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## Residential Development and Coastal Flood Plain Management in Rhode Island: Its History, Present Status and Future Options

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RESIDENTIAL DEVELOPMENT AND COASTAL FLOOD PLAIN MANAGEMENT  
IN RHODE ISLAND: ITS HISTORY, PRESENT STATUS AND FUTURE OPTIONS

by

William R. Gordon, Jr.

A MAJOR PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE  
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## Introduction

Coastal development along the eastern shoreline of the United States began in earnest during the 1880's and 1890's. It was during this time that emphasis was placed on coastal habitation from a recreationist perspective.<sup>1</sup> People have occupied flood-prone areas since the Colonial period, and as a result have sustained losses from coastal flood events, such as hurricanes and winter storms.

Even though hurricanes did occur in the late nineteenth century, such storms had not occurred with sufficient intensity to cause major damage to new coastal recreational homes. During this period it was seasonal flooding from winter storms that resulted in property damage. Cole states in reference to Westerly, Rhode Island:

There are also quite a number of lakelets, some so near the beach that they are overwhelmed from the ocean during the winter storms, and continue brackish all year round.<sup>2</sup>

It was not until September 21, 1938 that the Rhode Island coastal flood plain inhabitant truly became aware of the severe flooding potential of the low-lying coastal area.

On this day in 1938, a powerful hurricane swept the shoreline of Rhode Island with a 13 foot storm surge. All houses on the south shore were destroyed. Property losses ran in the millions. Human loss of life was even more tragic, as over 350 lives were lost along the Rhode Island shoreline.

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<sup>1</sup> William R. Gordon, Jr., "The Perception of Storm Hazard of Selected Rhode Island Barrier Beach Inhabitants", Unpublished M.A. thesis, (Kingston: University of Rhode Island, 1980), p. 40.

<sup>2</sup> J.R. Cole, History of Washington and Kent Counties, Rhode Island, (New York: W.W. Preston and Co., 1889), p. 269.

<sup>3</sup> Gordon E. Dunn and Banner I. Miller, Atlantic Hurricanes, (Baton Rouge: Louisiana State University Press, 1960), p. 274.

On August 31, 1954, another major hurricane impacted the coast of Rhode Island. Hurricane Carol resulted in the loss of 19 lives and over \$200 million in property damages.<sup>4</sup> Rhode Island has not experienced a major hurricane since Hurricane Carol, over 25 years ago.

In the period of time since the destruction by Hurricane Carol, widespread development has occurred along the Rhode Island shoreline. Many municipal officials and state agencies oppose the development of flood-prone areas, such as barrier beaches. Often the question is asked as to why someone would construct a home in such a hazardous environment.

Baumann and Sims state, "people live on the flood plain because they expect it to be profitable, and it may be that the economic benefits of locating in a hazard-prone area simply outweigh the losses incurred by the occasional flood".<sup>5</sup>

The coastal inhabitant does not necessarily make a financial profit by living in a flood-prone area, as may be interpreted in the statement by Baumann and Sims. The economic value, assessed more appropriately, is placed upon the amenities of the setting.

Gordon found, in his study of the perception of coastal hazards on the south shore of Rhode Island, the value of the property to coastal inhabitants far exceeds monetary values. As explained by one gentleman in Gordon's study,

I have enjoyed my house for twenty-five years without losing it. It has more than paid for itself. How can you put a price on being able to enjoy such amenities? 6

It might be concluded that the amenity enjoyed does exist as an economic benefit.

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<sup>4</sup> Ibid.

<sup>5</sup> Duanne D. Baumann and John H. Sims, "Flood Insurance: Some Determinants of Adoption", Economic Geography, vol. 54, n. 3, (1978): 192.

<sup>6</sup> Gordon, "The Perception of Storm Hazard", p. 80.

Kates noted that "coastal dwellers are relatively well educated and well to do, they are by and large, knowing and well informed of the hazard they face; and as to details, they are little worse off than the technical-scientific community".<sup>7</sup> Studies by Miller (1975) and Gordon (1980) support the statement above, regarding the high cognizance of coastal hazards.

The willingness to continue habitation in such a hazardous environment is most convincing. In Gordon's study, a hypothetical question was asked requesting the respondents to relate to his or her action in the event of a severe flood. He states that:

Nearly 82% replied that such an event would not affect their decision to return to their property. Several responses indicated a very high commitment to return even in the event of having experienced both property loss, and in a few instances the loss of a relative. Some residents indicated that they had lost members of their family in past hurricanes and even this had not deterred them from returning. <sup>8</sup>

Since it may be assumed that the coastal property owner will attempt to re-establish property rights after the next severe storm event, it is essential to examine what regulatory authority exists in the management of the coastal flood plains of Rhode Island. It is also important to determine what roles federal, state and municipal authorities will play during future reconstruction.

It is the objective of this major paper to examine and assess the present status and future orientation of flood plain management in Rhode Island. Since so many peripheral issues of significant importance exist, it will be the practice of this paper to identify such issues and cite suitable reference for further sources of information regarding the issue.

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<sup>7</sup> Robert W. Kates, "The Perception of Storm Hazard on the Shores of Megalopolis", in David Lowenthal, ed., Environmental Perception and Behavior. (Chicago: The University of Chicago, Department of Geography Research Paper No. 78, 1967):68.

<sup>8</sup> Gordon, "The Perception of Hazard", p. 71.

The primary focus of this paper will address floodproofing (Building Code Regulations) of structures as a preventative measure against flood damages. Floodproofing, as an exercise of local police power, is applicable to desired uses of the flood plain; such as residential, recreational and commercial structures. Emphasis will be extended to recreational and residential buildings.

The Evolution of Flood Plain Management Policies:  
Federal, State and Municipal Jurisdictions

Federal Legislation

The federal government delegates authority (enabling legislation) to the states to enact legislation regulating land use. Numerous federal incentives also exist, encouraging state and local authorities to implement land use regulations.

The primary federal regulatory program in flood plain management has been the National Flood Insurance Program (NFIP). The NFIP was established by Congress in 1968. (P.L. 90-448, Title XIII)

The National Flood Insurance Program was designed to fulfill one essential purpose: flood hazard mitigation through reducing the amount of property exposed to damages from flooding. The NFIP is based on dual principles. The first is to make flood insurance available to property owners in flood-prone areas and second, to require sound practices in flood plain management in flood-prone communities. (Minimum design features required by the NFIP will be addressed in Chapter 2).

The Flood Insurance Administration (FIA) will make flood insurance available in local communities, if those communities agree to impose federal guidelines regulating development in flood hazard areas. Local participation is voluntary. Property owners within a municipality cannot subscribe for the insurance, unless the town participates within the program.

Basic intent of the legislation is to provide federally subsidized insurance to owners of riverine and coastal properties which are subject to floods, coastal storms, mudslides, or sudden erosion. The NFIP amendments of 1973

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<sup>9</sup> Rutherford H. Platt, "Coastal Hazards and National Policy: A Jury-Rig Approach", Journal of the American Institute of Planners, vol. 44, n. 2, (April 1978): 175.



added as an insurable hazard the 'collapse or subsidence of land along the shore of a lake or body of water'.<sup>10</sup>

Flood insurance is available through private brokers in communities which participate in the NFIP. "On November 3, 1977, the secretary of HUD announced her intention for the FIA to assume the function of marketing flood insurance previously carried on by a consortium of 130 insurance companies under contract with the FIA".<sup>11</sup> This has yet to be carried out.

Implementation of the NFIP is dependent upon the delimitation of the area subject to flood hazard. The U.S. Army Corps of Engineers flood information report program has mapped flood profiles for more than 5,000 communities.<sup>12</sup>

These maps determine areas subject to a '100 year flood'.<sup>13</sup> Two zones of coastal flooding are established in these 'Flood Insurance Rate Maps' (FIRM). The first area is an 'A zone', which encompasses the entire 100 year flood plain. The second area is referred to as the 'V zone'. This area lies immediately landward of mean high water and represents areas subject to moving water. This moving water (velocity water) is produced by crashing surf.

The NFIP designated the V zone as being subject to wave heights of at least three feet for the 100 year storm. This is misleading for numerous reasons. Basicly, wave heights within the 100 year flood plain can be much higher than three feet.

Recent revisions in the FIA calculation techniques suggest that wave

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<sup>10</sup> Ibid. p. 176.

<sup>11</sup> Ibid. p. 180.

<sup>12</sup> Ibid. p. 177.

<sup>13</sup> This refers to all areas that have a one percent chance of flooding in any one year.

heights may be calculated as a 55% increase over the height of the stillwater flood or 100 year surge.<sup>13</sup> Another critical point to consider is that we are only dealing with a 100 year flood. Thus floods of greater magnitude will result in greater stillwater flooding, and more importantly in greater wave heights within the V zone.

One final point to establish is the fact that these maps (FIRM) are not technically produced so as to delineate the perfect legal boundary for a 100 year flood event.<sup>14</sup> U.S.G.S. topographic maps are used for base mapping of the flood hazard zones. The U.S.G.S. maps are drawn with an accuracy or confidence interval of 90% equal to one-half of the contour interval.

In other words, for a map having a contour interval of 10 feet, we would be 90% sure that a contour line passes through the true elevation within 5 feet of the stated elevation of that line. In areas of negligible slope, this factor could lend itself to considerable error of anticipating areas of flood potential. Dingman and Platt are of the opinion that flood plain mapping by standard procedures, is at best an approximation.<sup>15</sup> Even Army Corps engineers have stated the potential inaccuracies of the mapping procedure.<sup>16</sup>

By 1972, only 972 out of some 20,000 identified flood-prone communities had adopted some form of flood plain regulation and were eligible for flood insurance.<sup>17</sup> Exceptional flood damages of \$4,889 million, and disaster relief

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<sup>13</sup> John R. Sheaffer, of Sheaffer and Roland, Inc., Personal Interview, New Orleans, Louisiana, 28 May 1980.

<sup>14</sup> Lawrence M. Dingman and Rutherford H. Platt, "Floodplain Zoning Implications of Hydrologic and Legal Uncertainty." Water Resources Research, vol. 13, (June 1977): 521

<sup>15</sup> Ibid.

<sup>16</sup> New England River Basins Commission, The Ocean's Reach, comments by R. DiBuono, Boston (1976): 61.

<sup>17</sup> Sheaffer and Roland, Inc. Evaluation of the Economic, Social and Environmental Effects of Floodplain Management, Draft Report for HUD, (February 1979): 33.

payments of \$591 million stimulated enactment of the Flood Disaster Protection Act of 1973 (FDPA) (P.L. 93-234).<sup>18</sup> This Act substantially strengthened the Flood Insurance Program. The FDPA "amended the insurance law to prohibit federal funds from being used, directly or indirectly, for construction in flood hazard zones unless the new structures were covered by flood insurance."<sup>19</sup> By December 31, 1978, 16,192 communities had agreed to enact some form of flood plain regulations.<sup>20</sup>

As noted, the National Flood Insurance Act created a national program to which state and local flood plain regulations could be modeled.<sup>21</sup> The NFIP represented an initial attempt to uniformly address coastal flood plain management, yet other legislation had long been in effect to deal with riverine flooding.

The Flood Control Act of 1936 (49 Stat. 1570 - 22 June 1936) initiated the construction of "corrective flood control works."<sup>22</sup> The building of dams still did not appreciably reduce property losses from flooding.

The Flood Control Act of 1960, (74 Stat. 500, Section 206 - 14 July 1960) authorized the Corps to conduct flood plain information studies. These studies were prepared to increase public awareness of flood hazards and to introduce

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18 Ibid.

19 Earl J. Baker, Hurricanes and Coastal Storms: A Resource Paper on Risk Assessment, Warning Response, Non-Structural Damage Mitigation, and Awareness, (Washington, D.C.: Prepared for the Federal Disaster Assistance Administration, P.O. HUD-1173, May 1979): 26.

20 Sheaffer and Roland, Inc. Evaluation of Flood Plain Management, p. 34.

21 For more information regarding the NFIP, see: Baker (1979), Maloney and Dambly (1976), Miller (1977), Platt (1976) and Tierney (1976).

22 Sheaffer and Roland, Inc. Evaluation of Flood Plain Management, p. 32.

to flood plain occupants the availability of a range of flood plain management measures.

Up until the 1960's, structural approaches to flood plain management were considered to be successful. As noted above, these structural measures did not reduce flood losses, thus, from this point in time forward, non-structural measures were given greater examination.

Section 73 of the Water Resources Development Act of 1974 (P.L. 93-251, 88 Stat. 12 - 7 March 1974) requires all federal agencies to give equal consideration to non-structural approaches for flood control expenditures.

Federal authorities such as the U.S. Army Corps of Engineers and their regulation ER-1120-2-117 and Principles and Standards for Planning Water and Related Land Resources, also "demand equal and unprejudiced evaluation of non-structural alternatives."<sup>23</sup>

By recommendation of the Task Force on Federal Flood Control Policy, President Johnson on 10 August 1966, issued Executive Order 11296. The order directed all heads of federal agencies to "provide leadership in encouraging a broad and unified effort to prevent uneconomic uses and development of the nation's flood plains." It also dealt with the design and siting of federal structures, disposition of federal lands, and administration of federal loans and grants.<sup>24</sup> The order was not successful.

In July 1976, the U.S. Water Resources Council issued a policy statement reaffirming the goals of the 1966 Task Force. On 24 May 1977, President Carter revoked Executive Order 11296. He issued in its place Executive Order 11988 and Executive Order 11990. Executive Order 11988 addressed flood plains and

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<sup>23</sup> Ibid. p. 34.

<sup>24</sup> Platt, "Coastal Hazards", p. 178.

established guidelines for evaluating flood risk when planning construction of facilities funded by federal monies.<sup>25</sup> Executive Order 11990 addressed the evaluation of potential development in wetland areas.

The Disaster Relief Act of 1974 (P.L. 93-288, Section 406) encourages safe land use and implementation of construction regulations. This Act also provided up to \$250,000 to each state for the preparation of disaster preparedness plans which were to include a "hazard mitigation element".<sup>26</sup>

Mr. Anthony Pesaturo, formerly of the Rhode Island Governor's Disaster Preparedness Agency, which implemented such federal funding, stated that monies ran out before implementation of the plan could be effected.<sup>27</sup>

Other federal legislation exists which addresses, directly or indirectly, flood plain management. The final piece of federal legislation with the greatest potential for flood plain management is the Coastal Zone Management Act of 1972 (CZMA) (P.L. 92-583). The CZMA is the first national land use bill management bill passed by Congress. One point must be established to clarify what is meant by a land use management bill, as used in this context. The federal government could not force a state to participate in the Coastal Zone Management Program. In order for a state to receive federal monies for planning activities in the coastal zone, the state was required to prepare overall management plans and time schedules for implementation. Issues such as conflicting uses of the coastal margin and federal consistency with state plans were only a couple of the requisites of state planning required by the federal government in order to receive funding.

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<sup>25</sup> Baker, Hurricanes and Coastal Storms, p. 28.

<sup>26</sup> Ibid.

<sup>27</sup> Interview with Mr. Anthony Pesaturo, Providence, Rhode Island, 16 March 1981.

Platt further defines the scope of the CZMA by noting that the legislation is:

- 1) a declaration of a national policy favoring better management of (coastal) land and water resources,
- 2) creation of a process for federal-state collaboration in planning for these resources, and
- 3) authorization of federal funds to assist states in developing and administering their own plans. 28

The CZMA barely mentions natural hazards, but these concerns were discussed, in a Senate committee report, as being a congressional concern. 29, 30

The guidelines of the CZMA require states to identify areas of 'particular concern'. The first plans approved by the Office of Coastal Zone Management were not scrutinized for hazard identification and management. Later plans were required to address the hazardousness of that states coastline. 31

#### Rhode Island Legislation

As mentioned in the Introduction, the 1938 Hurricane and Hurricane Carol of 1954 resulted in a great loss of life and property in Rhode Island. In 1956, the Rhode Island legislature enacted a law for [STATE ACQUISITION OF HAZARD AREAS, COST SHARING FOR LOCAL FLOOD AND EROSION CONTROL WORKS, LOCAL WORKS AUTHORIZED] R.I. General Laws Annotated §§ 46-3-1. to 5., 7 to 18. (1956), amended 1968, §§ 46-3-6., - 19, -20, (Supp. 1968). See Appendix I.

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28 Platt, "Coastal Hazards", p. 172.

29 Senate Report No. 92-753, U.S. Code; Congressional and Administrative News, 1972, vol. 2, p. 4785.

30 Platt, "Coastal Hazards", p. 180.

31 Baker, Hurricanes and Coastal Storms, p. 27.

The "Shore Development Act of 1956" (short title) sought by:

co-operative means providing for the acquisition, by purchase or otherwise, of lands, or any rights, title, interest or estate in lands in beach areas vulnerable to storm damage, to assist municipalities in arresting, protecting, and preserving such beach areas from erosion and damage by the elements 32

Section 43-3-6 addressed a state payment plan for the acquisition of exposed beach areas. If agreement of a price could not be reached with a property owner, Section 43-3-10 allowed 'Condemnation of Property'.

Condemnation of coastal properties did take place. On East Beach in Charlestown, Rhode Island, over 20 homes were condemned by the State of Rhode Island. This action occurred in the late 1950's and early 1960's. In 1978, while conducting interviews for an evaluation of hazard perception of barrier beach inhabitants, this author came across a family who stated that they had been forced off East Beach with 20 other property owners. They had been asked to sell, but refused. The State's final offer was 20¢ a square foot, 'take it or leave it'.

As a result, people were paid two to four hundred dollars for property that they had paid much more for. If these property owners were not able to remove their homes from the property, they were confiscated and destroyed by the State.

The State of Rhode Island never really had the money to appropriate all of the coastal property that it desired. The area of East Beach that was condemned is now the Ninigret Pond Conservation Area. The people interviewed, to this day, are still extremely bitter toward the State of Rhode Island.

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<sup>32</sup> See Appendix I, 46-3-2, 'Declaration of Purpose'.

It is questionable as to whether such condemnation could take place today. This appears to be a direct violation of constitutional rights extended to property owners under the Fifth Amendment of the Constitution. This Amendment states that 'confiscation of property without due compensation' of fair market values is illegal. It would also appear that the Courts present interpretation of Eminent Domain would not apply to the East Beach condemnation. The provisions of this act are no longer carried out.<sup>33</sup>

The lead state regulatory body having jurisdiction over the development of coastal lands is the Rhode Island Coastal Resources Management Council (CRMC), which was created in 1971 (Title 46, Rhode Island General Laws, Sections 46-23-1 through 46-23-12, added to by Chapter 279, Public Laws of 1971).

As mentioned, the Coastal Zone Management Act of 1972 was passed by Congress to encourage a state level management program in the coastal zone. The CRMC is the agency in Rhode Island with the responsibility for implementing the state Coastal Zone Management Program. In September of 1972, the CRMC adopted a management plan. The Rhode Island Coastal Resources Management Program was federally approved in March of 1978.

Shortly after its creation the Council placed a moratorium on the development of undeveloped barrier beaches. Construction on developable barriers was required to take place behind the barrier's dune system.

Immediately thereafter, the Council promulgated a cease and desist order for construction on developable barrier beaches.<sup>34</sup> A court case resulted

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<sup>33</sup> It is interesting to note that the state land appraiser who evaluated the property worth of the condemned East Beach properties, owns a beach front cottage in Jerusalem, Rhode Island. This fact was discovered in an interview with his wife during Gordon's hazard perception study. This is ironical.

<sup>34</sup> Anna F. Prager, "Anicelli v. The Town of South Kingstown", unpublished M.C.P. thesis, (Kingston: University of Rhode Island, 1978), pp. 24-26, 87-88.



from this action and the Court determined that the Council had no intent to purchase the property. A finding of 'confiscation without due compensation' was rendered and the order was lifted.<sup>35</sup>

The CRMC at this time defers to the Federal Flood Insurance guidelines regarding coastal construction. These minimum construction guidelines will be reviewed in Chapter 2. It is essential though, at this time, to examine what role the National Flood Insurance Program has played in Rhode Island.

As previously noted, local participation in the program is voluntary and property owners cannot benefit unless the town participates in the program. The NFIP subsidizes private properties at rates of 90% of true insurance costs. The coastal property owner pays little for a lot of protection. Gordon found that many Rhode Island coastal homeowners pay annual premiums of \$150 to \$200 to protect their homes from flood-related damages.

Many homes have been destroyed by past hurricanes along the Rhode Island shoreline, and as a result no private insurance company would, in the past, take on the risk of insuring the coastal resident. Without insurance, local banks would not provide mortgages. Thus, those people who built prior to the implementation of the National Flood Insurance Program were either wealthy or built piecemeal on a shoestring budget.

In the Introduction, a statement was made regarding the dual purpose of the NFIP. The 'availability' of insurance as well as 'sound practices' in flood plain management provide two issues to be examined.

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<sup>35</sup> Nancy B Fillmore v. John Lyons, et. al., Providence Superior Court, C.A. 73-2372, decision by Bulman, J., dated 5 June 1974, citing decision Carralás, J.

As mentioned, lending institutions in Rhode Island would not loan monies to homeowners seaward of the "wet-wash line", the line beyond which<sup>36</sup> damage and destruction was heaviest as a result of the 1938 Hurricane. In certain instances, roadways were used as a loan boundary. Shore Road in Westerly, Rhode Island is such an example.

When the National Flood Insurance Program was adopted in South Kingstown in 1972, banks readily issued mortgages, resulting in an accelerated residential development of coastal areas. The CRMC, the Town of South Kingstown and various researchers<sup>37</sup> accuse the program of allowing increased developmental pressures. Malcolm Grant, co-author of Rhode Island Barrier Beaches: Volumes I and II, states, "There was a definite coincidence of increased development pressure in the early 1970's once the flood insurance program was introduced into the state"<sup>38</sup>.

Granted, the insurance program led to accelerated development, yet Gordon found evidence that indicates that the insurance program was not the sole culprit, as is expressed by many. It was the development of Green Hill<sup>39</sup> (South Kingstown), Rhode Island in 1972 which brought this issue to a crisis.

In personal interviews with residents at Green Hill, Gordon found that most property owners had wanted to wait some time before starting construction<sup>40</sup> of their beach residence. During 1972, beach residents heard rumors of the

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<sup>36</sup> State of Rhode Island, Coastal Resources Management Program; March 1978, (Providence, Rhode Island: Rhode Island Coastal Resources Management Council, 1978): 49

<sup>37</sup> Prager, "Anicelli v. The Town of South Kingstown", p. 78

<sup>38</sup> New England River Basins Commission, The Ocean's Reach, comments by Malcolm Grant, p. 9.

<sup>39</sup> Gordon, "The Perception of Storm Hazard", p. 79.

<sup>40</sup> Ibid.

forthcoming CRMC cease and desist order.<sup>41</sup> As a result, many panicked. Property owners rushed to obtain building permits to start construction before the imposition of the order. When asked why they built, a nearly unanimous response indicated the CRMC action. Given the availability of the insurance, that alone was not the incentive for the rush to obtain building permits, as the insurance could have been obtained at any time in the future.

Using the availability of insurance as the cause of increased development it appears that this development was at most coincidental. Crane Miller, in a study of the National Flood Insurance Program, interviewed beach residents at Green Hill. He states that:

the owners interviewed by the author have uniformly stated that they were aware of the hazards of building on Green Hill Beach and wanted to do so whether or not they had flood insurance. 42

Miller also felt that relaxed state perc test requirements for onsite sewage disposal was a contributing factor to increased development.<sup>43</sup> Gordon noted that:

a majority of respondents were apprehensive about state condemnation of their land in event of a total property loss should another hurricane impact the coast. From these responses it appears that legal contest between property owners and the State of Rhode Island would be initiated if such condemnation occurred. Even though most homeowners have obtained federal flood insurance, having such insurance would not be an incentive for personal protection, if possession of such insurance required forfeiture of their property after a major hurricane. Many homeowners passionately explained that had built their houses before mortgages and insurance were available, and would be willing to do so again. 44

Off the record comments by Council members have led many to believe that such

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<sup>41</sup> Prager, "Annicelli v. The Town of South Kingstown", p. 29.

<sup>42</sup> H. Crane Miller, Coastal Flood Hazards and the National Flood Insurance Program, (Washington, D.C.: U.S. Department of Housing and Urban Development, Flood Insurance Administration, HUD No. 1442-77): 33.

<sup>43</sup> Ibid.

<sup>44</sup> Gordon, "The Perception of Storm Hazard", p. 80.

a condemnation procedure may be attempted, thus reviving the intent of the 1956 "Shoreland Protection Act".

Again, the 'taking issue' would surface. It is doubtful that the state would succeed. In a Rhode Island court case, Bates v. Stitely, 84 R.I. 458, 125 A. 2d. 108 (1956), the "Court held that plaintiffs had a right to reconstruct buildings and other improvements destroyed by a hurricane (Carol of 1954), since this 'Act of God' did not constitute a voluntary surrender of legal nonconforming uses".<sup>45</sup> Other states have allowed similar reconstruction to occur. The day after Hurricane David severely damaged Hilton Head Island in South Carolina (1978), reconstruction of shorefront properties was allowed to take place.

Miller in his study of Westerly, Charlestown and South Kingstown (R.I.) noted a purchase rate on the order of 85%.<sup>46</sup> Gordon noted a similar purchase rate for Rhode Island south shore inhabitants.<sup>47</sup> In Florida, purchase rates of only 47% have been observed.<sup>48</sup> As in Miller's study where flood insurance was perceived as being a bonus by most coastal property owners,<sup>49,50</sup> a similar conclusion was made in Gordon's research.

The "Rhode Island State Building Code Rules and Regulations for Construction in Flood Hazard Areas" is the final state authority examined,

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45 Flood Insurance Administration, Statutory Land Use Control Enabling Authority In The Fifty States, (Washington, D.C.: U.S. Department of Housing and Urban Development, HUD-FIA-179, September 1976): 101.

46 Miller, "Coastal Flood Plain Management," found in New England River Basins Commission, The Ocean's Reach, p. 89.

47 Gordon, "The Perception of Storm Hazard," p. 80.

48 John A. Cross, "Residential Adjustments to the Hurricane Hazard in the Lower Florida Keys," Paper presented at the Annual Meeting of the Association of American Geographers, New Orleans, 10 April 1978, p. 7.

49 Miller, "Coastal Flood Plain Management", in The Ocean's Reach, p. 90.

50 Gordon, "The Perception of Storm Hazard," p. 81.

which provides regulatory control of construction in coastal flood-prone areas. These building codes are examined in detail in Chapter 2. A copy of the Codes are located in Appendix II.

The compulsory State Building Code (23.27.2-5) "applies to all cities and towns in the state. Cities and towns must appoint officials to administer the code. The State may permit amendments to the State Code for application to a particular locality to meet special conditions" such as flood hazard areas.<sup>51</sup>

### Municipal Regulations

The State of Rhode Island possesses zoning enabling legislation which "specifically authorize the adoption of local zoning regulations for flood hazard areas, which apparently include both riverine and coastal sites."<sup>52</sup>

The broad enabling statutes or 'Home Rule Provisions', as they are often referred to, allow a state or municipality to enact regulations to serve the public "health", "safety" and "welfare". Other forms of regulation include: building codes, subdivision regulations and other special codes and regulations such as wetland controls and flood damage prevention ordinances, etc.

Strauss and Kusler, in a report prepared for the Flood Insurance Administration, state that:

Traditionally, zoning, subdivision controls, and building codes have regulated different facets of land development or use. "Zoning" is said to control the use of the land; "subdivision" regulations, the division of land for sale or building purposes; and "building codes," the design and building materials used in building construction. This separation of functions is to some extent artificial since

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<sup>51</sup> Flood Insurance Administration, Statutory Land Use Control, p. 260.

<sup>52</sup> United States Water Resources Council, Regulation of Flood Hazard Areas, (Washington, D.C.: vol. II, 1972): 133.

the "use" of land may be said to encompass both sale and building construction. In addition, there is often some overlap and considerable interrelationship between regulations 53, 54

The use of "floodplain regulations are widely accepted as an appropriate exercise of police power."<sup>55</sup> The recognition of these regulations as an 'appropriate exercise of police power' also infers that the regulations<sup>56</sup> are constitutionally acceptable.

Volumes could be written on the positive and negative facets of flood plain regulations, of which time does not permit, yet it is essential to identify one basis for conflict. As noted earlier, people have rights of private property ownership extended to them under the Fifth Amendment. This implies that people have a right to use their property without being overburdened by regulation. Yet, it is also the responsibility of all levels of government to protect the health, safety and welfare of its citizens.

Strauss and Kusler are more demanding in their evaluation of this conflict:

It may be argued that flood plain regulations fall within the scope of broad enabling statutes for zoning, subdivision controls, or building codes to serve the public "health," "safety," or "welfare" since misuse threatens health and safety, reduces property values, results in extraordinary costs of government, and prevents the most suitable use of land throughout a community. 57

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53 Flood Insurance Administration, Statutory Land Use Control, p. 22.

54 For an indepth discussion of the intent of flood plain regulations, see Flood Insurance Administration, Statutory Land Use Control, pp. 6-8, 21-25.

55 Sheaffer and Roland, Inc., Evaluation of Flood Plain Management, p. 54.

56 Dingman and Platt, "Floodplain Zoning," p. 519.

57 Flood Insurance Administration, Statutory Land Use Control, p. 17.

Significant bias is represented in their comments. Does ownership of a residential structure intone "misuse of flood plain lands?" On what basis is a reduction in property values determined? Does this overlook the Fifth Amendment rights of private property ownership? Finally, what is the most suitable use of such land, as Strauss and Kusler identify it?

To avoid the perpetual pros and cons of the intent or morals of such regulations, suffice it to say that such regulations are presumed to be valid if they:

- 1) conform to and do not exceed the authority granted in enabling statutes;
- 2) adhere to the doctrine of reasonableness, i.e., do not unreasonably deprive property owners of all economic benefits; and
- 3) forbid arbitrary or discriminatory treatment, i.e., require equal treatment for similarly situated properties. 58

It is the 'reasonableness' of flood plain regulations that is one of the qualifying criteria for regulatory acceptance by the courts. If a regulation is not reasonable, a 'taking' of property rights may be rendered by the courts. This is not to imply that the property owner can expect to profit, exceedingly, from the use of marginal lands, such as wetlands. An example of unreasonable regulatory control could be a case of undue economic costs of complying with a statute. Because of these costs, the property owner may be prevented from using his property, thus resulting in a 'taking'.

As mentioned, Rhode Island cities and towns have broad general zoning authority, which includes flood language. The general enabling legislation (Rhode Island General Laws Annotated, §§ 45-24-1, Supp. 1968) states that localities may prohibit or limit use of lands "deemed subject to seasonal

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<sup>58</sup> Sheaffer and Roland, Inc. Evaluation of Flood Plain Management, pp. 54-55.

<sup>59</sup> Flood Insurance Administration, Statutory Land Use Control, p. 258.

or periodic flooding."<sup>59</sup>

Coastal communities within Rhode Island have enacted floodplain zoning ordinances, specifying various compliance criteria.(See Appendix III). Many of these regulations preceeded the required guidelines established by the National Flood Insurance Program, the Rhode Island Coastal Resources Management Council, and the Rhode Island Building Codes Standards Committee. Thus, some of these ordinances have been superseded as town ordinances were improved, meeting new federal and state guidelines.

Two Rhode Island communities having intriguing regulations are Warwick and South Kingstown. In 1957, Warwick specified a two district ordinance for hurricane areas. In areas of extreme danger, only open space uses are permitted; in areas of lesser danger, the first floor of buildings designed for overnight occupation must be 15 feet above mean sea level.<sup>60</sup> The zoning ordinance even went as far as to identify the plat and lot numbers of areas in extreme danger.<sup>61</sup> (See Appendix IV for specific criteria of Warwick zoning).

South Kingstown has been the most progressive and restrictive of the communities studied in regards to zoning requirements. After Hurricane Carol of 1954, South Kingstown implemented a Flood Damage Zone where no construction was allowed. In 1966, a new zoning ordinance was adopted in South Kingstown, allowing construction to resume. In 1972, a new amendment creating a High Flood Danger Zone was initiated, as well as providing for Spot Zoning. Thus a form of moratorium on development was enacted.<sup>62</sup>

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<sup>59</sup> Flood Insurance Administration, Statutory Land Use Controls, p. 258.

<sup>60</sup> United States Water Resources Council, Regulation of Flood Hazard Areas, p.296.

<sup>61</sup> Ibid. p. 329.

<sup>62</sup> Prager, "Annicelli v. The Town of South Kingstown," p. 75.



A New York resident, Mrs. Ida Annicelli, desired to construct a house on Green Hill Beach. She was prevented from doing so by the Town of South Kingstown. She took the town to court on the basis that the town's zoning ordinance was unreasonable and represented a taking. In September 1980,<sup>63</sup> the Washington County District Court rendered a decision in her favor. (Washington County Superior Court - Ca. 76-7).

Immediately thereafter, an appeal was filed by the Town of South Kingstown. South Kingstown has since been joined by the CRMC, R.I. Statewide Planning, the Department of Environmental Management, with other public agencies and private interest groups in its appeal to the Providence Superior Court.

Meanwhile, towns such as Westerly and Charlestown, who wished to enact similar ordinances as South Kingstown, must wait for the outcome of the appeal. This process could take years before this issue is resolved.

As mentioned, the exercise of flood plain regulations must meet tests of reasonableness; but these regulations must also meet tests of flexibility. Flexibility is achieved in flood plain zones through amendments, variances and special use permits. Flexibility, as defined above, does not seem to be present in the South Kingstown ordinances.

This raises one of the essential observations of this paper. As zoning ordinances and subdivision regulations are 'home rule' exercises of police power, it appears that there is no unified municipal approach to the mitigation of property damages to flood plain residents. Due to litigation, the effectiveness of certain flood plain regulations is presently in jeopardy. A need exists for a comprehensive floodplain management policy.

The adoption of a statewide land-use bill has met with great local resistance, yet state level guidance is essential. One avenue to examine is

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<sup>63</sup> For an indepth discussion of this case, see Prager's "Annicelli v. The Town of South Kingstown."

the use of building code regulations. Building codes are a use of local police power, yet their origin rests at the state level. As the State Building Code requires strict local compliance, coordination between the Rhode Island Coastal Resources Management Program (a statewide coastal land use bill) and provisions required by the National Flood Insurance Program might provide an initial step to a unified statewide flood plain management program. It is significant to note that the greatest support for laws or ordinances is at the state level.<sup>64</sup>

Chapter II is an examination of the strengths and weaknesses of the NFIP, the Rhode Island Coastal Resources Management Program (design and construction requirements for flood hazard areas) and the Rhode Island State Building Code Rules and Regulations for Construction in Flood Hazard Areas. Enforcement of these rules and regulations will also be addressed.

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<sup>64</sup> Earl J. Baker "Public Attitudes Toward Hazard Zone Controls," Journal of the American Institute of Planners, vol. 43, n. 4, (1977): 404.

Building Codes at the State and Federal Level:  
Present Regulations in Effect

The National Flood Insurance Program

As identified in Chapter I., the Flood Insurance Program specifies two distinct zones of flood hazard within coastal areas. The first zone is the V-zone, or wave velocity zone. The second zone is the A-zone, or stillwater flood zone. These zones have been given equal consideration for design and safety standards for coastal construction.

The basic standard of the NFIP regards the elevation of the lowest floor for human occupation within the 100 year flood plain. This requirement states that the lowest floor must be above the 100 year flood plain. This height has traditionally been interpreted as being the same for A-zones and V-zones.

Flood elevations account for the stillwater height of the storm surge or tide, without considering the superimposed wave heights, runup or wave velocity. This was a major oversight as the insurance requirements were originally designed for fluvial conditions. Recent revisions of the NFIP, suggest that an additional 55% increase in structural elevation in the V-zone will compensate for the waves superimposed on the storm surge.<sup>65</sup>

In order to meet height requirements for application for a flood insurance policy, the coastal resident must employ a certified professional engineer or architect to determine if the first floor of occupancy is in fact above the required height. Because of this requirement, a homeowner located on the mainland side of a barrier pond may pay higher premiums than a beachfront resident, if his home is not sufficiently elevated. This does not account for location within

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<sup>65</sup> Sheaffer, Interview, 28 May 1980.

a V-zone and the related hazard of pounding waves and moving water.

Height requirements have been established for the first floor of occupation, yet no NFIP regulation exists pertaining to how deep the pilings should be set as to afford maximum protection. If not adequately secured, these pilings will be undercut in a major storm, and the house will topple.

In January of 1981, the Flood Insurance Administration came out with a coastal construction manual. The Design and Construction Manual for Residential Buildings in Coastal High Hazard Areas addresses this problem. The Manual recommends that the pilings be set to a depth of -5 to -10 feet below mean sea level (msl).<sup>66</sup> The publication of this manual is indeed a step in the right direction. Unfortunately the design criteria utilized in the manual are not a part of the NFIP guidelines, but serve only on a recommendation basis to encourage local communities to incorporate these design criteria within their municipal ordinances and building codes.

#### Rhode Island State Building Codes

The requirements of the "Rhode Island State Building Code Rules and Regulations for Construction in Flood Hazard Areas" are modeled after the NFIP guidelines. (A copy of the State 'Building Codes' are included in Appendix II).

The basic construction regulation incorporated within these codes are located in Article 4, Section (D) - Coastal High Hazard Areas. It reads as follows:

#### (D) Coastal High Hazard Areas

Coastal high hazard areas (V zones) are located within the areas of special flood hazard and are associated with high velocity waters from tidal surges and hurricane wave wash, therefore the

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<sup>66</sup> Flood Insurance Administration, Design and Construction Manual for Residential Buildings in Coastal High Hazard Areas, (Washington, D.C.: U.S. Department of Housing and Urban Development, FIA-7, January 1981): 50.

following provisions shall apply:

- (1) Provide (1) that all new construction and substantial improvements are elevated on adequately anchored pilings or columns so that the lowest portion of the structural members of the lowest floor (excluding the pilings or columns) is elevated above the base flood level and (2) that a registered professional engineer or architect certify that the structure is securely anchored to adequately anchored pilings or columns in order to withstand velocity waters and hurricane wave wash as set forth in Section 300.1 (C) (3). 67

Many questions arise as to the interpretation of this section. First, what is meant by 'adequately anchored' pilings or columns? Also, what is meant by the term 'securely anchored'? Interpretation, in this instance, may be semantical. Too much is left to the personal interpretation of the 'registered engineer or architect'. No where are specific design standards to be found.

Near the end of this section, when reference is made to 'velocity waters and hurricane wave wash', we are given the impression that design standards may exist. An important oversight in engineering assessment is also made in this section. Horizontal loads or stresses resulting from moving water are noted, but we never see reference to horizontal wind loads or wind uplift loads.

Just what exactly are the criteria set forth in Section 300.1 (C) (3)?

Section 300.1 (C) (3) states:

In coastal high hazard areas, certification shall be obtained from a registered professional engineer or architect that the structure is securely anchored to adequately anchored pilings or columns to withstand velocity waters and hurricane wave wash. 68

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67 Building Code Standards Committee, "Rhode Island State Building Code Rules and Regulations for Construction in Flood Hazard Areas," (North Providence, Rhode Island, August 31, 1979): 8.

68 Ibid.

It appears that it is up to the engineer or architect to decide what 'velocity waters' are. Without specific standards, consistent construction techniques and building material requirements are not possible. In the southern United States, county building codes not only regulate design and construction techniques, but regulate the type of building materials to be used.

The State building codes adequately address 'breakaway walls' and mobile homes, which are discussed in the NFIP.<sup>69</sup> Another area of concern which is well outlined is the section of "Requirements and Procedures for Variances" found in Article 5. Even though specific design and construction criteria are commonly lacking throughout the codes, the variance and appeal procedure is comprehensively discussed. This is important, for this factor alone may fulfill the 'reasonableness' and 'flexibility' concerns of the courts in relation to the constitutionality of these building codes.

In 1955, one year after Hurricane Carol impacted the Rhode Island shoreline, the Rhode Island Development Council suggested coastal zoning to meet the challenges of development within coastal flood-prone areas. This model zoning suggested the definition of flood hazard zones by the magnitude of danger. Specific zones and boundaries were defined. For example, shores of southerly exposure, having elevations less than 20 feet and areas within 300 feet of mean high tide were designated as "Areas of Extreme Danger."<sup>70</sup>

The "Model Hurricane Zoning Regulations" also addressed permitted uses within these zones. Variance procedures were outlined in section on 'Zone Regulations'. This feature alone is something seldom identified today in municipal flood plain zoning ordinances. This "Model Zoning" is located in Appendix V.

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<sup>69</sup> A breakaway wall will allow the unrestricted flow of floodwaters beneath a house.

<sup>70</sup> See Appendix V., Section 1.- Definitions, a. Areas of Extreme Danger.

The model zoning addresses specific methodologies for anchoring a house, and sets criteria such that the superstructure of a house will be designed and constructed to resist wind loads of hurricane intensity. (It is this type of feature that is lacking in the present State Building Code Regulations). Even a first floor level or elevation for occupance must be 12 feet above mean sea level. The use of a 'Hurricane Danger Zoning Map' was also mandatory. It is unfortunate that many of the essential provisions of this model zoning are not effect in all Rhode Island coastal communities.

#### Rhode Island Coastal Resources Management Program Guidelines

Under Section 130.0-2 Policies and Regulations for Flood Hazards, the CRMC requires a permit for coastal construction. The Coastal Resources Management Program defers to the guidelines of the NFIP. The Program has only one reference to coastal construction, it reads as follows:

(Section 130.0-2, A-2.)

2. The lowest structural member of the lowest floor of any new, restored or substantially improved structure shall be elevated a minimum of 6 feet above the 100 year flood level as determined by the Department of Housing and Urban Development. Said members shall be adequately anchored to pilings with said space between the pilings free of obstructions. 71

The 6 foot additional height requirement nearly approximates the new NFIP recommended elevation increase of 55% within V-zones. This rule has been applied only to barrier beaches. This additional height requirement should be utilized in all V-zones subject to wave impacts and velocity waters.

Again technical confusion arises in what is meant by 'adequately secured'. No where does it specify as to who shall determine the meaning of this term.

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<sup>71</sup> State of Rhode Island, Coastal Resources Management Program; March 1978, (Providence, Rhode Island: Rhode Island Coastal Resources Management Council, 1978): 51.

The statement of the area between the pilings to remain clear of obstructions refers to a requirement of the NFIP, which has been discussed. The area beneath a house is to remain clear to allow unobstructed movement of water under the house. This will reduce the hydrostatic pressure exerted on the supports which hold the structure. This section also refers, indirectly, to the use of knockaway panels.



## Recommendations and Conclusions

The following suggestions should be considered in the rewriting of various state regulations reviewed above. The creation of new building code regulations, complementing existing building codes, will insure that coastal structures or homes are designed and constructed to weather minor and moderate storm events. Under favorable conditions, new construction may be able to survive severe coastal storms.

As building codes do not have the authority to modify existing structures, it is hoped that these codes may be in existence after the next major storm to provide a uniform statewide control on building practices.

Suggested regulations are modeled after the recommended guidelines set forth in the recent Flood Insurance Administration publication, Design and Construction Manual for Residential Buildings in Coastal High Hazard Areas. This excellent reference addresses the following topics: the COASTAL ENVIRONMENT, regional characteristics, weather considerations, shoreline considerations, coastal construction practices, SITE DESIGN RECOMMENDATIONS, zoning restrictions, dune protection, bulkheads, STRUCTURAL DESIGN RECOMMENDATIONS, environmental forces, construction materials, and design details such as foundations, framing, bracing, anchorage, and utilities.

Typical construction costs are given as well as design tables for the determination of wind, water and piling loads. Bracing loads are also given, as well as other types of information, such as recommended wood preservatives. This manual has a step-by-step instruction section, including design worksheets. The manual is designed for use by engineers as well as utilized by laymen.

### Construction in Wave Velocity Zones

1. The lowest structural members of the lowest floor of any new, restored or substantially improved structure (above 50% valuation of the structure) shall be elevated a minimum of 6 feet above the 100 year flood level

as determined by the Flood Insurance Rate Maps of the Department of Housing and Urban Development. This six foot additional height requirement will be utilized by all new structures located within a wave velocity zone (V-zone).

2. All residential and/or recreational structures shall be anchored to pilings by methods outlined in 2-a. All piling material to be used in V-zones will utilize the American Society for Testing and Materials (ASTM) Class B piles driven to a depth of 10 feet msl. Either wood piles, with a minimum tip diameter of 10 inches; or precast, reinforced concrete piling material will be allowed. Wood pilings shall be treated with a wood preservative to resist decay and boring from marine borers.

(These guidelines are presently utilized in Delaware. The depth of -10 feet is suggested to prevent undercutting of the structure by scouring. During the pounding of large storm waves, the sand may be liquified to a depth of -5 feet msl, thus providing little lateral support for a piling in this area. Placing the piling at -10 feet msl will provide the necessary integrity against horizontal loads, from wind against the house and water against the pilings. The use of poured cement pilings is to be expressly forbidden. There is no way that these type of pilings can be placed at an adequate depth to prevent undercutting in the V-zone).

- a. The use of notched pilings to connect to the floor beams (sills) of the structure is recommended in the use of wood piles. A mortised galvanized steel plate should be used to connect the pile and beam.

Appendix A of the Design Manual should be used to determine the uplift capacity of the structure. The uplift capacity of various sized bolts will be determined to secure the structure. For all wind loads, sustained winds of 100 miles per hour will be used.

(In Table VI. a map is copied from the Design Manual which illustrates the annual extreme fastest wind speed for Rhode Island. Our wind zone averages between 90 to 100 MPH, thus for safety reasons the next highest wind speed was selected).

As it is recommended that this manual be utilized, especially the tables in the determination of loads for the safe design of a coastal structure, verification of the plans submitted to the CRMC and local town building code inspector will be easily verified utilizing the same manual. Therefore, uniform design and safety engineering will be more than a possibility along the Rhode Island shoreline.

3. Floor joists will be secured where each joist encounters a floor beam by the use of metal strapping nailed to the joist as well as to the beam.
4. To secure the exterior wall to the floor joists or floor beam, the same metal strapping (GALVANIZED) must be used connecting the exterior wall studs to the floor joist. The capacity of the connections depends upon the number of nails used.

5. Roof to wall connections are critical. Whether trusses or rafters are used, they should be placed between 16 to 24 inches on center. Because of the high wind load pressures uplifting the roof, it is essential to again use metal connector straps nailed from each truss or rafter to the exterior wall. Galvanized metal strapping is to be used.

(It is recommended that in the design of a roof, a pitch or slope greater than 40° be maintained. During high winds, a positive force is established on the windward side of the roof, while a negative force is established on the leeward side. This opposing action is similar to that of an airplane wing. When air passes over the top of a wing, uplift results and the plane flies. Maintaining a slope greater than 40° will help to stabilize the roof. This is dependent upon the roof being adequately secured as mentioned above).

6. Bracing of pilings is required in V-zones. Consulting Table B in the Design Manual will help determine the specific requirements for a given structure.
7. All exterior windows and doors should be proved by manufacturers standards to be able to withstand design wind speeds of 110 mph.

#### Construction in Stillwater Flood Zones

1. Houses located in stillwater flood zones must be elevated to the 100 year flood level as indicated by the Flood Insurance Rate Maps.
2. Piling embedment depths are not required to go to -10 feet msl. Values determined from the use of the Minimum Embedment Depth Table, Table A-3, will be substituted (Design Manual).
3. Bracing of pilings is required, determined for wind loads. Wave velocity should not be a problem in this area.
4. All other standards mentioned in the wave zone apply, such as construction methods of securing the structure, etc.

#### Conclusion

In order to accomplish a reduction in flood losses (property and lives) to coastal properties in the future, it is necessary to strengthen flood management strategies at the state level. State level guidance can eliminate inconsistent regulatory efforts at the municipal level.

Zoning and subdivision regulations have potential to offer essential flood management authority to the coastal communities of Rhode Island. At

present, zoning and subdivision regulations are inconsistent in their content, from community to community. A uniform approach is needed. Until issues of 'reasonableness', 'flexibility' and 'confiscation without due compensation' are resolved in the courts, the application of these flood mitigation measures remain questionable.

Building code regulations, which have their origin at the state level, offer a unified management approach. Reasonable and flexible building codes can assure the safety and integrity of flood-prone structures in minor or moderate storm events. Revised state guidelines, implemented by the Rhode Island Building Codes Standards Committee and the Rhode Island Coastal Resources Management Council, would achieve a reduction in future flood losses, a goal envisioned in Federal flood-related legislation enacted since the 1930's.

The National Flood Insurance Program, in January 1981, made a significant revision in their evaluation of the design and safety engineering of flood-prone structures. Property owners, seeking to build a new structure in flood hazard areas, will be required to submit plans of their structure. These plans will illustrate the ability of the structure to survive storm related damages. As a result of the ability of the structure to meet various criteria, yet to be defined, premium rates will be variable. A structure utilizing sound construction design will pay a lower premium than a structure having an insufficient design.

Many questions exist as to the feasibility of such a program. Specifics for the operation of this plan have yet to be revealed because of funding problems created by policies of the Reagan Administration. A rubberstamp approval of all plans could result if a sufficient review staff is not employed. This program could make the Flood Insurance Program more responsive to complaints that the Program unreasonably subsidizes the insuring of flood-prone structures.

The revisions recommended above may be criticized because of a lack of specific methodologies or design materials to be used in the construction of a flood-prone structure. Building codes in use elsewhere in the U.S. go into such specifics. It is the intension of the recommendations to identify problems of hazard design and to suggest specific regulatory revision. The revisions could be more comprehensive, but such an effort would be beyond the scope of this paper.

As to the costs of complying with more stringent building code regulations, Sheaffer and Roland estimate that construction costs increase between 6 and 16 percent.<sup>72</sup> They also note "it appears that elevation and flood proofing requirements increase residential property values by as much as 10 percent."<sup>73</sup> Thus it may be concluded that improved flood proofing techniques do not unreasonably tax the resources of the coastal property owner, as costs and benefits nearly balance each other out.

Even though the State Building Codes requires local compliance with State guidelines, enforcement of the Codes appears to be an important weakness in the compulsory intent of the legislation. Building Code Enforcement Officers interviewed in this paper (not cited for obvious reasons of confidentiality) varied in their interpretation of the codes and how they were to be enforced. Some were not aware of the additional 6 foot elevation requirement utilized by the CRMC. This is a serious problem. Ignorance or laziness may be interpreted to be contributing factors to awareness of state regulations. It appeared that a few of the enforcement officers were aware of their own codes for their respective community, but were not aware of state guidelines. This was not

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<sup>72</sup> Sheaffer and Roland, Inc., Evaluation of Flood Plain Management, p. 9.

<sup>73</sup> Ibid. p. 14.

indicative of all enforcement officers. But it must be concluded that the effectiveness of any program rests with uniform enforcement.

In a few cases examined, state engineers tasked with the responsibility of reviewing site plans and conducting onsite examinations, appeared to be suffering from oversight or non-compliance of the regulations they were enforcing. This problem results from the understaffing of the CRMC. It also results from the unwillingness, once a violation has been discovered, to impose a fine or writ demanding compliance. It appears that property owners institute a non-conforming activity, aware of the fact that once discovered, they will not be forced into compliance. This observation covered only structural compliance of CRMC and state building codes and regulations. The unwillingness to impose a fine, in the observations noted above, rests with the Coastal Resources Management Council.

To qualify the problem noted above, there is a structure located on Ocean Drive, in Jerusalem, Rhode Island. This structure was recently elevated. This building rests on wood pilings. It is secured from the piling to the floor beam by the use of eight 1/8th inch thick steel straps (non-galvanized). These straps are connected to the joists or beams and to the pilings by the use of six nails per strap. (Three nails placed in the piling and three nails placed in the floor beam). This structure was examined by state officials and by local officials. By definition of the State Building Codes and the Coastal Resources Management Program, previously discussed, it appears that the structure is not 'adequately anchored or secured'. At least it is not anchored by standards recommended in the Flood Insurance Administration's Design Manual.

Sheaffer and Roland note that lax application and enforcement of regulations are due to political and economic constraints. With federal cutbacks in the

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<sup>74</sup> Ibid. p. 30.

funding of Coastal Management Programs, state level efforts to regulate coastal uses such as residential development of coastal flood plains, will be placed in jeopardy.

For building codes to work, proper funding, training of enforcement personnel and enforcement of regulations is necessary. Without these problems being adequately addressed, building code regulations face similar fates placed on zoning regulations by the courts.

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Personal Interviews:

Anthony Pesaturo, Providence, Rhode Island, 16 March 1981.

John R. Sheaffer, of Sheaffer and Roland, Inc., New Orleans, Louisiana, 28 May 1980.

to sign all necessary agreements therefor, and to do and perform all necessary acts in connection therewith to effectuate the intent and purposes of such federal aid.

#### 161.111 Shore erosion emergency

If a shore erosion emergency is declared by the governor, the state, acting through the department of natural resources, may spend whatever state funds are available to alleviate shore erosion, including such funds specifically set aside for such purposes in the erosion control account.

#### 161.121 Penalty

Whoever shall fail to comply with the provisions of part I of this chapter is guilty of a misdemeanor and upon conviction shall be punished by a fine not to exceed five hundred dollars (\$500.00) or by imprisonment not exceeding six (6) months, or by both such fine and imprisonment.

#### 161.131 Construction of §§161.011-161.121

The provisions of §§161.011-161.121 shall be liberally construed by all concerned in a manner to best accomplish the beach and shore preservation purposes and programs.

### 3. [STATE ACQUISITION OF HAZARD AREAS, COST SHARING FOR LOCAL FLOOD AND EROSION CONTROL WORKS, LOCAL WORKS AUTHORIZED]

*R.I. Gen. Laws Ann.* §§46-3-1. to 5., -7. to 18. (1956) §§46-3-6., -19., -20. (Supp. 1968).

46-3-1. Short title.—This chapter shall be known and may be cited as the "Shore Development Act of 1956."

46-3-2. Declaration of purpose.—Consistent with the legislative determination and declaration of state policy to protect and promote the health, safety and welfare of the people as heretofore set forth in chapter 3485 of the public laws of 1955, it is hereby declared to be the intention of the state, by co-operative means providing for the acquisition, by purchase or otherwise, of lands, or any rights, title, interest or estate in lands in beach areas vulnerable to storm damage, to assist municipalities in arresting, protecting, and preserving such beach areas from erosion and damage by the elements.

46-3-3. Municipality defined.—The word "municipality" as used in this chapter shall mean a city or town, as the case may be.

46-3-4. Co-operation with federal government—Prevention of erosion.—The division of harbors and rivers is hereby designated the shore erosion authority of the state for the purpose of co-operating, with the beach erosion board of the department of defense, as provided for in §2 of the "River and Harbor Act" adopted by congress and approved July 3, 1930, and known as H. R. 11781 of the second session of the 71st congress. Said division of

harbors and rivers, under the supervision and direction of the director of public works, shall carry out investigations and studies of conditions along the shore line, harbors, rivers, and islands within the territorial waters of the state with a view to devising and projecting economical and effective methods and works for preventing or correcting beach erosion and damage to public and private property resulting therefrom.

46-3-5. Beach areas classed as exposed—Extent of areas.—Open beach areas, including spits, dunes, and barrier beaches that are subject to loss of material through high waves, strong currents, or scouring wave action, or beach areas vulnerable to storm damage because of geographical location, are classed as exposed beach areas within the meaning of this chapter. The limits of such exposed beach areas shall be the extent of the natural topography of the land surface, not necessarily co-extensive with political boundaries, and shall include private and public property upon which public money may be spent and public debt incurred for the protection and conservation thereof, and taxes levied to support expenditures for such purposes.

46-3-6. State payments toward acquisition of exposed beach areas.—To carry out the purposes of this chapter, the state, acting through the division of harbors and rivers within the state department of public works, shall provide the payment for two-thirds (2/3) of the cost of acquisition by a municipality of exposed beach areas as hereinafter defined; provided, however, that the municipality has filed proper application and preliminary proposal in accordance with the provisions of chapter 3485 of the public laws known as the "Shore development act of 1955"; or provided, that such application and preliminary proposal in the detail specified by §6 of said chapter 3485 is filed with said division of harbors and rivers on or before [July 30, 1957]; and provided, further, that each such exposed beach area to be so acquired is certified by said division of harbors and rivers to be endangered by erosion and to be in need of beach erosion control measures, and is found by the Rhode Island development council to be consistent with other official plans and proposed projects.

46-3-7. Designation of exposed areas—Protective works.—For the purpose of promoting the public health, safety, and general welfare, the city council of any city and the town council of any town, hereinafter referred to as the legislative body, shall have power in accordance with the provisions of this chapter, to designate the exposed beach areas, or portions thereof, requiring attention, and, subject to provisions hereinafter set forth, may construct or cause to be constructed on any lands or interests acquired pursuant to this chapter, at the expense of the municipality, any protective works designed to prevent loss of beach material and the erosion of exposed beaches, and to assess the cost of such protective works upon the owners of property benefiting from such protective works. For the purposes of this chapter, protective works shall include breakwaters, bulkheads, groins, jetties, rip-rap walls, dunes, filled areas, and other structures or results of construction activities customarily employed to correct, control or prevent erosion.

**46-3-8. Application for state aid.**—Upon the determination that any exposed beach area requires attention, the legislative body shall apply for state aid as herein provided for acquiring any land or interest therein needed, and shall request the division of harbors and rivers to make an inspection of the area for the purpose of entering into a co-operative agreement with respect thereto.

**46-3-9. Co-operative agreements with municipalities.**—Upon the finding that the acquisition of land or interest therein is required for the purpose of this chapter, the division of harbors and rivers shall enter into an agreement with said legislative body to provide for the acquisition of such land or interest as aforesaid in the manner approved for its acquisition and at the price mutually acceptable for its purchase or taking. Such agreement shall also set forth the existing or intended use of the exposed beach area to be protected, the scope and method to be employed by the municipality in accomplishing the results desired, and the method and means to be taken by the municipality to finance the cost for its share in acquiring the land and for installing the protective work appropriate for the area. The plans and specifications for any such protective works and their construction shall require the approval of the division of harbors and rivers.

The municipality, as a condition precedent to the acquisition of any land to be acquired by the state under the provisions of this chapter shall give satisfactory guaranty to the state that the construction and maintenance of such protective works will be carried out by it as specified in such co-operative agreement.

All contracts and agreements for the purposes of this chapter shall be approved as to form by the attorney-general and as to substance by the director of public works and the state properties committee.

**46-3-10. Condemnation of property.**—Whenever it is impossible to reach agreement upon the price to be paid for the purchase of any land or interest therein needed to carry out the purposes of this chapter, or whenever the owner is legally incapacitated or is absent or is unable to convey valid title or is unknown, the division of harbors and rivers is hereby authorized and empowered to acquire by condemnation any properties, notwithstanding whether such properties taken or acquired are or may be devoted to public uses. Such condemnation proceedings shall be conducted and the compensation to be paid shall be ascertained and paid pursuant to the provisions of chapter 6 of title 37.

**46-3-11. Municipal bonds authorized.**—For the purpose of financing the municipality's share of the cost of acquiring any land or interest therein needed and for defraying the cost of the construction or installation of any structures or facilities approved for the control of beach erosion, the legislative body is authorized and empowered to issue bonds under the corporate name and seal of the municipality, bearing not more than six per cent (6%) interest, per annum, payable semiannually, at such times not exceeding the normal expected life of the construction or installation of the kind and sort employed, for such sum as may be authorized by the vote of the electors not in excess of an aggregate amount of three hundred thousand dollars (\$300,000) outstanding at any one (1) time. Such bonds shall be obligatory

upon said municipality in the same manner and to the same extent as other debts lawfully contracted by said municipality. The provisions of §§46-12-2 and 45-12-11 shall not apply to any bonds issued by any municipality under the provisions of this chapter.

**46-3-12. Assessments against property benefited authorized.**—For the purpose of securing repayment for the construction cost borne by the municipality for any erosion control system installed or for the cost of any land or interest purchased or taken pursuant to this chapter, the legislative body is authorized and empowered to assess any property upon which taxes are now levied that is benefited by such protective works, and to fix the rate of assessments levied thereon. Such assessments shall be a lien upon each such property or estate so assessed in the same way and manner as other taxes assessed on real estate are liens, and, if not paid as required, shall be collected in the same manner that other taxes assessed on real estate are by law collected.

**46-3-13. Property subject to assessment—Costs included.**—The legislative body may apportion and assess such part upon the lands and buildings in the municipality which, in its judgment, are especially benefited thereby, whether they abut on such erosion control system or not, and upon the owners of such lands and buildings, subject to the right of appeal. Such assessment may include a proportionate share of any expenses incurred in the construction of any erosion control system, such as legal fees, service expenses, interest, and publication costs, and related incidental expenses. The legislative body may divide the total territory to be benefited in each section separately. In assessing benefits against the property in any section, the legislative body may add to the cost of the part of the erosion control system located in such section, a proportionate share of the cost of any part of such system located outside the section which is useful for the operation or effectiveness of that part of such system within the section, and of any of the other items of cost or expenses above enumerated.

**46-3-14. Apportionment of assessments.**—Whenever any assessment is made as herein provided, the amount to be raised thereby shall be apportioned among the properties benefited according to such rule as the legislative body may adopt; provided that no benefits shall be assessed against any property in excess of the special benefit to accrue to such property. The legislative body may make reasonable allowances when for any reason the particular condition or situation of any property require such allowance.

**46-3-15. Application of assessment proceeds.**—The proceeds of such assessments, whether or not pledged for the payment of securities, shall be segregated from other funds of the municipality, and shall be used only to pay for the construction of the erosion control system or particular portion thereof in respect to which such assessments are made or, as the case may be, for the payment of the interest on, or principal of, any securities issued to pay for such system or particular part thereof.

**46-3-16. Technical advice—Acquisition and supervision expense.**—The division of harbors and rivers is authorized to furnish at the request and

expense of the legislative body such technical advice consisting of plans, specifications, surveys, appraisals, cost estimates, engineering and inspection services such as legislative body may deem advisable. Whenever such legislative body contracts with the state for the acquisition of land or for the supervision and inspection of any construction undertaken by it, the expenses thereof shall be deemed part of the cost of such construction or land acquisition.

**46-3-17. Title to land acquired—Municipal contributions.**—Whenever any land is purchased or otherwise acquired pursuant to the provisions of this chapter, title to the same shall be taken in the name of the state of Rhode Island and payment therefor shall be made in the first instance by the state from the appropriation hereinafter provided. At the time such payment is due and payable the municipality for which the land is acquired shall pay to the state its proportionate share of the cost as hereinbefore set forth. All moneys so paid to the state by any municipality for the purposes of this chapter shall be received by the general treasurer and by him deposited in a special fund. All moneys in such special fund shall be expended for the purposes of defraying the cost of land acquisition as aforesaid under the direction and supervision of the director of public works with the approval of the governor, and said director is vested hereby with all powers and authority necessary or incident to the purposes of this chapter.

The state controller is hereby authorized and directed to draw his orders upon the general treasurer for the payment out of said fund of such sum or sums as may be required from time to time upon receipt by him of proper vouchers approved by the director of administration.

**46-3-18. Transfer of land to municipality.**—Title to any land or interest therein purchased or acquired as hereinbefore provided for carrying out the purposes of this chapter shall vest in the municipality for which it is acquired upon transfer of title from the state as the acquiring authority hereunder.

The transfer of title by the state and the acceptance by the municipality of any exposed beach area acquired under authority of this chapter shall hereby be expressly deemed to dedicate such property henceforth to the public use; and, subject to such stipulations as may pertain to access to and use of such land, all regulations in respect thereto shall apply alike to the citizens of the municipality and to the citizens of the state.

**46-3-19. Cost of construction—Federal assistance.**—In the event that the federal government shall make available any funds for all or part of the construction of protective works, as defined in §46-3-7, the remaining portion of the cost therefor not fully covered by such (1/3) of the total cost for such construction for such city or town; and, provided, further, however, that in no event shall the construction commence until the city or town has appropriated and made available the funds required by such city or town for such purposes, and in such event the city or town may assess the cost thereof as in said §46-3-7 provided.

**46-3-20. Authority of chief of division of harbors and rivers—Federal assistance.**—The chief of the division of harbors and rivers in the depart-

ment of public works shall have full and complete authority to act as the public agency of the state, to cooperate with and assist the federal government in all matters relating to the construction of protective works in the event that the federal government shall make any federal funds or federal assistance therefor. Said chief or any subordinate designated by him, may act as the agent of the federal government in accordance with the requirements of the provisions of any federal legislation relating to such federal assistance.

Said chief, with the approval of the governor, is hereby authorized to accept, on behalf of the state, the provisions of any such federal legislation, and may file written evidence of each such acceptance with the federal government. Each such acceptance shall be duly signed by the chief and countersigned by the director of public works.

Said chief may enter into all necessary contracts and agreements with the federal government, or any agency thereof, necessary or incident to the construction of protective works, and all such contracts and agreements shall be signed in the name of the state by the chief and countersigned by the director of public works, and in such event the construction shall be carried out and executed in all respects subject to the provisions of the appropriate federal law, and the rules and regulations made pursuant thereto, and to such terms, conditions, rules and regulations, not inconsistent with such federal law, rules and regulations, as the chief of the division of harbors and rivers may establish with respect to such construction.

All moneys paid to the state by the federal government for the purpose hereinbefore set forth, shall be received by the general treasurer and by him deposited in a separate fund; and the state controller is authorized and directed to draw his orders on the general treasurer for the payment thereof, or so much thereof as may be required from time to time for such purposes, upon the receipt by him of proper vouchers signed by the chief of the division of harbors and rivers and approved by the director of public works.

### 3. ACTS AUTHORIZING LOCAL BEACH EROSION OR FLOOD CONTROL WORKS

#### 1. [COUNTY BEACH AND EROSION CONTROL DISTRICTS] *Fla. Stat. Ann. §§161.25-45 (Supp. 1970).*

#### PART II. BEACH AND SHORE PRESERVATION DISTRICTS

##### 161.25 County beach and shore preservation authority; board of county commissioners

To carry out the beach and shore preservation program, the board of county commissioners of any county and its successors in office, as an ex officio duty, are hereby severally constituted as the beach and shore preservation authority for their county. In this capacity, any such board of county commissioners may at its own initiative take all necessary steps as soon as practicable and desirable to implement the provisions of this chapter.

##### 161.26 Expenses; use of county funds

The board of county commissioners of any of the counties is authorized to



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Community Affairs  
BUILDING CODE STANDARDS COMMITTEE  
12 Humbert Street  
No. Providence, R.I. ~~02904~~ 02911  
(401) 277-3033

RHODE ISLAND  
STATE BUILDING CODE  
RULES AND REGULATIONS  
FOR  
CONSTRUCTION IN FLOOD HAZARD AREAS

SBC-5-77

DATED: JULY 1, 1977  
\*Revised August 31, 1979

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## ARTICLE 1 - SCOPE

100.1 GENERAL - In order to encourage only that development of floodprone areas which is appropriate, in light of the probability of flood damage, and recognizing the need to reduce flood losses within the context of acceptable social and economic use of the land; in relation to the hazards involved, and in order to avoid any increase in the danger to human life, and to discourage all other development, building restrictions must be observed within the designated flood hazard areas, as they now exist, or as they may hereafter from time to time be amended.

100.2 DESIGNATED AREAS & PROJECTS - All building projects, including new construction and substantial improvements to existing structures, and the placement of prefabricated buildings and mobile homes, shall be reviewed to determine if the location is within any area of special flood hazards as designated by the Federal Insurance Administration (FIA), through issuance of a Flood Hazard Boundary Map or through a scientific and engineering report entitled "Flood Insurance Study" with accompanying Flood Insurance Rate Maps and Flood Boundary and Floodway Maps.



## ARTICLE 2 - DEFINITIONS

For the purpose of these regulations the following terms, phrases, words and their derivations shall have the meaning given herein. When not inconsistent with the context hereof, words used in the present tense shall include the future; words used in the singular shall include the plural.

**APPEAL** - Means a request for a review of the Building Official's interpretation of any provision of these regulations or a request for a variance.

**AREA OF SHALLOW FLOODING** - Means a designated AO or VO Zone on a community's Flood Insurance Rate Map (FIRM) with base flood depths from one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and indeterminate, and where velocity flow may be evident.

**AREA OF SPECIAL FLOOD HAZARD** - Is the land in the flood plain within a community subject to a one percent or greater change of flooding in any given year.

**BASE FLOOD** - Means the flood having a one percent chance of being equalled or exceeded in any given year (Also known as the 100-year flood).

**BREAKWAY WALLS** - Means any type of walls, whether solid or lattice and whether constructed of concrete, masonry, wood, metal, plastic, or any other suitable building material which are not part of the structural support of the building and which are so designed to break away, under abnormally high tides or wave action, without damage to the structural integrity of the building on which they are used or any buildings to which they might be carried by flood waters.

**COASTAL HIGH HAZARD AREA** - Means the area subject to high velocity waters, including hurricane wave wash. The area is designated on a FIRM as Zone VI-30.

**FEDERAL INSURANCE ADMINISTRATION** - The agency that administers the National Flood Insurance Program.

**FLOOD OR FLOODING** - (a) A general and temporary condition of partial or complete inundation of normally dry land areas from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.
3. Mudslides (i.e. mudflows) which are proximately caused or precipitated by accumulations of water on or under the ground.

ARTICLE 2 Continued

- (b) The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in (a) (1) above.

FLOOD HAZARD BOUNDARY MAPS (FHBM) - An official map of a community, issued by the Federal Insurance Administration, where the boundaries of the flood, mudslide, (i.e. mudflow) related erosion areas having special hazards have been designated as Zone A, M and/or E.

FLOOD INSURANCE RATE MAP (FIRM) - An official map of a community on which the Federal Insurance Administration has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

FLOOD INSURANCE STUDY - Means the official report in which the Federal Insurance Administration has provided flood profiles as well as the Flood Hazard Boundary-Floodway Map and the water surface elevation of the base flood.

FLOOD PROOFING - Means construction methods and materials adequate to withstand the flood depths, pressures, velocities, impact and uplift forces and other factors associated with the base flood. Additionally, below the base flood level the structure is to be watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

MEAN SEA LEVEL - Means the average height of the sea for all stages of the tide.

MOBILE HOME - Means a structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. It does not include recreational vehicles or travel trailers.

NEW CONSTRUCTION - Means structures for which the "start of Construction" commenced on or after the effective date of these regulations.

ARTICLE 2 Continued

**PHYSICAL VALUE** - See definition in section 106.5 of the Rhode Island State Building Code and definition of Substantial Improvement.

**STRUCTURE** - A walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a mobile home.

**SUBSTANTIAL IMPROVEMENT** - Means any repair, reconstruction, or improvement of a structure, the cost of which equals or exceeds 50 percent of the market value (physical value) of the structure either (a) before the improvement or repair is started or (b) if the structure has been damaged, and is being restored, before the damage occurred. For the purpose of this definition "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure. The term does not however, include either (1) any project for improvement of a structure to comply with existing state or local health, sanitary, or safety code specifications which are solely necessary to assure safe living conditions or (2) any alteration of a structure listed on the National Register of Historic Places or a State Inventory of Historic Places.

**VARIANCE** - Means a grant of relief by a community from the terms of these rules and regulations.

## ARTICLE 3 ADMINISTRATION

### 300.1 DUTIES AND RESPONSIBILITIES OF THE BUILDING OCCICIAL

Duties of the Building Official shall include but not be limited to:

#### (a) Permit Review

- (1) Review all building permits to determine that the requirements herein have been satisfied.
- (2) Review all building permits to require that all necessary permits have been obtained from those federal, state, or local governmental agencies from which prior approval is required.

#### (b) Use of Other Base Flood Data

In the absence of base flood elevation data provided by the Federal Insurance Administration, the Building Official shall obtain, review and reasonably utilize any base flood elevation data available from a federal, state or other source in order to administer Article 4, Construction Requirements.

#### (c) Information to be Obtained and Maintained

- (1) Verify and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures.
- (2) For all new or substantially improved floodproofed structures:
  - (i) verify and record the actual elevation (in relation to mean sea level), and
  - (ii) Maintain the floodproofing certifications required in Section 400.2 (b)
- (3) In coastal high hazard areas, certification shall be obtained from a registered professional engineer or architect that the structure is securely anchored to adequately anchored pilings or columns to withstand velocity waters and hurricane wave wash.
- (4) Maintain for public inspection all records pertaining to these rules and regulations.

#### (d) Interpretation of Map Boundaries

The Building Official shall make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation (See Article 5 - Variances and Appeals).

## ARTICLE 4 CONSTRUCTION REQUIREMENTS

### 400.1 GENERAL STANDARDS

In all areas of special flood hazards the following provisions are required:

#### (A) Anchoring

- (1) All new construction and substantial improvements shall be anchored to prevent flotation, collapse or lateral movement of the structure.
- (2) All mobile homes shall be anchored to resist flotation collapse, or lateral movement by providing over-the-top and frame ties to ground anchors. Specific requirements shall be that:
  - (i) over-the-top ties be provided at each of the four corners of the mobile home, with two additional ties per side at intermediate locations and mobile homes less than 50 feet long requiring one additional tie per side;
  - (ii) frame ties be provided at each corner of the home with five additional ties per side at intermediate points and mobile homes less than 50 feet long requiring four additional ties per side;
  - (iii) all components of the anchoring system be capable of carrying a force of 4,800 pounds;
  - (iv) any additions to the mobile home be similarly anchored.

#### (B) Construction Materials and Methods

- (1) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
- (2) All new construction and substantial improvements shall be constructed by methods and practices that minimize flood damage.

#### (C) Utilities

- (1) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.
- (2) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters.
- (3) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

ARTICLE 4

400.2 SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data has been provided, as set forth in Section 100.2 or Section 300.1 (B), the following provisions are required:

(A) Residential Construction

New construction or substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to or above the base flood elevation.

(B) Non-Residential Construction

New construction or substantial improvement of any commercial, industrial or other non-residential structure shall either have the lowest floor, including basement, elevated to the level of the base flood elevation or together with attendant utility and sanitary facilities, be floodproofed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy. A registered professional engineer or architect shall certify that the standards of this sub-section are satisfied. Such certification shall be provided to the Building Official as set forth in Section 300.1 (C) (2).

(C) Mobile Homes

- (1) Mobile homes shall be anchored in accordance with Section 400.1 (A) (2).
- (2) For mobile homes not placed in a mobile home park or subdivision require:
  - (i) stands or lots are elevated on compacted fill or on pilings so that the lowest floor of the mobile home will be at or above the base flood level.
  - (ii) adequate surface drainage and access for a hauler are provided, and
  - (iii) in the instance of elevation on pilings, lots are large enough to permit steps, piling foundations are placed in a stable soil no more than ten feet apart, and reinforcement is provided for pilings more than six feet above the ground level.

ARTICLE 4

(D) Coastal High Hazard Areas

Coastal high hazard areas (V zones) are located within the areas of special flood hazard and are associated with high velocity waters from tidal surges and hurricane wave wash, therefore the following provisions shall apply:

- \* (1) Provide (1) that all new construction and substantial improvements are elevated on adequately anchored pilings or columns, and securely anchored to such piles or columns so that the lowest portion of the structural members of the lowest floor (excluding the pilings or columns) is elevated above the base flood level and (2) that a registered professional engineer or architect certify that the structure is securely anchored to adequately anchored pilings or columns in order to withstand velocity waters and hurricane wave wash as set forth in Section 300.1 (C) (3).
  
- \* (2) Provide (i) that all new construction and substantial improvements have the space below the lowest floor free of obstructions or be constructed with "breakway walls" intended to collapse under stress without jeopardizing the structural support of the structure so that the impact on the structure by abnormally high tides or wind-driven water is minimized. Such temporarily enclosed space shall not be used for human habitation or for the enclosure of any utility or item essential to the structure unless such item or utility is floodproofed.
  
- (3) Prohibit the use of fill for structural support of buildings.

ARTICLE 5 - VARIANCES AND APPEALS

500.1 Requirements and Procedures for Variances

The Board of Appeals after examining the applicant's hardships shall approve or disapprove a variance request and shall hear and decide appeals from the requirements of these regulations, in accordance with the procedures of Section 127.0 of the Rhode Island State Building Code and the following:

(A) Board of Appeals

The local Board of Appeals shall hear and decide appeals when it is alleged there is an error in any requirement, decision or determination made by the Building Official in the enforcement or administration of these regulations.

(B) Conditions for Variances

- (1) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this Article.
- (2) Variances may be issued for new construction and substantial improvements to be erected on a lot of one half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, in conformance with the procedures of paragraphs B (3), (4), (5), and (6) of this Article.
- (3) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
- (4) Variances shall only be issued upon (1) a showing of good and sufficient cause, (2) a determination that failure to grant the variance would result in exceptional hardship to the applicant, and (3) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
- (5) Any applicant to whom a variance is granted shall be given a written notice from the Board of Appeals that the structure will be permitted to be built with a lowest floor elevation X feet below the base flood elevation.



ARTICLE 5 - VARIANCES AND APPEALS (Continued)

- \* (6) The Board of Appeals shall notify the applicant in writing (over the signature of the Chairman of the Board) that (i) the issuance of a variance to construct a structure below the base flood level will result in increase premium rates for flood insurance wup to amounts as high as \$25 for \$100 of insurance coverage and (ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions, including justification for their issuance. All such variances issued shall be reported in the community's Annual Report to the Federal Insurance Administrator.
- \* (7) Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result. (For communities which must meet the requirements of Section 1910.3 (d) of the National Flood Insurance Program regulations.)

ARTICLE 5 - VARIANCES AND APPEALS (Continued)

- \* (6) The Board of Appeals shall notify the applicant in writing (over the signature of the Chairman of the Board) that (i) the issuance of a variance to construct a structure below the base flood level will result in increase premium rates for flood insurance wup to amounts as high as \$25 for \$100 of insurance coverage and (ii) such construction below the base flood level increases risks to life and property. Such notification shall be maintained with a record of all variance actions, including justification for their issuance. All such variances issued shall be reported in the community's Annual Report to the Federal Insurance Administrator.
- \* (7) Variances shall not be issued by a community within any designated regulatory floodway if any increase in flood levels during the base flood discharge would result. (For communities which must meet the requirements of Section 1910.3 (d) of the National Flood Insurance Program regulations.)

State and municipality	Flood regulations		Erosion control	Dune and natural barrier protection	Miscellaneous
	Use restrictions	Minimum protection elevations			
Edenton (Cont'd.)	uses, single family residences.				
Onslow County				[Sand Dune Protection Ordinance] (1968) Prohibits material weakening of dunes.	
Plymouth	[Zoning] §7.2 "Conservation Agricultural District" Open space uses permitted in areas subject to flooding				
Jacksonville		[Building Code] (1955). Requires building be elevated on pilings 8 ft. above mean high water.			
OHIO					
Eastlake	[Special Ordinance] Moratorium on building along Lake Erie in area of special erosion damage.				
RHODE ISLAND					
Bristol	[Building Code] §66 Buildings in area of hurricane danger less than 10 ft. above mean sea level or	[Building Code] §66. First floor elevation of any building in area of flooding danger must			

State and municipality	Flood regulations		Erosion control	Dune and natural barrier protection	Miscellaneous
	Use restrictions	Minimum protection elevations			
Bristol (Cont'd.)	less than 20 ft. above if within 300 ft. of mean sea level line must be elevated and reinforced.	be at least 10 ft. above mean sea level.			
East Providence	[Zoning] §32-18 Lands subject to hurricane flooding lying 10 ft. or less above mean sea level restricted to open uses and uses such as yacht clubs, light houses, marinas, areas subject to hurricane flooding lying 15 ft. or less above mean sea level but above 10 ft. may be used for structures for human occupancy if protected.	See Column I. First floor level of any building used for human occupancy shall be 10 ft. above mean sea level.			
Middletown	[Zoning] §5.5 (1968) Tide lands lying 12 ft. or less above mean sea level shall be used primarily for open uses, yacht clubs, marinas, and so forth.	See Column I. First floor elevations for building used for human occupancy must be 12 ft. above mean sea level.			

State and municipality	Flood regulations		Erosion control	Dune and natural barrier protection	Miscellaneous
	Use restrictions	Minimum protection elevations			
Providence	[Zoning] (1966) Like East Providence above.	[Zoning] (1966). Like East Providence above.			
Warwick	[Zoning] (1967) Two-district ordinance for hurricane areas. In areas of extreme danger, only open space uses permitted; in areas of lesser danger, the first floor of buildings designed for overnight occupation must be 15 ft. above mean sea level.	See Column I.			
SOUTH CAROLINA Charleston	[Zoning] §51-48 Zoning administrator may refuse to issue building permit for flood hazard area unless certain standards are met. Similar requirements in Subdivision Code.				
TEXAS Corpus Christi		[Building Code] Ord. #8645 (1967). All buildings or structures must have a minimum		[Building Code] Wind protection. Southern Standard Building Code.	

State and municipality	Flood regulations		Erosion control	Dune and natural barrier protection	Miscellaneous
	Use restrictions	Minimum protection elevations			
Corpus Christi (Cont'd.)		floor elevation of 7 ft. above mean tide level; flood-proofing requirements.			
Groves		[Building Code] Ord. #409 (1969) Residential and commercial floor elevations must be at least 10 ft. above mean sea level for some areas, 4.5 ft. in others.			
Nederland		[Zoning] Minimum grade elevations for concrete slab foundations.			
Port Arthur		[Building Code] Ord. #70-03 (1970) Defines minimum floor elevations for structures of 2 to 10 ft., depending upon the area.			

VIRGINIA Chesapeake	[Zoning] §2-13 (1969) Flood plain zoning for open space uses. [Subdivision] §III. (4)5 (1968) Plats				
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Building Code and all federal, state, county and village laws, ordinances, rules and regulations.

SECTION 7.3. The Board of Trustees may require the applicant to file with the Village Clerk a performance bond in an appropriate amount to guarantee fulfillment of applicant's program.

[ZONING] Providence, R.I. (Nov., 1966).

SEC. 32-18. *Areas subject to flooding*

Notwithstanding any other provisions of this chapter, the following provisions and restrictions regarding areas subject to flooding shall apply:

(a) No lands subject to seasonal or periodic flooding by freshet or by surface water during or after heavy rain shall be used for building purposes unless such lands are improved to eliminate such flooding. Before any lands are improved to eliminate flooding or any building or use of premises takes place, plans regarding the method of eliminating the flooding conditions shall be submitted to the zoning officer and approved by the city engineer before any zoning, building or occupancy permit is issued or approved.

(b) In areas subject to hurricane tidal flood, no structure intended for human occupancy shall be erected or placed on tidal lands lying fifteen feet or less above mean sea level except in cases where the following conditions are satisfied:

(1) The use shall be a permitted use in the zone in which the property is located.

(2) The first floor level of any structure designated for human occupancy shall have a minimum elevation of ten feet above mean sea level.

(3) The methods of water supply and sewage disposal are adequate and protected.

(4) Plans concerning the means by which the structure shall be secured or protected shall be submitted to and subject to the approval of the zoning officer before any permit is issued or construction is commenced.

(c) Areas subject to hurricane tidal flood lying ten feet or less above mean sea level shall not be used for any purpose except the following:

(1) Parks operated by a governmental agency.

(2) Nonbuilding uses such as farming; bathing beaches or picnic areas.

(3) Beach cabanas, not intended for human occupancy.

(4) Marinas, yacht clubs, boat docks, launching ramps, marine terminals and bulkheads.

(5) Lighthouse, sea wall, breakwater, jetty or other protective structure.

[ZONING] Warwick, R.I. (March, 1957).

B. *Zoning Ordinance*

SECTION 2.2.1.1. Areas of extreme hurricane danger are lots 23-72, 207-212, 225-231, 237-267, 288-290, 307-424, 426-433, 435-454, 456-458 on assessor's plat 334; lots 1-3, 26-28, 86-89, 174, 268-270, 355-356, 434-437 on assessor's plat 360; lots 92-94, 106-108, 202-205, 303-305, 307-314, 410-416, 424-429, 450-462, 472-475, 483-534 on assessor's plat 375; and lots 429-431, 439, 441-468, 470-480, 482-508, 516-528 on assessor's plat 376.

SECTION 3.8. Areas of hurricane danger. In areas of hurricane danger the first floor of any building other than an accessory building or a commercial, industrial, or recreational building not designed for overnight occupancy shall have a minimum elevation above mean sea level of fifteen (15) feet.

SECTION 3.8.1. In areas of extreme hurricane danger, notwithstanding the provisions of any other section of this ordinance, no building shall be erected or altered and no building shall be used for any purpose except:

Section 3.8.1.1 Non commercial boat docks

Section 3.8.1.2 Beach cabanas

Section 2.8.1.3 Non-building uses such as farming, bathing beaches, picnic areas.

Section 3.8.1.4 Similar uses on approval by the Zoning Board of Review.

SECTION 4.5. Non-conformance caused by Hurricanes (Non-Conforming Uses). All uses which are made non-conforming by the regulations pertaining to the areas of hurricane danger may be continued and maintained and the following special provisions shall apply:

4.5.1. Principal buildings demolished or removed from foundations by any hurricane may be rebuilt or replaced on foundations provided that such buildings shall be rebuilt or replaced in accordance with the provisions of this ordinance concerning areas of hurricane danger and with the provisions of section 19A through F (foundations) of the Building Ordinance of the City of Warwick.

SECTION 15.2.1. *Enforcement.* The application for a permit for any building to be erected in an area of hurricane danger shall state the elevation of the first floor of the proposed building above the finished grade of the lot.

DUNE AND BEACH PROTECTION

[DUNE PROTECTION] Brigantine, N.J., Ord. No. 7 (July, 1962).

AN ORDINANCE REGULATING AND CONTROLLING THE REMOVAL OF SAND, OR THE INTERFERENCE WITH, ALTERATION,

chored thereto with not less than ½ inch bolts embedded at least 6 inches in the masonry.

(6) Wooden columns and posts shall be securely anchored to their foundations and to the members which they support.

All new structures and all structures rebuilt or repaired where the structure required a new foundation or where rebuilding or relocating a building on existing foundations is necessary, shall be built upon piles in accordance with the following requirements.

(1) Height. Piles shall not be less than eight (8) feet in height measured from the "Building Line" of the Town of Wrightsville Beach as established by the North Carolina General Assembly and as shown on the map of the Town of Wrightsville Beach dated September 4, 1941. The height of the piles measured from the mean high water mark if established by competent authority may be used in lieu of the "Building Line" in measuring the required pile height. The average elevation of the building lot may be obtained by averaging the known elevations measured at the corners of such lot.

(2) Type of Pile. . . .

(3) Required Depth of Piles. Piles shall be sunk or buried to a depth of not less than 100% of the required height of the pile.

(4) Size of Wood Piles. . . .

(5) Spacing of Wood Piles. The maximum center-to-center spacing of wood piles shall not be more than eight (8) feet on centers under weight bearing sills. However, for two story or larger buildings or where the load bearing requirements demand it piles may be required to be spaced closer together by the building inspector.

(6) Tying and Bracing of Wood Piles. Wood piles shall be tied to the structure with bolts or galvanized nails, or tied in some other approved manner. Each pile shall be properly braced in an approved manner and when timber braces are used the recommended size shall be 4" x 4".

(RHODE ISLAND DEVELOPMENT COUNCIL SUGGESTED COASTAL ZONING) (1955)

#### MODEL HURRICANE ZONING REGULATIONS

The following provisions are suggested as additions or amendments to existing zoning ordinances and building codes. In those communities where there are no such ordinances at the present time, special regulations containing the provisions noted below might be adopted as an interim measure, until complete ordinances are enacted.

##### 1. DEFINITIONS

(These three definitions should be added to the existing Article on Definitions):

a. *Areas of Extreme Danger* are all lands that are vulnerable to the direct impact of hurricane waves and floods and all lands from which

escape to high ground is limited by tidal ponds or any other natural obstacle. (In general, these areas should include all lands on the shores of southerly exposure having an elevation of 10 feet or less, and all lands on such shores having an elevation of less than 20 feet which lie within 300 feet of the mean high tide line.)

b. *Areas of Danger* are all lands that are vulnerable to flooding caused by hurricanes. (In general, these areas should include all lands on the shores of southerly exposure, not included in the Areas of Extreme Danger, which have an elevation of less than 20 feet.)

c. Elevation is the height above mean sea level as used by the United States Geological Survey.

##### 2. ZONES AND ZONE BOUNDARIES

(The following three zones should be added to the existing Article on Zones and Zone Boundaries. The zone boundaries should be determined by reference to an official zoning map on which such areas are designated.)

- a. BD "Beach Zones in Area of Extreme Danger"
- b. CD "Commercial Zones in Area of Extreme Danger"
- c. Area of Danger

##### 3. ZONE REGULATIONS

(The following regulations for the BD, CD, and Area of Danger zones should be added to the existing Article on Zone Regulations.)

###### a. BD Zones

###### *Permitted Uses*

- (1) Beach clubs, beach cabanas and dressing rooms, bathhouses and boat docks.
- (2) Open space uses such as farming, bathing beaches, picnic areas, golf courses, auto parking areas, parks, and wildlife refuges, together with such small buildings for daytime occupancy only which are auxiliary to these uses.

###### *Other Regulations*

- (3) Regulations for height, width of lot, side yards, rear yards, and front yards, except as modified by Section 4 of this ordinance, shall be the same as are set forth for Residential A districts (or the most restrictive residential zone in the town).

###### b. CD Zones

###### *Permitted Uses*

- (1) All uses permitted in BD Zone.
- (2) All commercial uses permitted in commercial zones (of the local ordinance) except for residences, hotels, boarding houses and any other buildings used for overnight occupancy.

- (3) Hotels, casinos, recreational buildings, and yacht clubs may be allowed as special exceptions if (a) the site conditions are such that it is deemed possible to build such tide to be safe from hurricane waves and flooding and (b) if the allowance of such use will provide the general welfare of the town (or city).

*Other Regulations*

- (4) Regulations for height, width of lot, side yards, rear yards, and front yards, except as modified by Section 4 of this ordinance, shall be the same as are set forth for commercial districts (of the local ordinance).

c. Areas of Danger

*Permitted Uses*

- (1) All uses permitted within this area before the passage of this ordinance.

*Other Regulations*

- (2) All regulations now in effect within these areas shall remain in effect except as modified by Section 4 of this ordinance. (In general, only construction of buildings within an Area of Danger will be regulated. See Section 4.)

4. SPECIAL OR EMERGENCY REGULATIONS

(A new Article, entitled 'Special or Emergency Regulations, should be added to the zoning ordinance. This Article, concerned with protective measures for the Areas of Danger and the BD and CD zones, contains provisions intended to help safeguard these areas from hurricane waves and floods.)

a. *Construction*—The construction of all buildings, except accessory buildings of under 100 square feet of floor area, shall meet the following requirements:

*BD and CD Zones*

*Foundation*

- (1) Foundations shall be either, (a) constructed of continuous concrete, poured between two forms and shall be at least 12 inches thick and shall extend at least 4 feet below the surface of finished grade, or (b) shall be piles of creosoted wood, composite piles of creosoted wood bottom and concrete top or concrete piles. Piles shall be spaced a maximum of 12 feet on centers and shall extend below grade at least as much as they extend above grade, but they shall not extend less than 4 feet below grade. The diameter of the top of any pile shall be not less than 6 inches.

*Footing*

- (2) No foundation shall be constructed without proper footing.

*Anchorage*

- (3) The superstructure shall be adequately anchored to the foundation to withstand hurricane winds and flooding.

On walls of masonry block construction, flat metal straps or similar ties shall be attached to the foundation and shall extend up to and shall be attached to the top row of blocks. These straps shall be spaced a maximum of 8 feet on center and shall be at least ¼ inch thick and 2½ inches wide.

The wall sills of all buildings of wood frame construction shall be anchored to the foundation at each corner and at intermediate intervals of not more than 8 feet with ¾ inch bolts embedded in the masonry foundation to a depth of not less than 12 inches and having a right-angle bend within the foundation.

The superstructure of all buildings using a pile foundation shall be anchored to each pile with a ¾ inch bolt extending at least 12 inches into the pile, or shall be anchored to each pile with a flat metal strap at least ¼ inch thick and 2½ inches wide or similar anchorage of proper size and shape.

*Superstructure*

- (4) The superstructure shall be designed and constructed to resist wind loads of hurricane intensity.

In buildings of wood frame construction, the highest plate of all outside walls shall be tied to the foundation at each corner of the building and at intermediate intervals of not more than 25 feet with 2 tie rods ¾ inch in diameter. One end of the tie rod shall be bolted to the plat and the other end shall be embedded in the foundation to a depth of not less than 12 inches with a right-angle bend within the foundation, or if built on piles, shall be bolted to the sill.

The sheathing on all walls of wood frame construction shall be diagonally boarded at each corner for a distance along the wall equivalent to the height of the highest plate above the sill.

The roof shall be attached to the walls with hurricane braces or similar brackets. The braces shall be used to attach each rafter to the wall plate on which it rests.

*AREAS OF DANGER*

The same construction requirements for foundations and anchorage as heretofore set forth in BD and CD zones shall be in effect in Areas of Danger.

b. *Dislocation by Floods*—All buildings, except accessory buildings of under 100 square feet of floor area, that were built before the passage of this ordinance and which have been carried off their foundations by hurricane winds or waves shall be required to conform to the regulations as stated herein before they may be replaced on their foundation or relocated to another site within an Area of Danger or Extreme Danger.

c. *Damaged Buildings*—Buildings located in BD or CD zones and Areas of Danger that are damaged by fire, explosion, or by wind, wave or water action caused by hurricanes or great storms for which the cost of such reconstruction or restoration exceeds 75% of the market value of the building in the year such damage occurs, shall be required to conform to the regulations as set forth in this ordinance before such reconstruction or restoration may take place.

d. *First Floor Level*—In a BD or CD zone or an Area of Danger, the first floor level of every residence, hotel, boarding or rooming house, and any other building to be used for overnight occupancy shall not be less than 12 feet above mean sea level.

e. *Setback*—In a BD or CD zone or an Area of Danger no building shall be erected any part of which is closer than 50 feet from the mean high tide line of the ocean, sound or bay.

f. *Tents and Trailers*—No tents or trailers shall be permitted in a BD or CD zone or an Area of Danger.

g. *Sand Dune Protection*—In a BD or CD zone or an Area of Danger, the height of any dune shall not be lowered nor shall any construction be permitted thereon which, in the judgment of the building inspector, would weaken the dune or cause the height of the dune to be lowered.

h. *Sewage*—In a BD or CD zone or an Area of Danger, all buildings shall dispose of their sewage by use of a septic tank or by connection to a municipal sewerage system.

i. *Special Exceptions*—In a BD or CD zone, any building allowed as a special exception shall be subject to the requirements specified for construction of buildings in part (a) of this section and to such other requirements as may be imposed by (the official regulating body).

\* \* \* \* \*

HURRICANE DANGER ZONING MAP

A hurricane zoning ordinance should not be adopted without an accompanying *Hurricane Danger Zoning Map*. This map should designate those portions of the town subject to hurricane waves and flooding and should be prepared only after comprehensive study of the areas of hurricane damage. It should also follow careful evaluation of conditions influencing damage from hurricanes, especially study of maximum flood tides and analysis of existing and proposed protective structures.

PROCEDURE FOR ADOPTION

In general, the following procedure would be required before a hurricane zoning ordinance would go into effect: The town planning board, the town council, or a delegated body such as a rehabilitation subcommittee would, with technical planning advice, study damage areas, analyze protective structures, and prepare a draft of the Hurricane Danger Zoning Map and Ordinance. The Development Council is prepared to furnish limited technical planning aid or alternatively, the community might employ its own

town planning technician or engage a planning consultant. Public hearings for discussion of the proposed ordinance and map would have to be held by the town council, town planning board or special planning committee. Formal adoption by the town council and, if so desired, by the financial town meeting, would then be required before the ordinance goes into effect.

[ZONING] Lloyd Harbor, N.Y. (Oct., 1966).

ARTICLE VII  
FLOOD PLAIN DISTRICT

SECTION 7.0. The Flood Plain District shall consist of all land within the Village subject to flooding by tide water rising to a height of ten (10) feet above mean sea level, and all land within the Village inaccessible from a public road or highway except by an access road which in whole or in part is subject to flooding by tide water rising to a height of ten (10) feet above mean sea level.

SECTION 7.1. No person shall build or cause to be placed upon land lying within the Flood Plain District any building, house, residence, dwelling or other structure intended for human habitation; provided, however, that this prohibition shall not prevent the pitching of tents or the construction of non-residential shelters of a transitory nature for purposes of camping, fishing, swimming or hunting by the owner. No road traversing land lying within the Flood Plain District shall be added to the official map of the Village. No uses prohibited in the Residence A-1 District shall be permitted in the Flood Plain District.

SECTION 7.2. Land within the Flood Plain District may be placed in the Residence A-1 District by affirmative vote of all members of the Board of Trustees then in office upon a satisfactory showing by the applicant that:

(a) A suitable engineering plan has been prepared and filed by a professional engineer licensed in the State of New York showing the manner in which said land is to be reclaimed, by filling, dredging, bulkheading or other means to render it as suitable for human habitation as is land in said Residence A-1 District, and providing in detail for an installation of an access road which shall comply with pertinent Village ordinances and regulations and shall be safe from flooding.

(b) The proposed reclamation of land, including every access road, in the Flood Plain District shall not do injury to adjoining land above or below mean high water mark; shall not adversely affect the beauty or natural appearance of the general area; shall not cause danger of flooding of adjacent land previously free from flooding; shall not adversely affect previously existing natural drainage; and in general shall not act to the detriment of the comfort, safety or welfare of the community, or otherwise be inconsistent with the objectives of the comprehensive Master Plan of the Village.

(c) Any and all proposed excavations, structures, improvements and installations on such reclaimed land, or relating to the reclamation of such land, shall comply with all pertinent provisions of this Ordinance, the

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