Hugh E. "Trey" Ruthven III, E.I.T., M.S.E.

Coastal Engineer, Applied Coastal Research and Engineering, Inc.

Areas of Expertise

- Numerical modeling of estuarine hydrodynamics and water quality
- Evaluation and design of coastal structures
- Coastal processes analysis
- Analysis of tidal inlet dynamics and sediment transport

Education

1997 M.S.E. Naval Architecture and Marine Engineering, University of Michigan
1996 B.S. Civil Engineering, Purdue University

Professional Registration

Engineer in Training, Indiana

Experience

Mr. Ruthven is a coastal engineer specializing in nearshore dynamics, coastal structures, and numerical and physical modeling. He is experienced in circulation modeling, wave and sediment modeling, inlet processes, hydrographic analysis, coastal mitigation, and the design and rehabilitation of shore protection structures. Trey is skilled in the application of computer programs for two-dimensional hydraulic and hydrologic modeling, and has performed two-dimensional analyses to characterize harbor agitation, littoral transport, and nearshore contaminant trapping, as well as inland waters.

Project Experience

<u>Floodplain Analysis</u>

North Carolina Floodplain Mapping, Lumber River Basin. State of North Carolina. Project Engineer. Conducted FEMA coastal flooding analysis using the new Coastal Hazard Analysis Modeling Program (CHAMP) for Ocean Isle Beach and Holden Beach, NC. Analysis included erosion assessment, wave height analysis using WHAFIS, and runup using RUNUP 2.0 at Ocean Isle and Holden Beaches. Revised analysis used new topographic survey data collected by LIDAR. Created surface TIN model and extracted transects for analysis. Produced draft work maps for use in creating digital flood insurance rate maps (DFIRMs).

Review of Hurricane Induced Flood Analysis for the Territory of American Samoa, Territory of American Somoa, FEMA. Project Engineer. Conducted a engineering review of the floodplain study for the Territory of American Samoa. The analysis included a large scale hydrodynamic and metrological model simulations of historical hurricanes using the empirical simulation technique (EST) to develop a stage frequency relationship of water levels to hurricane intensity. Incorporating wave development and transformation into the islands the associated runup and surge elevation were evaluated across the surrounding reefs and shorelines to arrive at flood frequency elevation predictions.

Floodplain Revision Reviews, FEMA Regions V, VI, VII, FEMA. Project Engineer. Conducted engineering reviews and analysis of coastal and riverine floodplain amendments for Letter of Map Revisions (LOMRs), floodplain studies, and congressional inquires. This work involved hydrologic and hydraulic analyses for streams and rivers, coastal surge and wave analyses, digital and flood insurance rate map (DFIRMs and FIRMs) revisions, and review of FEMA regulations and technical specifications.

Analysis of Coastal Processes and Design of Coastal Structures

Palm Island Crescent Breakwater, Dubai**.** *Han-Padron Associates*. Project Engineer. Coordinated planning and engineering related to the preliminary design of this 10-kilometer structure. Design development included value analysis and subsequent sizing and specifying of tandem reef breakwater systems, and berm breakwater geometries. Activities included harbor tranquility analysis, water quality enhancements, shoreline impact assessments, and ecological preservation.

Physical Model for the Design Optimization of Outfall Extension, Deal Lake, New Jersey. U.S. Army Corps of Engineers, New York District. Project Engineer. Conducted a moveable-bed physical model of the coastal processes at Deal Lake, NJ to optimize the design location for an outfall extension. The extended outfall is to accommodate a beachfill project and resides adjacent to a groin, which will be notched for improved longshore sediment transport efficiency. Modeling including an analysis of waves and longshore sediment transport, in conjunction with multiple layout scenarios to identify a design which would minimize sedimentation inside the outfall opening. A final report was prepared detailing the coastal processes, model facilities, testing scheme, results and recommendations.

Beach Renourishment and Revetment Project, Coney Island Area Storm Damage Prevention Project. U.S. Army Corps of Engineers New York District. Assistant Engineer. Developed a design for a 60-ft closure revetment to a terminal groin to replace a failed temporary revetment. Developed plans and specifications for beach renourishment, including backpassing material from a downdrift accretion area.

Physical Model Tests, Ships Harbor, Anacortes, Washington. Bellingham Marine Industries, Inc. Project Engineer. Conducted 1:40 scale model test of a sectional concrete floating breakwater to maximize the cross sectional efficiency, examine wave transmission, wave overtopping, mooring characteristics, and the general marina layout.

Physical Model Tests, Destination Broadwater Resort, Biloxi, Mississippi. President Casinos, Inc. Assistant Project Engineer. Conducted 1:10 scale model test of eight breakwater/seawall configurations to determine wave forces on seawalls, appropriate armor size for breakwater, and wave transmission past breakwaters and seawalls.

Jones Inlet, Spur Jetty Investigation, Long Island, New York. U.S. Army Corps of Engineers, New York District. Project Engineer. Designed terminal extension for the existing jetty in order to limit sand loss into the inlet and better retain future beach renourishment. Analysis included structural evaluation of existing jetty, determination of coastal processes including deep water wave climate, refraction and diffraction of deep water waves to the site, and determination of extension length and orientation required to achieve sand retention without negatively affecting inlet hydraulics or down-drift beaches.

Investigation of Spur Jetties. State of New York Department of State. Project Engineer. Performed a comprehensive review of spur and L-jetties constructed around the world to determine the impacts of these structures on navigation, nearshore bathymetry, existing shore protection works, adjacent shorelines, and local ecology. Based on the results of the review, a summary was made regarding the potential impacts of spur construction at Shinnecock Inlet, South Hampton, New York.

Shinnecock Inlet, West Jetty Modification, South Hampton, New York. U.S. Army Corps of Engineers, New York District. Project Engineer. Tasked with conducting a feasibility level study to assess the existing site conditions and ascertain the causes leading to deterioration. Preconstruction engineering and design was provided to develop an alternative to counteract the deterioration. Specific tasks included assessment of the general condition of the structure, data analyses, nearshore coastal processes analyses, environmental and storm damage assessment, recommendations, and drawings for reconstruction.

New Jersey Beach Restoration Project, Long Branch, New Jersey. U.S. Army Corps of Engineers, New York District. Project Engineer. Examined the wave forces developing on a system of outfalls and infiltration structures along the nearshore region of Long Branch, New Jersey.

Ogden Dunes Shoreline Recession Analysis, Ogden Dunes, Indiana. Indiana Port Commission. Project Engineer. Evaluated and forecasted the shoreline retreat associated with delegation of liability for the Ogden Dunes waterfront. Conducted shoreline change forecasting and partitioning of culpability caused by down drift erosion effects from a major shoreline installation.

Numerical Modeling

Review of Numerical Modeling Analysis of Dune Breaching and Back-Bay Flooding, Fire Island to Montauk Point, Long Island, New York. U.S. Army Corps of Engineers New York District. Project Engineer. Conducted independent review of modeling of storm surge, wave, and dune erosion for overwash and breach scenarios. Evaluated ADCIRC and SBEACH models and how they were linked and applied to the study site. Compared model results with previous model studies and measured data. Identified modeling limitations and made recommendations on improvements to overall storm surge/overwash/breaching approach.

Numerical Model Investigations for Mississippi Sound Environmental Impact Statement. U.S. Army Corps of Engineers Mobile District. Project Engineer. Using MIKE 21, developed a two-dimensional wave transformation model to study wave transformation, at site of proposed waterfront development project, through barrier islands and across the shallow bathymetry of the sound during severe storms. Using LITPACK, analyzed littoral transport along the coastline to characterize the regional effects the project would have. The analysis was used to modify the island geometry and characteristics to minimize both updrift and downdrift influences.

Burns Harbor Agitation Study, Portage, Indiana. Indiana Port Commission. Project Engineer. Compiled data from a comprehensive examination of historical meteorological events resulting in damage within the harbor and inputted the data into a two-dimensional numerical wave model to hindcast the wave conditions on Lake Michigan. Transferred the wave climate at the site to a MIKE 21 Boussinesq wave model and conducted a full harmonic study of the wave environment within the harbor to characterize resonant harmonics and disturbance coefficients at mooring locations around the harbor.

Destination Broadwater Circulation and Water Quality Study, Biloxi, Mississippi. President Casinos, Inc. Project Engineer. Using RMA2/RMA4, carried out detailed numerical examination of tidal circulation and water quality in nearshore region. Simulations allowed for testing and optimization of several design alternatives for a proposed land reclamation and harbor development.

Alpine Development, Colville River Delta, North Slope, Alaska. ARCO. Project Engineer. The project consisted of development, calibration, and execution of a 13,000-element finite element water surface model for the Alpine Development on the Colville River Delta, Alaska. With the development of two drilling platforms, runway, and connecting roadway that extends for approximately 3 miles across the Colville River delta, a detailed engineering analysis of the water surface elevations was necessary for engineering design and permitting with the regulatory agencies. Due to the limited amount of historical water surface elevation data during extreme flooding events, a numerical water surface model was required to provide detailed water surface elevations, velocities, and depths necessary for all aspects of the engineering design.