Coastal Zone
Information
Center

HV
635.5
.H87
1984

HENRY VON OESEN AND ASSOCIATES
CONSULTING ENGINEERS AND PLANNERS

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

HURRICANE STORM MITIGATION AND POST-DISASTER RECONSTRUCTION PLANS

FOR

ONSLOW COUNTY, NORTH CAROLINA

APRIL, 1984

HENRY VON OESEN AND ASSOCIATES, INC.
Consulting Engineers & Planners
611 Princess Street ** P. O. Drawer 2087
Wilmington, North Carolina 28402
(919) 763-0141

HURRICANE STORM MITIGATION
AND
POST-DISASTER RECONSTRUCTION PLANS

ONSLOW COUNTY, NORTH CAROLINA

Prepared For:

ONSLOW COUNTY BOARD OF COMMISSIONERS

Edward Hurst, Chairman

Cecil Morton, Vice-Chairman

Paul Starzynski

Starkey Shaw

James Stewart

ONSLOW COUNTY PLANNING BOARD

Julius J. Segerman, Chairman

James A. Rouse, Vice-Chairman

Luther Ennett

Harold C. Morton

Bobby Williams

ONSLOW COUNTY PLANNING DEPARTMENT

Kenneth N. Windley, Jr.

Carey H. Brigman

Kim Moore

Chris Quinn

APRIL, 1984

HV635.5 H87 1986 C1

CONTENTS

		PAGE(S)
ACKNOWLEDGEMENTS AND CREDITS		
EXECUTIVE SUMMARY		
SECTION 1:	AUTHORITY FOR THE STUDY AND REPORT	1-1
2:	STUDY PURPOSE AND OBJECTIVE	2-1
3:	BACKGROUND	
3.1	General	3-1 thru 3-3
3.2	Prior Studies	3-3 thru 3-6
4:	AREA DESCRIPTION/INFORMATION	
4.1	General	4-1 thru 4-2
	Map 4.1: Map of Study Area	
4.2	Other Pertinent Physical Characteristics	4-2
4.3	Winds	4-3
	Chart 4.3.1: Wind Data	
4.4	Wave Data	4-3
4.5	Tide Data	4-3
4.6	Storm Tides	4-4
	Table 4.6.1: Storm Tide Stages for Topsail Island	4-4
4.7	Storm History and Vulnerability	4-5 thru 4-6
	Map 4.7.1: Hurricane Tracks	
	Chart 4.7.2: High Water Marks vs 100 Year Stage	
5:	REGULATORY PROGRAMS INFLUENCING THE PROBLEM	
5.1	General	5-1
5.2	CAMA Regulations and Use Designations	5-1
5.3	Ocean Hazard AEC's	5-2 thru 5-4

Contents, Continued

		PAGE(S)
SECTION 5:	Continued	
5.4	Estuarine System AEC's	5-4 thru 5-6
5.5	N. C. State Building Code	5-6 thru 5-8
5.6	National Federal Flood Insurance Program	5-9 thru 5-12
	Table 5.6.1: Minimum FIA Requirements for Regular Phase Communities	
	MAP 5.1: Areas of West Onslow Beach Not Eligible for Coverage Under NFIP	
6:	STUDY AREA INVENTORY AND ASSESSMENTS	
6.1	Population and Growth	6-1 thru 6-2
	Table 6.1.1: Onslow County 1980 Population By Area	
	Table 6.1.2: Onslow County Population By Township	
	Table 6.1.3: Onslow County Future Population Estimates	
	Table 6.1.4: Population Projections for West Onslow Beach	
6.2	Existing and Future Land Use	6-2 thru 6-3
	Table 6.2.1: 1981 Existing Land Uses, Onslow County	
	Table 6.2.2: Existing Land Uses West Onslow Beach	
	Table 6.2.3: Onslow County Land Use Needs	
	Table 6.2.4: Multi-Unit Condominum West Onslow Beach	

Contents, Continued

PAGE(S)

SECTION 6: Continued

6.3 Existing Local Regulations Ordinances 6-3 thru 6-6

Table 6.3.1: Description of Zoning Districts

Table 6.3.2: Zoning Districts West Onslow Beach

6.4 Future Development Scenarios 6-6 thru 6-7

Table 6.4.1: Scenario A - Maximum Buildout Under Existing Zoning, West Onslow Beach

Table 6.4.2: Scenarios B and C Ultimate Buildout Development Scenarios West Onslow Beach

6.5 Existing Utilities, Roads and Services 6-8 thru 6-11

Map 6.5: Water System Map West Onslow Beach and Environs

6.6 Vulnerability Assessment 6-11 thru 6-19

Table 6.6.1: Definition of Hazard Areas

Map 6.6.1: Composite Hazard Map

Map 6.6.2: Composite Hazard Map

Table 6.6.2: Number of Structures in Hazard Areas West Onslow Beach

Table 6.6.3: Summary of Potential Hurricane Damages West Onslow Beach

Contents, Continued

		PAGE(S)
SECTION 7:	HAZARD MITIGATION PLAN	
7.1	Introduction	7-1
7.2	Summary of Existing Policies	7-2 thru 7-3
	Table 7.2.1: Sumary of Existing Local Policies In Effect at West Onslow Beach	
7.3	Alternative Mitigation Measures To Reduce Hurricane Damages	7-3 thru 7-15
SECTION 8:	STORM RECONSTRUCTION PLAN	
8.1	Introduction/Purpose	8-1 thru 8-2
	Table 8.1: Categories of Public Assistance Available from FEMA	
8.2	The Federal Role In Emergency Response and Procedures For Obtaining Federal Disaster Assistance	8-2 thru 8-13
8.3:	The State Role In Emergency Response and Procedures For Obtaining State Disaster Assistance	8-13 thru 8-21
	Figure 8.1: Timing of Federal Disaster Assistance Activities	
	Figure 8.2: Format for Requesting State Disaster Assistance	
	Table 8.2: Local Actions During Three Phases of Disaster	
8.4:	The Local Role In Emergency Response	8-21 thru 8-23
8.5:	Damage Assessment and Reconstruction Plan	8-23 thru 8-27

Contents, Continued

PAGE(S)

ONSLOW COUNTY HURRICANE DAMAGE ASSESSMENT
AND RECONSTRUCTION PLAN

APPENDICIES: Appendix 1 - Organization Chart

Appendix 2 - Personnel Roster and Vehicle Assignments

Appendix 3 - Personnel Roster of Reconstruction Task Force

Appendix 4 - Sample Damage Assessment Worksheet

Appendix 5 - Damage Assessment Report

SECTION 9: BIBLIOGRAPHY

ACKNOWLEDGEMENTS AND CREDITS

The preparation of this document was financed in part through a grant provided by the North Carolina Coastal Management Program through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration.

Special appreciation is expressed to Mr. Kenneth N. Windley, Jr., Onslow County Planning Director, and Mr. Don Herman, Onslow County Emergency Management Coordinator, for their kind assistance and input which was invaluable in the preparation of this document. Ms. Mary Ellen Johnson, Coastal Land Use Planner, OCM, Wilmington, also provided valuable input and a critique of the draft report which is gratefully acknowledged.

A substantial portion of this document is based on the results of previous work of William D. McElyea, David J. Brower, Robert R. Godschalk and Barry Seymour of the Center for Urban and Regional Studies, University of North Carolina at Chapel Hill. Their report entitled, "Before the Storm: Managing Development to Reduce Damages" was used as a prime base for the development of the expanitory text and the specific recommendations in this report.

EXECUTIVE SUMMARY

The low-lying coastal area of Onslow County faces a strong threat of damages from a hurricane or other coastal storms (northeasters). Rapid development in the immediate coastal area and particularly at West Onslow Beach increases the potential for massive damage and for loss of life and heightens the need for Onslow County to prepare now for the inevitable hurricane induced disaster.

The purpose of this report is to assist Oslow County in managing development and post-disaster reconstruction to reduce the risk of future hurricane damages. It assists the County to plan ahead of time for the damages that a hurricane (or other major storm) can cause.

This plan covers four related phases of disaster planning: mitigation, preparedness, response and recovery.

A. Mitigation. (This phase involves activities which reduce the probability that a disaster will occur and minimize the damage caused by a hurricane). The following key mitigative actions are recommended for consideration:

(1) The allowable density of development at West Onslow Beach should be reduced from 14.6 units per acre to 8 units per acre in areas subject to flooding and high winds and 6 units per acre in high hazard areas (as defined herein).

(2) All non-conforming uses and structures should be brought into conformity after a storm if they are damaged beyond 50 percent of their current market

value. Slab-on-grade structures should be replaced with flood proof, elevated structures when damaged beyond 15 percent of their market value.

(3) The zoning ordinance should be amended to rezone the MHP and MHS categories to other categories which do not allow mobile homes. All mobile home structures are particularly vulnerable to storm damage and should not be permitted at West Onslow Beach.

(4) Zoning regulations for all of the flood prone mainland areas of Onslow County should be established.

(5) The subdivision ordinance should be amended to protect maritime forest vegetation from needless destruction.

(6) A request should be submitted to NCDOT to consider raising the base elevation of NC Highway 210 on West Onslow Beach at the high rise bridge to a minimum of 8 feet MSL. This action is needed to prevent the flooding of the area's major escape route during the early stages of a storm evacuation.

(7) The "constructive total loss (CTL)" approach towards the relocation of damaged structures in the high hazard areas should be adopted (see Section 7.3.5 for details).

(8) A post-disaster reconstruction moritorium ordinance should be drafted and adopted as soon as possible.

(9) A post-disaster reconstruction permit program should be established.

(10) A mutual aid agreement between the County and its incorporated municipalities should be concluded as soon as possible.

A. Preparedness. (Activities which immediately precede a hurricane which help the County to cope with threats to life and property). It is recommended that the County adopt the updated Hurricane Evacuation Plan (a separate companion document) which provides procedures for evacuation of the vulnerable areas prior to a storm.

C. Response. (Activities which immediately follow a hurricane including search and rescue, damage assessment, and providing emergency housing and medical care).

D. Recovery. (Activities which involve the full range of repair and reconstruction activities which seek to return the County to a state of normalcy).

The elements of Response and Recovery are addressed in The Hurricane Damage Assessment Plan included in this report. It is recommended that the County adopt the plan. Recommended actions associated with response and recovery are summarized in Table 8.2.

Respectfully submitted,

HENRY VON OESEN AND ASSOCIATES, INC.

Paul S. Denison

Paul S. Denison, P.E.
Vice President

William E. Burnett

William E. Burnett
Environmental Planner

HURRICANE STORM MITIGATION
AND
POST-DISASTER RECONSTRUCTION PLANS

ONSLOW COUNTY, NORTH CAROLINA

SECTION 1: AUTHORITY FOR THE STUDY AND REPORT

This hurricane storm mitigation and post-disaster reconstruction plan study and report has been prepared at the direction of the Onslow County Board of Commissioners. The preparation of this document was financed in part through a grant provided by the North Carolina Coastal Management Program. Local funds and in-kind services were also provided by Onslow County through the Onslow County Planning Department and the Office of Emergency Management.

SECTION 2: STUDY PURPOSE AND OBJECTIVE

The purpose and objective of this study is the development of storm hazard mitigation and post-disaster reconstruction plans that meet the specific needs of Onslow County, conform to the State rules for storm hazard planning, and facilitate the updating of the County's hurricane evacuation plan based on information developed through the planning process. The "Onslow County Hurricane Response Plan" (evacuation plan), has been published as a separate document. Pertinent portions of that plan are referred to herein as appropriate.

SECTION 3: BACKGROUND

3.1 General

As barrier islands of North Carolina have experienced increasing development, there has also been a growing awareness of a need to protect and preserve the physical and environmental values of the entire coastal area. At the same time, people have increasingly become aware of some of the risks or hazards inherent in living in the coastal zone. This fact becomes even more apparent as more people come to the area, either as permanent residents, tourists or day visitors, increasing development and population densities to proportions not realized less than a decade ago.

In light of these growth and development experiences, both the Federal and State governments began to focus attention on the problems associated with this phenomenon and to take actions establishing controls and guidelines in an effort to preserve the public values and assets inherent in the coastal region. Following a broad Federal mandate, the North Carolina General Assembly passed the Coastal Area Management Act of 1974 (CAMA) in response to these increasing pressures placed on coastal resources by growing population, general development and recreational demands. The act provides two key mechanisms for coordinating resource management to more effectively protect and enhance the use of coastal lands and waters; the formulation of local land use plans and the designation of areas of environmental concern. CAMA establishes a cooperative program between the state and local governments. Local governments are assigned the initiative for

planning and for developing local land use plans which articulate the objectives of local citizens and their vision of desired development patterns. The Coastal Resource Commission (established under the act) is assigned a supportive standards setting and review capacity which maintains uniformity in the management of the State's coastal resources. The Commission establishes guidelines for local land use plans and for development in areas of environmental concern.1./

The Onslow County Land Use Plan2./ is an outgrowth of the CAMA program, and is a useful tool contributing to the objectives of this particular report. Much of the data contained herein is based on information contained in the land use plan and is so referenced where appropriate. The broad land use plan is further reinforced by specific zoning and subdivision regulations discussed in detail later in this report. The land use planning program, supported by regulations and guidelines promulgated by the Coastal Resource Commission (CRC), was a major step towards influencing the desired preservation, growth and development in the coastal zone. However, these broad and sometimes general guidelines did not adequately address the specific questions of hurricane storm mitigation and post-disaster reconstruction planning requirements. In recognition of this, the CRC appointed a Post-Disaster Task Force to study the problem. After nearly two years of study and recommendations, the CRC adopted changes in its regulations, mandating that the problems of storm mitigation and

---

1./ 2./ All references cited are keyed to the Bibliography; see Section 9.

post-disaster reconstruction be specifically addressed at the local level. Limited funding support was made available, and this Onslow County study and planning effort is one of the first to be undertaken in the State to meet these requirements.

3.2 Prior Studies

In addition to the Onslow County Land Use Plan referenced above, numerous studies and reports pertaining to the problem and questions at issue have been prepared in the past. A few are directly related to the questions addressed herein, but all contain information pertinent to the investigation inherent in this sudy and report. Only those references listed below and/or included in the bibliography at the end of this report are included that have specific bearing on this study. However, each of the referenced reports also have listed biliographies of other reports containing information pertinent to the issue. A brief summary of the most important reports having bearing on this study are listed as follows and are included in the bibliography:

1./ William D. McElyea, David J. Brower, David R. Godschalk. Before the Storm: Managing Development to Reduce Hurricane Damages. Ocean and Coastal Ecology Program Center for Urban and Regional Studies, UNC/Chapel Hill; August 1982.

This excellent publication discusses the hurricane hazard, possible mitigation actions, tools and programs for such mitigation, and the planning programs associated therewith. A typical case study using Topsail Island is

included, followed by suggestions pertaining to planning for reconstruction. The information contained in this report is relied upon heavily in this study related to Onslow County.

2./ Onslow County Planning Department. Onslow County Land Use Plan; October 5, 1981.

This document establishes planning goals and objectives, and contains an excellent data base relating to the economy, existing population, existing land use and physical limitations, and constraints related to development. Future needs and demands are projected, and policies and objectives are established.

3./ North Carolina Department of Crime Control and Public Safety. Carolina County Disaster Relief and Assistance Plan - Prototype (With Annexes and Changes) 1981-83.

This useful document was prepared by the N. C. Crime Control and Public Safety Department as a prototype for use by local governments in developing plans to cope with natural disaster in or near their jurisdictions. The most applicable annexes include Annex "E" (Emergency Shelter Plan) and Annex "O" (Hurricane Response Plan). The general guidelines contained in these publications are used as a prototype as applicable in corresponding Onslow County plans.

4./ Onslow County Office of Emergency Management. Onslow County Hurricane Response Plan. Undated.

This brief document was developed to provide for an orderly and coordinated evacuation of Onslow County residents in hurricane vulnerable areas. This current study effort will update and expand on this basic plan as appropriate.

5./ Onslow County Board of Commissioners (Supported by Onslow County Planning Board and Planning Department). Zoning Ordinance. Undated.

This document contains current regulations relative to development criteria and zones or boundaries. Consideration is given in this report to suggested changes or modifications to the ordinance that may be appropriate to the conclusions and findings of this study.

6./ Onslow County Board of Commissioners (Supported by Onslow County Planning Board and Planning Department). Subdivision Regulations. October, 1979.

This publication is designated to guide the subdivision of land within the jurisdiction of the County and to promote orderly use of the land. Modification of the regulations is suggested to support the findings and conclusions of this study.

7./ John J. Hooten and Associates. Condominiums in Barrier Islands (Preliminary Draft). 1983 - Unpublished.

This report summarizes the barrier island development phenomenon with specific emphasis on condominium type projects. It emphasizes the impact on the land and environmental resources, while pointing out that such impacts are not restricted to condominium developments alone.

8./ U. S. Army Corps of Engineers District, Wilmington. Reconnaisance Report - West Onslow Beach and New River Inlet, N. C. (Draft). Undated.

This report contains a great deal of historical information and data pertaining to the West Onslow Beach and New River region. Technical information contained in the report is relied upon where appropriate to this study.

9./ Federal Emergency Management Agency. Flood Insurance Study - City of Jacksonville, North Carolina - Onslow County (Preliminary). May 1983.

This detailed study defines and quantifies floodprone areas within the City of Jacksonville relative to hurricanes and related storm events. The information developed in this plan is referred to related comments pertinent to the Jacksonville area.

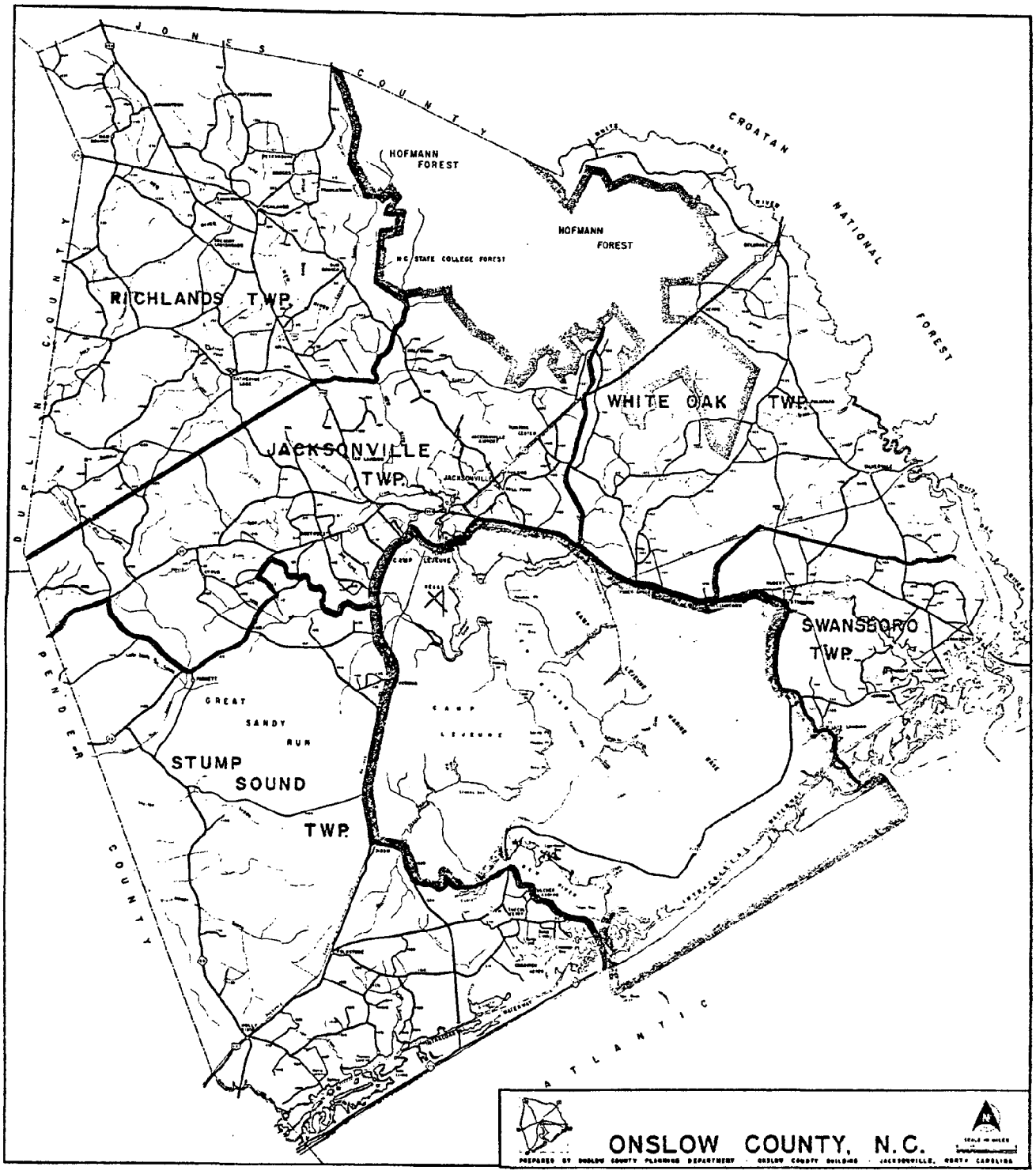
SECTION 4: AREA DESCRIPTION/INFORMATION

4.1 General

The study area involves a narrow segment of barrier islands, marsh areas and adjacent lowlands comprising the southeastern boundary of Onslow County at its interface with the Atlantic Ocean. The County is centrally located on a large embayment (called "Onslow Bay") formed by the major coastal promontories of Cape Lookout on the northeast and Cape Fear on the southwest. A map showing the study area location follows this page (Map 4.1).

The study area is approximately 29 miles long and is made up of a system of low barrier islands trisected by three major inlets (New River, Brown's and Bear Inlets) and bordered by Bogue Inlet on the northeast. The Atlantic Intracoastal Waterway (AIWW), wetlands and several small bays and sounds lie behind these barrier inlands to the west. Low-lying areas on the mainland fronting these sounds are at elevations subject to flooding and consideration must be given to these areas in any hurricane and disaster planning programs.

The United States Marine Corps Base at Camp Lejeune lies in the middle of the study area and comprises almost one half of the coastal area involved in the study (the Marine Corps is responsible for its own hurricane protection and disaster planning, and no further consideration will be given to this coastal segment other than to insure coordination with Onslow County's plans). The northernmost island in Onslow County's barrier islands chain is generally undeveloped and is the location



MAP OF STUDY AREA

(MAP 4.1)

of Hammocks Beach State Park. This island will be referred to later in this report, but only minimal planning actions are necessary associated with its development and use.

The remainder of the Onslow County coastal area is made up of the northern one-half of Topsail Island (formerly known as "Ashe Island"). The majority of attention in this study and report is focused on this area in that it is the only developed barrier island segment in the study area. This island segment is commonly known as "West Onslow Beach." This portion of the island is approximately ten miles long and varies in width from about 900 feet to 6,000 feet. The primary dune system is narrow and varies in elevation from approximately 10 feet to 25 feet above mean sea level (MSL). West Onslow Beach is only sparsely developed with most dwellings used as summer resort housing.

4.2 Other Pertinent Physical Characteristics

As previously mentioned, general elevations on West Onslow Beach range from 6 to 25 feet above mean sea level. However, with the exception of some of the higher foredunes, the entire island is designated as a "floodprone area" subject to inundation during severe hurricanes. Excluding saltwater marsh areas, the island has an average width of about 1,000 feet and an average elevation of 8 feet above mean sea level.

4.3 Winds

Records of the National Oceanic and Atmospheric Administration (NOAA) weather service station at Wilmington, NC were compiled for the period 1948 through June 1960 and are shown on the wind rose diagram following this page (Chart 4.3.1). As indicated, the predominant winds occur from the southwest, north and northeast directions. Winds out of the northeast direction, particularly when associated with northeaster storms, cause considerable erosion along the entire exposed beach area.

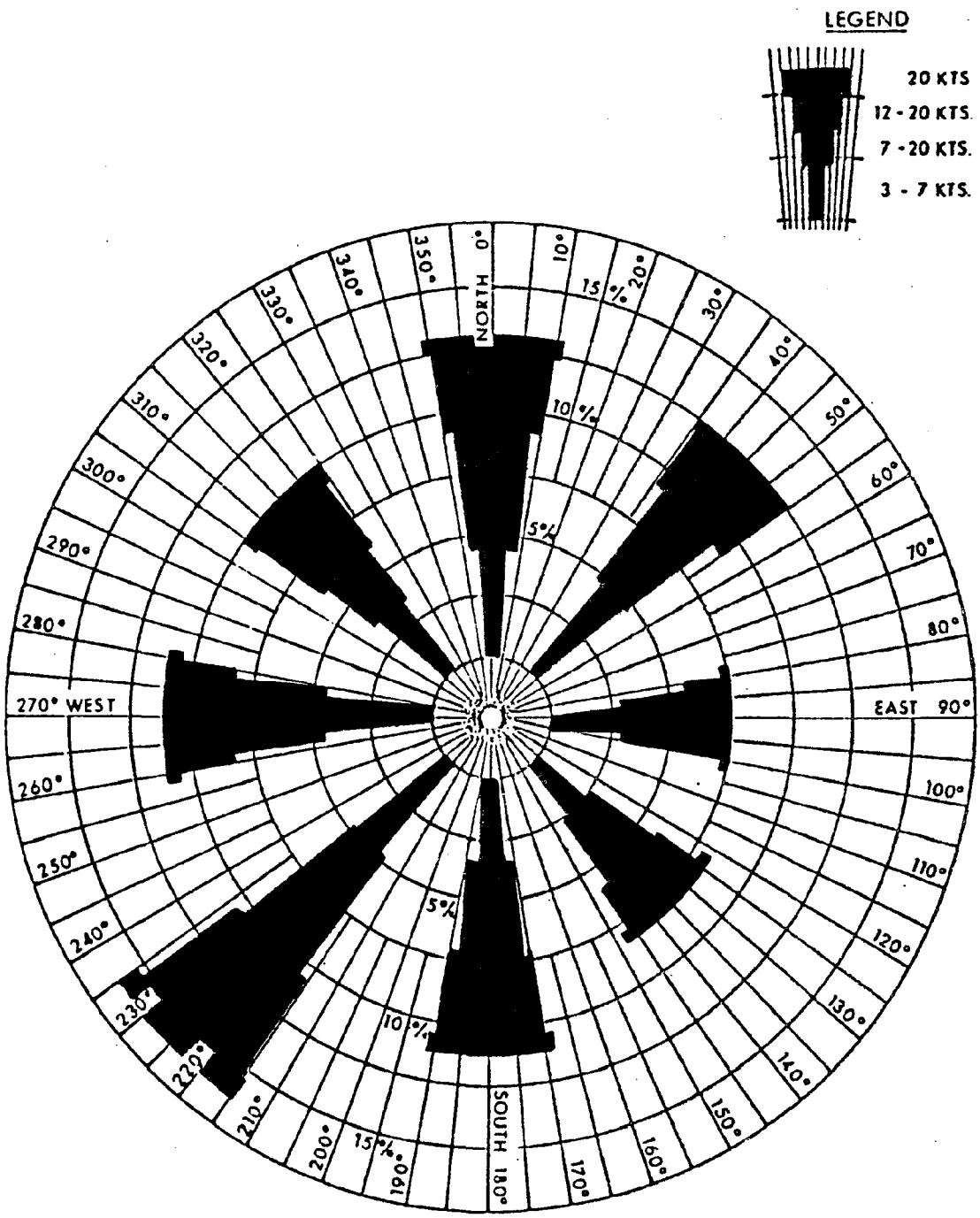
4.4 Wave Data

The nearest wave gauge station located with respect to the study area is at Johnny Mercer's Pier at Wrightsville Beach, NC (south of the study area). Wave gauge data was collected during the period March 1971 to February 1975. The average significant wave height was 2.55 feet and the average wave period was 7.88 seconds. The gauge location is about 20 miles from the center of the study area. Similar information was collected at Atlantic Beach, NC (to the north of the study area) with relatively similar results. Thus, the general wave and wind information can also be expected to apply to the study area. (See Reference 8, Bibliography)

4.5 Tide Data

Records on the tide data have been compiled by NOAA and predictions published in their tide tables for the east coasts of North and South America. Mean tides in the study area are semi-diurnal and indicated to be approximately 3.0 feet with spring tides running slightly higher at about 3.5 feet.

WIND DATA



WIND SPEED VS. DIRECTION FOR WILMINGTON, N.C. (1948 - 1960)

Source: USAED/Wilmington. Reconnaisance Report - West Onslow Beach and New River (Reference 8/).

CHART 4.3.1

4.6 Storm Tides

NOAA also prepared a storm tide frequency analysis for the coast of North Carolina south of Cape Lookout. This study was requested by the Federal Insurance Administration (HUD) in connection with the National Flood Insurance Program. Flood insurance studies have been conducted for both Topsail Beach and Surf City just south of the study area, whereas West Onslow Beach (which is unincorporated) has not yet been studied by FIA. Nevertheless, storm tide stages for various frequencies along the Topsail Island coastline taken from NOAA publications are shown below (Table 4.6.1). These data are considered to be applicable to the study area. (See Reference 8, Bibliography).

TABLE 4.6.1

Storm Tide Stages for Topsail Island, North Carolina

Return Period (Years)	Probability of Occurence Each Year (Percent)	Total Tide Height Static Water Levels (Ft. MSL)
5	20	5.0
10	10	6.6
25	4	9.1
50	2	10.8
100	1	12.6
500	0.2	16.0

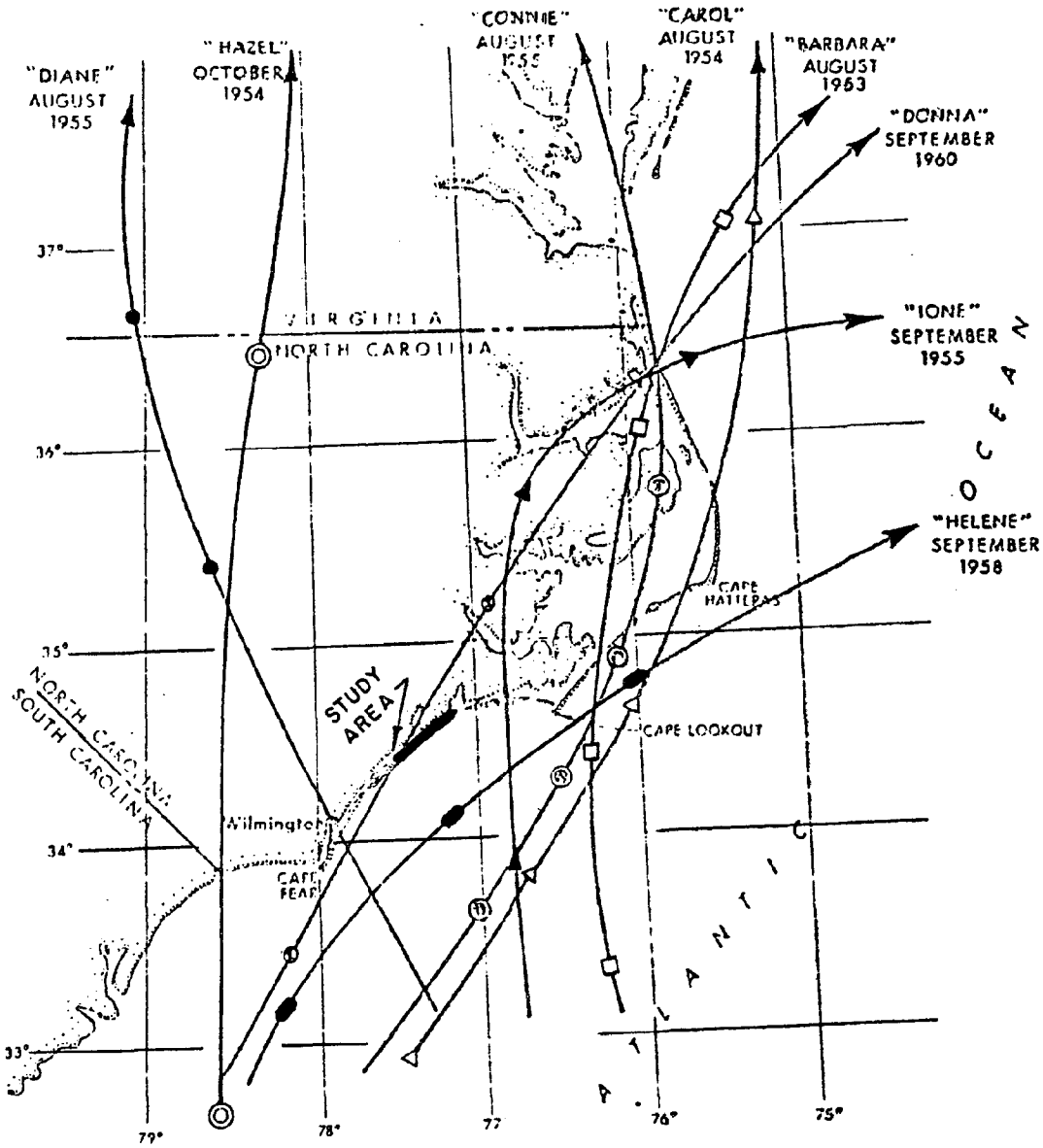
The above data are presented as being important to the considerations applicable in this report. These factors, coupled with storm history and an overall vulnerability analysis discussed below, must be taken into consideration when evaluating proper actions and procedures for hurricane evacuation mitigation and post disaster reconstruction.

4.7 Storm History and Vulnerability[8./]

The Topsail Island and West Onslow Beach coastline is highly vulnerable to hurricanes which produce winds in excess of 100 miles per hour. During the last twenty years, there has been a storm-free period with no major hurricanes affecting the North Carolina coastline; however, during the 1950's there was considerable hurricane activity along North Carolina coastal areas. Hurricane tracks for the period 1952 through 1960 are shown on the sketch map following this page (see Map 4.7.1). Hurricane Donna (September, 1960) was the last storm to pass directly over the study area. Representative high water marks compared with tide frequencies for the 100-year return period are also graphically shown on the sketch following the hurricane path map (Chart 4.7.2). This information clearly depicts the hurricane threat potential associated with the Onslow County coastal area. (Note: A summary of the hurricanes depicted on these charts is complied in the National Weather Service/NOAA publication entitled, "Storm Time Frequency Analysis for the Coast of North Carolina South of Cape Lookout." Technical information relative to each of these storms, including overall damage assessments, is included in the referenced report. The reader is referred to the text of this report for further details).

It should be emphasized that during Hurricane Hazel, which impacted the N. C. coastline in October 1954, all of Topsail Island was flooded (except for some higher dunal elevations) such that storm waves actually impinged on the mainland segment of the

HURRICANE TRACKS

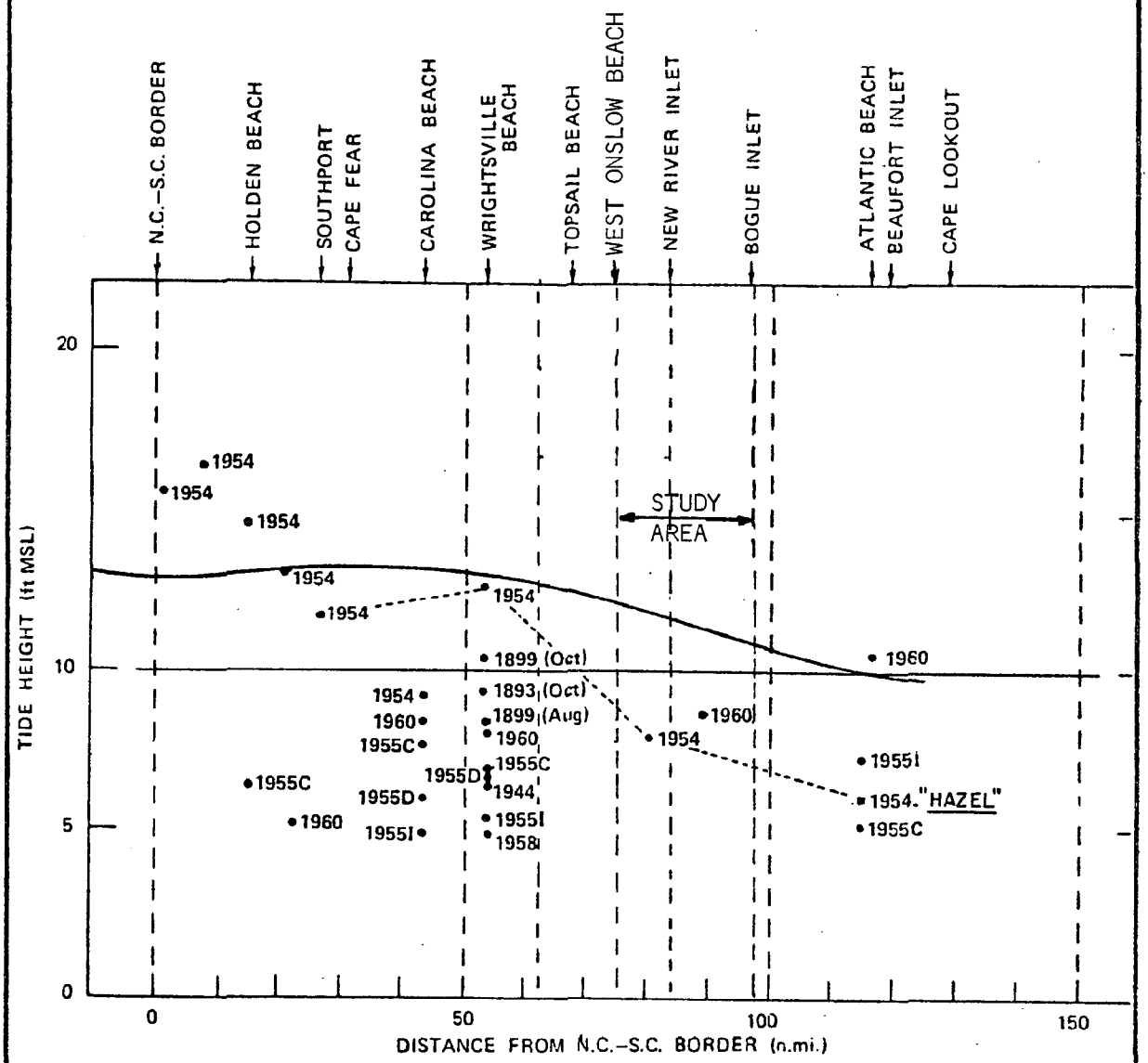


HURRICANE TRACKS
FOR
1952 - 1960

Source: 8/ (See Bibliography)

MAP 4.7.1

HIGH WATER MARKS VS 100-YR STAGE (NOAA)



Representative high-water marks compared with tide frequencies for the 100-yr return period.

Source: 8/ (See Bibliography)

CHART 4.7.2

area. The effects of this storm which made landfall in Brunswick County, NC indicates what could happen if a storm of similar intensity to that of Hazel were to affect the area.

SECTION 5: REGULATORY PROGRAMS INFLUENCING THE PROBLEM

5.1 General

Innumerable state and federal programs influence and/or control activities in the coastal zone; however, two of these programs are of primary concern relative to hurricane storm mitigation and post-disaster considerations. These are the previously mentioned Coastal Area Managment Act regulations administered by the North Carolina Resources Commission (CRC), and the National Flood Insurance Program established by Congress in the National Flood Insurance Act of 1968 (Public Law 90-448). The North Carolina State Building Code also has bearing on the problem. Factors relative to these activities that impact upon the objectives of this study and report are summarized in the following subsections.

5.2 CAMA Regulations and Use Designations

In carrying out its CAMA mandate, the CRC has identified four categories of areas of environmental concern (AEC's): the estuarine system, ocean hazard areas, public water supplies, and natural and cultural resource areas. The AEC categories with provisions for mitigating hurricane damages are ocean hazard areas and the estuarine system. A description of these areas follows, including permitted uses and other requirements for development within ocean hazard AECs and estuarine system AECs (these descriptions and related maps are paraphrased from Reference 1).

5.3 Ocean Hazard AECs

Ocean hazard AECs are most directly related to hurricane hazard mitigation. These are areas especially vulnerable to erosion and other adverse effects of sand, wind, and water where uncontrolled or incompatible development could unreasonably endanger life or property. Ocean hazard areas include beaches, frontal dunes, inlet lands, and other areas in which geologic, vegetative, and soil conditions indicate a substantial possibility of excessive erosion or flood damage. While presenting a hazard to development placed on them, these landforms also afford natural protection to development located landward of them. This protection of lives on property would be lost if uncontrolled development were allowed to significantly alter the beaches, frontal dunes, and inlet lands. Therefore, regulating development within ocean hazard areas benefits the entire community.

Absolute safety from the destructive forces of the sea is not possible for coastal development. It is also not always feasible or desirable to totally block development within hazardous areas. However, the appropriate siting and design of structures in ocean hazard areas and the protection of oceanfront landforms can greatly reduce the risk to life and property. With this in mind, the Coastal Resources Commission has developed management policies and standards for ocean hazard areas that serve to eliminate unreasonable danger to life and property and achieve a balance between the financial, safety, and social factors that are involved in hazard area development. The CRC's standards in furthering CAMA's goals give particular emphasis to minimizing

losses to life and property resulting from storms and long-term erosion, preventing encroachment of permanent structures on public beach areas, and reducing the public costs to inappropriately sited development.

The CRC has designated three types of ocean hazard AECs: (1) ocean erodible areas; (2) high hazard flood areas; and (3) inlet hazard areas.

The ocean erodible area is the beachfront zone which exhibits a strong possibility of erosion and shoreline fluctuation. The ocean erodible area includes all land between the mean low water line and the CRC's erosion setback line. The erosion setback line is the distance landward from the first line of stable vegetation determined by multiplying the long-term annual erosion rate for a particular segment of beach by 30 (the average life of a building). In no case shall the erosion setback line be less than 60 feet from the vegetation line. The ocean erodible area also includes a distance landward of the erosion setback line to the recession line that would be generated by a storm having a one percent chance to being equalled or exceeded in any given year.

The high hazard flood area corresponds to the "V-zones" (VI-V30) which appear on the Federal Insurance Administration's flood insurance rate maps. V-zones are those areas subject to high velocity waters (such as hurricane wave wash) in a one percent probability storm (the "base flood"). While V-zones usually lie along the oceanfront, several communities in North Carolina have V-zones along their estuarine shorelines. A storm surge can arise from the State's broad sounds as well as the

ocean. However, the CRC's designation of V-zones as AECs applies only to ocean front V-zones. Where the Federal Insurance Administration has not prepared rate maps for a community, the local government may use base flood elevation data prepared by federal, state or other sources to delineate the high hazard flood area. The data source must be approved by the CRC (a more detailed description of the National Flood Insurance Program and its methods of determining coastal flood hazard areas appears later in this section).

The inlet hazard area, due to its proximity to a dynamic ocean inlet, is especially vulnerable to erosion, flooding and other adverse natural processes. The inlet hazard area is an extension of the ocean erodible area which encompasses those sites where, based on statistical analysis, the inlet can be expected to migrate. The delineation of an inlet hazard area includes such factors as previous inlet territory, a barrier island's "weak spots" near the inlet (such as overwash fans and unusually narrow areas), and external influences (such as jetties and channelization projects). Maps designating inlet hazard areas must be approved by the CRC.

5.4 Estuarine System AECs

Estuarine system AECs also bear a direct relationship to hurricane hazard mitigation. Where ocean hazard AECs deal with the dynamics of the oceanfront, estuarine system AECs deal with the problems attending development in our near estuarine lands and waters. North Carolina's extensive estuarine system is dynamic -

subject to the full complement of water, wave and wind forces. Therefore, development in or near the estuarine system is subject to erosion and flooding hazards similar to those that accompany oceanfront development. It must be remembered that a large portion of the damages that North Carolina has sustained from hurricanes and other major storms have been the result of estuarine flooding and erosion, when the storm surge piled into the State's many sounds.

While the primary intent of the CRC's guidelines for development in estuarine system AECs is the preservation of the system's biological productivity, the guidelines also aim to minimize the likelihood of significant loss of private property and public resources. The geological processes and rates of change in the estuarine system are not always as dramatic or as visible as those along the ocean shore, but they are nonetheless important in exposing development to the destructive forces of flooding and erosion. Just as the ocean beaches and dune systems provide protection to landward development, estuarine shorelines and wetlands help buffer development from erosion and absorb floodwaters. Significant alterations to these land forms can weaken the system and put an entire community at risk.

The CRC's has designated four types of AECs within the estuarine system: (1) coastal wetlands; (2) estuarine waters; (3) public trust areas; and (4) estuarine shorelines. The management of estuarine shorelines and coastal wetlands is most relevant to hurricane hazard mitigation.

Estuarine shorelines are non-ocean shorelines which are especially vulnerable to erosion, flooding or other adverse effects of wind and water, and are intimately connected to the estuary. The Commission has designated the estuarine shoreline AEC to encompass the area along the estuaries, bays, sounds and other brackish waters from the mean high water level to a landward distance of 75 feet. Development within this area can affect the quality for the estuarine environment and is typically exposed to erosion and flooding damages.

Coastal wetlands are defined by the CRC as any salt marsh or other marsh subject to regular or occasional flooding by tides, including wind tides but not hurricane or tropical storm tides. These coastal wetlands serve as the first line of defense in retarding estuarine shoreline erosion. Wetland plant stems and leaves tend to dissipate wave action, while the vast network of roots and rhizomes resists soil erosion. In this way, the coastal wetlands serve as barriers against flood damage and control erosion between the estuary and the uplands.

5.5 N. C. State Building Code[1./]

Building codes set standards for construction materials, design, and procedures in order to protect lives and property. Important in safeguarding the health, safety and welfare of the public from unsafe construction practices in normal times, building code standards take on crucial importance during natural disasters such as hurricanes, when extraordinary stresses are imposed on manmade structures. In coastal communities subject to

hurricanes the building code is one of the most important tools for mitigating hazards to life and property during both the development that takes place before the storm and the reconstruction following the storm.

Building codes regulate the construction, alteration, maintenance, repair and demolition of buildings and structures. They establish minimally acceptable conditions or standards for all phases of building construction, based upon the properties of construction materials, physical and chemical principles, and engineering and architectural criteria. As legal guides for engineers, designers and contractors, building codes are enforced by local government building inspectors who check construction plans prior to issuing building permits and periodically inspect construction sites to ensure that approved plans are followed.

The two major types of building codes are performance codes and specification codes. A performance code recommends the objective to be accomplished and allows the designer to select from various materials and techniques to achieve the desired result. A specification code describes in detail the exact materials and methods to be used. In practice, most codes emphasize performance standards but also include certain specifications for materials and design.

North Carolina's State Building Code (Volume I, General Construction) applies uniformly to the design, construction, location and installation of all new residential and commercial structures thoroughout the State. To be legally effective, any city or county building code must be approved by the Building

Code Council. In the interest of standardization, local deviations from the State Building Code are approved only if a local government can present compelling evidence of necessity for the deviation. The North Carolina Supreme Court has consistently ruled that the State Building Code preempts local building code authority on grounds of the supremacy of state laws over local ordinances.

In addition to the State Building Code, the North Carolina Building Code Council has adopted the North Carolina Residential Building Code (Volume I-B), which governs the construction, alteration, repair and removal of one and two-family dwellings. The Residential Building Code does not apply to apartments or multi-family residences for three or more families. The Residential Building Code's Appendix D, "Wind Resistive Construction," applies to coastal communities and other areas where residences are subject to winds of greater than 75 miles per hour.

Further construction standards have been adopted by the Coastal Resources Commission. CAMA regulations for ocean hazard AECs require that buildings comply with Appendix D of the code, except where more restrictive standards have been set by the CRC. These standards include requirements for piling size and embedment, foundation stability during a 100-year storm, and floor elevation above the 100-year flood height.

5.6 National Federal Flood Insurance Program (NFIP)[1./]

Congress established the National Flood Insurance Program with the National Flood Insurance Act of 1968 (Public Law 90-448) to reduce annual flood losses through more careful planning of floodprone areas and to provide property owners in those areas with affordable insurance against flood damages. The National Flood Insurance Program sets guidelines for developers, homebuilders, and local governments to follow in order to qualify for flood insurance. The program also contains innovative provisions for post-disaster reconstruction which facilitate the relocation of damaged structures out of hazardous areas. The wide range of federal disaster assistance programs are designed to ease the burden of rebuilding after a disaster. The requirements of these programs vary and provide different opportunities for influencing the character of post-disaster reconstruction. Executive Order 11988, "Floodplain Management," directs federal agencies to avoid encouraging unwise development on floodprone lands. The Coastal Zone Management Act calls for federal actions to be consistent with the State's coastal management program, which includes state and local hazard mitigation and reconstruction policies.

The National Flood Insurance Program, which is administered by the Federal Emergency Management Agency's Federal Insurance Administration (FIA), offers flood insurance to property owners in designated flood hazard areas. In return, local and state governments enact and enforce comprehensive floodplain management measures to protect lives and properties from future flooding.

These floodplain management measures typically involve land use controls and construction standards, as well as other techniques, applied within floodprone sections of a community. These include all land which would be inundated by the "base flood" or 100-year flood (that is, the flood which has one percent chance of being equalled or exceeded in any given year). The program's main purpose is to reduce the amount of developed property exposed to flooding. It reflects the realization that "non-structural" measures are just as important as "structural" measures in mitigating flood damages.

There are two stages of community participation in the National Flood Insurance Program: the Emergency Phase and the Regular Phase. All of North Carolina's coastal communities are enrolled in either the Regular Phase or the Emergency Phase.

Emergency Program. A community enters the Emergency Phase after the FIA provides it with a "flood hazard boundary map," which delineates flood hazard areas based on the best available data. To be accepted into the Emergency Phase, the community must have in force preliminary measures for regulating development in designated flood hazard areas. The community must require permits for all proposed construction in the community and must review permits to ensure that development is reasonable safe from flooding.

Regular Phase. Once the community is in the Emergency Phase, the Federal Insurance Administration undertakes a detailed study of the community's base flood elevations (BFEs) and flood hazard areas, including the development of a "flood insurance rate map"

(FIRM). Based on the study, the FIA derives a schedule of actuarial (non-subsidized) flood insurance rates and the community develops more detailed floodplain management regulations. Once the community adopts these regulations, it enters the Regular Phase, which provides higher levels of insurance coverage for new and existing residential and non-residential structures. The regulations must protect new construction in designated flood hazard areas from inundation by the 100-year flood (or "base flood").

Flood insurance rate maps for coastal communities divide the 100-year floodplain into two adjacent zones: A-zones and V-zones. the delineation of A-zones and V-zones is based on the best information available on the storm surge levels a community can expect in a 100-year storm. The A-zone contains that area of the 100-year floodplain which is primarily subject to "static" flooding from storm surges (i.e., rising water but little or no wave action). The V-zone, which lies along the shorefront, contains that area of the 100-year floodplain which is subject to wave action as well as the storm surge. The V-zone (also known as the "coastal high hazard flood area") is usually determined by the inland extent of a three-foot breaking wave.

An important change is currently underway to refine the NFIP's determination to base flood elevations (BFEs) in V-zones. Flood insurance rate maps developed before 1982 geared V-zone BEFs to the water level associated with the 100-year storm surge. This did not account for waves that would appear atop the surge and damage structures elevated only to the storm surge level. The

Federal Insurance Administration is now using procedures to calculate 100-year wave crest elevations. These elevations (higher than the 100-year storm surge levels previously used) will become the BFEs for V-zones on all new rate maps and will be used to revise the BFEs appearing on existing rate maps. This adjustment will involve changes in local insurance premium schedules and regulations governing construction in V-zones.

To enroll in the Regular Phase, a community must adopt and administer a set of development regulations that meets the National Flood Insurance Program's minimum requirements. These regulations must be legally enforceable, apply uniformly through the community, and take precedence over any less-restrictive local regulations. They apply in addition to those regulations already adopted under the Emergency Phase. The minimum regulations required in the Regular Phase are listed in Table 5.6.1 following this page. They apply to new construction and substantial improvements to existing structures.

5.6.1 Areas Not Covered by NFIP

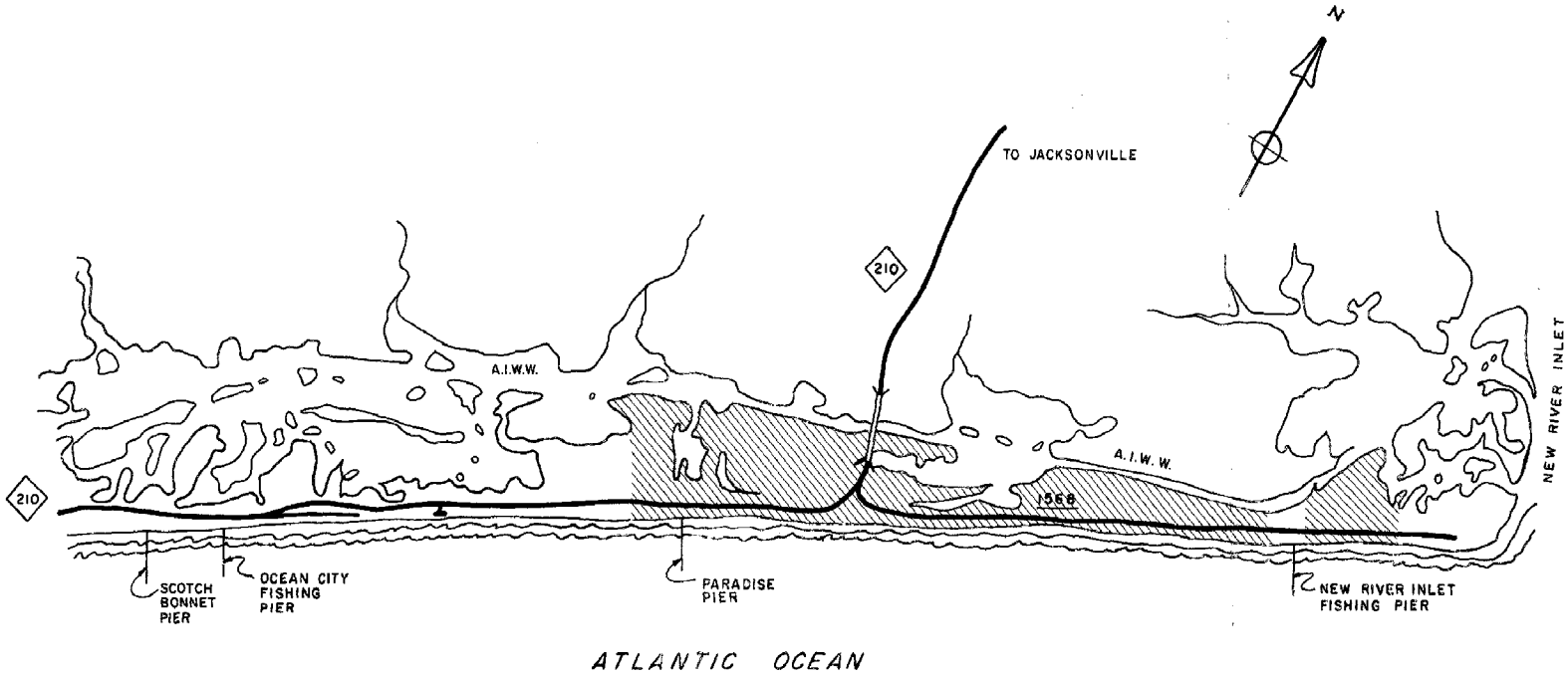
During the 1981-82 time frame, the U.S. Department of Interior created a Coastal Barriers Task Force to identify "undeveloped" barrier islands and make recommendations concerning withholding of federal grants or other funding assistance that might promote development of these areas. This action was consistent with the aforementioned Executive Order 11988 directing federal agencies to avoid encouraging unwise use or development of flood prone lands. The task forces findings and recommendations resulted in the passage of the Coastal Barrier Resources Act of 1982 by Congress.

TABLE 5.6.1: MINIMUM FIA REQUIREMENTS FOR REGULAR PHASE COMMUNITIES

Flood Hazard Zone	Development Requirement
A-zone (base flood determined)	-Residential structures must be elevated to the base flood level (includes mobile homes outside of existing parks or subdivisions). -Non-residential structures must be elevated or floodproofed to base flood level (registered engineer or architect must certify adequacy of floodproofing methods). -Mobile homes must be elevated to the base flood level in mobile home parks or mobile home subdivisions that are new or have been substantially improved (repair, reconstruction, or expansion exceeding 50 percent of the value of existing streets, utilities, and pads). -Mobile homes must be anchored by over-the-top and frame ties to resist flotation, collapse, and lateral movement. -Evacuation plans for mobile home parks and mobile home subdivisions must be filed with appropriate disaster preparedness authorities. -No new construction or substantial improvement may cause the base flood level to increase by more than one foot at any point in the community. -The community must maintain an accurate and up-to-date record of elevation and floodproofing heights for all new and substantially improved structures.
V-zone	All of the above apply, plus the following: -All structures must be landward of the mean high tide line. -All structures must be elevated to the base flood level on pilings or columns. A registered engineer or architect must certify that anchorages between the pilings and the floor of the structure are adequate to withstand velocity waters and hurricane wave wash. -Fill may not be used for structural support. -The space below the base flood elevation must be free of obstruction or constructed with "breakaway walls." -Mobile homes may only be placed in existing mobile home parks or mobile home subdivisions. -Man-made alterations of sand dunes are prohibited if they will increase potential flood damage.

Source: 1/ (See Bibliography)

West Onslow Beach was one of the specific areas identified in the act regarding restrictions on federal aid or assistance to designated areas. All of the undeveloped portions of the island (according to the Act's definition of undeveloped) are not eligible for coverage under the NFIP. Consequently, any new construction or development will not be covered by flood insurance under the program. Areas designated as "not-eligible" are shown on sketch map (Map 5.1) following this page. It is also emphasized that this federal assistance restriction is not limited only to flood insurance coverage, but will also limit federal participation (or funding assistance) in other programs such as highways, utilities, etc., where such assistance is normally available. This factor above should specifically influence future development planning factors related to the West Onslow Beach area.



LEGEND

AREAS NOT ELIGIBLE FOR FLOOD INSURANCE UNDER NFIP

SOURCE: U.S. FISH AND WILDLIFE SERVICE BASED ON A SET OF MAPS ADOPTED BY CONGRESS PURSUANT TO THE COASTAL BARRIER RESOURCES SYSTEM ACT (PL-97-348).

MAP 5.1

AREAS OF WEST ONSLOW BEACH NOT ELIGIBLE FOR FLOOD INSURANCE COVERAGE UNDER NFIP

ONSLOW COUNTY HURRICANE STUDY

SECTION 6: STUDY AREA INVENTORY AND ASSESSMENTS

6.1 Population and Growth

6.1.1 Existing Population Densities

Critical to this plan is an understanding of the permanent and seasonal population which exists in the beachfront and low-lying areas of the County. The number of persons in the hurricane impact area will in part govern when evacuation is ordered and will also influence post-disaster reactions to the storm.

Table 6.1.1 shows the Onslow County 1980 Census populations by area. The population of 240 persons at West Onslow Beach reflects only the permanent population. Table 6.1.2 shows the Onslow County 1980 Census population by township. It should be noted that Stump Sound Township contains the West Onslow Beach and Sneads Ferry areas which are most susceptible to hurricane damage.

6.1.2 Future Population Projections

According to the Onslow County Land Use Plan, based on recent historical trends, Onslow County's population is projected to continue to increase over the next ten years but at a slower pace than in the past. Previous projections given by the North Carolina Department of Administration for 1980 (121,653) were extremely optimistic in relation to the preliminary estimates by the U. S. Bureau of the Census (112,165). Therefore, according to the Land Use Plan, the Department of Administration's 1990 projection of 124,000 should actually be less, as indicated in Table 6.1.3.

TABLE 6.1.1

ONSLOW COUNTY

1980 POPULATION BY AREA

Area	Population
Swansboro	976
Richlands	825
Holly Ridge	465
West Onslow Beach (UNINC)	240
Camp Lejeune	35,000
Jacksonville	22,000
Unincorporated County Areas	53,278
COUNTY TOTAL	112,784

SOURCE: Onslow County Land Use Plan (1981)
Onslow County Planning Department

TABLE 6.1.2

ONSLOW COUNTY POPULATION BY TOWNSHIP

TOWNSHIP*	1960	1970	% CHANGE	1980	% CHANGE
Jacksonville	40,834	55,737	36%	54,111	-3%
Richlands	7,331	7,752	3%	9,006	19%
Stump Sound	5,486	5,545	1%	7,500	35%
Swansboro	21,678	20,800	-4%	23,380	12%
White Oak	10,879	13,472	24%	18,787	39%
	86,208	103,126	20%	112,784	9%

SOURCE: Onslow County Land Use Plan (1981)

---

* Refer to Map 4.1 for Township boundaries.

TABLE 6.1.3

ONSLOW COUNTY FUTURE POPULATION ESTIMATES

AREA	1980	1990	% CHANGE
Onslow County	112,784	122,447	8.6%
Jacksonville Twp.	54,111	56,100	3.7%
Jacksonville City	(22,000)	(25,000)	(13.6%)
Swansboro Twp.	23,380	25,960	11.0%
Swansboro Town	(976)	(1,025)	(4.9%)
Stump Sound Twp.	7,500	8,507	13.4%
Holly Ridge Town	(465)	(512)	(10.0%)
Richlands Twp.	9,006	9,843	9.3%
Richlands Town	(825)	(860)	(4.2%)
White Oak Twp.	18,787	22,037	17.3%

SOURCES: U. S. Bureau of the Census and Onslow County Planning Department.

Much of the projected growth in Onslow County will continue to be in the vicinity of the City of Jacksonville with some of this growth occuring within the extraterritorial jurisidction of the City.

An important factor to consider is the impact of the seasonal population on Onslow County's economy and public facilities. These visitors will grow in number and will demand many of the same services provided for full-time residences. Much of the seasonal population will be located at West Onslow Beach. Listed in Table 6.1.4 are population projections for that area.

6.2 Existing and Future Land Use

Existing (1981) land uses for Onslow County and West Onslow Beach are shown in Tables 6.2.1 and 6.2.2, respectively. Table 6.2.3 shows the future land use needs by category of development. A good portion of the residential land use needs will be met by the West Onslow Beach area of the County due to the pressures for development in that area. A significant factor in that development will be the multi-unit condominium type project. A current listing of new projects in this category is shown in Table 6.2.4.

West Onslow Beach contains approximately 3,283 acres of land. Of this, 1,789 acres are classified as wetlands (conservation) where, due to prevailing laws and regulations, little or no development is allowed to occur. Of the remaining 1,494 acres, some 564.3 acres located along some 11.5 miles of oceanfront are classified as beaches, of which an estimated 50 percent (282.2 acres) is associated in some way with existing development. In other words, the land in the beaches classification is located

TABLE 6.1.4

POPULATION PROJECTIONS FOR

WEST ONSLOW BEACH
ONSLOW COUNTY, NORTH CAROLINA

YEAR	PERMANENT	AVERAGE SEASONAL	PEAK SEASONAL	MAXIMUM POPULATION
1980	240	1,850	3,480	3,770
1985	465	3,515	6,612	7,770
1990	700	5,273	9,918	10,335

Source: Onslow County Land Use Plan; 1981.

TABLE 6.2.1

1981 EXISTING LAND USES

ONSLOW COUNTY

	ACREAGE	%
Agriculture (Cultivated)	42,596	8.80
Industry	600	< 1
Commercial Forestry	113,726	23.51
Camp Lejeune	108,480	22.42
Incorporated Areas	8,095	1.67
Hofmann Forest	53,696	11.10
Commercial	561	< 1
Residential	6,170	1.28
Water & Marsh	36,864	7.62
Private & Other Forests	96,002	19.84
Recreation Land (Public)	1,050	< 1
Urban & Rural Non-Farm	16,000	3.31
	483,840	100%

SOURCE: Onslow County Land Use Plan (1981)

TABLE 6.2.2

EXISTING LAND USES

WEST ONSLOW BEACH

USE	1976 ACREAGE	% OF TOTAL	1981 ACREAGE	% OF TOTAL
Residential	155.2	4.7	216.4	6.6
Commercial	26.0	0.7	36.9	1.1
Undeveloped & R/W	749.0	22.7	676.9	20.7
Wetlands	1,788.5	54.4	1,788.5	54.4
Beaches	564.3	17.2	564.3	17.2
	3,283.0	100.0%	3,283.0	100.0%

SOURCE: Onslow County Land Use Plan (1981)

TABLE 6.2.3

ONSLOW COUNTY LAND USE NEEDS

CATEGORY OF USE	1980	ACREAGE NEEDED	1990
Recreation	1,050	-----	----
Residential	6,170	576	6,746
Industrial	600	90	690
Commercial	561	85	646

Note: Excludes municipalities and Camp Lejeune

SOURCE: Onslow County Land Use Plan (1981)

TABLE 6.2.4

MULTI-UNIT CONDOMINIUM PROJECTS
WEST ONSLOW BEACH, NORTH CAROLINA*

Project	Number of Units	Number of Acres
Lionel Yow Project	575	40+
Permuda Island (Revision)	340	50+
Oceanbay Village	130	10+
Ship Watch Villas	40	5+
Bermuda Landing	72	7+
Topsail Villas	60	4.5+
Island Villas	55	6+
	1,272	122.5+

* Source: Onslow County Planning Department. List current to April, 1984.

between existing development and the ocean. This acreage enters into the calculation of total available developable acreage even though, due to CAMA regulations, it will essentially remain untouched. Thus, a total of about 950 acres of land (1981 data) is available for development at West Onslow Beach.

The development of Topsail Reef Condominiums at the eastern end of the island foretells the scale of development West Onslow Beach can expect in the future if current land use plan guidelines and other constraints remain unchanged. The developer of Topsail Reef Condominiums has, with the approval of the N. C. Division of Environmental Management, constructed a privately financed and privately maintained one million gallon per day sewerage disposal system for West Onslow Beach, with the capacity for expansion to three million gallons per day. This system serves the first phases of a 582-unit condominium development he plans to build just west of Topsail Reef, as well as a 600-unit development that another developer has proposed for Permuda Island (a low-lying soundside island that is connected to Topsail Island by a low, narrow and unpaved causeway.)*

6.3 Existing Local Regulations - Ordinances

In view of the preceeding discussions related to population and growth projections, the question arises regarding how effectively existing regulations and ordinances can serve to

---

* As of this writing, a zoning change to permit the development has been contested by a law suit by local interests who have argued that such a development will result in adverse environmental effects on fisheries in the estuarine waters adjacent to Permuda Island.

accommodate this expected growth in hurricane vulnerable areas. State and Federal regulatory programs influencing the problem were discussed in Section 5. In addition, the following local regulations or ordinances may or may not affect growth and development in the areas of Onslow County most susceptible to storm attack and damage.

6.3.1 Zoning Ordinance

This ordinance applies only to West Onslow Beach and County property at the County airport. Bonafide farms and related uses are specifically excluded, as are areas within any incorporated municipalities. The stated purpose of the ordinance is to promote the health, safety and welfare of the people within the zoning jurisdiction of Onslow County and regulate the height, number of stories, size of buildings and other structures; the percentage of a lot that may be occupied; the size of yards, courts and other open spaces; the density of population; the location and use of buildings, structures and land for trade, industry, residence or other purposes, except farming; to create districts and establish boundaries for said purposes; to define certain terms used in the ordinance; and to provide penalties for violation of the ordinance and for other purposes. A description of the zoning districts is shown in Table 6.3.1. Table 6.3.2 shows the number of acres of land associated with each zoning district.

The zoning ordinance permits mobile homes and multi-family condominium developments at West Onslow Beach, subject to the ordinance's lot size restrictions. For reconstruction following a

TABLE 6.3.1

DESCRIPTION OF ZONING DISTRICTS

1 RA (Residential-Agricultural) District - The purpose of this district shall be to set aside and protect those lands which are primarily suited for agriculture, agricultural-related uses or woodlands.

2 R-40 Residential District - The purpose of this district shall be to provide large residential lots where they are preferred and to provide sufficiently low densities where septic tanks are used in marginal or severe soils to insure a healthful environment.

3 R-20 (Residential District) - The purpose of this district shall be for low density residential and recreational uses to be protected from undesirable future development and those residential developments not having access to central water and sewer will occur in sufficiently low densities to insure a healthful environment.

4 R-15 Residential District - The purpose of this district shall be to provide for development of neighborhoods with medium population density comprised of single-family residences where water or sewer facilities are accessible.

5 R-10 Residential District - The purpose of this district shall be to provide land for medium density residential and recreational purposes. The regulations of this district are intended to discourage any use which because of its character would substantially interfere with the development of residences and which would be detrimental to the quiet residential nature of the areas included within this district.

6 R-8 Residential District - The purpose of this district shall be to provide land for single-family, two-family and multi-family residences and recreational purposes. This district is intended to provide areas of the community for those persons desiring small residences and multi-family structures in relatively high density neighborhoods. Any uses shall be discouraged which interfere with the residential nature of this district (highest permissible density is 9.9 units/acre for multi-family residences).

7 R-5 Residential District - The purpose of this district shall be to provide land for multi-family and other residences and recreational purposes. This district should provide areas for apartments, townhouses, PUDs and PRDs (highest permissible density is 14.6 units/acre for multi-family residences).

8 MHP Mobile Home Park District - The purpose of this district shall be to provide an area for mobile home owners to rent or buy an area in which to put a mobile home for the purpose of inhabiting it. Mobile home sales are not permitted in this district.

9 MHS Mobile Home Subdivision - The division of land into lots primarily designed for mobile home usage but adaptable in many cases to other residential uses.

TABLE 6.3.1 (Cont'd)

10 B-1 Highway Business District - The purpose of this district shall be to provide for the proper grouping and development of roadside business uses, and for uses not basically related to central or neighborhood business areas.

11 B-2 General Business District - The purpose of this district shall be to provide for the proper grouping and development of those uses which are related to central or neighborhood business districts. Such uses might include shopping centers and retail or wholesale uses.

12 B-3 Marina Business District - The purpose of this district shall be to provide an area for commercial marinas and related uses.

13 M-1 Light Industrial - The purpose of this district shall be to establish areas for offices, warehousing and other light industries located on tracts of land where the operations involved do not detract from the development potential of nearby properties.

14 M-2 Heavy Industrial - This district shall be established to accommodate all industries including those that could be objectionable to surrounding areas due to foul odors, smoke, dust, noise, glare or vibrations.

15 CON-D Conservation District - The Conservation District is established as a district in which only partial development of land may occur. The regulations of this district are intended to protect the floodplain and estuarine areas of Onslow County. The permitted uses shall be in conformity with the uses listed in this ordinance, subject to the appropriate state and federal laws. This district shall apply to those areas above mean high water which are covered by marsh protected by the Coastal Area Management Act and appropriate federal laws. This district shall not apply to marsh areas above mean high water not protected by the Coastal Area Management Act and appropriate federal laws.

TABLE 6.3.2

Zoning Districts
West Onslow Beach[1./]

Zoning District	Number of Acres[2./]	Percent of Total
RA	400.62	12.2%
R-20	536.04	16.3
R-15	80.61	2.5
R-10	167.30	5.1
R-5	9.57	0.3
MHP	15.26	0.5
MHS	194.17	5.9
B-1	63.53	1.9
B-2	20.15	0.6
B-3	15.53	0.5
CON-D (Conservation)	1,788.50	54.5
TOTAL ACREAGE	3,281.51	

1./ Source: Onslow County Planning Department (1982).

2./ Acreage estimated by a compensating polar planimeter.

hurricane, the Onslow County Zoning Ordinance states that non-conforming structures and uses may not be reconstructed if damaged beyond 60 percent of their replacement cost.

The zoning ordinance includes a conservation zoning district (CON-D) which is designed to protect floodplains and estuaries. This district covers over half of the land in West Onslow Beach, entirely on the soundside of the island.

The zoning ordinance does not contain any elevation or floodproofing requirements, nor does it contain any reference to open spaces or breakaway walls for portions of habitable structures below the flood level in the V-zone. Only slight restrictions are imposed on mobile homes or multi-family developments.

6.3.2 Subdivision Regulations

This regulation applies to all areas within Onslow County except those lands lying within the jurisdiction of any municipality. The stated purpose of the regulations is to support and guide the subdivision of land within the jurisdiction of Onslow County in order to promote the public health, safety and general welfare of the citizens of Onslow County. These regulations are designed to promote an orderly use of the land; for coordination of streets and highways within proposed subdivisions with existing or planned streets and highways; for the reservation of rights-of-way or easements for street and utility purposes; for the distribution of population and traffic which shall avoid congestion and over-crowding; to provide for

water, sewerage, parks, schools and playgrounds; and to facilitate the further resubdivision of larger tracts into smaller parcels of land.

The subdivision regulations do not specifically address hurricane hazards.

6.4 Future Development Scenarios

Based on the land available for development at West Onslow Beach, several future development scenarios were developed to determine potential future populations which would have to be evacuated from the vulnerable beach areas during a potential future hurricane. It should be emphasized here that each of the scenarios discussed below represent a "planning exercise" and are not designed to represent a prediction as to actually what will happen in terms of future development at West Onslow Beach. However, they do illustrate, albeit to the extreme, what could happen under certain circumstances.

In the first scenario (A), a projection was made of the ultimate population of West Onslow Beach based on existing zoning regulations assuming no zoning variances or changes. Scenario A is summarized in Table 6.4.1. While this projected pattern of future growth is admitedly unrealistic (zoning changes will occur to alter the pattern of growth), it does form a suitable backdrop or point of reference for the other two scenarios (B and C) to follow. Scenario A shows a potential future population of 23,452 persons at West Onslow Beach.

TABLE 6.4.1

SCENARIO "A"
MAXIMUM BUILDOUT UNDER EXISTING ZONING
WEST ONSLOW BEACH

Zoning District	Total Number of Acres In Zone	Maximum Permissible Density (Units/Acre)	Total Number of Potential Units	Total Potential Population
RA	400.62	1/3	134	469
R-20	536.04	4	2,144	7,504
R-15	80.61	5.8	468	1,638
R-10	167.3	8.7	1,456	5,096
R-5	9.57	14.6	140	490
MHP	15.26	8.7	133	466
MHS	194.17	8.7	1,689	5,912
B-1	63.53	5.4	343	1,201
B-2	20.15	5.4	109	382
B-3	15.33	5.4	84	294
		Totals	6,700	23,452

1./ See Table 6.3.1 for description.
2./ From Table 6.3.2.
3./ Based on information provided by Onslow County Planning Department.
4./ Based on 3.5 persons per unit.

In the second scenario (B) (see Table 6.4.2), a projection of the ultimate population of the West Onslow Beach segment of the island will be about 54,000 persons if present trends involving multiple zoning changes to allow more multifamily units continue and if development proceeds at the maximum permissible density of 14.6 units per acre. This projection is obviously a worst-case situation. Indeed, this level will not be reached in the very near future. However, it does demonstrate that the population projections shown above (see Table 6.1.2) are perhaps too low.

The third scenario (C) illustrated in Table 6.4.2 assumes a reduction in permissible density to 8 units per acre. The ultimate population is still high (some 32,000 persons) - well above the projections in the Land Use Plan. However, it is believed that the imposition of such density controls will lessen the steepness of the growth curve and thereby improve the success of any future hurricane evacuation.

These scenarios indicate that it would be most prudent to reduce permissible densities at West Onslow Beach to reduce the threat to human life from a future hurricane. If the entire population on the vulnerable beach area is to be evacuated before a storm, either the densities must be controlled or the infrastructure (roads) improved to such an extent to allow the evacuation of the larger population. Obviously the former course of action will ultimately be the most cost-effective approach.

TABLE 6.4.2
ULTIMATE BUILDOUT DEVELOPMENT SENARIOS
WEST ONSLOW BEACH

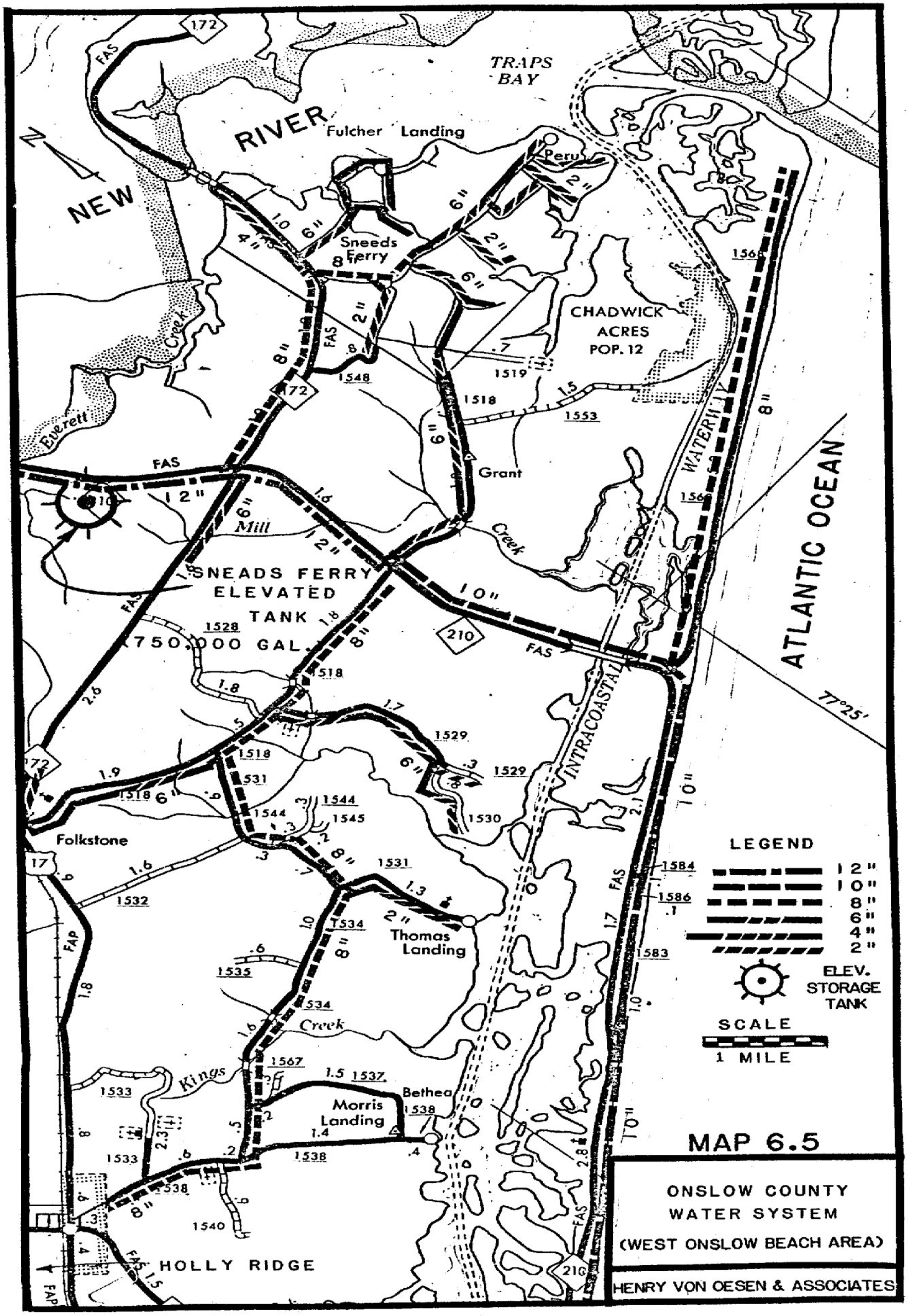
Scenario/Description	Total Acreage	Maximum Density (Units/Acre)	Number of Units	Number of Persons[1]
B. Development based on existing regulations, zoning, etc.				
(1) Existing (1981)[2] Residential Development	499	2.9[5]	1450[4]	5,075
(2) Future Development	959	14.6[3]	14,001	49,005
TOTALS	1458		15,451	54,080
C. Development based on 8 units/acre maximum density				
(1) Existing (1981)[2] Residential Development	499	2.9[5]	1450[4]	5,075
(2) Future Development	959	8[6]	7672	26,852
TOTALS	1458		9122	31,924

[1] Based on 3.5 persons per unit.
[2] Includes "beach" classification associated with existing development.
[3] Maximum density possible under existing regulations and development guidelines.
[4] Source: Onslow County Planning Department.
[5] Calculated value based on known number of units and total developed acreage as of 1981.
[6] Proposed density.

6.5 Existing Utilities, Roads and Services

6.5.1 Water

A good portion of Onslow County outside of the corporate limits of Jacksonville, Swansboro, Holly Ridge, Richlands and the Marine Corps Base of Camp Lejeune is served by the Onslow County regional water system. A system plan covering the West Onslow Beach area and mainland environs is included herewith as Map 6.5. The system is fed by a series of wellfields located in the Catherine Lake area in western Onslow County south of Richlands. The only treatment afforded the well water is chlorination. The West Onslow Beach area is served by a 750,000 gallon elevated tank located on Highway 210 west of the intersection with Highway 172. Raw water is supplied to the tank from a booster station at Verona, NC on US Highway 17. A 12-inch pressure main extends from the elevated tank along Highway 210 to the junction of SR 1518. Thence a 10-inch main extends along Highway 210 to the highrise bridge over the Atlantic Intracoastal Waterway. The 10-inch main is attached to the bridge and extends south along Highway 210 to the Onslow-Pender County line. An 8-inch main extends from the bridge north along SR 1568 to the New River Inlet area. However, an approximate 1,500 linear foot 6-inch main segment (not shown on Map 6.5) intervenes in the middle of this reach in the Galleon Bay area. This segment is scheduled for replacement with 8-inch pipe by the private developer served by the main.



MAP 6.5

ONSLOW COUNTY WATER SYSTEM (WEST ONSLOW BEACH AREA)

HENRY VON OESEN & ASSOCIATES

In the case of a hurricane, the distribution system at West Onslow Beach would most likely be shut down. The overtopping of the island by storm waves could cause some line dislocations and breaks which would need to be repaired after the storm and prior to allowing residents to return.

6.5.2 Wastewater

Most of the single family residential development at West Onslow Beach is served by individual, on-lot sewerage disposal systems (septic tanks). As of this writing, there are no known "package" wastewater treatment facilities serving either single family, campground or multi-family condominium developments. However, it is possible that some units will be installed in the near future as the multi-family unit "condominium boom" continues.

As indicated in Section 6.2 above, there is one large privately owned wastewater treatment facility serving a multi-family development at the north end of West Onslow Beach. The wastewater treatment facility consists of a large 60-acre stabilization lagoon followed by a spray irrigation type effluent disposal system on a 265-acre tract of land located on the mainland off NC Highway 210 approximately 1,000 feet from its junction with NC 172. The present design capacity of this system is one MGD with capabilities for expansion to 3 MGD. This system is capable of serving some 13,333 persons* now, and if expanded to

---

*Projection based on wastewater flow of 75 GPD/capita.

3 MGD, about 40,000 persons in the future. Therefore, this system could represent a significant factor in allowing additional growth at West Onslow Beach.

The on-island segment of the system consists of a gravity sewer collection system serving the condominium development, a 1,500 GPM capacity sewerage lift station, and a 12-inch diameter force main which transmits the collected wastewater to the mainland wastewater treatment facility site for treatment and ultimate disposal. The sanitary sewer lines are equipped with lock-tight manhole covers to minimize intrusion of water and sand during flooding. The lift station controls are located above the flood level. In the event of a hurricane, sewer line dislocations could occur, sewer mains could receive inputs of sand and the lift station could be damaged.

6.5.3 Roads

As previously mentioned, Topsail Island (and West Onslow Beach) is a barrier island with elevations ranging from zero to a little over 20 feet m.s.l. at its highest point. The width ranges from less than one quarter to just over one half mile. These physical characteristics specifically effect the road net on and servicing the island. There is a single two lane road (NC Highway 210 and SR 1568) running north to south over the entire length of the island. It is connected to the mainland by a relatively new high level fixed span two lane bridge about four miles from the north end of the island (New River Inlet). Route 210 also extends southward from West Onslow Beach (through Surf City) with

connections to the mainland over a two lane large swing span bridge at an elevation of about 14 feet above the Atlantic Intracoastal Waterway (AIWW). The general condition and carrying capacity of this main traffic artery are limited by its location, elevation, width and surface quality in some areas. There are also a limited number of paved streets or feeder roads leading from clusters of developments or homes adjacent to the main road; however, these are generally short and narrow with marginal surface conditions. Other narrow, unpaved roads or trails may be found throughout the island leading to individual homes or beach or sound access points. (A detailed discussion of this existing road system may be found in the Onslow County Hurricane Response Plan[4./]).

6.5.4 Power (Electric Service)

Power is provided to Topsail Island by the Jones-Onslow Electric Membership Corporation. Power distribution lines are strung overhead on timber poles located adjacent to primary roads. The distribution system is simple and characteristic of most rural electric services systems.

6.5.5 Other Community Facilities and Services

These are only limited community facilities available to serve developed areas on Topsail Island. These are generally confined to the communities of Surf City and Topsail Beach to the south of West Onslow Beach in Pender County. In general, all schools, fire and rescue, health care and governmental support facilities to serve the West Onlow Beach area are located on the mainland.

6.6 Vulnerability Assessment

6.6.1 Severity of Risk[1./] (General)

The severity of risk related to a hurricane storm is basically a function of the number of physical forces (erosion, wave action, etc.) that a hurricane is likely to impose on a particular hazard zone. Table 6.6.1 shows different hazard areas with different levels of risk.

Area 1 is the area at most severe risk due to its being subject to the full complement of hurricane forces. Area 4 faces the least severe risk on the island since, in a major storm, it can reasonably be expected to suffer only high winds. (This by no means implies that Area 4 is risk-free; hurricane winds are a serious force to contend with and must be accounted for in any hurricane-related planning effort. In the event of a hurricane, all of Topsail Island will face severe damage.) Using the Composite Risk Maps (see Maps 6.6.1 and 6.6.2) as a guide to the location of hazard areas and the levels or risk they entail, it is then possible to get a rough idea of the magnitude of risk facing West Onslow Beach by comparing the maps to the pattern of existing and expected development on the island.

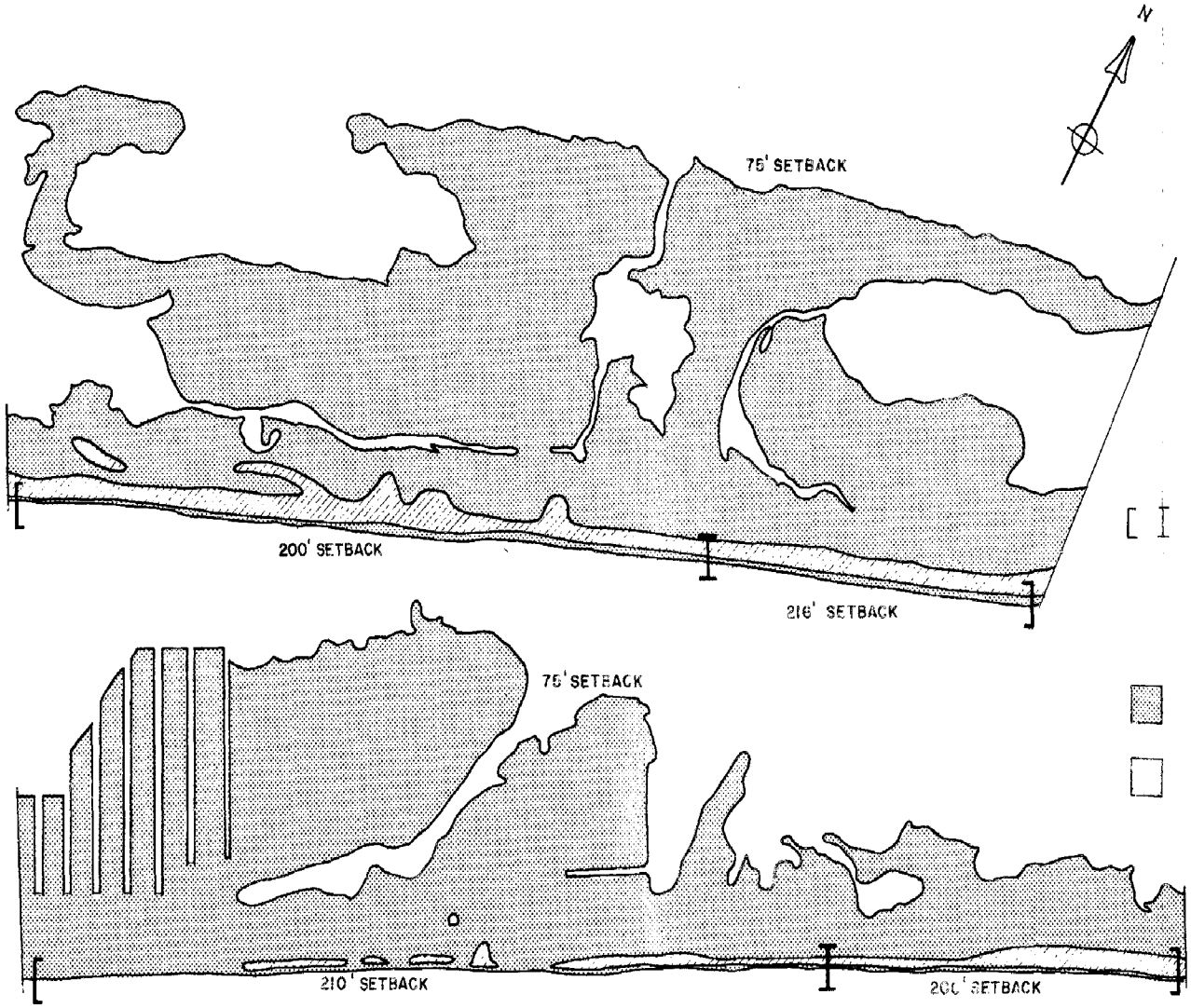
6.6.2 Magnitude of Risk

The magnitude of risk is basically a function of the size of the population and the number and value of developed properties exposed to the hurricane forces likely to affect a hazard area. To estimate the magnitude of risk facing West Onslow Beach, the Composite Hazard Map was overlain with the land use maps of West Onslow Beach.

TABLE 6.6.1

Definition of Hazard Areas

Area	Forces Present/Expected				Boundaries
	Erosion	Wave Action	Flooding	High Winds	
1	X	X	X	X	Ocean erodible AECs, inlet hazard AECs, estuarine shoreline AECs (Setbacks as prescribed by CAMA regulations)
2		X	X	X	Flood insurance V-zones (Designation pending FEMA Flood Hazard Boundary Map publication)
3			X	X	Flood insurance A-zones (Revisions pending publication of FEMA maps)
4				X	Rest of community (Above hurricane flood elevation)



LEGEND

AREA 1: OCEAN ERODIBLE AECs, INLET HAZARD AECs, ESTUARINE SHORELINE AECs, (SETBACKS AS PRESCRIBED BY CAMA REGULATIONS).

AREA 2: FLOOD INSURANCE V-ZONES (DESIGNATION PENDING FEMA FLOOD HAZARD BOUNDARY MAP PUBLICATION)

AREA 3: FLOOD INSURANCE A-ZONES (REVISIONS PENDING PUBLICATION OF FEMA MAPS)

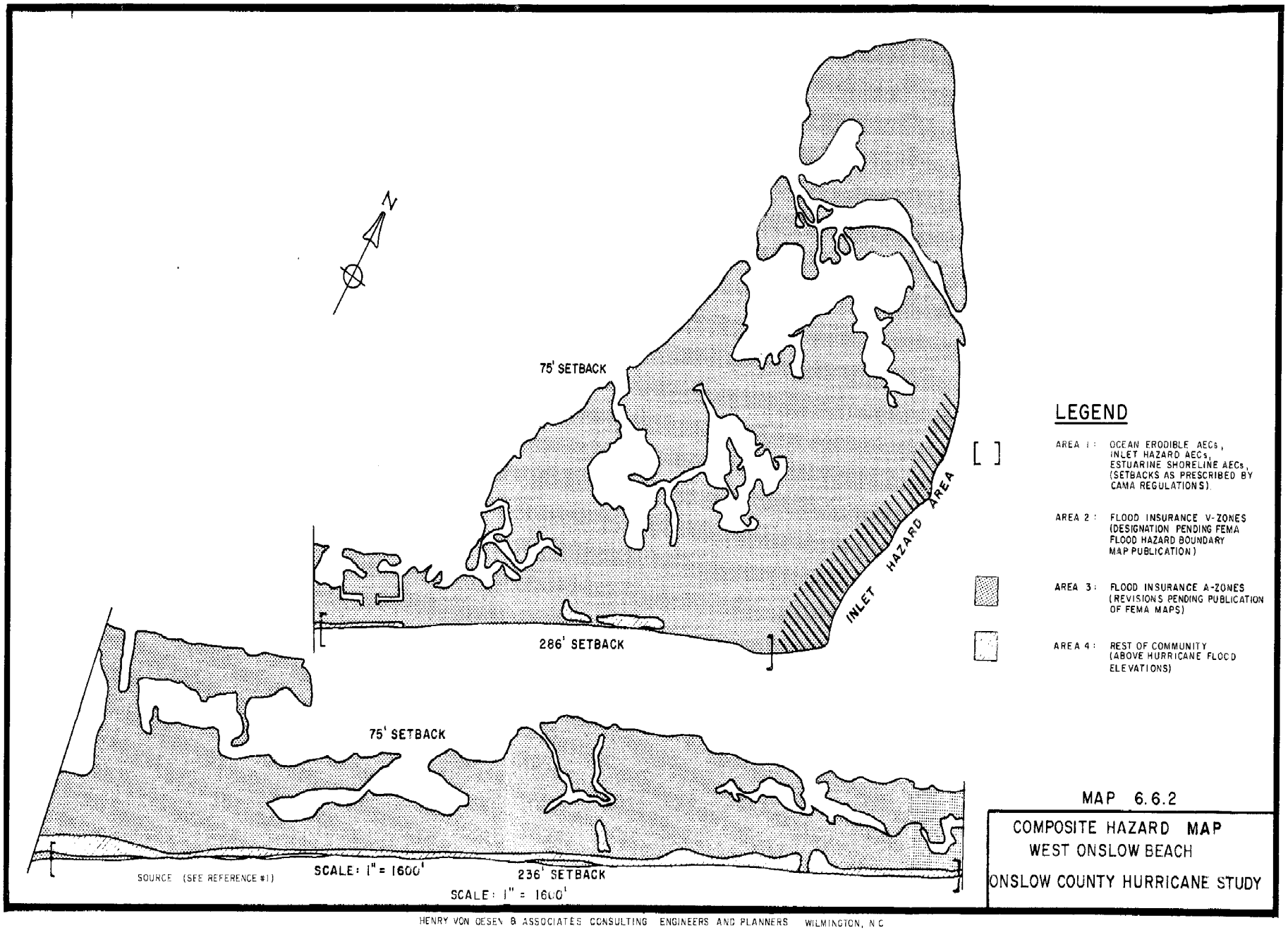
AREA 4: REST OF COMMUNITY (ABOVE HURRICANE FLOOD ELEVATIONS)

SOURCE: (SEE REFERENCE #1)

SCALE: 1" = 1600'

MAP 6.6.1

COMPOSITE HAZARD MAP
WEST ONSLOW BEACH
ONSLOW COUNTY HURRICANE STUDY



MAP 6.6.2

COMPOSITE HAZARD MAP
WEST ONSLOW BEACH
ONSLOW COUNTY HURRICANE STUDY

HENRY VON OESEN & ASSOCIATES CONSULTING ENGINEERS AND PLANNERS WILMINGTON, N.C.

The Onslow Beach land use maps identify the location of all buildings on the island. The maps were coded to indicate residential and commercial structures. The Onslow County Planning Department maintains an up-to-date inventory of structures for West Onslow Beach showing property lines, zoning districts, and whether or not a property is developed. This map is kept current as new construction occurs, buildings are moved, or buildings are torn down. Maintaining an on-going inventory such as this is a good idea. It provides a ready source of information concerning the development pattern of the community and is useful for post-disaster policy decisions.

6.6.3 Magnitude of Risk Facing Existing Development

An assessment of the magnitude of risk facing existing development on West Onslow Beach was obtained by counting the number of residential and commercial structures located in the various hazard areas identified on the Composite Hazard Maps. The location of roads, utilities, and public buildings was also examined.

Because Onslow County is not yet enrolled in the Regular Program of the National Flood Insurance Program, rate maps delineating V-zones do not yet exist; therefore, the Composite Hazard Maps do not show an Area 2 for West Onslow Beach. Area 3 covers the land in West Onslow Beach that is classified as the "special flood hazard area" (A-zone) by the flood hazard boundary map for Onslow County. Of the 1,225 residential units in West Onslow Beach (1981 data), about 315 (26 percent) fall into Area 1.

Another 790 (65 percent) fall into Area 3. Forty-five percent of the residential units lie in a area of extensive finger canals that appear in Area 3 but are likely to suffer more storm forces than just flooding and high winds. A large condominium development containing 240 units lies at the eastern end of the island, partially in the ocean erodible AEC and very close to the inlet hazard area.

Table 6.6.2 also shows the number of commercial units at West Onslow Beach that fall into the various hazard areas. The majority of the commerical units (65 percent) are located in Area 3, but some 35 percent are in the most vulnerable Area 1.

The roads, utilities, and other public facilities on West Onslow Beach were also examined for vulnerability. There is a single primary road (NC Highway 210 and SR 1568) along the length of the island. Through Surf City the road is located as far inland as possible, the right-of-way having been moved from its original location along the oceanfront. One section of the road floods consistently in minor storms. North of the Route 210 bridge in West Onslow Beach, the road runs directly adjacent to the dunes and oceanfront. This section of the road has long been recognized as hazardous, and private developers working in this area have already begun taking steps to move it. Everywhere on the island the primary road is subject to inundation by the 100-year flood. The location of secondary roads on the island basically coincides with the location of homes and businesses.

TABLE 6.6.2

Number of Structures in Hazard Areas
West Onslow Beach
(1981 Data)1./

	Number	Percent
Residential Units		
Area 1	315	26
Area 2	N/A	
Area 3	790	64
Area 4	120	10
Total	1,225	100
Commercial Units		
Area 1	6	35
Area 2	N/A	
Area 3	11	65
Area 4	0	0
Total	17	100

1./ Source: Reference 1.

The Jones-Onslow Electric Membership Corporation's electric lines are situated on overhead poles along the primary roads. These poles and overhead power lines pose a danger in the event of a hurricane. With a single route of evacuation, a fallen pole with broken wires across the highway could be disastrous.

All communities on Topsail Island have limited community facilities. All schools, health care facilities and courthouses are located on the mainland, a sufficient distance inland to be relatively safe from hurricane damage.

6.6.4 Damage Assessment (Cost) for Structures

A study conducted in the spring of 1982 by the U.S. Army Corps of Engineers sheds light on the cost of damages that existing development on Topsail Island could expect to suffer during a hurricane. The Corp's Wilmington District office surveyed nearly every existing structure on the island, estimated its value, and estimated the damages to each structure from flooding at different levels (the 500-year storm, the 100-year storm, the 50-year storm, etc.). The results of the study (see Table 6.6.3) indicate that, in the 100-year storm, West Onslow Beach can expect over 15 million dollars in damage. The study dealt with damages from flooding only - not including the further damages that erosion, wave action, and high winds would cause.

6.6.5 Magnitude of Risk Facing Water Distribution System

In the case of a hurricane, the County water distribution system to West Onslow Beach would most likely be shut down. The overtopping of the island by storm waves could cause some line

TABLE 6.6.3

SUMMARY OF POTENTIAL HURRICANE DAMAGES
WEST ONSLOW BEACH, NORTH CAROLINA
(March 1982 Price Level)

Hurricane Frequency (In Years)	Number of Structures Damaged	Property Values Affected (In Thousands of Dollars) Real	Personal	Total	Total Damages (In Thousands)	Avg. Annual Damages (AAD) (In Thousands)	Dune Protection
Residential:						507.97 (Total AAD)	
500	1,517	32,381.6	9,714.5	42,096.1	23,749.0	460.47	No
100	1,515	32,327.6	9,698.3	42,025.9	13,588.8	311.11	No
50	1,432	29,120.6	8,736.2	37,856.8	6,585.0	210.25	No
30	1,427	28,901.6	8,670.5	37,572.1	3,611.8	142.44	No
25	1,420	28,579.6	8,573.9	37,153.5	2,875.8	120.71	No
20	965	14,917.5	4,475.2	19,392.7	812.8	43.28	Yes
15	905	13,687.0	4,106.1	17,793.1	526.8	32.09	Yes
10	842	12,004.0	3,601.2	15,605.2	312.5	18.11	Yes
8	785	10,740.5	3,222.1	13,962.2	189.4	11.86	Yes
4	0	0.0	0.0	0.0	0.0	0.0	Yes
Commercial:						87.16 (Total AAD)	
500	25	1,721.0	2,222.0	3,943.0	2,237.2	82.68	No
100	22	1,371.0	1,637.8	3,008.8	1,485.7	67.78	No
50	21	1,301.0	1,521.6	2,822.6	1,112.0	54.80	No
30	18	1,089.0	1,326.4	2,415.4	787.9	42.17	No
25	18	1,089.0	1,326.4	2,415.4	700.9	37.18	No
20	8	443.0	542.8	985.8	185.3	5.15	Yes
15	7	386.0	448.2	834.2	95.9	2.80	Yes
10	3	66.0	102.3	158.3	25.5	0.77	Yes
8	1	10.0	24.7	24.7	6.1	0.38	Yes
4	0	0.0	0.0	0.0	0.0	0.0	Yes
Total:						595.13 (Total AAD)	
500	1,542	34,102.6	11,936.5	46,039.1	25,986.2	543.15	No
100	1,537	33,698.6	11,336.1	45,034.7	15,074.5	378.89	No
50	1,453	30,421.6	10,257.8	40,679.4	7,697.0	265.05	No
30	1,445	29,990.6	9,996.9	39,987.5	4,399.7	184.61	No
25	1,438	29,668.6	9,900.3	39,568.9	3,576.7	157.89	No
20	973	15,360.5	5,018.0	20,378.5	998.1	48.43	Yes
15	912	14,073.0	4,554.3	18,627.3	622.7	34.89	Yes
10	845	12,070.0	3,703.5	15,763.5	338.0	18.88	Yes
8	786	10,750.5	3,246.8	13,986.9	195.5	12.24	Yes
4	0	0.0	0.0	0.0	0.0	0.0	Yes

Source: Wilmington District, U. S. Army Corps of Engineers (November 1982)[8/]

dislocations and breaks which would completely disrupt service and introduce the likelihood of contamination. Any breaks or failures would have to be repaired and the line would have to be chlorinated and tested prior to restoring services. All of this would have to be accomplished prior to allowing residents to return to their homes. As a general rule, damage to buried water mains may be less severe and easier to repair than damages to other utility systems.

6.6.6 Magnitude of Risk Facing Wastewater (Sewer) Systems

In the case of a hurricane, the on-island segment of the existing private sewer system would be especially vulnerable to damage. With the loss of power, the lift station would not function. Elevated water levels and driving rain could cause damage to the pump station and its electrical control system. Also, elevated water levels and rainfall could cause deposition of sand in the gravity sewer mains, imparing their proper function. Wave action could also cause line dislocations. Such failures would inevitably cause pollution of surficial sands which would have to be cleaned up to protect public health. After the storm has passed, it will take some time to repair the system, to clean the sewers of sediment, and to restore the system to a normal operational mode.

Beachfront homes served by individual on-lot systems (septic tanks) may suffer severe damage from erosion such that the septic tank and/or drain lines are exposed, damaged or dislocated. These systems would need to be repaired or relocated on the lot (if

space was available) during the post disaster phase. Polluted areas resulting from these failures would also have to be cleaned up and decontaminated.

The repair and/or replacement of such systems could be subject to more stringent rules and regulations than those which were in effect when the original structure was permitted for construction. It is highly likely that, if such rules are enforced to the letter on lots with unsuitable soil conditions, it may not be possible for the Owner to rebuild on that lot.

6.6.7 Routes of Communication (Roads)

An investigation and inspection of West Onlow Beach's only major road and its only evacuation route (NC Highway 210 and SR 1568) reveals that portions of the road are at elevations of about 6 to 7 feet above mean sea level. Fortuitously, the lowest points are at the southern boundary (at the Surf City north limit) and along much of highly developed north end of the beach area between the bridge crossing point and New River Inlet. In many aras, the road passes extremely close to the ocean (where low dunes may or may not exist), which further increases the roads vulnerability to tide and wave attack. Finally, the immediate approach road section to the high level bridge crossing is at an elevation below 8 feet m.s.l. Thus, the escape access to the bridge itself could be inundated relatively early in the storm period. The excellent new high level bridge represents no inpediment to rapid evacuation of controlled vehicular traffic.

In addition to normal flooding of the road along much of its length during a hurricane storm, the likelihood for damage or breaking of the road in several areas is high. Wave attack and erosion forces will cut the road and/or undermine its foundation to render it unusable. Major sand deposits will cover the road in many areas as a result of wave over-wash and flood runoff effects. It is anticipated that major clearing and repairs will be required to put this main traffic artery back into service.

6.6.8 Electric Power Service

It may be expected that major damage will occur to the electric distribution system during a storm. Poles will be toppled by wave and wind forces and by floating debris. Power lines will be broken or shorted out by wind/wave action, or as supporting poles fail. Transformers will be damaged frequently requiring replacement. Disruption of power (electric service) will be experienced until the lines are repaired.

6.6.9 Telephone and Communication Services

Normal telephone services will experience the same problems and disruptions described above for electric service. Telephone communications between the beach area and the mainland will be disrupted until services can be restored. This generally follows restoration of the electric distribution system. Radio communications may be maintained, but only through battery powered radios.

6.6.10 Hurricane Evacuation Risk

As previously mentioned, a hurricane evacuation plan has been prepared as a part of the Onslow County Hurricane Response Plan.[4./] This detailed analysis effectively demonstrates that between eight (8) and thirteen (13) hours will be required to evacuate West Onslow Beach during a peak occupancy or visitation period. This time will increase as growth on the island continues. Innumerable factors influence an actual evacuation, but human response to warnings and/or evacuation orders is a primary factor. All of the planning in the world is to no avail if people do not respond appropriately to the plan of evacuation.

The analysis also shows that there are certain physical factors that will influence the success of the evacuation plan. Principal of these are the extensive areas subject to flooding on the island and the limited carrying capacity of the single evacuation route available (NC Highway 210). The low elevations render much of the West Onslow Beach land area subject to flooding at an early stage in the hurricane storm event. The evacuation route is likewise vulnerable to early flooding, cutting off the evacuation route long before the hurricane actually strikes the mainland. Nothing can be done to remedy the low-lying terrain problem; however, some remedial actions are possible relative to the evacuation route. This point will be discussed later in the hazard mitigation portion of this study.

The reader is referred to the above referenced Hurricane Response Plan for a more detailed discussion of this subject.

SECTION 7: HAZARD MITIGATION PLAN

7.1 Introduction

The purpose of this section of the report is to present a workable program for insuring that future development is located and constructed in a manner that minimizes its susceptibility to future storm damage. It forms the basic standards for reconstruction following the storm. In addition, this section includes brief consideration of other non-construction related mitigation actions which can minimize storm damage.

7.2 Summary of Existing Policies

Existing local policies relative to hazard mitigation are summarized in Table 7.2.1. West Onslow Beach is largely undeveloped, so existing policies reflect a growth-oriented attitude towards development and a limited recognition of the hurricane hazard. The Onslow County Land Use Plan recognizes that "West Onslow Beach will grow by leaps and bounds barring problems associated with hurricanes" (Onslow County Planning Department, 1981, p. 81). Development is expected to occur at a high pace, including single-family residences, condominiums, and hotels. The County maintains floodplain regulations and elevation requirements for West Onslow Beach which are consistent with NFIP regulations. The County does have zoning and subdivision regulations and planned unit development (PUD) standards in force on West Onslow Beach, but as noted above these are vague and ineffective at addressing hurricane hazards. Mobile homes and multi-family condominiums are permitted at West Onslow Beach, subject to the

TABLE 7.2.1*

Summary of Existing Local Policies in Effect at West Onslow Beach

	Local Policy	Status/Description
1.	Floodplain regulations	Partial
	- elevation or floodproofing required	Yes**
	- open space, breakway walls below flood level in V-zone	Yes**
	- no alteration of dunes	Yes
2.	Zoning ordinance	Yes
	- restrictions on mobile homes	Slight
	- restrictions on multi-family	Slight
3.	Subdivision regulations	Yes
4.	Land Use Plan	Yes
	- development outlook	High-density
5.	Destruction level to deny rebuilding nonconformities	60%
6.	National Flood Insurance Program	Emergency

*Source: Reference 1.

**By virtue of 1975 Resolution adopting by reference the criteria set forth in Section 1910 of the National Flood Insurance Program Regulations.

zoning ordinance's lot size restrictions. For reconstruction following a hurricane, the Onslow County zoning ordinance states that non-conforming structures and uses may not be reconstructed if damaged beyond 60 percent of replacement cost. The County does have a "conservation" zone in place that is designed to protect floodplains and estuaries. This district covers over half of the land in West Onslow Beach, entirely on the sound-side of the island. The County's land use plan supports the use of elevation and setback requirements to protect development from flood hazards; it also states that the County intends to adopt more stringent floodplain management regulations once the Federal Insurance Administration has the County's flood insurance rate maps prepared and the County enters the Regular Phase of the National Flood Insurance Program. However, the rate maps are not ready as of this writing. Meanwhile, development in West Onslow Beach continues; but most new construction is elevated to take advantage of lower flood insurance rates. The State's CAMA regulations also play a major role in determining whether or not new development reasonably protects itself against hurricane damages by enforcing the ocean erosion setback and standards for construction in ocean hazard AECs.

In addition to the above local regulations, Onslow County operates under the various requirements that State agencies use to govern development (as described in Section 5 above). Onslow County administers CAMA's standards for minor development projects in areas of environmental concern. The Office of Coastal Management handles major projects in AECs as well as proposals to dredge and fill in estuarine waters and wetlands. All development

must comply with the State Building Code, which is administered by the County's Building Inspector.

A review of the local policies now in effect and the potential for future growth at West Onslow Beach as summarized in Section 6 above points to the need to develop alternative measures for controlling future development in order to mitigate (minimize or lessen) storm hazard problems. These factors increase in importance because of restrictions related to limitations on federal assistance in designated areas resulting from the Barrier Islands Resources Act of 1982 (see Section 5.6.1). The measures are discussed in the following section.

7.3 Alternative Mitigation Measures to Reduce Hurricane Damages

7.3.1 Mitigation Measures for Development Throughout the Community (West Onslow Beach)

(1) Create an overlay of the zoning map which shows the boundaries of the different hazard areas that are subject to different forces (see Table 6.6.1 and Maps 6.6.1 and 6.6.2). Integrate the hazard area concept into the zoning ordinance and the descriptions of the zoning districts (see Table 6.4.1).

(2) Consideration should be given towards reducing the allowable density of development at West Onslow Beach. Current zoning laws allow up to 14.6 units per acre. It is recommened that the zoning law be changed to reduce the maximum density to 8 units per acre in Hazard zones 3 and 4 and 6 units per acre in Hazard Zones 1 and 2. This will serve to effectively reduce the maximum number of

persons that will need to be evacuated during a future storm and the amount of damage that will occur to private property and associated infrastructure. The basic rationale for this change is that the current infrastructure is inadequate to accomodate the density of development which could occur and evacuation times in the case of severe storms will be inordinately prolonged such that loss of life is almost certain to occur (see projections in Table 6.3.1).

(3) By alteration of the zoning law to reduce the allowable densities in the higher risk zones, higher-density uses will tend to locate outside of the most hazardous areas. For such developments as condominiums, further incentives such as allowances for higher density (up to 10 units per acre) for planned unit developments (PUDs) which allow for clustering of units and maximization of open space should be considered.

(4) Consideration should be given to amending the zoning ordinance to the effect that all non-conforming uses and structures should be brought into conformity after a storm if they are damaged beyond 50 percent of their current market value. For slab-on-grade structures, the owners should be required to rebuild flood proof elevated structures when the damage is more than 15 percent of the market value of the structure.

(5) The zoning ordinance should be amended to rezone the MHP and MHS categories to other categories which do not allow mobile homes. All mobile home structures are particu-

larly vulnerable to storm damage and should not be permitted at West Onslow Beach. With such a zoning change, all existing mobile homes will become non-conforming structures subject to the proposed new standards for replacement following a storm as delineated above.

(6) Establish zoning regulations for all of the flood prone mainland areas of Onslow County. Ultimately it would be prudent to extend zoning to all unincorporated areas of the County.

(7) Update the Land Use Plan to reflect actual development in each of the vulnerable areas identified in Table 6.6.1.

7.3.2 Mitigation Measures for Development in Areas Subject to High Winds (Hazard Area 4)

(1) The key to mitigative measures in this case are strict regulation of construction materials and practices including such requirements as structural connections and bracing adequate to withstand hurricane-force winds and the proper tie down of mobile home structures (if they continue as permitted uses). The uniform State Building Code sets the standards for construction materials, techniques, and procedures in order to protect lives and property.

The North Carolina Building Code Council is authorized by N.C.G.S. 143-138 to establish the North Carolina State Building Code. The Building Code Council also is responsible for making changes in the State

Building Code and for reviewing building laws. The Insurance Commissioner, through the Division of Engineering of the Department of Insurance, is responsible for enforcing the State Building Code. Inspection and enforcement responsibilities are relegated to local governments. Local governments may not amend the State Building Code, even by imposing stricter standards, unless such amendments are approved by the Building Code Council.

The local building inspector is the link between code standards and actual construction. The effectiveness of the building code depends on the inspector's interpretation of the code, his experience and technical competence, and the availability of his time and other resources needed to carry out inspections.

A key obstacle to local regulation of construction materials and practices is local government's inability to adopt stricter requirements without the consent of the Building Code Council. The State Building Code, as it now stands, falls short in adequately protecting buildings from the damaging forces of hurricanes and other coastal storms. The Building Code Council, in seeking to maintain uniformity of regulation across the State, has been resistant in the past to allowing more strigent local standards. (Note: recently the Council has sponsored a study of uniform construction standards for coastal hazard areas. The results of this study are

pending on this writing). Another problem small coastal communities are likely to face is a lack of fiscal and staff resources to sponsor the engineering and architectural studies that the Building Code Council requires to justify any local variations of the code.

In view of the above, it appears that the only mitigative actions the County can impose in this area are of an educational nature aimed at voluntary compliance. Thus, it is recommended that the County promote the publication of a technical manual or set of suggested guidelines by NC Sea Grant (or similar agency) to inform builders about the hazards present in the community and the different available ways of designing and constructing buildings to mitigate them. (2) Vegetative cover can dissipate the energy of high winds, helping shield development from destruction. Vegetation plays a key role in the formation and stability of dunes and wetlands. Maintaining vegetative cover is important not only in dunes and wetlands but in other areas of the community. For example, homes built in dense stands of maritime forest can achieve some protection against high winds by maintaining the forest cover around the house instead of tearing it down during construction. Of course, wind and waves that are severe enough will destroy vegetative cover; fallen trees can cause a great deal of damage to buildings. Nonetheless, some types of

vegetation, such as maritime forest, are adapted to withstand high winds and can provide protection.

Thus, it is recommended that the County adopt an amendment to the subdivision ordinance to protect maritime forest vegetation. This amendment should permit the removal of maritime forest only to the extent needed to build the structure. The remaining vegetation should be left untouched. Enforcement and regulation could possibly be tied in with the CAMA minor permit program.

7.3.3 Mitigation Measures for Development in Areas Subject to Flooding (Hazard Area 3)

(1) The County should request NCDOT to consider the raising of the base elevation of NC Highway 210 near the high rise bridge from its present low elevation to a minimum of 8 feet MSL. This action is needed to prevent the flooding of the road during the early stages of a storm evacuation (see Section 6 for details). Additional attention should be centered on relocation of the road away (landward) from the beach. When major repairs are effected on the road, minimum elevations should be raised to at least 8 feet MSL. All new roads should be constructed to at least this elevation.

7.3.4 Mitigation Measures for Development in Areas Subject to Wave Action (Hazard Area 2)

As soon as the FEMA Flood Hazard Maps for West Onslow Beach become available, the stage will be set for the County to enter into the FIA Regular Insurance Program. Part of that program will be to establish flood elevations with a factor for wave effects which will establish base elevations for all insured structures. It is recommended that the County impose this same level on all development in Hazard Zones 1 and 2.

7.3.5 Mitigation Measures for Development in Areas Subject to Wave Action (Hazard Area 2)

Existing policies and regulations imposed by the Coastal Area Management Act (CAMA) require an adequate setback from the oceanfront. The following additional recommendations are offered to mitigate the effects of severe erosion following a storm.

(1) Establishment of New Setbacks: After the storm and prior to reconstruction, the local unit of government must establish the baseline for the CAMA setback. This should be accomplished in conjunction with the OCM field staff. Once the setback baseline has been set, all remaining structures (whether damaged or not above the 50 percent market value threshold level) which intrude into the new setback should be relocated. Engineering judgements for the relocation and/or reconstruction of roads and utilities (water/sewer mains, power lines, etc.) should

be based in part on the effects of the new setback on the layout of the first tier of oceanfront lots. The reestablishment of setback lines brings up the problem of property ownership of those lots thus rendered useless for redevelopment. Possible solutions are discussed hereinafter.

(2) Recommended Procedures for Relocation of Damaged Structures: When a structure is damaged by flooding and the property owner holds a flood insurance policy, the Federal Insurance Administration determines the property owner's claim and pays the cost of repairing or rebuilding the structure up to the policy's limits. Until 1980, the National Flood Insurance Program paid claims with little or no provision for relocating the structure out of the flood hazard area. The insurance claim would pay for repairs only to restore the building to its original condition and location; the property owner had to bear any costs beyond this for elevating or relocating the building. Buildings were typically returned to their original condition, still ripe for damage by the next storm. Around 1980, this pattern began to change as the Federal Insurance Administration began emphasizing hazard mitigation as a high priority and instituted two innovative elements as part of its claim procedures: the constructive total loss approach and the Section 1362 relocation program.

The constructive total loss (CTL) approach covers those cases where a property is not totally destroyed but has lost its economic value. It requires the full cooperation of the property owner and the local government involved. The approach is used where the local government takes such action as prohibiting damaged structures to be rebuilt in areas with a high likelihood of future flooding. This allows the FIA to declare the property a "constructive total loss" and pay the owner's claim up to the policy limits even though the actual damages do not equal the total covered by the policy. The owner can then use the money to rebuild on a site outside the flood hazard area. Ownership of the damaged property is then dedicated to the community for open space use. The Federal Insurance Administration is responsible for deciding to use the approach in any given situation. The "constructive total loss" approach is only used in special situations where damages are particularly severe and the property owner and local government agree to participate. To date, its use has been limited, but the approach has proven successful.

The FIA first used the "constructive total loss" approach in 1979 in Conroe, Texas, to relocate approximately 50 flood-damaged structures. Thirty-five of these had been flooded every year since 1972; their owners had repeatedly recevied federal disaster loans and

insurance payments. To relocate the homes, the FIA made available to each owner payments of up to $35,000. Low-interest loans from the Small Business Administration also helped cover the costs of relocation.

A variation of the "constructive total loss" approach was recently used in Nags Head, North Carolina, to relocate approximately 14 oceanfront homes which faced imminent collapse due to storm-induced erosion. Several oceanfront homes in South Nags Head were damaged by a storm to a point where the next major storm was certain to erode the land beneath them and cause them to collapse. The FIA could have simply paid the claims to repair the buildings to their original condition in their original locations. However, the FIA realized that this would result in another claims payment after the next storm and sought a more far-sighted solution. The FIA, in cooperation with the homeowners and local government, settled the claims to pay for moving the damaged homes back from the rapidly eroding shoreline, yet still on the owner's lots, and out of the area posing the greatest hazard in future storms. The decision saved the FIA about $775,000 in future claims.

Section 1362 of the National Flood Insurance Act empowers the FIA to purchase insured properties that have been seriously damaged by flooding, to move the damaged structures, and to transfer the land as open space to a

state or local government agency. As with the "constructive total loss" approach, the Section 1362 program relies on the full cooperation of the property owner and the local government. In order to qualify for purchase under Section 1362, the damaged property must be covered by a flood insurance policy and must meet one or more of the following criteria:

(a) damaged by flooding "substantially beyond repair";

(b) damaged by flooding no less than three times in the past five years, where the average cost of repairs was no less than 25 percent of the value of the structure; and

(c) damaged to an extent where an existing statute, ordinance, or regulation prevents its restoration or allows its restoration only at a significantly higher cost.

The property owner can use the money from the sale to rebuild at another location outside the flood hazard area. Structures which meet the above criteria must also show an economic benefit to be gained through acquisition of the property (such as avoiding future damage and reducing flood insurance claim payments and disaster relief costs).

The FIA also maintains eight "community selection factors" for allocating Section 1362 funds. A community does not need to meet all the factors. Some of the factors carry more weight than others when the FIA is evaluating the community for participation in the program. A community's ability to rank highly on these criteria is an important factor in obtaining funding, expecially since overall funding for the program has been limited. Congress did not appropriate the money to administer Section 1362 until 1980, when it allocated 5.4 million dollars for Fiscal Year 1980. Subsequent appropriations have been as follows: FY81 - $5 million; FY82 - $1.6 million; and FY83 - $4.8 million (projected). The community seeking Section 1362 funds must also submit a "re-use plan" outlining how the community will manage the acquired land and indicating any changes it expects to make in existing land use plans and ordinances to accomodate the uses it proposes for the acquired properties.

In view of the above, it is recommended that Onslow County adopt the CTL approach towards the relocation of damaged structures in Hazard Zone 1. The County should move rapidly to qualify for the Section 1362 program including the preparations and submittal of a "re-use plan" prepared in accord with FIA guidelines.

For the segments of the island not covered by FIA as a result of the Barrier Islands Act exclusions, it is recommended that consideration be given towards establishing a CTL-type program with the private insurance institutions involved. If at all possible, agreements with private forms to approach reconstruction using the CTL program should be worked out before a hurricane strikes the island.

(3) Other Mitigative Actions:

(a) The County should draft the text of, hold a public meeting on and pass a post-disaster reconstruction moritorium ordinance. This will allow essential public services to be restored first before private reconstruction efforts resume.

(b) The County should establish a post-disaster reconstruction permit program.

(c) The County should conclude a mutual aid agreement with its incorporated municipalities (see Section 8.4).

(d) The County should take a suitable photo (or photos) of all new structures immediately prior to issuance of a certificate of occupancy for the structure. Copies of these photos should be filed with the County tax records for retrieval during post disaster assessment and reconstruction procedures.

(e) The Composite Hazard Maps (Maps 6.6.1 and 6.6.2) should be updated to include more complete FEMA information, when it becomes available, as a part of a the next CAMA land use plan update.

(f) Also, as a part of the next CAMA land use plan update, undeveloped land on West Onslow Beach should be accounted for by hazard area as indicated on Maps 6.6.1 and 6.6.2.

SECTION 8: STORM RECONSTRUCTION PLAN

8.1 Introduction/Purpose

The Storm Reconstruction Plan represents an offical statement of principles and policies for the County to follow in rebuilding after a hurricane. The Reconstruction Plan as hereinafter presented has four (4) purposes:

(1) to expedite community recovery by outlining procedures and requirements for repairs and reconstruction before damages occur;

(2) to establish a procedural framework for putting hazard mitigation measures into effect after disaster strikes the community and buildings and utilities are being repaired and rebuilt;

(3) to gather and analyze information concerning the location and nature of hurricane damages in the community; and

(4) to assess the community's vulnerability to hurricane damages and guide reconstruction to minimize this vulnerability.

The plan outlines damage assessment and reconstruction permitting procedures that should be followed after a disaster occurs. It identifies information that the local government will need to make sound permit decisions regarding repairs and reconstruction and to get state and federal disaster assistance. Some specific topics that the plan addresses include:

(1) identifying cases where repairs and reconstruction will not be permitted, or will be permitted only if they meet certain conditions;

(2) guidelines (drawn from the analysis of hazards and mitigation measures) for the repair and rebuilding of damaged structures and utilities; and

(3) plans for possible public acquisition of high hazard areas and the relocation of highly vulnerable and damaged structures.

By identifying and clarifying all of these policies, procedures, and information requirements, Onslow County officials will have a ready set of guidelines by which they can make wise and expedient decisions regarding reconstruction. The plan will help avoid delays as well as make the community safer from damages in the long run.

8.2 The Federal Role In Emergency Response and Procedures For Obtaining Federal Disaster Assistance

Federal procedures provide the context for local recovery activities following a major hurricane. They include very specific things that Onslow County must do to receive Federal disaster assistance. Also, they provide a basis for other actions that the County can take to implement its own hazard mitigation policy.

The key federal legislation dealing with disasters is the Disaster Relief Act of 1974 (P.L. 93-288), which authorizes a wide range of financial and direct assistance to state and local governments and private individuals. While other legislation has created a number of disaster assistance programs within a variety

of federal agencies, the Disaster Relief Act and the regulations adopted to administer it set the guidelines and procedures by which federal aid is issued and vests the Federal Emergency Management Agency (FEMA) with primary responsibility for coordinating and providing disaster relief. FEMA follows a standard set of procedures governing federal responsibilities, damage assessments, applications for assistance, the granting of assistance, and post-disaster hazard mitigation planning. Each of the steps leading up to and including the receipt of assistance is germain to this report and is discussed below (Note: this information is condensed from Reference No. 1 - see Bibliography).

8.2.1 The Presidential Declaration

FEMA's disaster response procedures are set into motion by a Presidential declaration of "emergency" or "major disaster," as authorized by P.L. 93-288. An "emergency" is any natural disaster which calls for emergency federal assistance to supplement state and local efforts to avert the threat of a disaster or to protect lives, public health, and property. A "major disaster" is one that causes damages to sufficient severity and magnitude to warrant major federal assistance above and beyond emergency services.

FEMA keeps close track of potential disasters, such as the development and path of a hurricane; it maintains close contact with the Governor's office in the NC Division of Emergency Management, as well as other federal agencies responsible for disaster assistance, as the threat increases and disaster strikes.

After an initial reconnaissance, Onslow County officials should immediately report the nature and extent of damages to the NC Division of Emergency Management (DOEM). DOEM then advises the Governor on the seriousness of the situation; the Governor may declare a state of emergency, put the State's disaster relief and assistance plan into operation, and direct State resources to where they are needed. If it becomes apparent that the situation is of a severity or magnitude that exceeds State and local capabilities, the Governor can ask the President, via FEMA, to declare an "emergency" or "major disaster." Only the Governor (or acting Governor) can make this request.

8.2.2 Preliminary Damage Assessment

If the Govenor asks for a Presidential declaration, State disaster officials will:

(1) survey the affected areas, jointly with Onslow County officials and (if possible) FEMA's regional disaster specialists, to determine the extent of damages;

(2) estimate the types and extent of federal assistance needed;

(3) consult with FEMA's Regional Director regarding eligibility requirements; and

(4) advise FEMA's Regional Director of the State's intent to request a Presidential declaration.

The Governor's request for a Presidential declaration will include a certification of reasonable state and local expenditures for disaster relief and an estimate of the federal assistance required

for the State and each affected county. The Governor's request, addressed to the President, is submitted to FEMA's Regional Director, who evaluates the estimates of damage and assistance needs and makes a recommendation to the Director of FEMA. The Director then recommends a course of action to the President, who issues the declaration and sets in motion the machinery for issuing federal disaster assistance to eligible public agencies, individuals, and businesses.

8.2.3 FEMA's Post-Disaster Procedures

Once the President declares an "emergency" or "major disaster," the Governor and FEMA's Regional Director sign a Federal-State Disaster Assistance Agreement which specifies where and how federal disaster assistance will become available. FEMA's Associate Director for Disaster Response and Recovery designates those counties and municipalities that are eligible for federal disaster assistance and appoints another federal official (usually FEMA's Regional Director) as the Federal Coordinating Officer (FCO). The FCO performs a number of functions:

(1) determining the types of assistance most urgently needed;

(2) coordinating all federal disaster relief efforts;

(3) coordinating federal activities with those of state and local agencies and private disaster relief organizations (such as the Red Cross and the Salvation Army);

(4) informing people in the community about the types of assistance available;

(5) setting up and operating disaster field offices; and

(6) taking other actions, consistent with his authority, to help local citizens and public agencies promptly obtain assistance for which they are eligible.

The FCO is usually supported by one or more deputies who are delegated to perform some of these functions.

FEMA sets up a temporary Disaster Field Office (DFO) in the stricken area as a base for federal disaster relief operations. The Disaster Field Office is usually located in conjunction with a similar state office operated by the State Coordinating Officer (from the NC Division of Emergency Managment), who is the primary liason between the FCO and state and local officials. The location and telephone number of the Disaster Field Office is publicized widely to allow applicants to visit or call when problems arise.* The Disaster Field Office is staffed by representatives of FEMA and all other federal agencies with disaster assistance resonsibilities in the area. These field representatives are responsible for providing prompt assistance to disaster victims and advising local and state agencies on eligibility requirements, surveying and reporting damages, and applying for federal assistance. In addition to these agency representatives, the FEMA Regional Director may dispatch Emergency Support Teams to provide specialized counseling, to help operate the Disaster Field Office, and to temporarily supplement local and state emergency response and damage assessment efforts.

---

* For the purposes of this plan, it is recommended that the Disaster Field Office be set up at the Camp Lejeune Marine Corps Base where Federal telephone service lines to the Nation's capital already exist.

The types of federal disaster assistance fall into two general categories: individual assistance (for individuals, families, and businesses) and public assistance (for local and state agencies). FEMA disseminates information about available aid programs via local radio, television, newspapers, and pamphlets. FEMA will establish a Disaster Assistance Center (DAC)* in the area to help individual disaster victims more easily get information and guidance from the various federal agencies. FEMA may dispatch mobile teams to help persons in the area who lack easy access to the Disaster Assistance Center. At the center, disaster victims apply for assistance from the various federal programs available. In addition to operating the Disaster Assistance Center (mainly for providing individual assistance), FEMA and NCDOEM personnel will hold an applicant briefing for local and state officials to inform them of the public assistance available and the procedures and eligibility requirements invovled. Items covered at the briefing will normally include:

(1) filing a Notice of Interest in receiving different types of federal disaster assistance;

(2) preparing Damage Survey Reports (DSRs) to document damages and present repair costs;

(3) filing a Project Application; and

(4) addressing special considerations, such as environmental assessments and opportunities for hazard mitigation.

---

* For the purposes of this plan, it is recommended that the Disaster Center be set up at the Dixon High School gymnasium located at the intersection of US Highway 17 and NC Highway 210.

The Notice of Interest* is basically a checklist on which local and state officials identify the types of damage sustained by public facilities. It provides the basis by which FEMA schedules damaged surveys.

Damaged Survey Reports (DSR)* document the extent of damages to different facilities, identify needed and eligible repairs, and assess in detail the costs of repairing or rebuilding them. The DSRs are prepared by a Damage Assessment Team consisting of federal, state, and local personnel, and are submitted to FEMA and the NC Division of Emergency Management. The DSR is the basis for FEMA's approval of applications for public assistance. The Damage Assessment Team depends on local officials' damage assessments to measure the severity and magnitude of damage; it is therefore very inportant for Onslow County to maintain accurate property records and conduct its own damage survey before the Damage Assessment Team arrives. Photographs, maps, and drawings are often included in the DSR to provide more complete descriptions and documentation.

FEMA classifies damages that are eligible for public assistance into seven categories of "permanent" work and two categories of "emergency" work (see Table 8.1). A separate DSR is is prepared for each category of work and for each damage site; separate DSRs are required for different categories of work at the same site.

---

* Copies of these forms are found in the Disaster Reconstruction Plan which follows.

TABLE 8.1

Categories of Public Assistance Available from FEMA*

"Emergency" Work	"Permanent" Work
Debris removal	Road or Street Systems
Emergency Protection (including communictions and public transportation)	Water Control Facilities Public Buildings and Related Equipment Public Utilities Facilities under Construction Private Non-Profit Facilities "Other"

* Source: Reference No. 1.

A DSR does not constitute an approval of repair work or a commitment of federal funds. It simply provides the most accurate information available on the extend of damages and estimated repair costs, which FEMA uses to approve or deny specific line items requested in the Project Application.

The Project Application* is the formal request for aid that a local government or state agency submits to FEMA's Regional Director through the NC Division of Emergency Management (or the Governor's Authorized Representative). The Project Application summarizes and combines the Damage Survey Reports for various projects for public facilities damaged in the community. The Project Application also provides the formal record of FEMA's and NCDOEM's review and approval of the different projects for which federal funds are committed. The Project Application is signed by the applicant's authorized representative and is accompanied by a form designating this representative. The Project Application is also accompanied by the complete Damage Survey Report for each project listed. The application must be submitted to FEMA's Regional Director within 90 days of the Presidential declaration of a "major disaster." The deadline is compressed to 30 days for an "emergency" declaration. It should be emphasized that, under current FEMA policy, the federal government will only fund up to 75 percent of the eligible cost of repairs to public facilities.

---

* Copies of this form are found in Section 7 of Reference No. 1.

Once a Project Application is approved and FEMA makes different forms of public assistance available to Onslow County or state agency, FEMA maintains standards for project administration. These include project completion deadlines, progress reports, and cost overruns. In a community where an "emergency" has been declared, federal assistance typically ends one month after the initial Presidential declaration. Where a "major disaster" has been declared, federal assistance for "emergency" work typically ends six months after the declaration and federal assistance for "permanent" work ends after 18 months. Recipients of federal disaster aid can receive time extensions for a number of extenuating circumstances. Recipients must submit progress reports if there are any delays that would make a project run past the deadline or if the recipient faces cost overruns. FEMA or other federal and state agencies may conduct periodic inspections of selected projects to make sure that work is progressing in a timely fashion and according to the appropriate standards, policies, and procedures.

As work on a project ends, the recipient notifies the Governor's Authorized Representative, who arranges for federal or state personnel to make a final inspection of the work in each category of funding (i.e. "emergency" or "permanent"). A final Inspection Report documents the completion of work and is essential to the recipient's being reimbursed for the cost of repairs. A project that does not exceed $10,000 usually does not require a final inspection.

Once the Final Inspection Report is completed and approved, the recipient files a Request for Reimbursement, attaching a listing of completed line items and their costs. This same form can be used to request advance payments as well as reimbursements. It is the final formal claim for the reimbursement of costs for all repair and reconstruction projects eligible and approved under FEMA's disaster assistance program.

Throughout the damage assessment/grant application/project administration/reimbursement process, it is esential for Onslow County to maintain detailed records. Records pertaining to damage assessment and repair costs should be well organized and contain accurate documentation. Damage Survey Reports should be accompanied by photographs, sketches, and property information (value, ownership, etc.); unsalvageable damaged equipment should even be retained for inspection by survey teams. Other records should be maintained to document repair costs that are contracted out or borne by the local government itself; this would include time sheets, equipment use schedules, and invoices should local staff and financial resources be expended for any project. These local expenditures may apply to the 25 percent match required of local and state governments under FEMA's public assistance program.

In addition to funding local repair and reconstruction projects, the federal government may deploy its own personnel and equipment to perform emergency work if local and state personnel and equipment are inadequate to do so. To obtain this "direct" federal assistance, the local government or state agency must

submit a request to FEMA's Regional Director, via the Governor's Authorized Representative, within ten days after the Presidential declaration. The request takes the form of a resolution by the local governing body (or body governing a state agency) accompanied by a statement of why the work cannot be conducted with local or state resources. Local government budget constraints are not considered a sufficient cause for receiving direct federal assistance. FEMA's Regional Director will either approve or deny the request or, if the requested work falls under the mission of another federal agency, refer the request to that agency.

At the same time that local governments and state agencies are applying for federal disaster assistance, FEMA's Interagency Regional Hazard Mitigation Team conducts its analysis of damages in the community, identifies opportunities for hazard mitigation, and issues its report recommending certain actions for federal, state, and local agencies. Also, FEMA's joint survey team and joint planning team, operating under Section 406 of the Federal Disaster Relief Act, evaluate hazards in the community, recommend specific mitigation measures, and prepare the Section 406 Hazard Mitigation Plan.

If there is no Presidential declaration, certain types of federal disaster assistance are still made available to the community. The procedures for receiving such aid vary, as these programs are administered by separate federal agencies. FEMA plays less of a coordinating function when there is no Presidential declaration.

Figure 8.1 illustrates the timetable under which FEMA's disaster assistance procedures operate. It includes deadlines for damage surveys, project applications, and project completion.

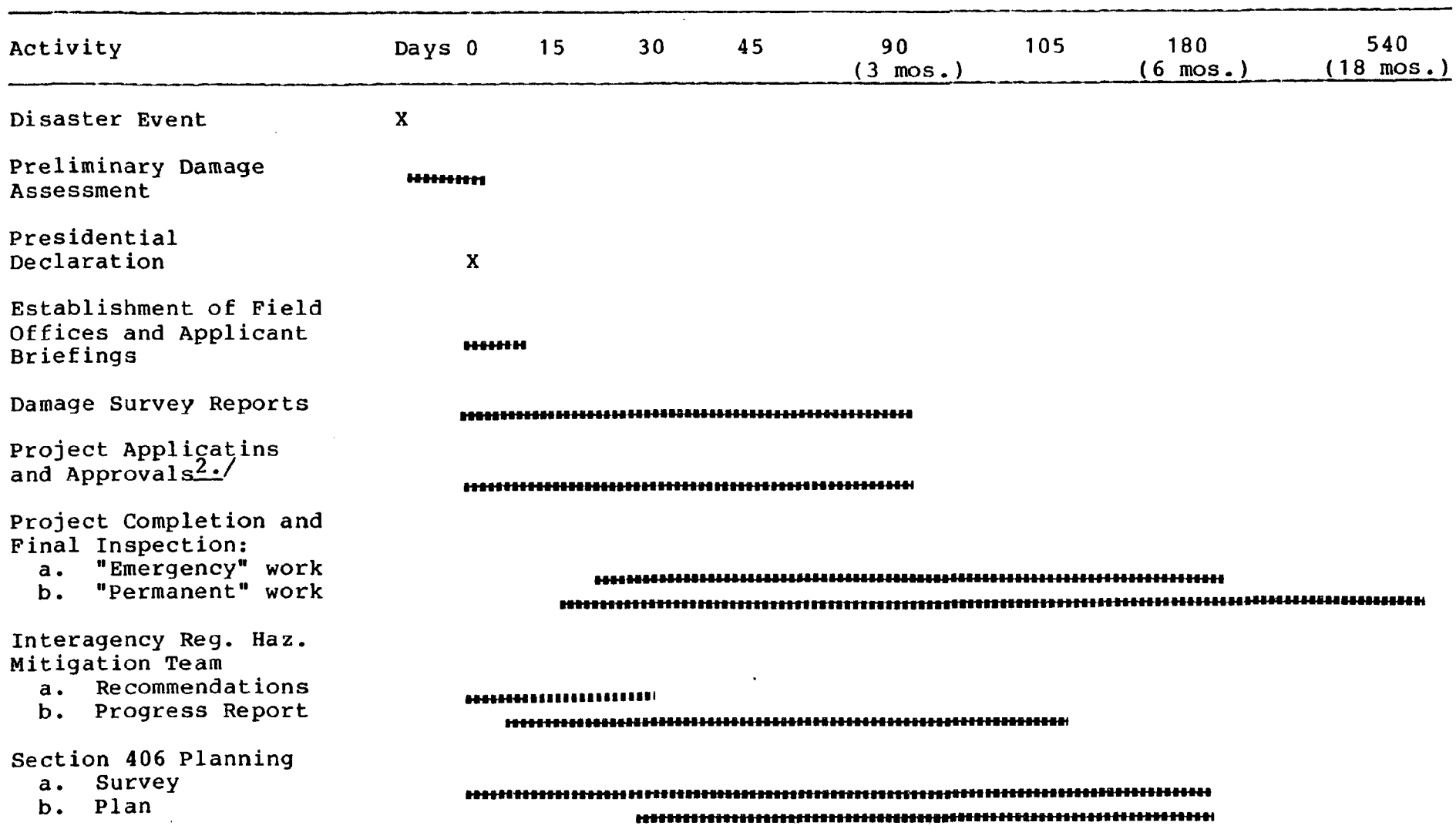
8.3 The State Role in Emergency Response and Procedures For Obtaining State Disaster Assistance

The State role in disaster situations is to allocate the State resources needed to cope with a disaster and avert losses of life and property. As with federal disaster assistance efforts, State actions are considered supplementary to local actions and are taken only if local resources are inadequate to deal with the situation. The State does play an active and important role in coordinating federal, state and local disaster relief efforts. All requests by local governments for federal disaster assistance must go through and be coordinated by the State government to ensure that proper procedures are followed and that assistance reaches the community as quickly as possible.

The lead state agency for disaster preparedness and response is the Division of Emergency Management in the NC Department of Crime Control and Public Safety. To coordinate state and local disaster efforts, the Division of Emergency Management has developed and maintains the North Carolina Disaster Relief and Assistance Plan, under authority of the NC Civil Preparedness Act (NCGS Chapter 166). The Plan outlines procedures for the state and local governments to follow in planning for disasters, responding to disasters and seeking outside assistance.

FIGURE 8.1

Timing of Federal Disaster Assistance Activities[1./]



1./ Source: Reference No. 1.
2./ Thirty-day deadline if only an "emergency" is declared, not a "major disaster."

The stated purpose of the NC Disaster Relief and Assistance Plan (NCDRAP) is "to provide direction and guidance to State and local governments for preemergency preparedness, emergency response, and postemergency recovery action." The plan sets the procedures and principles for state and local agencies to follow in responding to disaster by:

(1) defining the roles and responsibilities of state and local officials;

(2) defining the emergency-related missions of local governments and state agencies;

(3) directing the execution of measures to provide relief and assistance; and

(4) outlining forms of recovery assistance available from state and federal agencies and the local actions required to get it.

The NCDRAP identifies four levels of response to an emergency or disaster, each of which entails different levels and types of state involvement.

Level A -- Local Response - applies to those situations that local resources can handle on their own.

Level B -- Local Response With State Assistance - applies to those situations where the local government has declared a "state of emergency" and some assistance is needed from different state agencies to supplement local efforts.

Level C -- State of Disaster Response - applies to those situations that are so severe that they call for a Gubernatorial declaration of a "state of disaster" and a full commitment of state resources.

Level D -- Response With Federal Assistance Under the Disaster Relief Act - applies to those situations which state resources cannot handle on their own an which call for a Presidential declaration of disaster and for federal disaster relief.

The NC Disaster Relief and Assistance Plan is geared to procedures for Levels B, C and D.

Local governments bear primary responsibility for emergency response within their respective jurisdictions. The four levels of response identified above set up a hierarchy of actions that address disaster situations of different intensities. Assistance from higher levels of government is obtained by requests from the head of the affected local government to the head of the next higher level of government when (1) local resources are fully committed and found to be inadequate to cope with the situation and (2) a particular capability is required and is not locally available.

In the event of a disaster, the Governor has overall responsibility for directing state resources to disaster-stricken communities and in requesting federal disaster assistance. The Governor is assisted in this task by the Secretary of the Department of Crime Control and Public Safety, who oversees the Division of Emergency Management. The State Emergency Management Coordinator (the Director of the Division of Emergency Management) coordinates response operations, maintains response and assistance procedures, and guides and assists local and state agencies. (Either the Director of DOEM or the Assistant Secretary for Public Safety will serve as the State Coordinating Officer and Governor's

Authorized Representative if there is a Presidential declaration). Area Emergency Management Coordinators monitor state and federal field activities in their respective regions, provide a liaison between local governments and the State EMC, help coordinate the State's response, and provide situation information to the State EMC. The heads of other state departments and agencies carry out their own contingency plans and cooperative agreements, provide assistance at the State Emergency Operating Center, receive functional assignments from the Governor and the State EMC, and direct their own resources, as appropriate, to the community. County Emergency Management Coordinators* are the principal operatives at the local government level; it is their responsibility to coordinate all local government activities in their respective counties (including emergency operations, damage assessment and reporting, and requests for state and federal assistance).

The key "command center" for disaster activities is the State Emergency Operating Center (EOC), located at the Division of Emergency Management's Raleigh Office. The State EOC is used by the Governor and other state officials to direct and coordinate emergency response activities. A Disaster Field Office (DFO) may be set up in the region during and after a disaster to facilitate communication between state and local personnel and to expedite

---

* The Onslow County Emergency Management Coordinator is Mr. Don Herman.

the assignment of State resources to different problems. The DFO is staffed by the State Emergency Management Coordinator and other State employees as required for damage surveys, public and individual assistance, and public information. The DFO is usually co-located with the federal Disaster Field Office when there is a Presidential disaster declaration. In addition to the DFO, the State is likely to set up Field Emergency Operating Facilities throughout the damaged region to provide on-the-scene coordination, staff, and equipment. Each county will also have a Local Emergency Operating Center where county and municipal officials direct local response activities and maintain communications with the other state and federal emergency centers.*

Requests for State assistance are made to the Governor by the local governing body (see Figure 8.2 for the standard format); the Governor then directs the Division of Emergency Management and other state agencies to provide various types of assistance. Personnel from different state agencies may be called to help in the disaster relief effort by providing specific skills or expertise pertaining to their different departments. Special teams, made up of personnel from several departments, may be called on to address particular problems. State personnel may be called on to help with damage assessment, counseling applicants for state and federal aid, debris removal, and other disaster response and recovery tasks.

---

* For Onslow County that center is located at the Agricultural Building, Jacksonville, NC.

FIGURE 8.2

Format for Requesting State Disaster Assistance[1./]

REQUEST

Jurisdication - Onslow County Date _____

A. Purpose (Statement of need - why the assistance is requested).

B. Type of Assistance (Form of assistance - what assistance is requested).

C. Amount (In terms of personnel, material, equipment, facilities and duration - how much assistance).

D. Statement that necessary written clearances, releases, indemnifications have been or will be obtained.

E. Request is made on the authority of the Chairman of the Board of County Commissioners, acting for the governing body of the jurisdiction.

1./ Source: Adapted from Reference 1.

To the maximum extent feasible, state agencies receive assignments that are closely related to their regular missions. For example, the NC Department of Transportation typically plays the primary role in debris removal, expecially on public roads. The Division of Health Services (Department of Human Resources) will test water supplies and help assess damages to public water systems. Several departments will provide engineering services to help with surveying damages, identifying the feasibility of repairs and safety considerations, and recommending ways to restore essential public services. The Governor can call on the North Carolina National Guard, which can provide communications and transportation, search and rescue, food and water, sanitary and medical services, shelter, property protection, electricity generation, damage assessment, debris clearance, and repair of roads and bridges. The State Emergency Management Coordinator can call on the Civil Air Patrol and/or the Marine Corps, which can provide aerial surveillance of surface routes and traffic as well as aerial photography and reconnaissance to aid in damage assessment.

The NC Disaster Relief and Assistance Plan outlines local responsibilities for the three phases of disaster activity: the warning phase, the emergency operations phase, and the post-emergency phase (see Table 8.2). The Plan authorizes local governments to:

(1) assign employees and equipment for emergency operations;

(2) establish local emergency operating centers;

TABLE 8.2

Local Actions During Three Phases of Disaster[1./]

WARNING PHASE - Increased Readiness

1. Establish situation monitoring in local EOC and staff as appropriate. Conduct communications checks.

2. Alert and brief key officials and department personnel.

3. Disseminate appropriate warnings to the public and verify warning effectiveness.

4. Advise utilities, businesses, and industry.

5. Maintain liaison with local Red Cross and other local relief agencies.

6. If evacuation is indicated, insure route marking and shelter designation. Deploy shelter management teams in conjunction with the Red Cross and open shelters for voluntary use when situation indicates.

7. Meet with local news media to review public information policy.

8. Keep the public informed and provide necessary instructions.

9. Keep the State EOC informed and advise adjacent jurisdictions of the situation.

10. Maintain liaison with the Area EMC.

11. Be prepared to proclaim a local "state of emergency" when warranted.

EMERGENCY OPERATIONS PHASE

1. Take necessary measures to protect life and property as conditions permit.

2. Report situation to State EOC and maintain liason with AREA EMC.

3. Maintain contact with adjoining jurisdictions and provide information on own situation to the extent practicable.

1./ Source: Reference No. 1.

Table 8.2, Continued

EMERGENCY OPERATIONS PHASE, Continued

4. Based on own capability and severity of the situation, activate mutual aid agreements.

5. If situation is beyond local capabilities, request assistance from next higher level of government.

6. Keep situation reports and damage assessments current and establish priorities for repair and restoration of essential services.

7. Keep public informed and provide instructions.

8. Proclaim a local "state of emergency" if warranted.

POST-EMERGENCY PHASE - Immediate Recovery and Rehabilitation

1. Continue emergency operations as necessary.

2. Evaluate situation from reports received and initiate damage assessment. Use photography to the extent feasible.

3. Determine requirements for outside assistance and request such assistance when beyond local capabilities.

4. Keep the State EOC and Area EMC informed using Situation and Damage Reports.

5. Keep the public informed and provide instructions.

6. Assemble and maintain records of actions taken and expenditures and obligations incurred.

7. Proclaim a local "state of emergency" if warranted.

8. Commence cleanup, debris removal and utility restoration. Coordinate and facilitate restoration by private utility companies.

9. Undertake repair and restoration of essential public facilities and services in accordance with priorities developed through the situation evaluations.

(3) establish mutual aid agreements with other local governments and mutual understandings with public and private agencies; and

(4) declare a "local state of emergency" which (a) activates any local emergency plans and agreements, and (b) implements provisions of local emergency ordinances.

The State prototype plan encourages local governments to prepare local disaster plans. Throughout all phases of disaster activity, the local government must appoint one or more persons to act as chief coordinators of local activities and liaisons with state and federal personnel. The local government must also provide space for federal disaster assistance centers. It must also maintain procedures for accurate reporting, recordkeeping, and accounting to identify and document funds it expended which may be reimbursed by the state and federal governments or which may fullfill any match requirements for federal disaster assistance.

In requesting and receiving state assistance, the local government must file a series of three reports: the Situation Report, the Damage Assessment Report, and the Expenditure/ Obligation Report.

County and municipal governments submit initial Situation Reports through the County EOC to the State EOC immediately upon the threat or occurence of a disaster. Follow-up reports may be submitted or requested as the situation develops. The Situation Report contains any information and preliminary assessments which

local officials deem are appropriate to let the State know the severity and magnitude of the situation and what types of assistance the community might need.

The Damage Assessment Report is submitted by the County government no later than 48 hours after the disaster event. While the County government and any municipal governments in the County individually assess damages in their respective jurisdictions, the County government is responsible for consolidating all data for the entire County into one Damage Assessment Report. If a local government wants state assistance, the County transmits the report to the State EOC and the Area Emergency Management Coordinator. The Damage Assessment Report groups damages by property ownership and use according to the following:

(1) public property - state, local, and private non-profit; and

(2) private property - agricultural, residential, and business/industrial.

The report presents damages for each category in:

(1) total number of properties;

(2) degree of damage (destroyed, major, minor); and

(3) total dollar losses (as best estimates).

The State EOC uses the Damage Assessment Report to determine what types of assistance to provide to the community.

The Expenditure/Obligation Report is submitted by the County government to the State EOC at the State's request. The report presents data for the entire County (municipalities included). It

presents the extent of local response in financial terms, including that "local commitment" for which no reimbursement will be requested and which can be used to meet any state or federal match requirements. The NC Disaster Relief and Assistance Plan stresses that local governments must keep "records of actions taken and expenditures and obligations of funds, from the outset despite the stress and urgency of an emergency situation." Local records will be subject to state and federal audits if the local government receives outside disaster assistance. Once the Expenditure/Obligation Report is approved by the State, the local government can be reimbursed or credited for its expenditures.

8.4 The Local Role In Emergency Response

In the light of the information presented in Sections 8.2 and 8.3 above, it is apparent that state and federal policies call for Onslow County to bear the ultimate responsibility for emergency operations, assessing and reporting damages, requesting outside assistance, and managing reconstruction. While state and federal agencies set the procedures for granting assistance to a disaster-stricken community, such assistance will not be available unless Onslow County acts properly and quickly according to state and federal guidelines. In response to a disaster situation, Onslow County should expect to commit all of its resources to different response and recovery activities.

To help local governments cope with this task, the NC Disaster Relief and Assistance Plan calls for local governments in the State to prepare their own disaster relief and assistance plans.

These plans are to outline the responsibilities of local officials during disaster response and recovery and to outline procedures for various emergency activities, damage assessment, disaster assistance centers, and public information. To aid local governments in developing such plans, in 1981 the NC Division of Emergency Management prepared a Carolina County Prototype Disaster Relief and Assistance Plan (Reference No. 3). The prototype applies to all disasters (from tornados to nuclear reactor accidents) and must be tailored by the local government to fit its individual geography, governmental organization, and specific hazards.

Onslow County has prepared its own Disaster Relief and Assistance Plan based on the format of the State prototype. The Onslow County Disaster Relief and Assistance Plan (DRAP) includes the text of an existing ordinance for setting up the basic civil preparedness functions within the County government. It contains an executed agreement between the County and the American National Red Cross. It is important that the Plan also contain a mutual aid agreement between the County and its incorporated municipalities.

The Onslow County DRA Plan also outlines a set of procedures for communication and warning systems. These systems are modified and enhanced by the updated Onslow County Hurricane Response Plan (January, 1984) which compliments this Storm Reconstruction Plan. In addition, the DRA Plan identifies emergency shelters and procedures for transporting, registering, feeding, and bunking

persons using them. It designates the Disaster Assistance Center, outlines DAC procedures, and identifies the responsibilities of federal, state and local personnel as well as personnel from private relief organizations. Finally, it sets up a plan for temporary housing units including hotel/motel spaces, private rental properties, government-provided trailers, sites appropriate for temporary mobile homes, and the responsibilities of federal, state and local personnel relative to temporary housing of disaster victims.* In view of the fact that the Onslow County Disaster Relief and Assistance Plan covers the above items in detail, it will not be repeated herein. Therefore, it should be used as a guide towards:

(1) the assignment of local staff responsibilities during the emergency preparation and response stages;

(2) identifying communications and warning systems;

(3) setting up emergency shelters and moving people to them.

8.5 Damage Assessment and Reconstruction Plan

8.5.1 Introduction

This section presents standard procedures for the assessment of damages resulting from a hurricane. It also forms a basis for procedures and decisions relative to local reconstruction. The Damage Assessment and Reconstruction Plan assists County officials to:

---

* Note: Implementation of this portion of the Plan calls for close coordination and cooperation with the National American Red Cross.

(1) Assign responsibilities and to provide instructions for on-the-scene damage surveys consistent with the aforementioned state and federal requirements for reporting damages in order to receive state and federal assistance.

(2) Establish the responsibilities of the County's Emergency Management Coordinator, Damage Assessment Officer, Damage Assessment Teams and the Recovery Task Force.

(3) Designate Damage Assessment Teams and the Recovery Task Force before the inevitable hurricane strikes so people know their responsibilities and are prepared to act. The designation of the Damage Assessment Teams and the Recovery Task Force before the fact will insure that the required responses and actions will be positive, expeditious and organized and hopefully devoid of "brinkmanship," delays and confusion.

(4) Select the appropriate types of persons which could be used for Damage Assessment Teams and the Recovery Task Force.

(5) Set the procedures to follow (including their sequence and timing) in assessing damages and permitting repairs and reconstruction.

(6) Set standards for development that repairs and reconstruction must follow to reduce the risk of future damages. These standards are based in part on the recommendations found in the Hazard Mitigation Plan (see Section 7).

(7) Assist in the identification of particularly hazardous areas which are likely to need special treatment (such as the relocation of buildings, roads and utility lines) after a hurricane strikes, as well as, the types of action that could be taken.

It should be noted that the reconstruction plan cannot cover all contingencies and make all decisions beforehand since nobody can accurately predict the exact type, amount, and location of damages Onslow County will suffer during a specific hurricane event. Therefore, the plan simply embodies a policy framework and a procedural framework for the specific decisions that can only be made during reconstruction, such as those dealing with the relocation of roads and utilities. To facilitate these decisions, the reconstruction plan spells out (1) who is to make these decisions, and (2) what criteria they shall use to make the decisions. Even though the decisions themselves cannot be made until after disaster strikes, the reconstruction plan lays the foundation of policies, priorities, and procedures on which these decisions are based.

Included with the Damage Assessment and Reconstruction Plan which follows is a sample worksheet which the damage assessment teams can use to assess the damages. Based on prior discussions with the County's Emergency Management Coordinator and the Director of Planning, it was decided to use the "percentage of damage method" to assess the damages. This method will allow the damage assessment teams to concentrate on a field determination of

the percent damage to the structure and property. Estimates of dollar values associated with the damages will be applied by the Damage Assessment Officer (DAO). In this case, it was decided to use the County Tax Supervisor as the designated DAO. The Tax Supervisor will use existing tax records to assign the damage values. To expedite the work, he will also employ assistants to enable him to complete the necessary paperwork within the previously mentioned time constraints imposed by the state and federal requirements. The Damage Assessment Plan outlines procedures for filing Damage Assessment Reports with the State. The procedures break damages into four categories:

(1) destroyed (repairs costing more than 80 percent of value);

(2) major (repairs more than 30 percent of value);

(3) minor (repairs less than 30 percent which render the structure uninhabitable); and

(4) habitable (repairs less than 15 percent of value).

The Damage Assessment and Reconstruction Plan modifies the above classification scheme with the local hazard mitigation and reconstruction policies developed in Section 7 above. For example, in Section 7 it is recommended that the existing zoning ordinance be amended to require all non-conforming structures to meet current standards after being damaged beyond 50 percent. Also, it is recommended that all slab-on-grade structures be rebuilt as elevated structures when the damage amounts to more than 15 percent and that all mobile homes be replaced by

conforming elevated structures if damaged beyond the 50 percent level. The Plan requires a special Reconstruction Building Permit for all such reconstruction work.

To assist in visualizing the overall extent of the damages following a hurricane, the information gathered by the damage assessment teams should be translated onto property tax maps to readily identify those areas where repairs and reconstruction must meet certain requirements. When the damage assessment is completed, the Damage Assessment Team fills out a form identifying the level of damages sustained, or damage classification, of each property and any special requirmeents for repairs and reconstruction; the form is then mailed or otherwise delivered to the property owner. The form includes any other information the property owner should know regarding recovery procedures (such as a moritorium on construction, permit requirements, filing deadlines, and public meeting dates, etc.).

8.5.2 The Damage Assessment and Reconstruction Plan

The text of the Damage Assessment Plan follows this page. It is designed to stand alone as a singular working document in the case of a hurricane disaster.

ONSLOW COUNTY

HURRICANE DAMAGE ASSESSMENT AND RECONSTRUCTION PLAN

MARCH, 1984

Prepared at the Direction of

Onslow County Office of Emergency Management

and

Onslow County Board of Commissioners

The preparation of this document was financed in part through a grant from the North Carolina Office of Coastal Management through funds provided by the Coastal Zone Management Act of 1972, as amended, which is administered by the Office of Ocean and Coastal Resources Management, National Oceanic and Atmospheric Administration.

HENRY VON OESEN AND ASSOCIATES, INC.
Consulting Engineers & Planners
611 Princess Street ** P. O. Drawer 2087
Wilmington, North Carolina 28402

ONSLOW COUNTY HURRICANE DAMAGE ASSESSMENT AND RECONSTRUCTION PLAN

TABLE OF CONTENTS

		PAGE
RECORD OF CHANGES		ii
1.	PURPOSE	1
2I.	AUTHORITIES	1
3II.	ORGANIZATION	2
4V.	CONCEPT OF OPERATION	2
5.	RESPONSIBILITIES	3
6I.	INSTRUCTIONS FOR DAMAGE ASSESSMENT	7
7II.	INSTRUCTIONS FOR RECONSTRUCTION TASK FORCE ACTIVITIES	10
8III.	APPROVAL	11

Attachment 1 - Organizational Chart, Damage Assessment Teams

Attachment 2 - Personnel Rosters and Vehicle Assignments, Damage Assessment Teams

Attachment 3 - Personnel Roster, Reconstruction Task Force

Attachment 4 - Sample Damage Assessment Worksheet and Instructions

Attachment 5 - Damage Assessment Report

ONSLOW COUNTY

HURRICANE DAMAGE ASSESSMENT AND RECONSTRUCTION PLAN

RECORD OF CHANGES

CHANGE NUMBER	DATE OF CHANGE	DATE ENTERED	CHANGE MADE BY (SIGNATURE)

ONSLOW COUNTY

HURRICANE DAMAGE ASSESSMENT AND RECONSTRUCTION PLAN

I. PURPOSE

This plan sets forth the authority, organization, concept, assigns responsibilities and provides instructions for the conduct of damage assessment and reconstruction operations by means of on-the-scene surveys following a hurricane disaster in Onslow County. For definition of damage assessment, see Paragraph VI.A. The information obtained during the survey is essential in assessing the extent of damage within the County and is required when requesting State and Federal assistance. This plan will be used for assessing damage caused by a hurricane. However, it also may be used to access damages caused by other types of disasters such as a flash flood, tornado, winter storm (northeaster), etc.

II. AUTHORITIES

A. Public Law 93-288

B. NC General Statutes Chapter 166A

C. Civil Preparedness Ordinances and Agreements

(1) Jacksonville-Onslow County Civil Preparedness Resolution

(2) Jacksonville-Onslow County Disaster Operations Plan

(3) Jacksonville-Onslow County-American National Red Cross Agreement

(4) County of Onslow State of Emergency Ordinance, as amended.

III. ORGANIZATION

A. Damage Assessment Operations. The organization for damage assessment operations will be as shown in Appendix 1 - Organization Chart to this Plan. Personnel Rosters and Vehicle Assigments are shown in Appendix 2.

B. Reconstruction Task Force. The organization of the Reconstruction Task Force will be as shown in Appendix 3.

IV. CONCEPT OF OPERATION

A. Pre-Disaster. County Emergency Operating Center (EOC) personnel and Damage Assessment Section (DAS) will maintain equipment and supplies (maps, forms, city directories, photo records of structures, tax value information, etc.) in readiness condition. The Damage Assessment Section (DAS) will be provided damage assessment training, at least anually. The Reconstruction Task Force (RTF) will meet to discuss procedure coordination at least anually.

B. During the Disaster. DAS and RTF personnel will remain in shelters, listen to the radio, and prepare to respond to a telephone call, commercial radio and television or other message to report for duty.

C. Post-Disaster. As soon as safety conditions permit, DAS and RTF personnel when notified will report to the County EOC, receive assignments and pick up equipment and supplies, move to emergency or disaster area in vehicles equipped with two-way radios, survey assigned areas,

record damage, transmit general damage assessment information via radio or other means to EOC, return to EOC when directed, and provide specific written report to EOC. Damage assessment will continue until all suspect areas are covered even though Federal or State assistance has arrived. The Reconstruction Task Force will meet to recommend the declaration of a moritorium on repairs and new development (if necessary) in accord with the County of Onslow State of Emergency Ordinance, as amended. Also, the RTF will oversee the reconstruction process and advise the County Commissioners on any policy questions which may arise. The RTF will work closely with the State and Federal representatives on the Interagency Regional Hazard Mitigation team and the Section 406 Hazard Mitigation Survey and Planning teams.

V. RESPONSIBILITIES

A. Emergency Management Coordinator (EMC)

(1) Ensure that equipment and supplies (damage assessment planning maps, photo records of all existing structures, property evaluation and insurance data, damage assessment forms, city directories, etc.) are readily available in the EOC. Schedule damage assessment training for the DASA and provide for the instruction at least anually and no later than March of each year. Update this plan annually.

(2) Notify the County Damage Assessment Officer that an emergency or disaster is imminent or has occured and arrange to assist him in notifying the Survey Teams and Recovery Task Force members via telephone, commercial radio and TV or other means. Provide situation briefing in EOC and in coordination with the Damage Assessment Officer dispatch teams as needed to affected areas. Remain in the EOC and receive damage reports from the Damage Assessment Officer, analyze same and advise heads of local governments of situation. Provide consolidated damage assessment data to the State Emergency Management at the State EOC in Raleigh; or to the State Emergency Response Team (SERT) at its Field Command Post if it is operational.

(3) Retain reports for use in future to support disaster impact data (see Paragraph VI A (9) below).

B. Damage Assessment Officer (DAO)

(1) Assist the County EMC in maintaining DAS readiness to include this plan, equipment and supplies, and training. Update damage assessment planning maps, photo records of all existing structures and property evaluation and insurance data to include information available in the Onslow County Tax Office and from local insurance firms. Update personnel rosters and vehicle assignments.

(2) Upon notification of an emergency or disaster, report to the EOC and notify Survey Teams. In coordination with the EMC, dispatch appropriate teams to the affected area. Remain in the EOC and receive damage data from the teams, review for accuracy, record and plot information, access values to damages, and advise EMC of the situation. Contact local American Red Cross Chapter for damage assessment data. Prepare consolidated damage assessment data in prescribed format for transmittal by the EMC to State Division of Emergency Management. (See Appendix 5 of the Plan).

C. Damage Assessment Teams (DATs)

(1) Assist DOA and EMC in maintaining readiness by checking equipment and supplies, attending training sessions and reporting any changes to personnel rosters.

(2) Upon official notification, report to the EOC as soon as safety conditions permit, receive assignments, pick up equipment and supplies, move in vehicles equipped with two-way radios to the emergency or disaster area assigned, survey area, record damage, transmit general damage assessment information via radio to EOC, return to EOC when directed and provide specific written reports to Damage Assessment Officer.

D. Reconstruction Task Force (RTF)

(1) Review the nature of damages, identify and evaluate alternate approaches for repairs and reconstruction, and formulate recommendations for handling community recovery.

(2) Recommend to the County Commissioners the declaration of a moratorium on repairs and new development.

(3) Set a calendar of milestones for reconstruction tasks.

(4) Initiate orders for repairs to critical utilities and facilities.

(5) Recommend the lifting of a moratorium for "minor" repairs.

(6) Recommend the lifting of a moratorium for "major" repairs to conforming structures.

(7) Evaluate hazards and the effectiveness of mitigation policies and recommend the amendment of policies, if necessary.

(8) Initiate negotiations for relocations and acquisitions of property.

(9) Recommend the lifting of moratorium on "major" repairs (with approved changes to conform).

(10) Participate in federal hazard mitigation planning.

(11) Recommend the lifting of moratorium on new development.

VI. INSTRUCTIONS FOR DAMAGE ASSESSMENT

A. Definition. Damage assessment is a rapid means of determining a realistic estimate of the amount of damage caused by a hurricane (or other emergency or disaster). For the purpose of this plan, it is expressed in terms of numbers of structures, type of damage (destroyed, major damage, minor damage, habitable or uninhabitable), estimated total dollar loss, estimated total dollar loss covered by insurance, and information describing the impact of the disaster. Disaster impact information may include but is not limited to the following:

(1) Number homes inacessible (due to loss or roads, bridges, presence of overwash fans, or for other reasons).

(2) Number of people displaced and in need of housing.

(3) Number of substandard homes damaged or destroyed.

(4) Unemployment estimates, businesses affected and estimated length of problem.

(5) Needs for food, clothing, and medicine.

(6) Needs of elderly.

(7) Minority problems.

(8) Economic conditions of community - normal or depressed.

(9) History of past disasters.

(10) Debris problems.

(11) Emergency protective measures taken by government.

(12) Resources available to meet the needs of people.

(13) Resources needed and unavailable in terms of type, quantity and duration.

B. Reports

(1) To State. Damage Assessment Reports will be submitted by the County government for the entire County and will consolidate municipal and County data. Reports will be submitted to the State Director, NC Division of Emergency Management and a copy provided to the Area Coordinator as soon as possible, generally within 24 hours, but no later than 48 hours following the occurence. The reports will be in the format prescribed in the Onslow County Disaster Relief and Assistance Plan, and as shown in Appendix 5 of this Plan.

(2) To County. Survey team reports will be completed by Team Captains in accordance with the procedure shown below, reported as rapidly as practicable using best available means of communication, and confirmed with a completed form when the team returns to the EOC.

C. Team Procedure. Form EM-39 (Percentage of Value Method) will be used by the teams (or team members) who will estimate the extent of damage sustained expressed as a percentage of the total value of the structure (See Appendix 4). Determination of estimated dollar loss will be calculated by the Damage Assessment Officer using best available property value listings and other information.

(1) Survey area assigned perferably by on-site visit. (Note: If not possible, obtain data by other means, e.q., telephone or other personal contacts).

(2) Complete the Damage Assessment Worksheet (Form EM-39 - Percentage of Value Method), a copy of which is shown in Appendix 4, in accordance with the Damage Assessment Worksheet Instructions.

(3) Transmit general damage assessment information via radio or other means to the EOC. Provide followup written reports of general damage to the Damage Assessment Officer.

D. Section Procedure. Damage Assessment Officer will:

(1) Review all team worksheets for accuracy.

(2) Consolidate all team worksheets.

(3) Using the Damage Assessment Planning Map, photo files, and Property Evaluation and Insurance Data on file, complete that portion of the worksheets entitled "For Use By Damage Assessment Officer" in accordance with instruction contained in the reverse of each worksheet.

(4) Using the above data, complete Section A of the County Damage Assessment Report in accordance with instructions contained in Appendix 5.

(5) Obtain "Private Property - Agricultural" data from the County USDA Emergency Board and enter in Part B of the report.

(6) Complete Section C - Economic Impact and Section D - Public Property in accordance with Appendix 5.

(7) Pass report to EMC and retain one copy for files.

VII. INSTRUCTIONS FOR RECONSTRUCTION TASK FORCE ACTIVITIES

A. Task Force Procedures

(1) Based on preliminary damage assessment reports, recommend the declaration of a moratorium on repairs and all new development by County Commission.

(2) Prepare a calendar of milestones for reconstruction and set priorities for repairs to roads, water and sewer systems, telephone and electrical power line/ facilities, waterways, beach dunes, public structures, etc.

(3) Initiate orders for repair of infrastructure based on establishment priorities.

(4) Initiate special reconstruction permitting procedures using the resources of the existing County Building Inspector's office.

(5) Meet on site to (a) establish the new CAMA setback line for all beachfront construction, (b) establish the locations of roads, utilities, etc., (c) mediate decisions regarding relocation of structures away from hazard areas, and (d) negotiate the acquisition of land for public use.

(6) Recommend specific further mitigation of hazards based on presently unknown conditions extant following the storm.

(7) Recommend the gradual lifting of moratoria as reconstruction progresses.

(8) Conduct a post reconstruction meeting to review the disaster experience and to modify the role of the Task Force as needed.

(9) Revise the Hurricane Damage Assessment and Reconstruction Plan as required to meet future needs.

(10) Prepare a final disaster recovery report following the reconstruction period.

VIII. APPROVAL

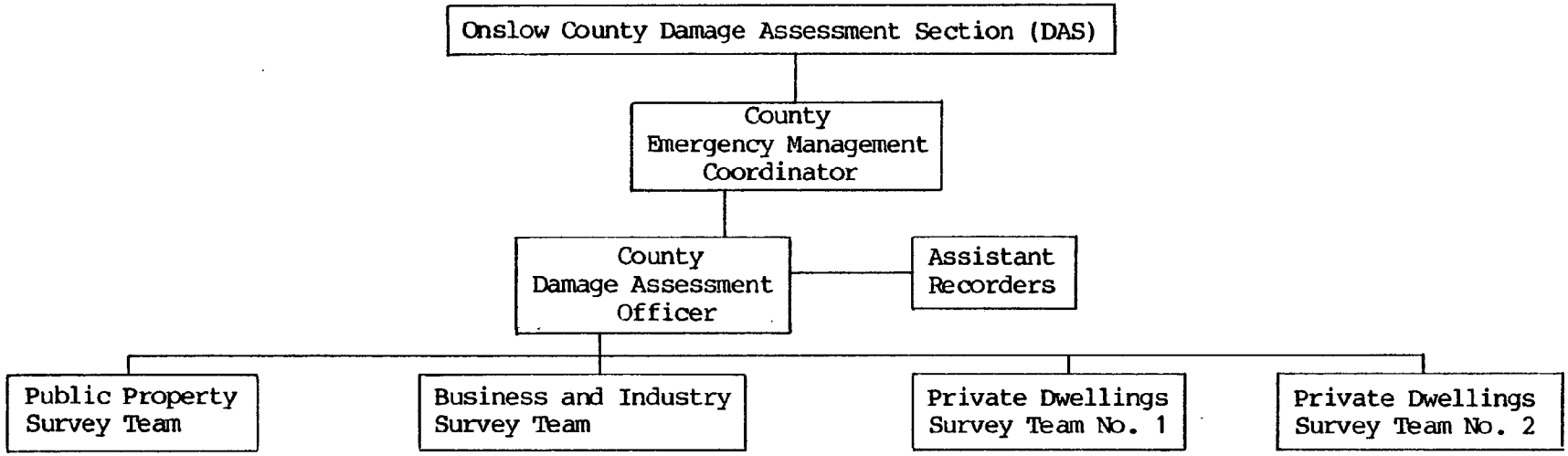
Emergency Management Coordinator	Damage Assessment Officer

APPENDICIES

1. Organizational Chart, Damage Assessment Teams
2. Personnel Rosters and Vehicle Assignments, Damage Assessment Teams
3. Personnel Roster, Reconstruction Task Force
4. Sample Damage Assessment Worksheet and Instructions
5. Damage Assessment Report

APPENDIX 1

ORGANIZATION CHART



Public Property Survey Team	Business and Industry Survey Team	Private Dwellings Survey Team No. 1	Private Dwellings Survey Team No. 2
- Volunteer Firemen	- Tax Collector (C)	- FmHA Representative	- Building Inspector (C)
- Public Works Engineer	- Building Inspector	- Vol. Firemen (D)	
- Building Inspector	- Realtor	- Realtor	- Realtor (D)
- Architect/Civil Engineer	- Arcitect/Civil Engineer	- Architect/Civil Engineer	- Architect/Civil Engineer

C = Team Captain
D = Driver

NOTE: The orginzation shown above is designed to show the various sources of personnel which may be available for survey teams. Onslow County should specify the composition of the teams.

APPENDIX 2

PERSONNEL ROSTER AND VEHICLE ASSIGNMENTS

SURVEY TEAM	AGENCY	NAME	TELEPHONE		VEHICLE	RADIO	BASE STA.
			OFFICE	HOME			
Public Property							
Business and Industry							
Private Dwellings No. 1							
Private Dwellings No. 2							

ASSESSMENT SECTION	AGENCY	NAME	TELEPHONE		
			OFFICE	HOME	
Damage Assessment Officer					
Assistant Assessment Officer					
Assistant Assessment Officer					

APPENDIX 3

PERSONNEL ROSTER OF RECONSTRUCTION TASK FORCE

Title	Name	Telephone Office - Home
A. County Personnel		
1. Chairman, Onslow County Board of Commissioners (Team Leader)		
2. Onslow County Emergency Management Coordinator		
3. Damage Assessment Officer (County Tax Supervisor)		
4. County Sanitarian		
5. County Sheriff		
6. County Building Inspector		
B. Private Sector Personnel		
1. Realtor		
2. Civil Engineer		
3. Architect		
4. Banker		
C. Designated Representatives From Following Public Agencies or Private Corporations		
1. Onslow/Jones County Electrical Membership Corporation		
2. Carolina Telephone Company		
3. NC Department of Transportation		
4. NC Division of Environmental Management		
5. NC Office of Coastal Management		
6. US Army Corps of Engineers		
7. Farmers Home Administration		

APPENDIX 4

SAMPLE DAMAGE ASSESSMENT WORKSHEET

Property Address	Name of Owner	Check (√) Type of Building				Check (√) Extent of Damage				For Use By Damage Assessment Officer		
						Unusable/Uninhabitable			Usable/ Habitable			
		Residence[1]	Mobile Home	Business	Other[2]	Destroyed or Essentially Destroyed, Small Percentage of Structure Remains Intact, or Flood Water Line 8 Feet Above Floor. (x 1.00)	Extensive Exterior and Interior Damage, Portions of Roof or Walls Destroyed, or Flood Water Line 6 Feet Above Floor. (x 0.70)	Damage to Exterior and Interior of Such Magnitude to Render Building Unusable, or Flood Water Line 3 Feet Above Floor. (x 0.30)	Mostly Exterior Surface Damage, Broken Window Glass, etc. Building is Usable. Flood Water Line Above Floor. (x 0.10).	Value of Building (Exclusive of Land, Contents)	Estimated Dollar Loss	% Insurance Coverage
1.												
2.												
3.												
4.												
5.												
6.												
7.												
8.												
9.												
10.												
11.												
12.												
13.												
14.												
15.												
16.												
17.												
18.												
19.												
20.												

Notes:
1. Check if single family, enter number of families if multi-family, duplex, or apartments.
2. Check and describe on reverse side of form.
3. Use reverse for notes, sketch maps, etc.

Damage Assessment Worksheet
(Percentage of Value Method)

Incident	Area/Zone	Date of Insp.
Assessor		Sht. No. / Of

form EM-39 9-81

DAMAGE ASSESSMENT WORKSHEET INSTRUCTIONS
(Percentage of Value Method)

This form is used by local/county government damage assessment teams following a disaster to assess losses to private property. Assessment is based upon on-site inspections and classification of damages according to "Extent of Damage" columns on the form. Estimated dollar losses are calculated by the Damage Assessment Officer.

INSTRUCTIONS:

Damage Assessment Team -

a. Complete bottom of form indicating type of incident (flood, tornado, ice storm, etc.), area or zone of assignment covered by this worksheet, date of inspections, name of assessor, and sheet number (serially by assessor, area/zone, or incident, depending upon local preference).

b. List damage property assessed by indicating address, name of owner (or business name, building name, etc.), and type of building. In case of multi-family housing, use figure to indicate number of families. For property not covered by types listed, check "Other" and describe under "Remarks" below.

c. Indicate usability and extent of damage by checking the most appropriate column.

d. Upon completion of the inspections, submit worksheets to the Damage Assessment Officer.

Damage Assessment Officer -

a. Review worksheets for completeness and legibility while assessor is present. Have any incomplete information added and any illegible entries clarified before releasing assessor.

b. Enter property values from available listings, being sure to exclude value of land and building contents.

c. Determine estimated dollar loss by multiplying value of building by percentage multiplier indicated in Damage column checked.

d. Using best available information, enter % of property value covered by insurance.

e. Consolidate damage figures and transmit to the State Emergency Operating Center (EOC) using Damage Assessment Report format used by the local Emergency Management Coordinator.

R E M A R K S:

APPENDIX 5

DAMAGE ASSESSMENT REPORT

DAMAGE ASSESSMENT REPORT 9/30/81

COUNTY: _____ NUMBER: _____ DATE: _____

Section A. Private Property - Non-Agricultural

TYPE OF PROPERTY	UNINHABITABLE			USABLE/ HABITABLE	TOTAL DOLLAR LOSS	AVERAGE % INSURANCE COVERAGE
	NUMBER DESTROYED	NUMBER MAJOR DAMAGE	NUMBER MINOR DAMAGE	NUMBER DAMAGED		
1. Houses						
2. Mobile Homes						
3. Multi-family						
4. Businesses						
5. Utilities				N/A		
6. Other (Specify)						
				TOTAL		

Section B. Private Property - Agricultural

TYPE OF PROPERTY	UNINHABITABLE			USABLE/ HABITABLE	TOTAL DOLLAR LOSS	AVERAGE % INSURANCE COVERAGE
	NUMBER DESTROYED	NUMBER MAJOR DAMAGE	NUMBER MINOR DAMAGE	NUMBER DAMAGED		
1. Houses						
2. Mobile Homes						
3. Farm buildings						
4. Equipment						
5. Livestock		N/A				
6. Poultry						
7. Timber						
8. Crops						
9. Farm fencing						
10. Irrigation System						
11. Other (Specify)						
				TOTAL		

Form EM-40-A&B
9/81

DAMAGE ASSESSMENT REPORT INSTRUCTIONS

Reports will be made by county governments and State Departments and will cover damages within the entire county including municipalities.

The Damage Assessment Report will be submitted following a significant emergency or disaster. Assessments are required in numerical and dollar value terms. They must be made by qualified personnel and should be the best estimates that can be made in the immediate post-emergency/disaster period. Numbers and dollar values are totals for the county. In completing Sections A and B below the following definitions will apply:

DESTROYED - More than 80% of value to repair; unusable, uninhabitable.

MAJOR DAMAGE - More than 30% of value of a structure; uninhabitable.

MINOR DAMAGE - 30 % or less of the value of a structure; uninhabitable.

HABITABLE - Damage amounting to 15% of less of value of structure; usable for intended purpose.

UNINHABITABLE - Unusable for intended purpose.

TOTAL DOLLAR LOSS - Repair/replacement cost at current prices; restore to pre-disaster conditions (present standards).

INSURANCE COVERAGE - Average insurance coverage by type of property expressed in percentage of total property value.

N/A - Not Applicable.

Section A - Private Property - nonagriculture - includes all dwellings, businesses (large and small commercial concerns) and privately owned utilities in urban, suburban and rural areas except properties of individuals principally engaged in agriculture.

Section B - Private Property - agriculture - reports damages to agricultural property including dwellings of farmers. Care should be taken to ensure that damaged dwellings are reported in only one Section.

Section C. Economic Impact

1. Business Losses:

NAMES OF BUSINESSES DAMAGED	TYPE OF PRODUCTS OR SERVICES	ESTIMATED NUMBER DAYS OUT OF OPERATION	NUMBER OF EMPLOYEES

(Indicate if goods/services are essential and not available elsewhere in area by use of *.)

2. Losses of Property by Income Level:

INCOME LEVEL	DOLLAR LOSSES	- AVERAGE % INS.COVERAGE	=UNINSURED LOSSES
Low			
Medium			
High			

3. Effects Upon Transportation: (Narrative)

Public:
Private:

4. Effects Upon Farm Employment: (Narrative)

Farm Employees:
Migrant Workers:

Section C - Economic Impact - includes information necessary to estimate the amount of individual assistance which will be needed in categories such as temporary housing, food stamps, unemployment compensation, individual and family grants, and Small Business Administration Loans.

Section C, Economic Impact is completed as follows:

1. Business Losses - List information requested based on conversation with owners or managers of damaged businesses.
2. Losses by Income Level:
   a. From Section A, determine total dollar loss for all types of property.
   b. From Section B, determine total dollar loss for all types of property.
   c. Add a and b above to obtain grand total dollar loss.
   d. On the basis of the Damage Assessment Officer's knowledge of the prices of the damaged/destroyed property, divide C (grand total dollar loss) into three parts; that which could be attributed to low, middle, and high income families. For example, if 2/3 of the dollar value of private property damage was sustained by low income families/individuals, then 2/3 of the total dollar loss would fall under the "Dollar Loss" column in the "Low" (Income) row. Divide the remaining 1/3 appropriately between middle and high income groups, using the same procedure. Enter these figures under the "Dollar Losses" column.
   e. Based on the Damage Assessment Officer's knowledge of the damage communities, estimate the average insurance coverage in the high, middle and low income groups and enter these figures under the average % insurance coverage column.
   f. Compute the uninsured losses for the three income levels by multiplying the dollar loss figures for each income group times the appropriate % insurance coverage and subtract the result from the appropriate income level dollar loss figure. Enter the result under the Uninsured Losses column in the appropriate Income Level Row.
3. Effects on Transportation - Give a verbal and/or numerical description of the effects of the disaster on public and private transportation.
4. Effects upon farm employment. From the County ASCS Emergency Board, obtain an estimate of the number of farm and migrant workers who are affected by the disaster.

Section D. Public Property (Including Private Non-Profit Facilities)

CATEGORY	DESCRIPTION	NUMBER DESTROYED	NUMBER DAMAGED	TOTAL DOLLAR LOSS	AVERAGE % INSURANCE COVERAGE
A Debris Clearance	Public Streets, R/W	N/A	N/A		N/A
	Other Public Property				
	Private Property (in the public interest)				
	Within Channels				
B Protective Measures	Life & Safety	N/A	N/A		N/A
	Health				
	Property				
	Stream/Drainage Channels				
C Road Systems (Non-State Maintained)	Roads and Highways				N/A
	Bridges				
	Culverts				
	Traffic Control				
	Other (Specify)				
D Water Control Facilities	Dikes				N/A
	Levees				
	Dams				*
	Drainage Channels				N/A
	Irrigation Work				
E Public Buildings, Equipment, and Communications	Public Buildings				
	Supplies, Inventory				
	Vehicles, Equipment, Communications				
	Transportation Systems				
	Higher Education Facilities				
F Public Utility Systems	Water				*
	Storm Drainage				
	Sanitary Sewer				
	Power and Light				
	Other (Specify)				
G Facilities Under Construction	Public Facilities (Specify)				
	Private Non-Profit (Specify)				
H Private Non-Profit Facilities	Educational				
	Medical				
	Emergency				
	Custodial Care				
	Utility (incl.Elec.Co-ops)				
	Other (Specify)				
I Other	Park Facilities				
	Recreational Facilities				

* These systems are not normally insurable.

Section D - Public Property - includes all properties and facilities ownded by legal governmental entitites within the county including publicly owned utility systems. It also includes damages to private nonprofit educational, utility, emergency medical and custodial care facilities which have an effective ruling letter from the Internal Revenue Service granting tax exemption.

All sections are required for a complete Damage Assessment Report. Where any of the three categories of property (private, agricultural, public) received no damages, it should be noted as "none."

Normally, one complete Damage Assessment Report will be submitted and will be shown as report number one. Changes or additions can be made by submitting revised reports which will be reports number two, three, etc.

SECTION 9: BIBLIOGRAPHY

1/ William D. McElyea, David J. Brower, David R. Godschalk. Before the Storm; Management Development to Reduce Hurricane Damages. Ocean and Coastal Ecology Program Center for Urban and Regional Studies, UNC/Chapel Hill; August 1982.

2/ Onslow County Planning Department. Onslow County Land Use Plan. October 1981.

3/ North Carolina Department of Crime Control and Public Safety. Carolina County Disaster Relief and Assistance Plan - Prototype (With Annexes and Changes) 1981-83.

4/ Onslow County Office of Emergency Management. Onslow County Hurricane Response Plan (Including Hurricane Evacuation Plan). January 1984.

5/ Onslow County Board of Commissioners (supported by Onslow County Planning Board and Planning Department). Zoning Ordinance. Undated.

6/ Onslow County Board of Commissioners (supported by Onslow County Planning Board and Planning Department). Subdivision Regulations. October 1979.

7/ John J. Hooten and Associates. Condominiums in Barrier Islands (Preliminary Draft). 1983 - Unpublished.

8/ U. S. Army Corps of Engineers District, Wilmington. Reconnaisance Report - West Onslow Beach and New River Inlet, N. C. (Draft). Undated.

9/ Federal Emergency Management Agency. Flood Insurance Study - City of Jacksonville, North Carolina - Onslow County (Preliminary). May 1983.

10/ Federal Emergency Management Agency. Federal Disaster Assistance Program - Handbook for Applicants Pursuant to Public Law 93288. March 1981.

11/ John R. Stone; UNC Sea Grant College Program. Hurricane Emergency Planning; Estimating Evacuation Times for Non-Metropolitan Coastal Communities (Working Paper 83-2). April 1983.

12/ Larry R. Goode, P. E.; N. C. Department of Transportation. Series of inter-agency memoranda entitled Estimated Evacuation Time for (Designated Coastal Counties). 1983

13/ David Brower, Etal; Department of City and Regional Planning, UNC/Chapel Hill. Currituck County, Outer Banks Carrying Capacity Study. June 1983.

14/ Onslow County Office of Emergency Management. Onslow County Emergency Management Ordinance. Undated.

15/ North Carolina State Building Code, Volume I. March 1982. (With Amendments, June 1982)

16/ N. C. Building Inspectors' Association. North Carolina Uniform Residential Building Code (1969-76)(Adopted by the North Carolina Building Code Council).

17/ U. S. Water Resources Council. Regulation of Flood Hazard Areas to Reduce Flood Losses (Volume 2). Undated.

NOAA COASTAL SERVICES CENTER LIBRARY
3 6668 14101 2403