

RISK REDUCTION MEASURES FOR REDUCING IMPACTS OF COASTAL STORMS ON THE BUILT ENVIRONMENT

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FEMA has made strides in improving understanding of coastal hazards on the built environment. Through efforts involving building performance studies, development of consensus codes and standards and the rigorous analysis of benefits and costs of freeboard, the public has a number of tools for achieving greater disaster resistance in coastal environments.

FEMA's Mitigation Assessment Team (MAT) has been studying impacts of hurricanes since Hurricane Andrew in 1992. Significant storms include Iniki, Opal, Georges, Charley, Ivan, Katrina and Ike. The MAT teams documented wind and flood issues that were causing unnecessary damages to the built environment and risk to individuals because of practices found to exist in those areas or because of weak provisions in codes and standards. The MAT has made recommendations both specific and broad in areas of codes and standards, construction practices, materials used and performance of critical and essential facilities. The knowledge gained and technology transferred from those efforts have gone into dozens of stakeholder briefings, improved codes and standards, state of the art design and construction guidance documents and the documentation of best practices that are found in communities throughout coastal areas. FEMA's involvement in model codes and standard goes back over 20 years. Efforts then went toward making legacy codes consistent with the recommended provisions of the National Earthquake Hazards Program. Over time and through experiences of the MAT, FEMA has expanded its code focus to include wind and flood. The creation of the single International Codes Series in 2000 was instrumental in providing for the first time a single consensus set of codes that could be used across the country. It also represented for the first time, consistency with flood provisions of the NFIP. Since 2000, flood provisions have been strengthened and in many respects go beyond minimum requirements of the NFIP. More stringent criteria include: incorporating ASCE 24-05 *Flood Resistant Design and Construction Standard*, the recognition of Coastal A Hazard areas, the necessity to include freeboard and others.

Today's economic climate and rising trend of housing costs makes it difficult to convince people building on the coast to elevate higher than minimum requirements. We have seen real world success of freeboard in actual events and for some homeowners rebuilding in affected areas, freeboard is being incorporated. But most opponents are more direct in their opposition and point to additional costs involved and additional time it takes to achieve return on investment if any. Conducting a first of its kind study for FEMA the American Institutes for Research conducted an extensive benefit cost analysis of coastal building costs, foundation types, flood zone variations and variable freeboard heights to ascertain how effective freeboard is and what optimum application of freeboard is in order to maximize cost benefit and disaster resistance. Results of these varied efforts (MATs, Codes and Standards and ground breaking economic studies of construction practices) successfully stand alone and in combination to provide tools, methods, standards and guidance for achieving greater disaster resistance for buildings in coastal environments.

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