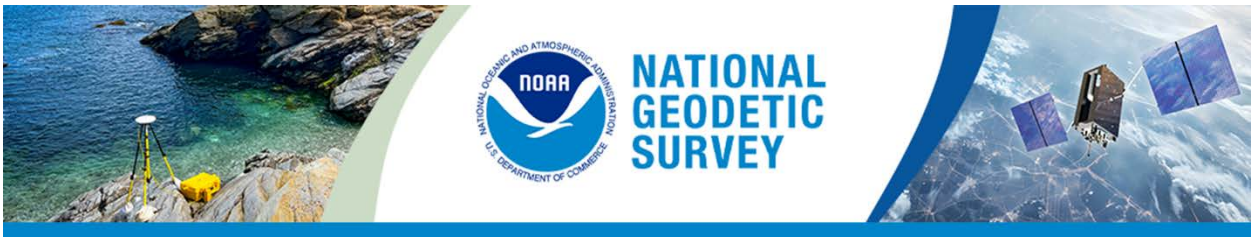

NOAA Technical Report NOS NGS 83

Primary Adjustment of Leveling Observations to Establish a Consistent Vertical Datum Tied to Local Mean Sea Level for Lanai, HI

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Introduction

This report summarizes work related to the adjustment of leveling data for the island of Lanai, Hawaii. This is a part of a larger effort on the part of Hawaii DOT for recon, mark setting, descriptions, leveling observations following FGCS Specifications and Procedures for Second Order Class I digital leveling, data processing following NGS Guidelines, and submitting data to NGS county by county. The State of Hawaii will contract the leveling work for the islands of Oahu, Maui, Molokai, Lanai, Kauai, and Hawaii for a total of 1001.3 miles. These six islands are part of four counties, and the state is planning on performing the leveling county by county. This report represents the culmination of the work on the first of these islands.

This effort was originally envisioned as a Project in the NGS PRB process. However, it is no longer tracked by the PRB, because it is primarily a data collection and processing effort by a large customer – HI DOT. As subsequent island collection efforts are finalized, additional technical reports will be issued.

Local Mean Sea Level (LMSL) Datum for Lanai

It should be noted that each island will have its own Local Mean Sea Level (LMSL) datum established from available tidal bench marks. As suggested by CO-OPS, this project was adjusted holding only one mark, designated 161 4465 TIDAL 2 on the National Tidal Datum Epoch 1983-2001, with an elevation 3.478 m.

Figure 1. Local Mean Sea Level (LMSL) datum for Lanai is Station 161 4465 TIDAL 2 (PID DL6323) at a height of 3.478 m.

In the next few years, a new NTDE will be realized (2002-2020). That might normally impact the control for the vertical datum, because the height of LMSL may change. However, by the time it is implemented the North America Pacific Geospatial Datum of 2022 (NAPGD 2022) should be realized everywhere including in Oahu. If not, then this may need to be reassessed at that time.

Primary Adjustment

The primary adjustment of this Island was made using the latest 2017 data (L28643/2) (Figure 2). The main line length of this project is 23 km with 3 km of spur line length. A total of 42 bench marks were observed, and their elevations were published.

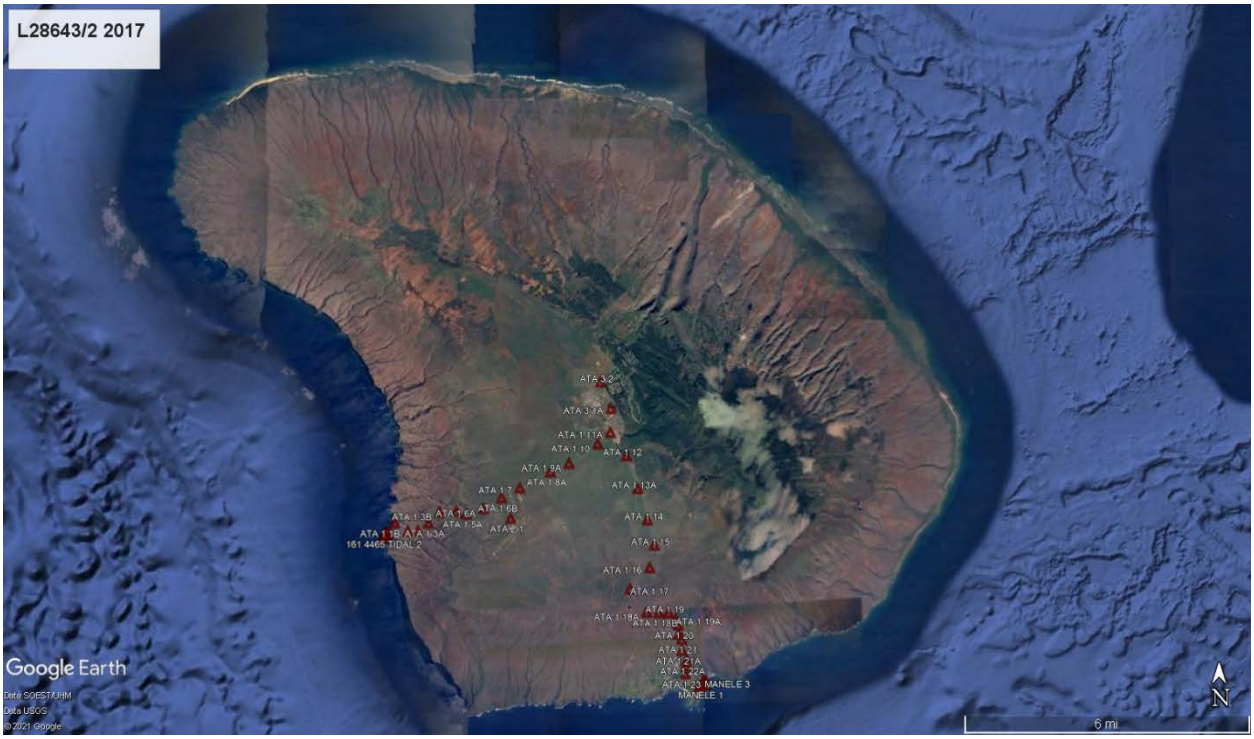

Figure 2. Graphic depiction of 2017 leveling survey around the island of Lanai, Hawaii. TIDAL 2 (DL6323) with an elevation of 3.4781 m (NTDE 1983-2001) served as the Local Mean Sea Level (LMSL) datum and the basis for vertical control.

NOTE: L28643/2 is new leveling campaign on Lanai. Lanai did not had any previously projects loaded into the NGS IDB.

The appropriate text below will be added to the datasheets for the PID's in this adjustment:

A. The datum point 161 4465 TIDAL 2 (DL6323) should have the following:
"This bench mark was chosen by the National Geodetic Survey (NGS) to serve as the datum origin point for the island of Lanai leveling done between September 2017 and October 2017. The height of this point was adopted by NGS to be exactly 3.478 meters which identical to the LMSL height of this bench mark for the National Tidal Datum 1983-2001 as determined by the Center for Operational Oceanographic Products and Services (CO-OPS) in June 2018".

B. Project L28643/2 (which is the new leveling network) should have the following:
"The orthometric height was determined by differential leveling and adjusted by the National Geodetic Survey in August 2020 holding the tidal station 161 4465 TIDAL 2 (DL6323) to the 1983/2001 tidal station epoch value 3.478 meters".