Historical Background

Laie, Hawaii, is a small village on the windward side of the north shore of the island of Oahu. In 1884 the area of Laie was turned into a large sugar plantation. In order to get the stacks of raw sugar and molasses to Honolulu for shipment overseas, a warehouse and small pier, with a crane, was built on the beach. The pier was called “Pounders Beach,” on the southeast corner of the village in 1887. Although not definitively recorded, the pier was likely abandoned sometime between 1899 and 1900, when the Oahu Railroad was extended to Laie. Today all that remains of the pier, above sea-level, are the iron, vertical support columns that held up the pier platform. Below sea-level there are a few large pieces of coral-encrusted debris scattered in an area around the columns. Little to no documentation of the pier since its abandonment has taken place, although it is a valuable historical artifact for the area, as well as a possible reference structure for changes to the local beach and sea level.

The work to move all of the sugar from the mill to the beach, all at the same time, took an extensive amount of time and labor. In 1887, the mill was shut down while everyone worked to carry the sugar down to beach and load it onto the ship’s boats to be taken onboard. The stacks of raw sugar and molasses would then be taken to Honolulu for shipment overseas.

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The aerial views are much clearer than previously available aerial photographs and clearly show the outline of the pier and its alignment and layout. The images are now being used as a base map for documenting the debris field around the pier remains, seasonal changes in the beach sediments, as well as better understanding of the overall relationship between the pier and the beach.

In order to better understand the changes that have occurred to the beach in and around the pier, as well as to document the history of the pier itself, small UAVs (DJI Phantom II and III with GoPro cameras attached) were used to obtain high-resolution images of the beach and pier layout. The images were corrected for the fisheye-distortion caused by the GoPro lenses. The aerial views are much clearer than previously available aerial photographs and clearly show the outline of the pier and its alignment (Figure 5). The images also show a change in the amount of sand around the pier remains.

In addition, a part of the work on this project was done with the assistance of undergraduate oceanography students. UAVs are a valuable educational tool in helping students to gain a birds-eye view and a clearer understanding of the geologic and geomorphologic processes affecting the pier remains (as well as other natural and man-made structures) over time (Jordan, 2015).

The images are now being used to develop a base map for documenting the debris field around the pier remains, seasonal changes in the beach sediments, as well as better understanding of the overall relationship between the pier and the beach.

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References

- Jordan, B. L., unpublished essay found in the Brigham Young University-Hawaii Archives, Laie, Hawaii.
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Figure 1: The only known image of the Laie Pier in a c- rotated view (edited 1887). In 2015 view of the Laie Pier from the same vintage print as A. Both images are taken at low tide, but not necessarily at the same time of year. However, a significant change in beach elevation and sedimentation has occurred. Figure 1A courtesy of the Brigham Young University-Hawaii Archives.

Figure 2: Examples of enhanced artifacts distributed around the pier layout.

Figure 3: The highest possible resolution of the Laie Pier using Google Earth.

Figure 4: A DJI Phantom II UA V with a GoPro camera - see Figure 5. The two images also show a clear change in the amount of sand around the pier remains.

Figure 5: UAV views of the remains of the Laie Pier illustrating the clarity that is possible using a UAV as well as documenting changes in the structure of the pier and the sediments around it. Compare to Figure 1.

An Aerial Geoarchaeological Survey of the Laie Pier, Oahu, Hawaii, U.S.A., Using UAVs

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Abstract

The remains of the pier are clearly visible from the ground (Figure 1B). However, the structure itself does not appear on USGS topographic maps and is nearly invisible from normal air photos and Google Earth. In order to better understand the changes that have occurred to the beach in and around the pier, as well as to document the history of the pier itself, small UAVs (DJI Phantom II and III with GoPro cameras attached) were used to obtain high-resolution images of the beach and pier layout. These images were corrected for the fisheye-distortion caused by the GoPro lenses. The aerial views are much clearer than previously available aerial photographs and clearly show the outline of the pier and its alignment and layout. The images are now being used as a base map for documenting the debris field around the pier remains, seasonal changes in the beach sediments, as well as better understanding of the overall relationship between the pier and the beach.

The aerial views are much clearer than previously available aerial photographs and clearly show the outline of the pier and its alignment (Figure 5). The images also show a change in the amount of sand around the pier remains. In 2014, the foundations of three additional columns are clearly visible, but are no longer visible in 2015. Likely broken down due to natural changes in the beach.

In addition, a part of the work on this project was done with the assistance of undergraduate oceanography students. UAVs are a valuable educational tool in helping students to gain a birds-eye view and a clearer understanding of the geologic and geomorphologic processes affecting the pier remains (as well as other natural and man-made structures) over time (Jordan, 2015).