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# **Measurement Science R&D Roadmap for Windstorm and Coastal Inundation Impact Reduction**



NEHRP Consultants Joint Venture  
*A partnership of the Applied Technology Council and the  
Consortium of Universities for Research in Earthquake Engineering*

**NIST**  
**National Institute of  
Standards and Technology**  
U.S. Department of Commerce

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The Roadmap developmental effort was supported in part by the National Science Foundation (NSF) to obtain input on related long-term fundamental research challenges in windstorm and coastal inundation impact reduction.

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Cover photos: top photo – condominium building destroyed by storm surge-induced scour during Hurricane Ivan in 2004, in Orange Beach, Alabama (FEMA); bottom photo – severe cladding damage to a hospital caused by wind and windborne debris during the May 22, 2011 tornado in Joplin, Missouri, resulting in the immediate and complete loss of functionality. The entire hospital and associated medical center were ultimately demolished (courtesy of ATC, 2011).

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National Institute of Standards and Technology  
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By  
NEHRP Consultants Joint Venture  
*A partnership of the Applied Technology Council and the  
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# Preface

In October 2011 the NEHRP Consultants Joint Venture, a partnership of the Applied Technology Council (ATC) and the Consortium of Universities for Research in Earthquake Engineering (CUREE), commenced a task order project under National Institute of Standards and Technology (NIST) Contract SB1341-07- CQ-0019 to develop a Measurement Science Research and Development (R&D) Roadmap to Reduce the Impacts of Windstorms and Coastal Inundation Hazards. The roadmap, to be developed by wind and coastal engineering practitioners and researchers from across the nation, was to incorporate a broad strategic approach and objectives for buildings, structures, and lifelines, including both new and existing construction.

The impetus for the project was the extensive property losses and casualties that have occurred over the last several decades as a result of damaging hurricanes, such as Hurricane Katrina, and severe tornadoes affecting the coastlines and interior portions of the nation. NIST's interest in the project stemmed from the agency's desire to expand its existing research and development capabilities in earthquake hazard reduction and fire engineering to include efforts to reduce the impacts of other hazards.

The roadmap development process included a review of the literature that identified research needs in the area of windstorm and coastal inundation hazards reduction, two workshops to obtain input from the nation's specialists in windstorm and coastal inundation hazard reduction, and an extensive roadmap preparation and review process.

The roadmap identifies a broad range of research and development activities for reducing the impacts of severe windstorms and coastal inundation hazards. The report includes:

- A vision for windstorm and coastal inundation resilient communities;
- A list of grand challenges in windstorm and coastal inundation impact reduction;
- Detailed descriptions of thirty priority research and development topics; and
- A proposed program of prioritized research and development activities, and their associated benefits.

The NEHRP Consultants Joint Venture is indebted to the leadership of William Coulbourne (ATC Director, Wind and Flood Hazard Mitigation), who served as

Project Technical Director and is the principal author of this report, and to the members of the Project Technical Committee, consisting of Jon Galsworthy, Horia Hangan, Christopher Jones, Chris Letchford, and Thomas L. Smith, for their contributions in developing this report and the resulting recommendations. Appreciation is also extended to the many individuals who participated in two workshops that were conducted as part of the roadmap development process, and to the National Science Foundation, who provided partial funding for the initial workshop and for the identification of grand challenges in windstorm and coastal inundation impact reduction. The names and affiliations of all who contributed to this report are provided in the list of Project Participants and in Appendices B and C.

The NEHRP Consultants Joint Venture also gratefully acknowledges Marc Levitan and Eric Letvin (of NIST) for their input and guidance in the preparation of the report, and Amber Houchen for ATC report production services.

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