



HURRICANE KATRINA DAMAGE ASSESSMENT

Louisiana, Alabama, and Mississippi
Ports and Coasts

ASCE

EDITED BY
Stephen A. Curtis, P.E.



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HURRICANE KATRINA DAMAGE ASSESSMENT

LOUISIANA, ALABAMA, AND MISSISSIPPI
PORTS AND COASTS

BY
Hurricane Katrina Assessment
Ports, Harbors and Marine Team of the
Coasts, Oceans, Ports, and Rivers Institute (COPRI)
of the American Society of Civil Engineers

EDITED BY
Stephen A. Curtis, P.E.



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Foreword

The 2005 hurricane season in the Atlantic Ocean basin was the busiest season on record, breaking records for the earliest and strongest occurring (July, Emily – 160 mph top sustained winds); number (15, previous record was 12 in 1969); and strength (Wilma – 882 millibars is the current strongest ranked hurricane to occur in the Atlantic, closely followed by fourth ranked Rita – 897 millibars and sixth ranked Katrina – 902 millibars). In total, there were 28 named Atlantic storms, 15 of which reached hurricane status. Seven of these hurricanes were considered major storm events, classified Category 3 or greater. Four (Dennis, Katrina, Rita and Wilma) of the seven major storm events made landfall in the United States causing more than 2,000 deaths and damages exceeding \$159 billion. Hurricane Katrina is the costliest (\$125 +/- billion) and deadliest (over 1,833 deaths) weather related disaster in the United States' recorded history. (Reference: <http://www.noaa.gov/>)

The Coast, Oceans, Ports, and Rivers Institute (COPRI) of the American Society of Civil Engineers (ASCE) recognized there were many things to be learned from Hurricane Katrina, and its responsibility to undertake assessments of coastal, ports, harbors and marine infrastructure, as well as the protection levees in New Orleans, to evaluate the impacts of this severe storm event. The COPRI effort did not interfere with, or duplicate, the various Federal and State damage assessment efforts, which were underway immediately following the storm event and during the Institute's assessments. Rather, the COPRI effort consisted of a broad-brush overview. By virtue of its voice, venue, history, and expertise, the Institute recognized its duty to conduct these assessments. COPRI's efforts were directed towards serving its members and society as a whole.

COPRI assembled three teams (Coastal; Ports, Harbors and Marine (PHM); and New Orleans) comprising technically qualified COPRI members and non-members, who provided unique expertise. State and Federal agencies' representatives served as liaison members. The assessment teams were independent of the principal stakeholders (e.g., State or Federal agencies), so the teams could remain impartial and credible. However, liaison with the stakeholders was critical for on-site logistical and technical support.

The purpose of the PHM assessment effort was to observe and evaluate damages to ports, marine terminals, marinas, navigation channels, floating casinos and coastal intermodal transportation infrastructure; and based on these evaluations, comment on the applicable engineering issues and policies for the basis of “lessons learned”. The PHM Assessment Team consisted of Stephen A. Curtis, P.E., M.ASCE (Team Leader); Jeffrey A. Florin, P.E., M.ASCE; Stanley M. White, P.E., M.ASCE; William L. Allen, P.E., M.ASCE; Dominic Izzo, P.E., M.ASCE; Dr. Reginald DesRoches, M.ASCE; Jeff Hellstrom, P.E., M.ASCE; Nick Pansic, P.E., M.ASCE; and Dr. Glenn J. Rix, P.E., M.ASCE. On-site assessments were performed on the Alabama – Mississippi Gulf Coast from October 3–7, 2005 and in south Louisiana from October 17–21, 2005. The resulting assessment reports for these trips are presented in *Hurricane Katrina Damage Assessment: Louisiana, Alabama, and Mississippi Ports and Coasts*.

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Team 3

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PART I

Teams 1 and 2

Alabama and Mississippi Gulf Coast

Assessment

Mississippi Gulf Coast
October 4–6, 2005
Stephen A. Curtis, P.E., Jeffrey A. Florin, P.E.,
and Stanley M. White, P.E.

Alabama–Mississippi Gulf Coast
October 4–6, 2005
William L. Allen, P.E., and Dominic Izzo, P.E.

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1. Introduction

Hurricane Katrina will probably be the worst natural disaster to have befallen the United States, in its recorded history. This hurricane storm event began as a tropical wave in the South Atlantic Ocean basin, progressing to a tropical depression and storm, within two days of August 23, 2005. The tropical storm traveled northwestward across the Bahamas and then turned westward towards south Florida. As the tropical storm moved towards south Florida, it gradually increased in strength to a Category 1 hurricane with sustained winds over 75 MPH, making landfall south of Fort Lauderdale, Florida on August 25, 2005 at approximately 6:30 PM EDT. Hurricane Katrina progressed southwestward across South Florida, dumping over a foot of rain in localized areas; toppling trees and power lines; damaging homes and business in Miami-Dade and Boward Counties. The hurricane entered the Gulf of Mexico, where it transformed from a low strength Category 1 to a powerful Category 5 hurricane on August 28, 2005 with sustained winds over 175 MPH and an atmospheric pressure of 902 MB, the fourth lowest atmospheric pressure on record. The hurricane was approximately 250 miles south-southeast of the mouth of the Mississippi at this point in time. Hurricane Katrina then traveled to the northwest and turned north making landfall, as a powerful Category 3 hurricane with sustained winds of 127 MPH, in Plaquemines Parish, south of Buras, Louisiana on August 29, 2005 at approximately 7:10 AM EDT. The hurricane continued northward making a second landfall near the Louisiana-Mississippi state border near the mouth of the Pearl River, with Category 3 sustained winds of 121 MPH, at approximately 11:00 AM EDT. Hurricane Katrina then weakened as it traveled inland to the north-northeast, but was still a Category 1 hurricane, when it was in close proximity to Laurel, Mississippi, about 100 miles inland from the Mississippi Gulf Coast. It weakened to a tropical storm just northwest of Meridian, Mississippi. The hurricane continued to weaken to a tropical depression near Clarksville, Tennessee on August 30, 2005. By August 31, 2005, the remnants of Hurricane Katrina were traveling east-northeast over the eastern Great Lakes region. (Knabb et al, 2005)

In addition to Hurricane Katrina's strong winds, a storm surge of historical significance was produced along the Louisiana, Mississippi and Alabama Gulf Coasts, by this storm event. Significant wave heights (average wave height of one-third of the highest waves) of approximately 30 feet were measured almost 74 miles