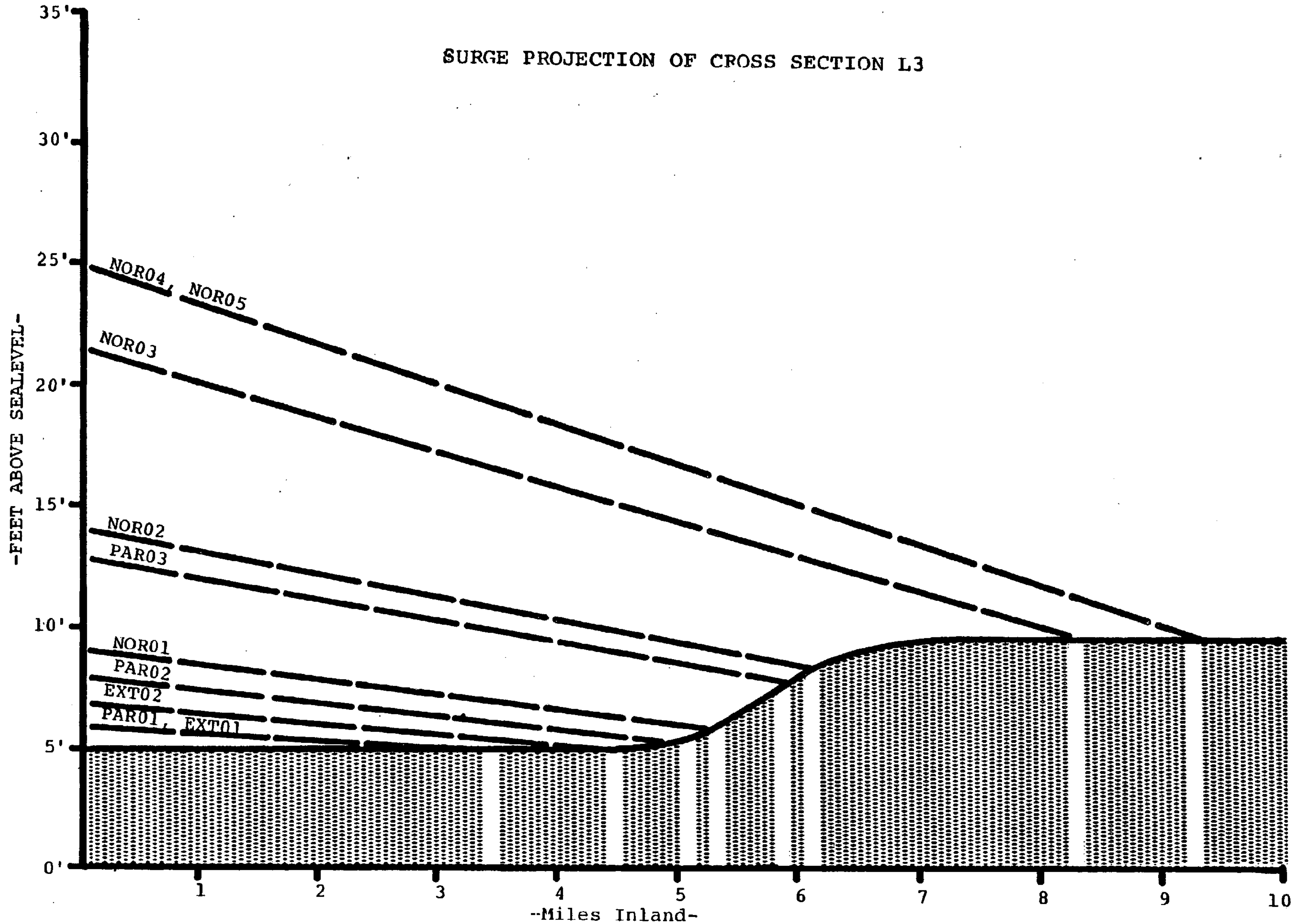


FIGURE 8

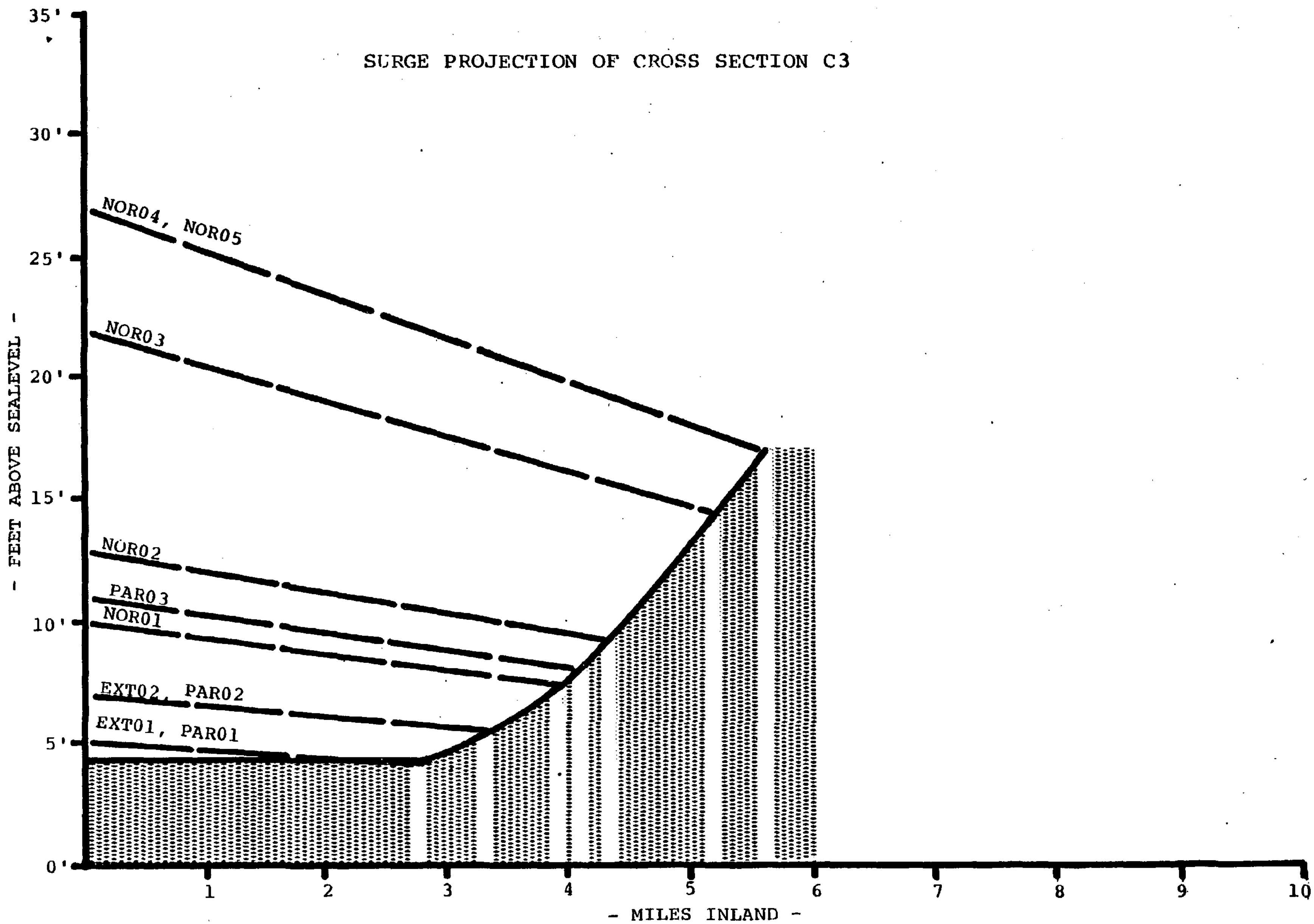
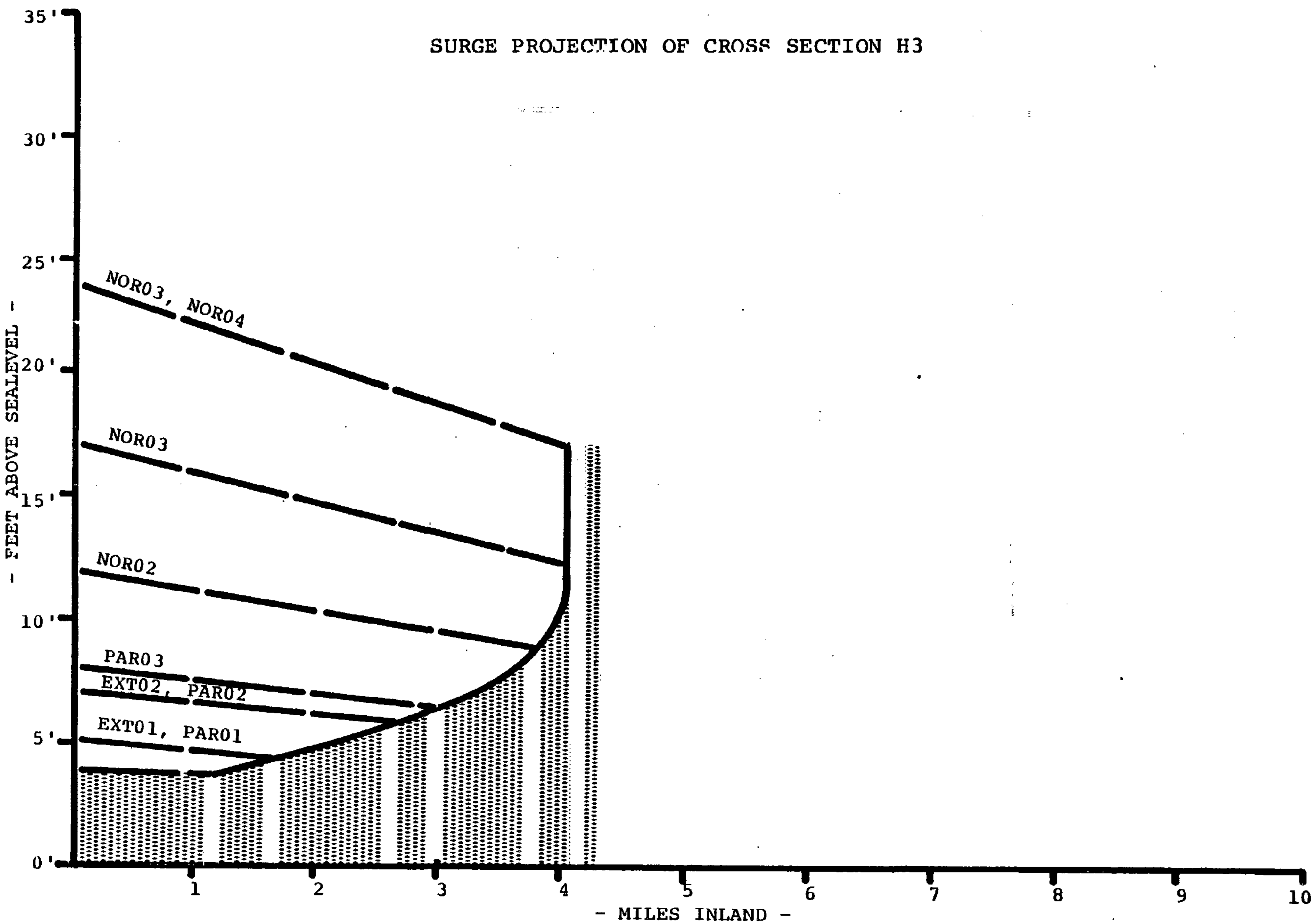

SURGE PROJECTION OF CROSS SECTION C3
35'
30'
25'
20'
15'
10'
5'
0'
- FEET ABOVE SEALEVEL -
NOR04, NOR05
NOR03
NOR02
PAR03
NOR01
EXT02, PAR02
EXT01, PAR01
1
2
3
4
5
6
7
8
9
10
- MILES INLAND -

FIGURE 9

SURGE PROJECTION OF CROSS SECTION H3



Storm Type	Storm Intensity Category	Vulnerability Level
Exiting	1	A
Exiting	2	A
Paralleling	1	A
Paralleling	2	A
Paralleling	3	A
Paralleling	4	A
Normal	1	A
Normal	2	A
Normal	3	B
Normal	4	B
Normal	5	B

Vulnerability levels are inclusive meaning that vulnerability Level B includes all storm types and intensities in Vulnerability A. Map 4 displays the extent to which the surge travels inland along the coast of the Withlacoochee region for Vulnerability Levels A and B.

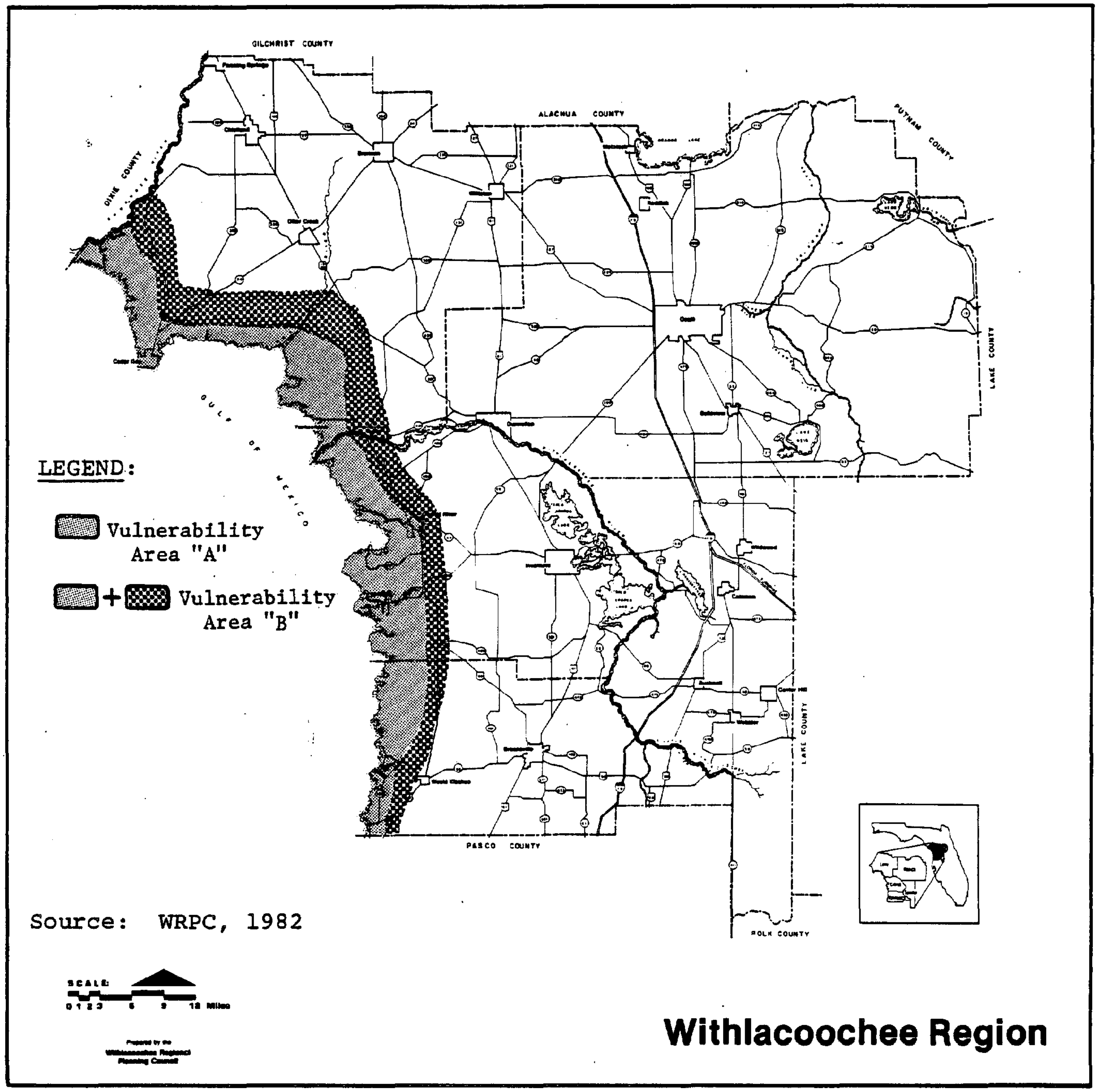
Population Data

Three types of population data are needed for each vulnerability level: the number of evacuees or population-at-risk, the number of vehicles used during evacuation and the number of evacuees requiring public shelter. This is accomplished in the following manner.

To obtain the population-at-risk due to storm surge, the surge-vulnerable areas were overlaid on maps showing sections, townships and ranges; the surge-vulnerable areas were rounded out to the nearest section. Next, the number of housing units for each section in the surge-vulnerable areas were obtained from the property appraiser's offices of each of the coastal counties. The following multipliers, obtained from the 1980 U.S. Census, were then applied to the number of housing units in each surge-vulnerable area in each county to derive the population-at-risk for each vulnerability level: 2.7 persons per household in Levy County; 2.3, Citrus County; and 2.4, Hernando County.

MAP 4

AREAS VULNERABLE
TO HURRICANE SURGE



The population-at-risk due to hurricane force winds are mobile home residents in the Withlacoochee region. The additional number of mobile home evacuees outside the areas vulnerable to storm surge is determined by subtracting the number of mobile home residents in each area vulnerable to storm surge from the total regional mobile home population obtained from the 1980 U.S. Census.

To derive the number of vehicles used during evacuation, the average number of vehicles per household[1/], obtained from a survey of hurricane response behavior in the Withlacoochee region,[2/] is applied to the number of housing units subject to storm surge or hurricane force winds for each vulnerability level.

Finally, to derive the number of persons requiring public shelter, the percentage of persons desiring public shelter in the event of a hurricane evacuation[3/], based, in part, on the behavioral survey, is applied to the total population-at-risk.

The following is a summary of the population data by vulnerability level[4/,5/]

Vulnerability Level	Population At Risk	Number of Vehicles	Number of Persons Requiring Shelter
A	98,923	48,421	39,984
B	110,649	53,697	43,573

The reason for the large population-at-risk is that a large part of the regional population reside in mobile homes.

In order to model the evacuation of the persons vulnerable to hurricane hazards in the Withlacoochee region to safe shelter locations, the above data will be separated into evacuation zones. This is addressed in the next chapter.

1/ See Appendix D for the method used in deriving these figures.

2/ See Appendix B for a summary of the behavioral survey conducted in the Withlacoochee region.

3/ See Appendices B and D.

4/ Appendices C and E list the numbers of housing units and elderly/disabled persons by vulnerability level for both hurricane hazards, respectively.

5/ In addition to public shelters, friends and relatives and hotels/motels were also assumed to be shelter destinations; see Appendices B and F.

CHAPTER III

EVACUATION ZONES AND SCENARIOS

The purpose of this chapter is threefold. First, to designate the principal evacuation routes to be used in the Withlacoochee region. Second, to delineate the region into evacuation zones which, in part, are based on the regional evacuation network; and to separate the population data developed in Chapter III, Vulnerability Analysis, by evacuation zone. Third, to designate evacuation scenarios which consist of groups of evacuation zones and other areas.

Designation of Evacuation Routes

Route Identification

The principal roadways used as evacuation routes were designated on the basis of providing eastward access from coastal areas and to provide the major arterial roads for inter- and intra-county evacuation. These routes form the basis for the route network used in modeling the evacuation times, as described in Chapter V. Route segments susceptible to freshwater flooding were also taken into consideration and are identified in the next section.

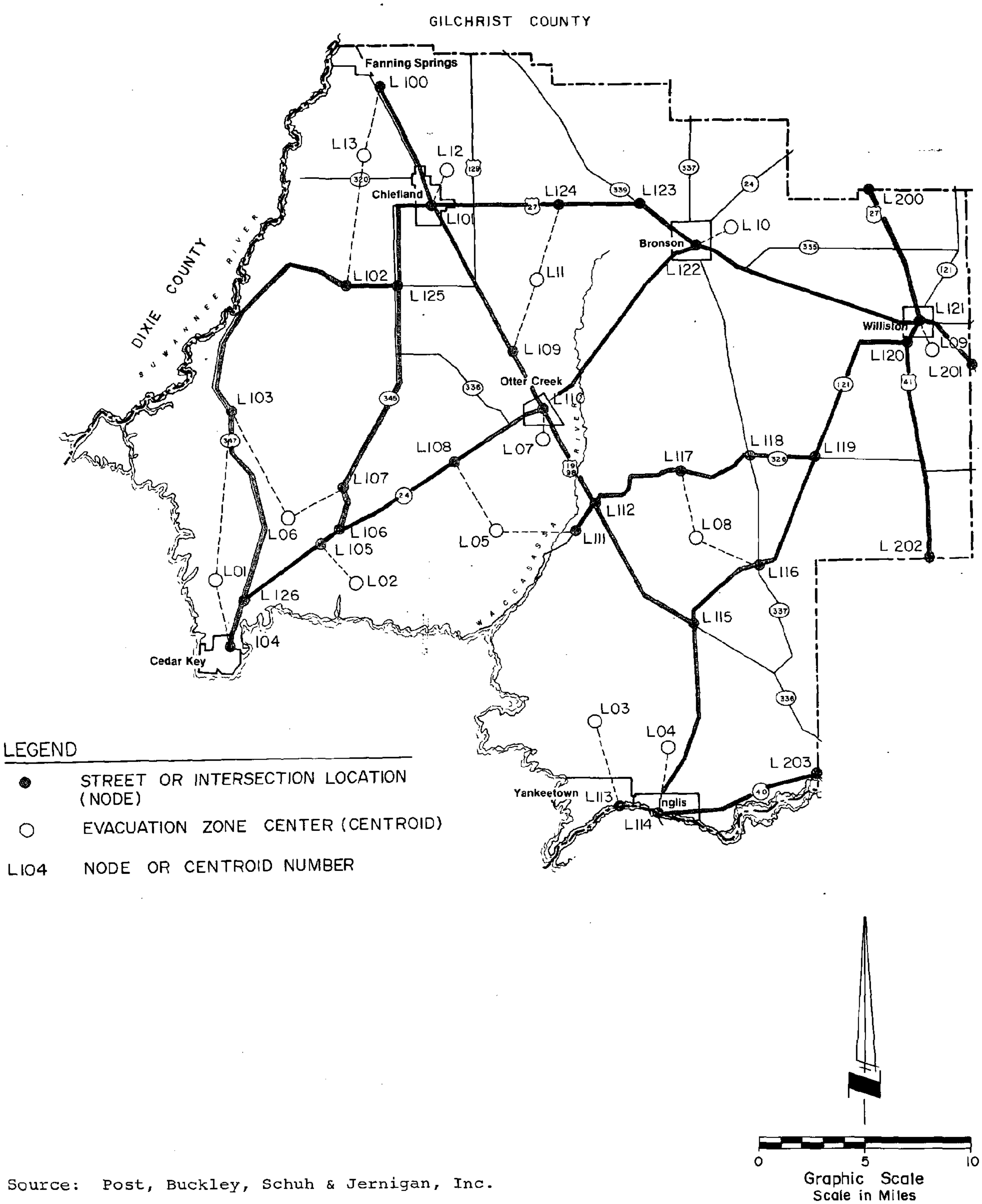
Two types of routes are designated. These are intra-regional and interregional evacuation routes. Intraregional evacuation routes refer to those routes which will be used predominantly by evacuees within the region, with shelter destinations primarily in their respective counties. Inter-regional evacuation routes refer to those routes which will be used primarily by intraregional evacuees with evacuation destinations outside their respective counties and/or the Withlacoochee region; and by evacuees outside the Withlacoochee region, such as Tampa Bay evacuees, with shelter destinations within or outside the Withlacoochee region.

These routes are displayed in maps 5 to 9 for each of the counties in the Withlacoochee region. These routes were designated as part of the transportation model of a hurricane evacuation in the Withlacoochee region (see Appendix I).[1/] Detailed evacuation network maps and roadway capacity information are presented in Appendix I.

[1/]The transportation model was developed by the consulting firm of Post, Buckley, Schuh & Jernigan. Portions of their report are included in Appendix I.

MAP 5

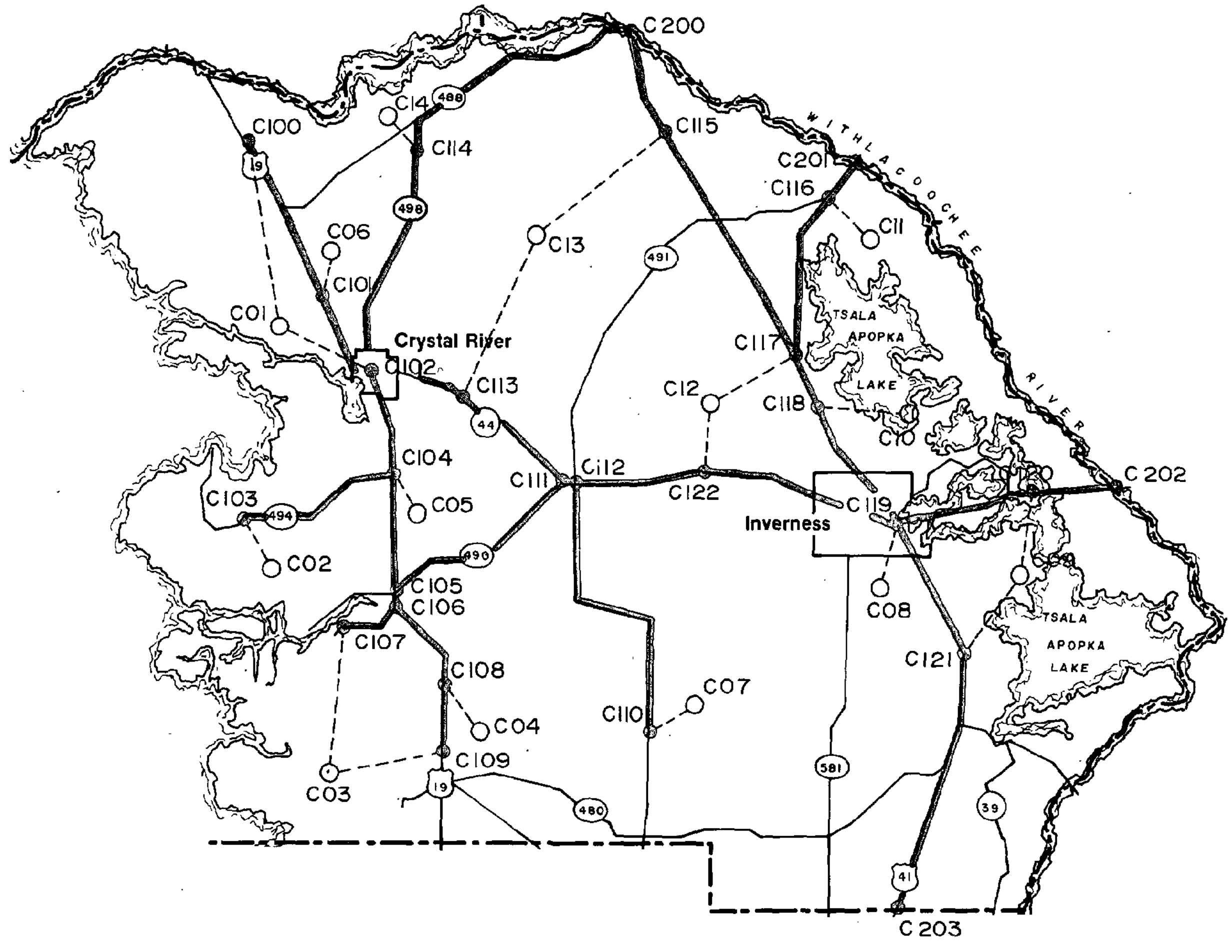
EVACUATION NETWORK - LEVY COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

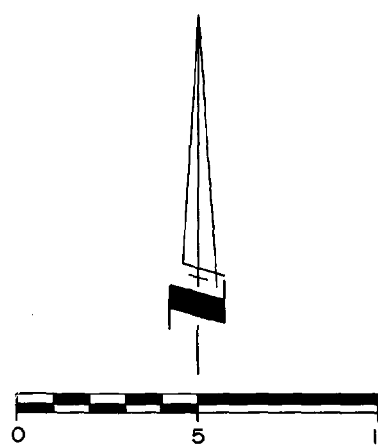
MAP 6

EVACUATION NETWORK - CITRUS COUNTY



LEGEND

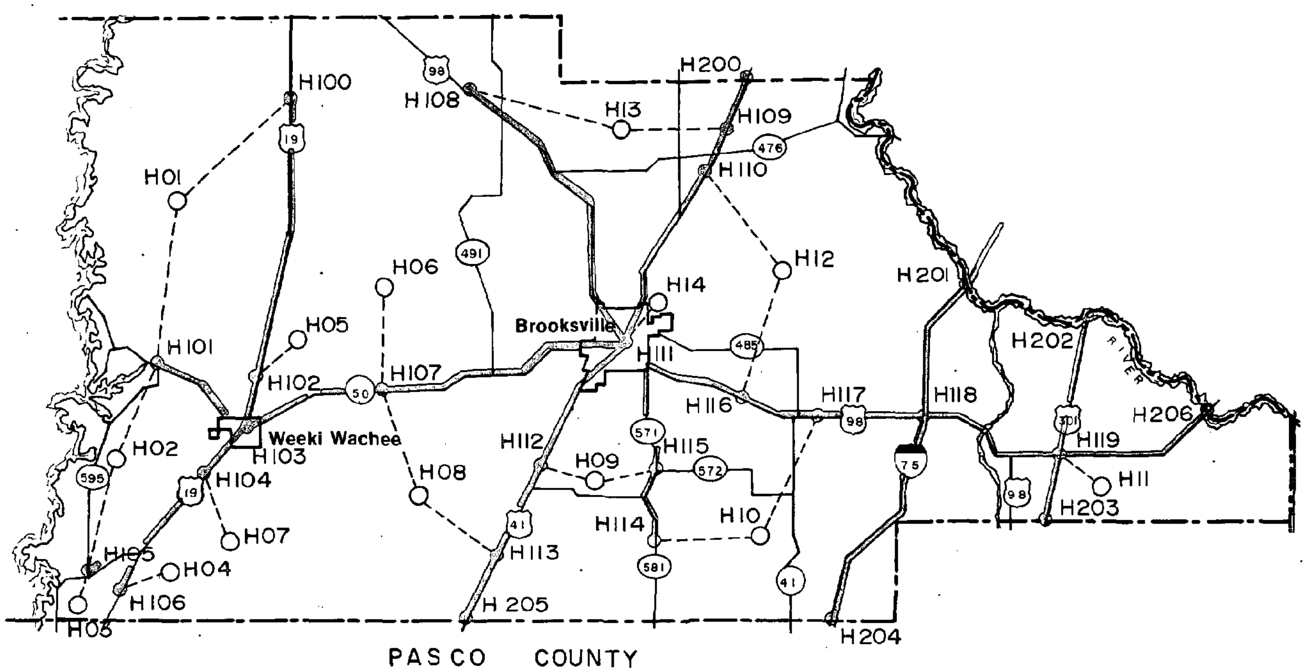
●	STREET OR INTERSECTION LOCATION (NODE)
○	EVACUATION ZONE CENTER (CENTROID)
C 102	NODE OR CENTROID NUMBER



Source: Post, Buckley, Schuh & Jernigan, Inc.

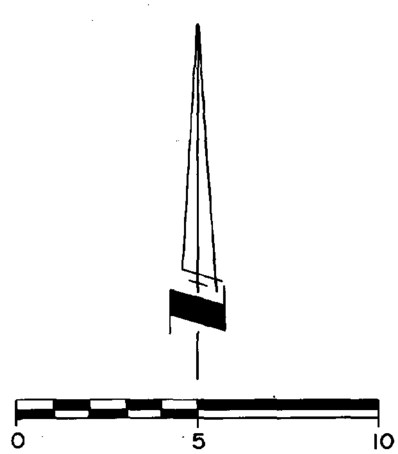
MAP 7

EVACUATION NETWORK - HERNANDO COUNTY



LEGEND

◎	STREET OR INTERSECTION LOCATION (NODE)
○	EVACUATION ZONE CENTER (CENTROID)
H114	NODE OR CENTROID NUMBER

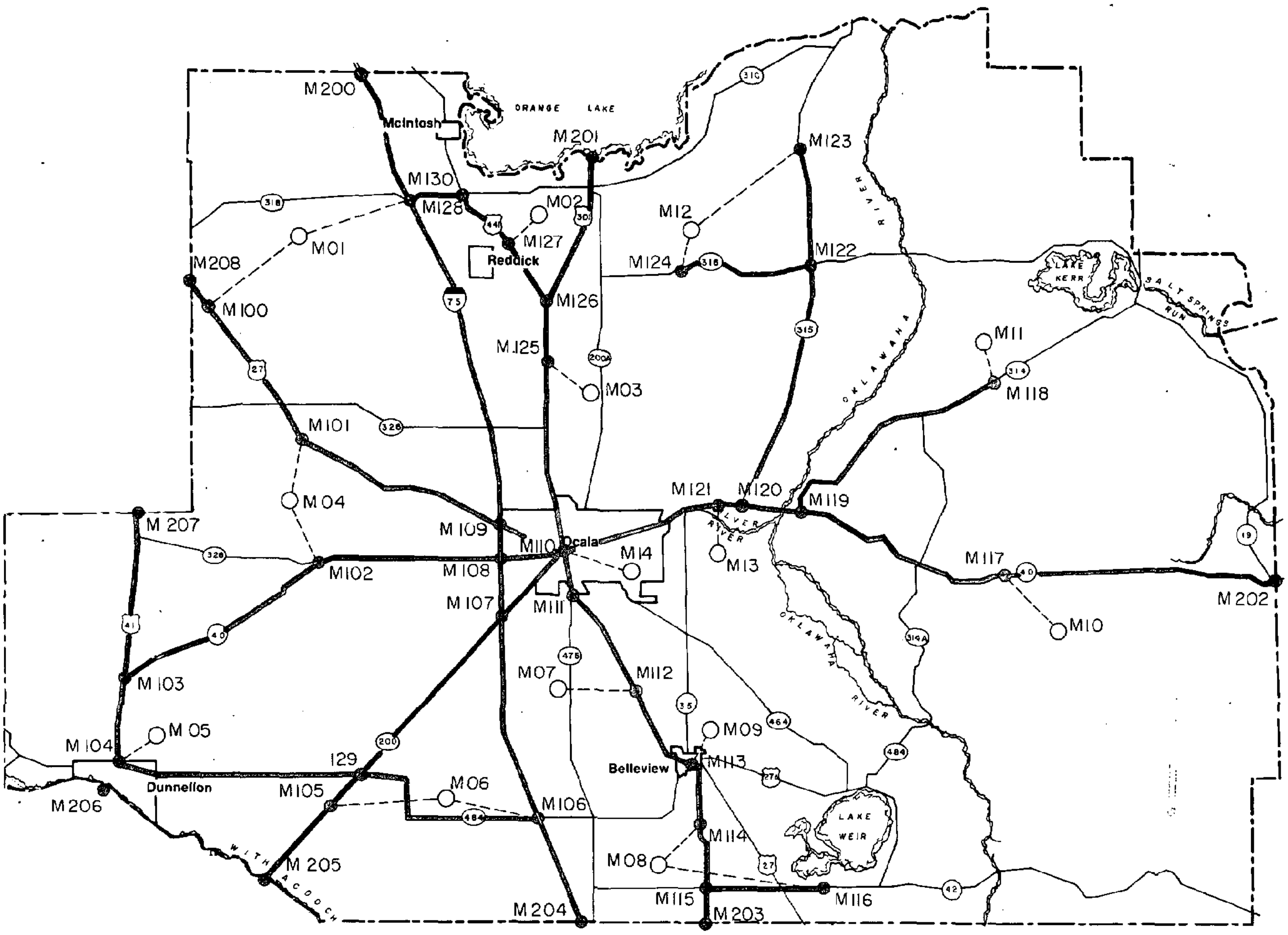


Graphic Scale
Scale In Miles

Source: Post, Buckley, Schuh & Jernigan, Inc.

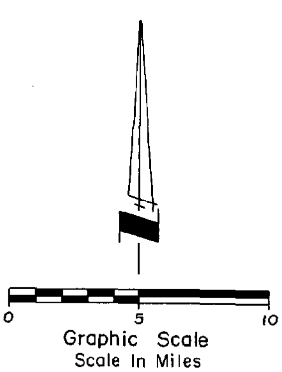
MAP 8

EVACUATION NETWORK - MARION COUNTY



LEGEND

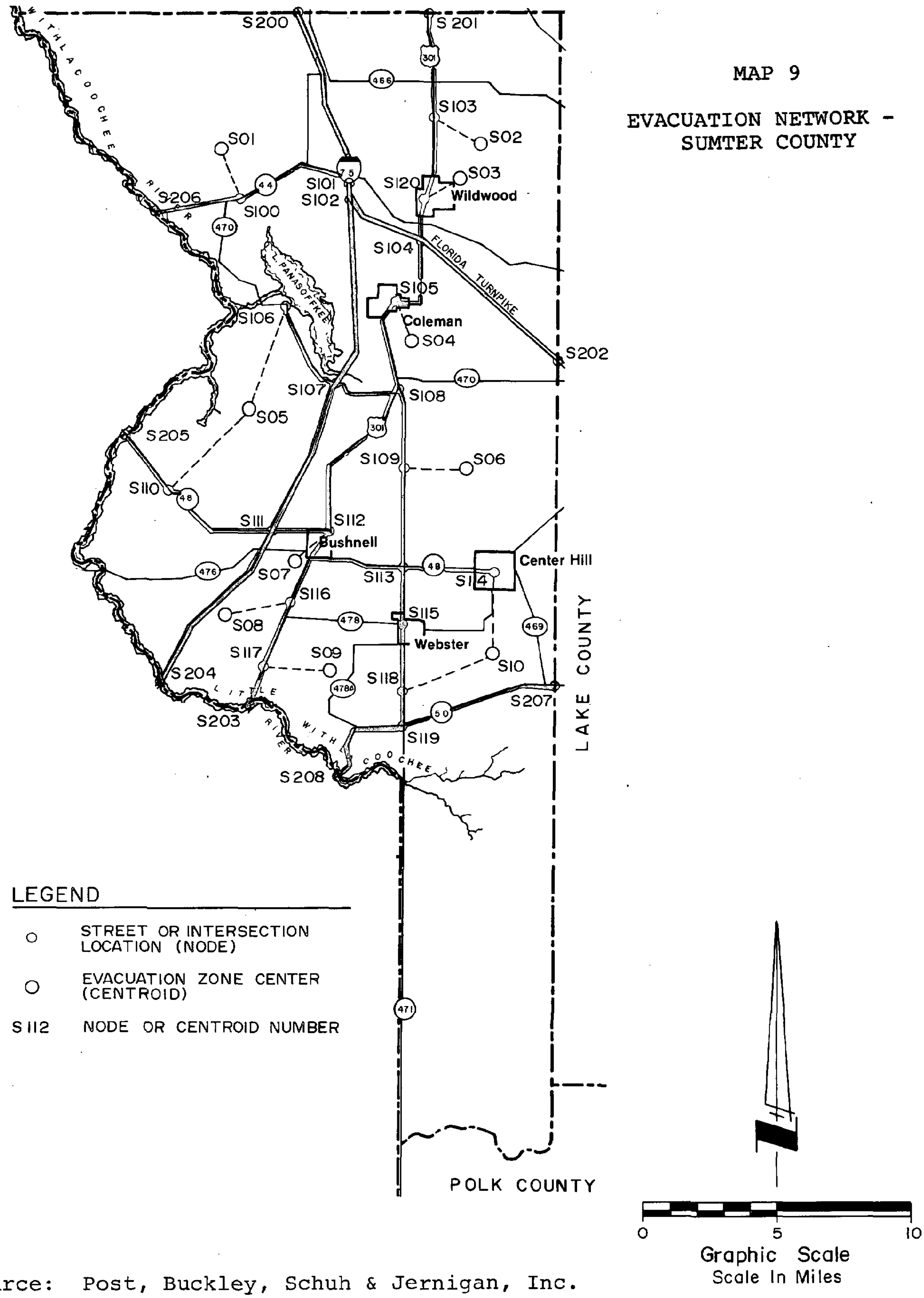
●	STREET OR INTERSECTION LOCATION (NODE)
○	EVACUATION ZONE CENTER (CENTROID)
M 113	NODE OR CENTROID NUMBER



Source: Post, Buckley, Schuh & Jernigan, Inc.

MAP 9

EVACUATION NETWORK - SUMTER COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

Freshwater Flooding Analysis

The purpose of the freshwater flooding analysis is to delineate segments of evacuation routes which may be susceptible to freshwater flooding. As stated in the hazard analysis, 6 to 12 inches of rain can be expected to accompany a hurricane. Such rainfall may inundate portions of roadways and thereby impede the evacuation process.

For purposes of this analysis, it is assumed that a hurricane will generate enough rainfall to cause a 100-year flooding event. Flood Hazard Boundary Maps produced by the Federal Emergency Management Agency, which delineate 100-year flood hazard areas, are used to determine segments of evacuation routes subject to freshwater flooding. Table 6 and Maps 10 to 14 display these segments for each of the counties in the Withlacoochee region.

It should be noted that some evacuation routes which contain segments susceptible to freshwater flooding will have to be used because there are no alternatives. But, as was indicated in the hazard analysis, completion of the evacuation before the onset of gale force winds (pre-landfall hazard time) should mitigate the impacts of the rainfall hazard. In addition, knowledge of the locations of these segments can assist in the allocation of traffic management personnel during the evacuation so as to warn motorists of the potentiality of flooded segments and/or divert traffic on other routes.

Delineation of Evacuation Zones

Delineation of the Withlacoochee region into evacuation zones achieves two purposes. First, evacuation zones divide the areas vulnerable to hurricane hazards into zones which correspond more closely with the evacuation network. Second, division of the region into evacuation zones provides a means of modeling evacuation traffic and thereby enables the calculation of evacuation time.

The criteria used to designate the zones were principally twofold. First, the boundaries chosen for the areas vulnerable to storm surge flooding roughly correspond to surge vulnerability levels. Second, for zones outside the surge vulnerable areas, state and local roads and other easily identifiable geographic boundaries were chosen for purposes of disseminating zonal information to the general public.

TABLE 6

ROUTE SEGMENTS SUBJECT TO FRESHWATER FLOODING
Levy County

Route	Segment Subject to Freshwater Flooding
SR 24	Sec. 30, T15S, R13E to Sec. 24, T12S, R16E*
US 19	Sec. 23, T13S, R15E to Sec. 3, T13S, R15E; Sec. 7, T12S, R15E
SR 500	Sec. 12, T12S, R16E to Sec. 4, T12S, R16E
C326	Sec. 36, T14S, R15E to Sec. 15, T14S, R16E Sec. 12, T14S, R18E to Sec. 7, T14S, R19E
C40	Sec. 14, T17S, R15E to Sec. 6, T17S, R17E

Citrus County

Route	Segment Subject to Freshwater Flooding
C44	Sec. 16, T18S, R16E to Sec. 27, T18S, R17E*
SR 44	Sec. 22, T18S, R17E to Sec. 25, T18S, R17E*
C494	Sec. 20, T19S, R16E to Sec. 3, T19S, R17E*
C490	Sec. 31, T19S, R16E to Sec. 23, T19S, R17E*
C480	Sec. 26, T20S, R17E to Sec. 30, T20S, R18E*
C491	Sec. 35, T17S, R19E to Sec. 36, T20S, R19E
SR 200	Sec. 30, T17S, R20E to Sec. 35, T17S, R19E Sec. 2, T18S, R20E to Sec. 11, T18S, R19E
US 41	Sec. 35, T16S, R18E
SR 44	Sec. 17, T19S, R20E to Sec. 9, T19S, R21E
SR 48	Sec. 14, T20S, R20E to Sec. 30, T20S, R21E

*Subject to surge and freshwater flooding.

TABLE 6 (Cont.)

Hernando County

Route	Segment Subject to Freshwater Flooding
SR 50	Sec. 25, T22S, R16E to Sec. 34, T22S, R17E
US 301	Sec. 14, T23S, R21E to Sec. 13, T22S, R21E
C-495	Sec. 35, T23S, R16E to Sec. 20, T22S, R17E
US I-75	Sec. 16, T22S, R21E

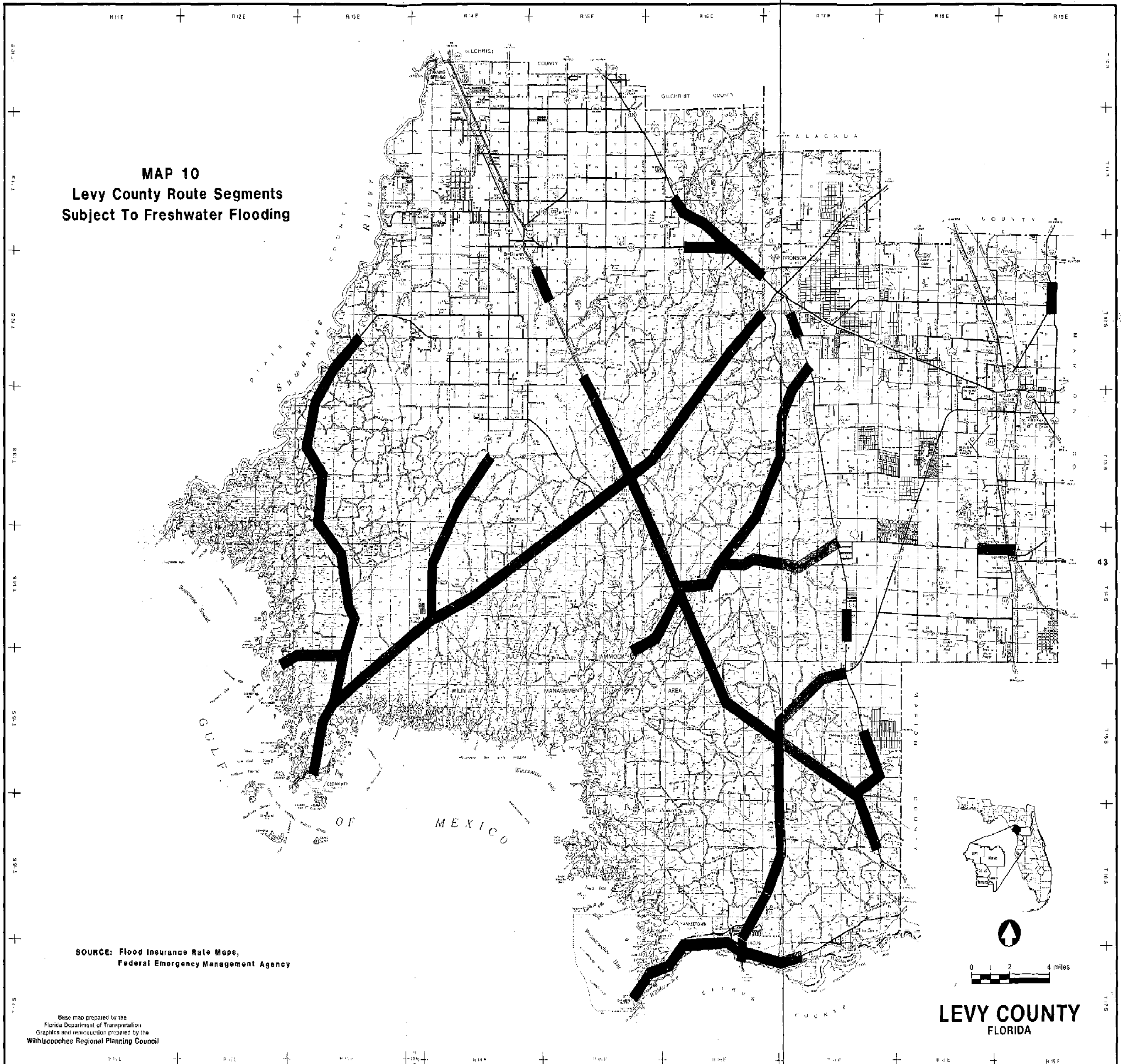
Marion County

Route	Segment Subject to Freshwater Flooding
US 41	Sec. 1, T15S, R18E to Sec. 12, T15S, R18E, Sec. 24, T15S, R18E
US 27	Sec. 22, T13S, R19E to Sec. 25, T13S, R19E
SR 200	Sec. 3, T17S, R20E to Sec. 30, T17S, R20E
SR 40	Sec. 30, T16S, R18E Sec. 3, T15S, R23E Sec. 8, T15S, R24E to Sec. 20, T15S, R25E
US 27A	Sec. 5, T17S, R24E to Sec. 9, T17S, R24E

Sumter County

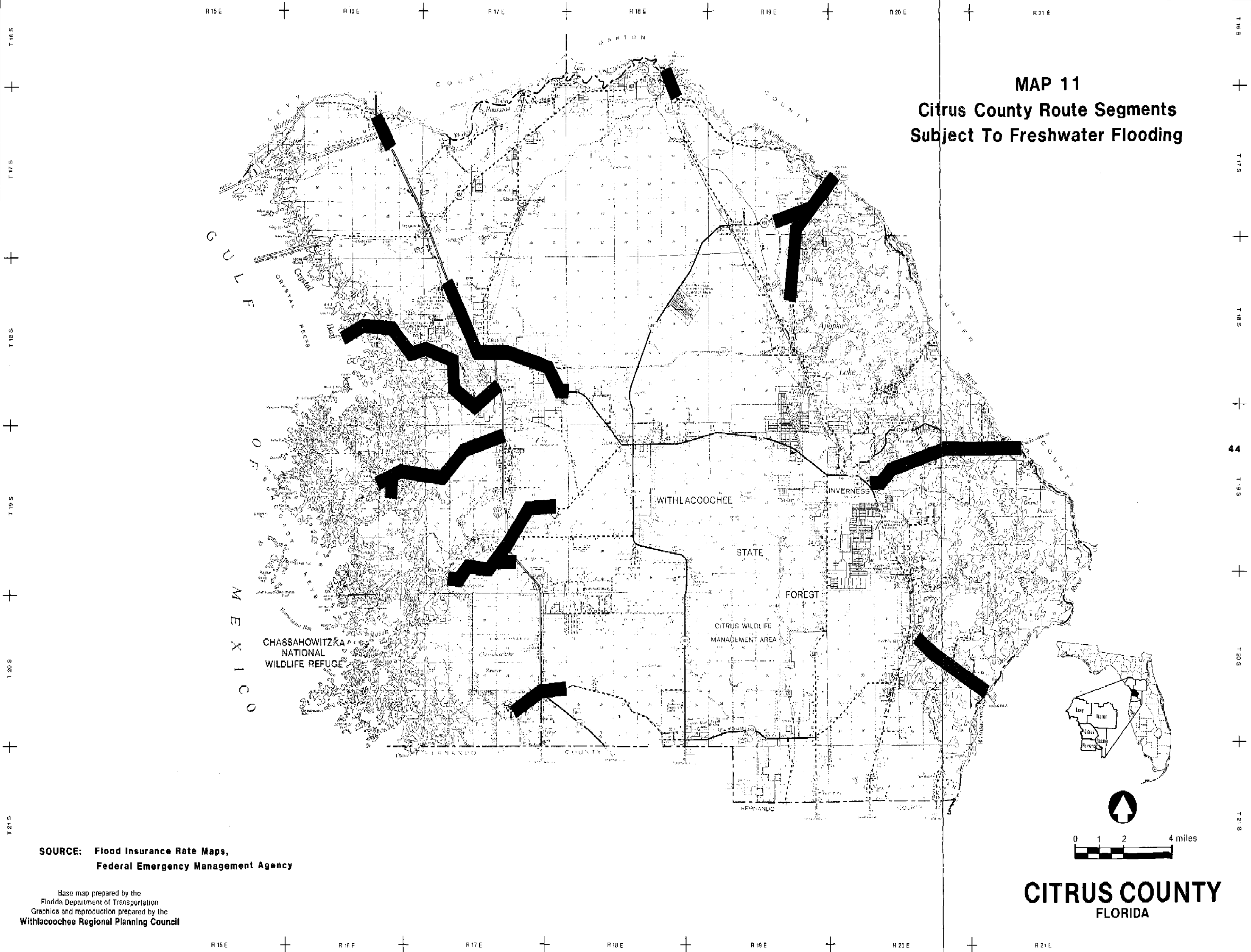
Route	Segment Subject to Freshwater Flooding
US I-75	Sec. 5, T21S, R22E to Sec. 26, T20S, R22E Sec. 12, T20S, R22E Sec 4-5, T18S, R22E
US 301	Sec. 6, T22S, R22E to Sec. 21, T21S, R22E Sec. 3, T21S, R22E Sec. 19, T19S, R23E Sec. 7, T19S, R23E
SR 50	Sec. 23, T22S, R22E to Sec. 19, T22S, R23E Sec. 15, T22S, R23E to Sec. 13, T22S, R23E

Source: Flood Hazard Boundary Maps, Federal Emergency Management Agency.



MAP 10
Levy County Route Segments
Subject To Freshwater Flooding

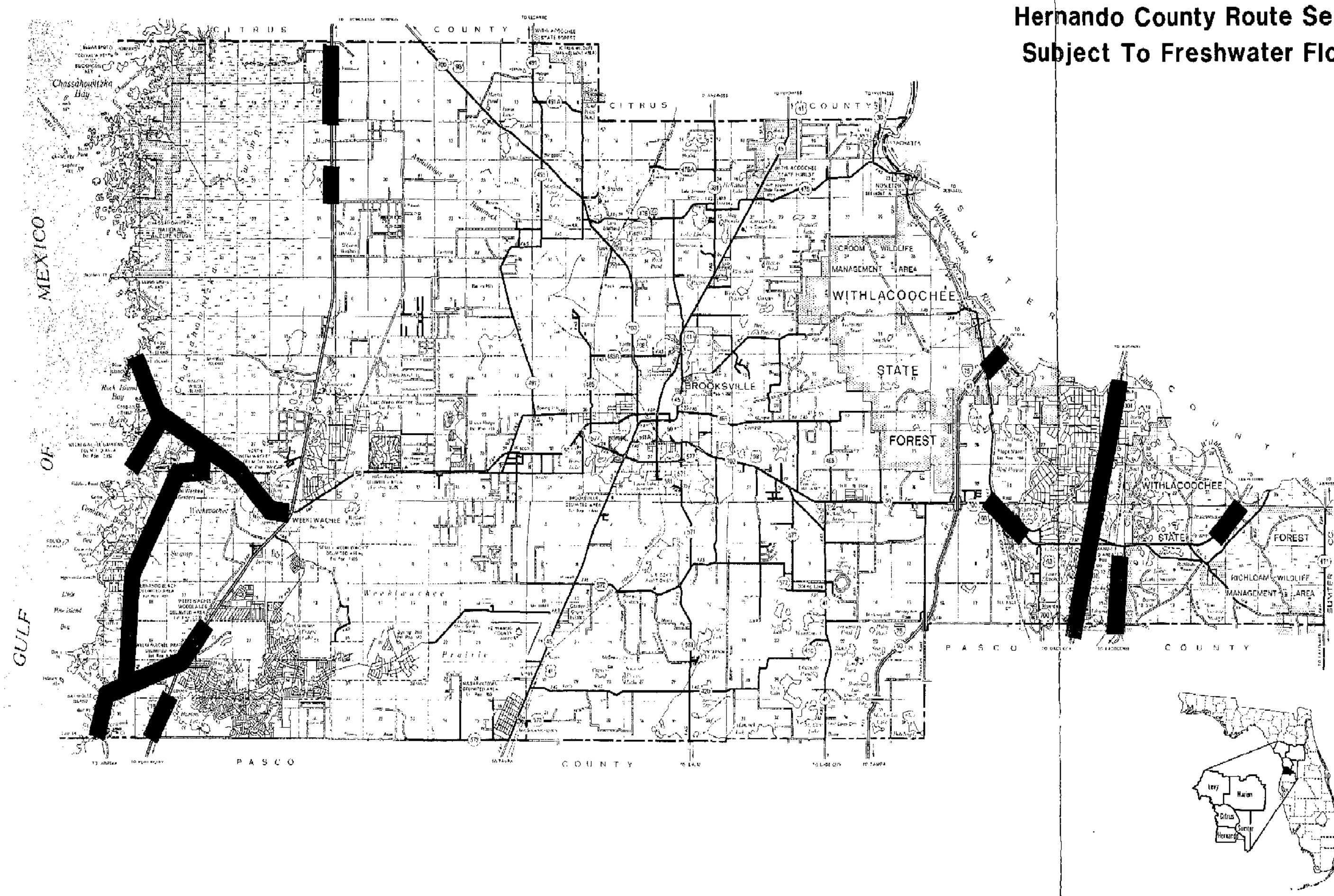
MAP 11
Citrus County Route Segments Subject To Freshwater Flooding



SOURCE: Flood Insurance Rate Maps, Federal Emergency Management Agency

Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the **Withlacoochee Regional Planning Council**

MAP 12
Hernando County Route Segments Subject To Freshwater Flooding

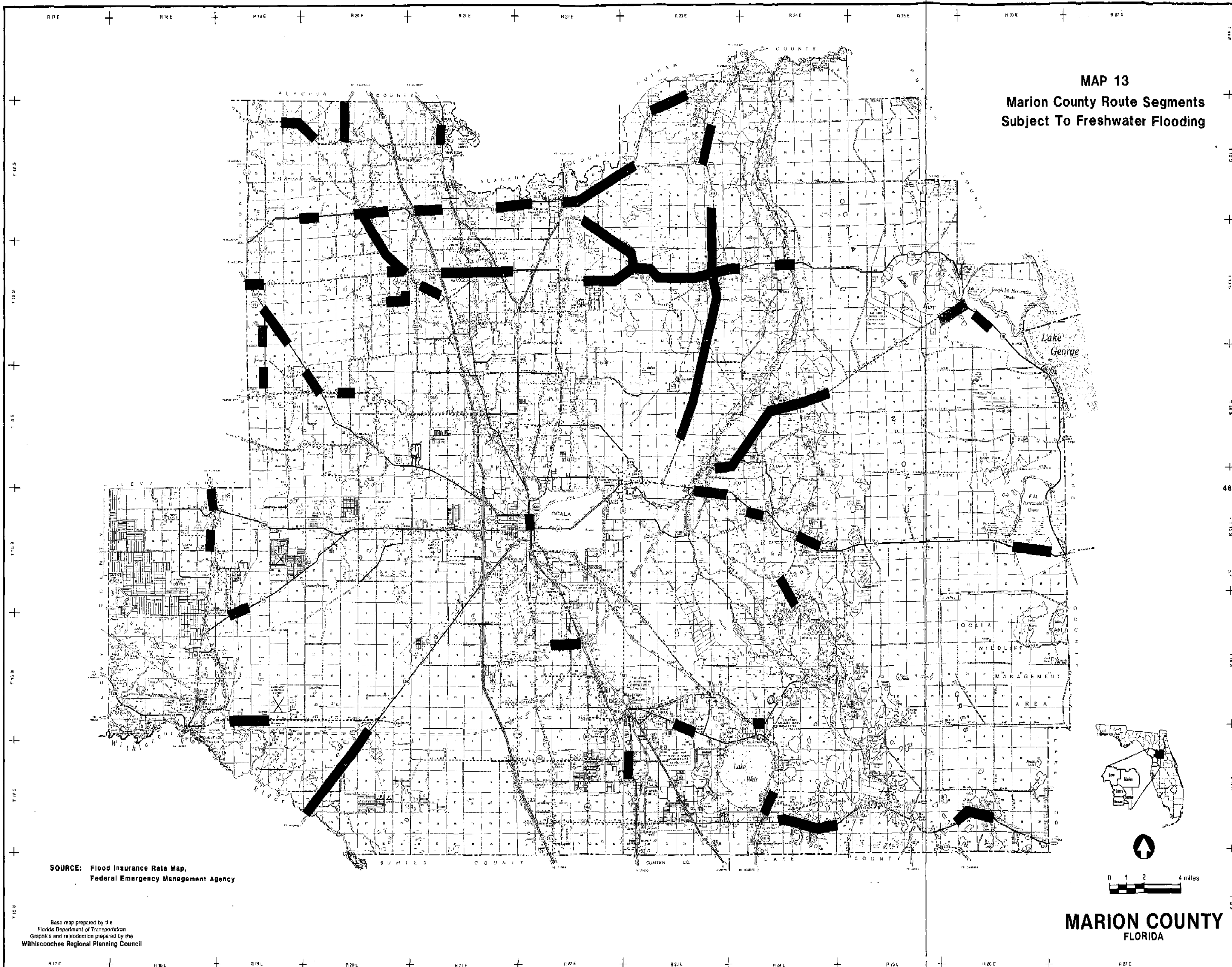


SOURCE: Flood Insurance Rate Maps, Federal Emergency Management Agency

Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the
Withlacoochee Regional Planning Council

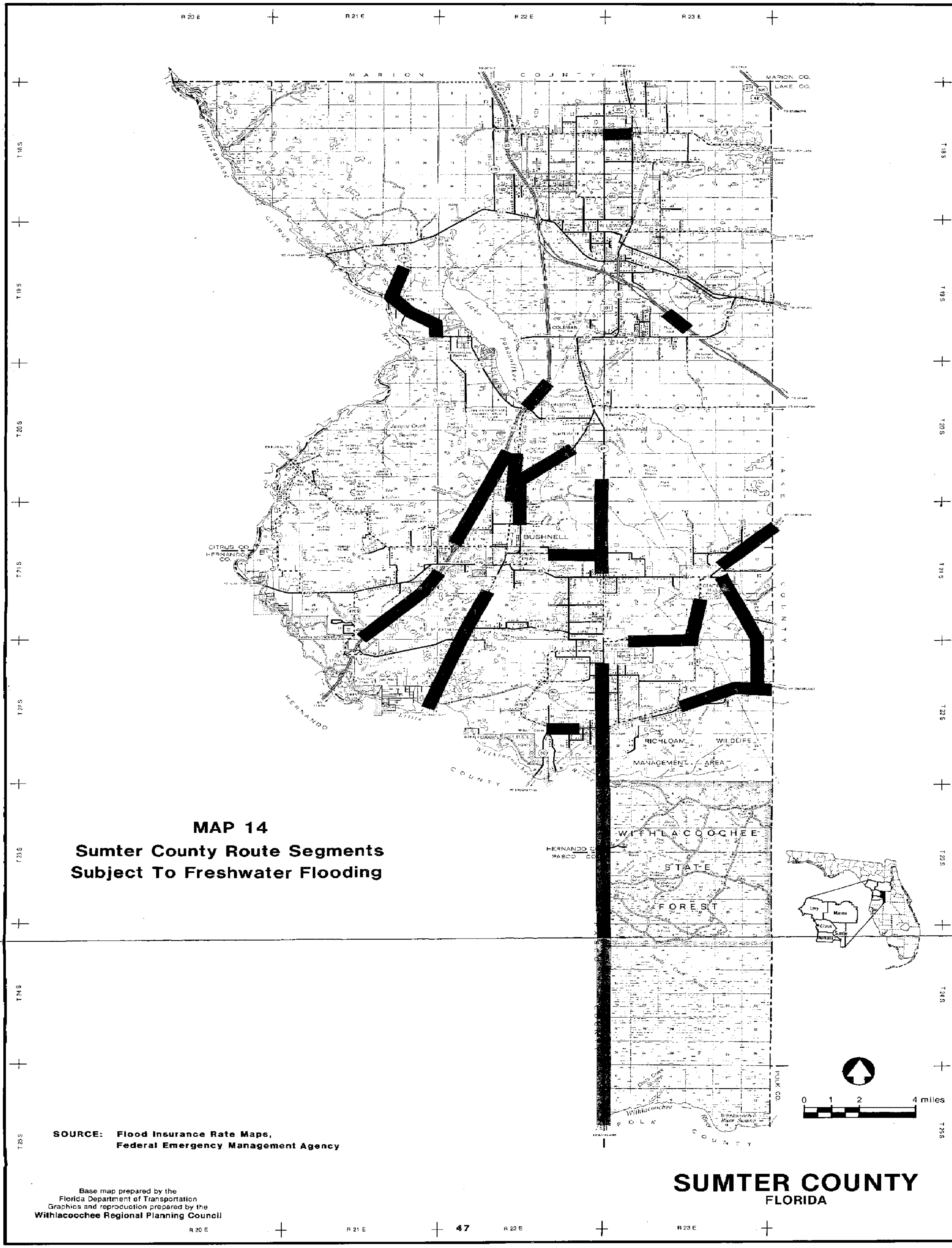
HERNANDO COUNTY
FLORIDA

MAP 13
Marion County Route Segments Subject To Freshwater Flooding



SOURCE: Flood Insurance Rate Map, Federal Emergency Management Agency

Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the
Withlacoochee Regional Planning Council



MAP 14
Sumter County Route Segments Subject To Freshwater Flooding

The evacuation zones for each county in the region are displayed in maps 15 to 19.[2] As can be seen, the surge evacuation zones roughly correspond to the surge-vulnerable areas identified in map 4 and are coded according to vulnerability level. The population data in these areas were compiled according to section, township and range which permitted an accurate calculation of the population-at-risk per evacuation zone. Evacuation zones outside the surge vulnerable areas consist of Census Enumeration Districts (ED's). ED boundaries are state and local roads, rivers, etc. which are easily identifiable from a local perspective. Also, the use of ED's permitted an accurate calculation of the population-at-risk (mobile home residents) within these zones. Narrative descriptions of the evacuation zones are found in Appendix I for each county. Tables 7 to 11 display the population-at-risk, stratified by evacuation destination, for each evacuation zone in each county.

Delineation of Evacuation Scenarios

County Evacuation Scenarios

County evacuation scenarios refer to the numbers of persons at risk in each county according to vulnerability level. Since it is assumed that all mobile home residents will have to evacuate regardless of storm intensity, the only counties in which county evacuation scenarios will be different are the coastal counties.

Specifically, County Evacuation Scenario A refers to the population-at-risk associated with Vulnerability Level 'A' surge flooding; and County Evacuation Scenario 'B', Level 'B' surge flooding. The difference between Scenario A and Scenario B is the number of non-mobile home residents in those evacuation zones associated with the Level 'B' surge flooding area. For example, in Levy County, according to Map 15, the non-mobile home residents in evacuation zones L4-L6 would be excluded under Scenario A, but included under Scenario B.

By cross-referencing each scenario with the types and intensities of hurricanes associated with each vulnerability level, as indicated on page 31, it is possible to determine which types and intensities of hurricanes are associated with each county scenario. Tables 7 to 9 display the population-at-risk for each coastal county evacuation scenario.

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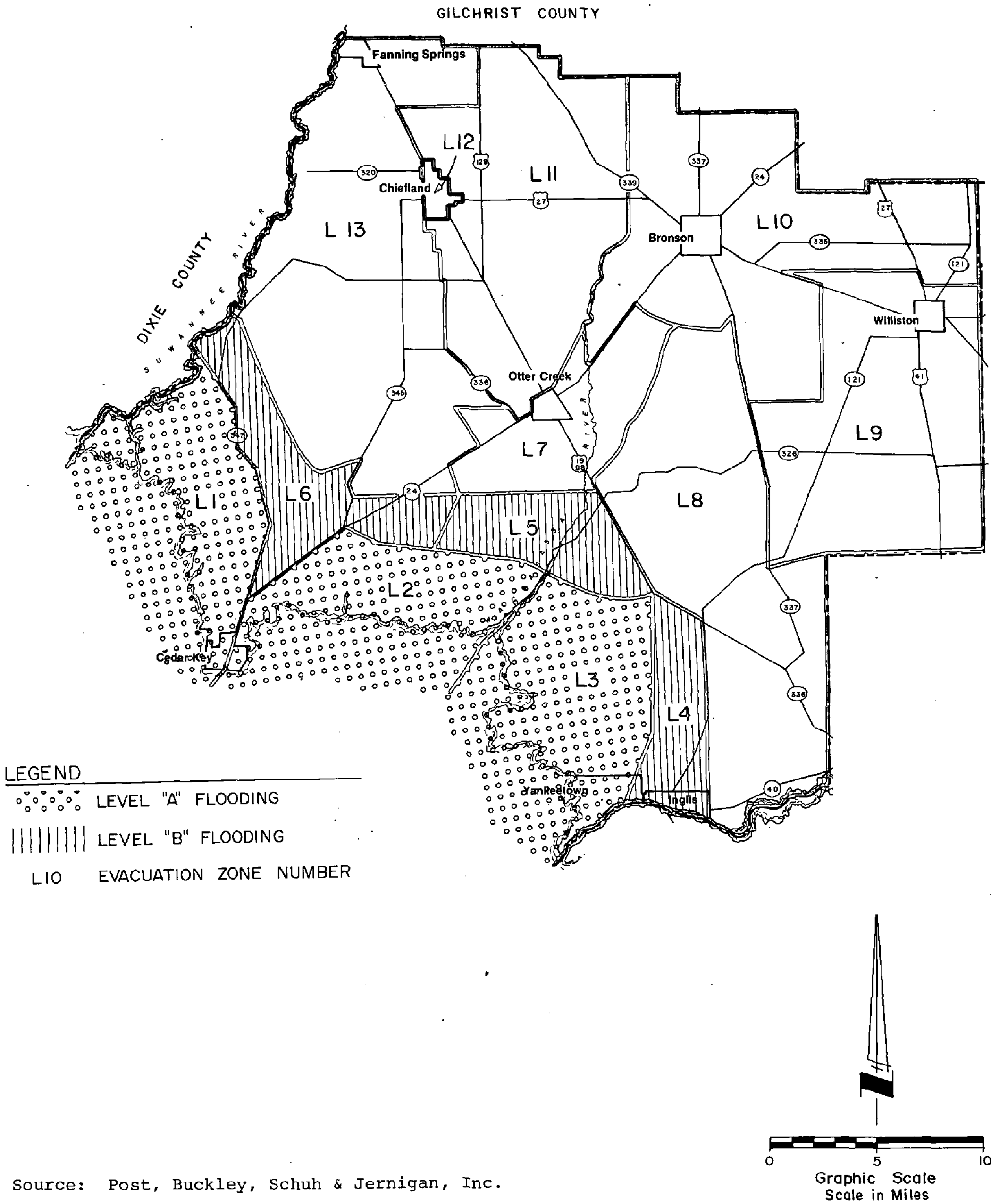
[2]/These zones were designated as part of the transportation model (see Appendix I) in consultation with the Withlacoochee Regional Planning Council and the region's Disaster Preparedness Advisory Committee.

MAP 15

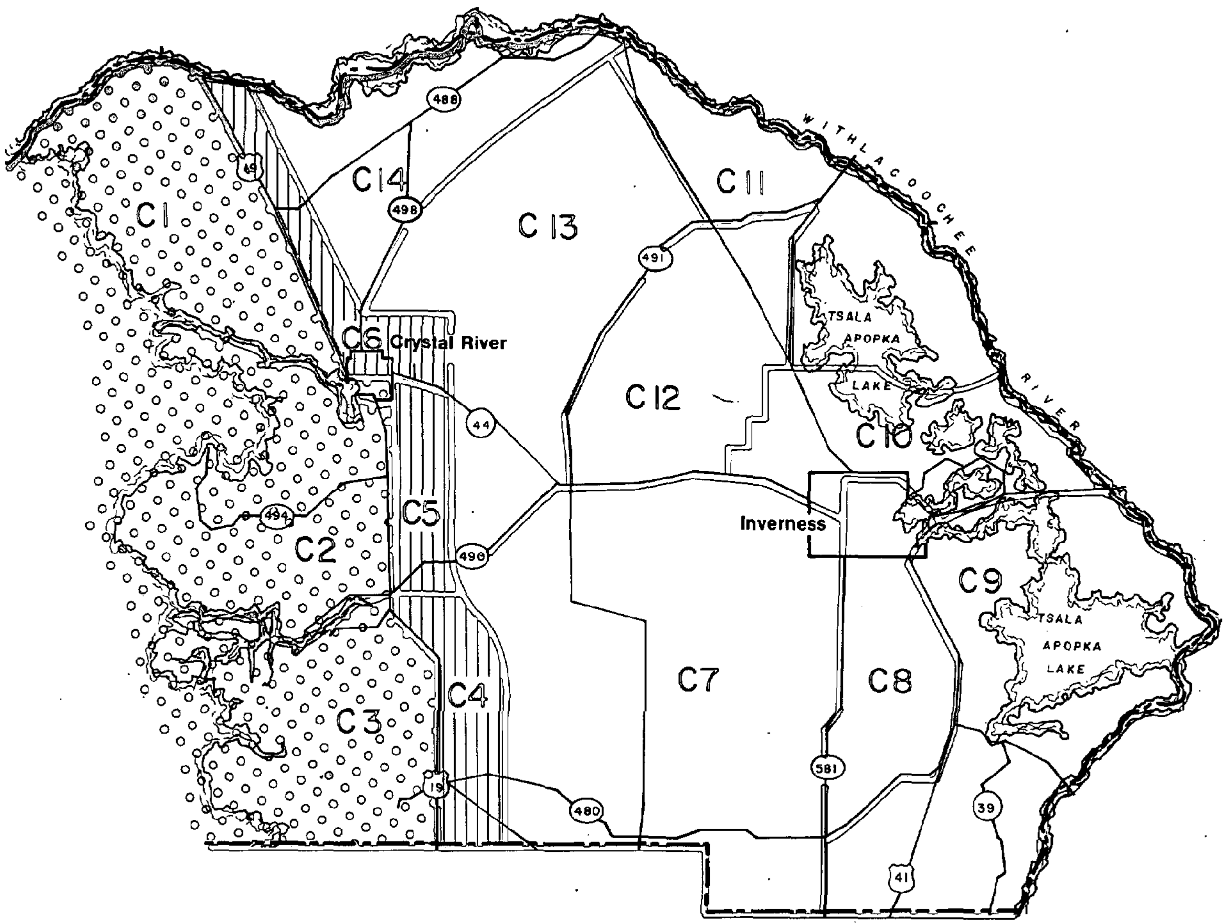
EVACUATION ZONES - LEVY COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

MAP 16

EVACUATION ZONES - CITRUS COUNTY

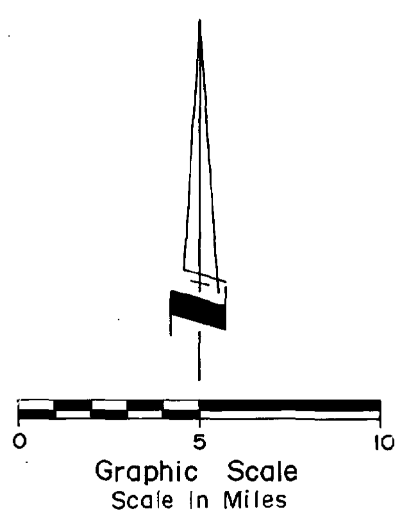


LEGEND

°°°°°° LEVEL "A" FLOODING

|||||||| LEVEL "B" FLOODING

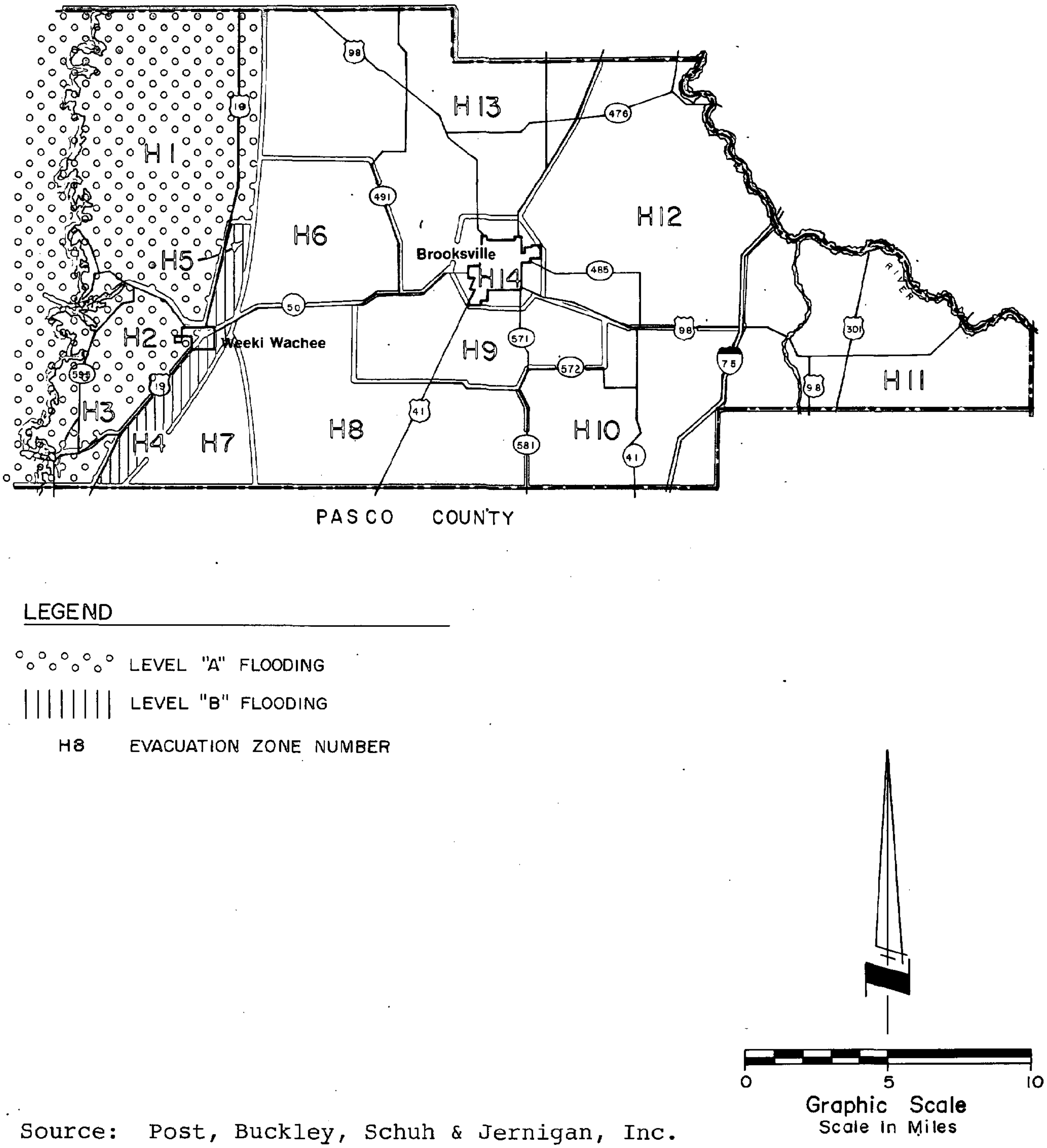
C6 EVACUATION ZONE NUMBER



Source: Post, Buckley, Schuh & Jernigan, Inc.

MAP 17

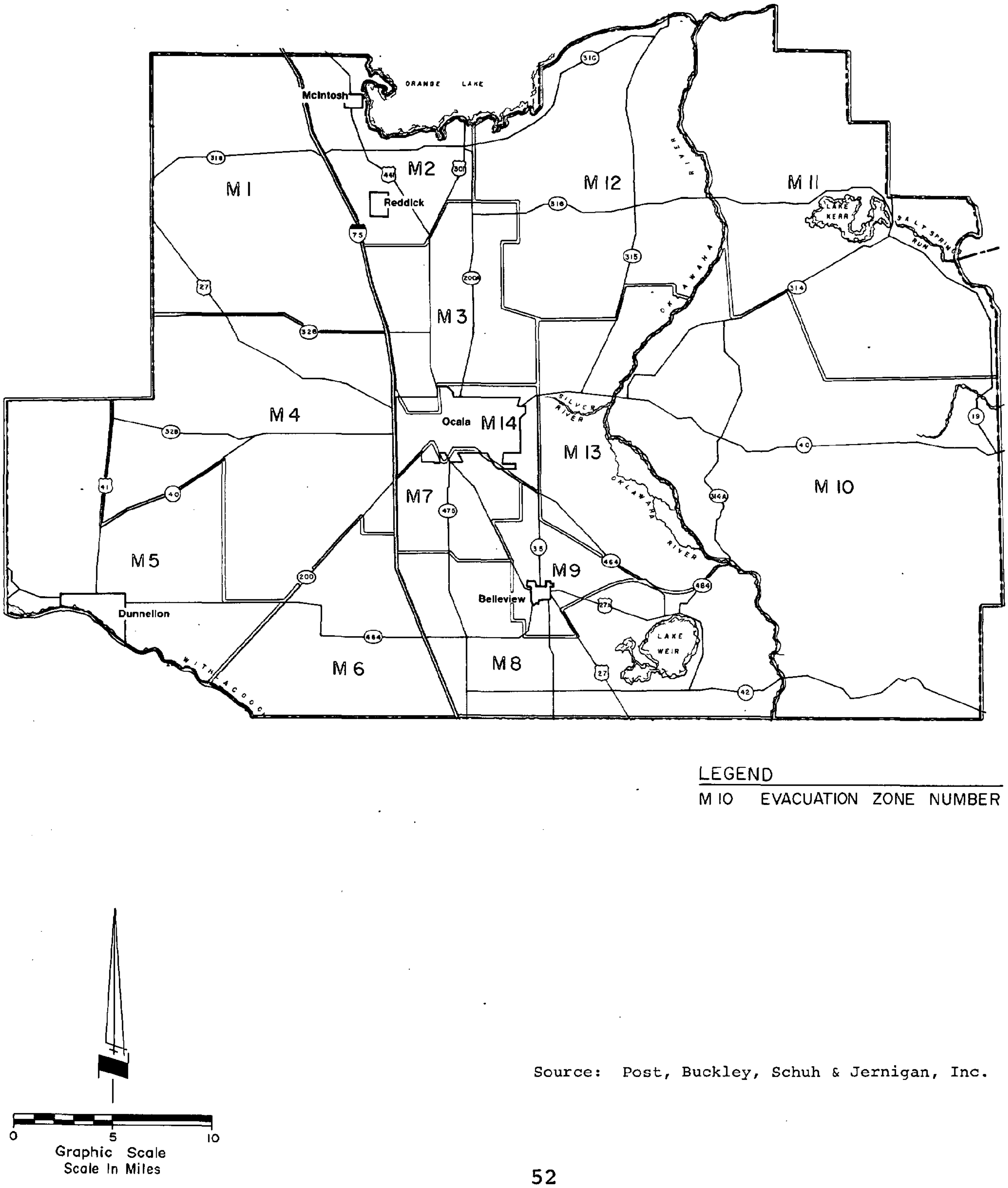
EVACUATION ZONES - HERNANDO COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

MAP 18

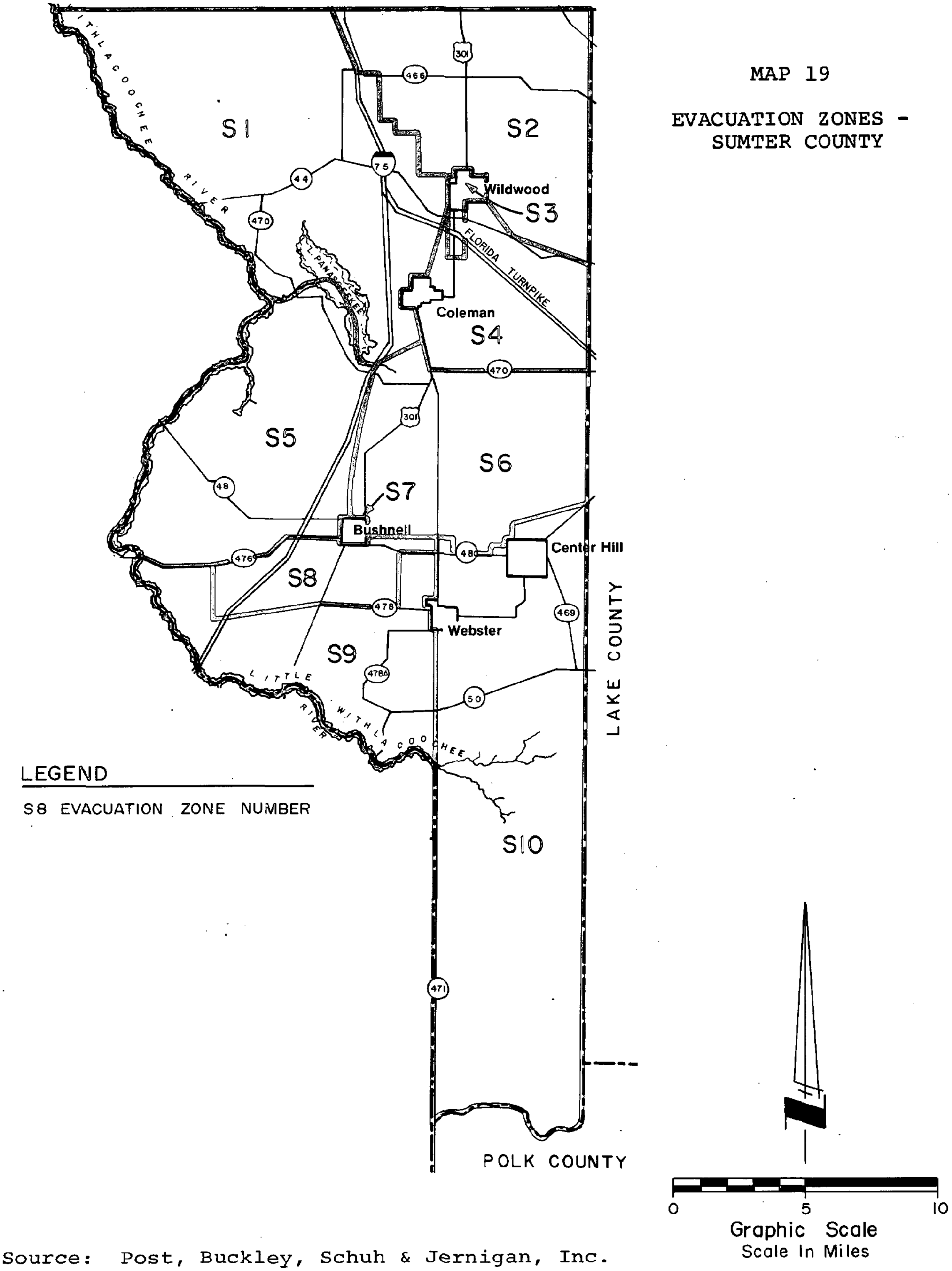
EVACUATION ZONES - MARION COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

MAP 19

EVACUATION ZONES - SUMTER COUNTY



Source: Post, Buckley, Schuh & Jernigan, Inc.

TABLE 7A

LEVY COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone # L01	2260	692	918	651	0	877	268	356	253	0
Zone # L02	113	35	46	33	0	44	13	18	13	0
Zone # L03	2341	716	950	674	0	909	278	369	262	0
Zone # L04	756	231	307	218	0	293	90	119	85	0
Zone # L05	54	17	22	16	0	21	6	9	6	0
Zone # L06	127	39	52	37	0	49	15	20	14	0
Zone # L07	124	38	50	36	0	48	15	20	14	0
Zone # L08	405	124	164	117	0	157	48	64	45	0
Zone # L09	1901	582	772	547	0	738	226	300	212	0
Zone # L10	1696	519	688	488	0	658	201	267	90	0
Zone # L11	429	131	174	124	0	167	51	68	48	0
Zone # L12	216	66	88	62	0	84	26	34	24	0
Zone # L13	1655	506	672	477	0	642	197	261	185	0
	12077	3696	4903	3480	0	4687	1434	1905	1351	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# Per Mobile Home Unit	2.7
# per Other Unit	2.7
Avg. Veh. per D.U.	1.6
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones L01, L02, L03

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 7B

LEVY COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone # L01	2260	692	918	651	0	877	268	356	253	0
Zone # L02	113	35	46	33	0	44	13	18	13	0
Zone # L03	2341	716	950	674	0	909	278	369	262	0
Zone # L04	2371	725	962	683	0	920	282	374	265	0
Zone # L05	130	40	53	37	0	50	15	20	14	0
Zone # L06	278	85	113	80	0	108	33	44	31	0
Zone # L07	124	38	50	36	0	48	15	20	14	0
Zone # L08	405	124	164	117	0	157	48	64	45	0
Zone # L09	1901	582	772	547	0	738	226	300	212	0
Zone # L10	1696	519	688	488	0	658	201	267	190	0
Zone # L11	429	131	174	124	0	167	51	68	48	0
Zone # L12	216	66	88	62	0	84	26	34	24	0
Zone # L13	1655	506	672	477	0	642	197	261	185	0
	13919	4259	5650	4009	0	5402	1653	2195	1556	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# Per Mobile Home Unit	2.7
# per Other Unit	2.7
Avg. Veh. per D.U.	1.6
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones L01, L02, L03, L04, L05, L06

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 8A

CITRUS COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #C01	4324	1323	1756	1245	0	1970	603	800	567	0
Zone #C02	4485	1372	1821	1292	0	2044	625	830	589	0
Zone #C03	3119	954	1266	898	0	1421	435	577	409	0
Zone #C04	1281	392	520	369	0	584	179	237	168	0
Zone #C05	1479	453	600	426	0	674	206	274	194	0
Zone #C06	975	298	396	281	0	444	136	180	128	0
Zone #C07	1014	310	412	292	0	462	141	188	133	0
Zone #C08	971	297	394	280	0	442	135	180	127	0
Zone #C09	2675	819	1086	770	0	1219	373	495	351	0
Zone #C10	2026	620	823	584	0	923	283	375	266	0
Zone #C11	1633	500	663	470	0	744	228	302	214	0
Zone #C12	1162	355	472	335	0	529	162	215	152	0
Zone #C13	225	69	92	65	0	103	31	42	30	0
Zone #C14	927	284	376	267	0	422	129	171	122	0
	26296	8046	10677	7574	0	11981	3666	4866	3450	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation 100
# Per Mobile Home Unit 2.3
# per Other Unit 2.3
Avg. Veh. per D.U. 1.6
Veh. Usage % 65.5
Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones C01, C02, C03

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 8B

CITRUS COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #C01	4324	1323	1756	1245	0	1970	603	800	567	0
Zone #C02	4485	1372	1821	1292	0	2044	625	830	589	0
Zone #C03	3119	954	1266	898	0	1421	435	577	409	0
Zone #C04	2006	614	814	578	0	914	280	371	263	0
Zone #C05	2822	864	1146	813	0	1286	393	522	370	0
Zone #C06	1872	573	760	539	0	853	261	346	246	0
Zone #C07	1014	310	412	292	0	462	141	188	133	0
Zone #C08	971	297	394	280	0	442	135	180	127	0
Zone #C09	2675	819	1086	770	0	1219	373	495	351	0
Zone #C10	2026	620	823	584	0	923	283	375	266	0
Zone #C11	1633	500	663	470	0	744	228	302	214	0
Zone #C12	1162	355	472	335	0	529	162	215	152	0
Zone #C13	225	69	92	65	0	103	31	42	30	0
Zone #C14	927	284	376	267	0	422	129	171	122	0
	29261	8954	11881	8428	0	13332	4079	5414	3839	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.3
# per Other Unit	2.3
Avg. Veh. Per D.U.	1.6
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones C01, C02, C03, C04, C05, C06

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 9A

HERNANDO COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #H01	655	200	266	189	0	304	93	123	88	0
Zone #H02	2148	657	872	619	0	997	305	405	287	0
Zone #H03	2935	898	1192	845	0	1362	417	553	392	0
Zone #H04	545	167	221	157	0	253	77	103	73	0
Zone #H05	168	51	68	48	0	78	24	32	22	0
Zone #H06	4008	1226	1627	1154	0	1860	569	755	536	0
Zone #H07	58	18	23	17	0	27	8	11	8	0
Zone #H08	1058	324	430	305	0	491	150	199	141	0
Zone #H09	835	256	339	241	0	387	119	157	112	0
Zone #H10	847	259	344	244	0	393	120	160	113	0
Zone #H11	667	204	271	192	0	310	95	126	89	0
Zone #H12	1183	362	480	341	0	549	168	223	158	0
Zone #H13	1994	610	810	574	0	925	283	376	266	0
Zone #H14	1577	483	640	454	0	732	224	297	211	0
	18678	5715	7583	5380	0	8668	2652	3520	2496	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation 100
# per Mobile Home Unit 2.4
# per Other Unit 2.4
Avg. Veh. per D.U. 1.7
Veh. Usage % 65.5
Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones H01, H02, H03

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 9B

HERNANDO COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #H01	655	200	266	189	0	304	93	123	88	0
Zone #H02	2148	657	872	619	0	997	305	405	287	0
Zone #H03	2935	898	1192	845	0	1362	417	553	392	0
Zone #H04	6960	2130	2826	2004	0	3229	988	1311	930	0
Zone #H05	672	206	273	194	0	312	95	127	90	0
Zone #H06	4008	1226	1627	1154	0	1860	569	755	536	0
Zone #H07	58	18	23	17	0	27	8	11	8	0
Zone #H08	1058	324	430	305	0	491	150	199	141	0
Zone #H09	835	256	339	241	0	387	119	157	112	0
Zone #H10	847	259	344	244	0	393	120	160	113	0
Zone #H11	667	204	271	192	0	310	95	126	89	0
Zone #H12	1183	362	480	341	0	549	168	223	158	0
Zone #H13	1994	610	810	574	0	925	283	376	266	0
Zone #H14	1577	483	640	454	0	732	224	297	211	0
	25597	7833	10393	7373	0	11878	3634	4823	3421	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.4
# per Other Unit	2.4
Avg. Veh. per D.U.	1.7
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones H01, H02, H03, H04, H05

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 10

MARION COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #M01	1108	596	205	307	0	641	345	119	178	0
Zone #M02	1342	722	248	372	0	777	418	144	215	0
Zone #M03	3026	1628	560	838	0	1753	943	324	485	0
Zone #M04	4862	2616	899	1347	0	2816	1515	521	780	0
Zone #M05	348	187	64	97	0	202	109	37	56	0
Zone #M06	421	227	78	117	0	244	131	45	68	0
Zone #M07	1906	1025	353	528	0	1104	594	204	306	0
Zone #M08	5559	2991	1028	1540	0	3219	1732	596	892	0
Zone #M09	1490	802	276	413	0	863	464	160	239	0
Zone #M10	5697	3065	1054	1578	0	3299	1775	610	914	0
Zone #M11	793	427	147	220	0	459	247	85	127	0
Zone #M12	2236	1203	414	619	0	1295	697	240	359	0
Zone #M13	926	498	171	256	0	536	288	99	148	0
Zone #M14	3045	1638	563	843	0	1763	949	326	488	0
	32759	17625	6060	9075	0	18971	10207	3510	5255	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100	Surge Zones
# per Mobile Home Unit	2.6	
# per Other Unit	2.6	
Avg. Veh. per D.U.	2.1	
Veh. Usage %	71.7	

Dist. %: S= 53.8 FR= 18.5 HM= 27.7 DK= 0

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

TABLE 11

SUMTER COUNTY EVACUATION POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
Zone #S01	294	158	54	82	0	133	71	25	37	0
Zone #S02	1064	572	197	295	0	480	258	89	133	0
Zone #S03	578	311	107	160	0	261	140	48	72	0
Zone #S04	1785	960	330	494	0	806	433	149	223	0
Zone #S05	2384	1283	441	660	0	1076	579	199	298	0
Zone #S06	556	299	103	154	0	251	135	46	70	0
Zone #S07	265	142	49	73	0	119	64	22	33	0
Zone #S08	367	198	68	102	0	166	89	31	46	0
Zone #S09	1061	571	196	294	0	479	258	89	133	0
Zone #S10	759	408	140	210	0	343	184	63	95	0
	9113	4902	1685	2524	0	4114	2211	761	1140	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100	Surge Zones
# per Mobile Home Unit	2.7	
# per Other Unit	2.7	
Avg. Veh. per D.U.	1.7	
Veh. Usage %	71.7	

Dist. %: S= 53.8 FR= 18.5 HM= 27.7 DK= 0

Source: Post, Buckley, Schuh & Jernigan, Inc., 1983.

Regional Evacuation Scenarios

For purposes of this report, "regional" is defined as affecting more than one county. Accepting this definition, the hurricane is intrinsically a regional event. This is not only because its hazards can affect a relatively large area, but also due to the error in prediction as to where the hurricane will strike, or make its closest point of approach (CPA) during the hurricane warning period, typically 12 to 24 hours before CPA. It is not inconceivable that up to a 250-mile "warning diameter" along the coast may occur during the warning period due to this error in prediction. Therefore, it is possible that, for example, both the Withlacoochee and the Tampa Bay regions may fall under this "warning diameter" and, hence, have to be evacuated.

It should be further noted that the rate of dissipation of hurricane-force winds after the hurricane makes its closest point of approach and proceeds inland is uncertain. Therefore, it is assumed that the mobile-home residents in the inland counties will have to evacuate regardless of the type or intensity of the hypothetical hurricane tracks modeled in the SPLASH computer model, should an evacuation order be issued for the inland counties.

Based upon the above information, three regional evacuation scenarios have been designated for purposes of this report. They are as follows:

- Regional Scenario A: includes all of the residents within the evacuation zones associated with Vulnerability Level 'A' in the coastal counties, the mobile-home residents in the remainder of the coastal counties and the mobile-home residents in the inland counties.

- Regional Scenario B: includes all of the residents within the evacuation zones associated with Vulnerability Levels A and B, the remainder of the coastal mobile-home residents and inland mobile-home residents.

- Regional Scenario C: includes all of the residents in Regional Scenario B and the number of persons entering the Withlacoochee region from the Tampa Bay region, based on the worst-case regional evacuation scenario for the Tampa Bay region.

The aforementioned scenarios do not cover all the possibilities in that it is possible that, for example, only the northern counties of Levy and Marion need be evacuated should the "warning diameter" be further to the north. The same applies to the southern counties of Citrus, Sumter and Hernando; should it be further to the south. These possibilities can be calculated using the previously described county evacuation scenarios. It is also possible that, for example, the Tampa Bay region may be evacuated without any of the counties in the Withlacoochee region evacuated. Thus, the regional scenarios should be viewed as worst-case planning possibilities, based on currently available information.

The population-at-risk for each regional scenario is shown below:

Regional Scenario	Population-At-Risk
A	98,742
B	112,232
C	255,742

This chapter has addressed the first hazard analysis objective, preparedness for the extent of the evacuation, by analyzing the number and spatial distribution of the persons vulnerable to hurricane hazards in the Withlacoochee region. It also has, in part, addressed the second objective, preparedness for the timing of the evacuation, through delineating the region into evacuation zones which are used to model evacuation times. This subject is addressed in Chapter V, Evacuation Times.

In order to further address the "extent objective" in the coastal counties of the Withlacoochee region, an analysis of the available public shelter capacity to accommodate those persons requiring or desiring public shelter in the coastal counties is necessary. This is addressed in the next chapter.

CHAPTER IV

COASTAL SHELTER ANALYSIS

The purpose of the coastal shelter analysis is fourfold. First, to analyze the vulnerability of potential coastal shelters and medical facilities to surge flooding.

Second, to determine the amount of available shelter capacity in the coastal counties of the Withlacoochee region. The principal shelters addressed in this analysis are those designated as primary shelters by the county civil defense departments. The principal criterion used for primary shelter designation is the structural integrity of the shelter. These shelters largely consist of the public schools in each county.

Third, an inventory of the shelter characteristics is taken in order to evaluate the suitability of the shelters for evacuation purposes. Of particular importance are auxiliary power and an emergency water supply.

Fourth, a comparison is made between the number of persons desiring public shelter in each county with the available primary shelter capacity in each county. A comparison is also made with the number of persons desiring shelter from the Tampa Bay region entering the coastal counties via U.S. 41.

Surge Shelter/Medical Facility Analysis

Potential primary shelters which are subject to possible surge flooding should not be used for evacuation purposes. In addition, medical facilities or nursing homes which may be vulnerable to surge should be identified as special personnel and emergency vehicles will be required to evacuate these persons. These potential primary shelters and medical facilities vulnerable to surge flooding are presented in table 12 according to vulnerability level. It should be noted that these potential primary shelters will not be used in calculating coastal shelter capacity.

TABLE 12

SHELTERS/MEDICAL FACILITIES VULNERABLE TO SURGE

Shelter/Facility Name	Vulnerability Level A	Vulnerability Level B
Cedar Key High	X	X
(L8)[1] Yankeetown School		X
Crystal River High	X	X
Crystal River Middle	X	X
Crystal River Primary	X	X
Homosassa Elementary	X	X
(H8) Westside Elementary		X
Crystal River Geriatric[2] Center (90)	X	X
ACLF Home (18)[2]	X	X

[1] Corresponds with shelter identification numbers in tables 13 to 15.

[2] Capacity of nursing home in parenthesis.

Shelter Capacity

The first step in calculating shelter capacity is to determine areas of usable shelter space within each shelter. The main criterion for determining areas of usable shelter space is the amount of window space on the exterior walls of the shelter. An area must contain a small percentage of window space in order to prevent injuries caused by the breaking of glass by gale to hurricane force winds.

In addition, the areas must contain a fairly large percentage of open space to be effectively utilized as shelter space. Thus, storage areas, heavy equipment areas, offices, etc., are unacceptable as shelter space.

Since most of the primary shelters are schools, examples of areas of usable shelter space, based on the aforementioned criteria, would be classrooms, libraries, and cafeterias with a small percentage of windows on the exterior walls.[1/]

The capacity of each shelter is then determined based on a requirement of 20 square feet of usable shelter space per person. This relatively small requirement is justified on the basis that the shelter duration period will probably not exceed 18 to 24 hours in most cases.

Tables 13 to 15 display the capacities of the designated primary shelters in Levy, Citrus and Hernando counties; respectively. Maps 20 to 34 show the approximate locations of these shelters.

Inventory of Shelter Characteristics

In the coastal counties, most buildings designated as primary shelters do not have auxiliary power or an available emergency water supply. Water and wastewater treatment are mainly provided by municipal service, although some utilize wells, septic tanks, and on-site wastewater treatment plants. Most of the kitchen facilities require electric power for cooking, however, some use gas which is useful in the event of power outage. Ample parking may be a problem at some shelters due to a small number of parking spaces or a limited area for potential parking. Tables 16 to 18 display all of the aforementioned, with the exception of parking area, for the primary shelters in each coastal county. Tables 19 to 21 provide vehicular capacity and additional comments.

[1/] Appendix G contains the shelter inventory forms used to determine shelter capacity and feasibility.

TABLE 13

LEVY COUNTY PRIMARY SHELTER CAPACITY

	Shelter Name	Address	Capacity[2/]
(L1)[1/]	Bronson Elementary School	School St. & Pine St. Bronson, FL 32621	477
(L2)	Bronson High School	School St. & Pine St. Bronson, FL 32621	360
(L3)	Joyce Bullock Elementary School	SW 3rd St. & SW 1st Ave., Williston, FL 32696	1,055
(L4)	Chiefland Elementary School	US 19 W & 8th Ave. Chiefland, FL 32626	1,270
(L5)	Chiefland High School	US 19 W & 8th Ave. Chiefland, FL 32626	1,095
(L6)	Williston High School	US 41 & SW 6th St. Williston, FL 32696	1,159
(L7)	Williston Intermediate School	C-511 & C331A Williston, FL 32696	385
(L8)	Yankeetown School	Port Ave. & Schoolcraft Dr., Inglis, FL 32649	212
	TOTAL		6,013

[1/]Corresponds with shelter identification number on Maps 21 to 25.
[2/]Based on 20 square feet of usable shelter space/person.

Source: Levy County School Board.

TABLE 14

CITRUS COUNTY PRIMARY SHELTER CAPACITY

	Shelter Name	Address	Capacity[2]
(C1)[1]	Adult General and Community Education	504 W. Grace St. Inverness, FL 32650	423
(C2)	Citrus High School	601 W. Main St. Inverness, FL 32650	2,347
(C3)	Floral City Elementary School	Marvin St. & Old Floral City Rd., Floral City, FL 32636	543
(C4)	Hernando Elementary School	N. US 41 & University Blvd., Hernando, FL 32642	600
(C5)	Inverness Middle School	1950 US 41 North Inverness, FL 32650	3,224
(C6)	Inverness Primary School	206 S. Line St. Inverness, FL 32650	1,397
(C7)	Lecanto Elementary	Lecanto, FL 32661	1,869
(C8)	Lecanto Middle School	Lecanto, FL 32661	2,519
(C9)	Oak Hill School	Van Nortwick Rd. & W. SR 44, Lecanto, FL 32661	188
	TOTAL		13,110

[1]Corresponds with shelter identification number on Maps 27 to 31.

[2]Based on 20 square feet of usable shelter space/person.

Source: Citrus County School Board.

TABLE 15

HERNANDO COUNTY PRIMARY SHELTER CAPACITY

	Shelter Name	Address	Capacity[1]
(H1)[1]	Mitchell L. Black Elementary School	Kelly St. & Bell Ave. Brooksville, FL	1,402
(H2)	Eastside Elementary School	Hill 'n Dale Subdivision Brooksville, FL	1,041
(H3)	Hernando High School	Kelly St. & Bell Ave. Brooksville, FL	666
(H4)	D. S. Parrott Jr. High School	Kelly St. & Bell Ave. Brooksville, FL	2,122
(H5)	Spring Hill Elementary School	3901 Roble Ave. Spring Hill, FL	453
(H6)	Springstead High School	1615 Mariner Blvd. Spring Hill, FL	2,275
(H7)	West Hernando Jr. High School	2574 Fox Chapel Ln. Spring Hill, FL	1,167
(H8)	Westside Elementary School	715 Applegate Dr. Spring Hill, FL	1,892
	TOTAL		11,018

[1]Corresponds with shelter identification number on Maps 33 to 35.

[2]Based on 20 square feet of usable shelter space/person.

Source: Hernando County School Board.

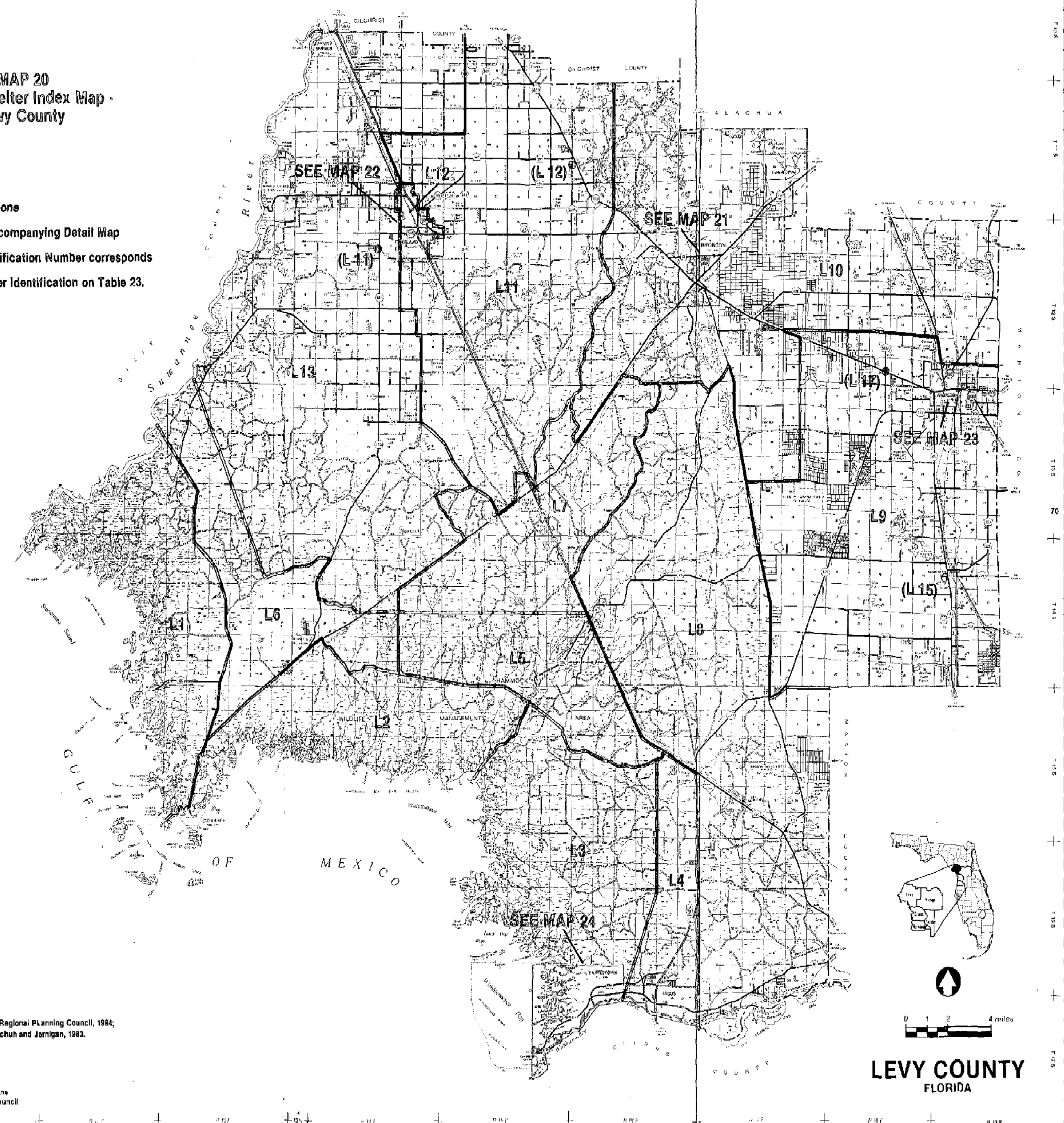
MAP 20
Public Shelter Index Map - Levy County

KEY:

L1 Evacuation Zone

☐ Indicates Accompanying Detail Map

(L 1) Shelter Identification Number corresponds with Shelter Identification on Table 23.

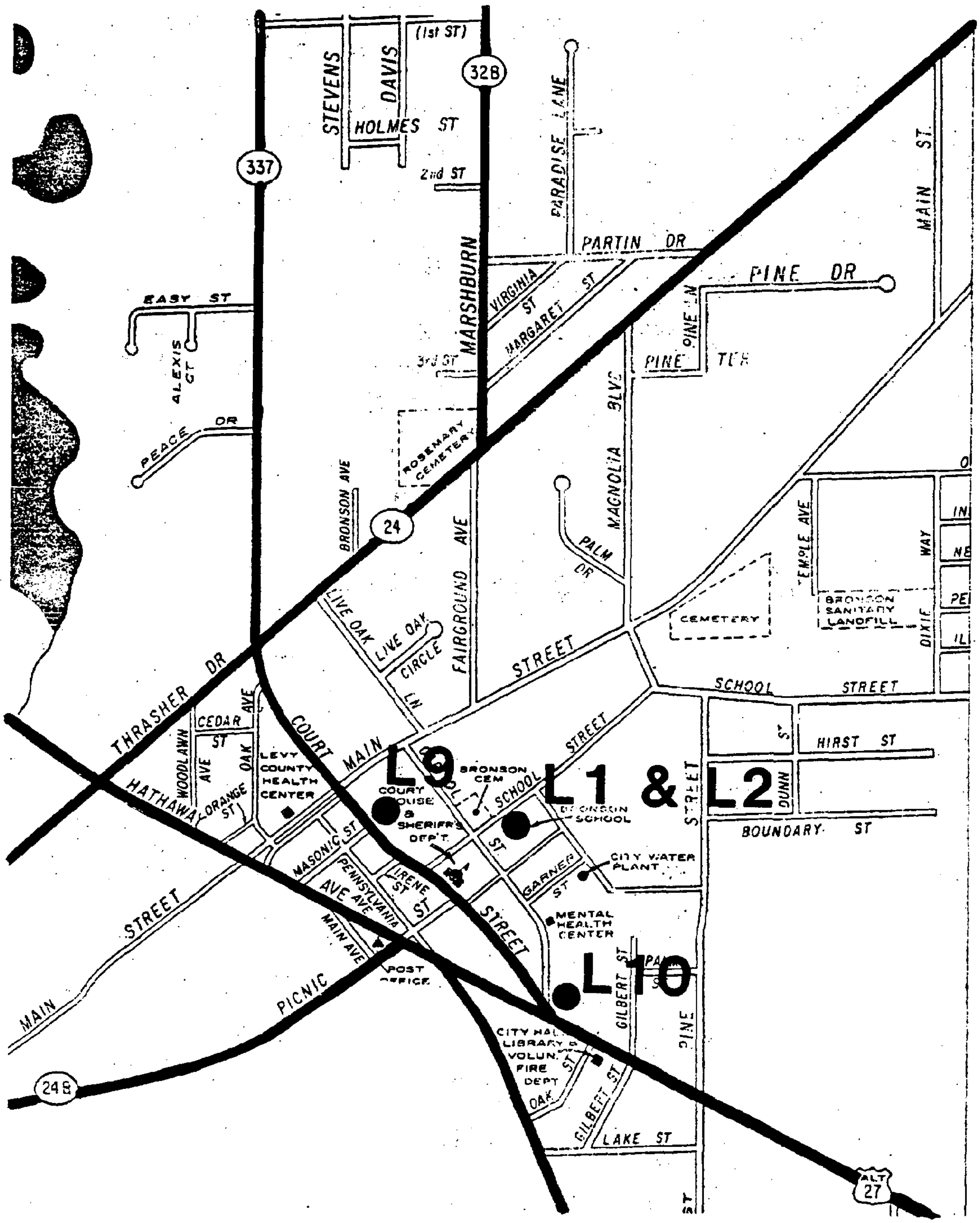


SOURCE: Withlacoochee Regional Planning Council, 1984; Post Buckley, Schuh and Jernigan, 1983.

Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the Withlacoochee Regional Planning Council

MAP 21

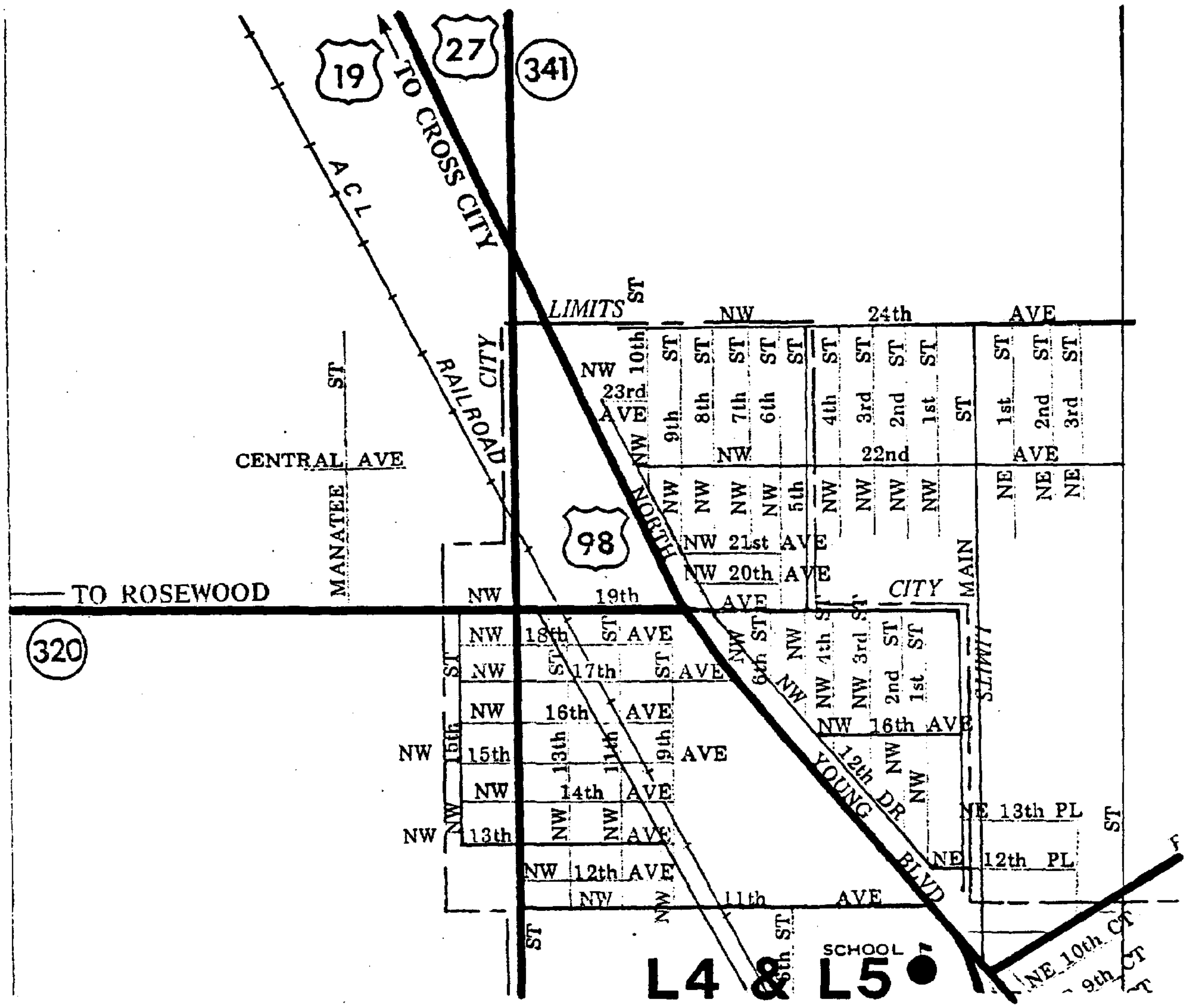
PUBLIC SHELTER LOCATIONS - BRONSON



L9 - Corresponds with shelter identification numbers on tables 13 and 23.

MAP 22A

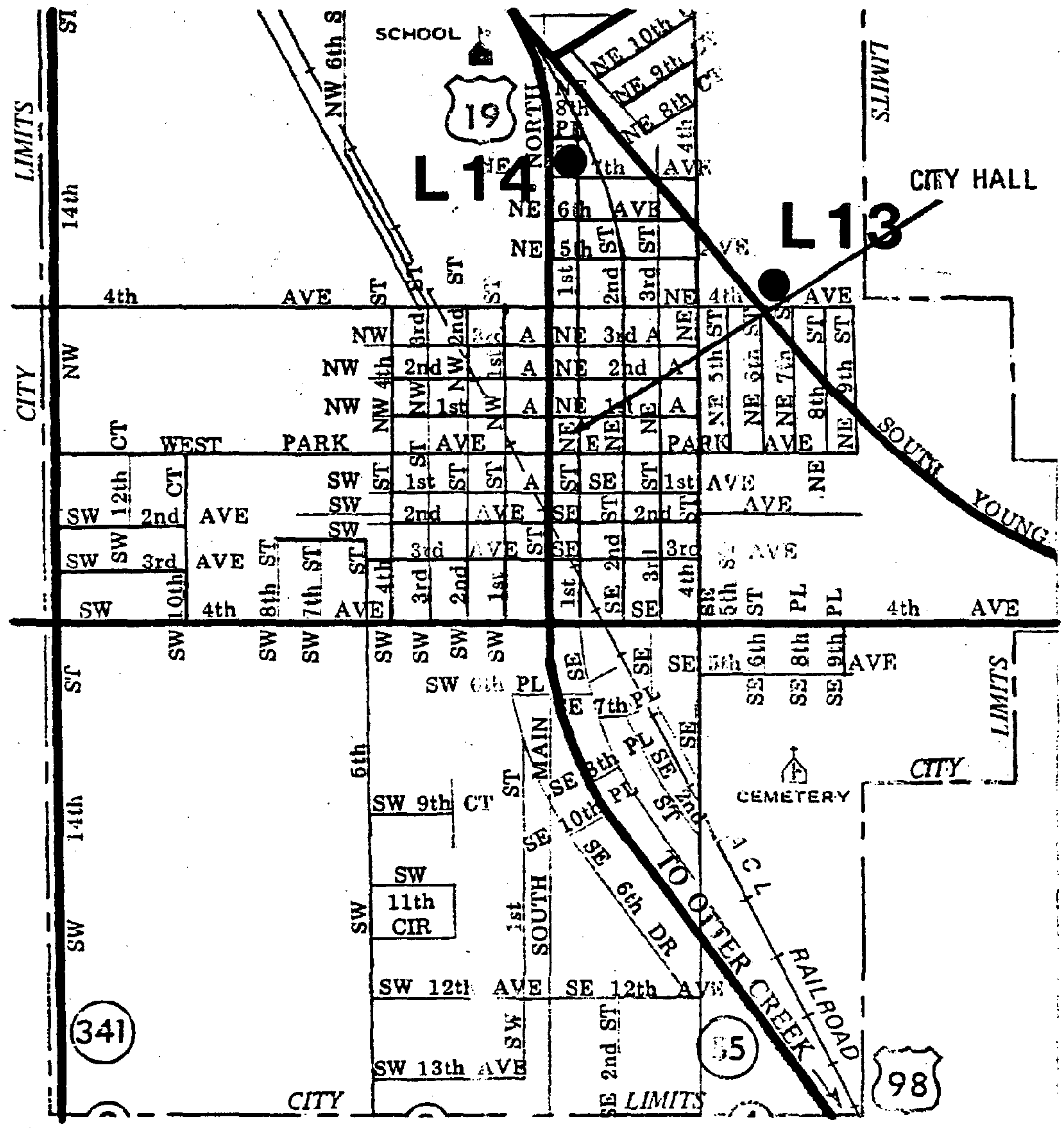
PUBLIC SHELTER LOCATIONS - CHIEFLAND



L4 - Corresponds with shelter identification numbers on table 13.

MAP 22B

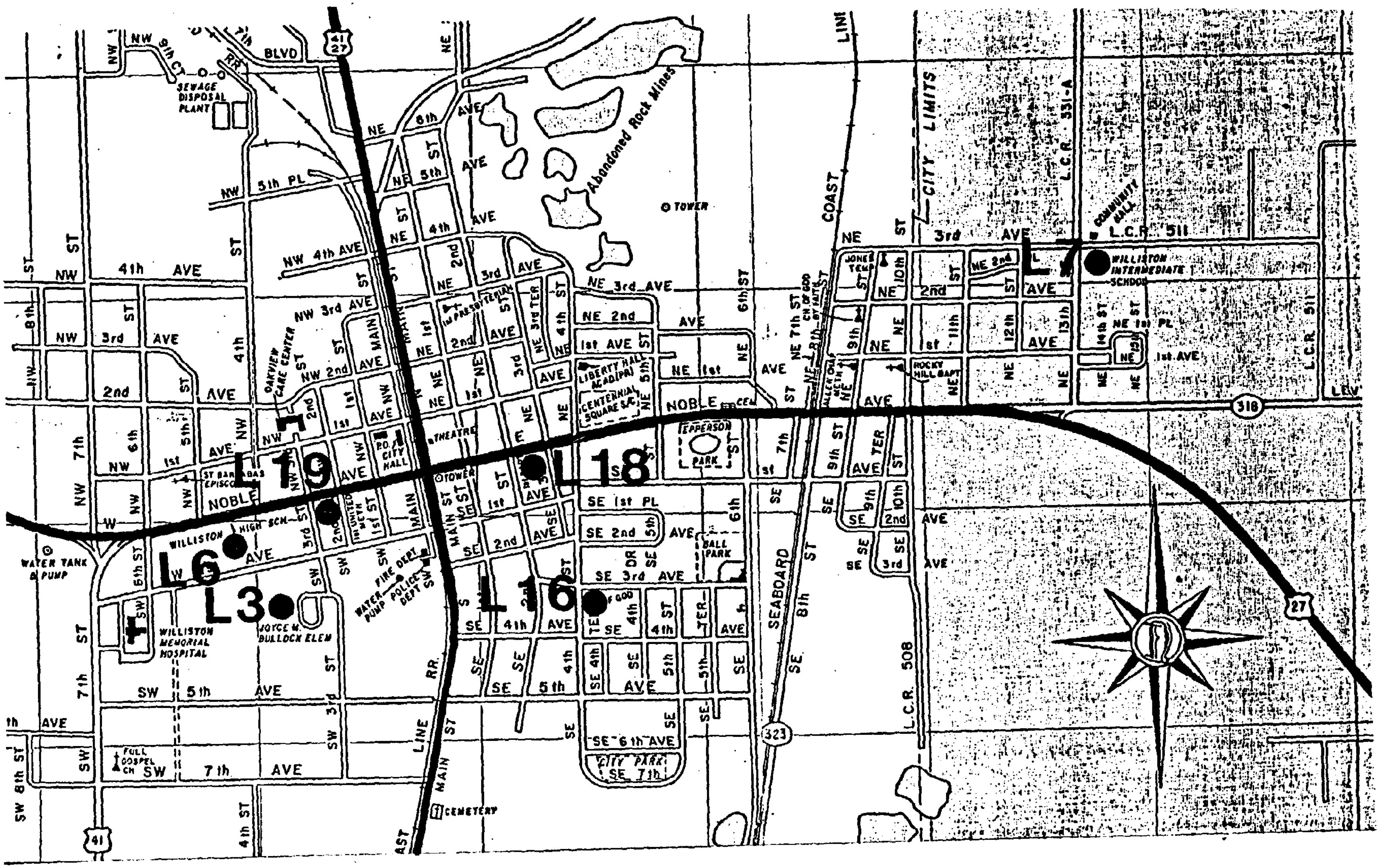
PUBLIC SHELTER LOCATIONS - CHIEFLAND



L13 - Corresponds with shelter identification numbers on table 23.

MAP 23

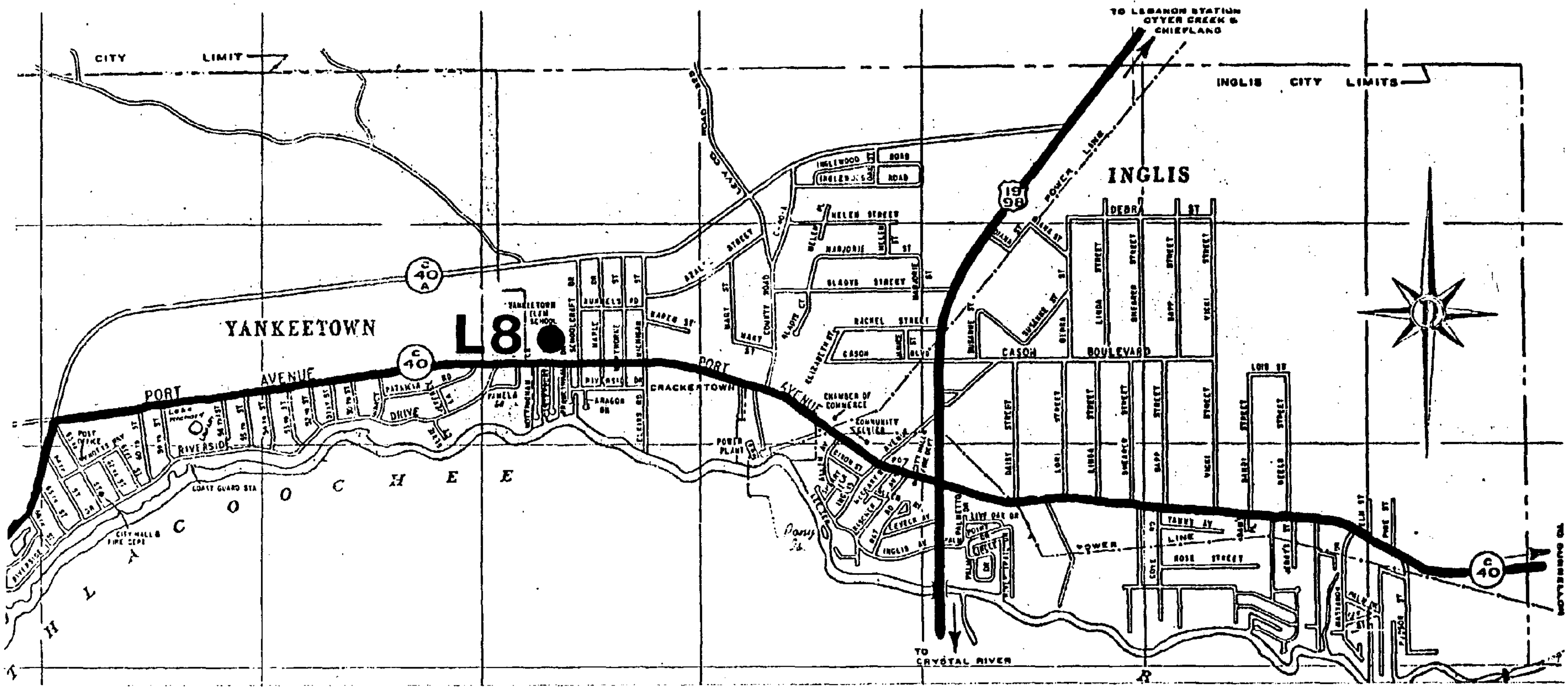
PUBLIC SHELTER LOCATIONS - WILLISTON



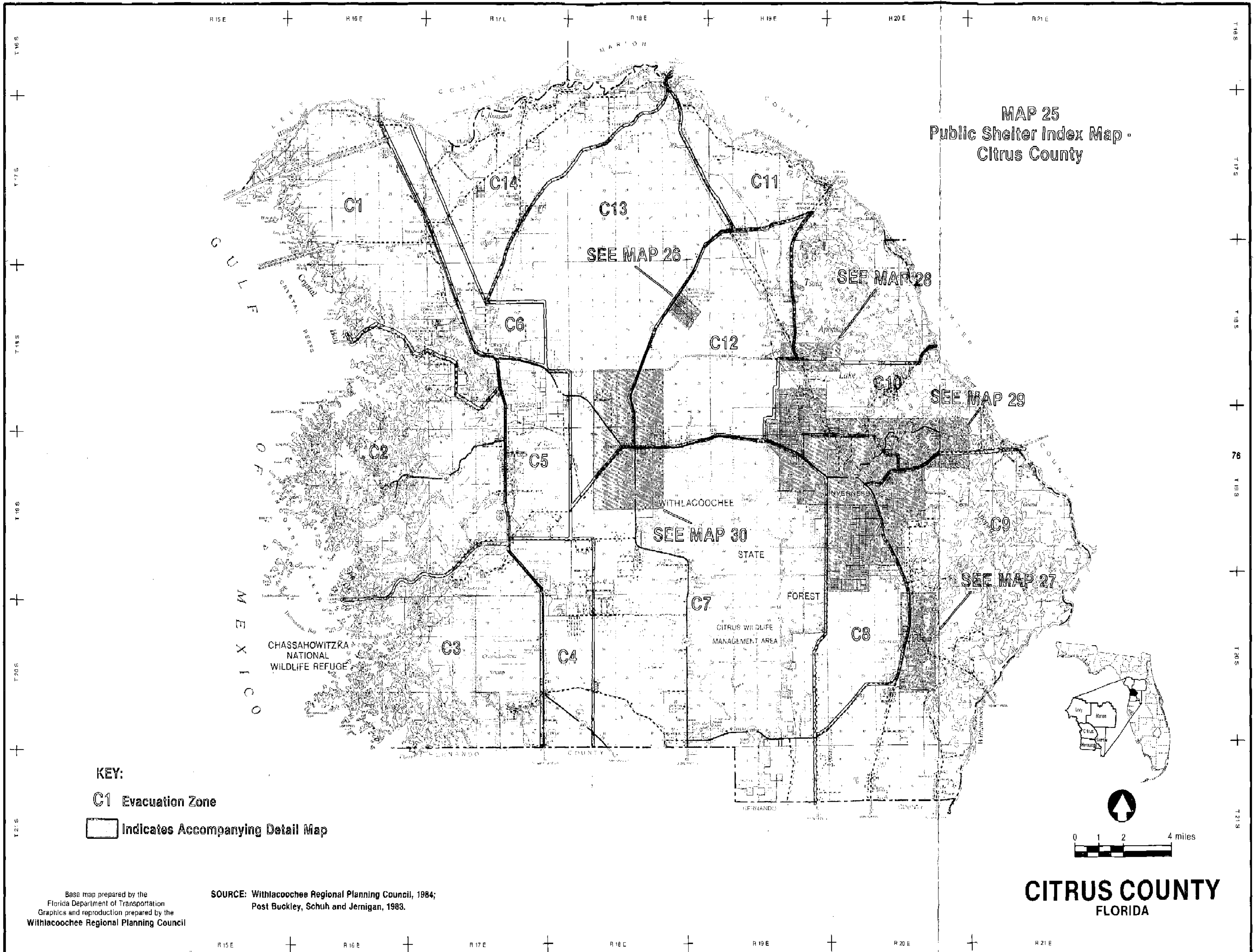
L3 - Corresponds with shelter identification numbers on tables 13 and 23.

MAP 24

PUBLIC SHELTER LOCATIONS - INGLIS-YANKEETOWN

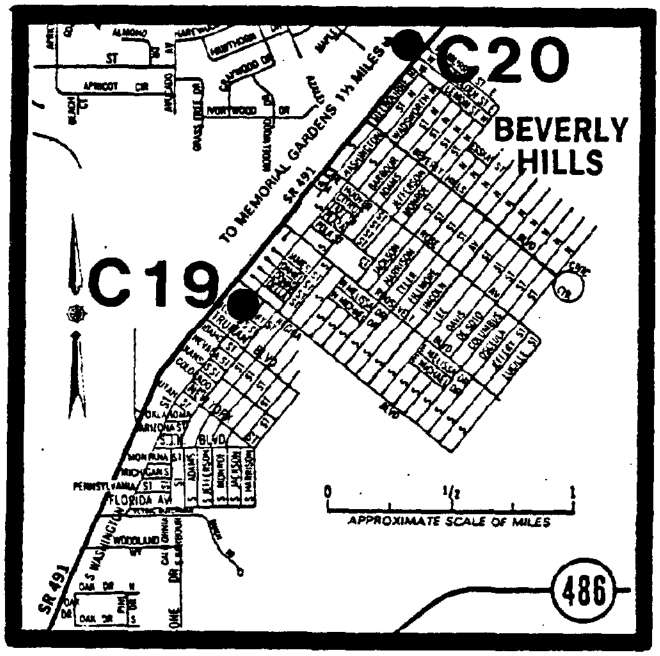


L8 - Corresponds with shelter identification number on table 13.


MAP 25
Public Shelter Index Map - Citrus County
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
SEE MAP 26
SEE MAP 27
SEE MAP 28
SEE MAP 29
SEE MAP 30
WITHLACOOCHEE
STATE
FOREST
CITRUS WILDLIFE MANAGEMENT AREA
CHASSAHOWITZKA NATIONAL WILDLIFE REFUGE
GULF OF MEXICO
INVERNESS
0 1 2 4 miles
CITRUS COUNTY
FLORIDA
KEY:
C1 Evacuation Zone
Indicates Accompanying Detail Map
Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the Withlacoochee Regional Planning Council
SOURCE: Withlacoochee Regional Planning Council, 1984; Post Buckley, Schuh and Jernigan, 1983.

MAP 26

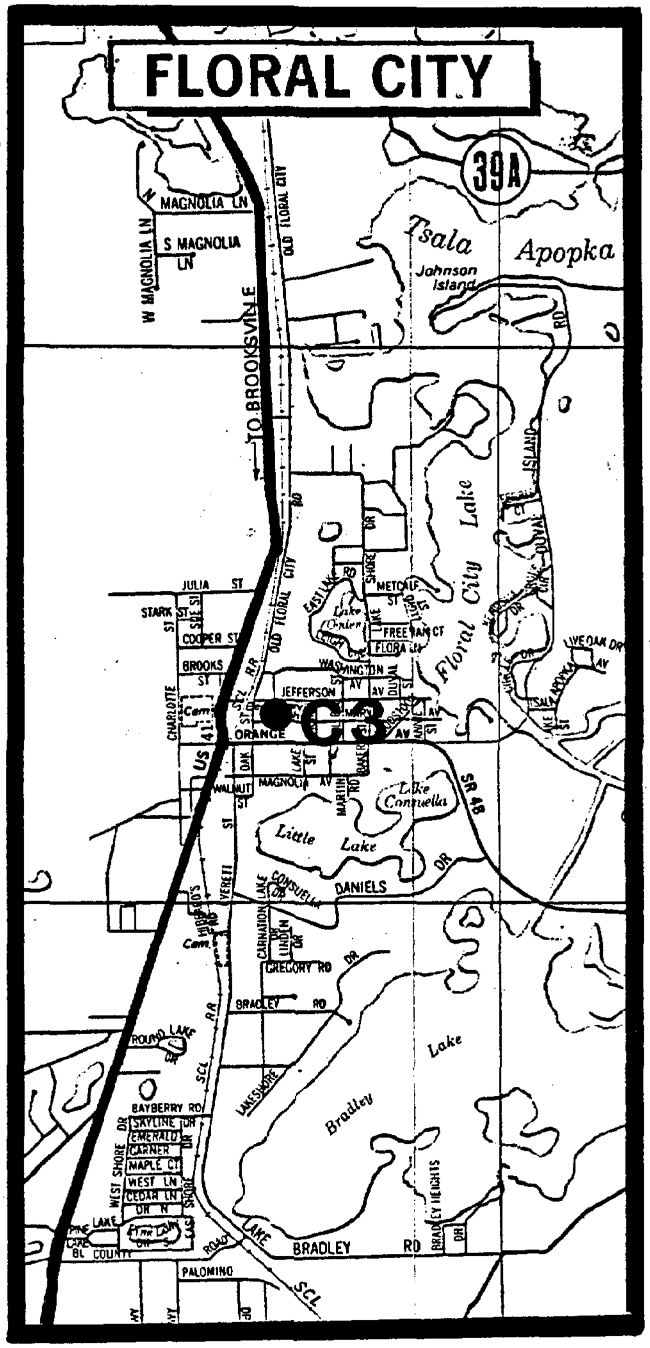
PUBLIC SHELTER LOCATIONS - BEVERLY HILLS



C19 - Corresponds with shelter identification numbers on table 24.

MAP 27

PUBLIC SHELTER LOCATIONS - FLORAL CITY



C3 - Corresponds with shelter identification number on table 14.

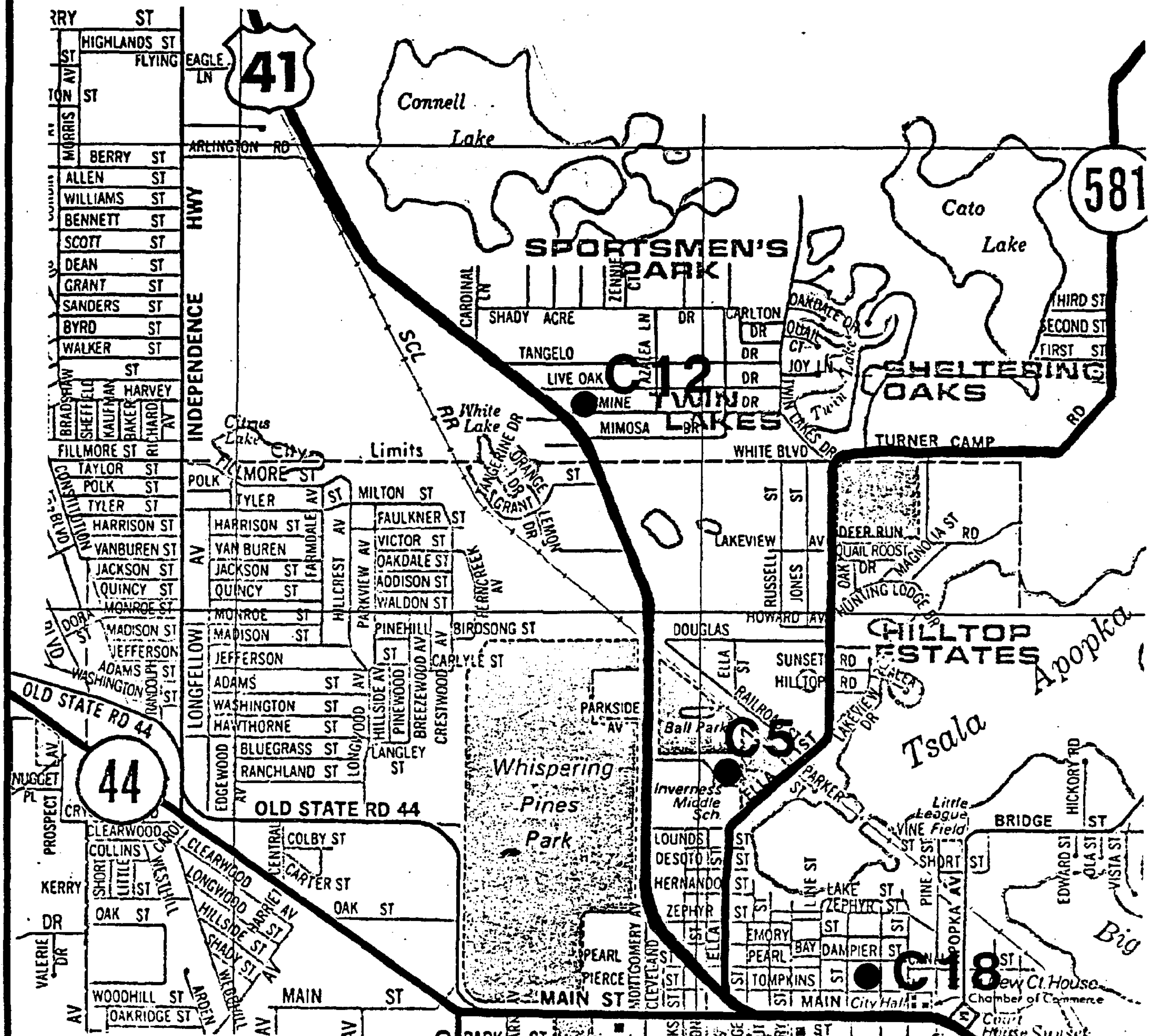
MAP 28

PUBLIC SHELTER LOCATIONS - HERNANDO

C4 - Corresponds with shelter identification number on table 14.

MAP 29A

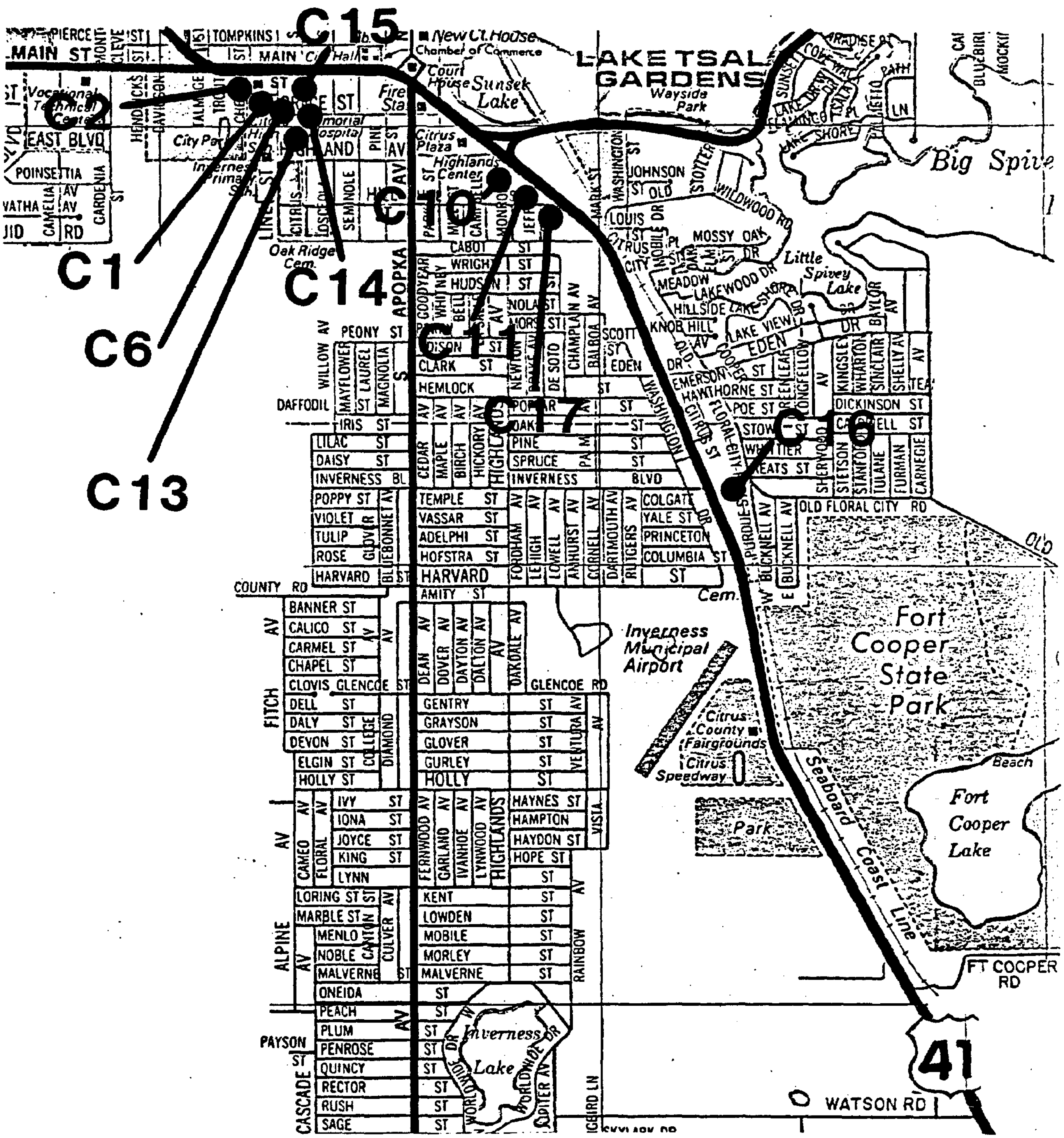
PUBLIC SHELTER LOCATIONS - INVERNESS



C18 - Corresponds with shelter identification numbers on tables 14 and 24.

MAP 29B

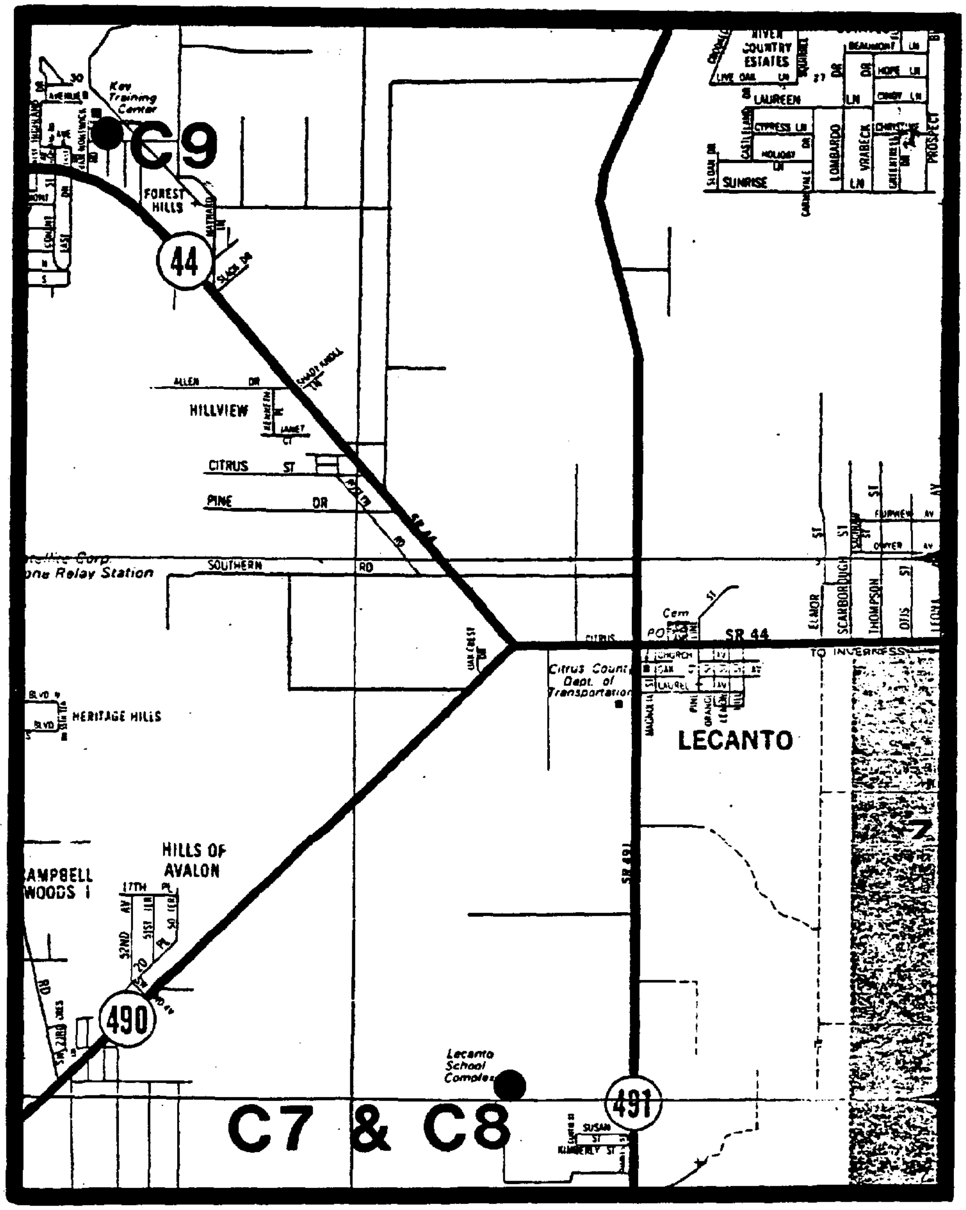
PUBLIC SHELTER LOCATIONS - INVERNESS



C11 - Corresponds with shelter identification numbers on tables 14 and 24.

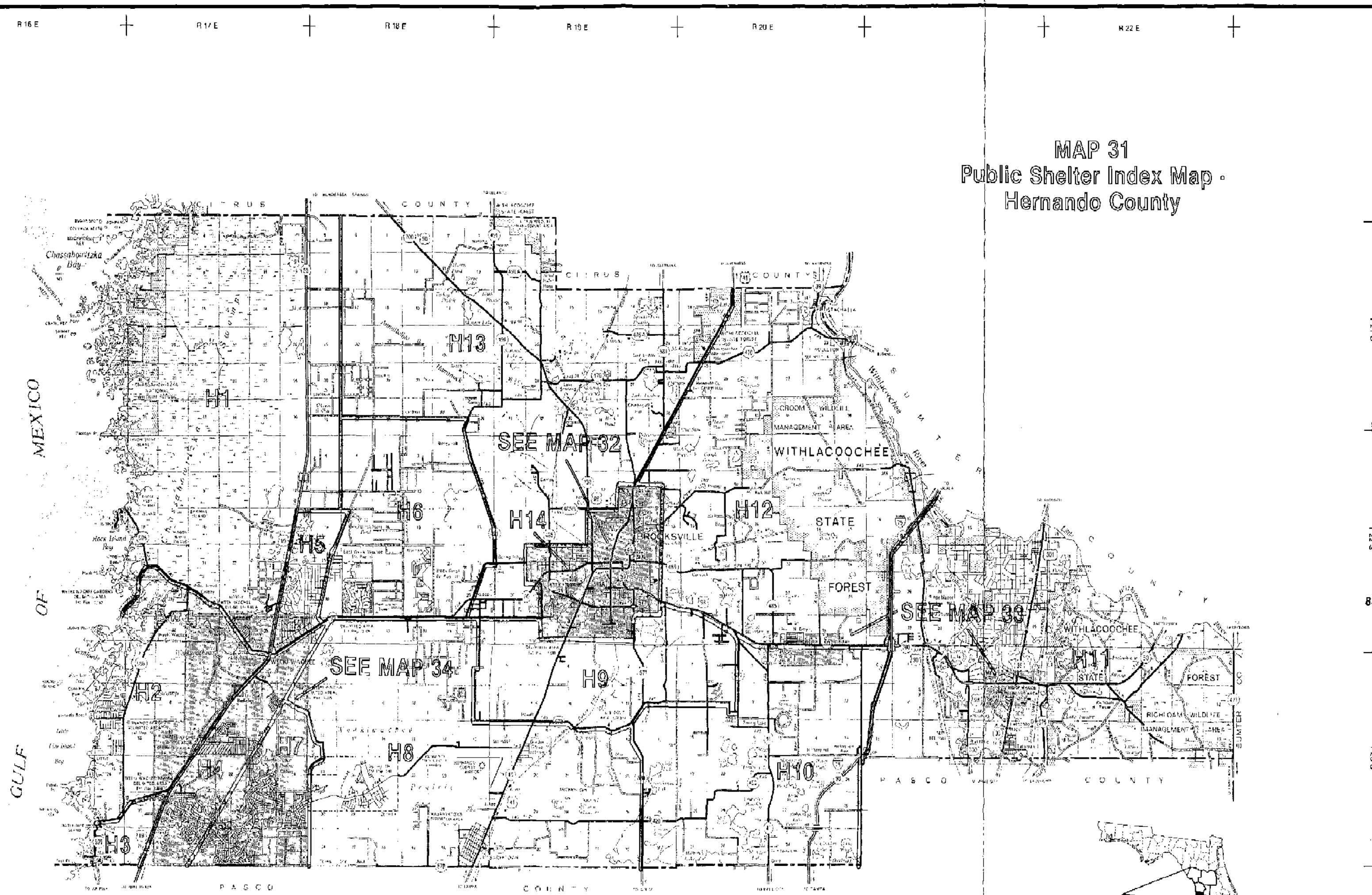
MAP 30

PUBLIC SHELTER LOCATIONS - LECANTO



C7 - Corresponds with shelter identification numbers on table 14.

MAP 31
Public Shelter Index Map - Hernando County



KEY:

H1 Evacuation Zone

Indicates Accompanying Detail Map

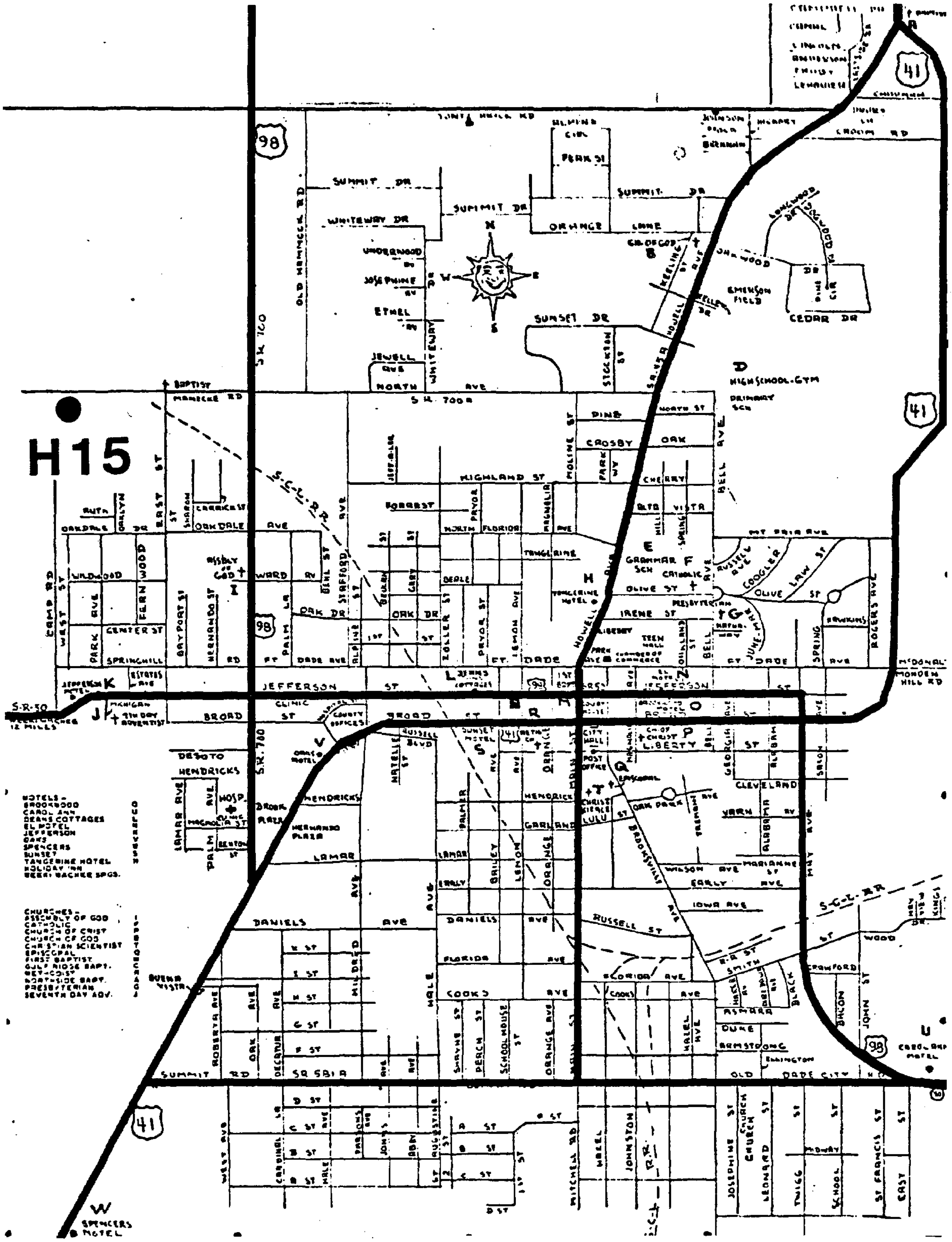
SOURCE: Withlacoochee Regional Planning Council, 1984; Post Buckley, Schuh and Jernigan, 1983.

Base map prepared by the Florida Department of Transportation
Graphics and reproduction prepared by the
Withlacoochee Regional Planning Council

HERNANDO COUNTY
FLORIDA

MAP 32A

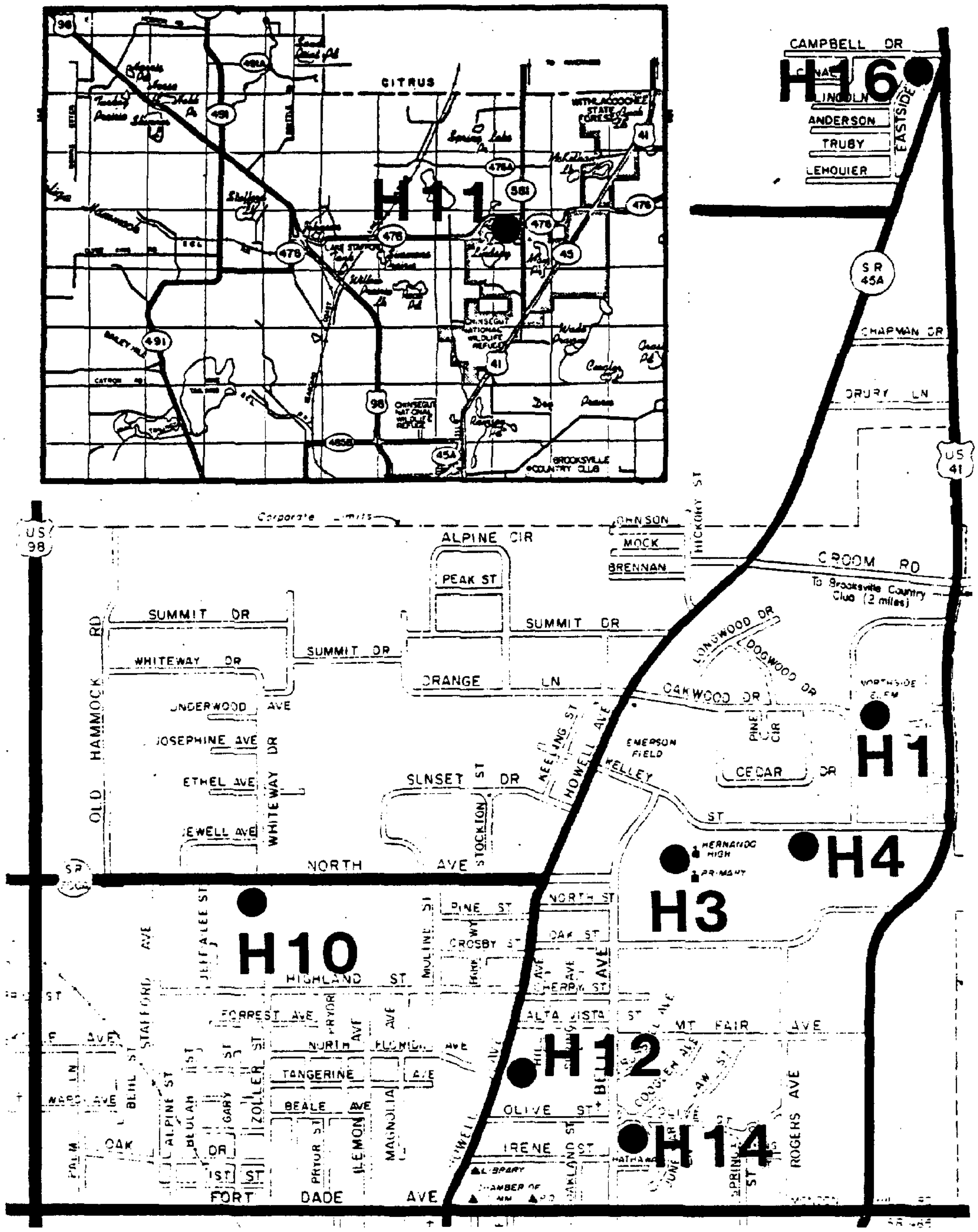
PUBLIC SHELTER LOCATIONS - BROOKSVILLE



H15 - Corresponds with shelter identification numbers on table 25.

MAP 32B

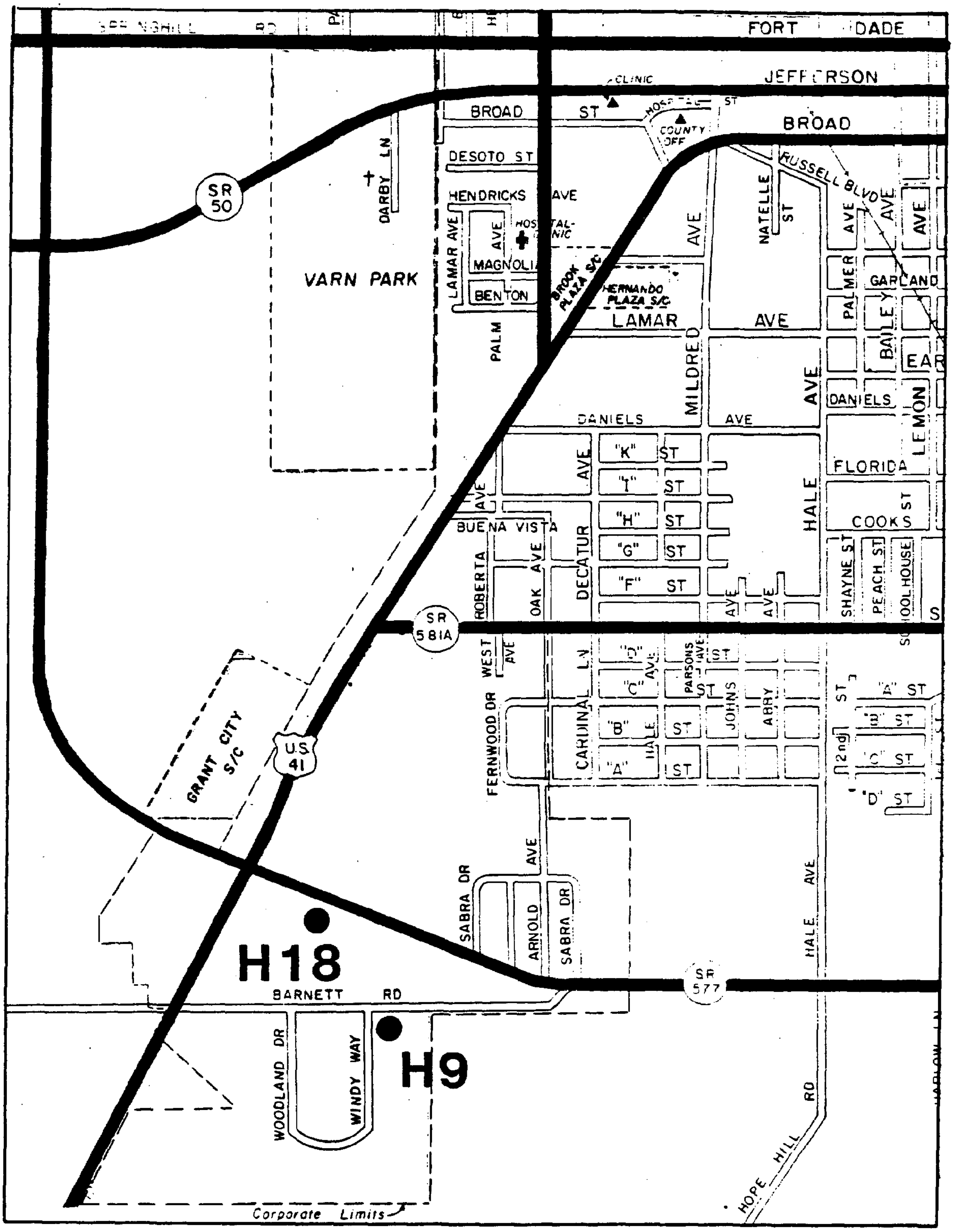
PUBLIC SHELTER LOCATIONS - BROOKSVILLE



H10 - Corresponds with shelter identification numbers on tables 15 and 25

MAP 32C

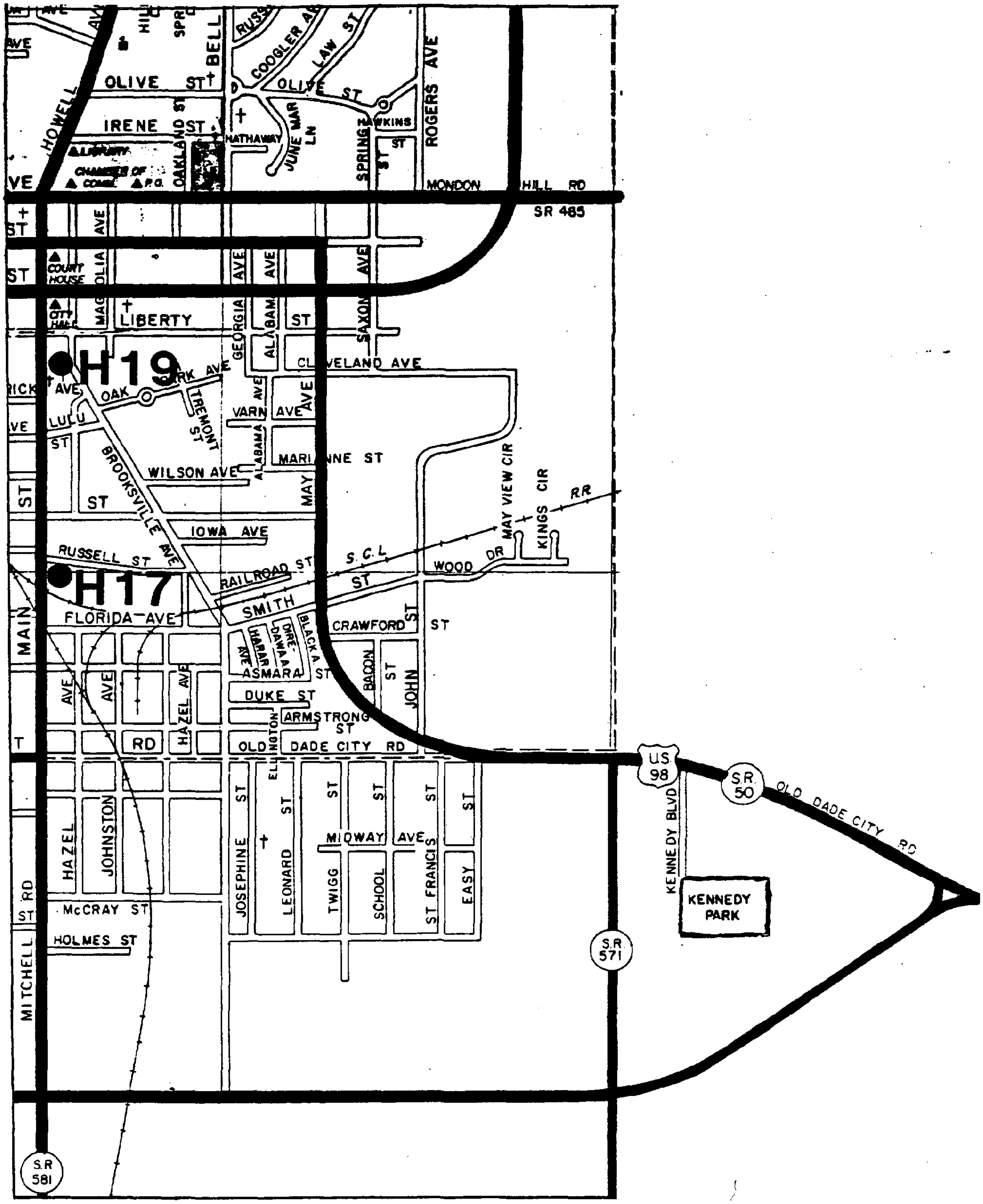
PUBLIC SHELTER LOCATIONS - BROOKSVILLE



H18 - Corresponds with shelter identification numbers on tables 15 and 25.

MAP 32D

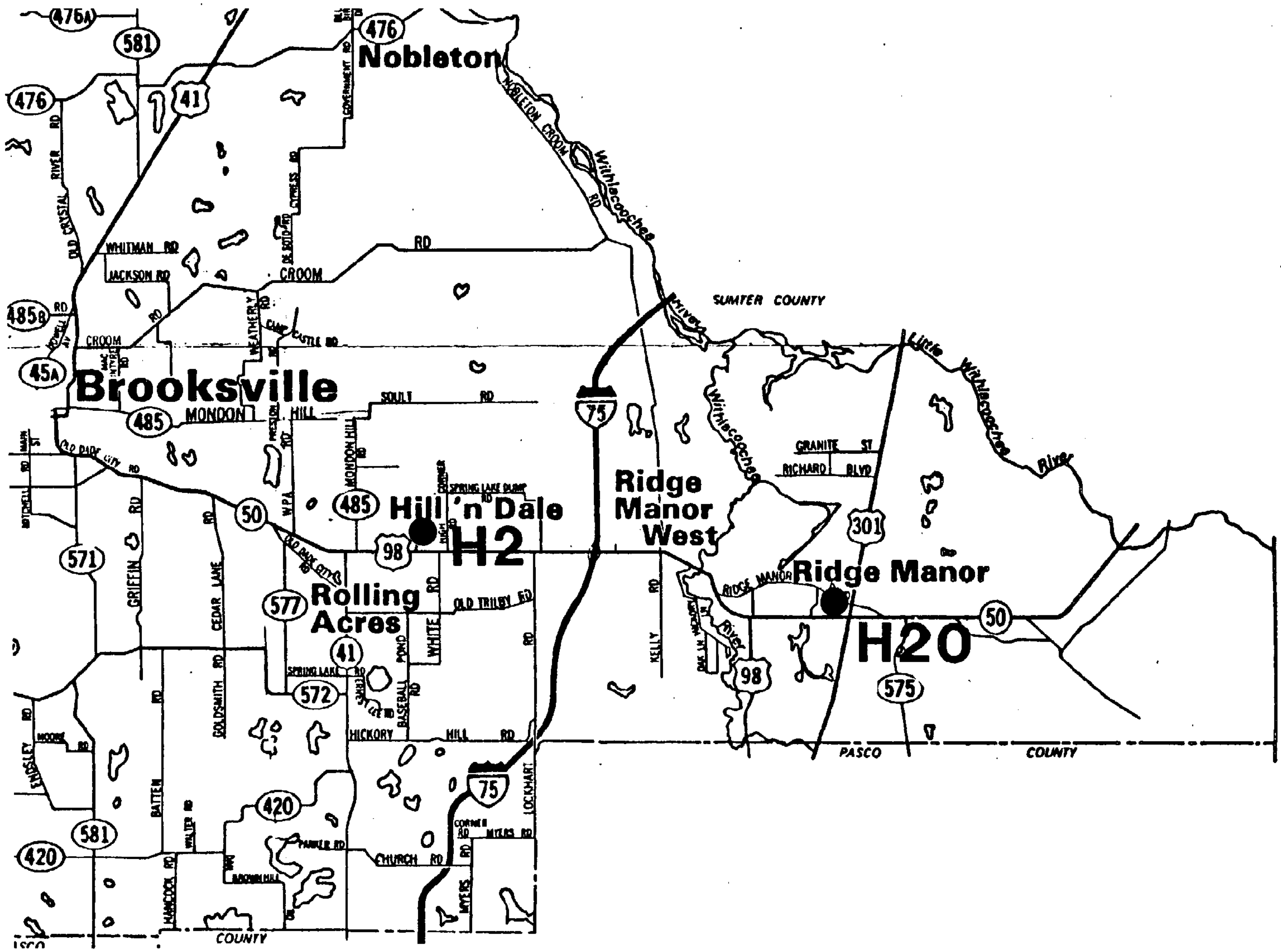
PUBLIC SHELTER LOCATIONS - BROOKSVILLE



H19 - Corresponds with shelter identification numbers on table 25.

MAP 33

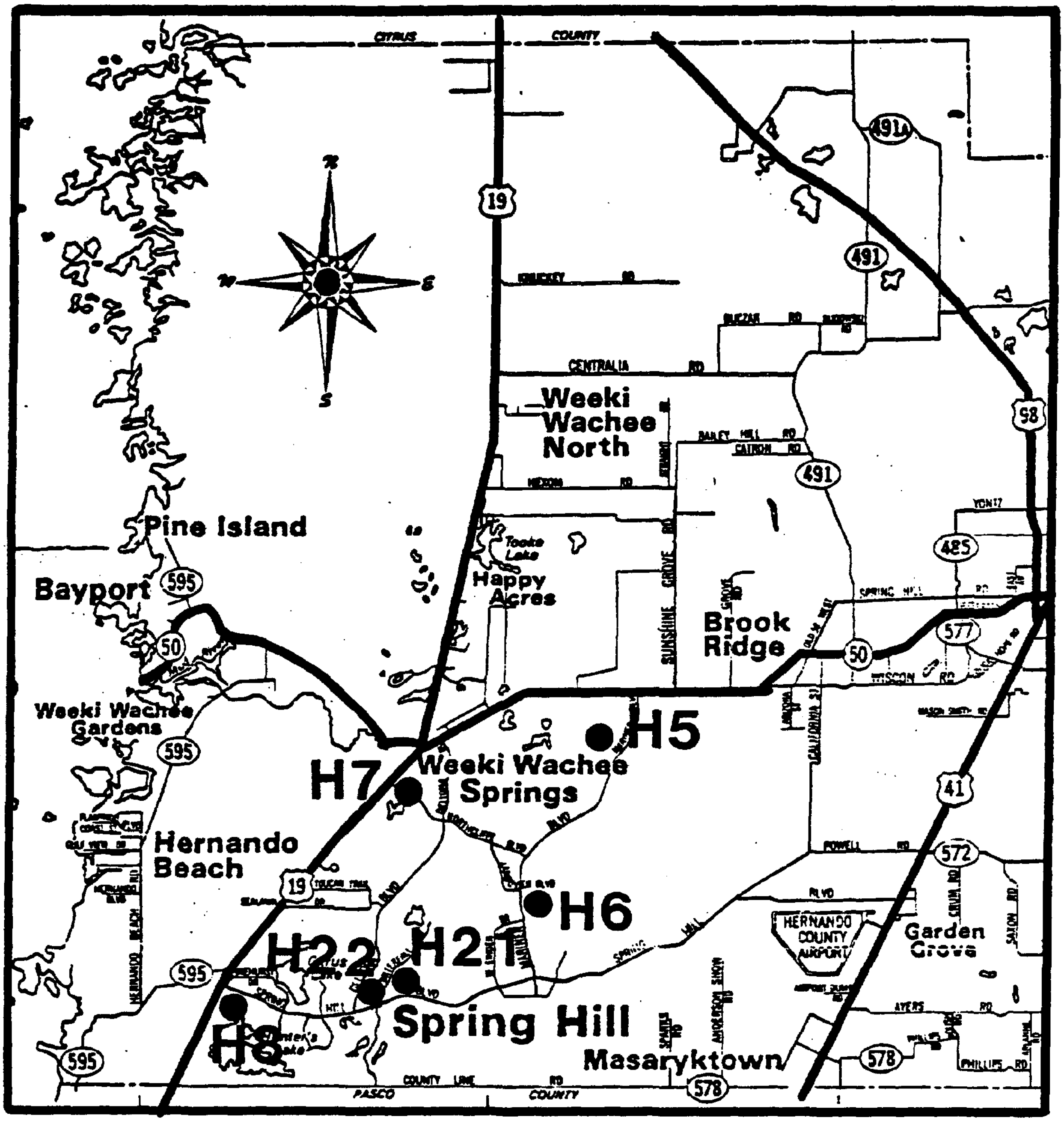
PUBLIC SHELTER LOCATIONS - RIDGE MANOR



H2 - Corresponds with shelter identification numbers on tables 15 and 25.

MAP 34

PUBLIC SHELTER LOCATIONS - SPRING HILL



H8 - Corresponds with shelter identification numbers on tables 15 and 25

TABLE 16

LEVY COUNTY PRIMARY SHELTER CHARACTERISTICS

Shelter Name	Independent Power	Independent Water	Sewage Septic/Sewer	Kitchen Gas/Electric
Bronson Elementary	No	No	Septic	None
Bronson High	No	No	Septic	Gas
Joyce Bullock Elementary	No	No	Sewer	None
Cedar Key High	No	No	Septic	Gas
Chiefland Elementary	No	No	Sewer	None
Chiefland High	No	No	Sewer	Gas
Williston High	No	No	Sewer	Gas
Williston Intermediate	No	No	Sewer	Gas
Yankeetown School	No	No	Septic	Gas

Source: Levy County School offices.

TABLE 17

CITRUS COUNTY PRIMARY SHELTER CHARACTERISTICS

Shelter Name	Independent Power	Independent Water	Sewage Septic/Sewer	Kitchen Gas/Electric
Adult General and Community Education	No	No	Sewer	None
Citrus High School	No	No	Sewer	Electric
Crystal River High	No	No	Sewer	Electric
Crystal River Middle	No	No	Sewer	Electric
Crystal River Primary	No	No	Sewer	Electric
Floral City Elementary	No	No	Sewer, Pkg. Plant	Gas
Hernando Elementary	No	No	Sewer, Pkg. Plant	Gas
Homosassa Elementary	No	No	Sewer, Pkg. Plant	Electric
Inverness Middle	No	No	Sewer	Electric
Inverness Primary	No	No	Sewer	Electric
Lecanto Elementary	Yes, Diesel Generator	No	Sewer, Pkg. Plant	Electric
Lecanto Middle	No	No	Sewer	Electric
Oak Hill School	No	No	Septic	Electric

Source: Citrus County School Offices.

TABLE 18

HERNANDO COUNTY PRIMARY SHELTER CHARACTERISTICS

Shelter Name	Independent Power	Independent Water	Sewage Septic/Sewer	Kitchen Gas/Electric
Mitchell L. Black Elementary	No	No	Sewer	None
Eastside Elementary	No	No	Sewer	None
Hernando High	No	No	Sewer	Electric
D. S. Parrott Jr. High	No	No	Sewer	Electric
Spring Hill Elementary	Yes	No	Sewer	None
Springstead High	Yes	No	Sewer	Electric
West Hernando Jr. High	Yes	No	Sewer	None
Westside Elementary	No	No	Sewer	None

Source: Hernando County School offices.

TABLE 19

VEHICLE CAPACITY AND GENERAL COMMENTS: LEVY COUNTY

Shelter Name	Vehicle Capacity # Parking Spaces	Vehicle Capacity Potential Acres	General Comments*
Bronson Elementary	0	0	Kitchen cafeteria, and parking shared with Bronson High
Bronson High	100	5	
Joyce Bullock Elementary	25	3	Kitchen and cafeteria shared with Williston High
Cedar Key High	30	3	
Chiefland Elementary	75	10	Kitchen and cafeteria shared with Chiefland High
Chiefland High	150	10	
Williston High	75	4	
Williston Intermediate	20	20	
Yankeetown School	20	6	

Source: Levy County School offices.

*All shelters do not have weather alert radio.

TABLE 20

VEHICLE CAPACITY AND GENERAL COMMENTS: CITRUS COUNTY

Shelter Name	Vehicle Capacity # Parking Spaces	Vehicle Capacity Potential Acres	General Comments
Adult General And Community Education	20	10	
Citrus High	100	6	Some rooms have window space slightly exceeding 40% of exterior wall space.
Crystal River High	100	0	
Crystal River Middle	30	4	
Crystal River Primary	30	4	
Floral City Elementary	10	0	
Hernando Elementary	10	0	Some rooms have window space slightly exceeding 40% of exterior wall space.
Homosassa Elementary	30	0	
Inverness Middle	50	10	
Inverness Primary	40	*	
Lecanto Elementary	50	2	
Lecanto Middle	80	0	
Oak Hill	10	0	

Source: Citrus County School offices.

TABLE 21

VEHICLE CAPACITY AND GENERAL COMMENTS: HERNANDO COUNTY

Shelter Name	Vehicle Capacity # Parking Spaces	Vehicle Capacity Potential Acres	General Comments
Mitchell L. Black Elementary	30	10	Limited Rest Rooms
Eastside Elementary	30	0	Limited Rest Rooms
Hernando High	150	5	Rest Rooms have outside entrances
D. S. Parrott Jr. High	40	0	
Spring Hill Elementary	40	0	
Springstead High	150	0	
West Hernando Jr. High	40	0	Glass hallway leads to rest rooms
Westside Elementary	60	0	

Source: Hernando County School offices.

In addition, most shelters do not have an infirmary, but most do have some cots and essential first aid supplies. Many shelters have sufficient food-serving capabilities relative to the capacity of the shelter. Most shelters have weather-alert radio and internal communication systems, few have access to a ham radio. Also, many shelters have facilities to accommodate the elderly and the handicapped.

Net Shelter Capacity

This section compares the number of persons requiring shelter in the coastal region with the available primary shelter capacity. A comparison is also made with the shelter demand generated by the Tampa Bay region. In addition, a concluding note is presented on the need for additional shelter capacity.

Coastal County Evacuees

Table 22 displays the net shelter capacity for each of the coastal counties of the Withlacoochee region. The table indicates the number of persons vulnerable to storm surge and hurricane force winds who desire public shelter by vulnerability level in each county. Also shown is the total primary shelter capacity for each county and the net shelter deficit or surplus.

Tampa Bay Evacuees

Table 22 also shows the net shelter capacity in the coastal counties in the event of a hurricane striking the Tampa Bay region. The shelter demand figure represents the worst case Tampa Bay regional evacuation scenario for the coastal counties of the Withlacoochee region as determined by the Florida Bureau of Emergency Management.

Additional Shelter Capacity

Table 22 indicates that there is more than sufficient primary shelter capacity in the coastal counties should an evacuation order be issued for the Withlacoochee region only. However, should an evacuation order be issued for both the Withlacoochee and Tampa Bay regions, a net shelter deficit, in terms of primary shelter capacity, results. It should be

TABLE 22

NET SHELTER CAPACITY

Vulnerability Level	Shelter Capacity		Shelter Demand		Net Shelter Capacity
			Levy County		
A	6,013	-	3,696	=	2,317
B	5,801	-	4,295	=	1,542
			Citrus County		
A	13,110	-	8,046	=	5,064
B	13,110	-	8,954	=	4,156
			Hernando County		
A	11,018	-	5,715	=	5,303
B	9,126	-	7,833	=	1,293
			Coastal County Total		
A	30,141	-	17,457	=	10,490
B	28,037	-	21,046	=	6,991
			Tampa Bay Evacuees		
-	28,037	-	16,793 1/	=	11,244
			Coastal County Total Plus Tampa Bay Evacuees		
-	28,037	-	37,839	=	-9,802

1/ "Report on the Expected Coastal Demand for Inland County Shelter Facilities from the Tampa Bay and Southwest Florida Regions", Florida Bureau of Disaster Preparedness.

noted that the aforementioned surpluses and deficits are based on the assumptions used in determining the evacuation destination distribution (i.e., what percentage of the population-at-risk will seek public shelter, friends or relatives, or hotel/motel as shelter destinations). The methodology used to determine the evacuation destination distribution is presented in Appendix I.

Given that there is a possible shelter deficit, in terms of primary shelter capacity, research was conducted on the feasibility of using privately-owned buildings as additional shelter capacity. This is the subject of the next section.

Secondary Shelter Analysis

The purpose of this analysis is to inventory privately-owned buildings or secondary shelters, for feasibility as public shelters in order to provide additional shelter capacity.

It should be noted that only churches and civic buildings are the only additional shelters inventoried in this report. Upon recommendation from the Regional Disaster Preparedness Advisory Committee, it was decided that the use of private businesses, such as shopping centers and office buildings, would not be practical.

Shelter Feasibility and Capacity

The criteria adopted for inventorying churches, secondary shelters, are less stringent than for public schools, primary shelters. That is, it is not necessary that secondary shelters have auxiliary power, cooking facilities, etc. The reasons are twofold. First, secondary shelters will only be used if primary shelter capacity is insufficient. Second, secondary shelters will most likely be used for the shelter duration period only, that is, the amount of time before and after the occurrence of gale force winds. Thus, the criteria used in this report for determining the feasibility of secondary shelters are structural integrity and the percentage of windows on the exterior walls.

The procedure used to inventory shelters consisted of two steps. First, Crisis Relocation Plan Host Area Facility Siting Surveys (CRP) were used to obtain the shelter capacity of the churches and civic buildings located in the coastal counties of the Withlacoochee region. Those buildings which had a capacity of 200 persons or greater, at 20 square feet per person, were selected to be inventoried for feasibility and capacity as hurricane shelters. The reasons for this selection process were threefold. First, shelters with a larger capacity are more able to accommodate evacuees. Second, too many shelters would present logistical problems in the evacuation process and cause confusion. Third, a much greater number of management personnel relative to the number of evacuees served would be required.

A telephone survey was then conducted on the selected shelters using the inventory form shown in Appendix G. Survey respondents were asked questions regarding structural integrity and usable shelter capacity. If the respondents were not certain as to the shelter capacity, the CRP listing was given as a reference.

The results of this survey are presented in tables 23 to 25 for Levy, Citrus and Hernando counties; respectively. The locations of these shelters are shown in Maps 20 to 34.

Net Shelter Capacity

Table 26 presents a comparison between the shelter demand from the coastal counties and Tampa Bay with available primary and secondary shelter capacity. The coastal county shelter demand figures are based on the worst case surge vulnerability. It can be seen that there is still a very small deficit if both the Withlacoochee and Tampa Bay regions are issued an evacuation order.

However, it should be noted that, in reality, should the number of Tampa Bay evacuees entering the Withlacoochee region and/or the percentage of the population-at-risk desiring or requiring public shelter in the coastal counties is lower, there will probably be more than sufficient coastal shelter capacity to accommodate both the Withlacoochee and Tampa Bay regions.

This chapter has addressed the first hazard analysis objective identified in Chapter I, which is preparedness for the extent of the hurricane evacuation. Yet to be addressed is the timing objective, or how long it takes for those persons vulnerable to the hurricane hazards to safely reach their

TABLE 23

LEVY COUNTY SECONDARY SHELTER CAPACITY

	Shelter Name	Address	Capacity
(L 9)	Methodist Church	235 Court Street Bronson	200
(L10)	First Baptist Church	Court St. & Capital St. Bronson	300
(L11)	Church of Jesus Christ	C.R. 418 & S.R. 345 Chiefland	196
(L12)	Ebenezer Baptist Church	C.R. 300 & C.R. 339 Chiefland	250
(L13)	First Baptist Church	U.S. 27 Alt. & N.E. 4th St. Chiefland	500
(L14)	First United Methodist Church	N.E. 1st St. & N.E. 7th Ave. Chiefland	50
(L15)	Church of Christ	C.R. 326 & U.S. 41 Morriston	125
(L16)	Church of God	S.E. 4th St. & S.E. 3rd Ave. Williston	150
(L17)	Faith Baptist Tabernacle	S.R. 500 & C.R. 335A Williston	228
(L18)	First Baptist Church	131 E. Noble Ave. Williston	800
(L19)	First United Methodist Church	W. Noble Ave. & S.W. 2nd Street Williston	200
	TOTAL		2,999

TABLE 24

CITRUS COUNTY SECONDARY SHELTER CAPACITY

	Shelter Name	Address	Capacity
(C10)	Assembly of God	200 W. Highland Ave. Inverness	400
(C11)	Church of God	438 S. Main Street Inverness	500
(C12)	First Church of God	Jasmine Dr. & U.S. 41 Inverness	150
(C13)	First Baptist Church	123 S. Seminole Ave. Inverness	610
(C14)	First Presbyterian Church	402 W. Grace St. Inverness	100
(C15)	First United Methodist Church	401 W. Main Street Inverness	400
(C16)	Main St. Baptist Church	S. U.S. 41 & Inverness Blvd. Inverness	250
(C17)	Our Lady of Futima Catholic Church	S. U.S. 41 & Louis St. Inverness	300
(C18)	St. Margaret's Episcopal Church	N. Osceola Ave. & Tompkins St. Inverness	171
(C19)	Catholic Church	6 Roosevelt Blvd. Beverly Hills	100
(C20)	Lutheran Church	N. S.R. 491 & Pine Ridge Blvd. Beverly Hills	75
	TOTAL		3,056

TABLE 25

HERNANDO COUNTY SECONDARY SHELTER CAPACITY

	Shelter Name	Address	Capacity
(H9)	Brooksville Christian	Barnett Rd. & Windy Way Brooksville	120
(H10)	Christ Lutheran Church	W. North Ave. & Zoller St. Brooksville	200
(H11)	Eden Baptist Church	E. S.R. 476 & S.R. 481 Brooksville	200
(H12)	First Baptist Church	420 W. Howell Ave. Brooksville	1,000
(H14)	First Presbyterian Church	300 Bell Ave. Brooksville	500
(H15)	Gulf Ridge Park Baptist Church	713 Manecke Rd. Brooksville	400
(H16)	Northside Baptist Church	U.S. 41 & S.R. 45A Brooksville	400
(H17)	Pentecostal Church of God	Russell St. & Main St. Brooksville	80
(H18)	St. Anthony Catholic Church	S.R. 577 & U.S. 41 Brooksville	314
(H19)	St. Johns Church	S. Brooksville Ave. & Virginia Ave., Brooksville	40
(H20)	All Faiths Community Church	W. S.R. 40 & U.S. 301 Ridge Manor	80
(H21)	Grace United Presbyterian Church	2106 Spring Hill Drive Spring Hill	160
(H22)	First United Methodist Church of Spring Hill	2600 Spring Hill Drive Spring Hill	170
	TOTAL		3,664

TABLE 26

NET SHELTER CAPACITY WITH SECONDARY SHELTERS

Primary Shelter Capacity		Secondary Shelter Capacity		Shelter Demand[1/]		Net Shelter Capacity
		Levy County				
5,801	+	2,999	-	4,259	=	4,541
		Citrus County				
13,110	+	3,056	-	8,954	=	7,212
		Hernando County				
9,126	+	3,664	-	7,833	=	4,957
		Coastal County Total				
28,037	+	9,719	-	21,046	=	16,710
		Coastal County Total Plus Tampa Bay Evacuees				
28,037	+	9,719	-	37,839	=	-83

Sources: WRPC Staff analysis.

Report on Expected Coastal Demand for Inland County Shelter Facilities from the Tampa Bay and Southwest Florida Regions, Florida Bureau of Disaster Preparedness.

NOTES: [1/] Based on worst case surge vulnerability.

shelter destinations. Knowledge of the location and capacity of public shelters is critical in the calculation of these evacuation times. This is the subject of the next chapter.

Also to be addressed are procedures for opening and assigning persons to public shelters during the evacuation process. This is addressed in Chapter VI, Warning System and Evacuation Procedures.

CHAPTER V

EVACUATION TIMES

Evacuation time consists of two components. The first component is the pre-landfall hazard time which, as described in Chapter I, Hazard Analysis, consists of the amount of time before the inundation of coastal routes by storm surge and/or before the onset of gale force winds.

The second component is the clearance time which is defined as the amount of time required for those persons vulnerable to hurricane hazards to reach their shelter destinations. The sum of these two components is evacuation time. Each of these components is addressed as follows.

Pre-landfall Hazard Times

Surge Roadway Inundation Analysis

The amount of time before landfall in which coastal evacuation routes become inundated is determined in the following manner. First, center line elevations of selected low points along major coastal evacuation routes were obtained from the State of Florida Department of Transportation and U.S.G.S. topographic maps. The height and location, in terms of distance inland from the coast, of each point of elevation are then graphed in an identical manner as the cross sections of topography in projecting storm surge (see Chapter III).

Next, using the same surge height projection procedure in delineating vulnerability areas, the point at which the surge height and road elevation intersect is the point of surge roadway inundation. Projecting this point out to the coast indicates the height of the surge at the coast which is required to inundate the roadway at its location inland.

These required coastal surge heights for each elevation point are then compared with the peak hourly surge values at the coast generated by SPLASH at the closest hypothetical storm track for each storm type and intensity. The number of hours before landfall at which this required coastal surge height occurs is the pre-landfall hazard time for storm surge.

Table 27 presents these pre-landfall hazard times at selected low points in Levy, Citrus and Hernando counties for a landfalling hurricane of intensities 1 and 5.

Gale Force Wind Analysis

The amount of time before the occurrence of gale force winds is determined by a comparison of the minimum gale force wind speed, assumed to be 40 mph, with the peak hourly wind speeds generated by SPLASH for each storm type and intensity. The number of hours before landfall at which a peak wind speed of 40 mph occurs is the pre-landfall hazard time for gale force winds. Table 28 displays these pre-landfall hazard times for each storm type and intensity.

A comparison of table 28 with table 27 indicates that the pre-landfall hazard time due to gale force winds exceeds the pre-landfall hazard time due to surge inundation in every case. Therefore, the pre-landfall hazard time due to gale force winds will be used as the reference pre-landfall hazard time.

The following is a summary of the pre-landfall hazard times for each vulnerability level:

Vulnerability Level	Pre-Landfall Hazard Time
A	4.5 - 8.0 hrs.
B	7.0 - 9.0

Sensitivity Analysis

The aforementioned pre-landfall hazard times were based on the input storm parameters for the hurricanes generated by SPLASH, as listed in table 3. Should the actual storm parameters, as determined by monitoring the approaching storm, differ from the SPLASH parameters, the pre-landfall times may change. The purpose of this section, then, is to address how sensitive the pre-landfall hazard times are to changes in storm parameters.

TABLE 27

SURGE ROADWAY INUNDATION ANALYSIS

Levy County

Road & Location	Elevation	Pre-landfall Hazard Time[1] Category 1	Category 5
C 347			
T12S, R13E, Sec. 33	10 ft.	--	1 (hr.)
T13S, R13E, Sec. 5	10	--	1
SR 24			
T15S, R13E, Sec. 3	8	1	2
T15S, R13E, Sec. 20	7	1	3
CR 40			
T17S, R16E, Sec. 6	5	2	3
T17S, R16E, Sec. 4	9	0	2

Citrus County

Road & Location	Elevation	Category 1	Category 5
SR 488			
T17S, R17E, Sec. 20	14	--	1
SR 490			
T19S, R17E, Sec. 27	7	0	2
T19S, R17E, Sec. 31	4	2	3
SR 480			
T20S, R18E, Sec. 25	13	--	1
SR 494			
T19S, R16E, Sec. 11	7	0	2

TABLE 27 (Cont.)

Hernando County

SR 595			
T22S, R17E, Sec. 18	5	2	3
T23S, R17E, Sec. 36	5	2	3
SR 50			
T22S, R17E, Sec. 29	6	2	3

Notes: [1/] Pre-landfall hazard time expressed in terms of the number of hours before landfall in which the peak surge occurs for landfalling type hurricanes.

Sources: Florida DOT regional offices
USGS topographic maps
SPLASH II computer output

TABLE 28

GALE FORCE WIND ANALYSIS AND SHELTER DURATION PERIOD
BY STORM TYPE AND INTENSITY

Storm Type	Storm Intensity	Pre-landfall Hazard Time	Shelter Duration Period
Normal	5	7.0 1/	12.0 1/
Normal	4	9.0	15.0
Normal	3	8.0	14.0
Normal	2	6.0	11.0
Normal	1	5.5	9.5
Paralleling	4	8.0	17.0
Paralleling	3	7.0	15.0
Paralleling	2	5.5	11.0
Paralleling	1	4.5	9.0
Exiting	2	5.5	13.0
Exiting	1	4.5	12.0

1/ Pre-landfall hazard time and shelter duration period for storm intensity category five are shorter due to a narrower radius of maximum winds

Source: SPLASH II computer output.

The parameters in the SPLASH model which can affect the arrival of gale force winds and thereby pre-landfall hazard times are the forward speed of the storm and the radius to maximum winds.[1/] As the storm speed increases, there is less time required for the arrival of gale force winds, thereby reducing pre-landfall hazard time. As the radius-to-maximum winds increases, gale force winds arrive sooner, thereby increasing pre-landfall hazard times.

In order to ascertain the sensitivity of pre-landfall hazard times to the aforementioned, additional SPLASH program runs were made. Forward speed and radius-to-maximum winds were independently varied in each additional run. The results are presented in table 29. This information shall be presented to local decision-makers to permit adjustments in evacuation times.

Clearance Times

Clearance time is the amount of time it takes for those persons vulnerable to hurricane hazards to reach their shelter destinations. A five-step procedure was used to calculate the clearance times.[2/]

First, the amount of time it takes for vulnerable residents to respond to the issuance of the evacuation order is calculated. This is referred to as behavioral response time.

Behavioral response time is calculated by using behavioral response curve, which is a cumulative distribution curve showing the percentage of evacuees that have left home by various hourly points relative to an evacuation order.

As part of the transportation model, three behavioral response curves were developed. The first curve was based on the survey of hurricane response behavior conducted in the Withlacoochee region. The other two curves were based on previous evacuation studies. These curves are presented in Appendix I.

[1/]The principal variable which governs wind speed is the change in barometric pressure which, in turn, is the basis for the different intensities on the Saffir/Simpson scale. The parameters herein referred to are those which can vary within each intensity category.

[2/]Appendix I provides a detailed description of the procedure used to calculate evacuation times.

TABLE 29

SENSITIVITY ANALYSIS OF PRE-LANDFALL HAZARD TIMES

Storm Speed

Intensity Level	Change in Storm Speed	Change in Hazard Time[1/]
1	+15 mph	-1.5 hrs.
2	+15	-2.0
3	+15	-4.0
4	+15	-4.0
5	+15	-3.0

Radius to Maximum Winds (RMW)

Change in RMW	Change in Hazard Time[2/]
-10	-2
+10	+2
+20	+4
+30	+6

[1/]Changes in pre-landfall hazard times for other changes in storm speed can be interpolated or extrapolated from this table.

[2/]Generally there is a 2 hour change in hazard time for every 10 mile change in RMW.

Source: SPLASH II computer printouts prepared by the National Hurricane Center.

Second, the number of vehicle trips generated by each evacuation zone, as described in Chapter IV, Evacuation Zones were calculated using the average number of vehicles per household for each county (see Appendix D). The number of vehicle trips generated in each evacuation zone is presented in tables 7 to 11.

Third, the number of trips generated by each evacuation zone were distributed according to evacuation destination. For public shelter destinations, this consisted of manually matching shelter demand with shelter capacity in each county. For friend or relative destinations, a gravity model was used to distribute trips. In the case of hotel/motel destinations, a manual match was used; however, since the demand for hotel/motels greatly exceeded county hotel/motel capacity, a portion of these trips were routed out of the region.

The fourth and fifth steps consisted of assigning the distributed trips on the evacuation network and determining which link in the network had the highest ratio of traffic volume to roadway capacity. This link was termed the "critical link". The amount of travel time it takes for the last vehicle on the critical link to reach the county line is the clearance time.[3/]

In the case of both the Withlacoochee and Tampa Bay regions simultaneously evacuating, the Tampa Bay evacuees were added to the roadway network. The number of vehicles from the Tampa Bay region expected to enter the Withlacoochee region via U.S. 41, U.S. 301 and I-75 were allocated to remaining primary shelter capacity and to secondary shelters in the region until all shelter capacity was utilized. The remaining vehicles were allocated to I-75 north and out of the region.

Clearance times for regional scenarios A and B, with and without Tampa Bay evacuees, are presented in table 30 for each county. Clearance times are stratified according to the level of behavioral response. It can be seen that the clearance times in Hernando, Marion and Sumter Counties are greatly increased with a Tampa Bay evacuation.[4/]

[3/]Appendix H presents an example of how clearance time was calculated using the transportation model.

[4/]It was assumed in the transportation model that through traffic (i.e., those persons not seeking public shelter) would gravitate toward I-75 in the event that both the Withlacoochee and Tampa Bay regions are issued an evacuation order. Therefore, evacuation times remain unchanged in Levy and Citrus Counties under this scenario.

TABLE 30

CLEARANCE TIMES (in hours)

		REGIONAL VULNERABILITY LEVEL			
	Response Curve	A	B	A w/Tampa Bay Evacuation	B w/Tampa Bay Evacuation
Levy County	A-Quick Response	4 1/4	4 3/4	4 1/4	4 3/4
	B-Medium Response	7 1/4	7 1/4	7 1/4	7 1/4
	C-Slow Response	10 1/4	10 1/4	10 1/4	10 1/4
Citrus County	A-Quick Response	7 3/4	9 1/4	7 3/4	9 1/4
	B-Medium Response	9 1/2	11	9 1/2	11
	C-Slow Response	11 1/2	13	11 1/2	13
Hernando County	A-Quick Response	4 1/4	7 1/4	26	26
	B-Medium Response	7 1/2	8 1/4	25 1/2	25 1/2
	C-Slow Response	10 1/2	10 1/2	26 1/4	26 1/4
Marion County	A-Quick Response	5	5	18	18 1/4
	B-Medium Response	8	8	19 1/2	19 3/4
	C-Slow Response	11	11	21	21 1/4
Sumter County	A-Quick Response	4 1/2	4 1/2	18	18
	B-Medium Response	7 1/4	7 1/4	19 1/2	19 1/2
	C-Slow Response	10 1/4	10 1/4	21	21

Source: Post, Buckley, Schuh & Jernigan, Inc.

Evacuation Times

Evacuation times are the sum of the clearance and pre-landfall hazard times and are presented in tables 31 and 32 for each vulnerability level. The range of time is accounted by the differences in pre-landfall hazard times for different storm types and intensities as listed on page 31.

Based upon the expected number of evacuees in the coastal counties, the above-referenced evacuation times represent the minimum amount of time before hurricane landfall or closest point of approach in which the evacuation order should be issued.

TABLE 31

EVACUATION TIMES (in hours)

VULNERABILITY LEVEL 'A'

	Response Curve	REGIONAL VULNERABILITY LEVEL A	REGIONAL VULNERABILITY LEVEL A w/Tampa Bay Evacuation
Levy County	A-Quick Response	8 3/4 - 12 1/4	8 3/4 - 12 1/4
	B-Medium Response	11 3/4 - 15 1/4	11 3/4 - 15 1/4
	C-Slow Response	14 3/4 - 18 1/4	14 3/4 - 18 1/4
Citrus County	A-Quick Response	12 1/4 - 15 3/4	12 1/4 - 15 3/4
	B-Medium Response	14 - 17 1/2	14 - 17 1/2
	C-Slow Response	16 - 19 1/2	16 - 19 1/2
Hernando County	A-Quick Response	8 3/4 - 12 1/4	29 1/2 - 33
	B-Medium Response	12 - 15 1/2	24 - 27 1/2
	C-Slow Response	15 - 18 1/2	30 3/4 - 34 1/4
Marion County	A-Quick Response	9 1/2 - 13 1/2	22 1/2 - 26
	B-Medium Response	12 1/2 - 16	24 - 27 1/2
	C-Slow Response	15 1/2 - 19	25 1/2 - 29
Sumter County	A-Quick Response	9 - 12 1/2	22 1/2 - 26
	B-Medium Response	11 3/4 - 15 1/4	24 - 27 1/2
	C-Slow Response	14 1/2 - 18 1/4	25 1/2 - 29

SOURCE: Post, Buckley, Schuh & Jernigan, Inc. and WRPC Staff.

TABLE 32

EVACUATION TIMES (in hours)

VULNERABILITY LEVEL 'B'

	Response Curve	REGIONAL VULNERABILITY LEVEL B	REGIONAL VULNERABILITY LEVEL B w/Tampa Bay Evacuation
Levy County	A-Quick Response	10 3/4 - 14 3/4	10 3/4 - 14 3/4
	B-Medium Response	13 1/4 - 16 1/4	13 1/4 - 16 1/4
	C-Slow Response	16 1/4 - 19 1/4	16 1/4 - 19 1/4
Citrus County	A-Quick Response	16 1/4 - 18 1/4	16 1/4 - 18 1/4
	B-Medium Response	18 - 20	18 - 20
	C-Slow Response	20 - 22	20 - 22
Hernando County	A-Quick Response	15 1/4 - 18 1/4	32 - 34 1/2
	B-Medium Response	15 1/4 - 17 1/4	32 1/2 - 34 1/2
	C-Slow Response	17 1/2 - 19 1/2	33 1/4 - 35 1/4
Marion County	A-Quick Response	12 - 14	25 1/4 - 27 1/4
	B-Medium Response	15 - 17	25 3/4 - 28 3/4
	C-Slow Response	18 - 20	28 1/4 - 30 1/4
Sumter County	A-Quick Response	11 1/2 - 13 1/2	25 - 27
	B-Medium Response	14 1/4 - 16 1/4	26 1/2 - 28 1/2
	C-Slow Response	17 1/4 - 19 1/4	28 - 30

SOURCE: Post, Buckley, Schuh & Jernigan, Inc. and WRPC Staff

CHAPTER VI

WARNING SYSTEM AND EVACUATION PROCEDURES

The previous chapters have focused on the technical analysis required to attain the hazard analysis objectives of preparedness for the extent and timing of the hurricane evacuation. This chapter is concerned with the coordinative mechanism necessary to effect the hurricane evacuation in the coastal counties.

For purposes of this chapter, the evacuation coordinative mechanism is divided into two parts. First, the increased readiness conditions necessary to effect the evacuation prior to landfall are identified. This is referred to as the warning system. Second, the method for allocating intra- and inter-county evacuees to public shelter destinations is described. This is referred to as evacuation procedures.

Warning System

The purpose of this section is not to propose a new warning system; but, rather to describe and elaborate upon the existing system, which has been proven to be quite successful.

Agency Participants and Warning Conditions

The following are the principal Federal, State and local governmental agencies involved in the warning system:[1/]

- National Hurricane Center, Miami
- Tampa Area Office, National Weather Service, Ruskin
- Florida Bureau of Emergency Management, Tallahassee
- Central Florida Area Office, Florida (Bureau of Emergency Management, Wildwood)
- County Disaster Preparedness Agencies
- Public Media (TV/Radio)

[1/] The following agencies are the primary participants in the warning system. The total number of agency participants will vary from county to county.

The warning process is initiated by the National Hurricane Center and reaches the public through the following five-step procedure:[2/]

1. A potential hurricane picked up in satellite images is usually the subject of the first in a series of advisory messages issued by the National Hurricane Center at six hour intervals (5 and 11 A.M. and P.M., Eastern Standard Time). These early advisories are aimed mainly at shipping and aviation interests. When the storm intensifies further into a tropical storm, it is given a name.

2. If the hurricane or tropical storm approaches land, the advisory information begins to focus on coastal and inland effects.

   - A Hurricane Watch announcement becomes part of the NHC advisories when the storm threatens coastal and inland areas. This Watch covers a specified area and period of time and means that hurricane conditions are a real possibility.

   - A Hurricane Warning is added to the advisory when hurricane conditions, winds of at least 74 miles per hour, high water and storm tides, are expected within a period of up to 24 hours. The Warning identifies coastal areas where these conditions are expected to occur.

3. As the threat to coastal areas becomes more apparent, the advisories are then interspersed with intermediate advisories every three hours or as needed.

4. Once a hurricane becomes a threat to the Withlacoochee Region, then the Tampa Area office of the National Weather Service will add local statements to each NHC advisory and intermediate advisories. The local statements will consist of recommendations for precautionary actions and completion times, existing conditions of wind and tides, information regarding projected storm tides confronting counties of the region.

[2/]The following information was taken from the Pinellas County Hurricane Implementation Guide, prepared by the Tampa Bay Regional Planning Council, June, 1981.

5. All normal warning information will be provided to the general public through the media (radio/TV) by the NHC and when necessary, local government.

On the basis of the aforementioned warning procedure, the Governor of Florida is advised by the State Bureau of Emergency Management to issue an evacuation order for the affected local area;[3/] or, the chief elected official of each affected local political jurisdiction may issue the evacuation order, as advised by its disaster preparedness agency or committee.[4/]

The Central Florida Area Office will serve as the lead agency for coordinating an interregional evacuation, which is described in the Evacuation Procedures section.

Local disaster preparedness agencies and other agencies, such as fire districts, Red Cross and Sheriffs Departments will be the key agencies in carrying out the evacuation. Agency involvement and specific evacuation procedures will vary from county to county. Evacuation procedures are addressed in the next section.

The following is a chronological summary of key warning system conditions, based on the above information, in relation to the number of hours before projected hurricane eye landfall or closest point of approach:

- 72 hour advisory: storm assigned Category number on Saffir/Simpson Scale by NHC (see Appendix A for a description of the Saffir/Simpson scale)
- 48 hours before projected eye landfall: local areas placed under hurricane watch condition by NHC
- 24 hours before projected eye landfall: local areas placed under hurricane warning condition by NHC
- 12-24 hours before projected eye landfall: local area advised to evacuate by NHC advisory or local NWS office Local Action Statement
- Governor advised by Bureau of Disaster Preparedness to issue an evacuation order for the local area or chief elected official of local political jurisdiction advised by its disaster preparedness department or committee to issue an evacuation order for the jurisdiction. Evacuation orders should be issued according to the recommended evacuation order times in this report.

[3/]See Appendix J for the chain of legal authority to issue an evacuation order.

[4/]The procedures for issuing a local evacuation order will vary from county to county.

- Evacuation order issued
- Evacuation order disseminated to the public by public media (Radio/TV) and/or emergency response agencies.

Technical Evacuation Information

As part of the warning system process, the State Bureau of Emergency Management, Central Florida Area Office and local disaster preparedness officials will have information on the extent and timing of the hurricane evacuation as compiled in this report.

By cross-referencing the population-at-risk and number of evacuating vehicles listed in tables 7 to 11 and the evacuation times listed in tables 29 to 30 with the levels of vulnerability listed on page 31, agency officials will be able to discern the amount of evacuation time and extent of evacuation for the affected areas according to the forecasted intensity of the storm.

Specialized Warning Procedures

Elderly and handicapped individuals, and residents of nursing homes and hospitals will probably require additional evacuation time. The number of elderly and handicapped residents in vulnerable areas or housing within the region are listed in Appendix E.

Specific procedures for an early warning system for elderly/handicapped and other individuals requiring assistance will be at the discretion of local officials. Examples of such procedures could include notices to such persons in public information materials to make special arrangements with friends or relatives or to contact specified governmental agencies.

Evacuation Procedures

For purposes of this section, evacuation procedures are divided into two parts: the assignment of vulnerable residents of the coastal counties to public shelter locations and the development of a regional framework for emergency evacuation management.

Shelter Assignments

Shelter assignments refer to the assignment of vulnerable persons within each evacuation zone to a particular shelter destination in the same or another evacuation zone. The assignment of individuals to public shelter destinations is based on the results of the transportation model.

The assignment of vulnerable residents requiring public shelter to public shelter destinations follow a three-phased procedure: designation of reception centers, assignment of intra-county evacuees and assignment of intercounty evacuees.

Designation of Reception Centers. In order to prevent the unnecessary opening of public shelters and thereby conserve needed evacuation manpower, evacuees will be first assigned to a reception center. A reception center is a key primary public shelter which will serve as a control point for opening additional public shelters. One reception center will be opened in each evacuation zone which contains at least one primary public shelter. During the evacuation process, as it becomes apparent that the capacity of the reception center will be exceeded, other primary public shelters in the evacuation zone or surrounding evacuation zones can be opened through a communications network.

The criteria for the designation of reception centers are those primary public shelters in each evacuation zone which have the greatest shelter capacity and are the most feasible for use as public shelter. Reception centers and associated primary public shelters, for each coastal county are presented in Table 33.

Intra-County Assignment. The goal of the intra-county shelter assignment is to minimize clearance time. As part of the transportation model, vulnerable intra-county residents were assigned to primary public shelter locations in each coastal county.[5/]

The logic of this shelter assignment can be seen by comparing tables 34 to 36 with maps 4 to 6. Tables 34 to 36 show the "paths" by which the vulnerable residents of an evacuation zone proceed to their primary shelter destinations. This is represented conceptually on maps 4 to 6 with evacuation zone centers, or centroids, and street or intersection locations, or nodes.

[5/] It was assumed in the assignment of intra-county evacuees that primary public shelters would be opened first. Since there appears to be adequate primary shelter capacity for coastal county evacuees, no secondary shelters were used in the assignment.

TABLE 33

RECEPTION CENTERS AND ASSOCIATED PRIMARY SHELTERS

Levy County

Evacuation Zone	Reception Center[1]	Associated Primary Shelters
L4	(L8)[2] Yankeetown School	None
L9	*(L7) Williston High School	(L3) Joyce Bullock Elementary School
		(L7) Williston Intermediate School
L10	(L1,L2) Bronson High and Elementary Schools	None
L12	(L4) Chiefland Elementary School	(L5) Chiefland High School

CITRUS COUNTY

Evacuation Zone	Reception Center[1]	Associated Primary Shelters
C8	(C5) Citrus High School	(C2) Inverness Middle School
		(C6) Inverness Primary School
		(C1) Adult Education
C9	*(C3) Floral City Elementary School	None
C10	(C4) Hernando Elementary School	None
C13	(C8) Lecanto Middle School	(C7) Lecanto Elementary School
		(C9) Oak Hill School

1/Asterisk indicates inter-regional reception center.

2/Corresponds with shelter identification numbers on tables 13 to 15 and Maps 21 to 35.

Hernando County

Evacuation Zone	Reception Center	Associated Primary Shelters
H7	(H6) Springstead High School	(H8) Westside Elementary School[3/]
		(H7) West Hernando Jr. High
		(H5) Spring Hill Elementary School
H11	*(H2) Eastside Elementary School	None
H14	(H4) D. S. Parrott Jr. High School	(H1) Mitchell L. Black Elementary School
		(H3) Hernando High School

[3/] Shelter will only be used under vulnerability level 'A'.

TABLE 34

LEVY COUNTY EVACUATION ROUTES
TO PUBLIC SHELTER

L01-L104, L126, L105, L106, L107, L125, L101-L12 <u>or</u> L01-L103, L102, L125, L101-L12

L02-L105, L106, L108, L110, L122-L10

L03-L113, L114, L115, L116, L119, L120, L121-L09

L04-L04 (Flood Level A); L04-L114, L115, L116, L119, L120, L121-L09 (Flood Level B)

L05-L108, L110, L122-L10 <u>or</u> L05-L111, L112, L110, L122-L10

L06-L107, L125, L101-L12 <u>or</u> L06-L103, L102, L125, L101-L12

L07, L110, L122-L10

L08-L116, L119, L120, L121-L09 <u>or</u> L08-L117, L118, L119, L120, L121-L09

L09-L09

L10-L10

L11-L109, L101-L12 <u>or</u> L11-L124, L101-L12

L12-L12

L13-L102, L125, L101-L12 <u>or</u> L 3-L100, L101-L12

Source: Post, Buckley, Schuh & Jernigan, Inc.

TABLE 35

CITRUS COUNTY EVACUATION ROUTES
TO PUBLIC SHELTER

C01-C102, C113-C13 or C01-C100, C101, C102, C113-C13

C02-C103, C104, C102, C113-C13

C03-C107, C106, C105, C111, C113-C13 or C03-C109, C108, C106, C105, C104, C102, C113-C13

C04-C108, C106, C105, C111, C112, C122, C119-C08

C05-C104, C105, C111, C112, C122, C119-C08 or C05-C104, C102, C113, C111, C112, C122, C119-C08

C06-C101, C102, C113-C13

C07-C110, C112, C122, C119-C08

C08-C08

C09-C09 or C09-C121, C119-C08 or C09-C120, C119-C08

C10-C10

C11-C116, C-1

C12-C122, C119-C08 or C12-C117, C118, C119-C08

C13-C13

C14-C114, C102, C113-C13 or C14-C114, C200, C115-C13

Source: Post, Buckley, Schuh & Jernigan, Inc.

TABLE 36

HERNANDO COUNTY EVACUATION ROUTES TO PUBLIC SHELTER

H01-H101, H103, H107, H111-H14 <u>or</u> H01-H100, H102, H107, H111-H114

H02-H105, H106-H04 <u>or</u> H02-H101, H103, H104, H106-H04 (Flood Level A); H02-H105, H106, H104-H07 <u>or</u> H02-H101, H103, H104-H07 (Flood Level B)

H03-H105, H106-H04 (Flood Level A); H03-H105, H106, H104-H07 (Flood Level B)

H04-H04 (Flood Level A); H04-H106, H104-H07 <u>or</u> H04-H106, H104, H103, H107, H111, H116-H12 <u>or</u> H04-H106, H104, H103, H107, H111, H110-H12

H05-H102, H103, H107, H111-H14

H06-H06 <u>or</u> H06-H107, H111-H14

H07-H07

H08-H107, H111-H14 <u>or</u> H08-H113, H112, H111-H14

H09-H112, H111, H110-H12 <u>or</u> H09-H115, H111, H116-H12

H10-H117, H116-H12 <u>or</u> H10-H114, H115, H111, H110-H12

H11-H119, H118, H117, H116-H12

H12-H12

H13-H108, H111-H14 <u>or</u> H13-H109, H110, H111-H14

H14-H14

Source: Post, Buckley, Schuh & Jernigan, Inc.

By following these paths, it can be seen that the vulnerable residents of each evacuation zone are assigned to the nearest primary shelter location until all the available primary shelters in the destination evacuation zone are utilized. If there is any overflow, the remaining evacuees are assigned to the nearest available primary public shelter. Public shelter capacities, by evacuation zone are presented in Table 37.

Inter-County Assignment. In the case of both the Withlacoochee and Tampa Bay regions evacuating (Regional Scenario C), it is assumed that a certain percentage of the Tampa Bay evacuees will enter the coastal counties via U.S. 41.[6/]

Under this scenario, the first reception center nearest U.S. 41 in each coastal county shall be designated as an inter-regional control center. These centers will monitor the number of incoming intra- and inter-regional evacuees and disseminate them, first among available primary shelter capacity and then to secondary shelters, if primary shelter capacity is exceeded.

Framework for Emergency Evacuation Management

Lead Agency. To effectively coordinate a regional response to a hurricane emergency, a lead agency must be designated to provide a linkage among the organizational participants. The lead agency must have jurisdiction over a multicounty area, and possess sufficient expertise, staff and funding to effectively manage the evacuation. A reliable communication system is also crucial for the overall coordination of the evacuation.

It is proposed that the Central Florida Area Office for the Bureau of Emergency Management (CEFA) located in Wildwood, be designated as the lead agency for interregional evacuation management. While other entities were considered for designation as lead agency, CEFA appears to be best qualified for terms of the criteria mentioned above. (see figure 10).

As the lead agency with overall responsibilities for coordination in the Withlacoochee Region, CEFA will serve as the focal point for the flow of information on hurricane warnings, evacuations and shelter openings.

[6/] Some evacuees will also enter the coastal counties via U.S. 301 and I-75.

TABLE 37

PUBLIC SHELTER CAPACITY BY EVACUATION ZONE

Levy County

Evacuation Zone Number[1/]	Primary Shelter Capacity	Secondary Shelter Capacity	Total
L4	212	0	212
L9	2,599	1,503	4,102
L10	837	500	1,337
L12	2,365	800	3,165
Total	6,013	2,803	8,816

Citrus County

Evacuation Zone Number[1/]	Primary Shelter Capacity	Secondary Shelter Capacity	Total
C8	7,391	2,881	10,272
C9	543	0	543
C10	600	0	600
C12	0	175	175
C13	2,707	0	2,707
Total	11,241	3,056	14,297

Hernando County

Evacuation Zone Number[1/]	Primary Shelter Capacity	Secondary Shelter Capacity	Total
H7	3,059	330	3,389
H8	2,728	0	2,728
H11	0	80	80
H12	1,041	0	1,041
H14	4,190	3,254	7,444
Total	11,018	3,664	14,682

[1/]Only those evacuation zones with public shelter capacity are listed.

SOURCE: WRPC Staff.

Figure 10

Emergency Facility Profile

Name

Central Florida Area Office (CEFA),
Bureau of Disaster Preparedness

Location

E. C. Rowell Building
S.R. 301 & 44A
Wildwood, Sumter County

Communication Systems:

- Standard Phone line
- Local Government Radio (18 counties, daily roll call)
- National Warning System (NAWAS - dedicated telephone line, some counties only)
- State Warning System (telephone line)
- "Hot ring" to nuclear plant and Levy and Citrus Counties
- Emergency Telephones - 16 telephones

Staffing

Normal Conditions - Hours 8 a.m. - 5 p.m., M-F
Secretary
Communicator
Local Government Assistance Representative

Emergency Conditions - 24 hours until emergency is over. In addition to normal staff, representatives from State agencies are present at the site (e.g. Florida Highway Patrol)

Other Facilities

EOC Room, Status Board, area-wide maps

Regional Entities. Organizations that will be involved at the regional level include the Florida Highway Patrol, the Red Cross and the Health and Rehabilitative Services Department. The FHP maintains traffic control and maintains the progress of the evacuation. Continuous communication with the regional EOC will provide up-to-the-minute information on the evacuation and thereby improved decision-making during the emergency. The Red Cross will be involved at the regional level in the opening and staffing of shelters. The regional office of the Red Cross would assist in areas without a local Red Cross Chapter. The State Department of HRS provides manpower assistance to the Red Cross should insufficient personnel be available for staffing of hurricane shelters.

County Entities. The County offices of civil defense or civil preparedness are responsible for marshaling county resources during and after a national disaster or emergency. The key contact person in each county is the civil defense director who is kept informed of conditions in the county and incorporated areas. The civil defense director reports to the county commission who are empowered to issue the evacuation order.

Other entities at the county level include the Red Cross, law enforcement, school boards, fire departments and so forth. The responsibilities of county agencies are specified to each county and are described in the respective peacetime emergency plans.

Traffic Control Points. Traffic control points are points along the county evacuation network used to direct traffic, resolve congestion problems and to divert traffic to other shelter destinations when the capacity of public shelters is reached.

It is recommended that the intersections, or nodes, shown on Maps 5-7 should be used as the basis for designating traffic control points. Nodes along U.S. 41 should serve as traffic control points for both intra- and inter-regional traffic.

Summary

By means of summary, two hypothetical scenarios of the use of the above warning system and evacuation procedures are presented.

In the first scenario, it is assumed that an intensity level 3 storm is forecasted to directly strike the Withlacoochee region within 24 hours. As a result, a hurricane warning has been issued for the coastal counties.

An intensity level 3 hurricane corresponds with vulnerability level 'B' from tables 7 to 9 it can be discerned how many evacuees from each evacuation zone will seek public shelter. From table 26 it can be seen that there is sufficient primary public shelter to accommodate the expected evacuees. From table 31, the evacuation times are shown to range from approximately 14 to 23 hours in the coastal counties.

Using this information, local disaster preparedness officials can employ increased readiness conditions, such as manning traffic control points and opening reception centers, according to the indicated evacuation times and expected evacuees.

Under the second hypothetical scenario, it is assumed that the same conditions hold with the exception that both the Withlacoochee and Tampa Bay regions are issued a hurricane warning.

Under this scenario, an estimated 17,000 persons will be seeking shelter in the coastal counties. As can be seen in table 31, this influx of Tampa Bay evacuees greatly increases evacuation times in Hernando County[7/]. As a result of this increased evacuation time, readiness conditions may have to be accelerated.

[7/]See footnote 4, Chapter V, on page 113.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Conclusions are divided into five categories: extent of vulnerability, sheltering, evacuation times, coordination and plan implementation.

Vulnerability

From the vulnerability analysis, it was determined that a majority of the vulnerable population in the coastal counties were mobile home residents outside of the surge vulnerable areas. It is apparent that if on-site shelters were available in mobile home parks, such as recreation centers, the number of persons requiring public shelter would be reduced.

Sheltering

From the coastal shelter analysis, it is apparent that there is sufficient primary shelter capacity to accommodate the coastal evacuees. Therefore, no inter-county evacuation will be necessary if only the Withlacoochee region is evacuated.

In the case of both the Withlacoochee and Tampa Bay regions being evacuated, secondary shelters will have to be opened. There should, however, be sufficient capacity to accommodate the expected number of evacuees seeking public shelter.

If secondary shelters are to be utilized they should be approved by the Red Cross or other agency, prior to opening.

Evacuation Times

In the case of only the Withlacoochee region being evacuated, the estimated evacuation times are within the 24-hour hurricane warning period, and, therefore, appear to be manageable.

If both the Withlacoochee and Tampa Bay regions are issued an evacuation order, the evacuation times are greatly increased and appear to be unmanageable.

Coordination

The warning system and evacuation procedures described in Chapter VI provide a guideline for assigning evacuees to public shelter and overall management of the evacuation process. For this system to work it is apparent that a good communications network is essential.

Plan Implementation

In order to effectively utilize the information produced in this report, decision-making guides and public information documents will be produced as companion reports to the technical data report.

Decision-making guides will be produced for each coastal county. These guides will consist of information on the warning and alerting of disaster preparedness agencies and the general public, decision-making necessary to effect the evacuation, and technical information, excerpted from the technical data report, on the extent and timing of the evacuation.

Public information documents will consist of newspaper tabloids and radio and TV scripts which will inform the public on what actions to take in the event an evacuation order is issued for the coastal counties. Newspaper tabloids will include maps indicating the location of public shelter areas, surge-vulnerable areas and evacuation routes. In addition, information on who is vulnerable to a hurricane and hurricane preparedness tips will be included. Radio and TV scripts will contain similar information.

Recommendations

Based upon the above conclusions, the following are recommendations for improving the evacuation process in the coastal counties of the Withlacoochee region.

1. The influx of Tampa Bay evacuees greatly increases evacuation times and puts a burden on public sheltering. Alternatives for reducing or better managing this influx should be investigated.

2. The use of on-site sheltering, such as recreation centers, in mobile home parks could reduce the vulnerable population and ease the burden on public shelters.

3. In order to more accurately determine the need for public sheltering, post-evacuation studies should be conducted, if possible.

4. The plan should be updated periodically to determine the increase in the vulnerable population and its effect on public sheltering and evacuation times. Post-evacuation studies should be included, if available.

5. In order to test the effectiveness of local evacuation procedures, mock evacuations should be conducted in the coastal counties.

APPENDIX

APPENDIX A

THE SAFFIR/SIMPSON HURRICANE SCALE

The Saffir/Simpson Hurricane Scale is used by the National Weather Service to give public safety officials a continuing assessment of the potential for wind and storm surge damage from a hurricane in progress. Scale numbers are made available to public safety officials when a hurricane is within 72 hours of landfall. Scale assessments are revised regularly as new observations are made, and public safety organizations are kept informed of new estimates of the hurricane's disaster potential.

Scale numbers range from 1 to 5. Scale No. 1 begins with hurricanes in which the maximum sustained winds are at least 74 mph, or which will produce a storm surge 4 to 5 feet above normal water level, while Scale No. 5 applies to those in which the maximum sustained winds are 155 mph or more, which have the potential of producing a storm surge more than 18 feet above normal.

The scale was developed by Herbert Saffir, Dade County, Florida, consulting engineer, and Dr. Robert H. Simpson, former National Hurricane Center director, and projects scale assessment categories as follows:

Category No. 1 - Winds of 74 to 95 mph. Damage primarily to shubbery, trees, foliage, and unanchored mobile homes. No real damage to other structures. Some damage to poorly constructed signs. Storm surge 4 to 5 feet above normal. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings.

Category No. 2 - Winds of 96 to 110 mph. Considerable damage to shrubbery and tree foliage; some trees blown down. Major damage to exposed mobile homes. Extensive damage to poorly constructed signs. Some damage to roofing materials of buildings; some window and door damage. Coastal roads and low-lying escape routes inland cut by rising water two to four hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded. Small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying island areas required.

Category No 3 - Winds of 111 to 130 mph. Foliage torn from trees; large trees blown down. Practically all poorly constructed signs blown down. Some damage to roofing materials of buildings; some window and door damage. Some structural damage to small buildings. Mobile homes destroyed. Storm surge 9 to 12 feet above normal. Serious flooding at coast and many smaller structures near coast destroyed; large structures near coast damaged by battering waves and floating debris. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Flat terrain 5 feet or less above sea level flooded inland 8 miles or more. Evacuation of low-lying residences within several blocks of shoreline possible required.

Category No. 4 - Winds of 131 to 155 mph. Shrubs and trees blown down; all signs down. Extensive damage to roofing materials, windows, and doors. Complete failure of roofs on many small residences. Complete destruction of mobile homes. Storm surge 13 to 18 feet above normal. Flat terrain 10 feet or less above sea level flooded inland as far as six miles. Major damage to lower floors to structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences on low ground within two miles of shore.

Category No. 5 - Winds greater than 155 mph. Shrubs and trees blown down; considerable damage to roofs on many residences and industrial buildings. Extensive shattering of glass in windows and doors. Some complete building failures. Small buildings over-turned or blown away. Complete destruction of mobile homes. Storm surge greater than 18 feet above normal. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes inland cut by rising water three to five hours before hurricane center arrives. Massive evacuation of residential areas on low ground within five to ten miles of shore possible required.

Dr. Neil Frank, present National Hurricane Center director, has adapted atmospheric pressure ranges to the Saffir/Sampson Scale. These pressure ranges, along with a numerical breakdown of wind and storm surge ranges are:

SCALE NUMBER	CENTRAL PRESSURES MILLIBARS	INCHES	WINDS (MPH)	SURGE (FT.)	DAMAGE
1	980	28.94	74- 95	4- 5	Minimal
2	965-979	28.5 -28.91	96-110	6- 8	Moderate
3	945-964	27.91-28.47	111-130	9-12	Extensive
4	920-944	27.17-27.88	131-155	13-18	Extreme
5	< 920	< 27.17	155+	18+	Catastrophic

APPENDIX B

BEHAVIORAL DATA

A statistically signficant survey was conducted by the consulting firm of H. W. Lochner, Inc. to determine hurricane evacuation behavior of the population-at-risk in the Withlacoochee region. Separate surveys were conducted for the inland counties of Marion and Sumter and the coastal counties of Levy, Citrus and Hernando.

The principal objectives of the survey were to determine:

- hurricane experience of persons in the region
- hurricane response, or how soon an evacuation order would be responded to
- the number of vehicles owned that would be used for evacuation
- the number of persons in the region needing transportation or special assistance during evacuation
- the types of destinations of the population-at-risk

Regarding hurricane experience, 45.3% ± 4.3% of the inland county survey respondents and 32.9% ± 4.1% of the coastal county survey respondents indicated they had experienced a direct hurricane strike. The respondents were also asked when and where this hurricane experience occurred. The locations and times provided were cross-referenced with Tropical Cyclones of the North Atlantic Ocean, published by the National Oceanic and Atmospheric Administration, to check the accuracy of the responses. The result of this cross-reference indicated that 17.% ± 3.2% of the inland county respondents and 9.2% ± 2.5% of the coastal county respondents actually experienced a hurricane, with an additional 8.3% ± 2.4% and 9.7% ± 2.6%, possibly experiencing a hurricane; respectively.

Table B1 provides information regarding the remainder of the survey objectives. Of particular importance is the evacuation destination section of the table which shows a fairly large percentage of the survey respondents indicating public shelter for their evacuation destination. In addition, a significant percentage also did not know their evacuation destination. When these two figures are combined, 41.9% ± 7.4% of the coastal county respondents and 65.7% ± 7.3% of the inland county respondents will either use public shelter or do not know their evacuation destination.

TABLE B1

BEHAVIORAL DATA

	Withlacoochee Coastal	Withlacoochee Inland
EVACUATION RESPONSE		
Immediate	74.0% ± 3.8%	85.6% ± 3.1%
Certain Number	15.4% ± 3.2%	12.6% ± 2.9%
Never	10.6% ± 2.7%	1.8% ± 1.2%
Average of the certain number of hours	1.71	1.77
VEHICULAR USAGE	65.5%[1/]	71.7%
NEED FOR TRANSPORTATION	1.1% ± 0.9%	3.6% ± 1.6%
NEED FOR SPECIAL HELP	3.9% ± 1.7%	6.1% ± 2.1%
DESTINATION		
Shelter	25.6% ± 4.0%	40.0% ± 4.3%
Friend or Relative	34.0% ± 4.3%	13.7% ± 3.0%
Hotel or Motel	24.1% ± 3.9%	20.6% ± 3.6%
Don't Know	16.3% ± 3.4%	25.7% ± 3.0%

1/ Percentage of vehicles owned which would be used for evacuation.

Source: Withlacoochee Behavioral Survey, H. W. Lochner, Inc.

The evacuation destination distribution presented in table B1 indicates that a significant percentage of the population-at-risk does not know what their shelter destination would be. As a result of presentations before the Regional Disaster Preparedness Advisory Committee, it was decided, as a planning assumption, that 50 percent of the "Don't Knows" would be allocated to public shelter and that the remaining 50 percent would be allocated to friends or relatives. The resulting evacuation destination distribution is shown below:

Destination	Coastal	Inland
Shelter	30.6	53.8
Friend or Relative	40.6	18.5
Hotel or Motel	28.8	27.7

It should be noted that the evacuation destination distribution percentages are changeable parameters in the trip generation phase of the transportation model. Therefore, if post-evacuation studies indicate a change in the percentage of persons requiring public shelter, the resulting changes in evacuation time can be calculated.

APPENDIX C

NUMBER OF DWELLING UNITS BY VULNERABILITY LEVEL

Vulnerability Level	Number Of[1] Mobile Homes	Number of Other Housing Units	Total
Levy County			
A	3,290	1,183	4,473
B	3,290	1,865	5,155
Citrus County			
A	8,238	3,195	11,433
B	8,238	4,484	12,722
Hernando County			
A	5,632	2,151	7,783
B	5,632	5,034	10,666
Marion County[2]			
-	12,599	-	12,599
Sumter County[2]			
-	3,375	-	3,375
Regional Total			
A	33,134	6,521	39,663
B	33,134	11,383	44,517

Notes: 1 - Includes number vulnerable to hurricane surge and winds
2 - Vulnerable to hurricane winds only

Sources: Levy County Tax Assessor's Office
Hernando County Property Appraiser's Office
Citrus County Property Appraiser's Office
U.S. Census, 1980
Certificates of Occupancy 1980-1982, WRPC Staff

APPENDIX D

DETERMINATION OF NUMBER OF VEHICLES AND ELDERLY/DISABLED PERSONS

Number of Vehicles

The number of vehicles used during evacuation is calculated in the following manner. First, the average number of vehicles per household for each county is determined by dividing the number of registered motor vehicles[1] for each county, obtained from the 1981 Florida Statistical Abstract, by the number of housing units in each county from the 1980 U.S. Census. This figure is then multiplied by the vehicular usage percentage obtained from the behavioral survey which indicates the average percentage of the number of vehicles per household that would be used during evacuation. Vehicular usage percentages were estimated for the coastal and inland counties.

The calculation of this multiplier is shown below:

County	Vehicles Per Household		Vehicular Usage Percentage		Vehicular Usage Multiplier
Levy	1.6	x	65.5%	=	1.1
Citrus	1.6	x	65.5	=	1.1
Hernando	1.7	x	65.5	=	1.1
Marion	2.1	x	71.7	=	1.5
Sumter	1.7	x	71.7	=	1.2

The resultant vehicular usage multiplier is applied to the number of housing units vulnerable to hurricane hazards (see Appendix C) to determine the number of vehicles used during evacuation.

Number of Elderly/Disabled Persons

The number of elderly/disabled persons is determined by multiplying the population-at-risk by the percentage of the sample survey indicating the need for transportation and the need for special assistance as shown below:

[1]Includes passenger cars, trucks, trailers and motorcycles.

County	Percentage Needing[1] Transportation	Percentage Needing Special Assistance	Total
Inland	5.2%	8.2%	13.4%
Coastal	2.0	5.6	7.6

[1] Percentages expressed are upper-range values of the confidence interval of the percentage estimates.

APPENDIX E

NUMBER OF ELDERLY/HANDICAPPED RESIDENTS
BY VULNERABILITY LEVEL

Vulnerability[1] Level	Number Needing Transportation	Number Needing Special Assistance	Total
	Levy County		
A	242	676	918
B	278	779	1,057
	Citrus County		
A	526	1,473	1,999
B	585	1,639	2,224
	Hernando County		
A	374	1,046	1,420
B	512	1,433	1,945
	Marion County[2]		
-	1,694	2,671	4,365
	Sumter County[2]		
-	474	747	1,221
	Regional Total		
A	3,310	6,613	9,923
B	3,543	7,269	10,812

Notes: 1 - Includes number vulnerable to hurricane surge and winds
2 - Vulnerable to hurricane winds only

Sources: Same as Appendix B
Withlacoochee Behavioral Survey, H. W. Lochner, Inc.

APPENDIX F

COASTAL COUNTY HOTEL/MOTEL CAPACITY

This analysis compares the number of persons in the coastal counties indicating hotels/motels as their shelter destination, according to the survey of hurricane response behavior conducted in the Withlacoochee region, with the available hotel/motel capacity.

To determine the number of persons seeking shelter in hotels/motels, the population-at-risk in the coastal counties, from the Vulnerability Analysis, is multiplied by the percentage of persons indicating hotels/motels as their shelter destination from the behavioral survey. The following are the results for each of the coastal counties:

County	Population At Risk[1/]		Percentage Hotel/Motel[2/]		Number of Persons
Levy	13,919	x	28%	=	3,897
Citrus	29,261	x	28%	=	8,193
Hernando	25,597	x	28%	=	7,167
Total	69,077	x	28%	=	19,257

To determine the available hotel/motel capacity, data from the Crisis Relocation Plan Host Area Facility Siting Surveys (CRP) by the Federal Emergency Management Agency are multiplied by the 1981 average hotel/motel vacancy rate from the Florida Hotel and Motel Association, Inc. Table F1 indicates the location of each hotel/motel in the coastal counties and its available capacity. It should be noted that a large percentage of the hotels/motels in the coastal counties of the Withlacoochee region are located in areas subject to possible surge inundation and are, therefore, not included in Table F1. In addition, the total capacity calculations are preliminary since only CRP listings were used to determine the capacity.

[1/] Number of persons vulnerable to hurricane force winds and storm surge for Vulnerability Level B.

[2/] Upper limit of confidence interval of percentage estimate.

TABLE F1

AVAILABLE COASTAL COUNTY HOTEL/MOTEL CAPACITY

Levy County[1/]

Hotel/Motel Name	Location	Total Capacity[2/]	Vacancy Rate	Available Capacity
Holiday Motel	US 27A & Main St. Bronson, FL	158	36.3%	57
Chiefland Motor Court	US 19 & US 27A Chiefland, FL	124	36.3%	45
Funny Farm Family Inn	Main St. & SE 9 Ave. Chiefland, FL	78	36.3%	28
Holiday Motel	US 19N & C 237 Chiefland, FL	140	36.3%	50
Manatee Springs Motel	US 19N & C 341 Chiefland, FL	176	36.3%	63
Tomahawk Motel	US 19N & C 346 Chiefland, FL	120	36.3%	43
Crystal Oaks Motel	US 19 & C 346 Fanning Springs, FL	68	36.3%	24
Holiday Lodge Motel	US 19 & SR 26 Fanning Springs, FL	256	36.3%	92
J-R Motel	US 19 & C55A Fanning Springs, FL	84	36.3%	30
Southern Inn Motel	US 19 & C346 Fanning Springs, FL	48	36.3%	17
Williston Motor Inn	W Noble Ave. & 6 St. Williston, FL	636	36.3%	230
Total	-	1,888	36.3%	679

[1/] The vacancy rate for Levy County is not available; therefore an average of the Citrus and Hernando County rates is used.

[2/] Based on Crisis Relocation Plan Host Facility Siting Surveys at 20 square ft./person.

Citrus County

Hotel/Motel Name	Location	Total Capacity	Vacancy Rate	Available Capacity
Beverly Hills Motel	SR 491 & Bev. Hills Blvd. Beverly Hills, FL	188	40.6%	76
El Ranchero Motel	US 41 & SR 486 Hernando, FL	66	40.6%	26
Mid Florida Motel	US 41 & SR 486 Hernando, FL	74	40.6%	30
Cypress Lodge	SR 44 & Ola St. Inverness, FL	90	40.6%	36
Leaning Oak Cottage	SR 44 & Washington St. Inverness, FL	110	40.6%	44
Florida Motel	US 41 & Zephyr St. Inverness, FL	82	40.6%	33
Total	-	610	40.6%	245

Hernando County

Hotel/Motel Name	Location	Total Capacity	Vacancy Rate	Available Capacity
Days Inn	I-75 & US 98 Brooksville, FL	274	31.9%	87
Holiday Inn	E SR 50 & I-75 Brooksville, FL	110	31.9%	35
Tangerine Hotel	307 N. Howell Ave. Brooksville, FL	775	31.9%	247
Willis Motel	S US 41 & SR 577 Brooksville, FL	40	31.9%	12
Holiday Inn	US 19 & SR 50 Weeki Wachee, FL	360	31.9%	114
Total	-	1,559	31.9%	495

Coastal County Total

Total	-	4,057	-	1,419

A comparison of the available coastal county hotel/motel capacity with the number of persons seeking shelter in hotels/ motels yields the following net capacity for hotels/motels:

County	Available Capacity		Number of Persons		Net Capacity
Levy	679	-	3,897	=	- 3,200
Citrus	245	-	8,193	=	- 7,948
Hernando	495	-	7,167	=	- 6,672
Total	1,419	-	19,257	=	-17,838

APPENDIX G

INVENTORY CRITERIA OF CURRENT PRIMARY PUBLIC SHELTERS

I. GENERAL INFORMATION

A. Name of Structure ______________________________

B. Address ______________________________

____

C. Telephone Number ______________________________

D. Type of Structure ______________________________
(i.e., school, commercial building)

E. Owner:

__________ County School Board

__________ County

Private ______________

____

____

F. Contact Person:

Name ______________________________

Address ______________________________

____

Phone Number ______________________________

II. SITE LOCATION INFORMATION

A. Building Site Elevation (of ground floor in feet above mean sea level) ______________________________

B. Total Number of Acres ______________________________

C. Number of Parking Spaces ______________________________

D. Number of Acres Conducive for Potential Parking __________

E. Location in Terms of a Flood Hazard Area ______________

F. Public Safety Jurisdictions:

1. Fire ______________________________

2. Rescue ______________________________

3. Law Enforcement ______________________________

III. BUILDING CONSTRUCTION CHARACTERISTICS

A. Year Constructed ______________

B. Building Classification by Construction

_____ Type I _____ Type IV

_____ Type II _____ Type V

_____ Type III _____ Type VI

C. Roof Type:

_____ Hip _____ Flat _____ Gable _____ Gambrel

_____ Mansard _____ Other

D. Roof Classification

_____ Type A _____ Type B _____ Type C _____ Other

E. Roof Covering ______________________

F. Roof Anchorage ______________________

G. Exterior Walls:

_____ Stucco Masonry _____Brick Masonry _____Masonry

_____Jumbo Brick _____Block Masonry _____Clay Tile Stucco

_____ Other

H. Floor Covering

___Carpeting ___Wood ___Tile ___Cement ___Other

I. Number of Floors

J. Types of Windows:

___Awning ___Casement ___Double Hung ___Horizontal

___Louver ___Hopper ___Jalousie ___Pivoted ___Other

K. Building Type: _____Single _____Wing _____Other

IV. CODE CONFORMANCE

			Date of Last Inspection
Building Code	_____Yes	_____No	__________
Fire Code	_____Yes	_____No	__________
Health Code	_____Yes	_____No	__________

V. SHELTER AMENITIES

A. Source of Power

1. Ongoing

___Electric ___Gas ___Other

2. Auxiliary

___Generator ___Battery Operated ___Other

B. Sources of Food

1. Number of people who can be served, based on three daily meals __________

2. For how long can food service be provided? __________

C. Sanitary Facilities

1. Toilet Facilities:

a) Number of restrooms: ___Men ___Women

b) Number of showers: ___Men ___Women

2. Type of wastewater treatment facilities:

a) _____Sewer _____Septic _____Package Plant _____Other

b) _____Independent system _____Dependent system

c) Serviced by ______________________________

3. Potable water supply facilities:

a) Available emergency supply ____________________

b) _____Independent system _____Dependent system

c) Serviced by ____________________

D. Kitchen Facilities

1. Sources of power

a) Ongoing Power

_____Electric _____Gas _____Other

b) Auxiliary Power

_____Generator _____Battery Operated _____Other

2. Total Number of Square Footage ____________________

3. Total Number of Sinks ____________________

E. Communications

1. Does the shelter have a public address system? ___Yes ___No

Control location ____________________

2. Does the shelter have a weather alert radio? ___Yes ___No

Designated Location ____________________

3. Other Communication Devices:

___Telephone ___Citizen Band Radio ___Ham-operated radio; is so, is antenna and coax installed? ___Yes ___No

___Other

Designated Location

F. First Aid Facilities

1. Does the building have an infirmary? ___Yes ___No

2. What is the status of the first aid supplies?

___Excellent ___Good ___Fair ___Poor

3. Is any special medical equipment or personnel available?

___Oxygen __________ __Doctor __________

__________ __________ __Nurse __________

4. Are facilities available to accommodate the infirm, elderly and/or handicapped? _____Yes _____No

   _____Ramps _____Specially equipped restrooms

   _____Other

G. Transportation Facilities

1. Is there a means of transportation at the site?

   _____Yes _____No

2. What type?

   _____Bus _____Van _____Automobile _____Other

3. Does vehicle have a two-way radio? ___Yes ___No

VI. DESIGNATED AREAS OF SAFETY AND PLANNED CAPACITY

Identification of Area				Planned Capacity	
Area Name	Building #	Room #	Square Footage	20 sq.ft.	40 sq.ft.
			Total:		

VII. EMERGENCY MANPOWER

A. Designated Emergency Administrator of Shelter

Name ______________________________

Address ______________________________

Phone Number ______________________________

B. Alternate Emergency Administrators of Shelter

Name ______________ Name ______________

Address ______________ Address ______________

Phone Number ______________ Phone Number ______________

SHELTER VICINITY MAP

MAJOR STREET ACCESSIBILITY TO SHELTER

____

____

____

____

____

____

INVENTORY CRITERIA OF SECONDARY SHELTERS

I. GENERAL INFORMATION

A. Name of Structure ______________________________

B. Address ______________________________

____

C. Telephone Number ______________________________

D. Type of Structure ______________________________

E. Contact Person ______________________________

____

____

II. BUILDING CONSTRUCTION CHARACTERISTICS

A. Exterior Walls ______________________________

B. Percent Square Footage of Windows ______________________________

III. SHELTER CAPACITY

A. CRP Listing ______________________________

B. Owner Estimate ______________________________

IV. COMMENTS

____

____

____

____

____

____

APPENDIX H

EXAMPLE OF CALCULATION OF CLEARANCE TIME

The following is a step-by-step example of the calculation of clearance time in Hernando County. Basically there are three steps: trip generation, trip distribution and assignment and the calculation of clearance time.

Trip Generation

Based on the average number of vehicles per household used during evacuation, the number of evacuating vehicles were calculated for each evacuation zone. These vehicles were stratified according to evacuation destination: public shelter, friend or relative, hotel/motel. The results are presented in table 9A and 9B, for each vulnerability level.

Trip Distribution and Assignment

For each evacuation destination, the number of evacuating vehicles in each evacuation zone are distributed on the evacuation network for each vulnerability level. This is accomplished in two ways. For the public shelter and hotel/motel destinations, the number of evacuating vehicles seeking these destinations in each evacuation zone is compared with the vehicle capacity of the public shelters and hotels/motels in the same and other evacuation zones. The vehicles are then distributed on the evacuation network such that the nearest available shelters or hotel/motels are utilized first. If the capacity is exceeded, the remaining vehicles are allocated to the next nearest available shelter or hotel/motel.[1/]

For the friend or relative destination, the evacuating vehicles are distributed on the evacuation network using a gravity model.[2/] Tables H-1 to H-6 present trip distribution matrices from each evacuation origin zone to each evacuation destination zone for each type of evacuation destination and each vulnerability level.

[1/]If the hotel/motel capacity in a particular county is exceeded, the remaining vehicles are routed outside the county.

[2/]The Council staff has a copy of the gravity-model set-up used for this part of the analysis.

In-county evacuating vehicles were assigned to evacuation destinations using the above trip distribution. Out of county vehicles were assigned to I-75 and SR 50 using a 50/50 split of out-of-county traffic on each route.

In the case of an evacuation of both the Withlacoochee and Tampa Bay regions, the number of vehicles expected to enter the county on U.S. 41, U.S. 301 and I-75 from the Tampa Bay region were allocated to remaining primary shelter capacity and available secondary shelter capacity in Hernando County.

Table H-6 shows the assigned traffic volumes and volume/capacity ratios for vulnerability levels 'A' and 'B' (with and without Tampa Bay evacuees) on each link in the evacuation network presented in Map 7.

Calculation of Clearance Times

Clearance time is calculated by examining Table H-7 for the link in the evacuation network which has the highest ratio of volume to capacity, that is, the most congested link. This is termed the critical link. Based on the assumed hourly link capacity for the critical link, the number of hours it takes to clear the link is calculated. Added to this time is the number of hours it takes for the last vehicle using the link to get to the county line.

Table H-8 shows how the clearance time is calculated. Traffic using the link is assigned to the link based on a quick, medium or slow response to an evacuation order. This is reflected in the percentage breakdown in the first set of columns. Traffic is released on the link from zones adjacent to the link, other zones in the region, other counties in the region, Tampa Bay evacuees and background traffic in the area according to the behavioral response distribution. An assumed offset of 0 or 1 hours is used for the amount of time it takes for each source of traffic to reach the critical link.

The hourly rate of increase and dissipation in evacuating traffic on the critical link is shown in the "carryover analysis." The sum of the result of the "carryover analysis" plus the number of hours it takes for the last vehicle to reach the county line is the clearance time.

Tables H-8 and H-9 show the results of this clearance time analysis for vulnerability level B and level of behavioral response A, with and without a Tampa Bay evacuation. It should be noted that the clearance times in Hernando County are the same for each vulnerability level with a Tampa Bay evacuation because the critical links do not change.

TABLE H-1

Red Cross purpose

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL A

No. of zones - 14

TO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
FROM															
1														93	
2				305											
3				417											
4				78											
5														24	
6						(210)								(359)	
7							7								
8														150	
9												119			
10												120			
11												95			
12												168			
13														283	
14														224	

TABLE H-2

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL A

Friends purpose

no. of zones - 14

TO / FROM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
1	0	0	0	27	3	7	12	14	3	6	6	8	8	11	18
2	0	0	0	170	6	9	52	45	5	11	10	10	9	15	61
3	0	0	0	265	4	3	81	42	6	12	16	12	10	20	83
4	0	0	0	64	1	1	9	6	1	2	1	1	1	2	16
5	0	0	0	5	2	1	3	4	1	1	2	2	3	4	5
6	0	0	0	58	10	60	43	73	30	21	48	87	90	122	113
7	0	0	0	3	0	0	3	1	0	0	0	0	0	1	1
8	0	0	0	20	1	3	12	65	9	13	10	6	4	25	30
9	0	0	0	3	0	1	4	11	26	22	12	21	8	25	24
10	0	0	0	1	0	0	1	3	4	63	35	14	2	12	24
11	0	0	0	0	0	0	0	0	0	2	101	3	0	1	19
12	0	0	0	1	0	1	1	1	3	11	39	94	14	26	33
13	0	0	0	2	1	2	1	2	3	4	14	40	106	144	56
14	0	0	0	2	1	2	1	9	7	18	20	49	21	122	45

TABLE H-3

Hotel/Motel purpose

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL A

No. of zones - 14

TO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
FROM															
1															88
2															287
3															392
4				53											21
5															22
6															536
7															7
8															141
9															112
10															113
11															89
12															158
13															266
14														176	35

TABLE H-4

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL B

Red Cross purpose

No. of zones - 14

TO / FROM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
1														93	
2							305								
3							417								
4							(324)							(916)	
5														95	
6						(210)								(359)	
7							7								
8														150	
9												119			
10												120			
11												95			
12												168			
13														283	
14														224	

TABLE H-5

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL B

Friends purpose

No. of zones - 14

TO / FROM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
1	0	0	0	0	0	9	16	20	4	8	8	12	12	16	18
2	0	0	0	0	0	18	105	94	11	23	21	21	19	31	61
3	0	0	0	0	0	7	187	100	13	27	38	28	23	47	83
4	0	0	0	0	0	40	546	339	39	97	77	77	70	111	247
5	0	0	0	0	0	6	17	21	5	6	10	8	15	21	19
6	0	0	0	0	0	69	47	81	33	24	53	100	99	136	113
7	0	0	0	0	0	0	5	1	0	0	0	0	0	2	1
8	0	0	0	0	0	3	14	75	10	15	11	7	4	29	30
9	0	0	0	0	0	2	4	11	27	22	12	22	8	25	24
10	0	0	0	0	0	0	1	3	4	64	35	15	2	12	24
11	0	0	0	0	0	0	0	0	0	2	101	3	0	1	19
12	0	0	0	0	0	1	1	1	3	11	38	96	13	26	33
13	0	0	0	0	0	2	1	2	4	4	14	41	106	145	56
14	0	0	0	0	0	2	1	9	7	18	20	50	21	124	45

TABLE H-6

HERNANDO COUNTY
TRIP DISTRIBUTION MATRIX
FLOOD LEVEL B

HOTEL/MOTEL Purpose

no. of zones - 14

TO / FROM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	OUT OF CTY.
1															88
2															287
3															392
4															1167
5															90
6															536
7															7
8															141
9															112
10															113
11															89
12															158
13															266
14														176	35

TABLE H-7

HERNANDO COUNTY
ASSIGNED LINK VOLUMES AND V/C RATIOS

Link	A	A w/tb	B	B w/tb	Volumes	A	A w/tb	B	B w/tb
100-102	134	134	138	138	25900	.005	.005	.005	.005
102-103	201	201	428	428	32400	.006	.006	.013	.013
101-103	624	624	628	628	14600	.043	.043	.043	.043
103-104	1349	1349	4574	4574	32400	.042	.042	.141	.141
104-106	1247	1247	5917	5917	25900	.048	.048	.228	.228
105-106	1860	1860	1877	1877	11700	.159	.159	.160	.160
103-107	1497	1497	5143	5143	14600	.103	.103	.352	.352
107-111	2861	2861	6218	6218	14200	.201	.201	.438	.438
108-111	312	312	365	365	14600	.021	.021	.025	.025
109-110	644	3208	720	3284	14600	.044	.220	.049	.225
110-111	627	3191	725	3289	14200	.044	.225	.051	.232
111-112	300	11198	271	11169	14200	.021	.789	.019	.787
112-113	200	11098	85	10983	14600	.014	.760	.006	.752
111-115	329	329	466	466	14200	.023	.023	.033	.033
114-115	112	112	218	218	14600	.008	.008	.015	.015
116-117	2499	9607	4477	11305	14600	.171	.658	.307	.774
111-116	2779	9327	4077	10905	14200	.196	.657	.287	.768
117-118	2998	9826	4578	11406	21600	.139	.673	.314	.771
118-119	1384	15041	2234	15891	14600	.095	1.030	.153	1.088
200-109	0	2564	0	2564	14600	.000	.176	.000	.176
201-118	1397	57906	2127	58033	68400	.020	.847	.031	.848
202-119	0	8103	0	8103	14600	.000	.555	.000	.555
206-119	1398	1398	2127	2127	14600	.096	.096	.146	.146
203-119	0	21797	0	21797	14600	.000	1.493	.000	1.493
204-118	0	35421	0	35421	68400	.000	.518	.000	.518
205-113	0	10898	0	10898	14600	.000	.746	.000	.746

TABLE H-8

CRITICAL LINK: SR50 W. OF BRKSVILLE

RESPONSE CURVE : A
HOURLY LINK CAPACITY: 1150

TRAVELTIME/DELAY ANALYSIS
HERNANDO COUNTY
FLOOD LEVEL :B

ZONES ADJACENT TO LINK	OTHER ZONES IN COUNTY	OTHER COUNTIES IN REGION	TAMPA BAY	BACKGROUND	TOTALS
1091 *(.15) +	5127 *(.00) +	0 *(.00) +	0 *(.00) +	790 *(.85) =	835
1091 *(.70) +	5127 *(.15) +	0 *(.15) +	0 *(.15) +	790 *(.15) =	1651
1091 *(.15) +	5127 *(.70) +	0 *(.70) +	0 *(.70) +	790 *(.00) =	3752
1091 *(.00) +	5127 *(.15) +	0 *(.15) +	0 *(.15) +	790 *(.00) =	769
					7008

CARRYOVER ANALYSIS

HOUR	QUEUE	HOUR	QUEUE
1	0	2	501
3	3103	4	2722
5	1572	6	422
7	0	8	0

6.36 HOURS TO CLEAR LINK
\+ .5 HOURS TO GO FROM SR50 W. OF BRKSVILLE TO HERNANDO COUNTY LINE
\------
6.86 HOURS CLEARANCE TIME

ZONES ADJACENT TO LINK 5,6,8,14
OTHER ZONES IN THE COUNTY 1-4,7,9-13

TABLE H-9

CRITICAL LINK: US301 S. OF SR50

RESPONSE CURVE : A
HOURLY LINK CAPACITY: 937

TRAVELTIME/DELAY ANALYSIS
HERNANDO COUNTY
FLOOD LEVEL :A&B W/ TAMPA BAY

ZONES ADJACENT TO LINK	OTHER ZONES IN COUNTY	OTHER COUNTIES IN REGION	TAMPA BAY	BACKGROUND	TOTALS
0 *(.15) +	0 *(.00) +	0 *(.00) +	21797 *(.00) +	519 *(.85) =	441
0 *(.70) +	0 *(.15) +	0 *(.15) +	21797 *(.15) +	519 *(.15) =	3347
0 *(.15) +	0 *(.70) +	0 *(.70) +	21797 *(.70) +	519 *(.00) =	15257
0 *(.00) +	0 *(.15) +	0 *(.15) +	21797 *(.15) +	519 *(.00) =	3269

					22316

CARRYOVER ANALYSIS

HOUR	QUEUE	HOUR	QUEUE
1	0	2	2410
3	16731	4	19063
5	18126	6	17189
7	16252	8	15315
9	14378	10	13441
11	12504	12	11567
13	10630	14	9693
15	8756	16	7819
17	6882	18	5945
19	5008	20	4071
21	3134	22	2197
23	1260	24	323
25	0	26	0

24.34 HOURS TO CLEAR LINK
\+ .25 HOURS TO GO FROM US301 S. OF SR50 TO HERNANDO COUNTY LINE

24.59 HOURS CLEARANCE TIME

ZONES ADJACENT TO LINK 11
OTHER ZONES IN THE COUNTY 1-10,12-14

APPENDIX I

TRANSPORTATION ANALYSIS

WITHLACOOCHEE REGIONAL HURRICANE EVACUATION PLAN

Prepared For

Withlacoochee Regional Planning Council
1241 S.W. 10th Street
Ocala, Florida 32670

Prepared By

Post, Buckley, Schuh & Jernigan, Inc.
217 South Adams Street
Tallahassee, Florida 32301

AUGUST 1983

Financial assistance provided by the Department of Environmental Regulation, the Coastal Zone Management Act of 1972, as amended, administered by the OCZM/NOAA, and the Department of Community Affairs, Bureau of Disaster Preparedness

EXECUTIVE SUMMARY

The potential for loss of life in the Withlacoochee Region of Florida due to a hurricane is significant considering the growing number of persons inhabiting the low-lying coastal areas and the number of persons living in mobile homes. The Withlacoochee Regional Planning Council, recognizing the importance of quantifying the clearance times required for individuals to leave their place of residence and reach safe shelter, hired Post, Buckley, Schuh & Jernigan, Inc. to perform the necessary transportation analysis.

Five evacuation travel patterns were identified and quantified for evacuation routes selected for each of Levy, Citrus, Hernando, Marion and Sumter Counties. Based on two assumed general flooding levels, evacuation with and without a Tampa Bay evacuation, and three levels of behavioral response, travel modeling was performed to estimate clearance times. Evacuation zones were established in each county to facilitate data analysis and estimate evacuation travel demand.

Of the approximately 250,000 people living in the region, 98,923 persons for a less severe hurricane, and 110,649 persons for a severe hurricane would be required to evacuate their homes and seek Red Cross shelters, safe hotel/motel units, or the safe home of a friend or relative. A shortage of hotel/motel units will exist for the many evacuees intending to go to this type of destination. Red Cross shelter capacities in each county are adequate for expected in-county demand.

Critical roadway links were identified for each county. These segments will experience the greatest traffic congestion in an evacuation. Although many roadways will experience congestion, for the purposes of calculating clearance times these links will be the controlling segments in the evacuation network.

Levy County:	US 41 between Williston and SR 121 (all regional vulnerability levels)
Citrus County:	SR 44 west of Inverness and east of CR491 (all regional vulnerability levels)

Hernando County:	SR50 west of Brooksville and east of CR491 (regional vulnerability levels without Tampa Bay)
	US 301 between SR50 and south county line (regional vulnerabiilty levels with Tampa Bay evacuation)
Marion County:	SR40 between CR314 and CR315 (regional vulnerability levels without Tampa Bay)
	I-75 between CR484 and SR200 (regional vulnerability levels with Tampa Bay evacuation)
Sumter County:	SR44 west of I-75 (regional vulnerability levels without Tampa Bay evacuation)
	I-75 between SR44 and north county line (regional vulnerability levels with Tampa Bay evacuation)

Clearance times varied depending on the assumed behavioral response rates. Ranges of clearance times estimated for each county area as follows:

Levy	4 1/4 to 10 1/4 hours
Citrus	7 3/4 to 13 hours
Hernando	4 1/4 to 26 1/4 hours
Marion	5 to 21 1/4 hours
Sumter	4 1/2 to 21 hours

Clearance time requirements for each county without a concurrent Tampa Bay region evacuation appear to be very manageable. However, with a Tampa Bay evacuation, clearance times become quite large and difficult to deal with given the limits of the warning system.

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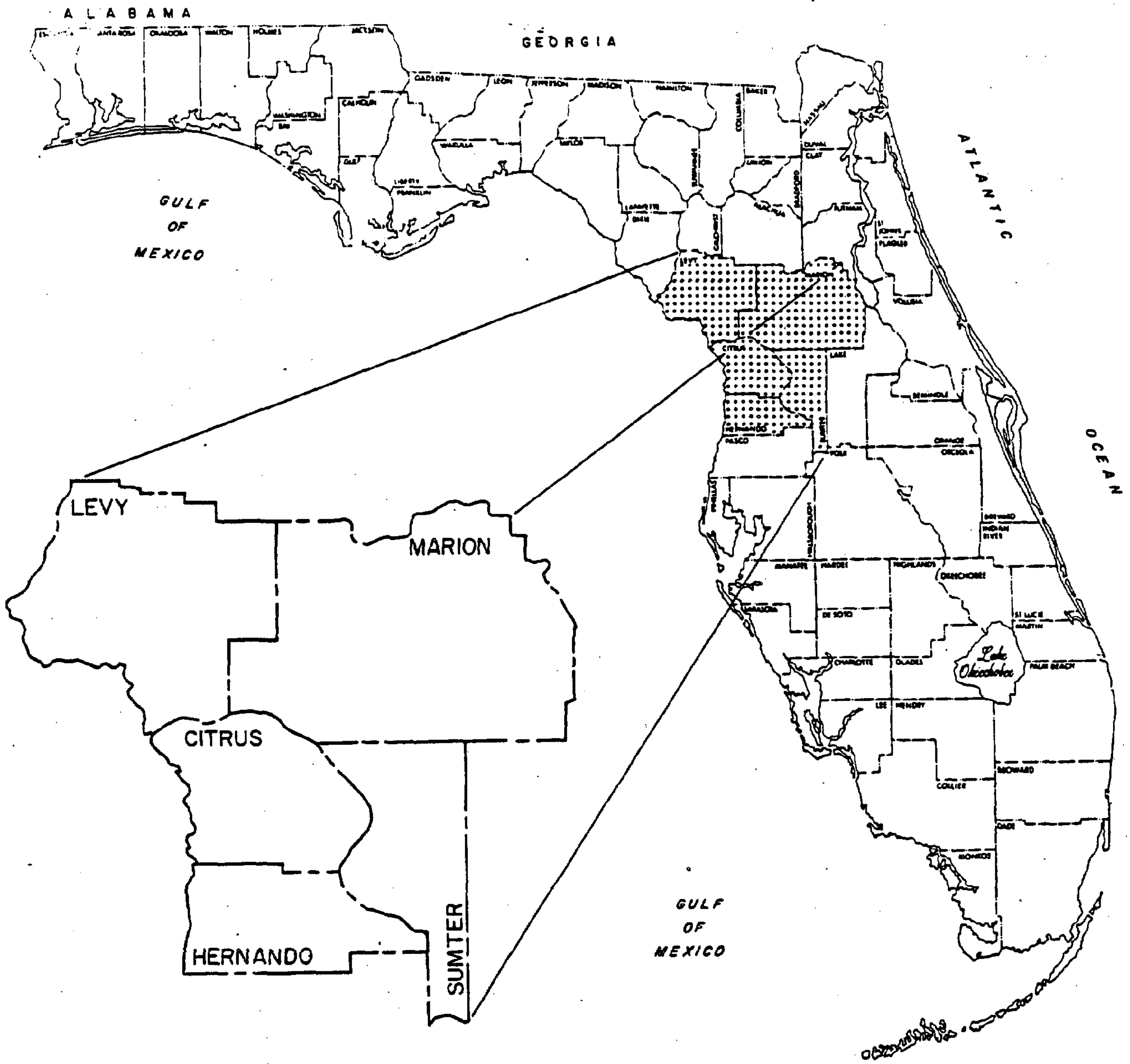
CHAPTER 1
INTRODUCTION

The Withlacoochee region of Florida, comprised of Levy, Citrus, Hernando, Marion and Sumter Counties, is one of the most hurricane vulnerable areas of the United States. The region, shown in Figure 1, has been affected in the last century by approximately 30 hurricanes. The potential for loss of life today is significant considering the number of persons inhabiting the low lying coastal areas and the number of persons living in mobile homes subject to severe wind damage. The region is particularly vulnerable to storms gathering strength in the Gulf of Mexico and turning northeast into the central west coast of Florida.

In addition to influencing people to move quickly, the focal point in avoiding loss of life during a hurricane is the determination of the time at which state or local authorities must order an evacuation to allow all residents in hazardous areas to obtain safe shelter before a hurricane arrives. The earlier the evacuation order is issued, the more time residents will have to evacuate. However, if an evacuation order is issued too early, there is a possibility that the hurricane may change course prior to landfall, rendering the evacuation unnecessary or placing evacuees in a more hazardous location.

Since 1950, the National Hurricane Center (NHC) has significantly improved its ability to forecast the path of approaching hurricanes through the use of computers, satellites and other scientific means. This has allowed the issuance of evacuation orders at earlier and earlier times before hurricane landfall. Over the past five years, however, the NHC has not been able to signficantly improve forecasting capabilities. This means that the amount of advance warning of the time and location of hurricane landfall is not expected to increase in the foreseeable future. Therefore, with the increasing population and tourist growth in the Withlacoochee region and the entire State of Florida, the need to improve the accuracy and timing requirements of the evacuation order has become of critical importance to those individuals and agencies responsible for public safety.



STUDY AREA

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 1

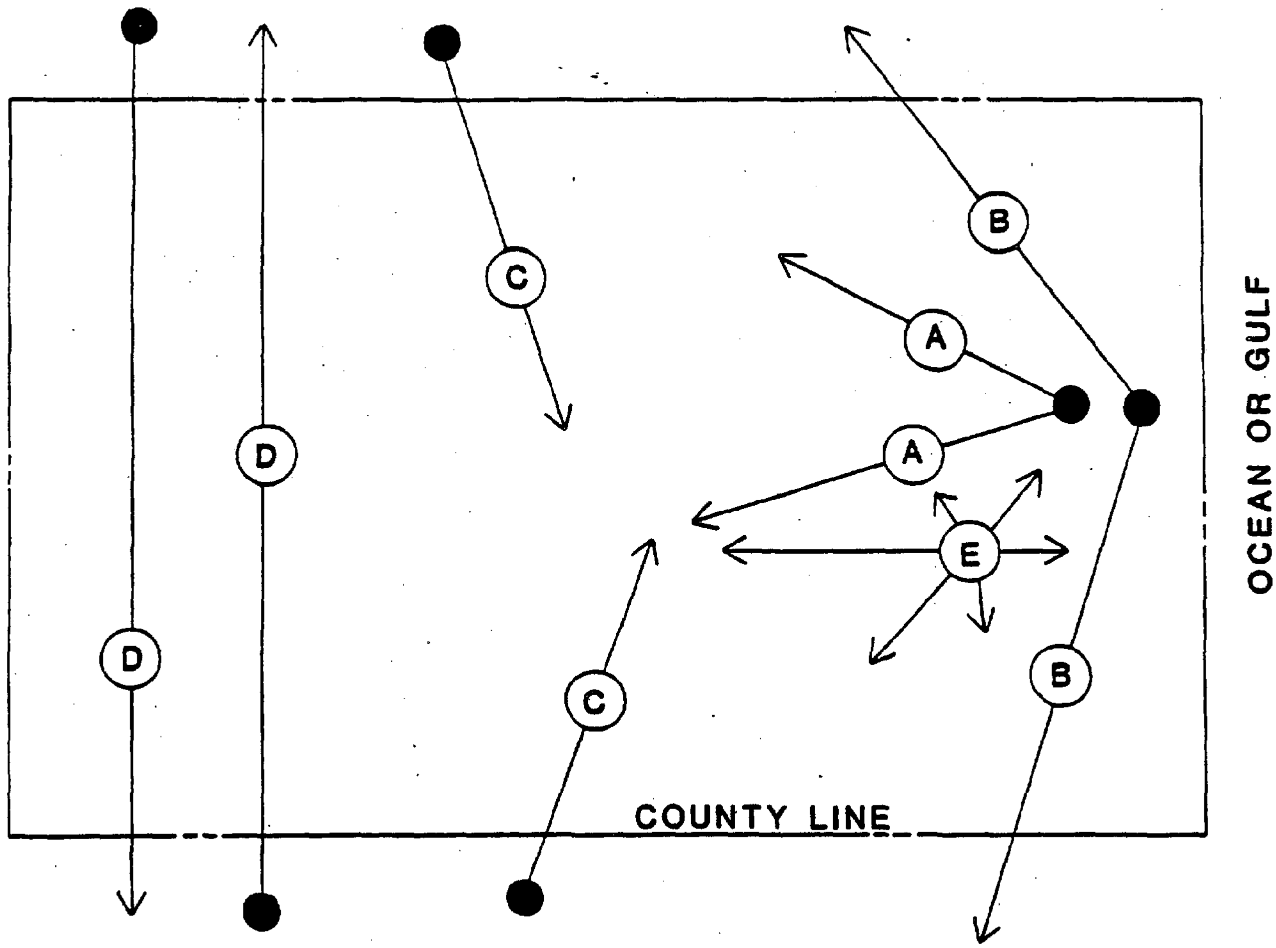
1.1 AN OVERVIEW

In a hurricane situation, the issuance of an evacuation order is clearly the most important action required by a county commission acting under the advice of a County Civil Defense Director. The order is issued a specified number of hours before the eye of the hurricane reaches land. A hurricane evacuation order must be issued in sufficient time to allow evacuees to reach their chosen destinations prior to the arrival of gale force winds and before roadways are inundated from storm surge and heavy rainfall. The critical components of the evacution order time, therefore, are the clearance time required for individuals to leave their place of residence and reach safe shelter, and the time of arrival of hurricane hazards prior to actual hurricane landfall.

While the time of arrival of hurricane hazards prior to hurricane landfall is determined through storm surge modeling, clearance times are calculated through detailed transportation analysis. The sum of pre-(hurricane eye)landfall hazards time and clearance time form the basis for how many hours before eye landfall the evacation order must be given.

During a hurricane evacuation effort, it is widely recognized that a significant number of vehicles have to be moved across a road network in a relatively short period of time. This number of vehicles can be large for densely populated areas and varies depending on the storm intensity and direction of approach to a study area. Vehicles enter the road network at varying times depending on the evacuees' response relative to the time the evacuation order is given. In addition, vehicles leave the road network depending on both the planned destinations of evacuees and the availability of acceptable destinations (number of Red Cross shelters, hotel/motel units and population in non-flooded areas). Vehicles move across the road network at a rate relative to the demand for various roadway segments and the ability of the segments to handle a certain volume of vehicles per hour.

It is critical for any determination of clearance times to recognize travel patterns associated with a hurricane evacuation effort. Figure 2 presents five general categories of evacuation movements. The categories are briefly described below:



A IN-COUNTY ORIGINS TO IN-COUNTY DESTINATIONS

B IN-COUNTY ORIGINS TO OUT-OF-COUNTY DESTINATIONS

C OUT-OF-COUNTY ORIGINS TO IN-COUNTY DESTINATIONS

D OUT-OF-COUNTY ORIGINS TO OUT-OF-COUNTY DESTINATIONS

E BACKGROUND TRAFFIC

EVACUATION TRAVEL PATTERNS

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 2

(1) **In-County Origins to In-County Destinations**

Trips made from storm surge vulnerable areas, mobile home units, and historically heavy rain flooded areas in an individual county to destinations within the same county, such as Red Cross shelters, hotel and motel units, and friends outside the surge vulnerable areas.

(2) **In-County Origins to Out-of-County Destinations**

Trips made as in category (1) that originate in an individual county, but have destinations in other counties of the region or outside the region entirely.

(3) **Out-of-County Origins to In-County Destinations**

Trips made as in category (1) that enter an individual county from other counties in the region.

(4) **Out-of-County Origins to Out-of-County Destinations**

Trips passing through an individual county while traveling from another county in the region to either another county or outside the region entirely.

(5) **Background Traffic**

Trips made by people anticipating the arrival of hurricane conditions; these trips may be shopping trips to gather supplies and/or trips from places of work to home to gather the family for evacuation.

It is important to recognize that three of the five defined patterns involve traffic movement patterns generated outside of the county's boundaries. Depending on the assumed storm track, these inter-county movements may result in a number of regional traffic impacts. These movements must be quantified to facilitate estimation of demand for roadway segments and their resulting clearance times.

1.2 STUDY OBJECTIVE AND SCOPE

Recognizing the importance of quantifying evacuation travel movements and clearance times for use in its regional hurricane evacuation plan, the Withlacochee Regional Planning Council hired Post, Buckley, Schuh & Jernigan, Inc. to perform the necessary transportation analysis. The objective of the transportation analysis is to optimize utilization of the regionwide road network for efficient movement of evacuees and to estimate clearance times based on the best available transportation planning and engineering techniques. An equally important objective is to make the transportation analysis sensitive to various population and behavioral parameters that may change over time, and to be able to update key assumptions made throughout the study.

To achieve these objectives, a comprehensive scope of services was developed by WRPC and PBS&J. The scope of services was directed toward establishing logical population, behavioral and roadway assumptions and then estimating clearance times based on projected travel demand. The specific work undertaken included the following:

Refinement of Regional Hurricane Evacuation Data Base

* Establishment of surge vulnerability levels
* Delineation of evacuation zones
* Finalization of dwelling unit/population data and shelter data by evacuation zone

Determination of the Expected Behavioral Patterns of the Population-at-Risk

* A look at current behavioral research and surveys performed in the Withlacoochee Region
* Development of behavioral parameters for transportation analysis

Development of an Evacuation Roadway Network

* Selection and coding of roadways to be used in an evacuation
* Determination of generalized capacity assumptions

Travel Modeling

* Generation, distribution and assignment of evacuating vehicle trips
* Identification of critical roadway segments
* Estimates of clearance time based on travel time/delay analysis

Examination of Traffic Control and Evacuation Planning Considerations

* Traffic control measures
* Inter-regional and inter-county transportation impacts

1.3 STUDY COORDINATION AND REVIEW ACTIVITIES

A critical element to the successful completion of the transportation analysis was the coordination with all interested local and state agencies. In addition to technical review sessions between WRPC and PBS&J, presentations were made to a Study Review Committee made up of emergency preparedness and planning officials from each of the five counties and representatives from the State of Florida Bureau of Disaster Preparedness. Suggestions and review by the committee were incorporated into each work task to insure useability of study results.

Several existing hurricane evacuation planning documents were obtained to have the best and most consistent data input from WRPC staff as well as draw from the recent hurricane evacuation planning experiences in other parts of the state. These documents included:

(1) Withlacoochee Regional Hurricane Evacuation Study (1982), prepared by Withlacochee Regional Planning Council

(2) Inland Hurricane Shelter Plan (1982), prepared by Withlacoochee Regional Planning Council

(3) Behavioral Surveys for the Withlacoochee Regional Disaster Preparedness Plan (1982), prepared by Richard T. Doyle, AICP, formerly of H.W. Lochner, Inc.

(4) Tampa Bay Region Hurricane Evacuation Plan, Technical Data Report (1982), prepared by the Tampa Bay Regional Planning Council and U.S. Army Corps of Engineers, Jacksonville District

(5) Lower Southeast Florida Hurricane Evacuation Plan Technical Data Report (1983), prepared by Post, Buckley, Schuh & Jernigan, Inc. and U.S. Army Corps of Engineers, Jacksonville District

1.4 REPORT FRAMEWORK

Documentation of this study effort will be presented in a chronological framework, describing work tasks as they were performed and as they built upon each previous task. The report begins with a brief description of the study area and data compiled by the WRPC and refined by PBS&J for use as a base throughout the study effort. The report continues with an examination of the probable transportation related behavioral patterns of the population-at-risk and establishes the assumptions regarding how quickly people will evacuate and what types of destinations they will seek. The methodology for establishing an evacuation network and performing the travel modeling is then presented. The report concludes with estimates of clearance times and a general discussion of traffic control measures and evacuation planning implications.

CHAPTER 2
STUDY AREA DESCRIPTION

The general locations and magnitude of population, as well as the configuration of the roadway system, must be examined in the initial stage of the transportation analysis to understand what unique evacuation problems may exist.

2.1 GENERAL GEOGRAPHIC AND POPULATION CHARACTERISTICS

The Withlacoochee region, comprised of five counties, includes 22 municipalities. The region is located north of the Tampa Bay area and southeast of the Panhandle area in the west central portion of Florida. Levy, Citrus and Hernando Counties border the Gulf of Mexico. Marion County includes the City of Ocala, the only SMSA in the study area. The region is primarily agricultural in character and has elevations ranging from 0 feet at the coastline to a high of 200 feet above sea level in Marion and Sumter Counties.

Although the 4,532 square mile region is primarily rural in nature, it continues to experience large population growth. Citrus and Hernando Counties have experienced the most growth, with the overall region growing 80.3 percent in the last decade. Marion County comprises almost half the region's total population. Table 1 summarizes the growth in population between 1970 and 1980 and provides area figures for each county.

TABLE 1

GROWTH IN POPULATION 1970-1980
AND AREA IN SQUARE MILES

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

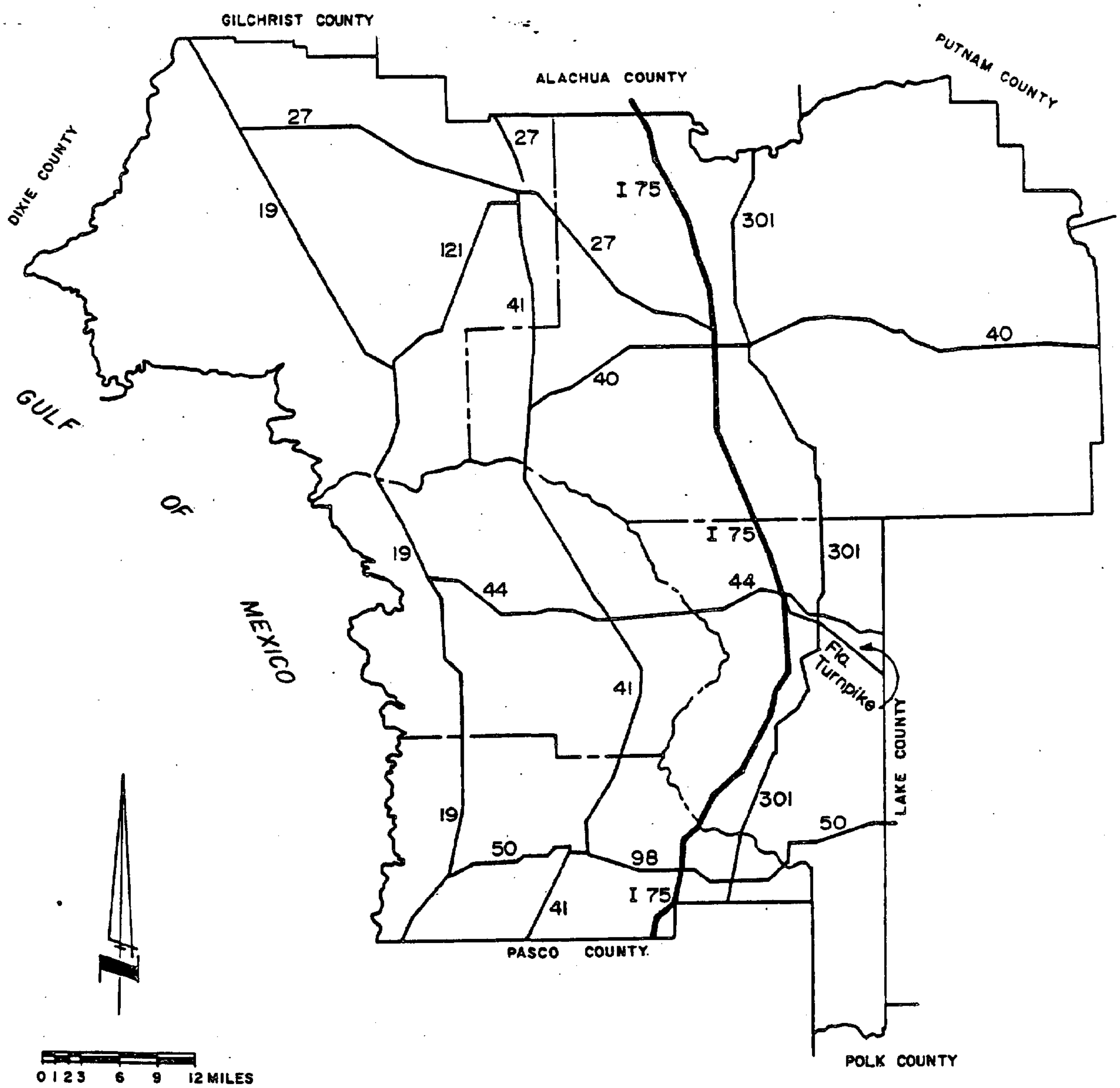
COUNTY	AREA IN SQUARE MILES	POPULATION GROWTH 1970	1980	PERCENT CHANGE
Levy	1,137	12,756	18,837	47.7
Citrus	661	19,119	49,612	159.5
Hernando	508	17,004	40,061	135.6
Marion	1,652	69,030	106,527	54.3
Sumter	574	14,839	24,305	63.8
Region	4,532	132,748	239,342	80.3

Source: 1980 U.S. Census

2.2 ROADWAY NETWORK

The study area is traversed by a maze of rural two-lane county and state roads that would carry vehicular traffic during an evacuation. Roadways providing eastward access away from the coastal fringe areas are extremely important to the safe evacuation of the surge vulnerable population. These roadways include State Roads 24, 121, 40, 44, and 50. In addition to these roadways, U.S. 41 , U.S. 19, U.S. 301 and Interstate 75 are major arterials running north and south through the study area. I-75 would carry the bulk of inter-regional traffic, with support from U.S. 41 and U.S. 301. Figure 3 illustrates the major roadways in the study area.

Many two-lane roads are low in elevation and subject to freshwater as well as surge flooding. The Withlacoochee Regional Planning Council has identified roadway segments subject to flooding. Table 2 lists these areas by county. These segments are often critical to the efficient movement of evacuating vehicles; therefore, in an evacuation situation, rainfall must be monitored and roadways must be cleared of evacuating vehicles before expected storm surge.



ROADWAY NETWORK

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 3

TABLE 2

ROADWAY SEGMENTS SUBJECT TO FRESHWATER FLOODING

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

Levy County

SR 24 between Cedar Key and Bronson
US 19 from Otter Creek to two miles north
US 19 from Chiefland to two miles south
CR 326 west and one mile east of US 19
US 27 between Bronson and the CR 339/US 27 intersection
CR 326 from US 41 to two miles west
SR 40 from Yankeetown to two miles east of Inglis

Citrus County

SR 44 west of and three miles east of Crystal River
CR 494 west of US 19
CR 490 west of US 19
CR 480 one mile east and west of US 19
US 41 from Citrus County line to one mile south
CR491 east of US 41
SR 44 east of US 41
SR 48 east of SR 39
SR 200 east of US 41

Hernando County

CR 4495 west of US 19
SR 50 west of US 19
I-75 from Hernando County line to one mile south
US 301 from Hernando County line to one mile north of US 98

Marion County

US 41 from Dunnellon city limit to one mile north
US 41 from Marion County line to three miles south
US 27 from Marion County line to two miles southeast
SR 200 from Withlacoochee River to three miles northeast
US 27A north of Lake Weir
SR 40 between CR 314 and CR 315
SR 40 one mile west and two miles east of CR 314A

Sumter County

I-75 from Sumter County line to one mile north
I-75 at Lake Panasoffkee
I-75 from SR 48 to two miles north
US 301 from Little Withlacoochee River to three miles north
US 301 from Bushnell to one mile north
US 301 from Florida Turnpike to one mile south
SR 50 one mile west of and east of CR 471

CHAPTER 3

REFINEMENT OF REGIONAL HURRICANE EVAUCATION DATA BASE

The Withlacoochee Regional Planning Council provided an extensive data base concerning flooding levels, population and dwelling unit numbers, and shelter locations and capacities. To streamline the data for use in the transportation analysis, refinements and assumptions concerning the data were made by PBS&J.

3.1 VULNERABILITY LEVELS

Based on hazards analysis for each coastal county, the WRPC staff developed three vulnerability levels reflecting the different flooding levels associated with different storm intensities and angles of approach. A close look at the small differences in the population associated with the three vulnerability levels, coupled with PBS&J's previous hurricane evacuation transportation analysis experience, led to the development of two vulnerability levels for transportation purposes. Two levels provides large enough differences in population to provide enough variability in travel modeling data inputs. Two vulnerability levels also simplifies the multiple alternatives that can result when testing many different evacuation parameters. Each of the two vulnerability levels is stratified based on evacuation with or without a Tampa Bay evacuation. Table 3 presents each regional vulnerability level with a description of hurricanes creating that particular level.

TABLE 3

REGIONAL VULNERABILITY LEVELS

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

VULNERABILITY LEVEL	STORM DESCRIPTION/SAFFIR-SIMPSON INTENSITY CATEGORY
A	Exiting hurricane, category 1-2 Paralleling hurricane, category 1-2 Normal hurricane, category 1-2
A w/Tampa Bay	Same as vulnerability level A, Tampa Bay Region also evacuates
B	Paralleling hurricane, category 3-4 Normal hurricane, category 3-5
B w/Tampa Bay	Same as vulnerability level B, Tampa Bay Region also evacuates

3.2 EVACUATION ZONES

Within the transportation analysis task it is assumed that all persons living in areas flooded by storm surge must be evacuated. This evacuee group includes residents living in single family, multi-family, and mobile home units located in surge vulnerable areas. In addition, all mobile home residents living outside the surge areas of each county must be evacuated due to high wind vulnerability. A final group of residents that can be included in the evacuating population of each county consists of persons living in areas that historically flood due to heavy rainfall.

Having established those dwelling units which should be evacuated, it was then necessary to develop a series of evacuation zones to state which people should evacuate for a particular vulnerability level and to be able to model traffic movements from one geographic area of a county to another. A series of evacuation zones was established for each county based on the following factors:

(1) coincidence with flooding limits for the A and B vulnerability levels

(2) direct relation to census divisions for an established population base

(3) use of easily recognizable streets and topographic features for identification of zonal boundaries

(4) consideration of population densities and locations in terms of major east-west arterial roadways

Figures 4 through 8 illustrate the evacuation zones established for the transportation analysis in each county of the region. Zones experiencing surge flooding for an A or B vulnerability are shaded accordingly. Appendix A provides the evacuation zonal boundaries for each county. Table 4 describes the evacuation required by each evacuation zone in each county for the A and B vulnerability levels:

TABLE 4

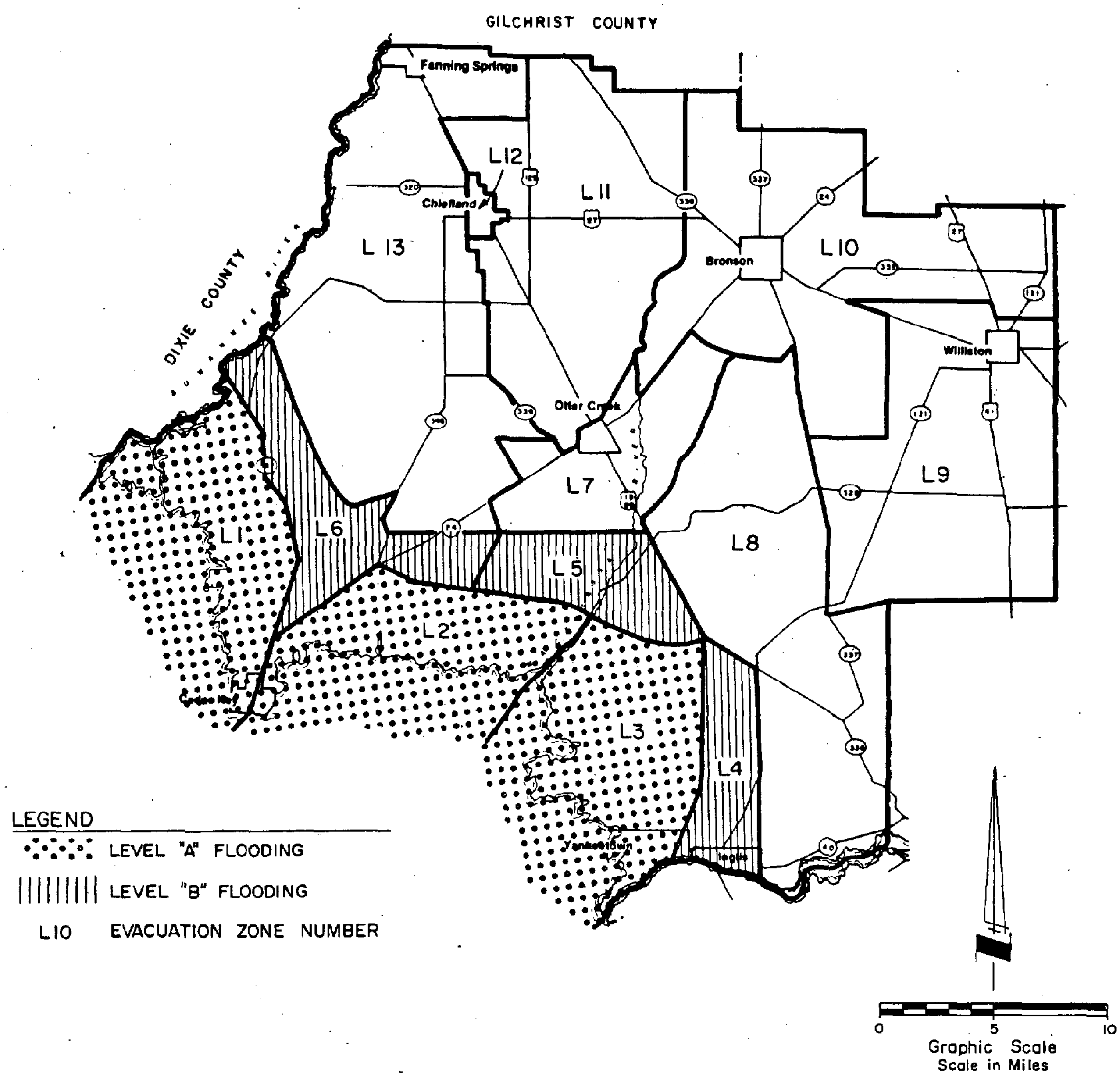
REQUIRED EVACUATION BY VULNERABILITY LEVEL

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

COUNTY	VULNERABILITY LEVEL	ALL RESIDENTS IN EVACUATION ZONE	MOBILE HOME RESIDENTS IN
Levy	A	L1-L3	L4-L13
	B	L1-L6	L7-L13
Citrus	A	C1-C3	C4-C14
	B	C1-C6	C7-C14
Hernando	A	H1-H3	H4-H14
	B	H1-H5	H6-H14
Marion	A	---	M1-M14
	B	---	M1-M14
Sumter	A	---	S1-S10
	B	---	S1-S10

3.3 DWELLING UNIT DATA/POPULATION-AT-RISK

Enumeration district, census tract, and township/range/section dwelling unit data were provided to PBS&J by the WRPC staff. Factors were also provided by WRPC staff to bring 1980 census information up to date based on the most recent dwelling unit occupancy permit information in each county. Dwelling unit data were limited to total dwelling units and mobile home dwelling



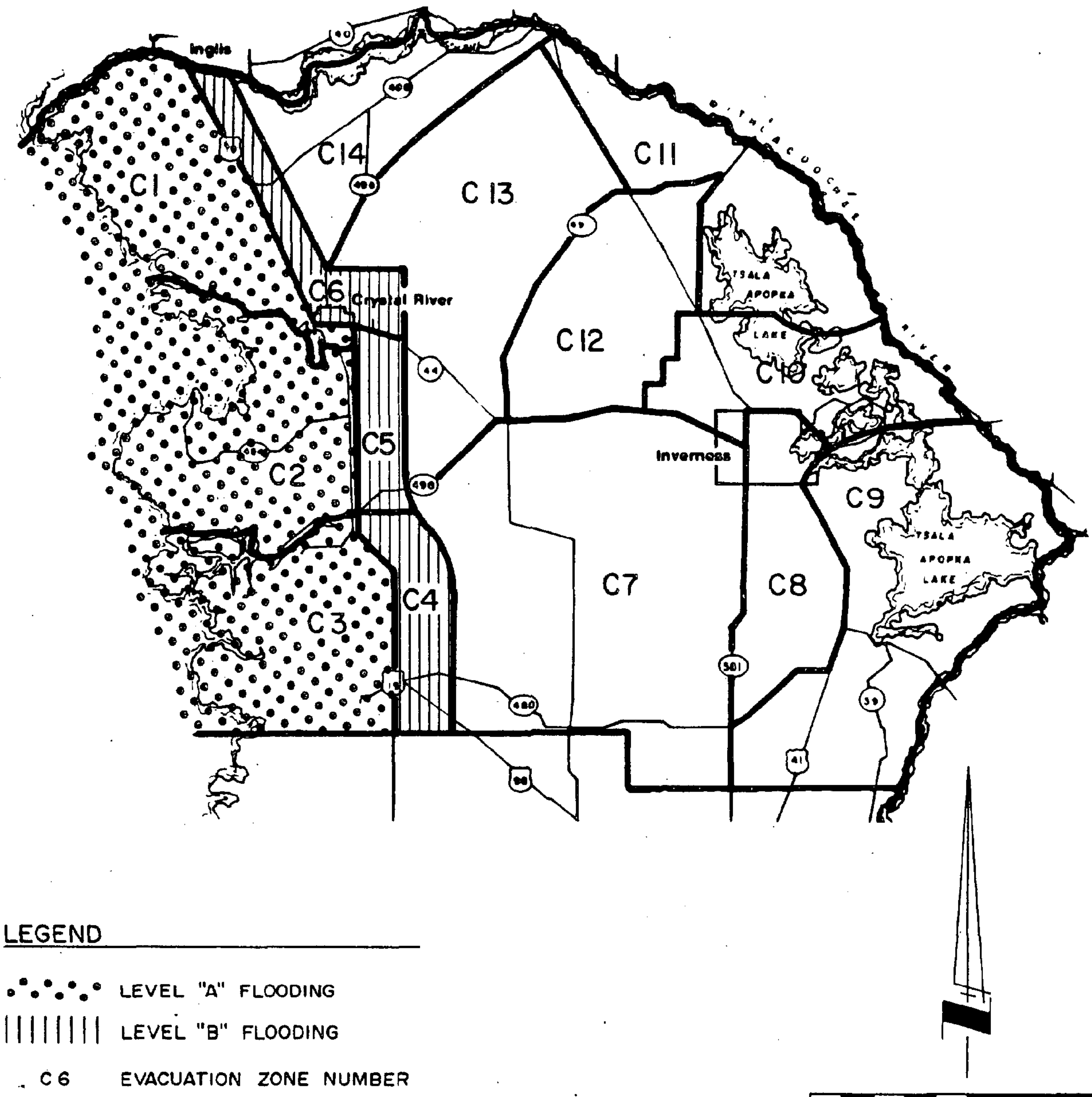
EVACUATION ZONES

LEVY COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 4



LEGEND

LEVEL "A" FLOODING

LEVEL "B" FLOODING

C6 EVACUATION ZONE NUMBER

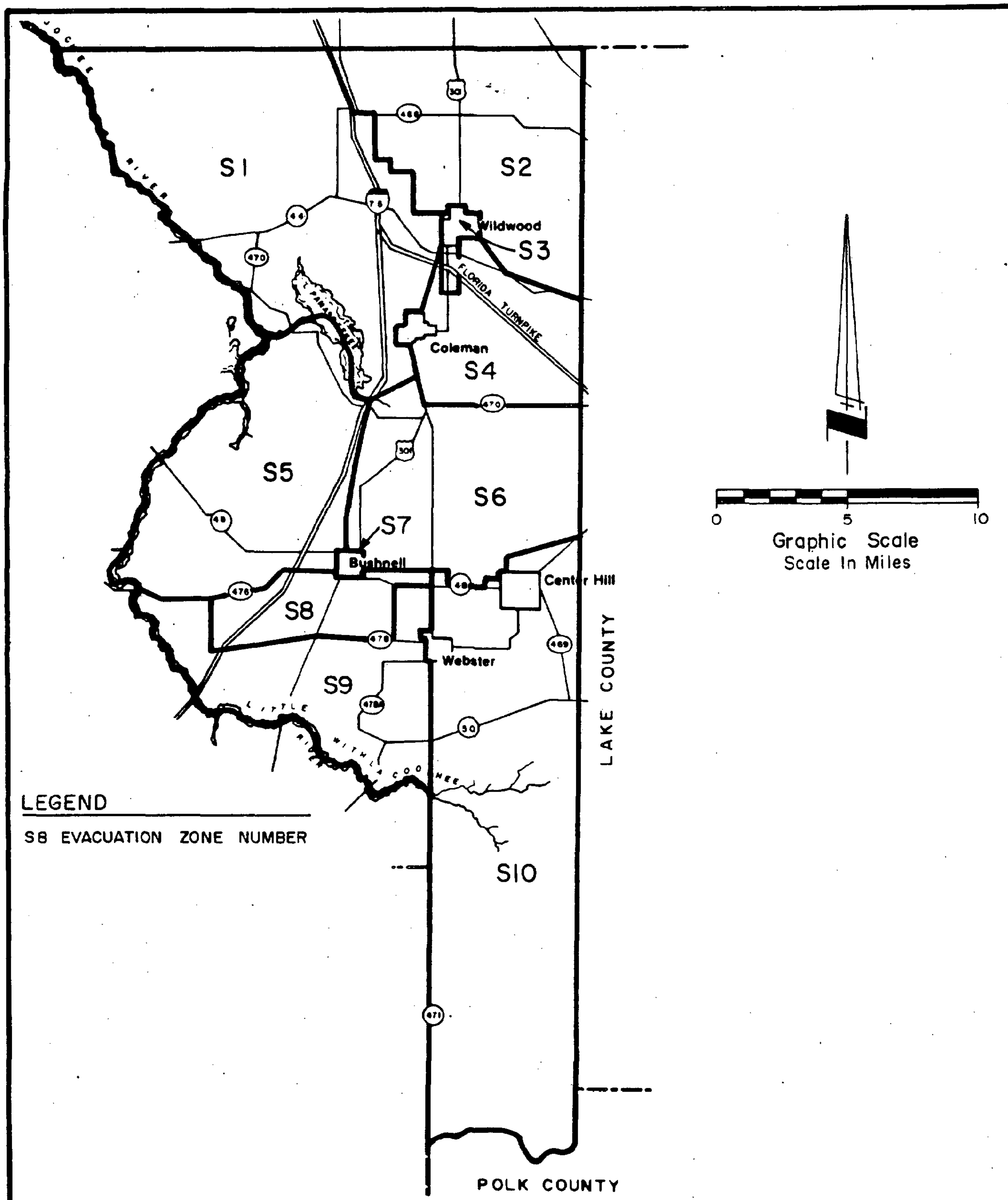
EVACUATION ZONES

CITRUS COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 5



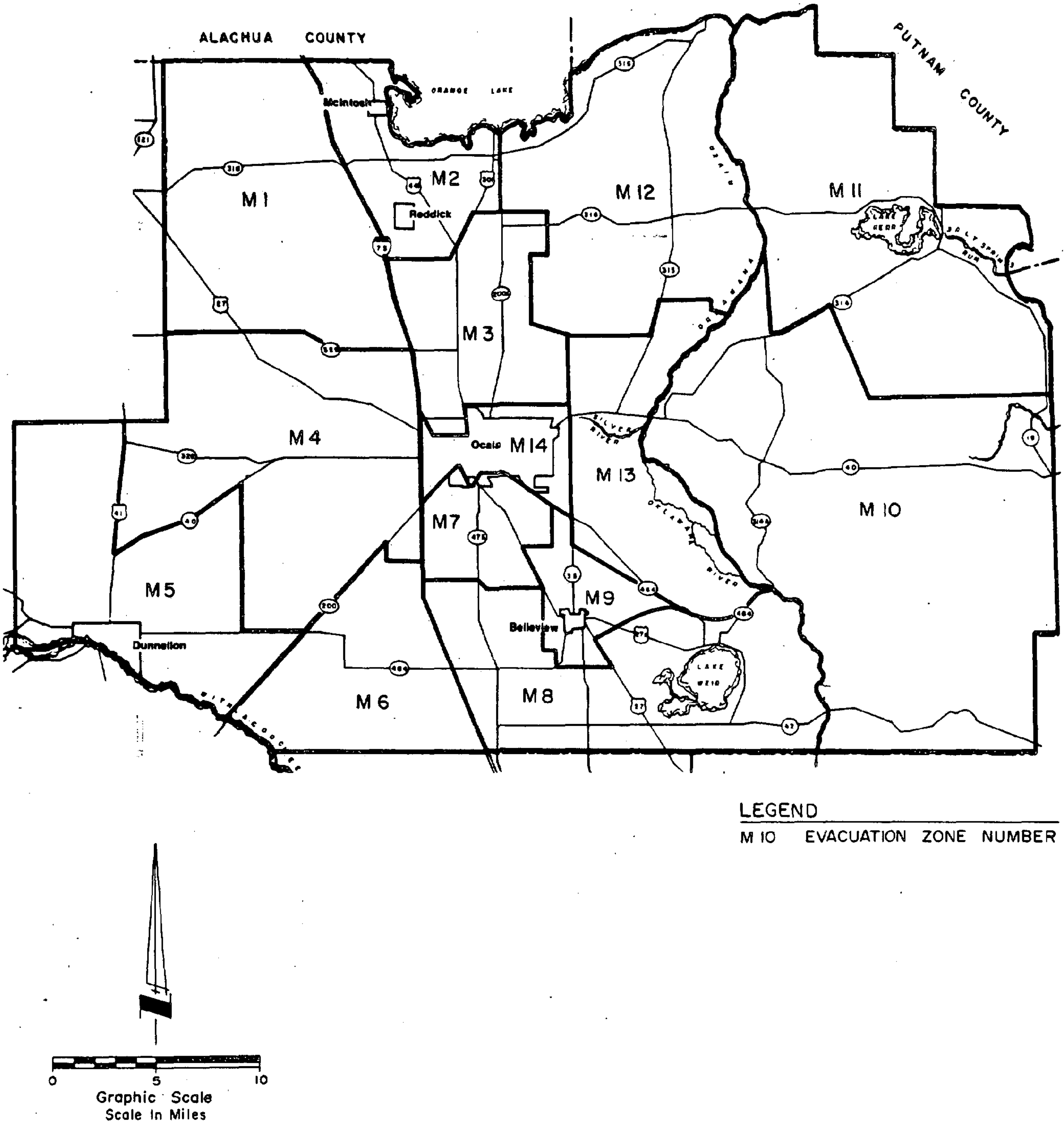
EVACUATION ZONES

SUMTER COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 8



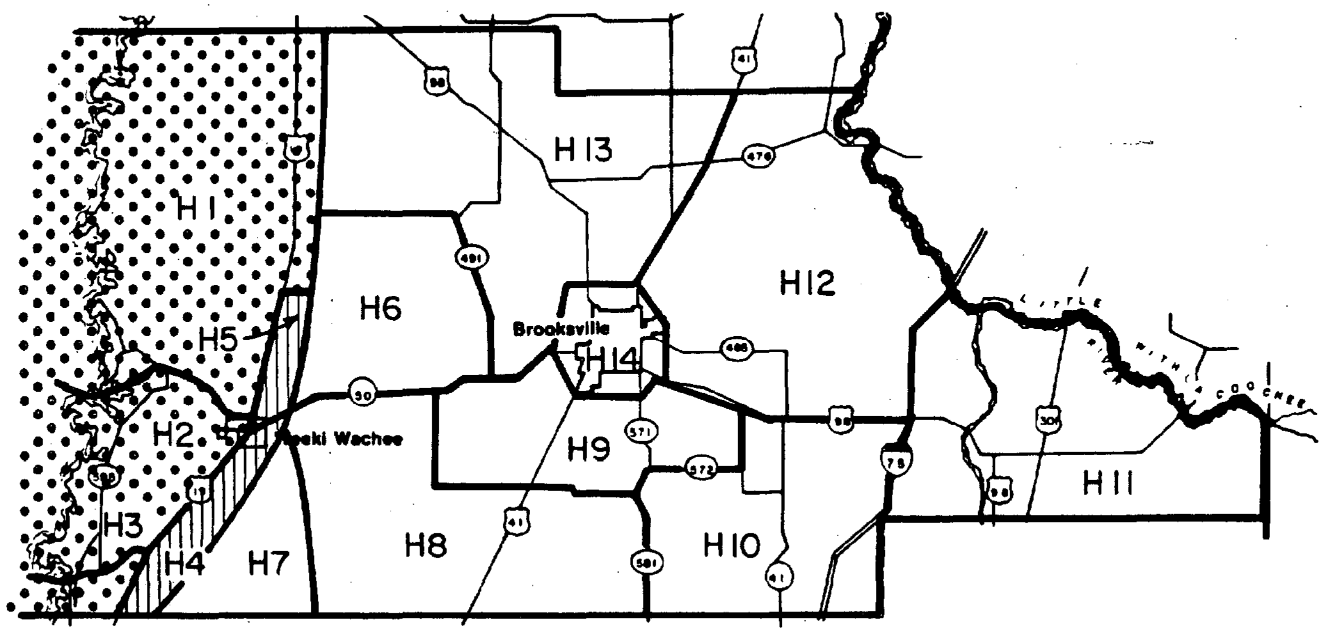
EVACUATION ZONES

MARION COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

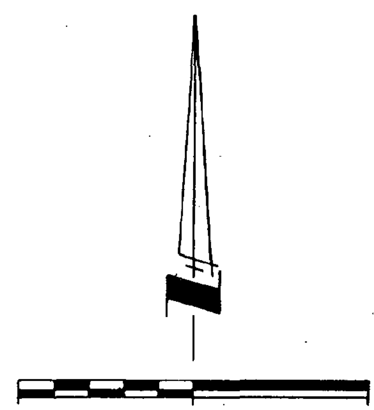
FIGURE 7



PASCO COUNTY

LEGEND

- LEVEL "A" FLOODING
- LEVEL "B" FLOODING
- H8 EVACUATION ZONE NUMBER



EVACUATION ZONES
HERNANDO COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 6

units. The following list by county shows the geographic level of data used in each county:

Levy:	Enumeration districts
Citrus:	Township/range/sections in surge areas, enumeration districts elsewhere
Hernando:	Township/range sections in surge areas, enumeration districts elsewhere
Marion:	Census tracts
Sumter:	Enumeration districts

To ensure the capability of easy plan updating, PBS&J developed a microcomputer program for entering and changing data in each county. A data file was then created for each county listing each geographical data unit, the evacuation zone in which it falls, total dwelling units, and mobile home units. A column was also provided for entering dwelling units subject to freshwater flooding; these will be added in future updates. Appendix B provides the data files for each county in the region. Another microcomputer program was then developed by PBS&J to total data by evacuation zone for each county data file. Appendix C provides the evacuation zonal data for each county.

To quantify the population-at-risk as defined earlier, dwelling unit data by evacuation zone were translated into evacuating population based on assumed occupancy factors and an evacuation participation rate. Depending on the evacuation zone's location relative to surge flooding for a particular vulnerability level, all dwelling units or just mobile home units were used in the calculation. Table 5 provides the parameters used for quantifying population-at-risk and resulting population-at-risk figures by county by vulnerability level.

TABLE 5

POPULATION-AT-RISK PARAMETERS

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

COUNTY	EVACUATION PARTICIPATION RATE	#PERSONS PER MOBILE HOME UNIT	#PERSONS PER ALL OTHER UNITS	POPULATION-AT-RISK/ VULNERABILTY LEVEL
Levy	100%	2.7	2.7	12,077/A 13,919/B
Citrus	100%	2.3	2.3	26,296/A 29,261/B
Hernando	100%	2.4	2.4	18,678/A 25,597/B
Marion	100%	2.6	2.6	32,759/A 32,759/A
Sumter	100%	2.7	2.7	9,113/A 9,113/B
REGION TOTAL				98,923/A 110,649/B

The microcomputer program developed by PBS&J to calculate population-at-risk was set up so that each parameter could be varied to arrive at a new population-at-risk figure. For transportation analysis purposes a 100% participation in the evacuation was used for this study, based on input received from the Study Review Committee. Committee members felt that this would be the best and most conservative planning figure to use. The number of persons per dwelling unit varied from 2.3 to 2.7 based on data obtained by WRPC staff from 1980 census information. Population-at-risk by county varies from 9,113 persons in Sumter County to 32,759 in Marion County. It is important to recognize that the largest vulnerable population is in Marion County, a non-coastal county. This is due to the large mobile home population.

3.4 SHELTER DATA

Just as important as understanding where evacuation trips originate is the understanding of where such trips will find acceptable destinations. WRPC staff provided PBS&J with the location and capacities of hotel/motel units, primary public shelters, and secondary public shelters. Shelters were located by evacuation zone so that useable capacity by evacuation zone by vulnerability level could be determined. The following primary shelters were found to be in the surge vulnerable area for the specified vulnerability level:

Vulnerability Level A	**Vulnerability Level B**
Cedar Key High	(Same as A)
Crystal River High	Yankeetown School
Crystal River Middle	Westside Elementary
Crystal River Primary	
Homosassa Elementary	

For transportation analysis purposes, these shelters were considered unacceptable destinations for population-at-risk (for the specified vulnerability level).

Appendix D contains a listing by county of primary shelters, including the evacuation zone in which the shelter is located and a capacity figure assuming 20 square feet per person. WRPC staff maintains detailed lists of hotel/motel units and secondary shelters; these lists were used to determined capacities by evacuation zone for those shelter types. Table 6 summarizes the total capacity of each shelter type by county by vulnerability level.

TABLE 6

SUMMARY OF SHELTER CAPACITIES
BY COUNTY BY VULNERABILITY LEVEL

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

(Capacities in Persons)

COUNTY	HOTEL/MOTEL CAPACITY/ VULNERABILITY LEVEL	PRIMARY SHELTER CAPACITY/ VULNERABILITY LEVEL	SECONDARY SHELTER CAPACITY/ VULNERABILITY LEVEL
Levy	679/A	6,013/A	2,999/A
	679/B	5,801/B	2,999/B
Citrus	245/A	13,128/A	3,056/A
	245/B	13,128/B	3,056/B
Hernando	495/A	11,018/A	3,664/A
	381/B	7,959/B	3,334/B
Marion	4,225/A	29,329/A	10,012/A
	4,225/B	29,329/B	10,012/B
Sumter	1,105/A	6,407/A	2,673/A
	1,105/B	6,407/B	2,673/B

Capacities by evacuation zone are used in the transportation analysis as a measure of attractiveness in satisfying evacuation demand seeking acceptable destinations. Before stating the adequacies or inadequacies of each shelter type capacity in each county, expected behavioral patterns of the population-at-risk must be assessed regarding intended destinations.

CHAPTER 4

BEHAVIORAL PATTERNS OF POPULATION-AT-RISK

Recognizing that the future evacuation of an endangered population due to a hurricane approaching the Withlacoochee Region involves the coordinated action of thousands of individuals, the WRPC gathered detailed information pertaining to the tendencies and intended choices of the evacuation population. PBS&J reviewed these data as well as current behavioral research nationwide to derive the best assumptions possible for the transportation analysis. Specifically, for transportation purposes, the following behavioral aspects were addressed:

* The pre-planned destinations of the potentially threatened population
* The number of vehicles that the threatened household would utilize for evacuation
* When the threatened population would leave their residences in relation to a given evacuation order

4.1 PRE-PLANNED DESTINATIONS

One of the most important sets of assumptions to be made for transportation analysis is related to where evacuees intend to go during an evacuation. The behavioral surveys conducted under the direction of the WRPC for the inland and coastal counties of the region provided an excellent starting point. Destination choices in the survey were: Red Cross shelter, friend or relative, hotel or motel, or don't know. In a hurricane evacuation, the "don't know" response is unacceptable. The household will either not evacuate or will go to one of the other three acceptable destination types. Results were reviewed with the Study Review Committee to derive a set of destination percentages for use in the transportation analysis. Committee members agreed that a weighted distribution of the "don't know" answer to the other categories would be most appropriate. Table 7 presents the destination percentages developed for use in the transportation analysis.

TABLE 7

EVACUEE PERCENTAGES BY DESTINATION TYPE

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

DESTINATION TYPE	LEVY, CITRUS, HERNANDO Behavioral Survey	LEVY, CITRUS, HERNANDO Adjusted	MARION, SUMTER Behavioral Survey	MARION, SUMTER Adjusted
Red Cross Shelter	25.6%	30.6%	40.0%	53.8%
Friend/Relative*	34.0%	40.6%	13.7%	18.5%
Hotel/Motel**	24.1%	28.8%	20.6%	27.7%
Don't Know	16.3%	-0-	25.7%	-0-
	100.0%	100.0%	100.0%	100.0%

*Of those going to the home of a friend or relative, it is assumed 15% would go out of the region.

**Since there are not enough hotel/motel units in each county to satisfy all those seeking such units, any excess demand is taken out of the region.

Since destination percentages could be changed based on new behavioral information, PBS&J developed population-at-risk and trip generation microcomputer programs sensitive to the modification of these important parameters.

4.2 VEHICLE USAGE

Of those vehicles available to each household for evacuation, the behavioral surveys performed in the Withlacoochee Region indicated that only 65.5% in the coastal counties and 71.7% in the inland counties would actually be used. These parameters were adopted for used in the transportation analysis.

Based on this vehicle usage statistic, a persons per evacuation vehicle was calculated using persons per household and average vehicles per household data developed by WRPC staff. The resulting calculation for each county is as follows:

Levy:	2.7 persons per household / (1.6 vehicles per household x 65.5%)	= 2.58 persons per evacuating vehicle
Citrus:	2.3 persons per household / (1.6 vehicles per household x 65.5%)	= 2.19 persons per evacuating vehicle
Hernando:	2.4 persons per household / (1.7 vehicles per household x 65.5%)	= 2.16 persons per evacuating vehicle
Marion:	2.6 persons per household / (2.1 vehicles per household x 71.7%)	= 1.73 persons per evacuating vehicle
Sumter:	2.7 persons per household / (1.7 vehicles per household x 71.7%)	= 2.22 persons per evacuating vehicle

These figures become critical to translating shelter person capacities to shelter vehicle capacities for use in the transportation analysis.

4.3 BEHAVIORAL RESPONSE RELATIVE TO THE EVACUATION ORDER

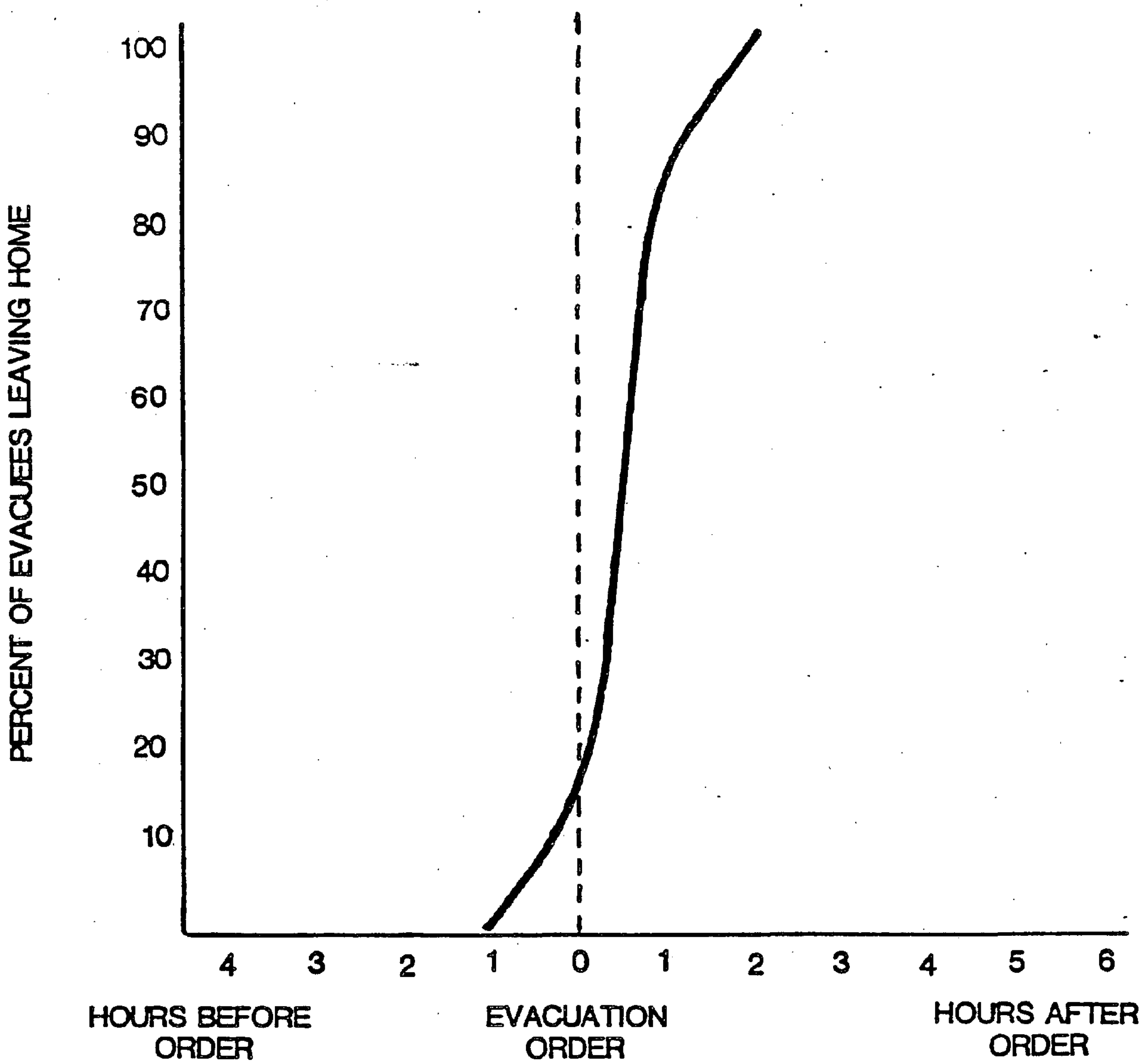
The issue of when people evacuate relative to an evacuation order is of critical importance in identifying the rate at which people enter the evacuation road network and thus overall clearance times. In the Tampa Bay Regional Hurricane Evacuation Plan Technical Data Report of June, 1981, the transportation modeling task revealed that clearance time was the sum of the number of hourly intervals contained in a behavioral response curve and the travel time and queuing delay time experienced by the last vehicle evacuating in response to a hurricane situation. A behavioral reponse curve is a cumulative distribution curve showing the percentage of evacuees that have left home by various hourly points relative to an evacuation order. Thus, if a behavioral response curve contains nine hourly intervals, clearance times are a minimum of 540 minutes plus travel and queuing delay time of the last vehicle leaving.

As hypothesized and verified in the Lower Southeast Florida Hurricane Evacuation Study, the assumed rate of evacuee response as illustrated by an assumed behavioral response curve is often the most important element in determining a clearance time for a given storm situation. In the Withlacoochee Region, where population densities and potential traffic queuing are considerably less than Tampa Bay or Southeast Florida, the behavioral response curve becomes an even more important determinant of clearance time.

The behavioral surveys performed indicated a very quick response intended by the threatened population. Almost 85 percent of those intending to evacuate said they would evacuate immediately in response to an evacuation order. This should be somewhat encouraging to local emergency management agencies assuming proper traffic control is in place.

Other areas of Florida have been surveyed indicating a slower response lasting six to nine hours. In Hurricane David (1979) and Hurricane Frederic (1979), the response of evacuees was a lengthy and slow process, with projected landfall at early morning hours. The response demonstrated by evacuees was spread out over 12 to 14 hours.

Recognizing the importance of behavioral response to calculating clearance times and the different responses found in surveys and actual evacuations, three behavioral response curves were set up for the Withlacoochee Region to achieve a sensitivity analysis. Curve A represents the quick response of evacuees indicated by the behavioral survey. The three-hour response begins one hour before the evacuation order and 85 percent of those evacuating have left by one hour after the order. Curve B represents a medium response of evacuees indicated by other surveys in Florida. The six-hour response begins two hours before the evacuation order and 85% of those evacuating have left by two hours after the order. Curve C represents a slow response of evacuees similar to the Hurricane David and Frederic experience in Miami and Mobile. The nine-hour response begins three hours before the evacuation order and 85 % of those evacuating have left by three hours after the order. Each curve is symmetrical around the middle time point statistically inferring a normal or bell-shaped response of evacuees. Figures 9 through 11 illustrate each behavioral response curve used in the transportation analysis. These curves define the rate at which evacuation vehicles load onto the street network at hourly intervals during the evacuation response.

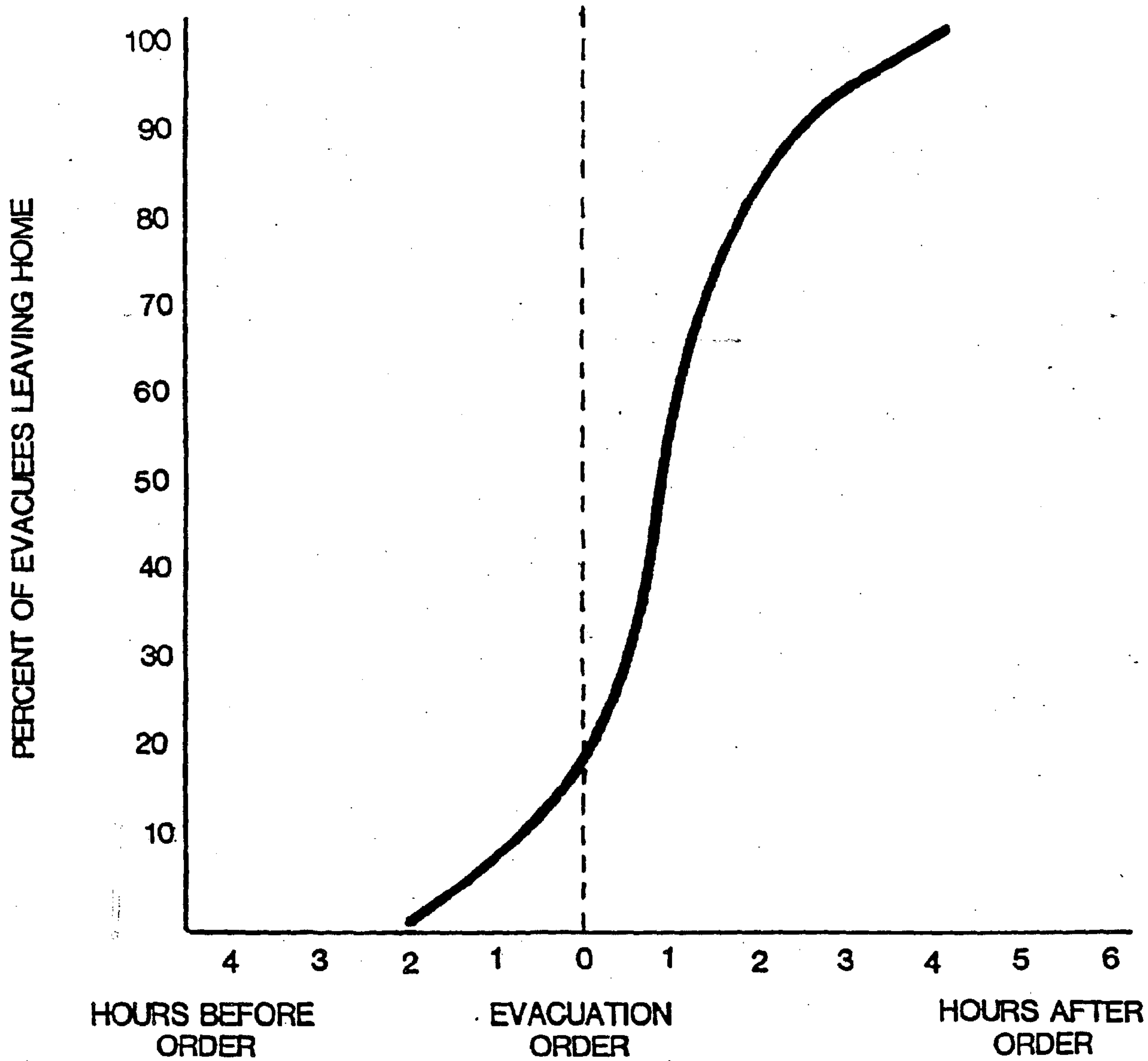


QUICK RESPONSE BEHAVIORAL CURVE A

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 9

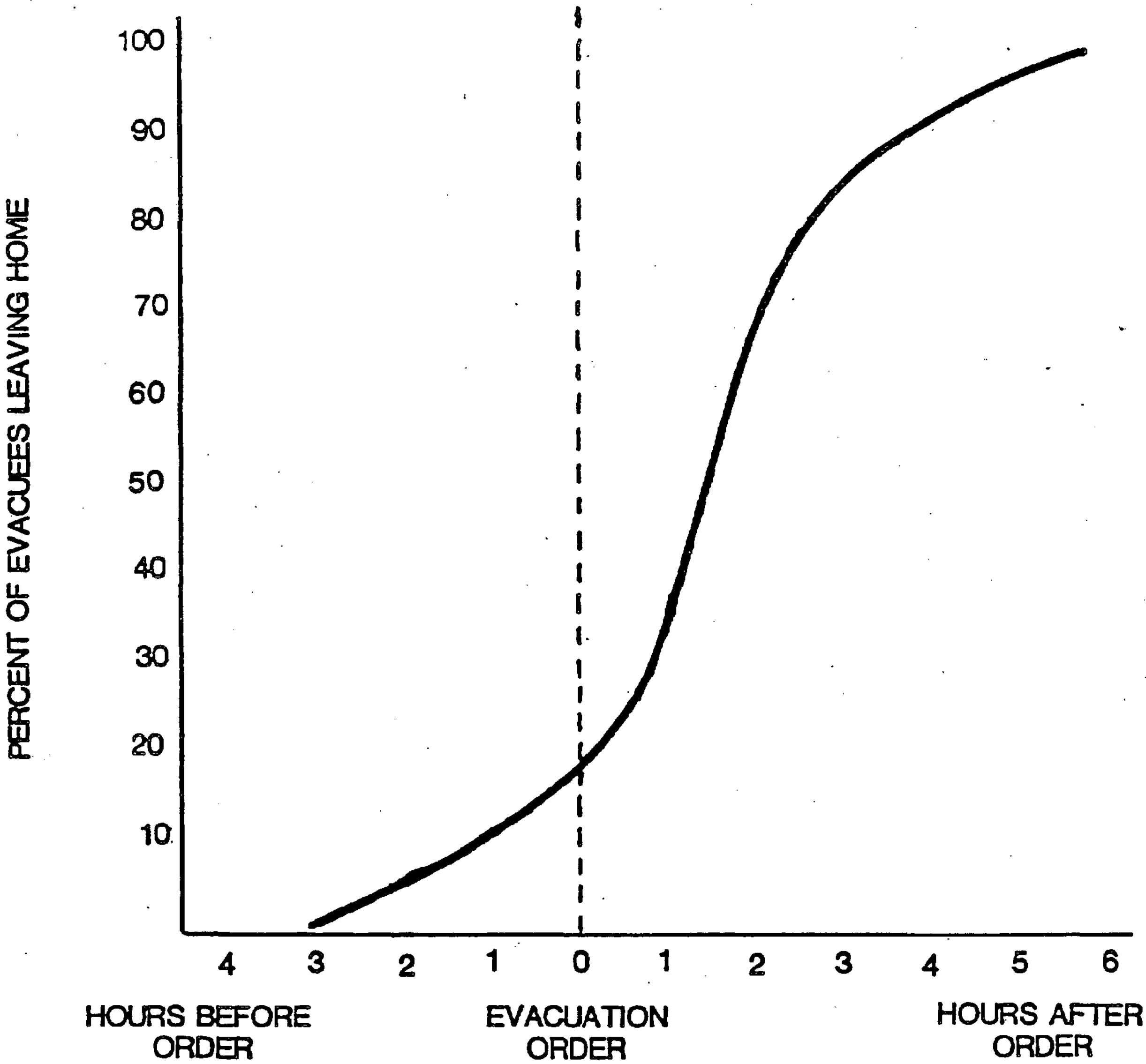


MEDIUM RESPONSE BEHAVIORAL CURVE B

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 10



SLOW RESPONSE BEHAVIORAL CURVE C

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 11

CHAPTER 5
ROADWAY SYSTEM REPRESENTATION

Roadway system assumptions and characteristics are critical to hurricane evacuation transportation analysis. The preparation of an evacuation network involved the selection and coding of roadways which would be used for evacuation in the study area. In addition, a measure of generalized capacity was used to represent each evacuation roadway's ability to handle evacuation traffic.

5.1 EVACUATION ROUTE STRUCTURE

In choosing roadways to be used for the evacuation network, an effort was made to include only street facilities with sufficient elevations, little or no adjacent tree coverage, substantial shoulder width and surface, and roadways already contained in existing WRPC hurricane evacuation study efforts. Another objective was to provide east-west arterials and route combinations that would provide the smoothest (least disjointed) possible traffic flow. In selecting major north-south arterials, US 41, US 301 and I-75 and the Florida Turnpike were incorporated as major regional movers of traffic. Portions of US 19 were omitted from the evacuation network in Levy, Citrus and Hernando Counties to discourage lengthy north-south movements which may interfere with traffic coming from the surge vulnerable areas. It should be noted that clearance times were based on having all evacuation vehicles off the roadways before hazardous conditions arrive.

An important assumption for the transportation analysis was that any movable span bridges would remain down during a Hurricane Warning period. U.S. Coast Guard regulation 33-117.1(c) and Florida DOT procedure 571-004 (6 p. 15) gives civil defense authorities tentative authority to implement this procedure. All boats should be moved to safe harbor prior to or during a Hurricane Watch period. The lives of citizens evacuating in vehicles could be at great risk if bridges are not allowed to operate at full capacity during a hurricane warning. Bridge openings obviously result in less than full hourly capacity for vehicular movement.

It was assumed that special manpower (local police officers, sheriffs, highway patrol officers) will be assigned to critical intersections in the study area. This would allow for smoother traffic flow and would allow east-west traffic movements more intersection "green time." The transportation analysis task also assumed that provisions would be made for removal of vehicles in distress during the evacaution.

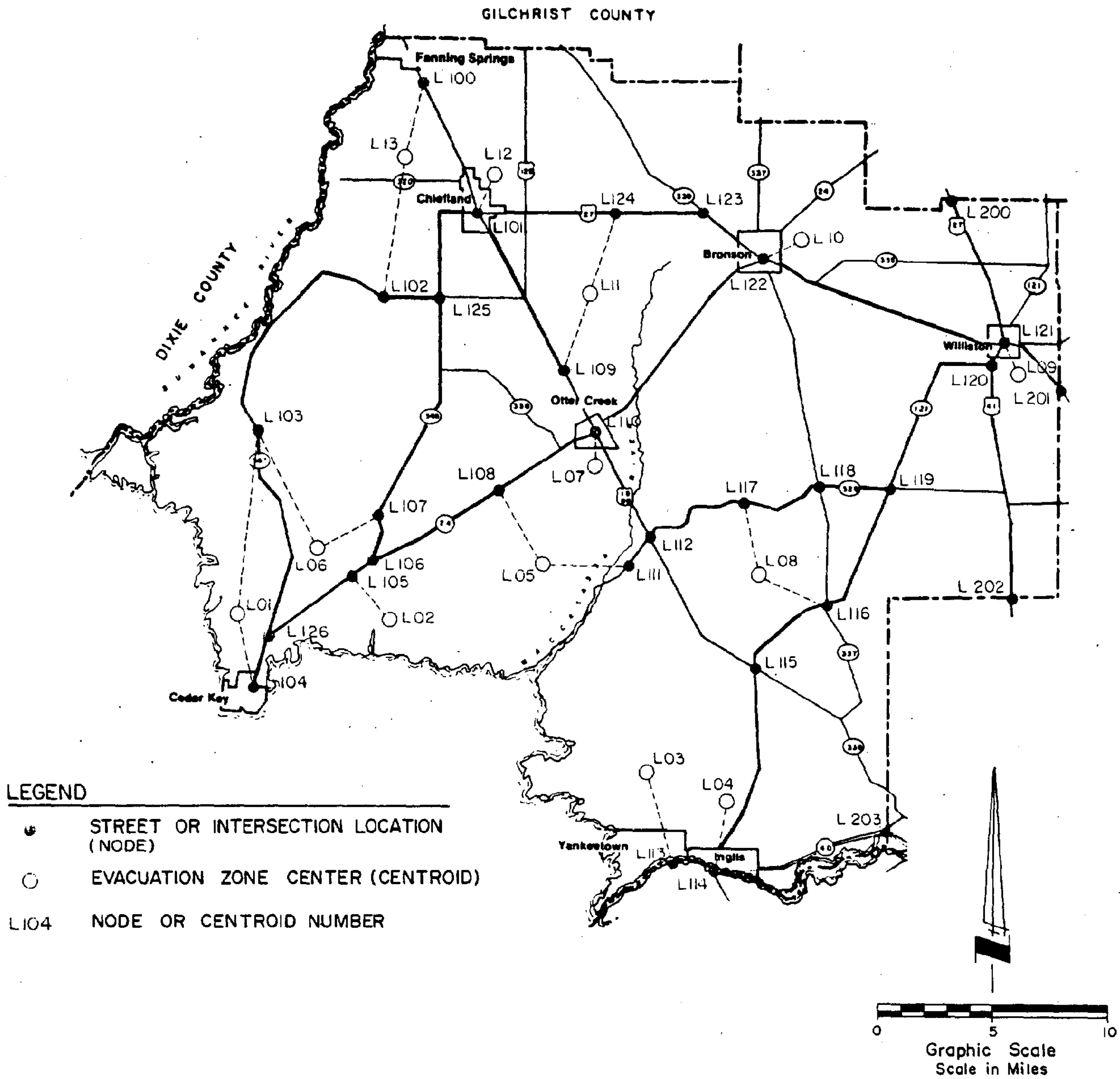
In order to determine the routing of evacuation traffic, a representation of the evacuation network roadway system was developed. A traditional "link-node" system was developed to identify roadway sections. Nodes are used to identify the intersection of two roadways or changes in roadway characteristics. Links are the roadway segments as defined by the nodes when connected. Each link is identified by a pair of node numbers. Another type of node, represented by an open circle, identifies the geographic center of activity within an evacuation zone. When connected to the evacuation network by a dashed line, these points indicate where evacuating vehicles enter the network. Figures 12 through 16 provide the representation of the evacuation network used in each county for transportation analysis.

5.2 GENERALIZED CAPACITY ASSUMPTIONS

Once the links and nodes for the evacuation routes were identified, roadway characteristics were specified for each link. The characteristics of each link were defined by the following features.

* Number of travel lanes
* Type of facility
* Area type

The number of travel lanes has the greatest effect on the ability of a roadway segment to handle a certain number of vehicles per hour. The type of facility refers to a link's designation as a one-way street, collector (undivided or divided), arterial, freeway, or centroid connector (local street). Area type designates the major land use characteristics surrounding the link and includes central business district, outlying business district, fringe area, residential area and rural area. The significance of these link characteristics is defined by their use as indicators of roadway speed and capacity.



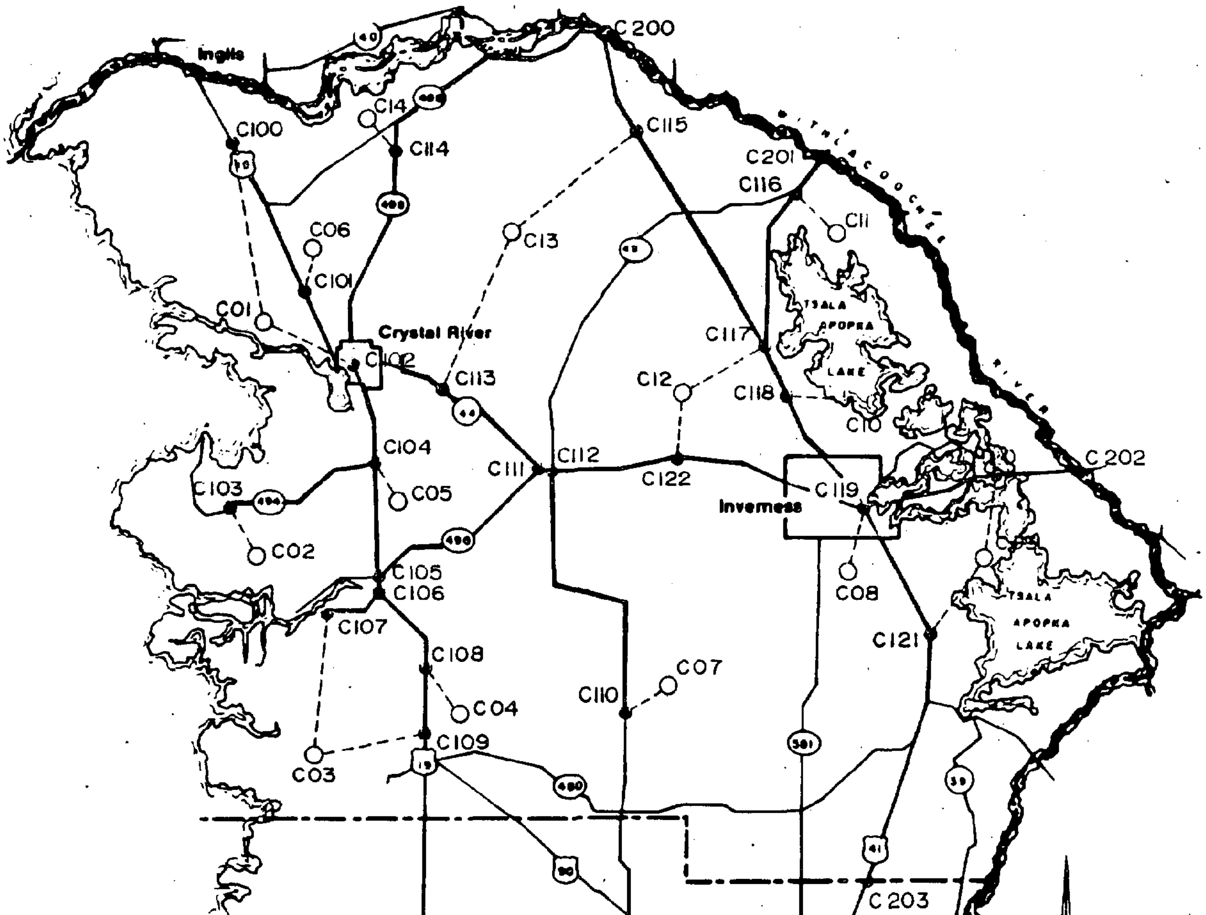
EVACUATION NETWORK

LEVY COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 12



LEGEND

● STREET OR INTERSECTION LOCATION (NODE)

○ EVACUATION ZONE CENTER (CENTROID)

C 102 NODE OR CENTROID NUMBER

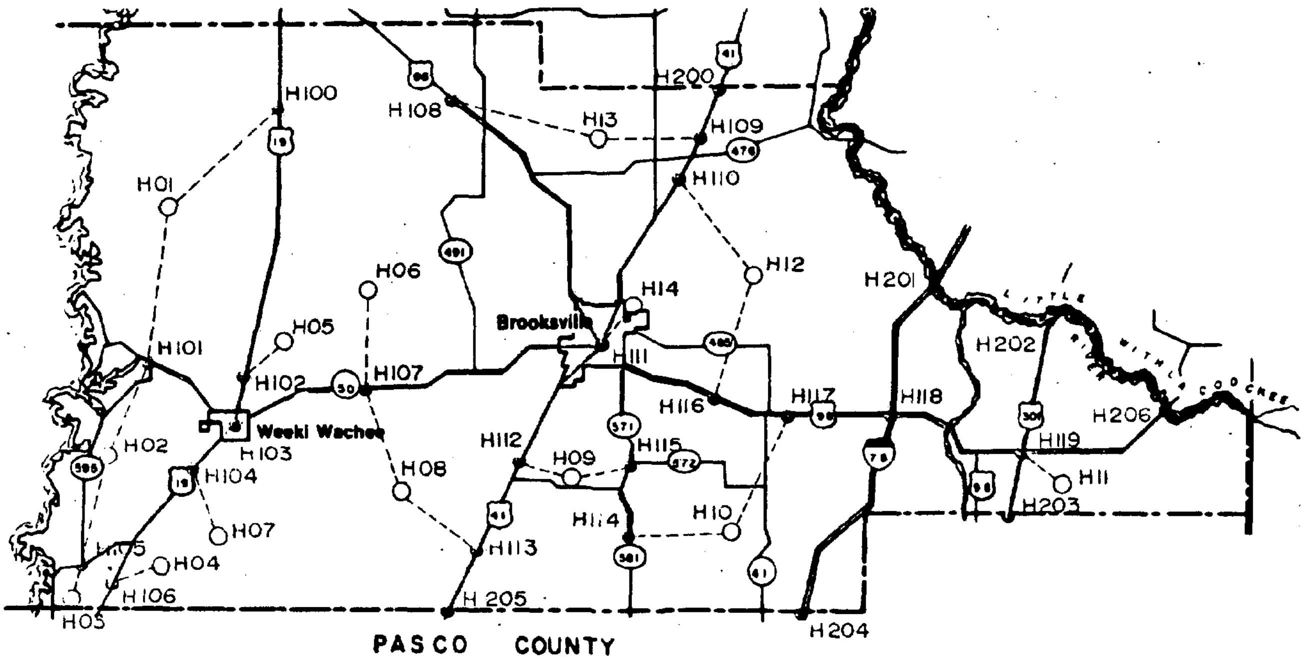
0 5 10
Graphic Scale
Scale In Miles

EVACUATION NETWORK
CITRUS COUNTY

PBSJ

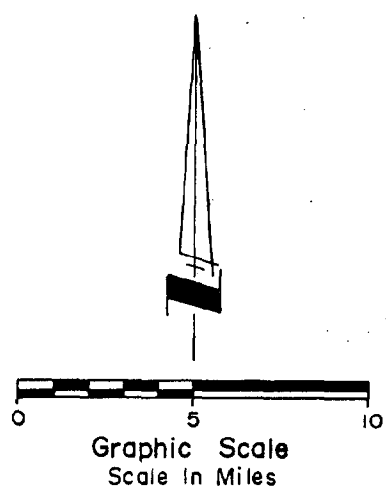
TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 13



LEGEND

◡	STREET OR INTERSECTION LOCATION (NODE)
○	EVACUATION ZONE CENTER (CENTROID)
H114	NODE OR CENTROID NUMBER

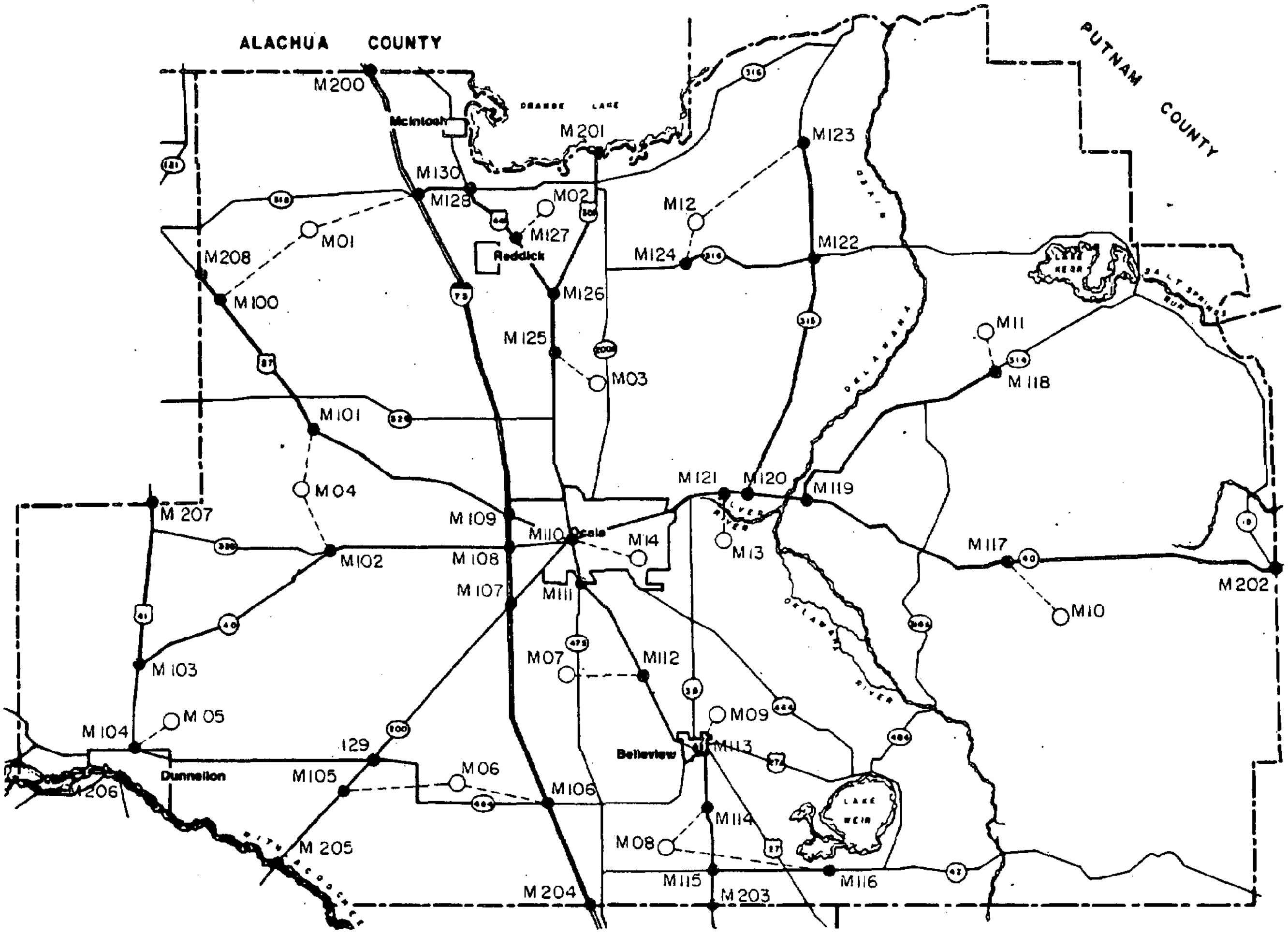


EVACUATION NETWORK

HERNANDO COUNTY

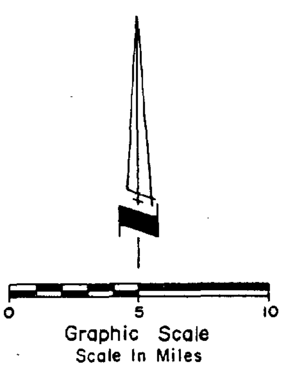
TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 14



LEGEND

●	STREET OR INTERSECTION LOCATION (NODE)
○	EVACUATION ZONE CENTER (CENTROID)
M 113	NODE OR CENTROID NUMBER

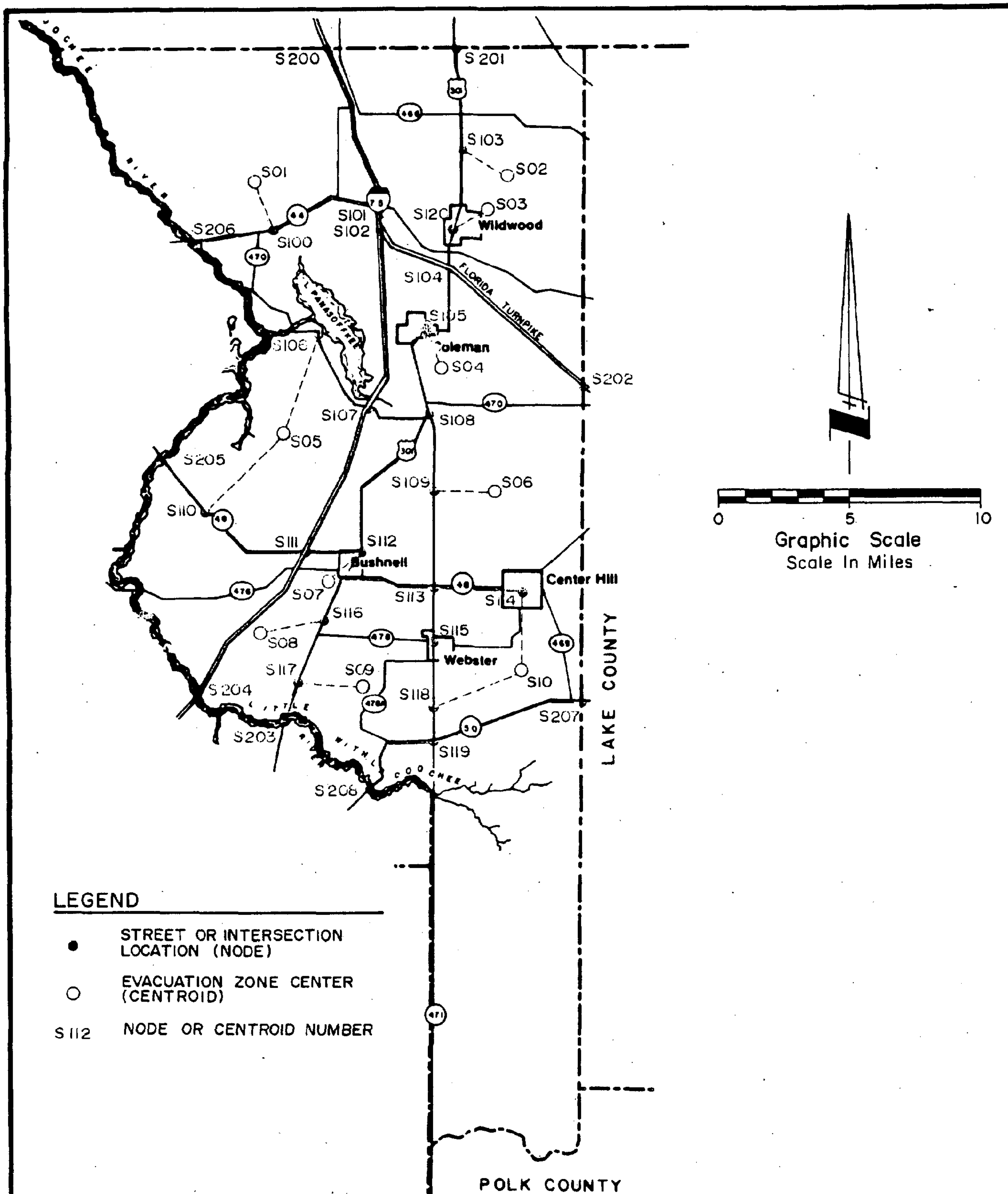


EVACUATION NETWORK
MARION COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 15



EVACUATION NETWORK

SUMTER COUNTY

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 16

Appendix E provides a link file for each county. Each link contained in the evacuation network is listed and described by the characteristics discussed above. A daily service volume (at Level of Service D) is then provided based on Florida Department of Transportation UTP Technical Memo of January 1979. Although evacuation travel demand will generally not be a 24-hour volume, daily service volumes provide a generalized relative measure of the ability of each link to conduct evacuation traffic. Further definition of facility type and area type are also provided in Appendix E.

CHAPTER 6
TRAVEL MODELING

To identify evacuation travel demand along the evacuation network, a series of transportation modeling steps were performed. The transportation modeling methodology developed and employed for the Withlacoochee Region involved a number of microcomputer and manual activities. The methodology, while very technical, was designed to be consistent with the accuracy level of the modeling inputs and assumptions. The methodology was deliberately created to be sensitive to different behavioral and population parameters.

6.1 TRIP GENERATION

Trip generation focused on determining how many evacuating vehicles would be produced by each evacuation zone and how many evacuating vehicles could be attracted to safe shelter locations in each evacuation zone. In this transportation modeling effort, originating vehicles are called "productions," while acceptable destinations for vehicles are called "attractions." Depending on the vulnerability level, more or fewer vehicles may be produced by and more or fewer vehicles attracted to each evacuation zone.

To arrive at vehicle productions by evacuation zone, population-at-risk (as defined in Chapter 3) was divided by the persons per evacuating vehicle statistic (calculated in Chapter 4). This step was accomplished for each vulnerability level. Vehicle productions by evacuation zone were then stratified by destination type using the assumed evacuee destination percentages (established in Chapter 4). Appendix F provides the evacuating population-at-risk and evacuating vehicles for each county's evacuation zones and stratifies each by destination type. Based on 100% participation in the evacuation by the population-at-risk, Table 8 shows the totals of evacuating vehicles within each county calculated for each vulnerability level.

TABLE 8

TOTAL EVACUATING VEHICLES BY COUNTY BY DESTINATION TYPE

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

	EVACUATING VEHICLES					
	VULNERABILITY LEVEL A			VULNERABILITY LEVEL B		
COUNTY	SHELTER	HOTEL	FRIENDS	SHELTER	HOTEL	FRIENDS
LEVY	1,434	1,351	1,905	1,653	1,556	2,195
CITRUS	3,666	3,450	4,866	4,079	3,839	5,414
HERNANDO	2,652	2,496	3,520	3,634	3,421	4,823
MARION	10,207	5,255	3,510	10,207	5,255	3,510
SUMTER	2,211	1,140	761	2,211	1,140	761
REGION TOTAL	20,170	13,692	14,562	21,784	15,211	16,703

It must be noted that vehicle productions by destination type refers to locations people intend to go and not where they may have to go due to shelter shortages. Trip distribution addressed the concept of where people actually go.

To arrive at vehicle attractions by evacuation zones, shelter capacity data provided by WRPC staff were translated into vehicle capacities by dividing person capacity by the persons per evacuating vehicles statistic developed for each county. This was accomplished for primary and secondary public shelters as well as hotels/motels as identified by WRPC staff. Secondary shelters were assumed to be used for Tampa Bay evacuees. Table 9 provides the totals of vehicle attractions for primary shelters and hotels/motels in each county by vulnerability level.

TABLE 9

TOTAL VEHICLE ATTRACTIONS BY COUNTY BY DESTINATION TYPE AND VULNERABILITY LEVEL

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

	VEHICLE CAPACITIES (ATTRACTIONS)			
	VULNERABILITY LEVEL A		VULNERABILITY LEVEL B	
COUNTY	Primary Shelter	Hotel	Primary Shelter	Hotel
LEVY	2,331	263	2,249	263
CITRUS	5,994	119	5,994	119
HERNANDO	5,101	229	3,685	176
MARION	16,953	2,442	16,953	2,442
SUMTER	2,886	457	2,886	457
REGION TOTAL	33,265	3,510	31,767	3,457

Vehicle attraction for the "friends" destination type was handled differently due to the nature of acceptable destinations. Since friends and relatives destinations are so numerous and much less definable than Red Cross shelters or hotels/motels, a relative measure of vehicle attractability in each county's non-surge evacuation zones was achieved by the following formula:

$$\frac{\text{Non-mobile home dwelling units x average persons per household}}{\text{Persons per evacuating vehicle}}$$

This formula was applied in each county using that county's unique parameters.

6.2 TRIP DISTRIBUTION

Trip distribution focused on matching expected evacuating vehicles from evacuation zones with available vehicle attractions in non-surge vulnerable evacuation zones. For each destination type, productions and attractions were matched based on the relative attractability of each zone (measured in terms of the total number of vehicle attractions) and impedence between origin and destination zones (measured in air line distance between zones).

Although productions and attractions were manually matched for the Red Cross shelter and hotel/motel destination types, a gravity model application was used to match productions and attractions for the friends/relatives destination type. The gravity model is a standard distribution technique used in urban travel demand forecasting. National Cooperative Highway Research Program Report 187 describes the gravity model used in this analysis. The microcomputer program SUPERCALC was used to perform the many calculations required in the gravity model analysis for five counties and two vulnerability levels.

The final products of trip distribution included a trip table showing all vehicle trips from each evacuation zone to all other evacuation zones -- a separate trip table was produced for each county, for each destination type, and for each vulnerability level. By adding the Red Cross shelter, hotel/motel and friend/relative trip tables together, a total trip table was produced for each county and vulnerability level. The total trip table provides all evacuation trip interchanges within a county for the in-county to in-county and in-county to out-of-county evacuation travel patterns.

In performing trip distribution, it was learned that a severe shortage of hotel/motel units exists in each county in light of the number of people who expect to find such units. Therefore, those vehicles seeking in-county hotel/motel units but not able to be accommodated were assumed to go out of the county and ultimately out of the region.

Primary shelter capacity appears adequate for accommodating in-county shelter demand, assuming 20 square feet per person. The only exception to this was in Sumter County where vehicle productions slightly exceeded vehicle attractions for this destination type. However, for travel modeling purposes, these vehicles were kept in-county.

As set forth in Chapter 4, 15 percent of vehicles seeking the homes of friends and relatives were assumed to go out of county, with the remaining 85 percent assumed to be accommodated by in-county homes. Although not included in this report, WRPC staff has available tabulated trip tables showing all county vehicle trip movements originating in evacuation zones and finding acceptable destinations in other evacuation zones or out of the county.

6.3 TRIP ASSIGNMENT

Trip assignment focused on the placement of evacuation trips contained in a trip table for a particular vulnerability level on to the roadway links included in the coded evacuation network. Although some vehicle trip diversion will occur to alternative roadway combinations connecting traffic evacuation zones, most zonal evacuation traffic uses an east-west arterial closest to the zone of interest. This is due primarily to the coarseness of the evacuation network. This phenomenon in the assignment portion of the transportation analysis emphasizes the importance of choosing roadways for the evacuation network that result in the smoothest traffic flow and that have the best ability to handle a large number of vehicles per hour.

Since trip tables produced in trip distribution reflect only the in-county to in-county and in-county to out of county travel movements, other evacuation travel movements had to be addressed for arriving at evacuation travel demand by link. These other movements include two specific groups:

1) Travel movements by vehicles leaving one regional county and traveling through another regional county to leave the region

2) Tampa Bay evacuation movements - vehicles stopping at secondary shelters and vehicles passing through the region

The logic of trip assignment of the first group is best described by county as follows:

Levy:	50/50 split of traffic exiting the county to US 27 north and south; south US 27 traffic goes to I-75 through Marion County to leave the region.
Citrus:	50/50 split of traffic entering the county to SR200 north and SR44 east; both groups of traffic go to I-75 with 50% impacting Sumter County and all impacting Marion County.
Hernando:	50/50 split of traffic exiting the county to I-75 and SR50 east; I-75 traffic impacts Sumter and Marion County; SR50 traffic impacts Sumter County.
Marion:	Traffic exiting the county split into thirds and assigned to US 301 north, I-75 north, and I-75 south; I-75 south traffic impacts Sumter County as it goes to Florida Turnpike.

Sumter:	50/50 split of traffic exisitng the county to I-75 north and Florida Turnpike south; I-75 traffic impacts Marion County.

Exiting traffic was assigned to each impacted county's coded evacuation network based on the above description.

To make assumptions regarding the magnitude and logic of vehicle trips coming from the Tampa Bay Region, PBS&J consulted with WRPC staff. Based on hurricane evacuation work in the Tampa Bay Region and WRPC direction, it was assumed that 143,510 persons, or 68,116 vehicles would impact the Withlacoochee evacuation network. These worst case figures are assumed to use US 41 (16% of traffic), US 301 (32%), and I-75 (52%). According to State of Florida inland shelter assumptions, 53,593 persons or 25,438 vehicles will need to find public shelter within the region. Regarding the through traffic of 42,678 vehicles (68,116 - 25,438 vehicles), it was assumed that although the traffic would enter the Withlacoochee Region on three different routes, all through traffic would gravitate to I-75 to leave the region.

Since secondary shelter capacity falls far short of worst case Tampa Bay shelter demand, excess primary shelter capacities in Ocala, Inverness and Brooksville were used to satisfy this demand. Traffic seeking secondary shelter was routed on US 41 to Brooksville and to Inverness. Traffic on US 301 was routed to secondary shelters in Bushnell, Wildwood and to Ocala. Traffic on I-75 was routed to Ocala. Tampa Bay evacuation traffic can be summarized as follows:

	US 41 (16%)	US 301 (32%)	I-75 (52%)
Seeking Shelter	4,070 vehicles	8,140 vehicles	13,228 vehicles
Through Traffic	6,848 vehicles	13,657 vehicles	22,913 vehicles

The appropriate assignment of a trip table, regional through movements, and Tampa Bay evacuation traffic for each regional vulnerability level resulted in the estimation of evacuation travel demand for every roadway link. Appendix G provides the total expected evacuation travel volume by link for each vulnerability level. WRPC staff has worksheets available summarizing all assigned volumes by evacuation travel pattern by link as well as map worksheets used in the manual assignment process.

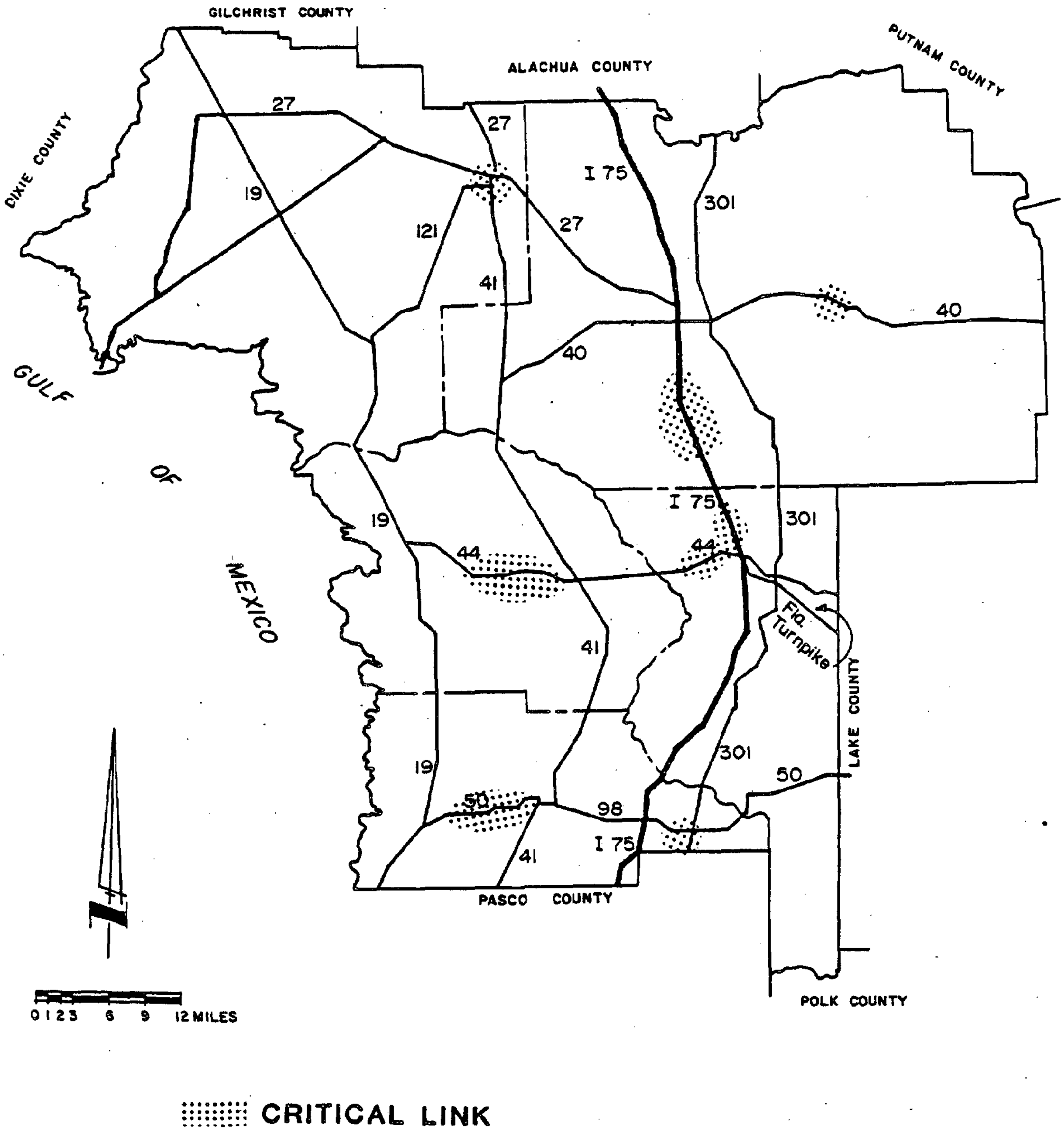
6.4 IDENTIFICATION OF CRITICAL ROADWAY LINKS

Using the assigned volumes by link and service volumes (capacities) developed by link, a series of volume to capacity ratios were calculated for each vulnerability level. Those links with the highest volume to capacity ratio were then identified as the critical links for each county. Appendix F in addition to the assigned volumes provides the v/c ratios calculated for each link. Thus, critical links are those roadway segments having the greatest travel demand during a hurricane evacuation relative to the segments' ability to handle a certain number of vehicles per hour. Critical links by vulnerability level and identified by county are as follows:

Levy County:	US 41 between Williston and SR121 (all regional vulnerability levels)
Citrus County:	SR44 west of Inverness and east of CR491 (all regional vulnerability levels)
Hernando County:	SR50 west of Brooksville and east of CR491 (regional vulnerability levels A and B without Tampa Bay)
	US 301 between SR50 and south county line (regional vulnerability levels A and B with Tampa Bay evacuation)
Marion County:	SR40 between CR314 and CR315 (regional vulnerability levels A and B without Tampa Bay)
	I-75 between CR484 and SR200 (regional vulnerability levels A and B with Tampa Bay evacuation)
Sumter County:	SR 44 west of I-75 (regional vulnerability levels A and B without Tampa Bay Evacuation)
	I-75 between SR44 and north county line (regional vulnerability levels A and B with Tampa Bay evacuation)

Figure 17 illustrates the critical links described above.

As expected, the large worst case Tampa Bay evacuation assumption shifted the critical link to I-75 in Hernando, Sumter and Marion Counties for



ROADWAY NETWORK CRITICAL LINKS

PBSJ

TRANSPORTATION MODELLING
WITHLACOOCHEE REGIONAL
HURRICANE EVACUATION PLAN

FIGURE 17

those regional vulnerability levels including a Tampa Bay evacuation. Since critical links are the most constrictive points in the evacuation network, traffic must be metered through these segments to estimate clearance times.

6.5 ESTIMATES OF CLEARANCE TIMES

The final transportation analysis step took a detailed look at the critical links identified for the five counties of the study area. Initially, evacuation travel patterns using the critical link of interest were identified for each vulnerability level. Evacuation vehicles from each origin-zone were then released to the critical link in accordance with a behavioral response curve. Based on an assumed hourly capacity for the critical link, the hourly volume desiring to use the link was then translated into a number of hours to clear the link. The number of hours to clear the link included time required by zonal vehicles to get to the link based on an assumed arrival offset for each zone. Added to this number of hours to clear the link was the estimated time it would take the last vehicle using the link to get to the county line (assuming an average speed). The sum was considered to be the clearance time for that particular storm situation.

To illustrate the travel time/queuing delay analysis performed at each critical link as described above, the most congested evacuation roadway link for Hernando County turned out to be SR50 west of Brooksville for vulnerability level A without a Tampa Bay evacuation. Evacuation traffic expected to use the link would consist of 842 vehicles from adjacent evacuation zones 5, 6, 8 and 14; 2,019 vehicles from other Hernando County evacuation zones; no vehicles from other counties in the region; and no vehicles from the Tampa region.

In addition to the usage of SR50 by vehicles described above, a background traffic figure must also be included. Background traffic as defined in the Introduction was hypothesized to be similar to peak period traffic volumes. By examining peak hour factors at Florida DOT permanent traffic count locations in the study area, an average peak hour factor of 12% was derived. This average peak hour factor was then applied to a 1982 24-hour FDOT traffic count of 6,583 vehicles on State Road 50 west of Brooksville. The resulting figure of 790 vehicles was then used as an estimate of background traffic that could be expected at the link in a hurricane evacuation. Background traffic would be heaviest at the beginning of the evacuation and taper off as the evacuation progressed.

The following three pages provide the analysis data sheets for the three assumed behavioral response curves. The vehicle volumes noted above appear under each appropriate origin heading. In each exhibit, the horizontal lines of data represent hourly intervals at the critical link. The portion of vehicles from each origin expected to be at the link for a particular hourly interval is shown in parenthesis by each vehicle volume. These portions were taken from the behavioral reponse curve being used, with portions for the background traffic being an inverse of the assumed behavioral response curve. Thus, the totals provided at the right hand side of each exhibit represent the total evacuation vehicle demand for the critical link at each hourly interval.

To calculate the rate at which vehicles would move through this critical evacuation link and to understand what traffic queues would develop, a detailed capacity figure needed to be calculated for SR50 west of Brooksville. Since intersections are the most constrictive points of an evacuation road network, an eastbound intersection approach capacity at Level of Service D was calculated for SR50 and CR700 and used to meter traffic across the critical link. Table 10 provides the analysis performed using a microcomputer program based on the 1965 Highway Capacity Manual.

TABLE 10

INTERSECTION ANALYSIS: SR 50 and CR 700
Hernando County, Florida
Brooksville

Transportation Analysis
Withlacoochee Regional Hurricane Evacuation Plan

GIVEN:

1.	Two-way street with no parking (Urban)		
2.	Metropolitan Population	=	6,000
3.	Peak Hour Factor	=	.99
4.	Location of the Intersection	=	Outlying Business Dist.
5.	Level of Service	=	D
6.	% Left Turns	=	5%
7.	% Right Turns	=	5%
8.	% Thru Trucks and Buses	=	5%
9.	Cycle Length	=	60 sec.
10.	Green Time	=	30 sec.
11.	Width of Approach	=	21 ft.

CALCULATED:

1.	Vehicles Per Hour of Green	=	1,690
2.	Left Turn Factor	=	1.05
3.	Right Turn Factor	=	1.025
4.	Metropolitan Area Type Factor	=	1.25
5.	Population Adjustment Factor	=	1.012

EASTBOUND APPROACH VOLUME (THROUGH TRAFFIC) = 1,150 vph

Green time was assumed to be a minimum of 50% of total cycle length due to the use of police manpower to control the intersection during an evacuation.

Data in the three analysis sheets under the heading "Carryover Analysis," presented the resulting queues by hourly interval. These figures resulted from comparing hourly vehicle demand for the critical link with calculated hourly capacity for the link. Carryover analysis then allowed the calculation of a number of hours to clear the critical link. For response curves A, B and C, the resulting number of hours was calculated to be 4 1/2, 7 1/2 and 10 1/2 hours, respectively. An estimate of the number of hours it would take the last vehicle crossing the link to reach the county line was added to arrive at total clearance time. An average speed for this last vehicle was assumed to be 30 mph. Vehicle speeds in an evacuation have been observed to range from 25 to 45 mph with an average speed of 35 mph.

Performing this analysis at each county's critical link for each regional vulnerability level produced a set of clearance times. Clearance times were varied using the behavioral response curves outlined earlier. Clearance times range from 4 1/4 to 10 1/4 hours in Levy County, 7 3/4 to 13 hours in Citrus County, 4 1/4 to 26 1/4 hours in Hernando County, 5 to 21 1/4 hours in Marion County, and 4 1/2 to 21 hours in Sumter County. Table 11 provides all calculated clearance times. The planning implications of this transportation analysis output are discussed in Chapter 7.

TABLE 11

CLEARANCE TIMES (in hours)

Transportation Analysis
Withlacoochee Regional Hurricane Plan

REGIONAL VULNERABILITY LEVEL

	RESPONSE CURVE	A	B	A w/Tampa Bay Evacuation	B w/Tampa Bay Evacuation
LEVY COUNTY	A-Quick Response	4 1/4	4 3/4	4 1/4	4 3/4
	B-Medium Response	7 1/4	7 1/4	7 1/4	7 1/4
	C-Slow Response	10 1/4	10 1/4	10 1/4	10 1/4
CITRUS COUNTY	A-Quick Response	7 3/4	9 1/4	7 3/4	9 1/4
	B-Medium Response	9 1/2	11	9 1/2	11
	C-Slow Response	11 1/2	13	11 1/2	13
HERNANDO COUNTY	A-Quick Response	4 1/4	7 1/4	26	26
	B-Medium Response	7 1/2	8 1/4	25 1/2	25 1/2
	C-Slow Response	10 1/2	10 1/2	26 1/4	26 1/4
MARION COUNTY	A-Quick Response	5	5	18	18 1/4
	B-Medium Response	8	8	19 1/2	19 3/4
	C-Slow Response	11	11	21	21 1/4
SUMTER COUNTY	A-Quick Response	4 1/2	4 1/2	18	18
	B-Medium Response	7 1/4	7 1/4	19 1/2	19 1/2
	C-Slow Response	10 1/4	10 1/4	21	21

CHAPTER 7

TRAFFIC CONTROL AND EVACUATION PLANNING IMPLICATIONS

The calculation of clearance times through the transportation analysis was of critical importance to the overall hurricane evacuation planning effort of the WRPC. However, results of the transportation analysis must be interpreted for use in traffic control and evacuation order issuance if they are to have any real meaning.

7.1 EVACUATION ROUTES

The assignment of evacuating vehicles to the evacuation road network was a critical output of the transportation analysis. Since the transportation analysis models the evacuation travel patterns expected in a hurricane evacuation, the evacuation routes used by a particular traffic evacuation zone become of ultimate importance in identifying critical links and their clearance times. The effect that one zone's set of evacuation routes has on all other zones' route usage is thus an important element within the transportation analysis. Evacuation travel patterns were then modeled on a zone to zone basis. Since zones are quite large, particularly outside the surge vulnerable areas, the actual roadways used to get to a particular shelter location in a zone could vary depending upon the direction of approach to the zone.

To facilitate the development of evacuation instructions for each county, evacuation route assignments were developed from each surge vulnerable zone to an assigned Red Cross shelter(s) for that zone. Where possible, zones outside the surge vulnerable areas were assigned to a Red Cross shelter within that same zone; thus specific route assignments were sometimes inappropriate for non-surge vulnerable zones since evacuating vehicles would not use the main evacuation road network. Specific route assignments were not made for hotel/motel or home of a friend destinations because of the infinite number of possible routings that would be taken to get to these general destinations.

Evacuation route assignments from evacuation zones to Red Cross shelters are provided in Appendix H. Evacuees from surge vulnerable zones should use the specified corridor(s) to leave the area at risk regardless of whether going to a Red Cross shelter or some other destination. This structuring of traffic movement will ensure the use of manually controllable intersections and reduce traffic conflict at many east-west arterial intersections.

7.2 TRAFFIC CONTROL MEASURES

The movement of evacuating vehicles during a hurricane evacuation requires traffic control efforts to make maximum use of roadway capacity and to expedite safe escape from hurricane hazards. Although detailed manpower planning and assignments are best made at the local level, a general discussion of traffic control measures is provided related to traffic control points, roadway modifications and emergency response to traffic accidents and vehicle breakdowns.

Traffic Control Points

Safe evacuation of residents at risk must involve the near-continuous movement of vehicles through critical intersections and convergence points along critical links of the evacuation road network. Typically, traffic signals along east-west evacuation routes do not provide the necessary "green time" required in an evacuation situation. An underlying assumption of the transportation analysis was that manpower would be available at key intersections and thus clearance times reflect the use of manpower. Therefore, it is recommended that specific assignment of emergency traffic control manpower to intersections along east-west corridors and other critical traffic control points within the evacuation road network be incorporated into each county's hurricane emergency operations plans. Although critical links identified in the transportation analysis may need special manpower control, many other traffic control points will require assistance from state, county and local police and emergency personnel. Using the "nodes" identified in each county's evacuation route structure as a base, local officials should identify specific traffic control points where detailed manpower assignments will be made.

Roadway Modifications

The use of traffic barriers, swing/drawbridge positioning and lane usage modifications should be used as necessary in a hurricane evacuation situation. Physical barriers should be used primarily to supplement manual efforts to discourage long through movements on US 19 in Levy, Citrus and Hernando

Counties. Physical barriers should be used to channel traffic and prevent unnecessary turning conflicts.

All drawbridges throughout the region should be locked in the "down" position during a hurricane warning. Boat owners in each coastal county must be made aware of existing flotilla plans and understand that vessels must be secured in safe harbor prior to or during the hurricane watch.

Lane usage modifications must involve close coordination between civil defense staff and local agencies involved in traffic control. Generally, because of the complex and intricate interrelation of each roadway contained in the evacuation network, it is difficult to realize a savings in clearance time by changing flow direction on roadway lanes. This lack of savings in clearance times is due to traffic operations problems, the need for additional manpower that is already scarce, and the need to allow emergency vehicles to travel against the main flow of traffic. Depending on how much lead time is available, lane usage modifications should only be considered for traffic exiting Cedar Key and inter-regional traffic on I-75.

A final roadway modification should include alleviating the payment of tolls by evacuation traffic on the Florida Turnpike. This could be accomplished by the Governor of Florida ordering all toll attendants to leave their work facilities.

Emergency Response to Accidents/Breakdowns

The intensity of traffic during a hurricane evacuation will always be accompanied by a certain number of traffic accidents and breakdowns. Although roadway shoulders are available for vehicles in distress, the movement of such vehicles to these areas is often difficult and disruptive. It is recommended that at least two traffic control personnel be positioned at each key roadway link so that one can assist disabled vehicles as needed. A tow vehicle should also be positioned at each critical link to facilitate the removal of immobilized vehicles. Those roadways that historically experience flooding due to rainfall alone should be monitored for vehicle distress and help.

7.3 USE OF CLEARANCE TIMES IN ISSUANCE OF AN EVACUATION ORDER

Clearance time is one of two major time components involved in issuing an evacuation order. Clearance time must be added to pre-landfall hazards time to ensure that evacuees can reach safe shelter before the arrival of hazardous conditions. The WRPC staff will take the results of the transportation analysis and couple them with hazards analysis data to arrive at evacuation order times for each county for particular storm situations.

Since clearance time begins before an evacuation order is issued (due to people leaving before the order is issued), only that portion of clearance time assumed to be needed after the order should be used in calculating evacuation order times. To arrive at post-evacuation order clearance times for each county, the following adjustment has to be made:

Clearance time for:	
Behavioral Response A	Subtract 1 Hour
Behavioral Response B	Subtract 2 Hours
Behavioral Response C	Subtract 3 Hours

This adjustment corresponds to the hours before the evacuation order shown previously in each behavioral response curve. Since it is difficult to measure how quickly the evacuating population is actually responding, it may be prudent to use behavioral response curve B times in estimating evacuation order time.

7.4 INTERREGIONAL TRAFFIC IMPACTS

Traffic assumed to be generated from the Tampa Bay Region in an evacuation presents a difficult situation for the Withlacoochee Region. Clearance times are magnified to the point of incompatibility with the warning system. Traffic queuing on Interstate 75 would result in traffic flow breakdowns and difficulties for Withlacoochee evacuees desiring to use the roadway. These impacts should also be addressed with regard to gasoline supplies and shelter considerations. Alternatives to this interregional traffic problem must be addressed by regional, state and local officials.

LEVY COUNTY
EVACUATION ZONE BOUNDARIES

Evacuation Zone	Zone Boundary Description
L1	South of Suwannee River; west of CR 347 and SR 24; all of Cedar Key; north and east of Gulf of Mexico
L2	South of SR 24 and Main Line Road; west of Waccasassa River; north of Gulf of Mexico; east of SR 24
L3	South of Wacassassa River and Robinson Road; west of two miles west of US 19; north of Levy County line; east of Gulf of Mexico
L4	South of CR 336; west of US 19; all of Inglis; north of Levy county line; east of two miles west of US 19
L5	South of two miles north of Main Line Road; west of US 19; north of Robinson Road and Main Line Road; east of Rocky Run
L6	South of Suwannee River, two miles northeast of CR 347 and Purdue Road; west of Rocky Run; north of Main Line Road and SR 24; east of CR 347
L7	South of SR 24 and Yearty Road; west of 01 Road #4 and #7; north of two miles north of Main Line Road; east of Rocky Run
L8	South of Osteen Road; west of CR 337 and Levy County line; north of Levy County line; east of US 19, 01 Road #4 and #7.
L9	South of CR 343; west of Levy County line; north of Levy County line; east of CR 337 and Williston Highlands area Road
L10	South of Levy County line; west of Levy County line; north of CR 343 and Osteen Road; east of Waccasassa River
L11	South of Levy County line; west of Waccasassa River; north of Otter Creek; east of CR 336, CR 330, Chiefland, railroad and SR 49
L12	Chiefland city limits
L13	South of Suwannee River and Levy County line; west of SR 49, railroad, Chiefland, CR 330 and CR 336; north of two miles north of Main Line Road, Purdue Road and Moody Road; east of two miles east of CR 347

CITRUS COUNTY
EVACUATION ZONE BOUNDARIES

Evacuation Zone	Zone Boundary Description
C1	South of Citrus County line; west of US 19 and Crystal River city limit; north of SR 44; east of Gulf of Mexico
C2	South of SR 44; west of ½ mile east of US 19; north of Homosassa River; and east of Gulf of Mexico
C3	South of Homosassa River; west of US 19; north of Citrus County line; east of Gulf of Mexico
C4	South of CR 490A; west of two miles east of US 19; north of Citrus County line; east of US 19
C5	South of SR 44; west of two miles east of US 19; north of CR 490A; east of ½ mile east of US 19
C6	South of Citrus County line; west of one mile east of US 19 and one mile east of Crystal River city limit; north of SR 44; east of US 19 and Crystal River city limit
C7	South of CR 490 and SR 44; west of CR 581; north of Citrus County line; east of two miles east of US 19
C8	South of Inverness city limit; west of US 41; north of CR 480; east of CR 581
C9	South of SR 44; west of Citrus County line; north of Citrus County line; east of CR 581, CR 480, and US 41
C10	South of Hernando northern town limit and Tsala Apopka Lake; west of Citrus County line; north of SR 44 and Inverness city limit; east of North Inverness Highlands western limit and Hernando western town limit
C11	South of Citrus County line; west of Citrus County line; north of Hernando and Tsala Apopka Lake; east of CR 200, CR 491 and US 41
C12	South of CR 491; west of CR 200, Hernando and north Inverness Highlands; north of SR 44; east of CR 491
C13	South of SCL Railroad; west of US 41 and CR 491; north of CR 490; east of two miles east of US 19 and Crystal River
C14	South of Citrus County line; west of SCL Railroad; north of two miles north of Crystal River; east of one mile east of US 19

HERNANDO COUNTY
EVACUATION ZONE BOUNDARIES

Evacuation Zone	Zone Boundary Description
H1	South of Hernando County line; west of one mile east of US 19 and west of US 19 at Tooke Lake; north of SR 50; east of Gulf of Mexico
H2	South of SR 50; west of US 19; north of Little Pine Island area; east of Gulf of Mexico
H3	South of Little Pine Island; west of US 19; north of Hernando County line; east of Gulf of Mexico
H4	South of SR 50; west of 1½ miles east of US 19; north of Hernando County line; east of US 19
H5	South of Tooke Lake; west of one mile east of US 19; north of SR 50; east of US 19
H6	South of Centralia Road; west of CR 491; north of SR 50; east of one mile east of US 19
H7	South of SR 50; west of Spring Hill; north of Hernando County line; east of 1½ miles east of US 19
H8	South of SR 50 and CR 572; west of CR 581; north of Hernando County line; Spring Hill area.
H9	South of SR 50, Brooksville city limit, and US 98; west of Spring Lake and CR 577; north of CR 572; east of Weekiwachee Prairie and Brook Ridge areas
H10	South of CR 572 and SR 50; west of I-75 and Hernando County line; north of Hernando County line; east of CR 581
H11	South of Hernando County line; west of Hernando County line; north of Hernando County line; east of I-75
H12	South of Hernando County line; west of I-75; north of US 98; east of Brooksville city limit
H13	South of Hernando County; west of SR 45; north of Brooksvile city limit and SR 50; east of CR 491, Centralia Road and one mile east of US 19
H14	Brooksville city limits

MARION COUNTY
EVACUATION ZONE BOUNDARIES

Evacuation Zone	Zone Boundary Description
M1	South of Marion County line; west of I-75; north of CR 326; east of Marion County line
M2	South of Marion County line; west of SCL railroad; north of CR 316, SR 200 and CR 329; east of I-75
M3	South of CR 329, SR 200, and CR 315; west of Mallard Lake and Mt. Olive Cemetary; north of NE 35th St. and US 27; east of I-75
M4	South of CR 326; west of I-75; north of SR 200 and CR 484; east of the western Rolling Hills and Rolling Ranches area and east of US 41
M5	South of Marion County line; west of US 41, Rolling Hills, Rolling Ranches and SR 200; north of Marion County line; east of Marion County line
M6	South of SR 200; west of I-75; north of Marion County line; east of Marion County line
M7	South of SR 200 and CR 464; west of Silver Springs Shores; north of CR 312; east of I-75
M8	South of CR 312, Belleview city limit, Belleview Candler Highway, and CR 464; west of Oklawaha Canal; north of Martin County line; east of I-75
M9	South of SCL Railroad; west of Belleview Candler Highway; all of Belleview; east of CR 467
M10	South of CR 314 and Juniper Prairie; west of Marion County line; north of Marion County line; east of Oklawaha River
M11	South of Marion County line; west of Marion County line; north of CR 314 and Juniper Prairie; east of Oklawaha River
M12	South of Marion County line; west of Oklawaha River; north of Indian Lake Prairie; east of SCL Railroad and Mallard Lake
M13	South of Indian Lake Prairie; west of Oklawaha River; north of CR 464 and SCL Railroad; east of CR 350
M14	City of Ocala

SUMTER COUNTY
EVACUATION ZONE BOUNDARIES

Evacuation Zone	Zone Boundary Description
S1	South of Sumter County line; west of CR 466, Wildwood city limit and railroad; north of Lake Panasoffkee and Outlet River; east of Sumter County line
S2	South of Sumter County line; west of Sumter County line; north of railroad and Wildwood city limit; east of CR 466
S3	Wildwood city limits; SR 35 area south to Florida Turnpike
S4	South of railroad and Florida Turnpike; west of Sumter County line; north of CR 470; east of CR 471, Coleman city limits and railroad
S5	South of Outlet River and Lake Panasoffkee; west of railroad and Bushnell city limit; north of CR 476; east of Sumter County line
S6	South of Shady Brook and CR 470; west of Sumter County line; north of CR 476 and Center Hill city limit; east of railroad and Bushnell city limit
S7	Bushnell city limits; one square mile area northwest of city
S8	South of CR 476 and Bushnell city limit; west of CR 471; north of CR 478 and railroad; east of CR 476B
S9	South of CR 476, CR 476B, CR 478 and railroad; west of CR 471 and Webster city limit; north of Sumter County line; east of Sumter County line
S10	South of CR 476, Center Hill northern city limit and railroad; west of Sumter County line; north of Sumter County line; east of Sumter County line and CR 471

LEVY COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
345	L01	760	228	0
341UP	L01	37	15	0
350P	L01	40	19	0
350P	L02	32	16	0
349P	L02	10	6	0
348P	L03	31	9	0
351P	L03	103	50	0
346	L03	733	220	0
343	L04	784	236	0
353	L04	0	0	0
351P	L04	83	41	0
348P	L04	11	3	0
348P	L05	31	9	0
349P	L05	17	11	0
350P	L06	66	32	0
341UP	L06	37	15	0
337	L07	0	0	0
347	L07	0	0	0
338	L07	0	0	0
344	L07	76	21	0
349P	L07	38	25	0
348P	L08	133	41	0
351P	L08	228	109	0
334	L13	62	36	0
340A	L13	272	109	0
341T	L13	676	338	0
341UP	L13	298	118	0
350P	L13	24	12	0
326	L09	433	25	0
327	L09	396	43	0
331	L09	702	234	0
332	L09	596	159	0
333	L09	498	243	0
352	L09	0	0	0
325	L10	337	80	0
328	L10	370	109	0
329	L10	671	439	0
330	L11	54	7	0
339	L11	284	85	0
342	L11	249	67	0
335	L12	482	80	0
336	L12	0	0	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zones
TDU = # of Total Dwelling Units
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FW = # of Units in Freshwater Flood Prone Areas

CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
71602	C06	5	2	0
71603	C01	50	10	0
71604	C01	26	13	0
71605	C01	18	0	0
71606	C01	0	0	0
71607	C01	0	0	0
71608	C01	0	0	0
71609	C01	0	0	0
71610	C01	0	0	0
71611	C06	2	1	0
71612	C06	4	2	0
71613	C06	5	0	0
71614	C01	0	0	0
71615	C01	0	0	0
71616	C01	0	0	0
71617	C01	0	0	0
71618	C01	0	0	0
71619	C01	0	0	0
71620	C01	1	0	0
71621	C01	1	0	0
71622	C01	0	0	0
71623	C01	1	0	0
71624	C01	15	2	0
71625	C01	1	0	0
71626	C01	0	0	0
71627	C01	0	0	0
71628	C01	0	0	0
71629	C01	0	0	0
71630	C01	0	0	0
71631	C01	0	0	0
71632	C01	0	0	0
71633	C01	0	0	0
71634	C01	0	0	0
71635	C01	0	0	0
71636	C01	0	0	0
81601	C01	0	0	0
81602	C01	1	1	0
81603	C01	0	0	0
81604	C01	0	0	0
81605	C01	0	0	0
81609	C01	0	0	0
81610	C01	0	0	0
81611	C01	0	0	0
81612	C01	0	0	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
81613	C01	3	0	0
81614	C02	0	0	0
81615	C02	0	0	0
81616	C02	0	0	0
81618	C02	0	0	0
81620	C02	0	0	0
81621	C02	0	0	0
81622	C02	0	0	0
81623	C02	0	0	0
81624	C02	28	1	0
81625	C02	7	0	0
81626	C02	0	0	0
81627	C02	0	0	0
81628	C02	0	0	0
81629	C02	0	0	0
81630	C02	0	0	0
81631	C02	0	0	0
81632	C02	0	0	0
81633	C02	0	0	0
81634	C02	41	11	0
81635	C02	10	5	0
81636	C02	0	0	0
91601	C02	0	0	0
91602	C02	0	0	0
91603	C02	0	0	0
91604	C02	0	0	0
91605	C02	0	0	0
91606	C02	0	0	0
91607	C02	0	0	0
91608	C02	0	0	0
91609	C02	0	0	0
91610	C02	194	168	0
91611	C02	2	2	0
91612	C02	0	0	0
91613	C02	0	0	0
91614	C02	96	50	0
91615	C02	80	72	0
91616	C02	0	0	0
91617	C02	0	0	0
91618	C02	0	0	0
91620	C02	0	0	0
91621	C02	0	0	0
91622	C02	0	0	0
91623	C02	2	2	0
91624	C02	0	0	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
91625	C02	18	3	0
91626	C02	3	0	0
91627	C02	0	0	0
91628	C02	0	0	0
91629	C02	0	0	0
91630	C02	0	0	0
91631	C03	0	0	0
91632	C03	0	0	0
91633	C03	0	0	0
91634	C03	3	3	0
91635	C03	0	0	0
91636	C03	21	6	0
01602	C03	0	0	0
01603	C03	0	0	0
01604	C03	1	1	0
01608	C03	0	0	0
01609	C03	0	0	0
01610	C03	0	0	0
01611	C03	0	0	0
01614	C03	0	0	0
01615	C03	0	0	0
01620	C03	0	0	0
01621	C03	0	0	0
01622	C03	0	0	0
01623	C03	0	0	0
01626	C03	0	0	0
01627	C03	0	0	0
01628	C03	0	0	0
01629	C03	0	0	0
01630	C03	0	0	0
01631	C03	0	0	0
01632	C03	0	0	0
01633	C03	0	0	0
01634	C03	0	0	0
01635	C03	0	0	0
71719	C06	21	0	0
71729	C06	8	3	0
71730	C06	11	3	0
71731	C01	26	5	0
71732	C06	7	0	0
71733	C06	2	0	0
81703	C06	12	7	0
81704	C06	8	2	0
81705	C06	28	27	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
81706	C01	16	6	0
81707	C01	53	20	0
81708	C06	50	6	0
81709	C06	72	19	0
81710	C06	94	63	0
81711	C06	15	11	0
81713	C06	15	13	0
81714	C06	115	92	0
81715	C06	47	11	0
81716	C01	152	2	0
81717	C01	123	1	0
81718	C01	158	0	0
81719	C02	73	54	0
81720	C01	128	2	0
81721	C01	362	180	0
81722	C01	458	282	0
81723	C06	69	35	0
81724	C06	224	127	0
81725	C05	73	20	0
81726	C05	103	35	0
81727	C02	71	20	0
81728	C01	258	9	0
81729	C01	29	0	0
81730	C02	52	0	0
81731	C02	0	0	0
81732	C02	19	6	0
81733	C02	116	0	0
81734	C02	91	85	0
81735	C05	129	0	0
81736	C05	268	136	0
91701	C05	16	4	0
91702	C05	1	0	0
91703	C02	71	70	0
91704	C02	95	3	0
91705	C02	4	2	0
91706	C02	0	0	0
91707	C02	0	0	0
91708	C02	0	0	0
91709	C02	0	0	0
91710	C02	148	114	0
91711	C05	75	34	0
91712	C05	46	29	0
91713	C05	81	57	0
91714	C05	72	52	0
91715	C02	149	88	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
91716	C02	14	2	0
91717	C02	0	0	0
91718	C02	0	0	0
91719	C02	0	0	0
91720	C02	0	0	0
91721	C02	0	0	0
91722	C02	92	20	0
91723	C05	209	147	0
91724	C05	154	129	0
91825	C04	120	81	0
91726	C04	237	156	0
91727	C03	105	46	0
91728	C02	171	46	0
91729	C02	244	67	0
91730	C02	59	3	0
91731	C03	195	14	0
91732	C03	0	0	0
91733	C03	45	24	0
91734	C03	0	0	0
91735	C03	224	125	0
91836	C04	149	84	0
01701	C03	10	2	0
01702	C03	0	0	0
01703	C03	0	0	0
01704	C03	6	6	0
01705	C03	61	42	0
01706	C03	13	6	0
01707	C03	33	24	0
01708	C03	78	31	0
01709	C03	9	5	0
01710	C03	0	0	0
01711	C03	0	0	0
01712	C03	13	11	0
01713	C03	28	16	0
01714	C03	0	0	0
01715	C03	0	0	0
01716	C03	0	0	0
01717	C03	0	0	0
01718	C03	0	0	0
01719	C03	0	0	0
01720	C03	0	0	0
01721	C03	0	0	0
01722	C03	0	0	0
01723	C03	0	0	0
01724	C03	16	6	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
01725	C03	137	22	0
01726	C03	230	109	0
01727	C03	0	0	0
01728	C03	35	0	0
01729	C03	0	0	0
01730	C03	0	0	0
01731	C03	0	0	0
01732	C03	4	0	0
01733	C03	2	2	0
01734	C03	0	0	0
01735	C03	28	20	0
01736	C03	59	43	0
01806	C04	109	79	0
01807	C04	247	150	0
01818	C04	0	0	0
01819	C04	0	0	0
01830	C04	10	7	0
01831	C04	0	0	0
134	C07	674	391	0
151	C07	0	0	0
152T	C07	587	50	0
127	C08	656	66	0
128	C08	495	49	0
135T	C08	1111	143	0
135U	C08	572	61	0
153	C08	711	103	0
129	C09	659	171	0
136T	C09	847	206	0
136U	C09	251	154	0
137T	C09	453	233	0
137U	C09	343	169	0
138T	C09	402	125	0
138U	C09	384	105	0
126T	C10	429	159	0
126U	C10	353	141	0
131T	C10	612	216	0
132V	C10	652	191	0
133A	C10	507	107	0
133B	C10	50	10	0
133U	C10	692	57	0
130T	C11	465	248	0
132T	C11	474	214	0
132U	C11	455	248	0
123T	C12	687	1	0
123U	C12	536	0	0

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CITRUS COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
124T	C12	505	0	0
124U	C12	469	0	0
125T	C12	426	16	0
125U	C12	510	0	0
125V	C12	35	0	0
130U	C12	558	330	0
131U	C12	398	158	0
139	C13	756	2	0
146	C13	0	0	0
143T	C14	318	117	0
143U	C14	734	255	0
144A	C14	33	31	0
147A	C13	0	0	0
147U	C13	197	96	0

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HERNANDO COUNTY DWELLING UNIT DATA

ED/S	EVAC	TDU	MHDU	FW
11612	H01	0	0	0
11613	H01	0	0	0
11614	H01	0	0	0
11623	H01	0	0	0
11624	H01	0	0	0
11625	H01	0	0	0
11636	H01	0	0	0
21601	H01	0	0	0
21612	H01	0	0	0
21613	H01	34	0	0
21624	H01	0	0	0
21625	H01	0	0	0
21636	H02	0	0	0
31601	H02	0	0	0
31611	H02	16	0	0
31612	H02	301	0	0
31613	H02	63	0	0
31614	H02	0	0	0
31623	H03	0	0	0
31624	H03	0	0	0
31625	H03	28	0	0
31626	H03	0	0	0
31635	H03	16	0	0
31636	H03	8	0	0
21702	H01	0	0	0
21703	H01	0	0	0
21704	H01	0	0	0
21705	H01	0	0	0
21706	H01	0	0	0
21707	H01	0	0	0
21708	H01	0	0	0
21709	H01	0	0	0
21710	H01	0	0	0
21711	H01	0	0	0
21714	H01	0	0	0
21715	H01	0	0	0
21716	H01	0	0	0
21717	H01	0	0	0
21718	H01	0	0	0
21719	H01	18	0	0
21720	H01	0	0	0
21721	H01	0	0	0
21722	H01	0	0	0
21723	H01	0	0	0
21727	H01	0	0	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
MHDU = # of Mobile Home Dwelling U
FW = # of Units in Freshwater Flo

HERNANDO COUNTY DWELLING UNIT DATA

ED/S	EVAC	TDU	MHDU	FW
21728	H02	53	13	0
21729	H02	127	0	0
21730	H02	21	0	0
21731	H02	20	0	0
21732	H02	239	0	0
21733	H02	42	15	0
21734	H01	84	21	0
31703	H02	0	0	0
31704	H02	0	0	0
31705	H02	0	0	0
31706	H02	0	0	0
31707	H02	0	0	0
31708	H02	0	0	0
31709	H02	5	0	0
31716	H03	37	14	0
31717	H02	0	0	0
31718	H02	0	0	0
31719	H03	0	0	0
31720	H03	0	0	0
0101P	H07	659	16	0
31730	H03	8	3	0
31731	H03	87	72	0
91	H01	137	97	0
96	H05	237	69	0
97	H05	43	1	0
81	H02	8	0	0
84	H04	523	211	0
85	H04	486	0	0
86	H04	478	0	0
87	H07	738	3	0
88	H03	1039	5	0
101P	H04	660	16	0
104	H04	753	0	0
78	H06	934	659	0
79	H06	102	41	0
80T	H06	660	465	0
80U	H06	287	204	0
98	H06	578	301	0
89	H07	419	5	0
105	H07	466	0	0
99	H08	1687	156	0
100T	H08	620	261	0
100U	H08	528	24	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units

MHDU = # of Mobile Home Dwelling Units
FW = # of Units in Freshwater Flood Prone

HERNANDO COUNTY DWELLING UNIT DATA

ED/S	EVAC	TDU	MHDU	FW
74U	H09	350	93	0
75	H09	590	255	0
76	H10	602	219	0
77	H10	368	134	0
50	H11	593	31	0
51	H11	19	3	0
52	H11	129	104	0
53	H11	30	15	0
54	H11	11	2	0
55	H11	0	0	0
56	H11	5	1	0
57	H11	1	0	0
58	H11	16	1	0
59	H11	0	0	0
60	H11	14	3	0
61	H11	217	26	0
62	H11	246	92	0
71T	H12	613	159	0
71U	H12	544	73	0
72A	H12	738	261	0
63	H13	491	162	0
69	H13	420	142	0
73	H13	378	182	0
74T	H13	540	218	0
90	H13	393	127	0
64	H14	646	349	0
65	H14	583	5	0
66	H14	502	7	0
67	H14	422	82	0
68	H14	245	143	0
70	H14	512	71	0
72B	H14	0	0	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
MHDU = # of Mobile Home Dwelling Units
FW = # of Units in Freshwater Flood Pror

MARION COUNTY ZONAL DATA

ED/S	EVAC	TDU	MHDU	FW
11	M09	2268	573	0
7	M08	2209	723	0
8	M08	1452	602	0
9	M08	2217	813	0
10	M06	1526	162	0
27	M05	971	134	0
5	M11	997	305	0
6	M10	4070	2191	0
26	M04	2089	762	0
3	M03	1917	664	0
4	M12	1709	860	0
14	M14	3069	657	0
15	M03	1421	213	0
16	M14	537	116	0
17	M14	1396	0	0
18	M14	1334	0	0
19	M14	1706	173	0
20	M14	2765	74	0
21	M14	1925	5	0
22	M14	2741	146	0
23	M07	2429	360	0
24	M07	1509	373	0
25	M04	2447	1108	0
13	M03	2010	287	0
12	M13	2450	356	0
2	M02	2066	516	0
1	M01	1453	426	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zones
TDU = # of Total Dwelling Units
MHDU = # of Mobile Home Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas

SUMTER COUNTY DWELLING UNIT DATA

ED/S	EVAC	TDU	MHDU	FW
12	S07	416	98	0
16B	S07	0	0	0
16C	S07	0	0	0
16K	S07	0	0	0
16L	S07	0	0	0
16M	S07	0	0	0
17B	S07	0	0	0
18B	S07	0	0	0
18C	S07	0	0	0
18D	S07	0	0	0
18E	S07	3	0	0
13	S10	324	58	0
10T	S05	379	175	0
10U	S05	170	87	0
11	S05	401	98	0
14	S10	335	47	0
20D	S10	0	0	0
15	S09	133	68	0
16A	S06	532	206	0
16U	S10	584	176	0
17A	S05	357	190	0
18A	S05	648	250	0
19	S09	41	18	0
20C	S09	446	235	0
20T	S08	555	136	0
20V	S09	190	72	0
21	S10	4	0	0
3	S04	386	82	0
4	S05	173	83	0
1	S03	433	0	0
2	S03	627	208	0
7B	S03	22	6	0
5	S02	341	139	0
6T	S02	528	93	0
6U	S02	494	162	0
7A	S01	562	109	0
8	S04	653	387	0
9	S04	356	192	0

ED/S = Enumeration District/Section
EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
MHDU = # of Mobile Home Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas

LEVY COUNTY ZONAL DATA BY EVACUATION ZONES

EVAC	TDU	MHDU	FW
L01	837	262	0
L02	42	22	0
L03	867	279	0
L04	878	280	0
L05	48	20	0
L06	103	47	0
L07	114	46	0
L08	361	150	0
L09	2625	704	0
L10	1378	628	0
L11	587	159	0
L12	482	80	0
L13	1332	613	0

EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas
MHDU = # of Mobile Home Dwelling Units

CITRUS COUNTY ZONAL DATA BY EVACUATION ZONES

EVAC	TDU	MHDU	FW
C01	1880	533	0
C02	1950	894	0
C03	1356	564	0
C04	872	557	0
C05	1227	643	0
C06	814	424	0
C07	1261	441	0
C08	3545	422	0
C09	3339	1163	0
C10	3295	881	0
C11	1394	710	0
C12	4124	505	0
C13	953	98	0
C14	1085	403	0

EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas
MHDU = # of Mobile Home Dwelling Units

HERNANDO COUNTY ZONAL DATA BY EVACUATION ZONES

EVAC	TDU	MHDU	FW
H01	273	118	0
H02	895	28	0
H03	1223	94	0
H04	2900	227	0
H05	280	70	0
H06	2561	1670	0
H07	2282	24	0
H08	2835	441	0
H09	940	348	0
H10	970	353	0
H11	1281	278	0
H12	1895	493	0
H13	2222	831	0
H14	2910	657	0

EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas
MHDU = # of Mobile Home Dwelling Units

MARION COUNTY ZONAL DATA BY EVACUATION ZONES

EVAC	TDU	MHDU	FW
M01	1453	426	0
M02	2066	516	0
M03	5348	1164	0
M04	4536	1870	0
M05	971	134	0
M06	1526	162	0
M07	3938	733	0
M08	5878	2138	0
M09	2268	573	0
M10	4070	2191	0
M11	997	305	0
M12	1709	860	0
M13	2450	356	0
M14	15473	1171	0

EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas
MHDU = # of Mobile Home Dwelling Units

SUMTER COUNTY ZONAL DATA BY EVACUATION ZONES

EVAC	TDU	MHDU	FW
S01	562	109	0
S02	1363	394	0
S03	1082	214	0
S04	1395	661	0
S05	2128	883	0
S06	532	206	0
S07	419	98	0
S08	555	136	0
S09	810	393	0
S10	1247	281	0

EVAC = Evacuation Zone Number
TDU = # of Total Dwelling Units
FW = # of Units in Freshwater Flood Prone Areas
MHDU = # of Mobile Home Dwelling Units

LEVY COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Bronson Elementary School School St. & Pine St. Bronson, FL	L10	477
Bronson High School School St. & Pine St. Bronson, FL	L10	360
Joyce Bullock Elementary School S.W. 3rd St. & S.W. 1st Ave. Williston, FL	L09	1,055
Cedar Key High School Whiddon Ave. & S.R. 24 Cedar Key, FL	L01	135
Chiefland Elementary School U.S. 19 W. & 8th Ave. Chiefland, FL	L12	1,270
Chiefland High School U.S. 19 W. & 8th Ave. Chiefland, FL	L12	1,095
Williston High School U.S. 41 & S.W. 6th St. Williston, FL	L09	1,159
Williston Intermediate School C0511 & C331A Williston, FL	L09	385
Yankeetown School Port Ave. & Schoolcraft Dr. Inglis, FL	L04	212
TOTAL		6,148

CITRUS COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Adult General and Community Education 504 W. Grace St. Inverness, FL 32650	C08	423
Citrus High School 601 W. Main St. Inverness, FL 32650	C08	2,347
Crystal River High School 1205 N.E. 8th Avenue Crystal River, FL 32629	C01	2,301
Crystal River Middle School 344 N.E. Crystal St. Crystal River, FL 32629	C01	2,297
Crystal River Primary School N.E. 9th Avenue & 6th St. Crystal River, FL 32629	C01	2,085
Floral City Elementary School Marvin St. & Old Floral City Rd. Floral City, FL 32636	C09	543
Hernando Elementary School N. U.S. 41 & University Blvd. Hernando, FL 32642	C10	600
Homosassa Elementary School S.R. 490, Mason Creek Rd. Homosassa, FL 32646	C03	1,220
Inverness Middle School 1950 U.S. 41 North Inverness, FL 32650	C08	3,224
Inverness Primary School 206 S. Line Street Inverness, FL 32650	C08	1,397

CITRUS COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Lecanto Elementary School Lecanto, FL 32661	C13	1,869
Lecanto Middle School Lecanto, FL 32661	C13	2,519
Oak Hill School Van Nortwick Rd. & W. S.R. 44 Lecanto, FL 32661	C13	188
TOTAL		21,013

HERNANDO COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Mitchell L. Black Elementary School Kelly St. & Bell Ave. Brooksville, FL	H14	1,402
Eastside Elementary School Hill 'n Dale Subdivision Brooksville, FL	H12	1,041
Hernando High School Kelly St. & Bell Ave. Brooksville, FL	H14	666
D.S. Parrott, Jr. High School Kelly St. & Bell Ave. Brooksville, FL	H14	2,122
Spring Hill Elementary School 3901 Roble Avenue Spring Hill, FL	H06	453
Springstead High School 1615 Mariner Blvd. Spring Hill, FL	H07	2,275
West Hernando Jr. High School 2574 Fox Chapel Lane Spring Hill, FL	H04	1,167
Westside Elementary School 715 Applegate Dr. Spring Hill, FL	H04	1,892
TOTAL		11,018

MARION COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Belleview Elementary School 5556 S.E. Agnew Road Belleview, FL	M09	166
Belleview-Santos Upper Elementary School North Highway 444 Belleview, FL	M09	810
College Park Elementary School 3155 S.W. 26th Street Ocala, FL	M14	560
Dunnellon Elementary School Chestnut Street Dunnellon, FL	M05	480
Dunnellon High School Chestnut Street Dunnellon, FL	M05	1,452
East Marion Elementary School County Road 326 Lynne	M10	1,168
Eighth Street Primary School 513 S.E. 8th Street Ocala, FL	M14	536
Fessenden Elementary School State Road 15A Martin , FL	M03	836
Forest High School 1614 S.E. Ft. King Street Ocala, FL	M14	1,672
Fort King Middle School 545 N.E. 17th Street Ocala, FL	M14	1,010
Ft. McCoy Elementary School State Road 315 Fort McCoy, FL	M12	265
Hillcrest School 3143 S.E. 17th Street Ocala, FL	M14	66

MARION COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Howard Upper Elementary School 306 N.W. 7th Avenue Ocala, FL	M14	213
Lake Weir Middle School Sunset Harbor, FL	M08	1,600
Lake Weir High School State Road 464	M08	3,346
Madison Street Primary School 1239 N.W. 4th Street Ocala, FL	M14	812
Marion Education Resource Center 2091 N.E. 35th Street Ocala, FL	M14	180
North Marion High School State Road 329 Sparr, FL	M03	2,696
Oakcrest Elementary School 1156 N.E. 28th Street Ocala, FL	M14	245
Reddick-Collier Elementary School State Road 329 Reddick	M02	774
Sparr Elementary School State Road 329 Sparr, FL	M03	282
Stanton-Weirsdale Elementary School W. Highway 42 Weirsdale, FL	M08	512
Vanguard High School 7 N.W. 28th Street Ocala, FL	M14	4,854
Wyomia Elementary School 511 N.E. 12th Avenue Ocala, FL	M14	898
TOTAL		29,329

SUMTER COUNTY PRIMARY SHELTERS

Withlacoochee Hurricane Evacuation Plan
Transportation Modeling Task

Shelter	Evacuation Zone	Capacity @ 20 Sq. Ft./Person
Bushnell Elementary School Flannery Avenue Bushnell, FL 33531	S07	74
North Sumter Intermed. School Huey Street Wildwood, FL 32785	S03	462
North Sumter Primary School Warfield Avenue Wildwood, FL 32785	S03	140
South Sumter High School Highway 475, North Bushnell, FL 33513	S07	1,692
South Sumter Middle School N.W. 10th Street Webster, FL 33597	S10	948
Webster Elementary School Highway 471 Webster, FL 33597	S12	514
Wildwood High School Huey Street Wildwood, FL 32795	S03	1,532
Wildwood Middle School Fruitland Park Road Wildwood, FL 32785	S03	1,045
TOTAL		6,407

UTPS AREA TYPE DEFINITIONS

Area Type 1.

Central Business District - an area where the dominant land use comprises intense business activity. These areas are characterized by large numbers of pedestrians, commercial vehicles, loadings of goods and people, a heavy demand for parking space, and high parking turnover (usage).

Area Type 2.

Fringe Area - the portion of a municipality immediately outside the Central Business District having a wide range in type of business activity but which includes small businesses, light industry, warehousing, automobile service activities, and intermediate strip development with some concentrated residential areas. Traffic in these areas generally involves trips that do not have an origin or destination within the area. Moderate pedestrian traffic and lower parking turnover than is found in the Central Business District are implied in this category. However, large parking areas serving the Central Business District might be present.

Area Type 3.

Residential Area - areas within the influence of a municipality in which the dominant land use is residential development. Small businesses may be included, but the area is characterized by few pedestrians and low parking turnover.

Area Type 4.

Outlying Business District - an area within the influence of a municipality which is normally separated geographically by some distance from the Central Business District and its fringe area but which has intense activity characteristic of a central area. The principal land use is for business, and there may be heavy traffic circulation or through movements involved with the area causing lower operating speeds than fringe areas. Another characteristic is high parking demand and turnover with moderate pedestrian traffic. This category does not include off-street shopping development entirely on one side of the street. Moderate to heavy strip development on both sides of facility should be coded OBD.

Area Type 5.

Rural Area - an area within the influence of a municipality in which predominant land use is other than those described in Items 1 through 4 above.

UTPS FACILITY TYPE DEFINITIONS

Facility Type 1.

Freeway - a facility with full control of access to give preference to through traffic, i.e., Interstate and Turnpike.

Facility Type 2.

Divided Arterial and Expressway - a facility 1) with a painted area or physical barrier separating opposing traffic flows; 2) carrying a majority of the longer trips within and through the urban area; 3) emphasizing traffic movement over land access; and 4) carrying higher volumes than any facility except Freeways. Expressways have some grade separate intersections, fewer signals per mile than arterials, and some frontage roads.

Facility Type 3.

Undivided Arterials - similar to Facility Type 2 except no painted area or physical barrier separates opposing traffic flows. Undivided arterials generally have more signals per mile, few frontage roads, serve fewer through trips, and serve more land access than divided arterials.

Facility Type 4.

Collector - streets collecting traffic from local streets in the neighborhoods, and channeling it into the arterial systems. A minor amount of through traffic may be carried on collector streets, but the system primarily provides land access service by carrying local traffic movements between or within residential neighborhoods, commercial, and residential areas, or to higher type facilities.

Facility 5.

Local Street or Centroid Connector - streets not classified in a higher system, primarily providing direct access to abutting land and access to the higher systems. They offer the lowest level of mobility and usually carry no bus routes. Service to through traffic is deliberately discouraged. In the systems planning networks a number of these facilities are generally represented by a single zone centroid connector, thus an artificially high hourly capacity is assigned by the capacity tables. Each zone should have two or more centroid connectors to increase the accuracy of the assignment process.

Facility Type 6.

One Way Streets - any facility where traffic is confined to one direction of flow.

Levy County Link File

Link	Area Type	Facility Type	No. of Lanes	Service Volume
100-101	2	2	4	32400
101-125	5	3	2	14600
102-125	5	4	2	10100
102-103	5	4	2	10100
103-126	5	4	2	10100
104-126	5	3	2	14600
105-126	5	3	2	14600
105-106	5	3	2	14600
106-107	5	3	2	14600
107-125	5	3	2	14600
106-108	5	3	2	14600
108-10	5	3	2	14600
101-109	5	2	4	25900
109-110	5	2	4	25900
110-112	5	2	4	25900
111-112	5	4	2	10100
112-115	5	2	4	25900
114-115	5	2	4	25900
113-114	1	3	2	11300
115-116	5	3	2	14600
112-117	5	4	2	10100
117-118	5	4	2	10100
116-19	5	3	2	14600
119-120	5	3	2	14600
118-119	5	4	2	10100
120-121	1	3	2	11300
121-122	2	3	2	14200
110-122	5	3	2	14600
122-123	2	3	2	14200
123-124	5	3	2	14600
101-124	2	3	2	14200
200-121	5	3	2	14600
201-121	5	3	2	14600
202-120	5	3	2	14600
203-115	5	3	2	14600
203-114	2	3	2	14200

Citrus County Link File

Link	Area Type	Facility Type	No. of Lanes	Service Volume
100-101	5	2	4	25900
101-102	5	2	4	25900
102-104	5	2	4	25900
103-104	5	4	2	10100
104-105	5	2	4	25900
105-106	2	2	4	32400
106-107	5	4	2	10100
106-108	5	2	4	25900
108-109	5	2	4	25900
102-114	5	3	2	14600
102-113	2	3	2	14200
105-111	5	3	2	14600
111-113	5	3	2	14600
110-112	5	3	2	14600
111-112	2	3	2	14200
112-122	5	3	2	14600
119-122	2	3	2	14200
115-117	5	3	2	14600
116-117	5	3	2	14600
117-118	5	3	2	14600
118-119	2	3	2	14200
119-120	5	3	2	14600
119-121	2	3	2	14200
200-115	5	3	2	14600
201-116	5	3	2	14600
202-120	5	3	2	14600
203-121	5	3	2	14600

Hernando County Link File

Link	Area Type	Facility Type	No. of Lanes	Service Volume
100-102	5	2	4	25900
102-103	2	2	4	32400
101-103	5	3	2	14600
103-104	2	2	4	32400
104-106	5	2	4	25900
105-106	3	4	2	11700
103-107	5	3	2	14600
107-111	2	3	2	14200
108-111	5	3	2	14600
109-110	5	3	2	14600
110-111	2	3	2	14200
111-112	2	3	2	14200
112-113	5	3	2	14600
111-115	2	3	2	14200
114-115	5	3	2	14600
116-117	5	3	2	14600
111-116	2	3	2	14200
117-118	5	3	4	21600
118-119	5	3	2	14600
200-109	5	3	2	14600
201-118	5	1	4	68400
202-119	5	3	2	14600
206-119	5	3	2	14600
203-119	5	3	2	14600
204-118	5	1	4	68400
205-113	5	3	2	14600

Marion County Link File

Link	Area Type	Facility Type	No. of Lanes	Service Volume
100-101	5	3	2	14600
101-109	2	3	2	14200
102-103	5	3	2	14600
102-108	2	3	2	14200
103-104	2	3	2	14200
104-129	5	3	2	14600
105-129	5	3	2	14600
106-107	5	1	4	68400
107-108	2	1	4	68400
108-109	2	1	4	68400
108-110	1	3	4	19800
107-110	1	2	4	27000
109-110	1	3	4	19800
109-128	2	1	4	68400
110-121	1	2	4	27000
110-125	2	2	4	32400
110-111	1	2	4	27000
111-112	2	2	4	32400
112-113	2	2	4	32400
113-114	2	2	4	32400
114-115	2	3	2	14200
115-116	5	3	2	14600
117-119	5	3	2	14600
118-119	5	3	2	14600
119-120	2	3	2	14200
120-121	2	2	4	32400
120-122	5	3	2	14600
122-123	5	3	2	14600
122-124	5	4	2	10100
125-126	2	2	4	32400
126-127	2	2	4	32400
127-130	2	2	4	32400
128-130	5	4	2	10100
200-128	5	1	4	68400
201-126	5	2	4	25900
202-117	5	3	2	14600
203-115	5	3	2	14600
204-106	5	1	4	68400
205-105	5	3	2	14600
206-104	1	3	2	11300
207-103	5	3	2	14600
208-100	5	3	2	14600

Sumter County Link File

Link	Area Type	Facility Type	No. of Lanes	Service Volume
100-101	5	3	2	14600
101-102	5	1	4	68400
102-104	5	1	4	68400
102-107	5	1	4	68400
103-120	2	3	2	14200
104-120	1	3	2	11300
104-105	2	3	2	14200
105-108	2	3	2	14200
106-107	5	4	2	10100
107-108	5	3	2	14600
108-109	5	3	2	14600
108-112	5	3	2	14600
107-111	5	1	4	68400
109-113	5	3	2	14600
110-111	5	3	2	14600
111-112	2	3	2	14200
112-113	2	3	2	14200
113-114	5	3	2	14600
112-116	5	3	2	14600
113-115	5	3	2	14600
115-118	5	3	2	14600
118-119	5	3	2	14600
116-117	5	3	2	14600
200-101	5	1	4	68400
201-103	5	3	2	14600
202-104	5	1	4	68400
203-117	5	3	2	14600
204-111	5	1	4	68400
205-110	5	3	2	14600
206-100	5	3	2	14600
207-119	5	3	2	14600
208-119	5	3	2	14600

APPENDIX F

EVACUATING POPULATION AND VEHICLES BY EVACUATION ZONE

LEVY COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # L01	2260	692	918	651	0	877	268	356	253	0
ZONE # L02	113	35	46	33	0	44	13	18	13	0
ZONE # L03	2341	716	950	674	0	909	278	369	262	0
ZONE # L04	756	231	307	218	0	293	90	119	85	0
ZONE # L05	54	17	22	16	0	21	6	9	6	0
ZONE # L06	127	39	52	37	0	49	15	20	14	0
ZONE # L07	124	38	50	36	0	48	15	20	14	0
ZONE # L08	405	124	164	117	0	157	48	64	45	0
ZONE # L09	1901	582	772	547	0	738	226	300	212	0
ZONE # L10	1696	519	688	488	0	658	201	267	90	0
ZONE # L11	429	131	174	124	0	167	51	68	48	0
ZONE # L12	216	66	88	62	0	84	26	34	24	0
ZONE # L13	1655	506	672	477	0	642	197	261	185	0
	12077	3696	4903	3480	0	4687	1434	1905	1351	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.7
# per Other Unit	2.7
Avg. Veh. per D.U.	1.6
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones L01,L02,L03

LEVY COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # L01	2260	692	918	651	0	877	268	356	253	0
ZONE # L02	113	35	46	33	0	44	13	18	13	0
ZONE # L03	2341	716	950	674	0	909	278	369	262	0
ZONE # L04	2371	725	962	683	0	920	282	374	265	0
ZONE # L05	130	40	53	37	0	50	15	20	14	0
ZONE # L06	278	85	113	80	0	108	33	44	31	0
ZONE # L07	124	38	50	36	0	48	15	20	14	0
ZONE # L08	405	124	164	117	0	157	48	64	45	0
ZONE # L09	1901	582	772	547	0	738	226	300	212	0
ZONE # L10	1696	519	688	488	0	658	201	267	190	0
ZONE # L11	429	131	174	124	0	167	51	68	48	0
ZONE # L12	216	66	88	62	0	84	26	34	24	0
ZONE # L13	1655	506	672	477	0	642	197	261	185	0
	13919	4259	5650	4009	0	5402	1653	2195	1556	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation 100
# per Mobile Home Unit 2.7
# per Other Unit 2.7
Avg. Veh. per D.U. 1.6
Veh. Usage % 65.5
Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones L01,L02,L03,L04,L05,L06

CITRUS COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # C01	4324	1323	1756	1245	0	1970	603	800	567	0
ZONE # C02	4485	1372	1821	1292	0	2044	625	830	589	0
ZONE # C03	3119	954	1266	898	0	1421	435	577	409	0
ZONE # C04	1281	392	520	369	0	584	179	237	168	0
ZONE # C05	1479	453	600	426	0	674	206	274	194	0
ZONE # C06	975	298	396	281	0	444	136	180	128	0
ZONE # C07	1014	310	412	292	0	462	141	188	133	0
ZONE # C08	971	297	394	280	0	442	135	180	127	0
ZONE # C09	2675	819	1086	770	0	1219	373	495	351	0
ZONE # C10	2026	620	823	584	0	923	283	375	266	0
ZONE # C11	1633	500	663	470	0	744	228	302	214	0
ZONE # C12	1162	355	472	335	0	529	162	215	152	0
ZONE # C13	225	69	92	65	0	103	31	42	30	0
ZONE # C14	927	284	376	267	0	422	129	171	122	0
	26296	8046	10677	7574	0	11981	3666	4866	3450	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.3
# per Other Unit	2.3
Avg. Veh. per D.U.	1.6
Veh. Usage %	65.5

Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones C01,C02,C03

CITRUS COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # C01	4324	1323	1756	1245	0	1970	603	800	567	0
ZONE # C02	4485	1372	1821	1292	0	2044	625	830	589	0
ZONE # C03	3119	954	1266	898	0	1421	435	577	409	0
ZONE # C04	2006	614	814	578	0	914	280	371	263	0
ZONE # C05	2822	864	1146	813	0	1286	393	522	370	0
ZONE # C06	1872	573	760	539	0	853	261	346	246	0
ZONE # C07	1014	310	412	292	0	462	141	188	133	0
ZONE # C08	971	297	394	280	0	442	135	180	127	0
ZONE # C09	2675	819	1086	770	0	1219	373	495	351	0
ZONE # C10	2026	620	823	584	0	923	283	375	266	0
ZONE # C11	1633	500	663	470	0	744	228	302	214	0
ZONE # C12	1162	355	472	335	0	529	162	215	152	0
ZONE # C13	225	69	92	65	0	103	31	42	30	0
ZONE # C14	927	284	376	267	0	422	129	171	122	0
	29261	8954	11881	8428	0	13332	4079	5414	3839	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.3
# per Other Unit	2.3
Avg. Veh. per D.U.	1.6
Veh. Usage %	65.5

Surge Zones C01,C02,C03,C04,C05,C06

HERNANDO COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # H01	655	200	266	189	0	304	93	123	88	0
ZONE # H02	2148	657	872	619	0	997	305	405	287	0
ZONE # H03	2935	898	1192	845	0	1362	417	553	392	0
ZONE # H04	545	167	221	157	0	253	77	103	73	0
ZONE # H05	168	51	68	48	0	78	24	32	22	0
ZONE # H06	4008	1226	1627	1154	0	1860	569	755	536	0
ZONE # H07	58	18	23	17	0	27	8	11	8	0
ZONE # H08	1058	324	430	305	0	491	150	199	141	0
ZONE # H09	835	256	339	241	0	387	119	157	112	0
ZONE # H10	847	259	344	244	0	393	120	160	113	0
ZONE # H11	667	204	271	192	0	310	95	126	89	0
ZONE # H12	1183	362	480	341	0	549	168	223	158	0
ZONE # H13	1994	610	810	574	0	925	283	376	266	0
ZONE # H14	1577	483	640	454	0	732	224	297	211	0
	18678	5715	7583	5380	0	8668	2652	3520	2496	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation 100
# per Mobile Home Unit 2.4
# per Other Unit 2.4
Avg. Veh. per D.U. 1.7
Veh. Usage % 65.5
Dist. %: S= 30.6 FR= 40.6 HM= 28.8 DK= 0

Surge Zones H01,H02,H03

HERNANDO COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # H01	655	200	266	189	0	304	93	123	88	0
ZONE # H02	2148	657	872	619	0	997	305	405	287	0
ZONE # H03	2935	898	1192	845	0	1362	417	553	392	0
ZONE # H04	6960	2130	2826	2004	0	3229	988	1311	930	0
ZONE # H05	672	206	273	194	0	312	95	127	90	0
ZONE # H06	4008	1226	1627	1154	0	1860	569	755	536	0
ZONE # H07	58	18	23	17	0	27	8	11	8	0
ZONE # H08	1058	324	430	305	0	491	150	199	141	0
ZONE # H09	835	256	339	241	0	387	119	157	112	0
ZONE # H10	847	259	344	244	0	393	120	160	113	0
ZONE # H11	667	204	271	192	0	310	95	126	89	0
ZONE # H12	1183	362	480	341	0	549	168	223	158	0
ZONE # H13	1994	610	810	574	0	925	283	376	266	0
ZONE # H14	1577	483	640	454	0	732	224	297	211	0
	25597	7833	10393	7373	0	11878	3634	4823	3421	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100
# per Mobile Home Unit	2.4
# per Other Unit	2.4
Avg. Veh. per D.U.	1.7
Veh. Usage %	65.5

Surge Zones H01,H02,H03,H04,H05

MARION COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # M01	1108	596	205	307	0	641	345	119	178	0
ZONE # M02	1342	722	248	372	0	777	418	144	215	0
ZONE # M03	3026	1628	560	838	0	1753	943	324	485	0
ZONE # M04	4862	2616	899	1347	0	2816	1515	521	780	0
ZONE # M05	348	187	64	97	0	202	109	37	56	0
ZONE # M06	421	227	78	117	0	244	131	45	68	0
ZONE # M07	1906	1025	353	528	0	1104	594	204	306	0
ZONE # M08	5559	2991	1028	1540	0	3219	1732	596	892	0
ZONE # M09	1490	802	276	413	0	863	464	160	239	0
ZONE # M10	5697	3065	1054	1578	0	3299	1775	610	914	0
ZONE # M11	793	427	147	220	0	459	247	85	127	0
ZONE # M12	2236	1203	414	619	0	1295	697	240	359	0
ZONE # M13	926	498	171	256	0	536	288	99	148	0
ZONE # M14	3045	1638	563	843	0	1763	949	326	488	0
	32759	17625	6060	9075	0	18971	10207	3510	5255	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100	Surge Zones
# per Mobile Home Unit	2.6	
# per Other Unit	2.6	
Avg. Veh. per D.U.	2.1	
Veh. Usage %	71.7	

Dist. %: S= 53.8 FR= 18.5 HM= 27.7 DK= 0

SUMTER COUNTY EVACUATING POPULATION AT RISK AND EVACUATING VEHICLES

	Evacuating Population	1	2	3	4	Evacuating Vehicles	1	2	3	4
ZONE # S01	294	158	54	82	0	133	71	25	37	0
ZONE # S02	1064	572	197	295	0	480	258	89	133	0
ZONE # S03	578	311	107	160	0	261	140	48	72	0
ZONE # S04	1785	960	330	494	0	806	433	149	223	0
ZONE # S05	2384	1283	441	660	0	1076	579	199	298	0
ZONE # S06	556	299	103	154	0	251	135	46	70	0
ZONE # S07	265	142	49	73	0	119	64	22	33	0
ZONE # S08	367	198	68	102	0	166	89	31	46	0
ZONE # S09	1061	571	196	294	0	479	258	89	133	0
ZONE # S10	759	408	140	210	0	343	184	63	95	0
	9113	4902	1685	2524	0	4114	2211	761	1140	0

1 = Red Cross Shelter
2 = Friends Home
3 = Hotel/Motel
4 = Do Not Know

% Participation	100	Surge Zones
# per Mobile Home Unit	2.7	
# per Other Unit	2.7	
Avg. Veh. per D.U.	1.7	
Veh. Usage %	71.7	

Dist. %: S= 53.8 FR= 18.5 HM= 27.7 DK= 0

APPENDIX G

ASSIGNED LINK VOLUMES AND VOLUME/CAPACITY RATIOS BY COUNTY

Levy County
Assigned Link Volumes and V/C Ratios

Link	TOTAL LINK VOLUME A	A w/tb	B	B w/tb	Service Volume	VOLUME/CAPACITY RATIO A	A w/tb	B	B w/tb
100-101	260	260	297	297	32400	.008	.008	.009	.009
101-125	658	658	665	665	14600	.045	.045	.046	.046
102-125	634	634	233	233	10100	.063	.063	.023	.023
102-103	475	475	92	92	10100	.047	.047	.009	.009
103-126	455	455	0	0	10100	.045	.045	.000	.000
104-126	870	870	804	804	14600	.060	.060	.055	.055
105-126	415	415	804	804	14600	.028	.028	.055	.055
105-106	449	449	838	838	14600	.031	.031	.057	.057
106-107	51	51	20	20	14600	.003	.003	.001	.001
107-125	24	24	431	431	14600	.002	.002	.030	.030
106-108	430	430	495	495	14600	.029	.029	.034	.034
108-110	440	440	527	527	14600	.030	.030	.036	.036
101-109	140	140	164	164	25900	.005	.005	.006	.006
109-110	77	77	155	155	25900	.003	.003	.006	.006
110-112	83	83	166	166	25900	.003	.003	.006	.006
111-112	0	0	0	0	10100	.000	.000	.000	.000
112-115	83	83	173	173	25900	.003	.003	.007	.007
114-115	976	976	1833	1833	25900	.038	.038	.071	.071
113-114	914	914	916	916	11300	.081	.081	.081	.081
115-116	892	892	1664	1664	14600	.061	.061	.114	.114
112-117	0	0	0	0	10100	.000	.000	.000	.000
117-118	71	71	26	26	10100	.009	.009	.003	.003
116-119	964	964	1742	1742	14600	.066	.066	.119	.119
119-120	1035	1035	1768	1768	14600	.071	.071	.121	.121
118-119	71	71	26	26	10100	.007	.007	.003	.003
120-121	1035	1035	1768	1768	11300	.092	.092	.156	.156
121-122	769	769	812	812	14200	.054	.054	.057	.057
110-122	485	485	579	579	14600	.033	.033	.040	.040
122-123	152	152	152	152	14200	.011	.011	.011	.011
123-124	152	152	152	152	14600	.010	.010	.010	.010
101-124	216	216	213	213	14200	.015	.015	.015	.015
200-121	654	654	772	772	14600	.045	.045	.053	.053
201-121	653	653	772	772	14600	.045	.045	.053	.053
202-120	0	0	0	0	14600	.000	.000	.000	.000
203-115	0	0	0	0	14600	.000	.000	.000	.000
203-114	0	0	0	0	14200	.000	.000	.000	.000

Citrus County
Assigned Link Volumes and V/C Ratios

	TOTAL LINK VOLUME				Service	VOLUME/CAPACITY RATIO			
Link	A	A w/tb	B	B w/tb	Volume	A	A w/tb	B	B w/tb
100-101	811	811	642	642	25900	.031	.031	.025	.025
101-102	1268	1268	1495	1495	25900	.049	.049	.058	.058
102-104	1924	1924	2502	2502	25900	.074	.074	.097	.097
103-104	2071	2071	1980	1980	10100	.205	.205	.196	.196
104-105	1772	1772	1752	1752	25900	.068	.068	.068	.068
105-106	1995	1995	2344	2344	32400	.062	.062	.072	.072
106-107	728	728	781	781	10100	.072	.072	.077	.077
106-108	1308	1308	1613	1613	25900	.051	.051	.062	.062
108-109	707	707	698	698	25900	.027	.027	.027	.027
102-114	429	429	453	453	14600	.029	.029	.031	.031
102-113	4030	4030	5184	5184	14200	.284	.284	.365	.365
105-111	2682	2682	3115	3115	14600	.184	.184	.213	.213
111-113	1766	1766	2772	2772	14600	.121	.121	.190	.190
110-112	509	509	572	572	14600	.035	.035	.039	.039
111-112	4347	4347	5867	5867	14200	.306	.306	.413	.413
112-122	4765	4765	6083	6083	14600	.326	.326	.417	.417
119-122	4551	4551	5729	5729	14200	.320	.320	.403	.403
115-117	177	177	189	189	14600	.012	.012	.013	.013
116-117	2505	2505	2871	2871	14600	.172	.172	.197	.197
117-118	2487	2487	2805	2805	14600	.170	.170	.192	.192
118-119	3000	3000	3482	3482	14200	.211	.211	.245	.245
119-120	1976	1976	2231	2231	14600	.135	.135	.153	.153
119-121	669	3233	782	3346	14200	.047	.228	.055	.236
200-115	0	0	0	0	14600	0	0	0	0
201-116	2034	2034	2271	2271	14600	.139	.139	.156	.156
202-120	2033	2033	2267	2267	14600	.139	.139	.155	.155
203-121	0	2564	0	2564	14600	0	.176	0	.176

Hernando County
Assigned Link Volumes and V/C Ratios

Link	TOTAL LINK VOLUME A	A w/tb	B	B w/tb	Service Volume	VOLUME/CAPACITY RATIO A	A w/tb	B	B w/tb
100-102	134	134	138	138	25900	.005	.005	.005	.005
102-103	201	201	428	428	32400	.006	.006	.013	.013
101-103	624	624	628	628	14600	.043	.043	.043	.043
103-104	1349	1349	4574	4574	32400	.042	.042	.141	.141
104-106	1247	1247	5917	5917	25900	.048	.048	.228	.228
105-106	1860	1860	1877	1877	11700	.159	.159	.160	.160
103-107	1497	1497	5143	5143	14600	.103	.103	.352	.352
107-111	2861	2861	6218	6218	14200	.201	.201	.438	.438
108-111	312	312	365	365	14600	.021	.021	.025	.025
109-110	644	3208	720	3284	14600	.044	.220	.049	.225
110-111	627	3191	725	3289	14200	.044	.225	.051	.232
111-112	300	11198	271	11169	14200	.021	.789	.019	.787
112-113	200	11098	85	10983	14600	.014	.760	.006	.752
111-115	329	329	466	466	14200	.023	.023	.033	.033
114-115	112	112	218	218	14600	.008	.008	.015	.015
116-117	2499	9607	4477	11305	14600	.171	.658	.307	.774
111-116	2779	9327	4077	10905	14200	.196	.657	.287	.768
117-118	2998	9826	4578	11406	21600	.139	.673	.314	.771
118-119	1384	15041	2234	15891	14600	.095	1.030	.153	1.088
200-109	0	2564	0	2564	14600	.000	.176	.000	.176
201-118	1397	57906	2127	58033	68400	.020	.847	.031	.848
202-119	0	8103	0	8103	14600	.000	.555	.000	.555
206-119	1398	1398	2127	2127	14600	.096	.096	.146	.146
203-119	0	21797	0	21797	14600	.000	1.493	.000	1.493
204-118	0	35421	0	35421	68400	.000	.518	.000	.518
205-113	0	10898	0	10898	14600	.000	.746	.000	.746

Marion County
Assigned Link Volumes and V/C Ratios

Link	TOTAL LINK VOLUME A	A w/tb	B	B w/tb	Service Volume	VOLUME/CAPACITY RATIO A	A w/tb	B	B w/tb
100-101	60	60	60	60	14600	.004	.004	.004	.004
101-109	1290	1290	1290	1290	14200	.091	.091	.091	.091
102-103	14	14	14	14	14600	.001	.001	.001	.001
102-108	1236	1236	1236	1236	14200	.087	.087	.087	.087
103-104	0	0	0	0	14200	.000	.000	.000	.000
104-129	137	137	137	137	14600	.009	.009	.009	.009
105-129	137	137	137	137	14600	.009	.009	.009	.009
106-107	2908	58814	3638	59544	68400	.043	.860	.053	.871
107-108	3995	55146	5421	56113	68400	.058	.806	.079	.820
108-109	3995	54687	4962	55654	68400	.058	.800	.073	.814
108-110	1227	1227	1227	1227	19800	.062	.062	.062	.062
107-110	573	5787	573	5787	27000	.021	.214	.021	.214
109-110	2010	2010	2010	2010	19800	.102	.102	.102	.102
109-128	5419	56111	6505	57197	68400	.079	.820	.095	.836
110-121	2457	2457	2457	2457	27000	.091	.091	.091	.091
110-125	2692	2692	2692	2692	32400	.083	.083	.083	.083
110-111	3403	9748	3403	9748	27000	.126	.361	.126	.361
111-112	3403	9748	3403	9748	32400	.105	.301	.105	.301
112-113	2466	8811	2466	8811	32400	.076	.272	.076	.272
113-114	1519	8124	1519	8124	32400	.047	.251	.047	.251
114-115	376	7342	376	7342	14200	.026	.517	.026	.517
115-116	159	159	159	159	14600	.011	.011	.011	.011
117-119	2949	2949	2949	2949	14600	.202	.202	.202	.202
118-119	435	435	435	435	14600	.030	.030	.030	.030
119-120	3335	3335	3335	3335	14200	.235	.235	.235	.235
120-121	5158	5158	5158	5158	32400	.159	.159	.159	.159
120-122	830	830	830	830	14600	.057	.057	.057	.057
122-123	50	50	50	50	14600	.003	.003	.003	.003
122-124	780	780	780	780	10100	.077	.077	.077	.077
125-126	1831	1831	1831	1831	32400	.057	.057	.057	.057
126-127	620	620	620	620	32400	.019	.019	.019	.019
127-130	498	498	498	498	32400	.015	.015	.015	.015
128-130	592	592	592	592	10100	.059	.059	.059	.059
200-128	5563	56255	6649	57341	68400	.081	.822	.097	.838
201-126	1237	1237	1237	1237	25900	.048	.048	.048	.048
202-117	0	0	0	0	14600	.000	.000	.000	.000
203-115	159	7125	159	7125	14600	.011	.488	.011	.488
204-106	2874	58780	3604	59510	68400	.042	.859	.053	.870
205-105	0	0	0	0	14600	.000	.000	.000	.000
206-104	0	0	0	0	11300	.000	.000	.000	.000
207-103	0	0	0	0	14600	.000	.000	.000	.000
208-100	0	0	0	0	14600	.000	.000	.000	.000

Sumter County
Assigned Link Volumes and V/C Ratios

	TOTAL LINK VOLUME				Service	VOLUME/CAPACITY RATIO			
Link	A	A w/tb	B	B w/tb	Volume	A	A w/tb	B	B w/tb
100-101	2434	2434	2668	2668	14600	.167	.167	.183	.183
101-102	1878	57784	1878	57784	68400	.027	.845	.027	.845
102-104	1348	1348	1348	1348	68400	.020	.020	.020	.020
102-107	531	56437	531	56437	68400	.008	.825	.008	.825
103-120	581	7666	539	7666	14200	.041	.540	.038	.540
104-120	840	8527	840	8527	11300	.074	.755	.074	.755
104-105	966	8653	966	8653	14200	.068	.609	.068	.609
105-108	237	7924	237	7924	14200	.017	.558	.017	.558
106-107	401	401	401	401	10100	.040	.040	.040	.040
107-108	100	100	100	100	14600	.007	.007	.007	.007
108-109	129	129	129	129	14600	.009	.009	.009	.009
108-112	98	7785	98	7785	14600	.007	.533	.007	.533
107-111	101	56007	101	56007	68400	.001	.819	.001	.819
109-113	207	207	207	207	14600	.014	.014	.014	.014
110-111	649	649	649	649	14600	.044	.044	.044	.044
111-112	800	800	800	800	14200	.056	.056	.056	.056
112-113	368	616	368	616	14200	.026	.043	.026	.043
113-114	549	797	549	797	14600	.038	.055	.038	.055
112-116	616	8717	614	8717	14600	.042	.597	.042	.597
113-115	26	26	26	26	14600	.002	.002	.002	.002
115-118	26	26	26	26	14600	.002	.002	.002	.002
118-119	0	0	0	0	14600	.000	.000	.000	.000
116-117	458	8561	458	8561	14600	.031	.586	.031	.586
200-101	3510	59416	3744	59650	68400	.051	.869	.055	.872
201-103	159	7125	159	7125	14600	.011	.488	.011	.488
202-104	1316	1316	1316	1316	68400	.019	.019	.019	.019
203-117	0	8103	0	8103	14600	.000	.555	.000	.555
204-111	1397	57303	2127	58033	68400	.020	.838	.031	.849
205-110	0	0	0	0	14600	.000	.000	.000	.000
206-100	2033	2033	2267	2267	14600	.139	.139	.155	.155
207-119	1398	1398	2127	2127	14600	.096	.096	.146	.146
208-119	1398	1398	2127	2127	14600	.096	.096	.146	.146

APPENDIX H

EVACUATION ROUTES TO PUBLIC SHELTER BY COUNTY EVACUATION ZONES

LEVY COUNTY EVACUATION ZONES
TO PUBLIC SHELTER

L01-L104, L126, L105, L106, L107, L125, L101-L12 or L01-L103, L102, L125, L101-L12

L02-L105, L106, L108, L110, L122-L10

L03-L113, L114, L115, L116, L119, L120, L121-L09

L04-L04 (Flood Level A); L04-L114, L115, L116, L119, L120, L121-L09 (Flood Level B)

L05-L108, L110, L122-L10 or L05-L111, L112, L110, L122-L10

L06-L107, L125, L101-L12 or L06-L103, L102, L125, L101-L12

L07, L110, L122-L10

L08-L116, L119, L120, L121-L09 or L08-L117, L118, L119, L120, L121-L09

L09-L09

L10-L10

L11-L109, L101-L12 or L11-L124, L101-L12

L12-L12

L13-L102, L125, L101-L12 or L23-L100, L101-L12

CITRUS COUNTY EVACUATION ROUTES TO PUBLIC SHELTER

C01-C102, C113-C13 or C01-C100, C101, C102, C113-C13

C02-C103, C104, C102, C113-C13

C03-C107, C106, C105, C111, C113-C13 or C03-C109, C108, C106, C105, C104, C102, C113-C13

C04-C108, C106, C105, C111, C112, C122, C119-C08

C05-C104, C105, C111, C112, C122, C119-C08 or C05-C104, C102, C113, C111, C112, C122, C119-C08

C06-C101, C102, C113-C13

C07-C110, C112, C122, C119-C08

C08-C08

C09-C09 or C09-C121, C119-C08 or C09-C120, C119-C08

C10-C10

C11-C116, C117, C118, C119-C08

C12-C122, C119-C08 or C12-C117, C118, C119-C08

C13-C13

C14-C114, C102, C113-C13 or C14-C114, C200, C115-C13

HERNANDO COUNTY EVACUATION ROUTES
TO PUBLIC SHELTER

H01-H101, H103, H107, H111-H14 or H01-H100, H102, H103, H107, H111-H114

H02-H105, H106-H04 or H02-H101, H103, H104, H106-H04 (Flood Level A);
H02-H105, H106, H104-H07 or H02-H101, H103, H104-H07 (Flood Level B)

H03-H105, H106-H04 (Flood Level A); H03-H105, H106, H104-H07 (Flood Level B)

H04-H04 (Flood Level A); H04-H106, H104-H07 or H04-H106, H104, H103, H107, H111, H116-H12 or H04-H106, H104, H103, H107, H111, H110-H12

H05-H102, H103, H107, H111-H14

H06-H06 or H06-H107, H111-H14

H07-H07

H08-H107, H111-H14 or H08-H113, H112, H111-H14

H09-H112, H111, H110-H12 or H09-H115, H111, H116-H12

H10-H117, H116-H12 or H10-H114, H115, H111, H110-H12

H11-H119, H118, H117, H116-H12

H12-H12

H13-H108, H111-H14 or H13-H109, H110, H111-H14

H14-H14

MARION COUNTY EVACUATION ROUTES TO PUBLIC SHELTER

M01-M128, M129, M127, M126, M125-M03 or M01-M100,M101, M109, M110, M125-M03

M02-M02

M03-M03

M04-M102, M109, M110, M121, M120, M122, M123-M12 or M04-M101, M109, M110, M121, M120, M122, M124, M12

M05-M05

M06-M105, M107, M108, M102, M103, M104-M05 or M06-M106, M107, M108, M102, M103, M104-M05

M07-M112, M111, M110-M14

M08-M08

M09-M09

M10-M117, M119, M120, M121, M10, M111, M112, M113-M09 or M10-M117, M119, M120, M121, M110-M14

M11-M118, M119, M120, M121, M110, M125-M03

M12-M12 or M12-M124, M122, M120, M121, M110, M125-M03 orM12-M123, M122, M120, M121, M110, M125-M03

M13-M121, M110-M14

M14-M14

SUMTER COUNTY EVACUATION ROUTES TO PUBLIC SHELTER

S01-S100, S101, S102, S104, S120-S03

S02-S103, S120-S03

S03-S03

S04-S105, S104, S120-S03

S05-S110, S111, S112-S07 or S05-S106, S107, S11, S112-S07 or S05-S106, S108, S112, S07

S06-S109, S113, S114-S10 or S06-S109, S113, S115, S118-S10

S07-S07

S08-S116, S112-S07

S09-S117, S116, S112, S113, S114-S10 or S09-S117, S116, S112, S113, S115, S118-S10

S10-S10

APPENDIX J

LEGAL AUTHORITY TO ISSUE AN EVACUATION ORDER

In any hurricane evacuation, one of the most critical components of the decision-making process for local government officials is the timely issuance of the evacuation order to the endangered population. Within the State of Florida, the decision-making authority and power to order evacuation has been conferred or delegated to three different levels of government: state, county and municipal. Such emergency powers at the various levels of government are also innate responsibilities of the particular jurisdictions to safeguard the lives and property of their citizens. The Governor is empowered to issue an evacuation order; however, in the event that the Governor fails to order evacuation as early as required by local conditions, then the Board of County Commissioners may order evacuation within its physical boundaries. The same is true for a mayor of any municipality in the region. However, the evacuation order of a higher level of government is binding upon a lower level of government.

The authority to order evacuation of threatened Florida residents from an approaching hurricane is conferred to the Governor by Chapter 252.36 (5)(c) of the Florida Statutes, stating that the Governor may:

> "...direct and compel the evacuation of all or part of the population from any stricken or threatened area within the State if he deems this action necessary for the preservation of life or other disaster mitigation, response or recovery."

This power to order evacuation from an approaching hurricane conferred upon the Governor by Statutes is delegated to the governing body of each political subdivision of the State by Executive Order 80-29. The term "political subdivision" is defined under the Statute as "any County or municipality created pursuant to law." The delegation of authority empowers the chief elected official of a county or municipality to order an evacuation from any approaching storm.

The diffusion of the authority to issue an evacuation order does not create problems during a localized evacuation. However, in the case of a hurricane which threatens the coastal residents of the Withlacoochee or Tampa Bay Regions, it, by necessity, demands detailed inter-jurisdictional coordination. This is especially true in the event of the evacuation of the highly population Tampa Bay Region with its many municipal and county jurisdictions all with the power to issue an evacuation order. An evacuation order not coordinated between municipal, and county officials can have a devastating impact upon the evacuation jurisdiction as well as surrounding jurisdictions. Prior to the evacuation order, region-wide traffic control and coordinated opening of the shelters should be established. Since a portion of the Tampa Bay evacuees will seek shelter in the Withlacoochee Region, a mechanism of coordination is needed to alert officials in the probable "host" counties of the impending evacuation. A proposed mechanism to achieve this coordination is described in Chapter VI, Warning System and Evacuation Procedures.

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