

10126

Diagram No. 4116-2

NOAA FORM 76-35A

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SURVEY

DESCRIPTIVE REPORT

Type of Survey .. Navigable Area Hydrographic ..
Field No. RA-2.5-1-84 ..
Office No..... H-10126 ..

LOCALITY

State Hawaii ..
General Locality .. Southeast Coast of Molokai ..
Locality Pukoo Harbor ..

19 84

CHIEF OF PARTY
CDR J.P. Vandermeulen

LIBRARY & ARCHIVES

DATE March 1, 1985 ..

☆U.S. GOV. PRINTING OFFICE: 1980-766-230

Area 6

Chg

19353

19347

19340

19004-12

TO SIGN OFF SEE
"RECORD OF APPLICATION"

HYDROGRAPHIC TITLE SHEET

H-10126

INSTRUCTIONS - The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

FIELD NO.

RA-2.5-1-84

State HawaiiGeneral locality Southeast Coast of MolokaiLocality Pukoo HarborScale 1:2500 Date of survey April 29 - May 3, 1984Instructions dated January 9, 1984 Project No. OPR-T126-RA-84Vessel 2125; 2126Chief of party John P. Vandermeulen, CDR, NOAASurveyed by LT. S. R. Iwamoto, NES J. L. Judson, ENS K. W. Barton, ENS C. C. Wilson,
ENS J. S. Griffin, ENS. M. H. PickettSoundings taken by echo sounder, hand lead, ~~and~~ DSF 6000NGraphic record scaled by RAINIER PersonnelGraphic record checked by RAINIER PersonnelVerification by R. D. Mueller Automated plot by PMC Xynetics PlotterEvaluation by C. R. DaviesSoundings in ~~fathoms~~ feet at ~~MHW~~ MLLWREMARKS: Preliminary copies of field sheets were provided on June 11, 1984 to:(1) Commander 14th Coast Guard District, (2) District Engineer, U.S. Corps
of Engineers, (3) Mr. George Peabody.Marginal notes in black made by evaluator."See H-10169 for information relating to items crossed through or identified
as N/A H-10126"STANDARDS CK'D 3-8-85C. LaySH-16-97 AWOIS / SURF MSM 12/4/85

A. PROJECT ✓

This hydrographic survey was conducted in accordance with Project Instruction OPR-T126-RA-84 dated 9 January 1984, change number 1 dated 16 February 1984, and change number 2 dated 16 April 1984. The PMC OPODER, Hydrographic Manual (4th Edition), and Hydrographic Guidelines are also applicable.

B. AREA SURVEYED ✓

This is a navigable area survey of the harbors of Kamalo and Pukoo on the southeast side of the island of Molokai, Hawaii. ~~An investigation of Kalaeles Harbor which lies between Kamalo and Pukoo harbors was performed at the request of the Army Corps of Engineers.~~ The survey area extends from Latitude 21°07'00"N to 21°04'37"N and from Longitude 156°47'37"W to 156°53'08"W. Hydrographic operations began on 29 March 1984 (JD 089) and were completed on 3 May 1984 (JD 124).
April 120

C. SOUNDING VESSEL ✓

Hydrographic data for this survey was collected from Jensen survey launches RA-5 and RA-6 designated vessel numbers 2125 and 2126 respectively.

D. SOUNDING EQUIPMENT AND CORRECTIONS TO ECHO SOUNDINGS

Both survey launches were equipped with Raytheon DSF-6000N dual beam echo sounders. See Table I, SOUNDING EQUIPMENT, for a list of equipment used by each launch and inclusive dates.

Depths on this survey ranged from ²1 ^{ee}foot to ³⁹81 feet.

TABLE I

SOUNDING EQUIPMENT

<u>LAUNCH</u>	<u>DATES</u>	<u>MODEL</u>	<u>SERIAL NUMBER</u>
2125	JD 120-124	Raytheon DSF-6000N	A119N
2126	JD 089-124	Raytheon DSF-6000N	A123N

N/A for H-10126

The DSF-6000N echo sounder was set to digitize on the narrow beam at all times, therefore there were no junctioning problems resulting from the use of the wide and narrow beams.

During this survey the DSF-6000N (S/N A103N) in vessel 2126 could not be made to operate in the dual beam mode without extraneous stray appearing in the water column of the graphic record. Therefore this echo sounder was operated in the narrow beam only mode.

N/A-H-10126

Bar checks were performed daily for both beams of the DSF-6000N fathometer as per the Provisional Operating and Processing Instructions for the DSF-6000N Echo Sounder. All bar checks were performed within the survey area. The bar checks were used to confirm proper system function, and bar check data were used to determine velocity corrections.

To determine the velocity corrections the draft was taken to be the historical value 1.8 feet and the correction table derived from the bar check data indicates an apparent instrument error of 0.8 foot for survey launches 2125, ~~and 2126~~. The bar check data was extrapolated beyond the bar check depth of 36 feet in order to obtain velocity correctors to the maximum survey depth of ~~81~~ feet.

39

The final field sheets were plotted with a preliminary velocity correction table. It was necessary to create the preliminary velocity table with 0.4 foot correction increments instead of the required 0.2 foot increments due to a bug in Hydroplot program RK-216 which would not allow a longer velocity tape when using the new ASR-43 Teletypes. A printout of the preliminary velocity correction table may be found in the ~~seperates~~ following the text. *Seperates filed with field records.*

Sea conditions during this survey were variable depending on the launches location in relation to land and coral formations; winds varied from 15 to 30 knots and seas from 1 to 3 feet. The persistent easterly trade winds resulted in unavoidable marginal survey conditions making it impractical to suspend surveying operations as per Hydrographic Guideline 31. Corrections for heave were applied during the scanning of the graphic records when required, as per section 4.9.8.2 of the Hydrographic Manual.

Launches 2125 ~~and 2126~~ ^{was} were tested for settlement and squat, and correctors were determined in increments of 0.2 feet as required by Section 4.4.9.2 of the Hydrographic Manual. All settlement and squat correctors for this survey were less than 0.2 foot and were not applied to sounding data as per Section 4.4.9.2.

TC/TI tapes were made in accordance with PMC OPORDER, Appendix Q. Printouts of the TC/TI tapes are included in the separates following the text.

For further details on corrections to echo soundings for this survey see Corrections to Echo Soundings Report OPR-T126-RA-84.

E. HYDROGRAPHIC SHEETS ✓

The ~~two~~ final field sheets designated ~~RA-2.5-1H-84~~ ^{was} (Kamalo Harbor) and RA-2.5-1E-84 (Pukoo Harbor) were prepared on the RAINIER using the PDP8/E Hydroplot system which produces modified transverse Mercator projections. A list of parameters used to define these field sheets is provided in the separates following the text.

~~A sheet designated RA-2.5-1C-84 for the chart investigation of Kalaheo Harbor was prepared and forwarded to N/66222 through the Pacific Marine Center.~~

All data and accompanying field records will be sent to Pacific Marine Center for verification.

F. CONTROL STATIONS ✓

~~One new control station was established and five stations were recovered for this survey. Station KAMALO-3 1984 was established to Third Order Class I standards. Refer to the~~ Horizontal Control Report, OPR-T126-RA-84 for details.

See EVAL Report
Section 2

G. HYDROGRAPHIC POSITION CONTROL ✓

Range-Azimuth was the only method used for hydrographic position control. Motorola Mini-Rangers and Wild T-2 theodolites (S/N 75599E and S/N 57259) were the instruments used. The following tables summarize the location of all Mini-Ranger mobile and shore equipment.

MINI-RANGER MOBILE EQUIPMENT

<u>VESSEL</u>	<u>CONSOLE</u>	<u>R/T S/N</u>
2125	715	1635
2126	711	B1405

MINI-RANGER SHORE EQUIPMENT

<u>CODE</u>	<u>TRANSPONDER S/N</u>	<u>STATION #</u>
E	911721	101
F	911711	100
0	C1789	100
2	B1106	101

~~Initial Mini Ranger calibrations for vessel 2126 were performed in Honolulu, Hawaii on 26 April 1984. Initial calibrations for vessel 2125 were performed in Kamalo Harbor, Molokai, Hawaii on 29 March 1984. An ending baseline calibrations for vessel 2126 was not performed. Ending calibrations for vessel 2125 were performed in Seattle, Washington 23 May 1984.~~

Two Mini-Rangers were set up at each Range-Azimuth station and both rates were collected by the ASI data loggers. The two rates were averaged and when the average was within a meter of range 1, range 1 was taken to be the truth. When the difference between range 1 and the average was greater than a meter, then the average, taken to the nearest even meter, was taken to be the truth. Obvious flyers were eliminated by interpolating between fixes. The final baseline corrections for the two ranges were averaged together to obtain a final range corrector for each Range-Azimuth setup. This procedure was necessary in order to meet the horizontal accuracy requirements for the 1:2500 survey scale and is in accordance with change number two of the project instructions.

See Section 2
of EVAL Report

~~Two calibrations were performed daily on vessel 2126 using Day Beacon #4 as a static calibration check. Twice daily calibration for vessel 2125 were done using direct comparisons with the Hewlett Packard Model 3808 geodimeter. Mini-Ranger performance was good and confirmed baseline corrector values. For more information concerning electronic control for this survey refer to the Electronic Control Report, OPR-T126-RA-84.~~

See Section 2
of EVAL Report

H. SHORELINE ✓

The shoreline was transferred from enlargements of chart 19353 9th edition April 22 1978 and is for orientation only.

Sounding operations were conducted as near to shore and reef areas as necessary to meet the requirements of a navigable area survey. Numerous rocks and reefs previously shown on the chart and prior hydrographic surveys but outside the navigable area were not specifically investigated.

I. CROSSLINES ✓

A total of 2.5 nautical miles of crosslines were run during the survey, representing 20 percent of the mainscheme mileage. Agreement of soundings at the crossings was excellent, generally within 1 foot and not exceeding 2 feet in areas of steep bottom gradients.

J. JUNCTIONS ✓

This survey does not junction with any contemporary surveys.

concur

K. COMPARISON WITH PRIOR SURVEYS

This survey was compared to the following prior surveys:

<u>SURVEY</u>	<u>SCALE</u>	<u>YEAR</u>
H-4456	1:5,000	1925
H-4457	1:5,000	1925 - N/A - H-10126
H-8829	1:5,000	1965

See EVAC Report
Section 6

~~In the area of Kamalo Harbor survey soundings were generally 5 percent deeper when compared to prior survey H-4457. In areas of steeply sloping bottom near the harbor entrance and the reef edges differences of up to 10 feet exist. These differences can be expected to occur in these areas of steeply sloping bottom when surveying at a very large scale using narrow beam echo sounders.~~

In the area of Pukoo Harbor soundings south of latitude 21-04-10N were generally within 2 foot when compared to prior survey H-8829. North of latitude 21-04-10N dredging has occurred with the development of Pukoo Harbor into a small boat harbor. The depths in this area have been increased from an average of 8 to 13 feet. On JD 124 divers performed a search in the area of the submerged piles at 21-04-20N, 156-47-57W and could not find any remaining evidence of their existence. Also on JD 124 divers verified the existence of the dangerous submerged ruins at the entrance to the Pukoo Fishpond at 21-04-22N, 156-48-03W. The following features were discovered during this survey which are not found on survey H-8829.

a) A ~~submerged rock~~^{uncovered} covered by ~~1~~¹ foot water at MLLW at 21-04-08.5N 156-48-04.9W (pos. # 5025) was found during this survey. It is recommended that this rock be charted.

b) A submerged coral head covered by ~~8~~¹ foot water at MLLW at 21-04-13.2N 156-48-05.2W (pos. # 5056) was found during this survey. It is recommended that this coral head be charted.

c) A ~~submerged rock~~^{awash} covered by ~~1~~⁰ foot water at MLLW at 21-04-18.2N 156-48-00.8W was found during this survey. It is recommended that this rock be charted.

In comparing this survey with prior survey H-4456, the depths in the area of Pukoo Harbor follow the same general pattern as prior survey H-8829 above. Survey H-4456 does show that the pier which is now gone was in existence at that time. Also shown on that survey was a pair of range markers which would be extremely useful for present users attempting to navigate through the reef entrance.

Concur

~~No comparisons were made between prior surveys and the chart investigation of Kalaeloa Harbor as there are no prior surveys available.~~

L. COMPARISON WITH CHART ✓

This survey was compared with a 1:2500 scale enlargement of Chart 19353, 9th edition, dated 22 April 1978.

See Section 7
EVAL Report

In the area of Kamalo Harbor survey soundings were generally 10 percent deeper than the charted soundings. The charted soundings also did not agree with prior survey H-4457 in this area. Numerous differences exist in areas of steeply sloping bottom as noted in section K. Most notably a 6 foot shoal charted at 21-02-17.1N, 156-42-47W is most probably the same shoal found at 21-02-16.7N, 156-42-47.5W. The following are major differences found between this survey and chart 19353 in the area of Kamalo Harbor.

N/A to H-10126

<u>Latitude</u>	<u>Longitude</u>	<u>Chart 19353</u>	<u>Survey Depth</u>
21-02-33N	156-52-42W	14 Ft	40 Ft
21-02-31.5N	156-52-46W	26 Ft	45 Ft
21-02-30N	156-52-46.5W	29 Ft	47 Ft
21-02-21N	156-52-44W	23 Ft	51 Ft
21-02-12N	156-52-48W	23 Ft	67 Ft
21-02-12N	156-52-46W	23 Ft	35 Ft

N/A to H-10126

It is recommended that the above charted soundings be superseded by soundings from the present survey.

In the area of Pukoo Harbor the charted soundings are generally 2-3 foot deeper than the survey depths. The shoaling of 12 foot in the main channel reported in 1973 was not found during this survey. Other discrepancies were noted in section K. above. Shoaling considered disproven. Recommend deletion from chart.

No comparisons were made between charted soundings and surveyed depths in the area of Kalaeloa Harbor as there is only a very small scale chart covering the area.

N/A to H-10126

M. ADEQUACY OF SURVEY ✓

This navigable area survey of Pukoo and ~~Kamalo Harbors~~ is complete and sufficient to supersede all prior surveys for charting purposes in the areas actually surveyed. The ~~soundings taken during the chart investigation of Kalaeloa are adequate for charting purposes.~~

Concur

N. AIDS TO NAVIGATION ✓

No new Aids to Navigation were found during this survey.

Kamalo Bay Reef Lighted Buoy #2 (Light List # 3736) charted at 21-02-04.6N, 156-52-43.8W was found to be located at 21-02-05.7N, 156-52-44.5W (pos #6367). The charted position and the position of the light as described in the Light List is adequate and fulfills the intended purpose.

N/A - H-10126

Kamalo Harbor Day Beacon #4 (no # in Light List) charted at 21-02-48.3N, 156-52-39.2W was found to be located at 21-02-48.1N, 156-52-39.4W using a Hewlett Packard Model 3808 geodimeter range and a T-2 cut. It is recommended that it be recharted at this position. The Light List description is adequate. A NOAA Form 76-40 form is attached.

N/A - H-10126

The position of the Kaamola Point Light (Light List #3735) was determined to Third Order Class I standards during the Kalaeloa Harbor investigation. The charted position (chart 19347 13th edition dated 7 January 1984) and the position of the light as described in the light list should be superseded. A NOAA Form 76-40 is attached.

N/A to A-10126

O. STATISTICS ✓

<u>Launch</u>	<u>Linear Nautical Miles of Hydro</u>	<u>Square Nautical Miles of Hydro</u>	<u>Number of Positions</u>
2125	6.5	0.8	485 333
2126	8.5 6.5	0.9 .8	343 333
TOTALS	15.0	1.7	828

Bottom Samples: 4

Tide Stations: 2

P. MISCELLANEOUS ✓

No anomalous currents or tidal situations were observed or reported during this survey.

On JD 124 divers obtained a bottom sample on the coral sill at 21-02-15N, 156-52-46W. This sill is composed of dead coral and thus is not expected to grow further and possibly shoal this entrance to Kamalo Harbor. N/A - H-10126

Q. RECOMMENDATIONS ✓

This navigable area survey is complete and adequate for charting purposes and no additional field work is recommended at this time.

R. AUTOMATED DATA PROCESSING ✓

Data acquisition and processing were accomplished in accordance with the Hydrographic Manual (4th Edition), Manual Automated Hydrographic Surveys, the PMC OPORDER, Hydrographic Survey Guidelines and the Hydrographic Data Requirements for the 1984 field season.

Soundings and positions were collected by an Aircraft Systems Inc. (ASI) data logger. The daily logger, master and corrector tapes are included as part of this survey. The following is a list of all computer programs and version dates used for data acquisition and processing.

<u>NUMBER</u>	<u>DESCRIPTION</u>	<u>VERSION</u>
RK 201	Grid, Signal, and Lattice Plot	4/18/75
RK 212	Visual Station Table Load	4/01/74
RK 216	Range-Azimuth Non-Real Time Plot	2/24/84
RK 300	Utility Computations	10/21/80
RK 330	Reformat and Data Check	5/04/76
PM 360	Electronic Corrector Abstract	2/02/76
RK 407	Geodetic Inverse/Direct Computation	9/25/78
AM 500	Predicted Tide Generator	11/10/72
RK 561	H/R Geodetic Calibration	12/01/82
AM 602	Elinore--Line Oriented Editor	12/08/82
RK 606	Tape Duplicator	8/22/74
AM 607	Self-Starting Binary Loader	8/10/80
RK 610	Binary Tape Duplicator	12/01/82
RK 612	Line Printer List	3/22/78

S. REFERENCES TO OTHER REPORTS ✓

The following reports contain information related to this survey.

<u>Report</u>	<u>Project</u>	<u>Date Submitted</u>
Echo Sounding Report	OPR-T126-RA-84	June 1984
Electronic Control Report	OPR-T126-RA-84	June 1984
Horizontal Control Report	OPR-T126-RA-84	June 1984
Coast Pilot Report	OPR-T126-RA-84	June 1984



Hawaii 1/1/84

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

June 6, 1984

Michael M. Jenks
Colonel, U.S. Army Corps of Engineers
District Engineer, Honolulu
Ft. Shafter, Hawaii 96858

Dear Sir:

Enclosed are preliminary copies of our hydrographic surveys of Kalaeloa, Pukoo and Kamalo Harbors completed on May 3, 1984. These surveys are preliminary and subject to office review. Final results will be available from:

Chief, Nautical Chart Branch
N/MOP21
7600 Sand Point Way N.E.
Seattle, WA 98115
Phone: (206) 526-6835

We were unable to survey Honouliwai Bay due to weather and time constraints.

Sincerely,

John P. Vandermeulen
Commander, NOAA
Commanding Officer





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

June 7, 1984 S221 1601-01/SRI

Commander
Fourteenth Coast Guard District
Prince Kalanianoʻle Federal Building
300 Ala Moana Blvd.
Honolulu, HI 96850

Dear Sir:

In response to your request to NOAA dated September 21, 1983, we have conducted a navigable area hydrographic survey of Kamalo Harbor, Molokai. Surveys were also conducted in Pukoo and Kalaeloa Harbors in early May, 1984 in response to other agencies' requests. Preliminary copies of these surveys are enclosed for your use. The surveys are subject to office review and final surveys will be available through:

Chief, Nautical Chart Branch
N/MOP21 - BIN C15700
7600 Sand Point Way N.E.
Seattle, WA 98105

Accurate positions were determined for three aids to navigation in the course of the survey:

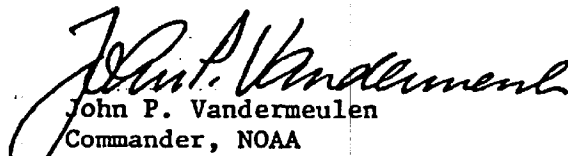
Kamalo Bay Reef Buoy 2 (LLNR 3736) 21/02/06N, 156/52/45W
Kamalo Harbor Daybeacon 4 21/02/48.0N, 156/52/39.4W
Kaamola Point Light 21/03/09.756N, 156/51/07.957W
(Third Order, Class 1 Geodetic Position)

The location of buoy 2 is very close to the charted location and adequately marks the entrance to Kamalo Harbor. For future positioning of buoy 2 the following additional landmarks and associated Third-order positions could be used:

Gable (Kaunakakai) 21/05/02.471N, 157/01/54.190W
Tank (Kawela) 21/04/33.720N, 156/57/46.972W

We hope this information will satisfy your requirements.

Sincerely,


John P. Vandermeulen
Commander, NOAA
Commanding Officer

cc: N/MOP21





U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NOAA Ship RAINIER S221
1801 Fairview Avenue East
Seattle, Washington 98102-3767

*Hawaii
Project*

June 6, 1984

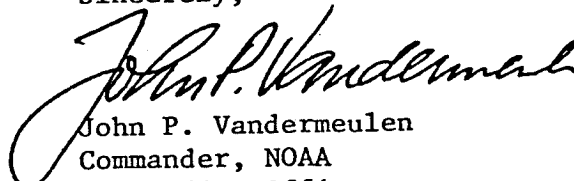
Mr. Peabody
Star Route, Box 179
Kaunakakai, Molokai, HI 96748

Dear Mr. Peabody:

Enclosed is a preliminary copy of our hydrographic survey of Pukoo Harbor completed on May 3, 1984. This survey is preliminary and subject to office review. Final results will be available from:

Chief, Nautical Chart Branch
N/MOP21
7600 Sand Point Way, N.E.
Seattle, Washington 98115
Phone: (206) 526-6835

Sincerely,


John P. Vandermeulen
Commander, NOAA
Commanding Officer

enclosure



APPROVAL SHEET

DESCRIPTIVE REPORT TO ACCOMPANY
HYDROGRAPHIC SURVEY

H-10126

RA-2.5-1-84

In producing this sheet, standard procedures were observed in accordance with the Hydrographic Manual, PMC OPORDER, Hydrographic Survey Guidelines, 1984 Data Requirements Letter, and the Instruction Manual for Automated Hydrographic Surveys. The data was examined daily during the execution of the survey.

The boatsheet and the accompanying records have been examined by me, are considered to be complete and adequate for charting purposes, and are approved.

Submitted By:



Timothy D. Rulon
LT. NOAA

Approved By:



John P. Vandermeulen
CDR. NOAA
Commanding Officer

MASTER STATION LIST
OPR-T126-RA-84
HAWAII, HAWAIIAN ISLANDS
MOLOKAI ISLAND

FINAL VERSION

~~100 1 21 02 57611 156 52 37703 250 0001 000000~~
~~/KAMALO 3 1984~~ RAINIER

101 1 21 04 22380 156 48 00766 250 0001 000000
/HARBOR 1983 FAIRWEATHER

~~200 1 21 03 57974 156 54 00536 139 0207 000000~~
~~/PUU PAPAI 1915 1962~~ NGS LISTING

~~201 1 21 03 07756 156 51 07957 139 0005 000000~~
~~/KAAMOLA POINT LIGHT~~ RAINIER

~~202 1 21 02 59404 156 52 30049 250 0001 000000~~
~~/RAYKANA 1961~~ NGS LISTING

203 1 21 06 02052 156 46 47465 139 0286 000000
/PUU MANO 1890 NGS LISTING

204 1 21 04 28427 156 48 07076 139 0002 000000
/HARBOR AZ 1983 FAIRWEATHER

~~206 1 21 02 40091 156 52 39406 139 0000 000000~~
~~/KAHOLA DAYBEACON 4~~ RAINIER

FIELD TIDE NOTE

RA-2.5-1-84
H-10126

Field tide reduction of soundings for survey H-10126 was based on predicted tides from Honolulu, Hawaii (161-2340). Corrections were obtained from Preliminary Tidal Zoning OPR-T126-RA-84. The predicted tides were derived using program AM500.

The reference station at Honolulu was leveled on March 3, 1984. Three permanent benchmarks (including the primary mark) were connected to the ETG reading mark. Levels were run at the end of survey operations on April 26, 1984. Initial and final levels compared very well.

^{One}
~~Two~~ subordinate stations were installed on Molokai on March 28, 1984 to provide data for this survey. ~~A Fisher/Porter ADR tide gage was installed in Kamalo Harbor (161-3077), 21 02.9'N, 156 52.6'W. A Metercraft bubbler gage was installed in Pukoo Harbor (161-3155), 21 04.3'N, 156 48.0'W.~~

Two historic benchmarks were recovered at Kamalo Harbor. In addition, two triangulation disks and one reference mark were used for leveling purposes. Installation levels were run on March 29, 1984. Final levels were run on May 3, 1984. The gage was removed on May 4, 1984. Comparison of the initial and final levels showed no appreciable movement of the staff during survey operations. N/A-H-10126

Pukoo Harbor was not an historical gage site. This gage was to operate for a period of three days or for the duration of hydro operations in the area. No reference marks were established. A triangulation disk ("Harbor 1983") and two reference marks were used for leveling. No tide staff was installed at this site. Therefore, leveling was done to the water's edge. Installation levels were conducted on March 28, 1984.

Due to a change in operation plans, the survey of Pukoo Harbor did not begin until April 29, 1984. The gage did not operate continuously between installation and the beginning of hydro due to lack of maintenance. However, the gage operated well during survey operations. Final levels were run on May 3, 1984. Comparison of initial and final levels indicated no movement of the orifice.

DATE: 9/19/84

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

TIDE NOTE FOR HYDROGRAPHIC SHEET

Marine Center: Pacific

OPR: T126

Hydrographic Sheet: H-10126

Locality: Kamalo Harbor, Kalaeloa Harbor, Pukoo Harbor, SE Coast Molokai
Island, Hawaii

Time Period: March 29 - May 3, 1984

Tide Station Used: 161-3077 Kamalo Harbor, HI
161-3155 Pukoo Harbor, HI

Plane of Reference (Mean Lower Low Water): 161-3077 = 31.39 ft.
161-3155 = 1.76 ft.

Height of Mean High Water Above Plane of Reference: 161-3077 = 1.7 ft.
161-3155 = 1.8 ft.

Remarks: Recommended Zoning:

1. In Kamalo Harbor Zone Direct on 161-3077.
2. In Kalaeloa Harbor Zone Direct on 161-3077.
3. In Pukoo Harbor Zone Direct on 161-3155.


Chief, Tidal Datums Section

GEOGRAPHIC NAMES

H-10126

Name on Survey	A	B	C	D	E	F	G	H	K
Hawaii, Southeast Coast of Molokai, Pukoo Harbor	ON CHART NO. 19353	ON PREVIOUS SURVEY	ON U.S. QUADRANGLE MAPS	FROM LOCAL INFORMATION	ON LOCAL MAPS	P.O. GUIDE OR MAP	RAND McNALLY ATLAS	U.S. LIGHT LIST	
HAWAII (title)									1
MOLOKAI (title)									2
PUKOO HARBOR									3
									4
									5
									6
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HYDROGRAPHIC SURVEY STATISTICS

H-10126

RECORDS ACCOMPANYING SURVEY: To be completed when survey is processed.

RECORD DESCRIPTION		AMOUNT	RECORD DESCRIPTION		AMOUNT
SMOOTH SHEET		1	SMOOTH OVERLAYS: POS., ARC, EXCESS		3
DESCRIPTIVE REPORT		1	FIELD SHEETS AND OTHER OVERLAYS		7
DESCRIP- TION	DEPTH/POS RECORDS	HORIZ. CONT. RECORDS	SONAR- GRAMS	PRINTOUTS	ABSTRACTS/ SOURCE DOCUMENTS
ACCORDIAN FILES					
ENVELOPES					
VOLUMES					
CAHIERS	1				
BOXES					

SHORELINE DATA

SHORELINE MAPS(List):

PHOTOBATHYMETRIC MAPS(List):

NOTES TO THE HYDROGRAPHER(List): Enlargements of prior surveys H-4456 & H-8829

SPECIAL REPORTS(List):

NAUTICAL CHARTS(List): Enlargements of Chart 19353

OFFICE PROCESSING ACTIVITIES

The following statistics will be submitted with the cartographer's report on the survey

PROCESSING ACTIVITY		AMOUNT'S		
		VERIFICATION	EVALUATION	TOTALS
POSITIONS ON SHEET				333
POSITIONS REVISED	See Item 7 Ver Rpt TC/TL corrected all positions effected* 1161*			
SOUNDINGS REVISED		324		
CONTROL STATIONS REVISED		0		
		TIME - HOURS		
		VERIFICATION	EVALUATION	TOTALS
PRE-PROCESSING EXAMINATION		1		1
VERIFICATION OF CONTROL		1		1
VERIFICATION OF POSITIONS		19		19
VERIFICATION OF SOUNDINGS		41		41
VERIFICATION OF JUNCTIONS		0		
APPLICATION OF PHOTOBATHYMETRY		0		
SHORELINE APPLICATION/VERIFICATION		NA		
COMPILATION OF SMOOTH SHEET / Ver. Report		11		11
COMPARISON WITH PRIOR SURVEYS AND CHARTS			11.0	11
EVALUATION OF SIDESCAN SONAR RECORDS				
EVALUATION OF WIRE DRAGS AND SWEEPS				
EVALUATION REPORT			10	10
OTHER Digitizing				10
Misc			10	10
TOTALS		73	31.0	104
Pre-processing Examination by		Beginning Date 8/17/84	Ending Date 8/17/84	
Verification of Field Data by R.D. Mueller		Time(Hours) Begin 73 8/23/84	Ending Date 12/10/84	
Verification Check by J. L. Stringham, B. Olmstead, J. Green		Time(Hours) 23	Ending Date 1/3/85	
Evaluation and Analysis by C.R. Davies		Beginning Date 12/26/84	Ending Date 1/3/85	
Inspection by D. Hill		Time(Hours) 4	Ending Date 1/11/85	

PACIFIC MARINE CENTER

EVALUATION REPORT

REGISTRY NO: H-10126

FIELD NO: RA-2.5-1-84

Hawaii, Southeast Coast of Molokai, Pukoo Harbor

SURVEYED: April 29 - May 3, 1984

SCALE: 1:2,500

PROJECT NO: OPR-T126-RA-84

SOUNDINGS: Raytheon DSF-6000N,
Handlead

CONTROL: Range/Azimuth
Motorola
MiniRanger III

Chief of Party.....CDR J.P. Vandermeulen

Surveyed by.....LT S. Iwamoto
ENS J. Judson
ENS K. Barton
ENS C. Wilson
ENS J. Griffin
ENS M. Pickett

Automated Plot by.....PMC Xynetics Plotter

Verified by.....R. D. Mueller

Evaluated by.....C. R. Davies

I. INTRODUCTION

H-10126 is a navigable area survey conducted by the NOAA Ship RAINIER in accordance with the following:

Project Instructions for OPR-T126-RA-84, dated January 9, 1984
Change No. 1, dated February 16, 1984
Change No. 2, dated April 16, 1984

The original survey consisted of three harbor areas: Pukoo, Kamalo, and Kalaeloa. Only Pukoo Harbor was accepted for office processing. The Kalaeloa and Kamalo Harbor surveys were returned to the NOAA Ship RAINIER because of incomplete field work. The hydrographer's Descriptive Report discusses all three harbors, however, marginal notes and deletions are included in the hydrographer's report whenever Kamalo and Kalaeloa harbors are discussed. The navigable area survey was conducted in Pukoo Harbor and offshore to latitude 21°03'46.5"N.

Predicted tides based on the Honolulu, Hawaii (161-2340) tide gage with time and range adjustments were utilized during shipboard processing. Tide correctors used for the reduction of the final soundings are computed from

approved hourly heights from one Metercraft bubbler tide gage, Pukoo Harbor (161-3155).

During verification the following were changed:

- a) Projection parameters were changed to center the hydrography on the smooth sheet and to change the projection to polyconic.
- b) The electronic correctors used for this survey were changed from baseline correctors to daily correctors (see section II, Control & Shoreline).
- c) The TC/TI correctors were changed from fathoms to feet; the survey was conducted in feet.

II. CONTROL AND SHORELINE

Horizontal control is adequately addressed in the hydrographer's Descriptive Report, paragraph F and the Horizontal Control Report for OPR-T126-RA-84. Change No. 2 to the project instructions dictated special procedures to allow Miniranger utilization at 1:2,500 scale. One of these requirements was to accomplish beginning and ending baseline calibration at temperatures within $\pm 5^{\circ}\text{F}$ of the temperature in the operating area. Since this requirement was not met, twice daily system checks utilizing a Hewlett-Packard EDM were deemed acceptable and were utilized to determine the final correctors for H-10126.

The smooth sheet was plotted using published and original field positions based on the Old Hawaiian Datum.

Shoreline for orientation only is not shown on H-10126, in accordance with the N/CG letter dated February 16, 1984, entitled "Reduction of Marine Center Hydrographic Survey Processing Backlog". No conflicts were found when a comparison was made with H-10126 and the charted shoreline.

III. HYDROGRAPHY

Crossline soundings are in fair agreement with minor differences resulting from steep sloping bottom due to natural and man-made features. Hydrography within the limits of H-10126 was adequate to determine the bottom configuration and least depths except for two holidays at:

Latitude (N)	Longitude (W)
21°04'21"✓	156°47'53"✓
21°04'06.5"✓	156°47'54"✓

A submerged coral reef limit line was delineated during survey operations but was not shown on the hydrographer's final field sheet. The approximate submerged coral reef line shown on the smooth sheet was interpreted from comments by the hydrographer.

Generally, standard depth curves are complete and satisfactory except in areas that are foul with coral, rocks or breakers.

IV. CONDITION OF SURVEY

With the exception of items discussed in the Preprocessing Report, dated August 17, 1984, the hydrographic records and reports are adequate and conform to the requirements of the Hydrographic Manual.

V. JUNCTIONS

H-10126 is not bordered by any contemporary surveys but the depths are in harmony with charted depths in the junction area.

VI. COMPARISON WITH PRIOR SURVEYS

H-4456 (1925) 1:5,000

Comparison was not accomplished as required by the project instructions. H-4456 has been superseded by H-8829 (1965). Approval for this change was granted via a telephone conversation with personnel in the Operations Section (N/CG241).

H-8829 (1965) 1:5,000

This survey compares well, with differences of ± 1 to 3 feet, south of latitude $21^{\circ}04'10''N$. North of latitude $21^{\circ}04'10''N$, H-8829 compares very poorly; the prior survey being 2 to 15 feet shoaler. This difference is attributed to recent dredging in the harbor area.

The submerged piles between latitude $21^{\circ}04'23.3''N$, longitude $156^{\circ}47'58.4''W$ and $21^{\circ}04'12''N$, longitude $156^{\circ}47'57''W$ were partially investigated by the hydrographer. The only pile considered disproven is plotted at latitude $21^{\circ}04'18.0''N$, longitude $156^{\circ}47'57.5''W$. The other piles extending north and south of the presently surveyed area were not specifically discussed by the hydrographer and are not considered disproven. Those piles extending north have been carried forward to the present survey; however piles extending south were not specifically plotted on the H-8829 smooth sheet. Instead, evidence of their existence exists only as a discussion by the hydrographer in the H-8829 report. Accordingly, a descriptive note has been added to the H-10126 smooth sheet to indicate the presence of submerged piles. In addition, a submerged pile has been added to the smooth sheet at latitude $21^{\circ}04'12''N$, longitude $156^{\circ}47'57''W$ at a point, again described by the previous hydrographer, as the location of the outer most pile. Although the longitude of the pile was not specifically mentioned it was inferred by extending a line along the axis of the other piles until it intersected the recorded latitude.

The present survey is adequate to supersede H-8829 within the common area.

VII. COMPARISON WITH CHART

19340 21st Edition, September 3, 1983

Comparison was made with this chart, however due to the large scale differences, 1:2,500 vs 1:250,000 no meaningful results were possible.

19353 9th Edition, April 22, 1978

Comparison was made with this chart since it provides the largest scale coverage for the area at 1:5000.

- a) Hydrography -- Most charted information originates with the prior surveys previously discussed. North of latitude 21°04'10"N, extensive dredging has occurred, deepening the harbor area by 2 to 14 feet. South of latitude 21°04'10"N, a deepening of 2 to 5 feet has occurred within the common area.

The specific positions of piles charted in a line between latitude 21°04'23.3"N, longitude 156°4'58.4"W and latitude 21°04'12.0"N, longitude 156°4'57"W do not originate with any of the prior surveys. It appears that the charted piles were added to the chart based on a generalization of information shown on the H-8829 smooth sheet. The H-8829 survey documents only three piles which are shown on that smooth sheet in addition to a note that there exists a row of piles. To preclude the possibility of a misinterpretation of these symbols it is recommended that the chart be revised to show either a note referencing submerged piles or a submerged piling symbol such as Chart 1 symbol 0.30a.

The hydrographer delineated a submerged coral reef line on both sides of the main channel of Pukoo Harbor. In the raw records the hydrographer does not state whether or not the line is on the edge of the reef. It is recommended by the evaluator that the submerged reef line found on the chart be superseded where the hydrographer's coral reef line falls seaward from the charted one, and be retained where the hydrographer's reef line falls shoreward from the charted reef line.

The approximate dredge limit line found on H-10126 should be charted at the compilers discretion, other sources should be investigated for exact limits (i.e. U.S. Army Corps of Engineers).

No new dangers to navigation were found on H-10126.

The geographic name shown on the smooth sheet originated from this chart. H-10126 is adequate to supersede the hydrography on chart 19353 within the common area.

- b) Controlling Depths -- There are no controlling depths within the limits of H-10126.
- c) Aids to Navigation -- There are no aids to navigation within the survey area.

VIII. COMPLIANCE WITH INSTRUCTIONS

H-10126 (1984) is a good navigable area survey. No additional field work is required.

Respectfully submitted,

Charles R. Davies

C. R. Davies
Cartographer
December 31, 1984

This survey has been examined by me and it meets the Charting and Geodetic Services survey standards and requirements for use in nautical charting except as noted in the Evaluation Report. The survey is recommended for approval.

Dennis Hill

Dennis Hill
Chief, Hydrographic Section

ATTACHMENT TO DESCRIPTIVE REPORT FOR H-10126

I have reviewed the smooth sheet, accompanying data, and reports of this hydrographic survey. Except as noted in the Evaluation Report, the hydrographic survey meets or exceeds Charting and Geodetic Services (C&GS) standards, complies with instructions, and is accurately and completely represented by the smooth sheet and digital data file for use in nautical charting.

For *Dennis H. O* 2-7-85
Chief, Nautical Chart Branch (Date)

CLEARANCE:

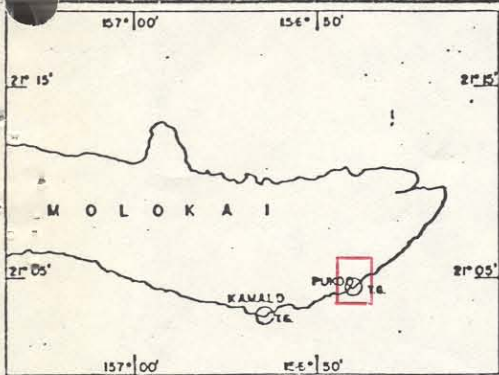
N/MOP2:LWMordock

SIGNATURE AND DATE:

Larry M. Mordock 2/7/85

After review of the smooth sheet and accompanying reports, I hereby certify this survey is accurate, complete, and meets appropriate standards with only the exceptions as noted above. The above recommendations are forwarded with my concurrence.

Robert L. Sankit 2/14/85
Director, Pacific Marine Center (Date)



PROGRESS SKETCH

OPR-TI26-RA-84
HYDROGRAPHIC SURVEY
HAWAII, HAWAIIAN ISLANDS

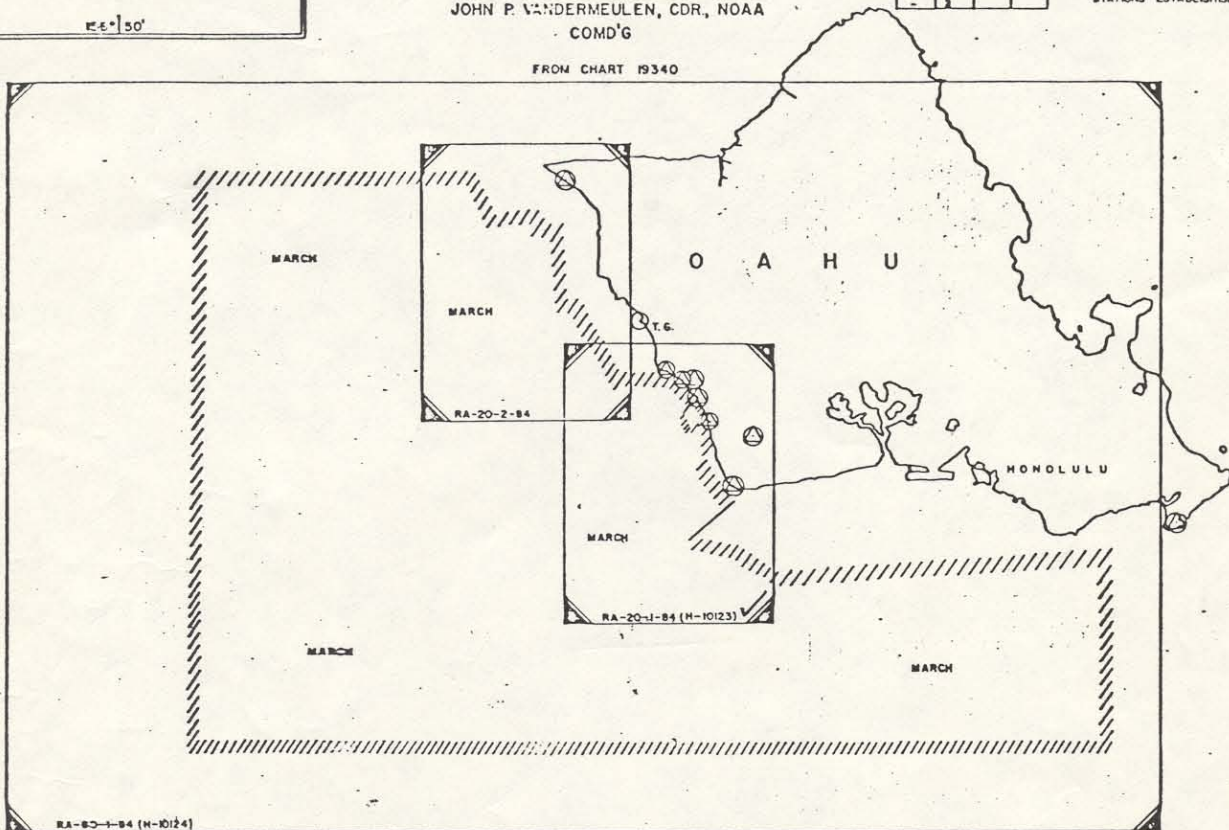
FEB.28-MAR.31,1984

NOAA SHIP RAINIER
JOHN P. VANDERMEULEN, CDR, NOAA
COMD'G

FEB	MAR	APR	MAY
726.25			
1302.4			
0.83			
20.4			
100.7			
3			
1			
3	6		
-	-		
-	1		
1	2		
-	2		

80 NM SOUNDING
LNM SOUNDING LINE
80 NM SIDE SCAN SONAR
LNM SIDE SCAN SONAR
LNM MISCELLANEOUS DISTANCE
BOTTOM SAMPLES (GRAB)
WATER SAMPLES ANALYZED (SALINITY)
CONTROL STATIONS (ELECTRONIC)
MANSEN CAST (S)
SOUND VELOCITY, TEMPERATURE, DEPTH CAST
TIDE GAGE (O)
STATIONS ESTABLISHED BY TRAVERSE

FROM CHART 19340



RECORD OF APPLICATION TO CHARTS

FILE WITH DESCRIPTIVE REPORT OF SURVEY NO. H-10126

INSTRUCTIONS

A basic hydrographic or topographic survey supersedes all information of like nature on the uncorrected chart.

1. Letter all information.
2. In "Remarks" column cross out words that do not apply.
3. Give reasons for deviations, if any, from recommendations made under "Comparison with Charts" in the Review.

[illegible]