

# UNIVERSITY OF HAWAII

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Sea Grant College Program on Kauai  
School of Ocean and Earth Science and Technology

## MEMORANDUM

DATE: October 18, 2012

TO: Doug Haigh, Chief of Buildings, County of Kaua'i  
Lenny Rapozo, Director of Parks and Recreation, County of Kaua'i

FROM: Ruby Pap, Coastal Land Use Extension Agent

SUBJECT: Redesign of multi-modal path along Wailua Beach

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Thank you for the opportunity to review and discuss with you the plans for the redesign of the multimodal path in the highway right-of-way along Wailua Beach. In consultation with other Sea Grant hazards extension faculty, I reviewed the following plans depicting the concrete slab and the barrier wall: CO 171, and CO ADD 172, 172S-1R, and 172S-2 (Plans). Per your request, this memo focuses solely on shoreline processes, potential impacts and design issues.

According to shoreline erosion studies conducted by the University of Hawaii and adopted by the County of Kauai, Wailua Beach has experienced an overall pattern of shoreline accretion (growth) over the past century at an average annual rate of 0.6 ft per year. However, historical shoreline positions visible in the erosion map show that shoreline position is highly variable at Wailua Beach, and the biggest erosion hazard is seasonal or episodic as opposed to a chronic long-term erosion trend. As can be seen in the Kauai coastal erosion study map for Wailua, the shoreline eroded and came close to Kuhio highway in the middle portion of the beach during a temporary erosion episode in 1975. The beach eventually recovered (as shown by the shoreline position in 1987) but it is not clear exactly how long this recovery process took, nor how often these erosion episodes occur. The beach loss experienced this summer may be explained by a period of stronger and more persistent trade winds than typical. Infilling of the river mouth with sand was also observed during recent period of erosion. The beach has begun to recover (since August), with the sand apparently being transported back to the north. It is unknown, however, if and when the beach will regain its former width. While the recent and previously observed erosion episodes are temporary, similar episodic or event based erosion events are highly likely to cause management problems for infrastructure sited close to the beach in this area in the future.

My understanding is that the subject path will be located as far mauka as possible from the beach, adjacent to the road and within the road right-of-way, on the back-beach area. The path is being redesigned so that it can be removed should shoreline erosion threaten its stability in the future. As we've discussed, this strategy is preferable to other 'hard' responses to erosion, such as seawalls and revetments, because these structures have the potential to increase local erosion rates during erosion episodes, slow beach recovery following an erosion episode, and/or or lead to total beach loss as seen in similar situations on Kauai. The Plans show a concrete slab design in 10' sections separated by 6" control joints, with a concrete barrier wall on the mauka side separating the path from the highway. A removable/moveable pathway design is advantageous for the Wailua reach of the pathway due to the recent episodic erosion at Wailua Beach. The advantages of a removable design include: (1) a lower cost quick removal process; and (2) the path can be adjusted to localized erosion for individual affected sections.

As an alternative, we suggest that you look into a resilient raised wooden boardwalk design. This option may be less costly and easier to maintain than a concrete path over the long-term, given the probability of removal that may be needed. The height of a wooden boardwalk is flexible, and need not be extensive and I believe could be compatible with a highway barrier wall. Benefits of a raised boardwalk design include an accommodation strategy which allows for waves and erosion to migrate under the structure without causing damage or even effecting the use of the boardwalk. Raised boardwalks are commonly constructed in beach settings around the world and serve to provide reliable access to and along the beach with minimal, negligible even, impact to the beach processes at a fraction of the cost of reinforced concrete pathways that may require repair. Attached is an example Army Corps of Engineers technical note and design that could be modified for your purposes. We can also provide more detailed examples of similar boardwalk designs for your consideration.

Please don't hesitate to contact me at (808) 241-4183 or [rpap@hawaii.edu](mailto:rpap@hawaii.edu) if you have any questions or wish to discuss the project further.

Examples of typical raised wood board designs:

