

Capstone Design Project: Kuhio Beach Park Shoreline Improvement

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Abstract

Kuhio Beach, located between Waikiki Beach and Queen's Beach on the south shore of Oahu, is very popular with beach goers for its calm waters. The breakwaters and groins create two basins almost completely sheltered from incoming wave energy. The existing design suffers from poor circulation and constant beach erosion. Complications to improve this situation arise from the structures' historical status and its cultural context. In addition, Kuhio Beach lies just shoreward of the popular surf spots, 'Queens' and 'Walls', with the latter breaking right in front of the Diamond Head basin and relying on wave energy reflected from the existing breakwater. Using 34 years of wave hindcast data, simulated future hurricane tracks, and state-of-the-art wave modeling for reef environments, we develop a new T-groin system that addresses circulation and beach erosion issues while maintaining the recreational value of the area. The feasibility study includes a preliminary design of the T-groin system, an estimate of the future beach shape, construction scheduling and cost calculations, and an assessment of regulatory and permitting requirements.