F00535

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Field Examination

Field No. N/A

Registry No. F00535

LOCALITY

State Commonwealth of the Northern Mariana Islands

General Locality North Pacific Ocean

Sublocality Tinian Harbor

2007

CHIEF OF PARTY
Corey Allen, NOAA

LIBRARY & ARCHIVES

DATE 30-Jul-07

NOAA FORM 77-28 (11-72)

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

REGISTER NO.

HYDROGRAPHIC TITLE SHEET

F00535

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.

State **Commonwealth of the Northern Mariana Islands**

General Locality **North Pacific Ocean**

Sublocality **Tinian Harbor**

Scale **1:5,000** Date of Survey **23-May-07**

Instructions Dated **March 15, 2007** Project No. **M-T901-AHI-07**

Vessel **R/V AHI**

Chief of Party **Corey Allen, Physical Scientist, NOAA**

Surveyed by **Corey Allen, Erin Campbell, Kurt Brown, Scott Ferguson, Joyce Miller**

Soundings taken by echo sounder: **Reson 8101**

Graphic record scaled by **N/A**

Graphic record checked by **N/A**

Protracted by **NA** Automated plot **NA**

Verification by **Sarah Wolfskehl** Evaluation by **Katie Reser**

Soundings in **Meters** at **MLLW**

REMARKS: **All times are UTC. The purpose of this survey was to provide contemporary surveys to update National Ocean Service (NOS) nautical charts. All separates are filed with the hydrographic data. Revisions and end notes in red were generated during office processing. As a result, page numbering may be interrupted or non-sequential.**

Descriptive Report to Accompany Hydrographic Survey F00535

Project M-T901-AHI-07
Tinian Harbor
Commonwealth of the Northern Mariana Islands
Scale 1:5000
May, 2007
NOAA Research Vessel AHI

Introduction

The United States Navy and the Commonwealth of the Northern Mariana Islands (CNMI) Port Authority requested a modern hydrographic survey of Saipan Harbor. The US Navy plans to utilize Saipan as the primary port-of-call in the region for Navy vessels until such a time as Apra Harbor, Guam can be dredged to again support safe entry by Navy ships and submarines; this dredge work is scheduled to occur in FY2008 or later. The CNMI Port Authority has additionally requested modern hydrographic surveys of Tinian Harbor and Rota Harbor to support safe and efficient commerce and transportation in the region.

This project provides contemporary hydrographic data to update the nautical charts in the area and support sound navigational decision-making for both military and civilian mariners entering the ports of Saipan, Rota and Tinian.

A. AREA SURVEYED

This hydrographic survey was completed as specified by Hydrographic Survey Letter Instructions M-T901-AHI-07, dated March 15, 2007[1] and all other applicable direction[1], with the exception of deviations noted in this report.

The survey area was located in Tinian Harbor (Figure 1) on the Island of Tinian, which is part of the Commonwealth of the Northern Mariana Islands. This survey corresponds to Sheet C in the sheet layout provided with the Letter Instructions.

Data acquisition was conducted on May 23, 2007 (DN143).

[1] NOS Hydrographic Surveys Specifications and Deliverables (April, 2007), OCS Field Procedures Manual for Hydrographic Surveying (March 2007), and all Hydrographic Surveys Technical Directives issued through the dates of data acquisition.

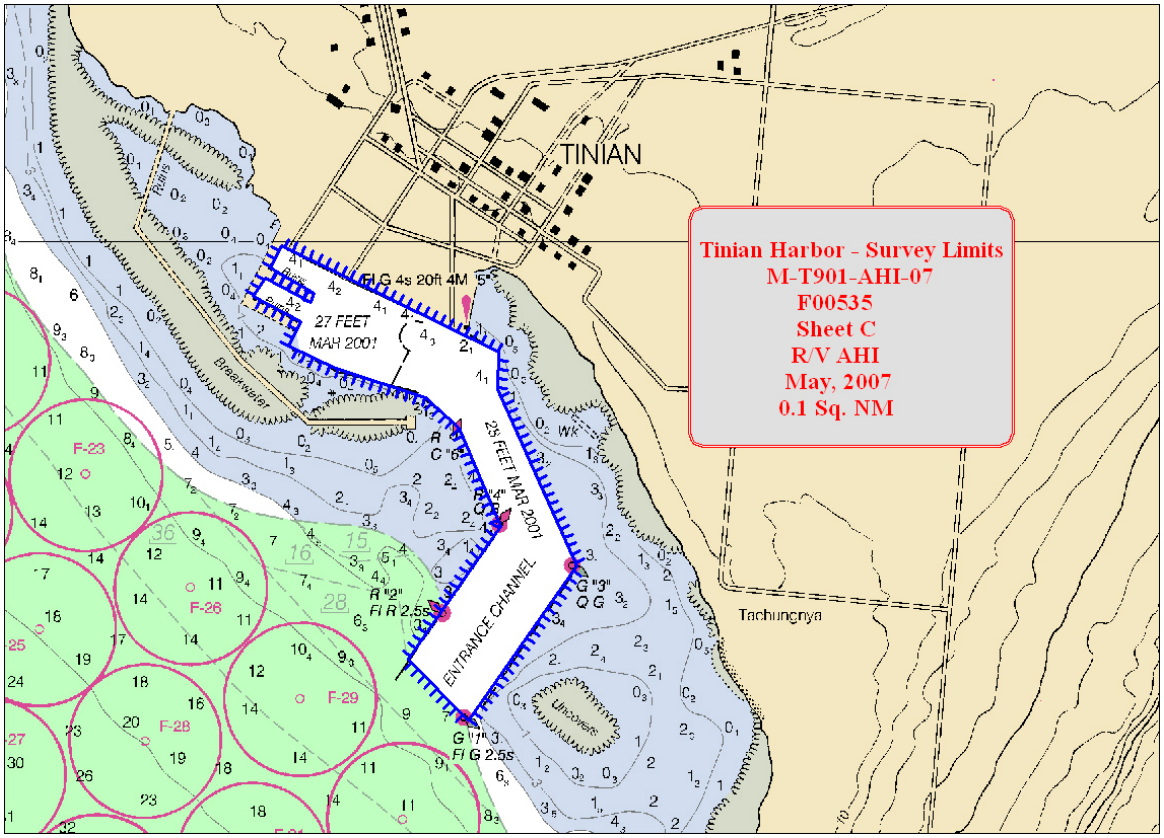

Figure 1: F00535 Survey Area

F00535 Statistics	
Linear Nautical Miles of Mainscheme Multibeam	12.4
Linear Nautical Miles of Side Scan Sonar Lines	0.0
Linear Nautical Miles of Crosslines	1.4
Linear Nautical Miles of Developments	0.0
Total Square Nautical Miles	0.1

Table 1: F00535 Statistics

Complete MBES coverage was obtained with the exception of the westernmost portion of the northern berth inside of Tinian Harbor (Figure 2). This area was inaccessible due to a moored Ferry, tied up with lines running across the berth (Figure 3).

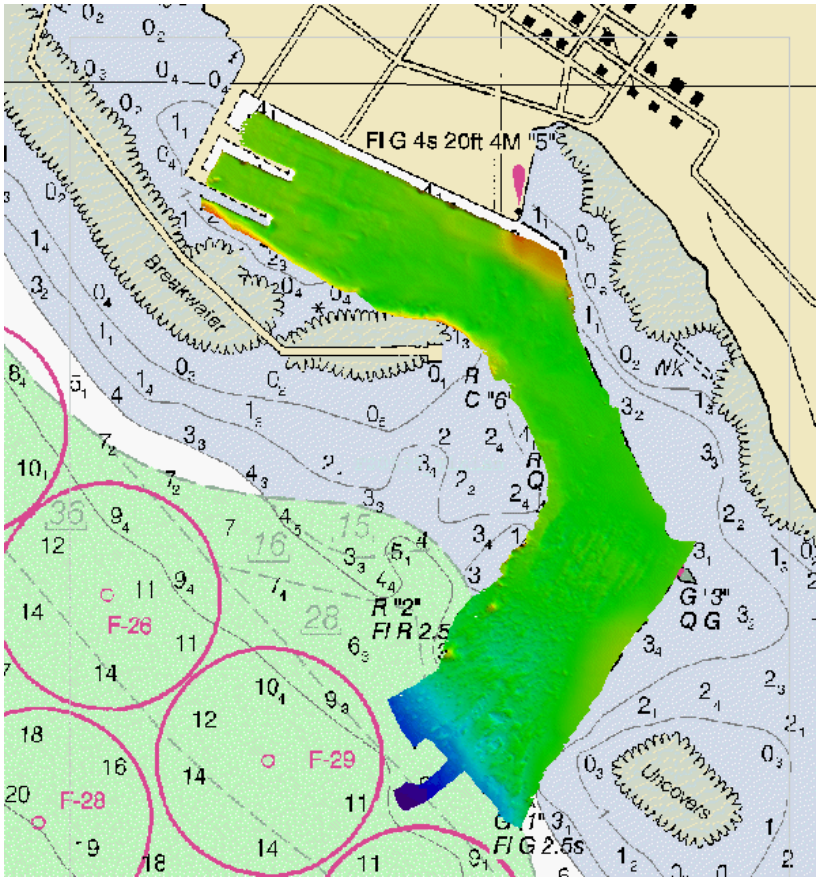

Figure 2 – Tinian Harbor Coverage


Figure 3 – Ferry with lines across northern berth.

B. DATA ACQUISTION AND PROCESSING

A complete description of data acquisition and processing systems, the R/V AHI, quality control procedures and data processing methods are described in the *M-T901-AHI-07 Data Acquisition and Processing Report (DAPR)*[2], submitted under separate cover. Items specific to this survey and any deviations from the aforementioned report are discussed in the following sections.

Final approved water levels were applied to survey F00535 on July 16, 2007. See Section C for additional information.

B1. Equipment

R/V AHI was the only vessel used during survey F00535. Specifications for the AHI are listed in Table 2.

R/V AHI	
Hull Registration Number	F-2505
Builder	Safe Boat International
Length Overall	25 feet
Beam	10 feet
Draft, Maximum	3.3 ft
Cruising Speed	15 knots
Max Survey Speed	6 knots
Primary Echosounder	RESON 8101
Sound Velocity Equipment	SBE 19
Attitude & Positioning Equipment	POS/MV V4
Type of operations	MBES & SSS

Table 2: AHI Specifications

No vessel configurations used during data acquisition deviated from the DAPR.

B2. Quality Control

Data quality for survey F00535 was evaluated through examination of CUBE surfaces that were generated from raw soundings. Internal consistency and integrity of the data were manually examined by the Hydrographer in CARIS subset mode. Soundings and surfaces in overlapping coverage and outer

beams were reviewed for systematic errors and excessive noise. The data were found consistent in comparisons between line-line coverage.

Data Logging

At the location of the Survey in the Mariana Islands, midnight UTC occurred at 10 am local time. DNs used on the acquisition log, SV cast names, and in CARIS are named according to the DN occurring after midnight UTC.

Crosslines

Crossline mileage totaled 1.4 nautical miles comprising 11.3% of total mainscheme hydrography. The mainscheme bathymetry was manually compared to the XL nadir beams in CARIS subset mode and agreed well with differences of 0.1 meters or less. Crossline agreement with main scheme data meet the vertical accuracy requirements as stated in the *NOS Hydrographic Surveys Specifications and Deliverables Manual (HSSDM)*.

Junctions

No contemporary surveys junction with F00535[3].

Coverage Assessment

Based on examination of the half meter resolution BASE surface, complete multibeam coverage was obtained in Tinian Harbor with no significant gaps in the BASE surface[4].

Trueheave

Trueheave was applied to all survey lines as described in the DAPR.

Sound Velocity

All sound velocity data were applied during data collection as described in the M-T901-AHI Data Acquisition and Processing Report. Sound velocity was not applied in CARIS and no CARIS .svp files exist for the survey. Sound velocity data remains in converted file (.cnv) format. The ISS-2000 software did not allow the extension of the sound velocity data based on the slope of the curve. As a result, CTDs were only taken in the deeper areas of the survey where depths were deeper than the expected survey depth. The sound velocity names, positions and times are shown below.

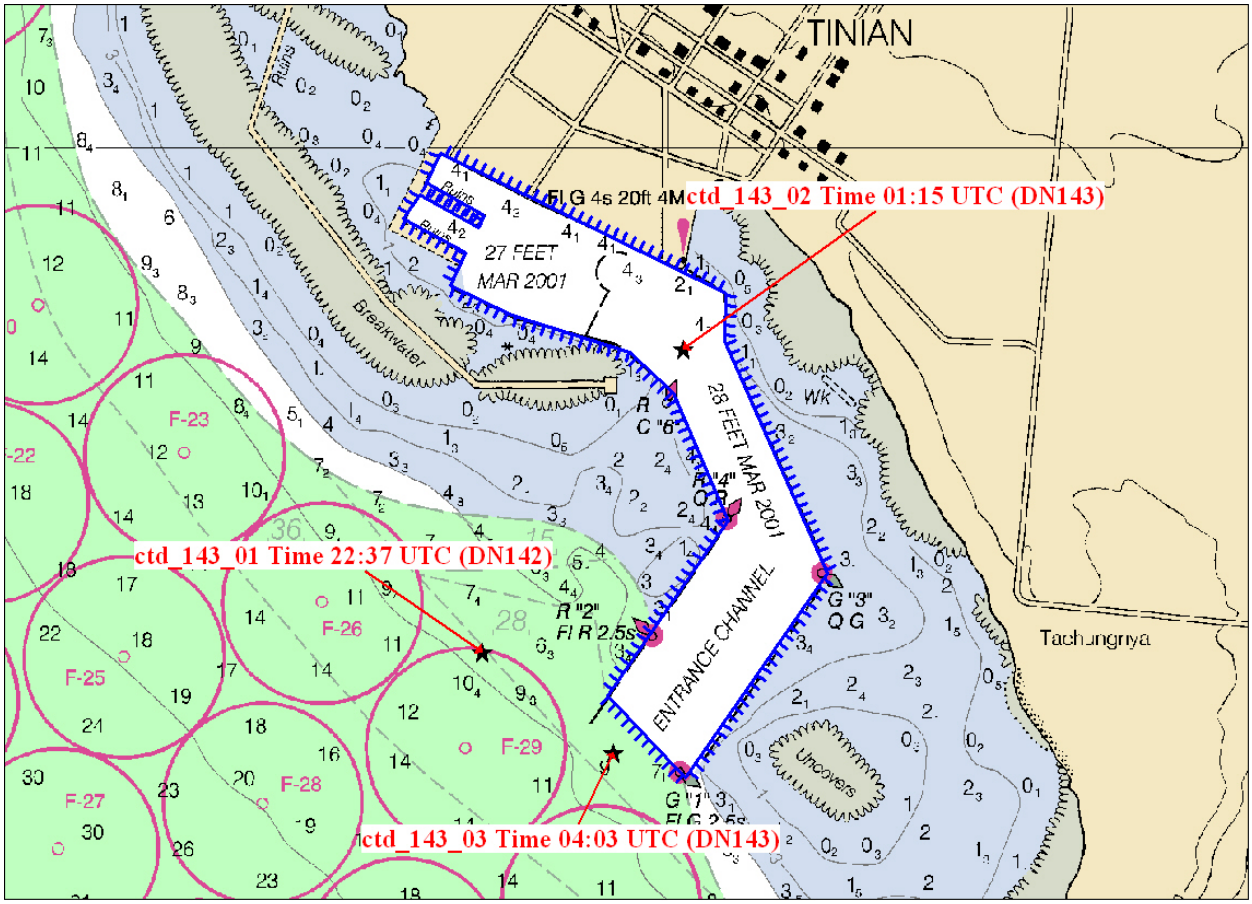

Figure 4 – Sound Velocity Positions, Names and Times

Raw .cnv files are located in Separate II - Sound Speed Data.

Accuracy Standards

Uncertainty values in the CUBE surface were generally close to 0.21 meters. Uncertainty values exceeding 0.3 meters exist in isolated spots throughout the finalized CUBE surface and are the result of high standard deviation from steeply sloped bottom features or coral heads. Data from survey F00535 meet data accuracy specifications as stated in the *HSSDM*[5].

B3. Corrections to Echo Soundings

Data reduction procedures for survey F00535 conform to those detailed in the DAPR.

B4. Data Processing

Data processing procedures for survey F00535 conform to those detailed in the DAPR

A single fieldsheet, F00535_Tinian was created to encompass survey F00535, and contains a single half meter CUBE surface, F00535_0p5m and one finalized surface, F00535_0p5m_Final The fieldsheet is shown in Figure 5 . The fieldsheet and all data open in CARIS session file F00535.hsf.

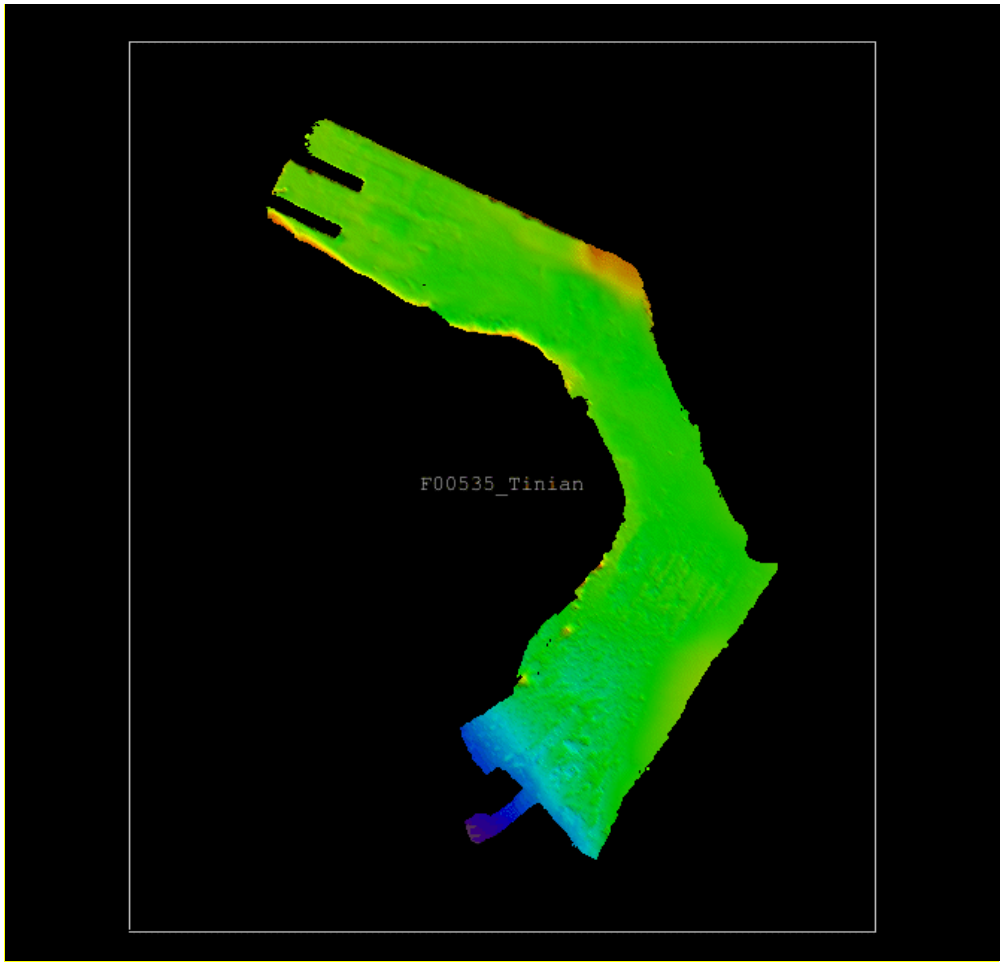

Figure 5 - Fieldsheet F00535_Rota

A half meter resolution BASE surface was chosen as the highest resolution surface the data would support without creating significant gaps in coverage. In addition, the half meter resolution was chosen to increase the likelihood of the surface representing the shoal points on the numerous coral heads of various shapes and sizes in the survey area.

Designated Soundings

Soundings were designated on features in the survey area whose shoal points were not adequately represented in the half meter BASE surface. The most significant coral heads in a particular area were selected for designated soundings reflecting their shoal point. Other coral heads with deeper shoal depths were examined in the multibeam data but no sounding designated on their shoal point. In these cases the least depth on the coral head was adequately represented in the BASE surface or, if not, the least depth was not deemed significant in relation to nearby coral heads whose shoal depths were designated.

C. HORIZONTAL AND VERTICAL CONTROL

Horizontal control work was not done during Survey F00535 and a Horizontal and Vertical Control report was not written for this survey.

Horizontal Control

The horizontal datum for this project is the World Geodetic System of 1984 (WGS84). Differential GPS (using a C-Nav SF-2050G DGPS receiver to supply the POS/MV with differential correctors) was the sole method of positioning.

Vertical Control

The vertical datum for this project is Mean Lower-Low Water (MLLW). The primary tide station at Apra Harbor, Guam (163-0000) served as control for datum determination and as the primary source for water level correctors for survey F00535 during acquisition.

A request for delivery of final approved water level data (smooth tides) for survey F00535 was forwarded via email to N/OPS1 on May 30, 2007. A copy of the request is included in Appendix IV.

The Tide Note for Hydrographic Survey F00535 was received on June 18, 2007, and states that preliminary zoning is accepted as the final zoning correctors. Therefore, verified water levels applied on July 16, 2007 are the final water levels. Final approved water levels consist of verified water level data downloaded from the CO-OPS website for station Guam in file 1630000.tid, and the tide zoning information in file T901AHI2007CORP.zdf. The Tide Note for Hydrographic Survey F00535 and ancillary correspondence are included in Appendix IV.

It will not be necessary for the Pacific Hydrographic Branch to reapply the final approved water levels to the survey data during the survey acceptance review.

D. RESULTS AND RECOMMENDATIONS

D.1 Chart Comparison

Survey F00535 was compared with chart 81071_2 (7th Ed.; December, 2004, 1:20,000), updated with Notice to Mariners through 04/07/2007[6].

Chart 81072_2

An offset of approximately thirty meters to the northwest was noted in chart 81071_2 and is shown in Figure 6[7].

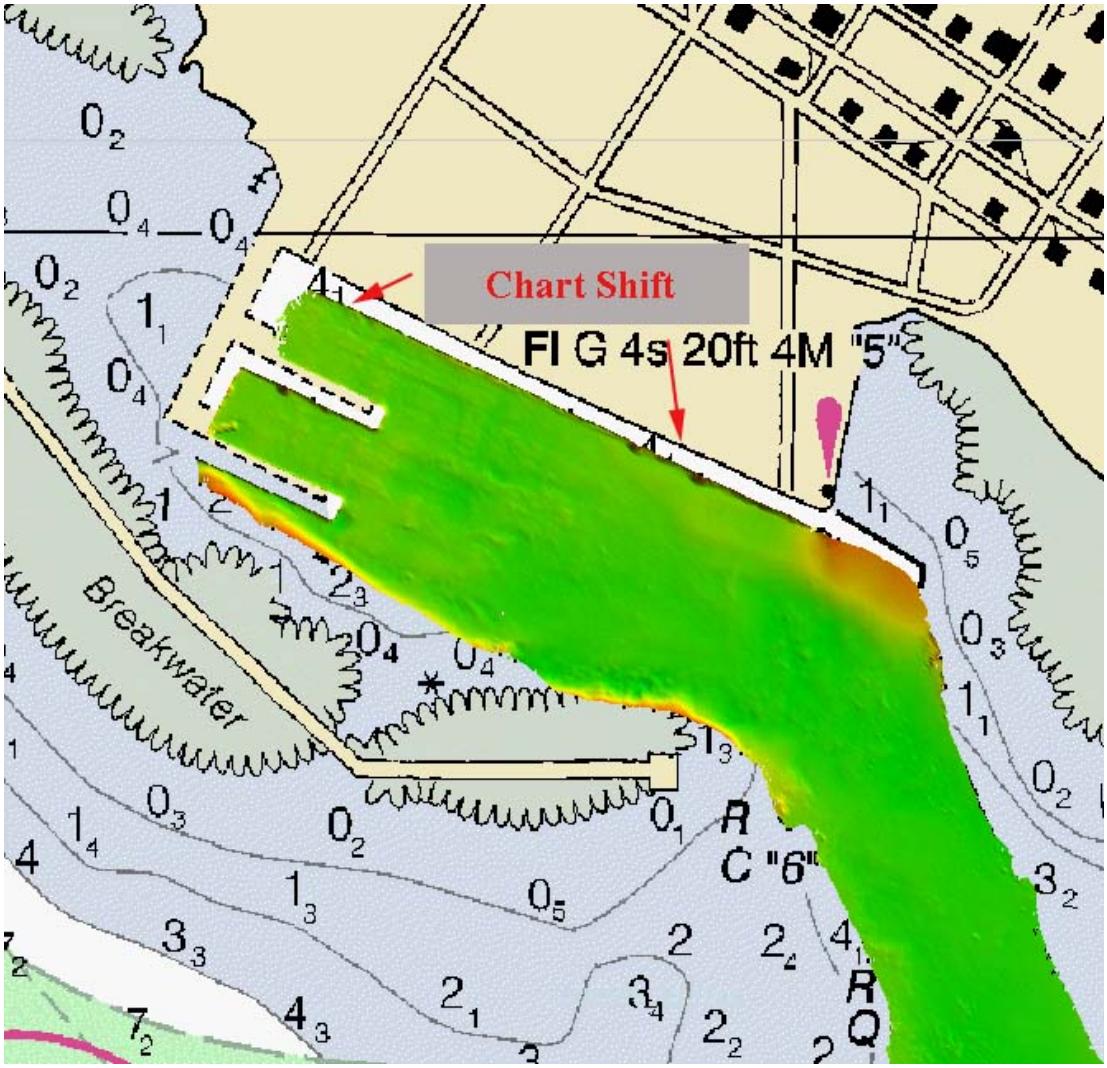

Figure 6 – Shifted Chart

Chart 81071_2 contains eight spot soundings within the channel limits that indicate areas that are shoaler than the controlling depth. These soundings generally agree within a foot with depths from survey F00535[8].

In the inner harbor area, cleared to 27 feet, several 26 foot soundings were found (Figure 7). The clearance depth noted on the chart for this area should be changed to 26 feet[9].

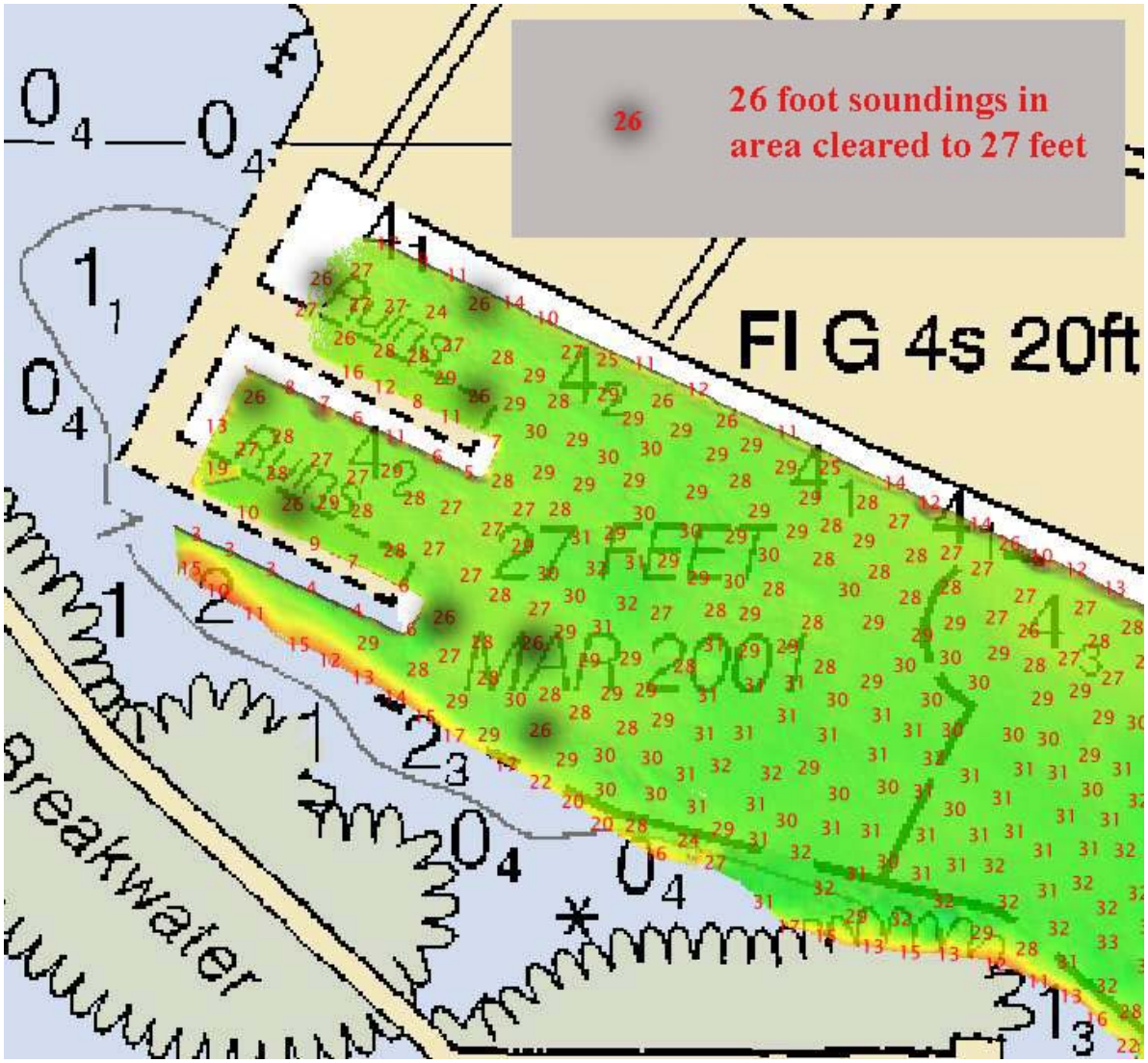

Figure 7

A 17 foot shoal was found west of the entrance channel at position 14/57/26.3N, 145/37/22.8E, over a charted depth of 19 feet (Figure 8)[10].

A 19 foot shoal was found west of the entrance channel at position 14/57/23.3N, 145/37/19.9E, over a charted depth of 22 feet (Figure 8)[11].

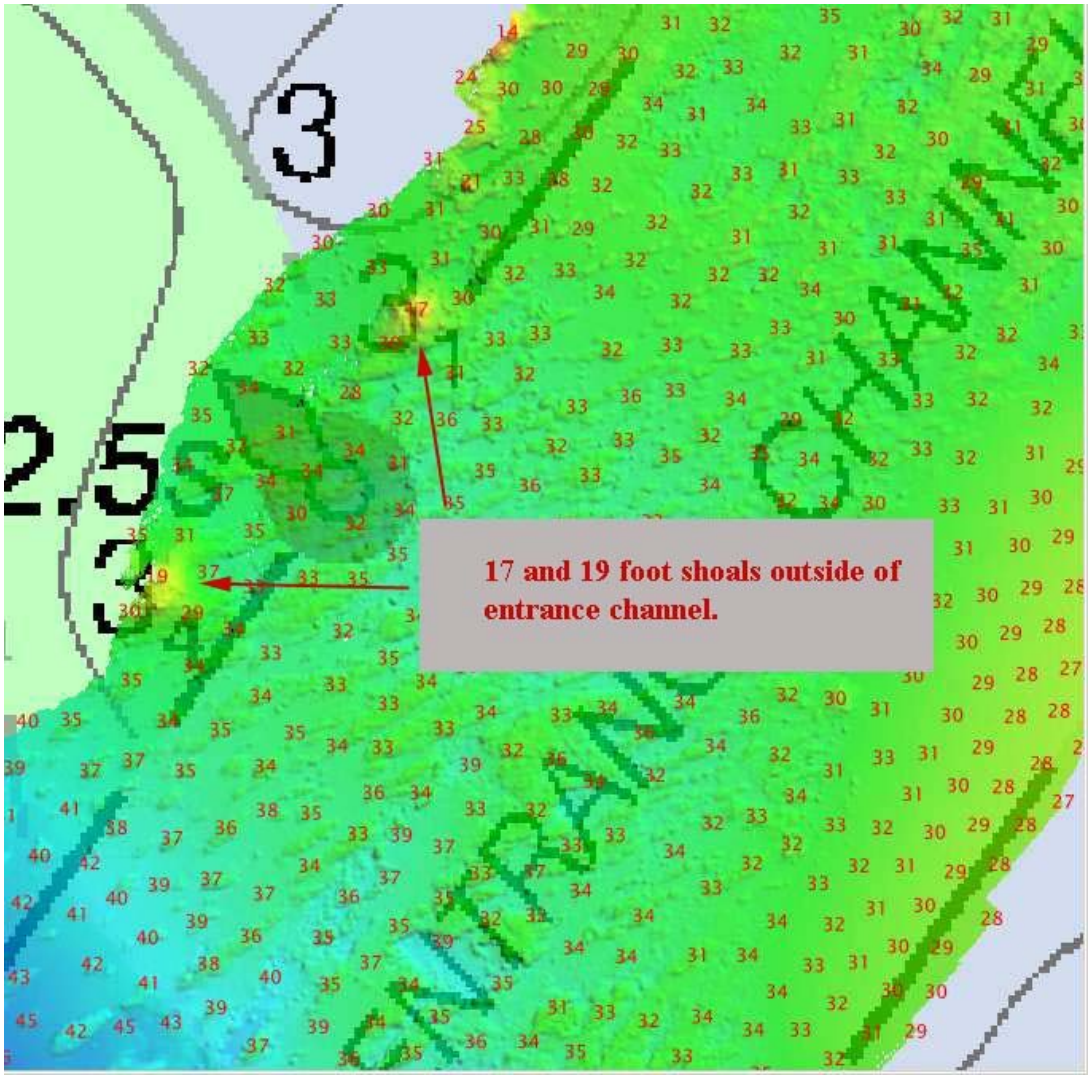

Figure 8

Several other areas of shoaling in the survey area were found and reported as DTONs (see DTON reports located in Appendix I). These areas are described below.

A broad gently sloping shoal into the eastern side of the entrance channel with depths ranging from 26 to 28 feet was found in the area where the chart indicates the channel is cleared to 28 feet. A 26 foot sounding on the shoal was selected and reported as a DTON with the recommendation that a spot sounding be added to the chart in this area (Figure 9)[12].

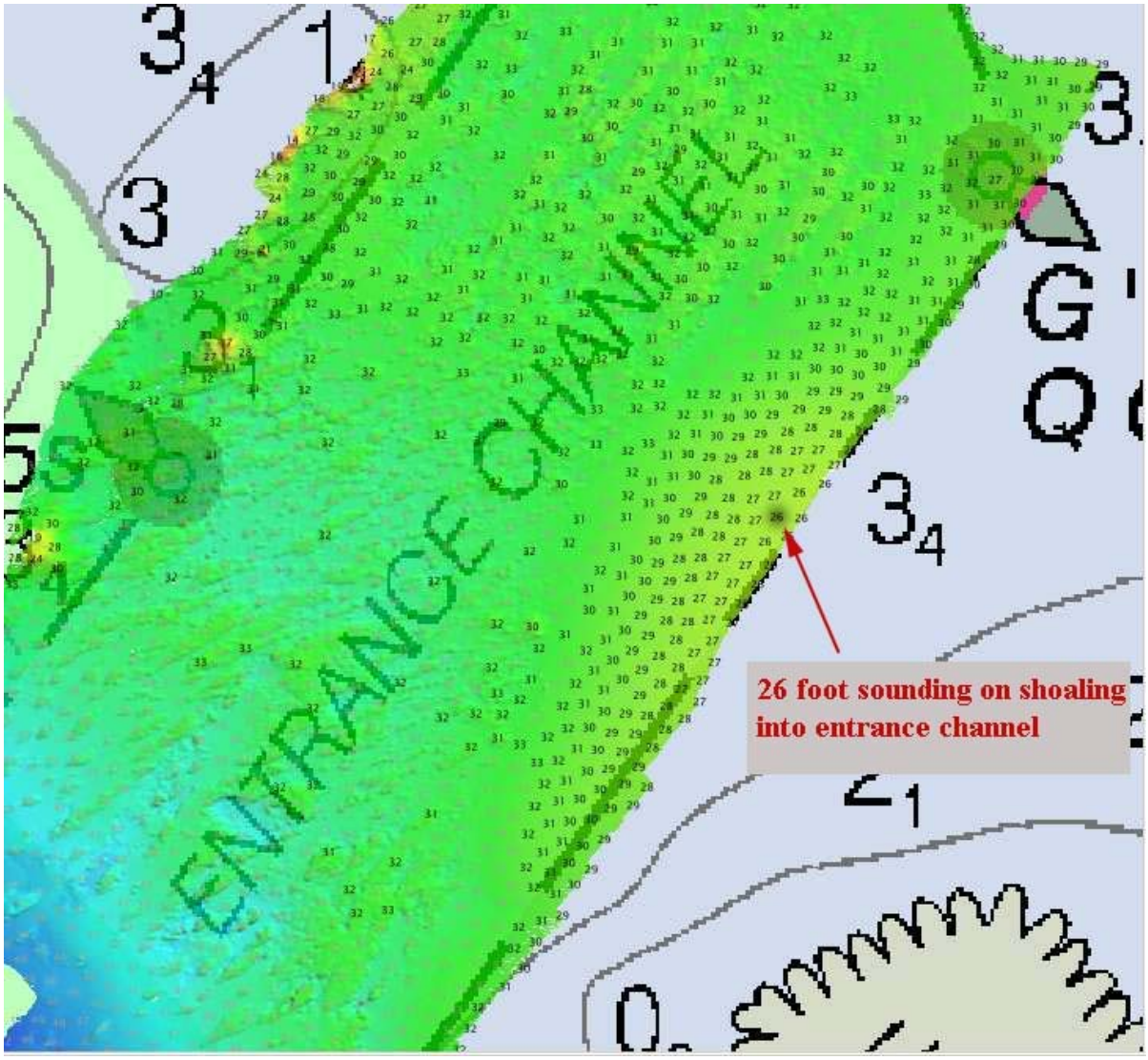

Figure 9 - DTON

Two small areas of shoaling, southeast of the northern berthing area, that extend off of the pier face (Figure 10) were found in an area where the pier face is in ruins (Figure 11). A 17 and 20 foot sounding were selected on the shoals and submitted as DTONs with the recommendation that spot soundings be added to the chart to represent the shoal areas[13].

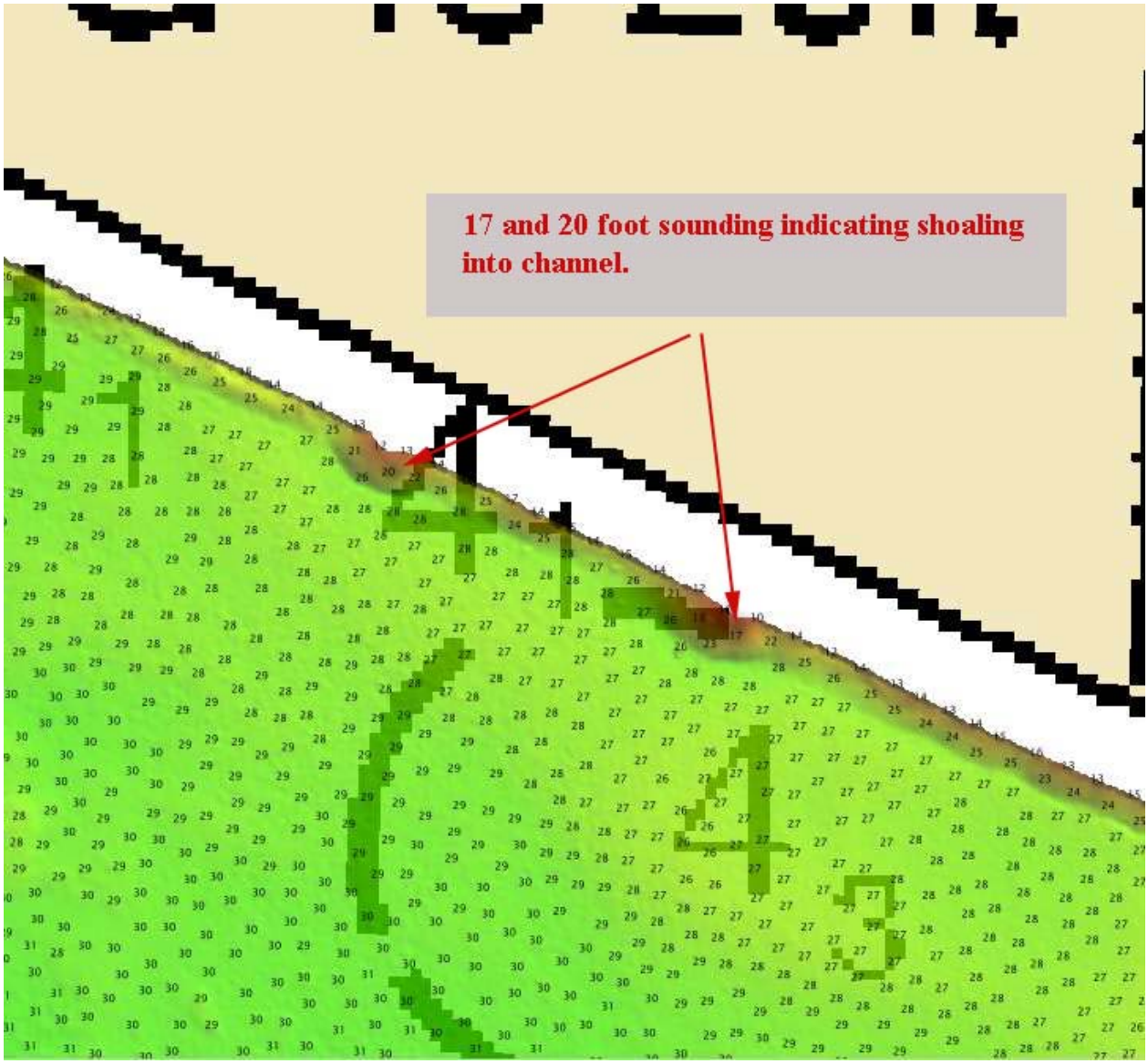

Figure 10 - DTON

Figure 11 – Pier face in ruins in area of shoaling

Two 24 ft. soundings in the northern berthing area (Figure 12) were found. The soundings were reported as DTONs with the recommendation that spot soundings be added to the chart to represent the shoals[14].

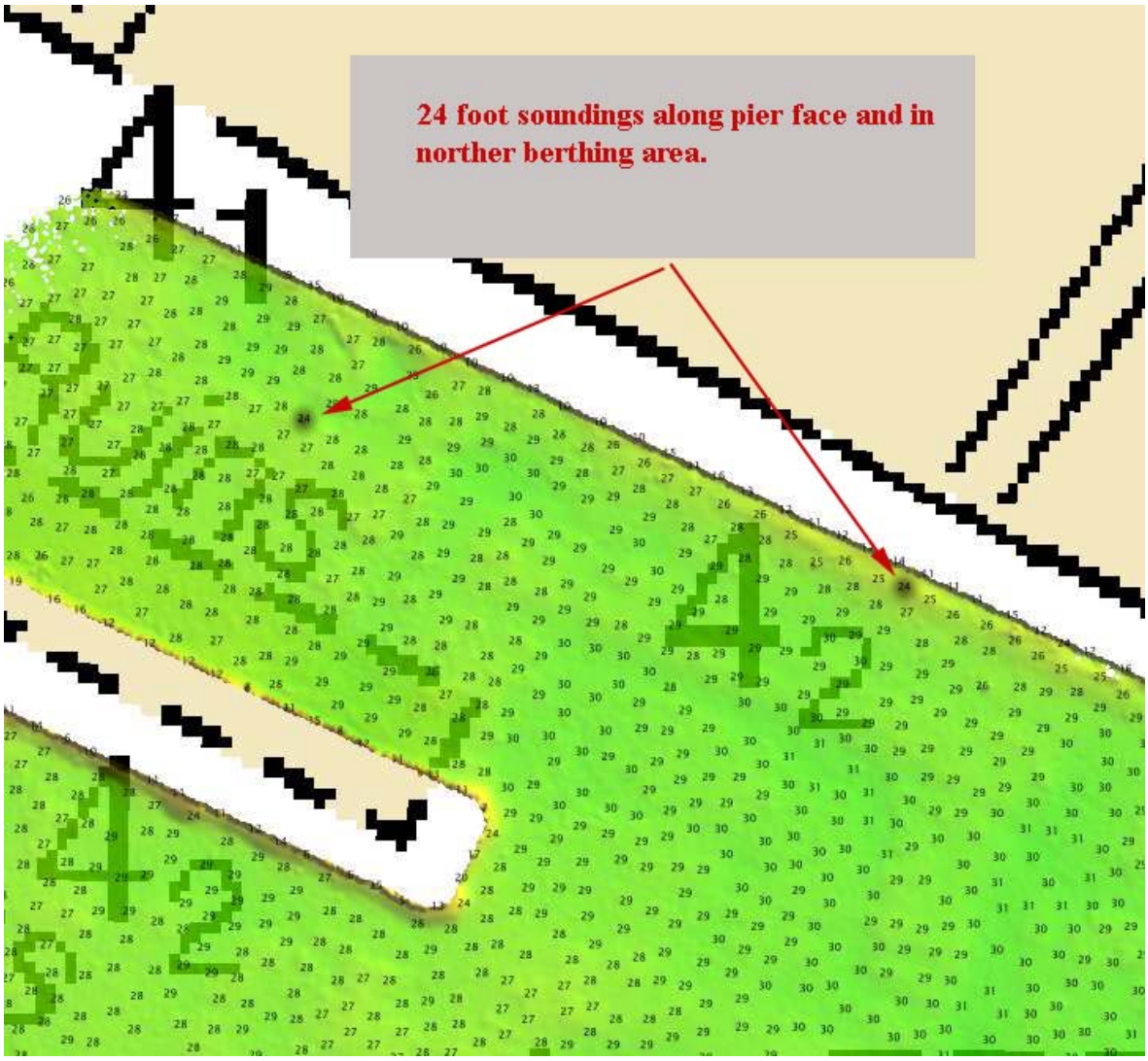

Figure 12 - DTON

A shoal and a 19 foot obstruction were found in the southern berthing area (Figure 13). An 18 ft. sounding was selected on the shoal and submitted as a DTON with the recommendation that a spot sounding be added to the chart to represent the shoal area. The obstruction was submitted under a separate DTON report with the recommendation that a 19 ft. submerged obstruction be added to the chart[15].

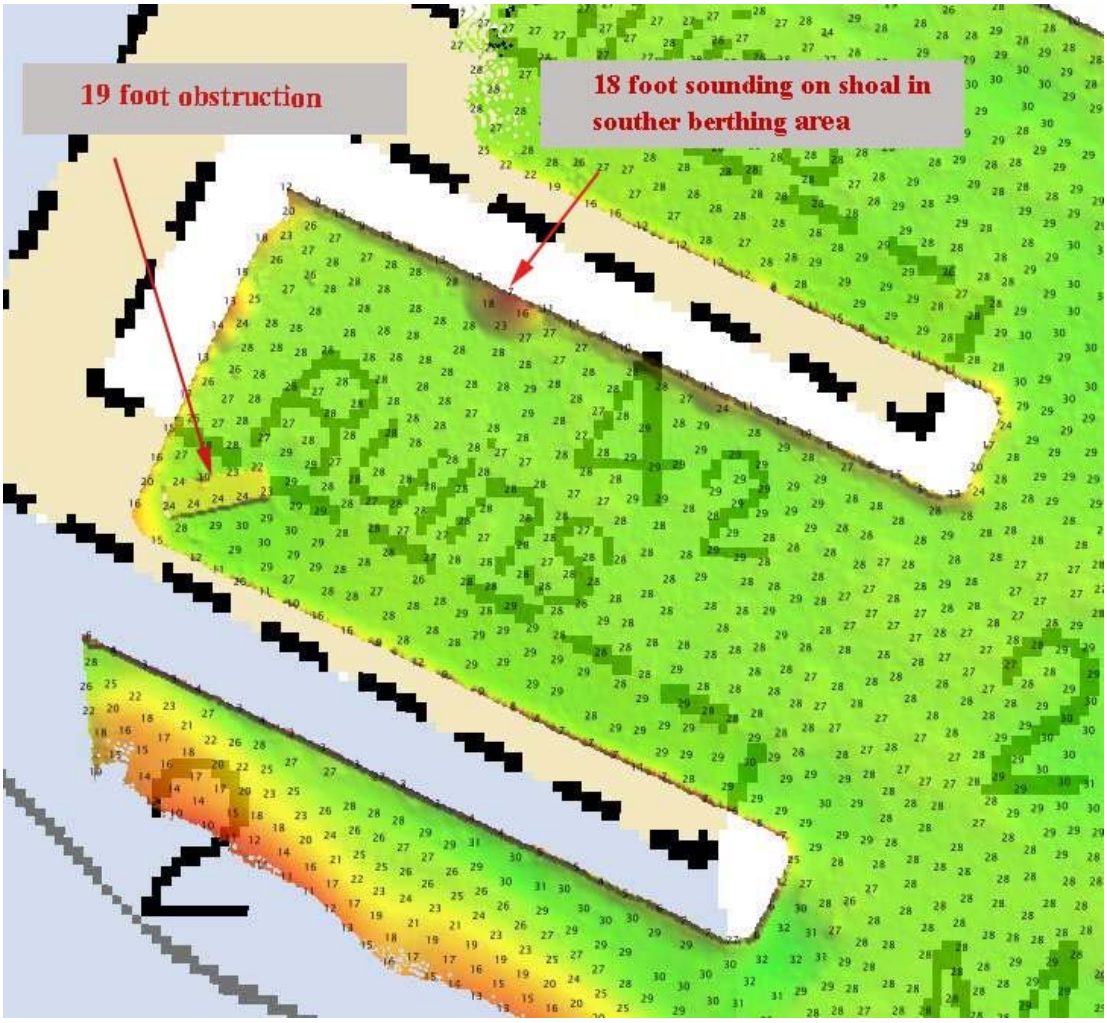

Figure 13 - DTON

The Hydrographer has determined that bottom coverage requirements have been met and data accuracy meets requirements specified by the *HSSDM*. The surveyed soundings are adequate to supersede prior surveys in their common areas[16]. Based on the application of verified water level data, final chart comparisons are not required by the Pacific Hydrographic Branch.

Automated Wreck and Obstruction Information System (AWOIS) Investigations

There were no AWOIS items located within the limits of F00535[17].

Dangers to Navigation

Two Danger to Navigation reports were submitted[18]. One concerned a 19 ft. obstruction in Tinian Harbor and the other made recommendations to add several soundings to the chart to represent shoal areas[19]. See F00535_DTON_1 and F00535_DTON_2 reports in Appendix I.

Coast Pilot

As described in the Chart Comparison section above, 24 ft soundings were found in the berthing area where Coast Pilot 7 (Chart 81063 - Chapter 15, page 657) states that vessels drawing 25 ft. can berth. An update was sent to the Coast Pilot branch and the email is included in Appendix V[20].

D.2 Additional Results

Shoreline Verification and Processing

Shoreline verification was not required for survey F00535[21].

Prior Survey Comparison

Survey F00535 was compared to Navy lidar surveys W00054 and W00055. Survey F00535 generally agrees to within a foot of depths from the lidar surveys. However the shoal soundings described in the chart comparison section above were not noted in the lidar surveys.

Aids to Navigation

All aids to Navigation were positioned accurately and found to serve their intended purpose[22].

Bottom Samples

Bottom samples were not required for survey F00535[23].

E. APPROVAL

As team leader, field operations for hydrographic survey F00535 were conducted under my direct supervision, with frequent personal checks of progress and adequacy. I have reviewed the attached survey data and reports. The survey data meets or exceeds requirements as set forth in the NOS Hydrographic Surveys and Specifications Deliverables Manual (April 2007 edition), Field Procedures Manual (March 2007 edition), and all HSD Technical Directives issued through March 2007. These data are adequate to supersede charted data in their common areas. This survey is complete and no additional work is required . All data and reports are respectfully submitted to N/CS34, Pacific Hydrographic Branch.

Listed below are supplemental reports submitted separately that contain additional information relevant to this survey:

Title	Date Sent	Office
AHI_HSRR_Memorandum	April 23, 2007	N/CS34
M-T901-AHI-07 Data Acquisition and Processing Report	June 14, 2007	N/CS34

Approved and Forwarded:

Corey Allen, Physical Scientist, NOAA

In addition, the following individuals were also responsible for overseeing data acquisition and processing of this survey:

Digitally signed by Kurt Brown
DN: cn=Kurt Brown, c=US, o=NOAA, ou=PHB, email=kurt.brown@noaa.gov
Date: 2007.08.09 08:14:04 -07'00'

Kurt Brown
Physical Scientist, NOAA

Erin Campbell
2007.08.16 20:07:59 Z

Erin Campbell
Physical Scientist, NOAA

Revisions Compiled During Office Processing and Certification

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[1] Concur
[2] Filed with project records
[3] Concur
[4] Concur
[5] Concur
[6] Chart comparisons were performed with the most recent edition of Chart 81071 (7th Ed.; December, 2004, 1:20,000), updated with Notice to Mariners through 02/16/2008 and ENC US4SP05M.
[7] Concur with clarification. An offset also exists between ENC US4SP05M and survey F00535 of approximately 50 meters to the southeast.
[8] Concur. Chart area as shown in the H drawing
[9] Do not concur. The cleared depth for the channel should be changed to 24 feet (4 fathoms). This more accurately depicts the most shoal soundings in the area and eliminates the need for many of the spot soundings on the chart.
[10] Concur. Chart shoal sounding
[11] Concur. Chart shoal sounding
[12] Concur. Chart sounding
[13] Concur with clarification. Chart 20 ft. sounding and replace 17 ft sounding with shoaler 16th ft sounding
[14] Do not concur. Recommend changing channel clearance depth to 24 feet.
[15] Concur
[16] Concur
[17] Concur
[18] The two DtoN reports containing 7 dangers have been condensed into one attached report containing office notes in red
[19] The obstruction and recommendations have been applied to the latest edition of the chart
[20] Filed with the hydrographic record
[21] NGS released the latest vector shoreline, project MP0704, for the survey area during compilation. F00535 abuts this shoreline at the location of the pier. The pier position from MP0704 was included in compilation of F00535.
[22] Concur
[23] Concur

F00535_Danger to Navigation

Registry Number: F00535

State:

Locality: North Pacific Ocean

Sub-locality: Tinian Harbor

Project Number: M-T901-AHI-07

Survey Date: 05/23/2007

This Danger to Navigation concerns soundings in Tinian Harbor that are either shoaler than charted spot soundings or shoaler than the clearance depths reported on the chart. Note that the chart is shifted approximately 30 meters to the northwest in the figures below.

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	Obstruction	5.98 m	14° 57' 53.930" N	145° 37' 03.967" E
1.2	Sounding	5.50 m	14° 57' 55.050" N	145° 37' 05.967" E
1.3	Sounding	5.18 m	14° 57' 52.269" N	145° 37' 19.976" E
1.4	Sounding	6.11 m	14° 57' 53.263" N	145° 37' 17.777" E
1.5	Sounding	7.40 m	14° 57' 55.847" N	145° 37' 12.224" E
1.6	Sounding	7.40 m	14° 57' 56.926" N	145° 37' 08.222" E
1.7	Sounding	8.00 m	14° 57' 23.766" N	145° 37' 31.583" E

1 - Danger To Navigation

1.1) 7079/72

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 53.930" N, 145° 37' 03.967" E
Least Depth:	5.98 m
Timestamp:	2007-143.01:05:45.545 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d14
Profile/Beam:	7079/72
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

Uncharted obstruction in Tinian Harbor. Obstruction is a large concrete slab possibly from the ruined pier. Shoal point is on a pile of debris on top of concrete slab.

Hydrographer Recommendations

Chart 19 ft. submerged obstruction.

S-57 Data

Geo object 1:	Obstruction (OBSTRN)
Attributes:	SORDAT - 20070523
	SORIND - US,US,Graph,F00535
	VALSOU - 5.981 m
	WATLEV - 3:always under water/submerged

Office Notes

Chart 19 ft. submerged obstruction.

Feature Images

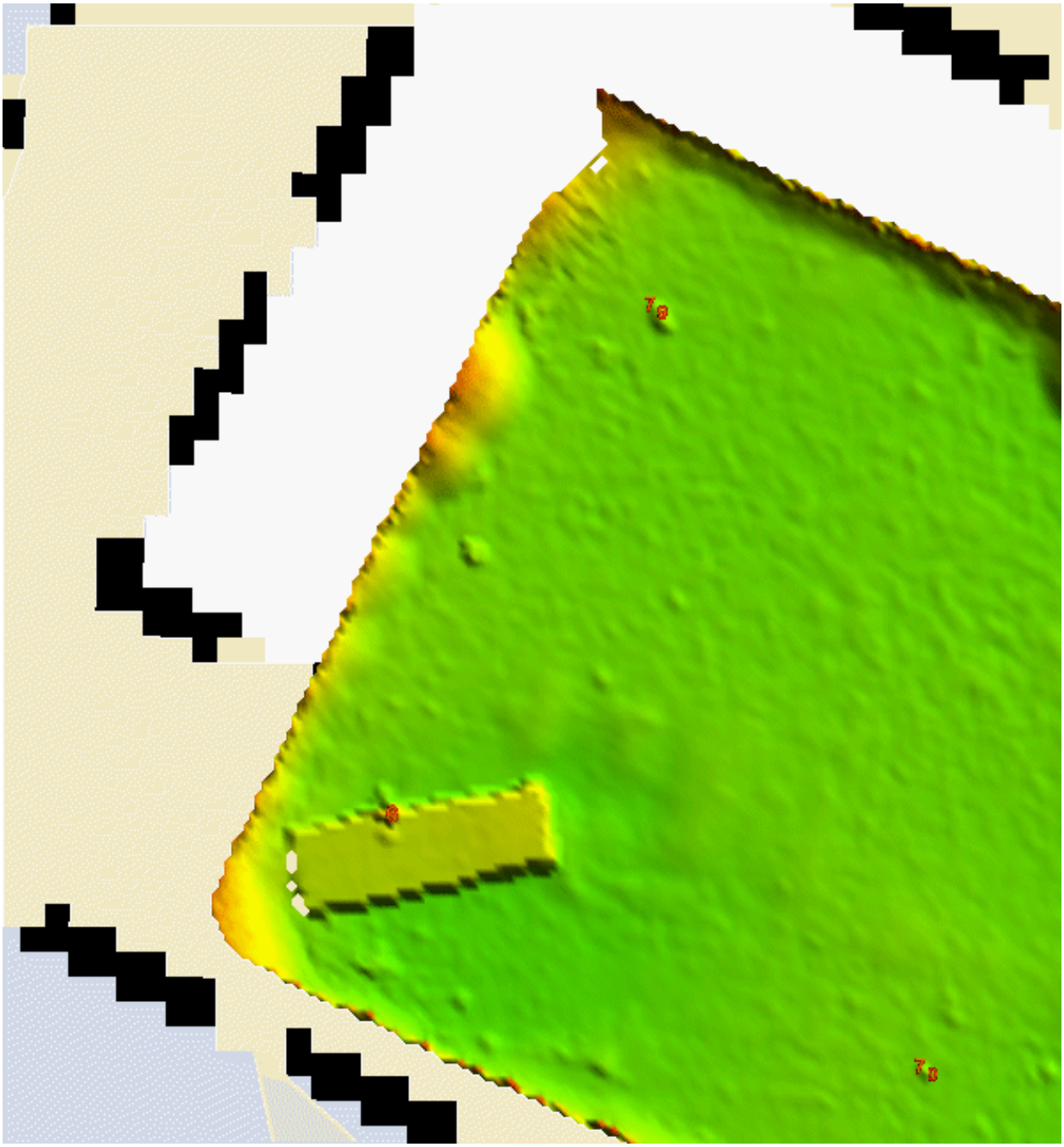


Figure 1.1.1

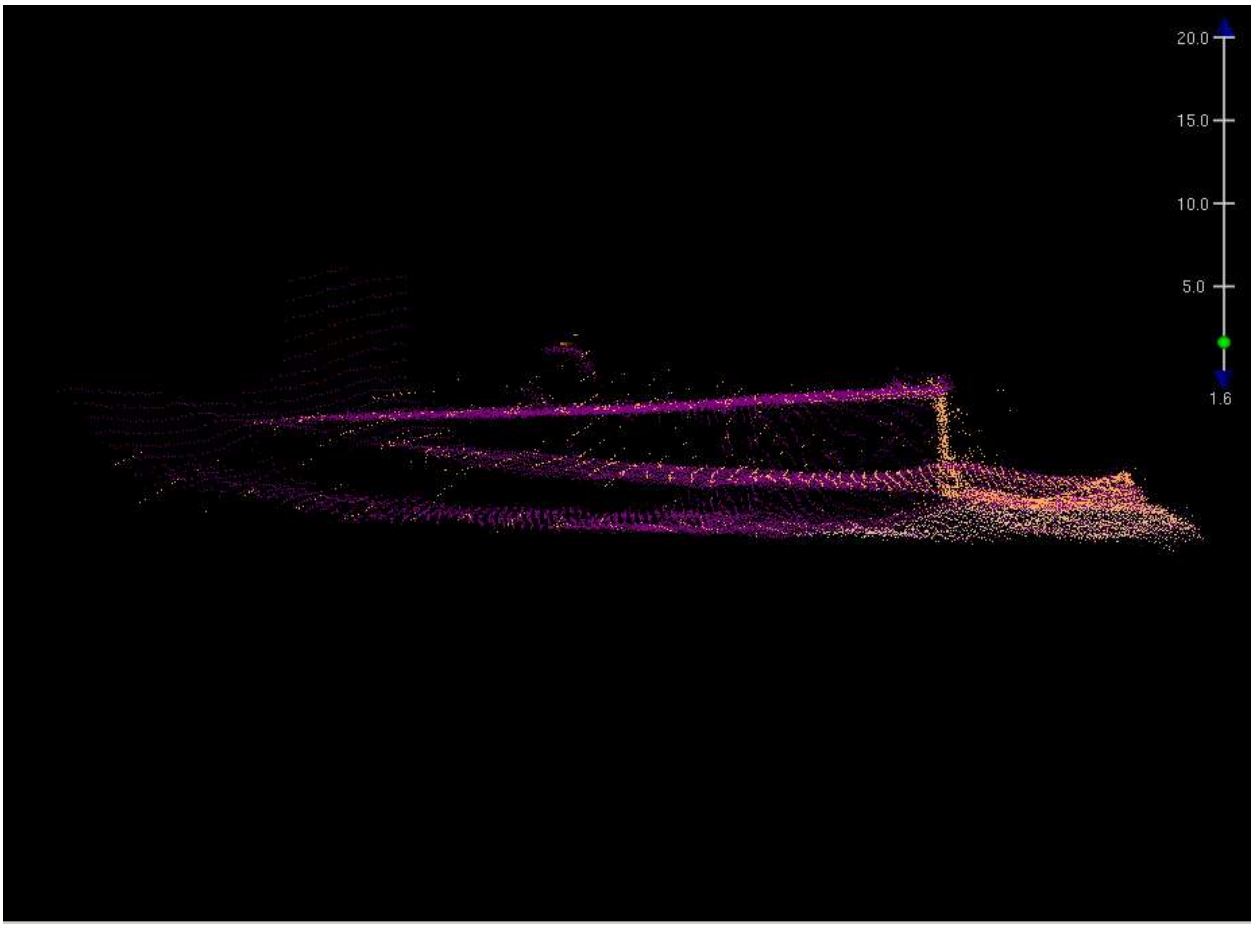


Figure 1.1.2

1.2) 5778/73

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 55.050" N, 145° 37' 05.967" E
Least Depth:	5.50 m
Timestamp:	2007-143.00:45:49.824 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d11
Profile/Beam:	5778/73
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

18 ft. sounding on small area of shoaling into the southern berthing area.

Hydrographer Recommendations

Chart 18 ft. spot sounding

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Chart 18 ft. spot sounding.

Feature Images

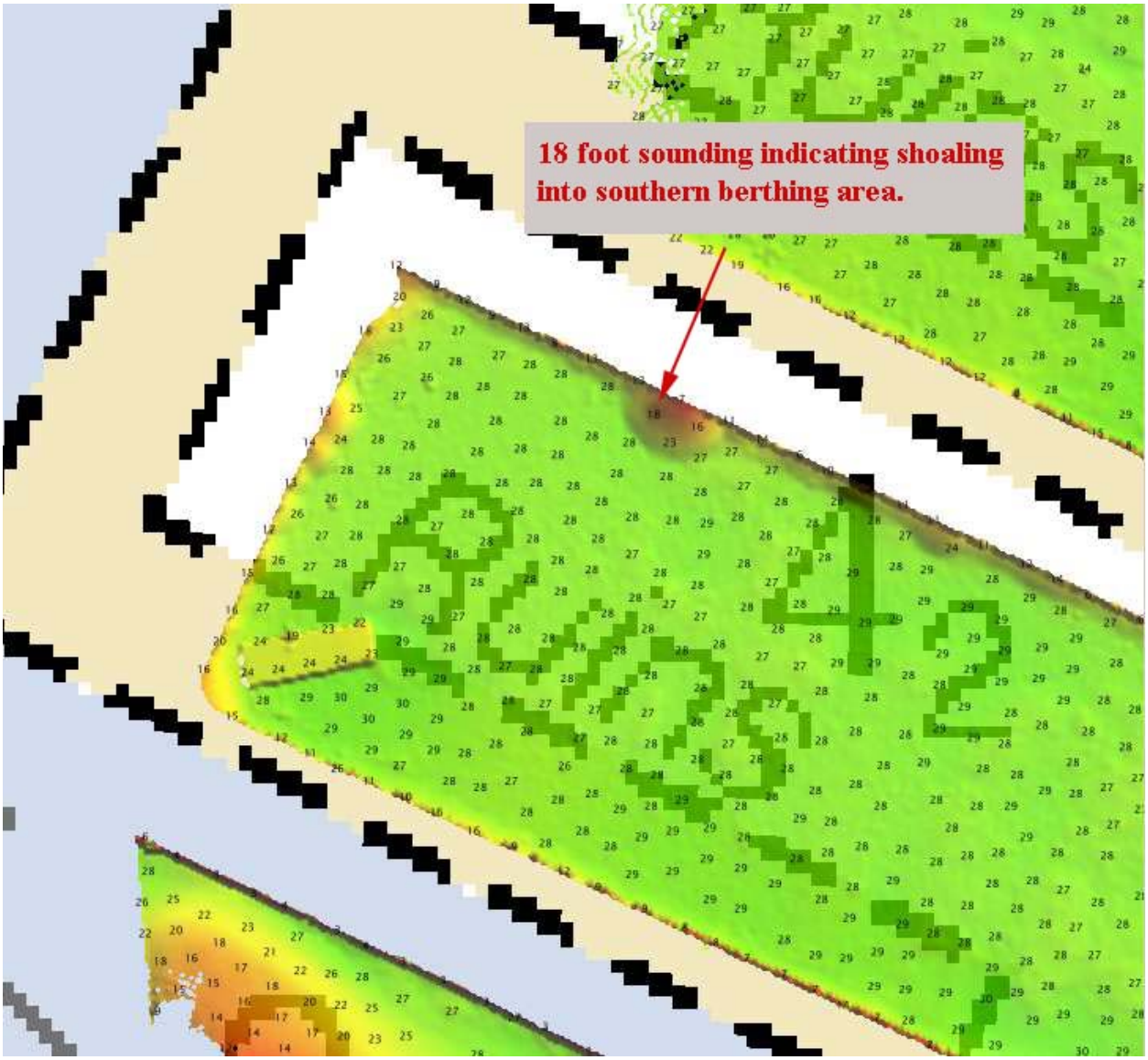


Figure 1.2.1

1.3) 2621/88

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 52.269" N, 145° 37' 19.976" E
Least Depth:	5.18 m
Timestamp:	2007-143.02:16:15.604 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d22
Profile/Beam:	2621/88
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

17 foot sounding on shoal area extending from pier into channel.

Hydrographer Recommendations

Chart 17 ft. spot sounding.

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Chart shoaler 16 ft sounding in vicinity.

Feature Images

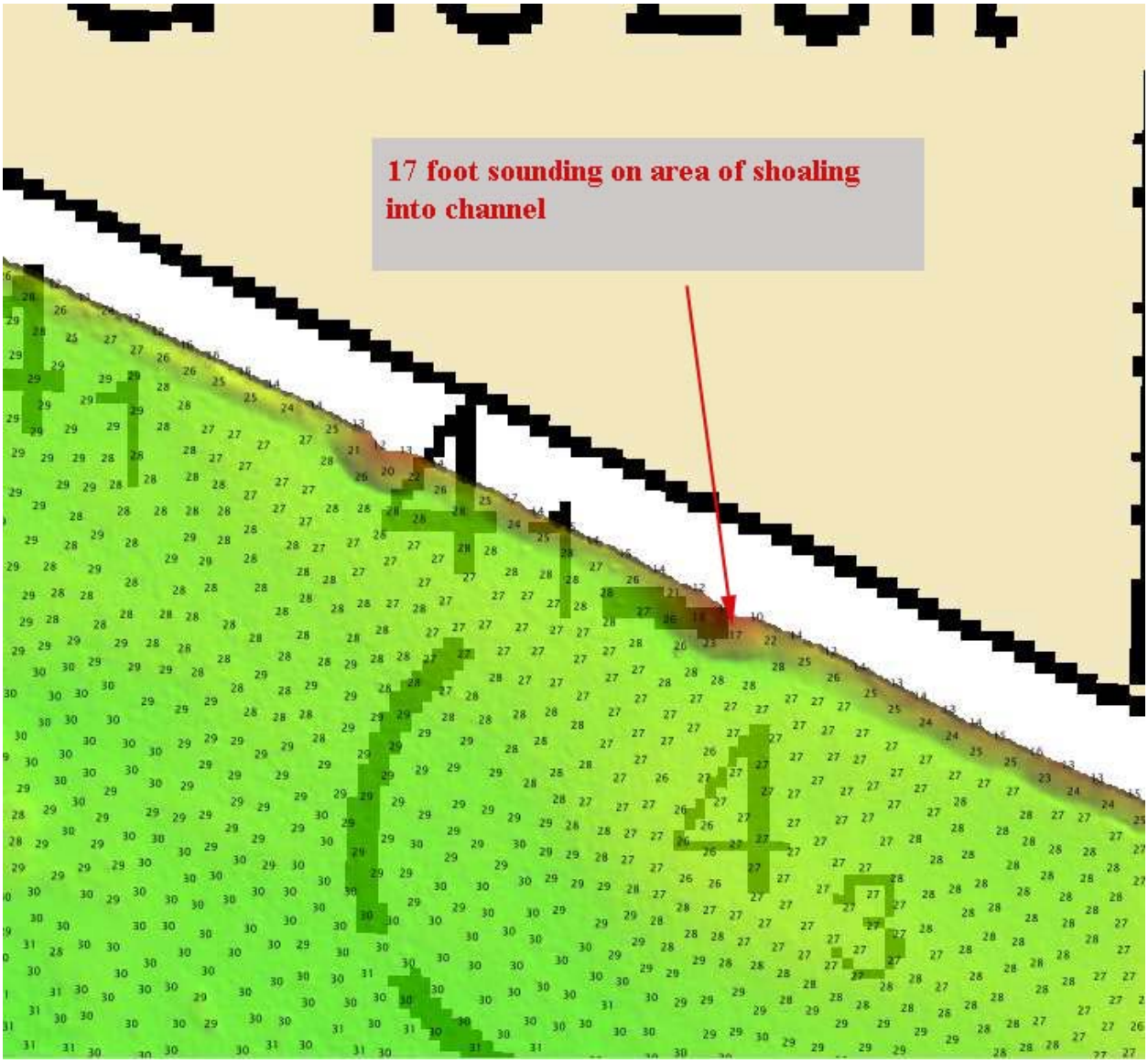


Figure 1.3.1

1.4) 3419/89

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 53.263" N, 145° 37' 17.777" E
Least Depth:	6.11 m
Timestamp:	2007-143.02:16:48.004 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d22
Profile/Beam:	3419/89
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

20 foot sounding on shoal area extending from pier into channel.

Hydrographer Recommendations

Chart 20 ft. spot sounding.

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Chart 20 ft. spot sounding.

Feature Images

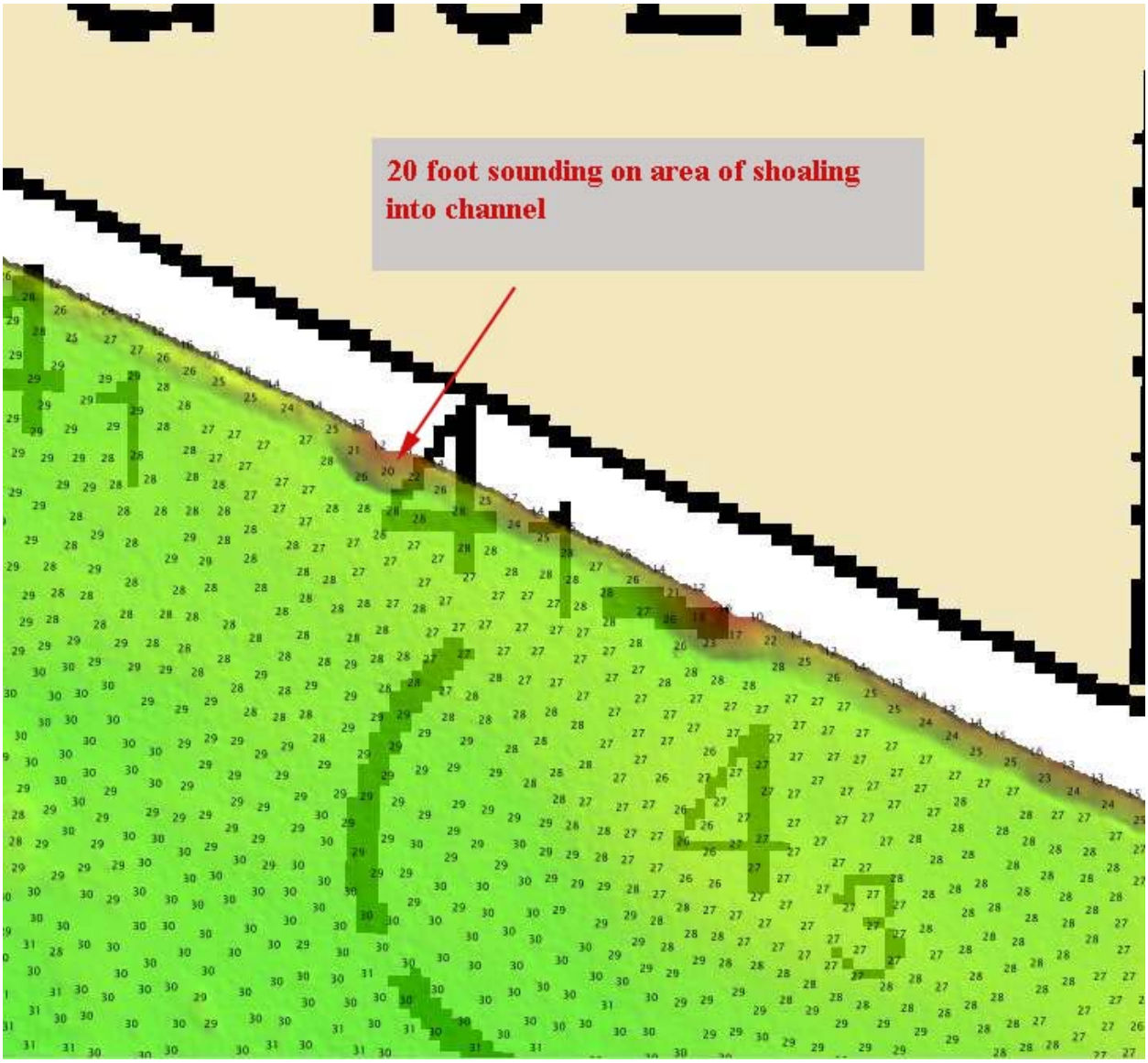


Figure 1.4.1

1.5) 59/94

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 55.847" N, 145° 37' 12.224" E
Least Depth:	7.40 m
Timestamp:	2007-143.03:28:47.911 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d24
Profile/Beam:	59/94
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

24 ft. sounding off the pier face near the northern berthing area. The sounding is two feet shoaler than the nearest charted spot sounding of 4 fathoms, 2 feet.

Hydrographer Recommendations

Chart 24 foot spot sounding.

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Do not chart sounding. New channel clearance depth accounts for shoal.

Feature Images

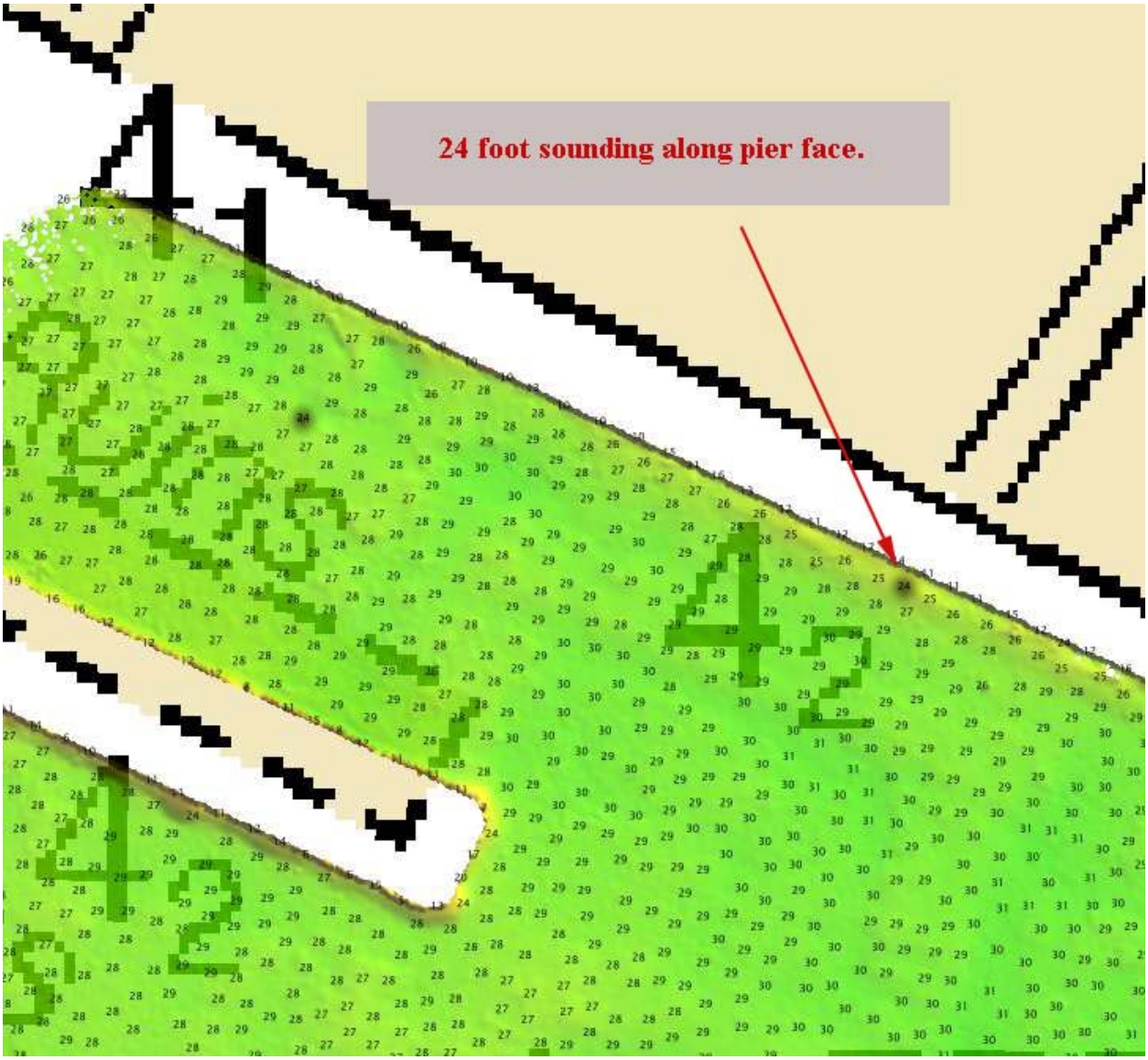


Figure 1.5.1

1.6) 1518/92

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 56.926" N, 145° 37' 08.222" E
Least Depth:	7.40 m
Timestamp:	2007-143.03:34:45.370 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d25
Profile/Beam:	1518/92
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

24 ft. sounding in northern berthing area.

Hydrographer Recommendations

Chart 24 ft. spot sounding.

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Do not chart sounding. New channel clearance depth accounts for shoal.

Feature Images

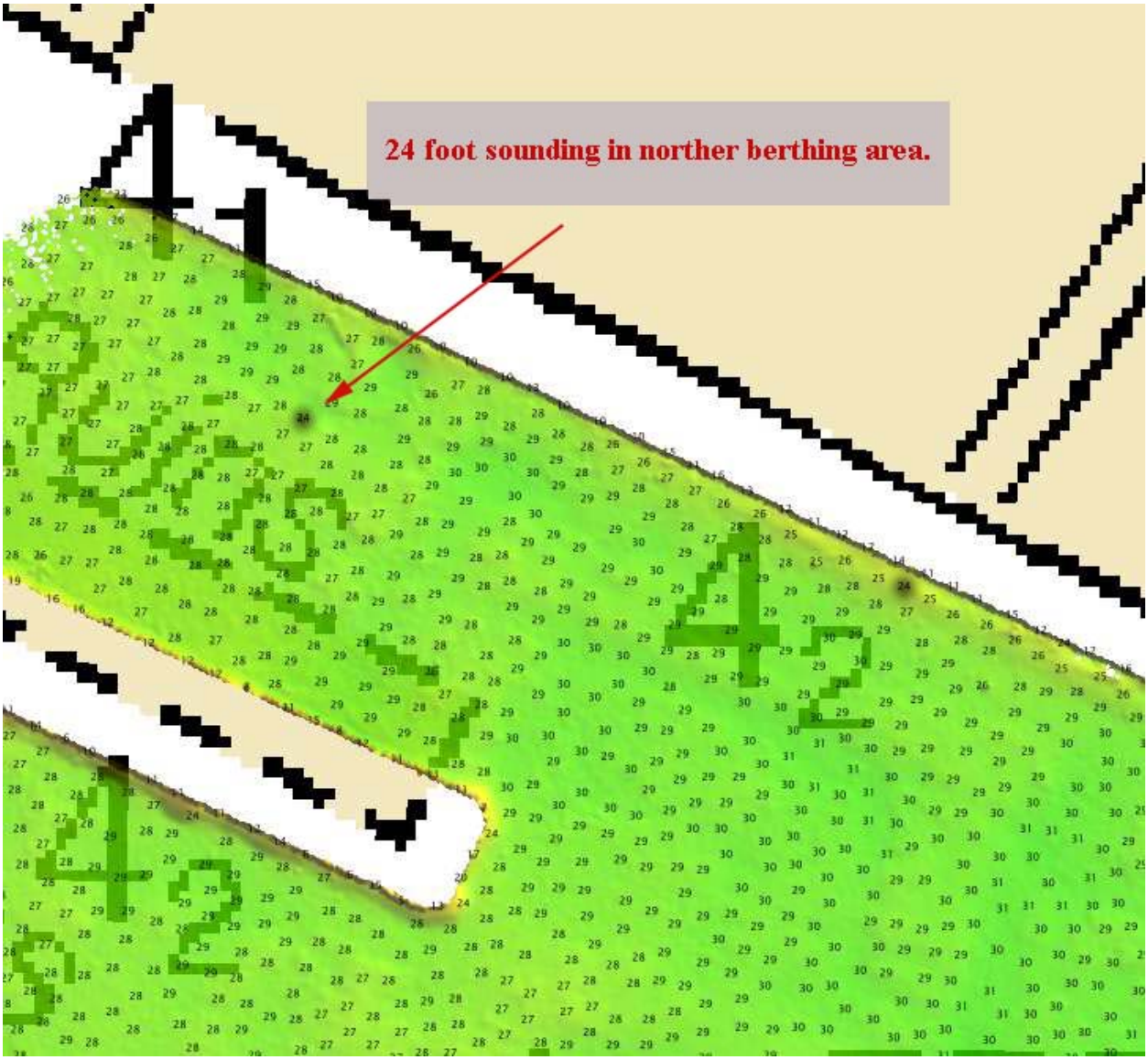


Figure 1.6.1

1.7) 4190/74

DANGER TO NAVIGATION

Survey Summary

Survey Position:	14° 57' 23.766" N, 145° 37' 31.583" E
Least Depth:	8.00 m
Timestamp:	2007-143.00:21:16.201 (05/23/2007)
Survey Line:	f00535 / ahi_f2505_reson8101_07 / 2007-143 / ahmba07143_d04
Profile/Beam:	4190/74
Charts Affected:	[81071_2 (7th Ed.; December, 2004, 1:20,000)

Remarks:

26 foot sounding on shoaling into entrance channel.

Hydrographer Recommendations

Chart 26 ft. Spot sounding.

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	SORDAT - 20070523
	SORIND - US,US,graph,F00535

Office Notes

Chart 26 ft. Spot sounding.

Feature Images

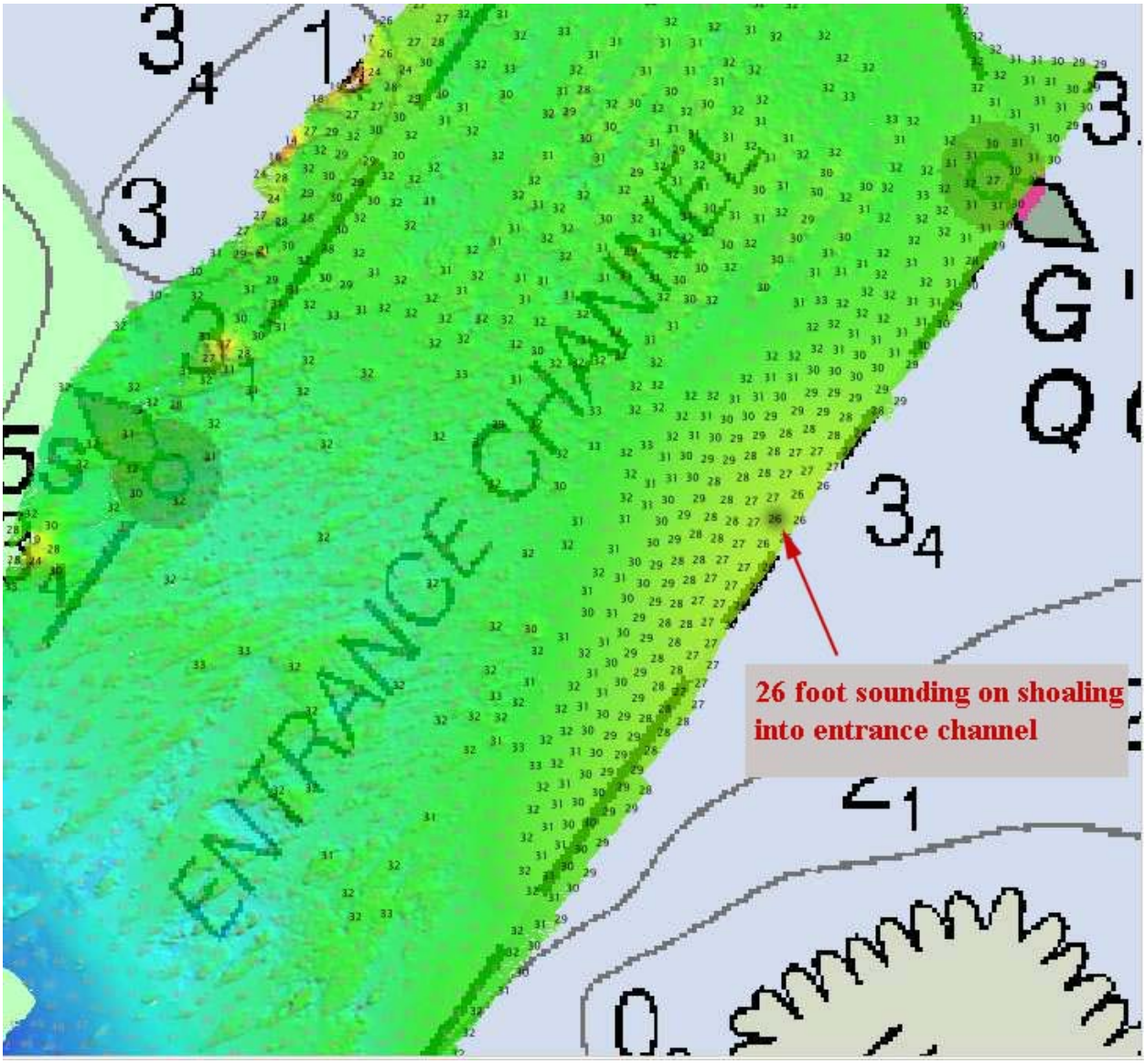


Figure 1.7.1

UNITED STATES DEPARMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Ocean Service
Silver Spring, Maryland 20910

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : June 18, 2007

HYDROGRAPHIC BRANCH: Pacific
HYDROGRAPHIC PROJECT: M-T901-AHI-2007
HYDROGRAPHIC SHEET: F00535

LOCALITY: Tinian Harbor, North Pacific Ocean,
Commonwealth of the Northern Mariana Islands
TIME PERIOD: May 22 - May 23, 2007

TIDE STATION USED: 163-0000 Guam-Apra Harbor
Lat. 13° 26.6'N Long. 144° 39.4' W

PLANE OF REFERENCE (MEAN LOWER LOW WATER): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 0.678 meters

REMARKS: RECOMMENDED ZONING

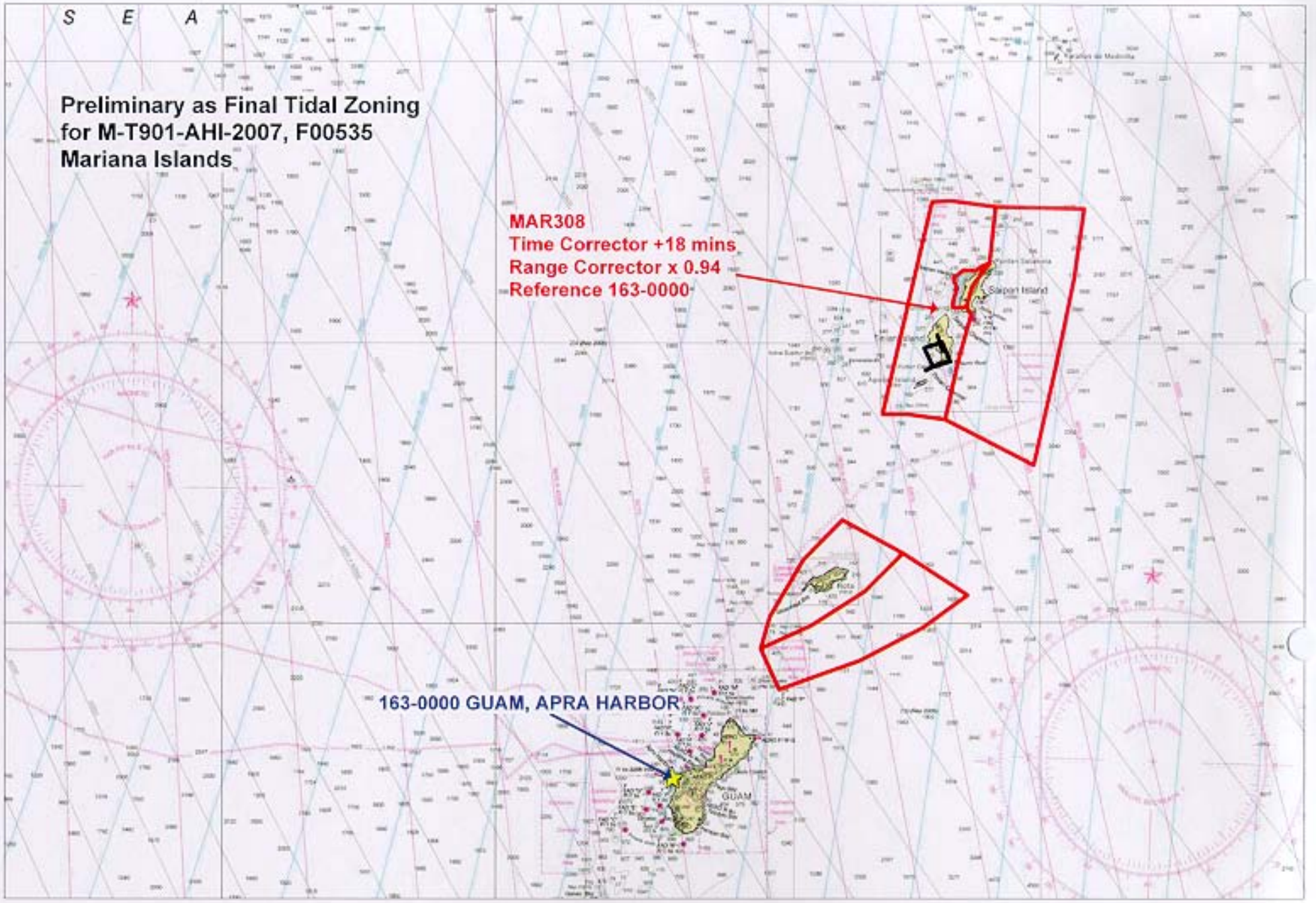
Preliminary zoning is accepted as the final zoning for project M-T901-AHI-2007 during the time period between May 22 to May 23, 2007.

Please use the zoning file "T901AHICORP" submitted with the project instructions for M-T901-AHI-2007. Zone MAR308 is the applicable zone for F00535.

Refer to attachments for zoning information.

Note 1: Provided time series data are tabulated in metric units (meters), relative to MLLW and on Greenwich Mean Time on the 1983-2001 National Tidal Datum Epoch (NTDE).

CHIEF, PRODUCT AND SERVICES DIVISION


S E A
Preliminary as Final Tidal Zoning
for M-T901-AHI-2007, F00535
Mariana Islands
MAR308
Time Corrector +18 mins
Range Corrector x 0.94
Reference 163-0000
Saipan Island
Rota
GUAM
163-0000 GUAM, APRA HARBOR

F00535 HCell Supplemental Report

Sarah Wolfskehl, Hydrographic Survey Intern
Pacific Hydrographic Branch

Introduction

The primary purpose of the HCell is to directly update NOAA ENCs with new survey information in International Hydrographic Organization (IHO) format S-57. HCell compilation of survey F00535 utilized Office of Coast Survey HCell Specifications Versions 2.0. HCell F00535 will be used to update chart 81071, 1:20,000 (7th Ed.; December 1, 2004, NM 2/16/2008). ENC US4SP05M covers the area of this survey.

1. Compilation Scale

Contours and the density of soundings are compiled as appropriate to emulate those of Chart 81071, 1:20,000. Position and density of features included in the HCell have not been generalized from the scale of the hydrographic survey, 1:5,000.

2. Soundings

2.1 Source Data

A 0.5 m resolution Finalized BASE surface, **F00535_0p5m_Final.hns** was used as the basis for HCell production following Branch certification. This surface contained 100 designated soundings and seven DtoNs submitted by the field.

A survey-scale full density sounding (SOUNDG) feature object source layer was built from the **F00535_0p5m_Final.hns** surface in CARIS BASE Editor. A shoal-biased selection was made at the 1:5,000 survey scale using a radius table with values shown in Table 1. The sounding feature object source layer was exported as **F00535_SS.hob**, and imported into HOM.

Upper Limit (m)	Lower Limit (m)	Radius (mm)
0	10	2.5
10	20	3.5

Table 1.

2.2 Sounding Feature Objects

In CARIS BASE Editor soundings were manually selected from the survey scale sounding set **F00535_SS.hob** to create a chart scale sounding set **F00535_CS.hob**. The F00535_CS.hob sounding selection emulates the density and distribution of soundings on chart 81071, while more closely representing the seafloor morphology. The soundings were selected with regard to a 20, 10, 5, 3 and 1 fathom contour.

3. Depth Areas

3.1 Source Data

The finalized Base Surface, **F00535_0p5m_Final.hns**, was used to generate a depth area, and for survey evaluation and verification purposes only, a set of contours. The contour set included the chart equivalent, 20 fathom, 10 fathom, 5 fathom, 3 fathom and 1 fathom contours. The depth contours were not submitted as deliverables, as according to OCS HCell Specifications ver. 2.0.

3.2 Depth Area Feature Objects

One all-encompassing depth range, 20 meters to 0 meters, was used for all depth area objects below MLLW. Upon conversion to NOAA charting units, this depth range is 10.9 to 0 fathoms.

4. Meta Areas

The following Meta object areas are included in HCell F00535:

M_QUAL
M_COVR

Meta area objects were constructed from filtered perimeter lines delineating the survey limits. The perimeter was first used to create the Skin of the Earth (SOTE) layer, then duplicated to the Meta object layers and attributed per the OCS HCell Specifications, Ver. 2.0.

5. Survey Features

No survey features were used in the creation of HCell F00535.

6. Shoreline / Tide Delineation

Updated RSD shoreline from project MP0704 Tinian Island and Aquijan Island, Northern Mariana Islands (GC10684), was received during compilation of F00535. One shoreline construction feature from MP0704 abuts the survey limits and was included in compilation. No shoreline features from F00535; including Mean Lower Low Water (MLLW) or Mean High Water (MHW) lines were used in the creation of H-Cell F00535.

7. Attribution

All S-57 Feature Objects have been attributed as fully as possible based on information provided by the Hydrographer and in accordance with OCS HCell Specifications ver. 2.0.

8. Layout

8.1 CARIS HOM Layering Scheme

100	Survey Scale Soundings
101	Chart Scale Soundings
200	Depth Area/Skin of the Earth
400	Line Features
600	M_covr
601	M_qual
800	Blue Notes (spatial only)
1001	Contours (spatial only)

8.2 Blue Notes

Notes regarding HCell feature compilation are on layer 800 and as shape file sets **F00535_bluenotes_p.shp** and **F00535_bluenotes_l.shp** for point and line figures, respectively. A copy of the survey perimeter is included in the line shape file set for orientation purposes.

9. Spatial Framework

9.1 Coordinate System

All spatial map and base cell file deliverables are in an LLDG geographic coordinate system, with WGS84 horizontal, MHW vertical, and MLLW (1983-2001 NTDE) sounding datums.

9.2 Horizontal and Vertical Units

During creation of sounding sets and contours, and creation of the HCell, units are maintained as metric with millimeter resolution. NOAA rounding is applied at the same time that conversion to chart units is made to the metric HCell base cell file, at the end of the HCell compilation process.

The CARIS environment variable, uslXsounding_round, controls the depth at which rounding occurs. Setting this variable to NOAA fathoms and feet displays all soundings equal to or greater than 11 fathoms as whole units.

In an ENC viewer fathoms and feet display in the format X**.**YZZZ, where X is fathoms, Y is feet, and ZZZ is decimals of the foot. For fathoms and feet between 0 and 10 fathoms 4.5 feet (10.75 fms), soundings round to the deeper foot if the decimals of the foot are X**.**Y75000 or greater. For fathoms and feet deeper or equal to 11 fathoms, soundings round to the deeper fathom if feet and decimals of the foot are X**.**45000 (X**.**Y75000) or greater. Drying heights are in feet and are rounded using arithmetic methods. In an ENC viewer, heights greater than 6 feet will register in fathoms and feet using the above stated rules.

HOM Units

Sounding Units:	Meters rounded to the nearest millimeter
Spot Height Units:	Meters rounded to the nearest meter

Chart Unit Base Cell Units

Depth Units (DUNI):	Fathoms and feet
Height Units (HUNI):	Feet
Positional Units (PUNI):	Meters

10. QA/QC

10.1 Data Processing Notes

Manual chart scale sounding selections were made for this survey.

Chart 81071 will not open in CARIS Bathy Database without modifying the BSBtoCARISEllipsoid.dat file. Add the line 'LDU NA83' to the \BDB\21\System\BSBtoCARISEllipsoid.dat file and the chart will open. However, the chart will not open in CARIS HOM.

An offset exists between the survey data and Chart 81071, and ENC US4SP05M. The offset between 81071 is further illustrated in section D.1 Chart Comparisons of the Descriptive Report.

10.2 ENC Validation Checks

F00535 was subjected to QA and Validation checks in HOM prior to exporting to the HCell base cell (000) file. Full millimeter precision was retained in the export of the metric S-57 base cell data set. This data set was then converted to a chart unit 000 file. dKart Inspector 5.0 (Service Pack 1) was then used to further check the data set for conformity to the S-58 version 2 standard (formerly Appendix B.1 Annex C of the S-57 standard). All tests were run and errors investigated and corrected where necessary.

11. Products

11.1 MCD Deliverables

- F00535 Base Cell File, Chart Units, Soundings compiled to 1:20,000
- F00535 Base Cell File, Chart Units, Soundings compiled to 1:5,000
- F00535 Descriptive Report including end notes compiled during office processing and certification
- F00535 HCell Supplemental Report
- F00535 Data Acquisition and Processing Report
- Blue Notes shape files
- .000 Features File

11.2 File Naming Conventions

HOM file set prefix: *F00535_hc.**

MCD Chart units base cell file: *US500535_CU.000*

MCD Chart units base cell file, survey scale soundings: *US500535_SS.000*

Features File (for CGTP): *US500535_Features.000*

11.3 Software

HIPS 6.1:	Management and inspection of Combined BASE surfaces; generation of the BAG
BASE Editor 2.1:	Combination of Product Surfaces and initial creation of the S-57 bathymetry-derived features, examination of base cell files against the chart; chart density sounding selection
HOM 3.3:	Assembly of the HCell, S-57 products, QA
GIS 4.4a:	Setting the sounding rounding variable
Pydro v7.3 (r2014_TCfix)	Creation of AWOIS and DTON reports; export of features for the HCell
dKart Inspector 5.0:	S-58 Validation of the HCell base cell file

12. Contacts

Inquiries regarding this HCell content or construction should be directed to:
Sarah Wolfskehl, Hydrographic Survey Intern, PHB, Seattle, WA; 206-526-6859
Sarah.Wolfskehl@noaa.gov.

APPROVAL SHEET
F00535

Initial Approvals:

The survey evaluation and verification has been conducted according to branch processing procedures and the H-Cell compiled per the latest OCS H-Cell Specifications.

Sarah Wolfskehl
cn=Sarah Wolfskehl, c=US,
o=NOAA, ou=Pacific Hydrographic
Branch, email=sarah.
wolfskehl@noaa.gov
2008.03.25 15:16:29 -07'00'

The survey and associated records have been inspected with regard to survey coverage, delineation of the depth curves, development of critical depths, S-57 classification and attribution of soundings and features, cartographic characterization, and verification or disproval of charted data within the survey limits. The survey records and digital data comply with OCS requirements except where noted in the Descriptive Report and are adequate to supersede prior surveys and nautical charts in the common area.

Digitally signed by Gary C. Nelson
DN: cn=Gary C. Nelson, c=US,
o=NOAA, ou=Pacific Hydrographic
Branch, email=gary.nelson@noaa.
gov
Date: 2008.03.26 07:52:41 -07'00'

I have reviewed the H-Cell, accompanying data, and reports. This survey and accompanying digital data meet or exceed OCS requirements and standards for products in support of nautical charting except where noted in the Descriptive Report.

David Neander
2008.03.25
16:01:47 -07'00'

Rachel
Soraruf

Digitally signed by Rachel Soraruf
DN: cn=Rachel Soraruf, c=US,
o=NOAA/NOS/OCS/HSD,
ou=Operations Branch,
email=Rachel.Sorasuf@noaa.gov
Date: 2008.03.27 14:43:25 -04'00'