

W00212

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey	Hydrographic Survey
Field No.	M/V Red Witch
Registry No.	W00212

LOCALITY

State	St. Thomas, USVI
General Locality	Charlotte Amalie
Sub-locality	Crown Bay

2010

CHIEF OF PARTY

Frank J. Sawyer

HYDROGRAPHIC TITLE SHEET

W00212

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 U.S. Virgin Islands

General Locality Charlotte Amalie

Sub-Locality Crown Bay

Scale 1:10000 **Date of Survey** 05/19/10-05/20/10

Instructions dated N/A **Project No.** OSD-ARC-10

Vessel M/V Red Witch

Chief of Party Frank J. Sawyer

Surveyed by Frank Sawyer and Geoff Crews of ARC Surveying & Mapping

Soundings by echo sounder, hand lead, pole Reson 7101 SWMB

Graphic record scaled by _____

Graphic record checked by _____ **Automated Plot** N/A

Verification by Atlantic Hydrographic Branch

Soundings in fathoms **feet at MLW MLLW** FEET at MLLW

REMARKS: All times in UTC

All soundings corrected with verified tides

Map Projection is UTM zone 20 North

Project: OSD-ARC-10
Registry #: W00212
State: St. Thomas, USVI
Locality: Charlotte Amalie
Sub-locality: Crown Bay
Surveyed by: ARC Surveying & Mapping M/V *Red Witch*

The data for this project were collected by ARC Surveying & Mapping for the USVI Port Authority. Crown Bay is a popular destination for cruise lines. The cruise ships' drafts call for critical under keel clearance approaching the piers. This survey was intended to provide bathymetric information in order to facilitate possible dredging for some of the newer 35-ft draft cruise ships. It has been determined through the Survey Acceptance Review process that this data is of suitable quality for nautical chart update purposes.

Data were collected aboard the M/V *Red Witch*, a 21-ft MonArk Little Giant, owned and operated by ARC Surveying & Mapping out of Jacksonville, FL. The M/V *Red Witch's* survey sensors include a 240 kHz Reson 7101 sonar providing bathymetry, a TSS VRU-210 Motion Reference Unit which measures attitude, a Trimble DSM232 GPS receiver for position, a TSS Meridian Gyro Compass for heading, and an Odom Digibar Pro for measuring sound speed profiles.

Reson 7101 multibeam data were collected from 19 May – 20 May, 2010 at Little Krum Bay and out to the port area of Crown Bay and the northeast section of the West Gregerie Channel. These multibeam data were collected using Hypack Hysweep software version 2009a with the Hysweep HSX extension and processed using Hysweep MB Max editing software with the HS2 file extension. All corrections were applied during acquisition except for final tides which were incorporated prior to data submission. The processed HS2 files were converted into Caris for review and analysis by the Atlantic Hydrographic Branch reviewer.

Horizontal accuracy is 10m (using DGPS corrections from the USCG beacon located in Isabela, Puerto Rico). Vertical accuracy is depth dependent (~1% of water depth), WGS84 datum.

NOTE: The field unit's descriptive report is pending. Due to the priority of this survey, the field unit's Data Acquisition and Processing Report (DAPR) is included in this data submission package. Please see the H-Cell Report for Section D. Results and Recommendations.

Data Acquisition and Processing Report

Arc Surveying and Mapping

Vessel Red Witch



TABLE OF CONTENTS

Introduction.....	3
A. Equipment.....	3
A.1 Survey Launch Red Witch.....	3
A.2 Sounding Equipment.....	3
A.3 Positioning Equipment.....	4
A.3.1 TSS VRU-210Motion Reference Unit.....	4
A.3.2 Trimble DSM232.....	4
A.3.3 TSS Meridian Surveyor Gyro Compass.....	4
A.3.4 Odum Digibar Pro Velocity Probe.....	4
A.4 Software.....	5
A.4.1 Acquisition Software.....	5
A.4.1.1 Hypack and Hysweep 2009a.....	5
A.4.1.2 Hysweep 2009a.....	5
B. Data Processing and Quality Control.....	5
B.1 Shallow-Water Multibeam Data.....	5
C. Corrections to Echo Soundings.....	6
C.1 Sound Velocity.....	6
C.2 Vessel Offsets and Dynamic Draft Corrections.....	6
C.3 Heave, Pitch, Roll, Heading, and Timing.....	7
C.4 Water Level Correctors.....	7
D. Approval.....	7
E. Digibar Probe Calibration.....	8-9

Data Acquisition and Processing Report

Introduction

This Data Acquisition and Processing Report (DAPR) details all Arc Surveying and Mapping survey equipment and methods used to acquire and process survey data. The data and deliverables were acquired according NOS HSSD, April 2010. Survey systems and methods used during this project were also chosen based on the water depth, sea and weather conditions, and the ability of the vessel to safely navigate the area.

A. Equipment

A.1 Survey Launch Red Witch

Survey Launch Red Witch is a 21-ft MonArk Little Giant, and was used to acquire multibeam echosounder data, and sound velocity profiles. The launch is 8 feet wide, has a static draft of 0.61 meters, and is powered by twin 115hp Yamaha outboards.

Vessel Information:

Builder: Mon Ark Built: 1978 Length Overall: 21 ft. Beam: 8 ft. Draft: 1.4ft Cruising Speed 25knts
Min/Max Survey Speed: 4-5 knots. Primary Echosounder: Side Mount Reson 7101: Sound Velocity Profiler: Odom Digibar Pro Surface Sound Velocity Probe: Reson SVP

A.2 Sounding Equipment

Red Witch is equipped with a Reson 7101 Multibeam Swath System. The Reson 7101 operates at a frequency of 240 kHz. The Reson 7101 has 511 beams, each of which has a 1.5° beam width. The maximum ping rate of this echosounder is 50 Hz. Soundings are acquired in meters.

The sonar head contains a curved face projector (Reson 8101 transducer) and transmits a pulse of acoustic energy across the direction of travel illuminating a thin strip of seabed. The acoustic returns are picked up by the receiver section of the sonar head, amplified, digitized, and sent to the topside processor for beamforming and processing.



The processing unit performs the beamforming, bottom detection and controls the sonar head with respect to gain, ping rate and transmit angle. It also contains the interfaces for all time-critical external sensors such as attitude data, position, and the 1 PPS (pulse per second) signal. Real time velocities are also interfaced to the 7101 using a Reson SVP mounted on the transducer for initial beamforming and steering. Data is transmitted to the survey computer via Ethernet connection.

The sonar head is a side mount located on the port side of the vessel just aft of the wheel house. The sound velocity probe is mounted on transducer. The TSS VRU-210 Motion Reference Unit is mounted 0.52m starboard of the transducer. The Trimble DSM 232 DGPS antenna is mounted directly over the transducer and the SG Brown Meridian Surveyor Gyro Compass is mounted in the wheel house parallel to the keel of the vessel. This enables all the data to be collected with zero offsets other than the MRU.

A.3 Positioning Equipment

A.3.1 TSS VRU-210 Motion Reference Unit

The Red Witch is equipped with TSS VRU-210 Motion Reference Unit configured thru Hypack and Hysweep Data collection software. The MRU is offset .058 meters starboard of the multibeam transducer with a zero offset fore and aft. The data string (TSS1) is sent to the survey computer via a serial connection at a rate of 40hz. The unit is fully aided using the NEMA GGA string from the Trimble DSM 232 and heading information supplied by the Gyro Compass.

A.3.2 Trimble DSM232

The Red Witch is equipped with a Trimble DSM232 integrated 12-channel GPS receiver. There are three modes: Auto-Range, which locks onto the beacon nearest the vessel, Auto-Power, which locks onto the beacon with the greatest signal strength, and Manual, which allows the user to select the desired beacon. Additionally, the DSM232 can accept differential correctors (RTCM messages) from an external source such as a user established DGPS reference station. The unit was set to receive DGPS corrections from the USCG Beacon located in Isabela Puerto Rico. The DGPS antenna is mounted directly over the transducer enabling an offset of 0.00. The DSM232 is configured in the auto-power mode to only use correctors from the strongest USCG beacon, to go off-line if the age of DGPS correctors exceeded 20 seconds, and to exclude satellites with an altitude below 8°. The 1PPS signal and the NEMA ZDA timing are sent from the unit to the Reson via interface on the 7101 processor.

A.3.3 TSS Meridian Surveyor Gyro Compass

The Red Witch is equipped with a Meridian Surveyor Gyro Compass for precise heading information. The Gyro has a dynamic heading accuracy of +/- .02deg. The Gyro is located in the wheel house and mounted parallel to the keel /centerline of the vessel. The heading information is sent to Hysweep via a serial connection and also splits to the MRU. This device also has an offset of 0.00.

A.3.4 Odom Digibar Pro Velocity Probe

The Odom Digibar Pro is used to obtain sound velocity profiles at frequent intervals during the course of the survey. Sound velocities are collected at .5 meter intervals through the water column at different locations in the survey area. These velocities are post processed into the multibeam data.

A.4 Software

A.4.1 Acquisition Software

A.4.1.1 Hypack and Hysweep Version's 2009a

Hypack is used for vessel navigation and line tracking during data collection. Hypack's Survey program is used to log data and is used in conjunction with Hypack's Hysweep Survey program to log vessel positioning. In addition, the hysweep interface enables the boat operator to view the nadir depths in the hypack survey data information window. The vessels DGPS system is configured in the software for positioning only. Data is saved with a .RAW extension.

A.4.1.2 Hysweep 2009a

Hysweep is used for Multibeam data collection as well as navigation. Different displays are available for the survey technician to ensure bottom coverage and real time QC of data during the survey. The MRU, Gyro and the Reson 7101 are configured in Hysweep for data collection. Data is collected on the survey computer (Dell Laptop). Survey lines were laid out at a 16m interval to ensure 200 percent bottom coverage during the survey. The files are collected with a .HSX extension these are raw multibeam files in Hysweep.

B. Data Processing and Quality Control

B.1 Shallow-Water Multibeam Data MB MAX (Hysweep)

Shallow-water multibeam (SWMB) data were monitored in real-time using the 2-D and 3-D data display windows in Hypack Hysweep, and the Reson controller window. The Reson 7101 control interface allows the operator the ability to control ping rate and pulse length as well as gain and power settings. The Reson 7101 control interface is virtually hands free and is typically set up prior to data collection. Adjustments to the gates can be made to ensure that false returns or outliers are eliminated during data collection. Power settings can be adjusted along dock faces or around structures to eliminate reflections or false returns. Data is also viewed in the Hysweep interface screen allowing the operator to see 3-D representations of the bottom, as well as cross section views along with pre set error displays, such as heave drift and sounding overlays to previous sweeps and numerous other QA tools built into the software. During data collection any soundings not meeting IHO standards are automatically removed .

Hypack Hysweep .HSX files are loaded into the Hysweep MB MAX multibeam data processing software at the completion of the survey. The data in the HSX file is displayed in a way that heave, pitch, roll and heading as well as positioning, velocities, and tide values for each individual line are displayed prior to integration into the sounding information from the 7101. After examination of this data it is then combined with the Reson 7101 data and the sweeps are reviewed. Typically 100 sweeps are displayed at a time and any outliers are removed with the editing tools available in MB Max. Any anomalies found during this step of the processing such as targets identified on the seafloor are saved to a Hypack target file (.TGT). Upon completion of sweep editing, all data is saved to Hysweeps .HS2 format then exported in the appropriate matrix i.e. 1mx1m grid with the minimum sounding being exported. An all file is also saved containing every data point in an ASCII format.

C. Corrections to Echo Soundings

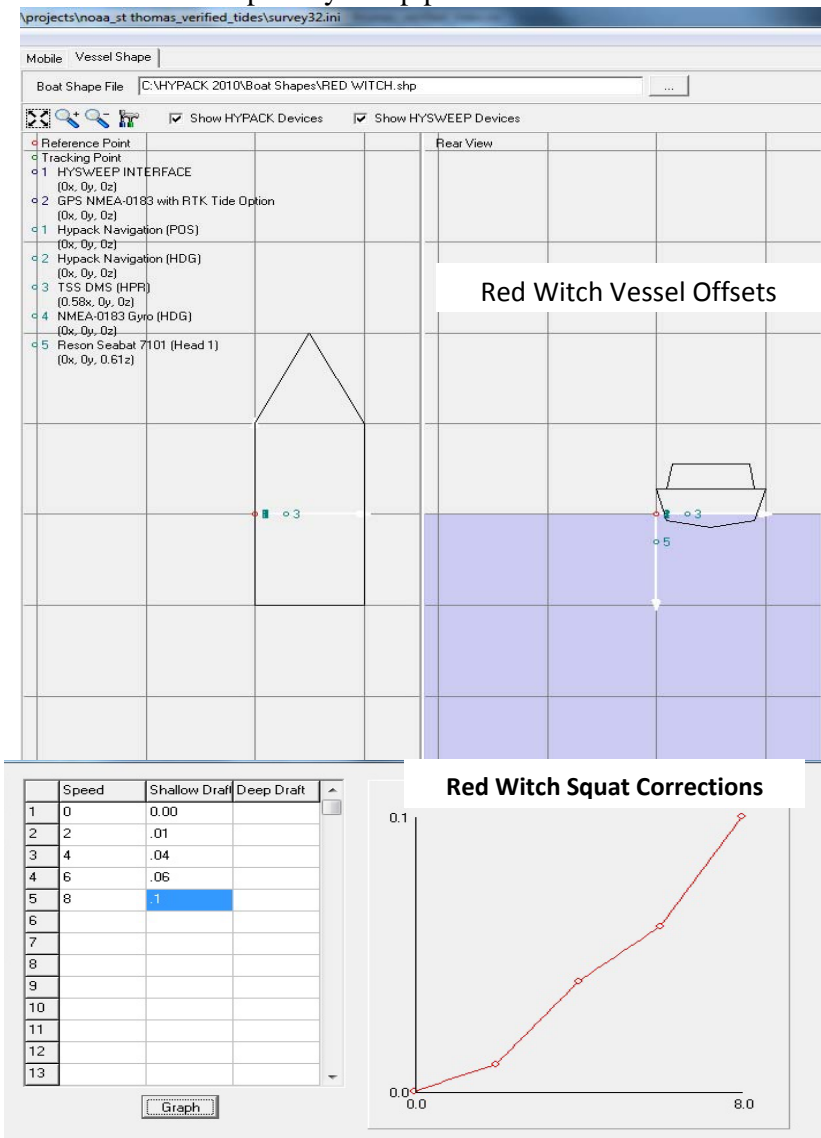
C.1. Sound Velocity

As stated above sound velocity data is collected real time at the transducer via RESON SVP sound velocity probe attached directly to the transducer.

The Odom digibar Pro is used to collect sound velocity profiles throughout the water column during the survey and is incorporated into the data during post processing. *See page 8 & 9 for calibration report.

C.2. Vessel Offsets and Dynamic Draft Corrections

Angular offsets and navigation timing errors of the multibeam system were determined using a patch test. A series of calibration lines are run and processed using Hysweeps Patch test program. The test was conducted following the re-installation of the multibeam transducer. These values were entered into the device setup in Hysweep prior to data collection.



Static Draft/Bar Check

Bar Depth	2.00				
Measured Depth	2.00				
Beam	Samples	Min	Max	Ave	Diff
107	16	1.93	2.01	1.96	0.04
108	32	1.93	2.05	1.99	0.01
109	44	1.89	2.06	1.98	0.02
110	49	1.91	2.07	1.97	0.03
111	49	1.88	2.08	1.97	0.03
112	49	1.81	2.13	1.97	0.03
113	46	1.89	2.12	1.99	0.01
114	49	1.89	2.12	1.99	0.01
115	48	1.78	2.10	1.97	0.03
116	47	1.81	3.48	2.04	-0.04
117	49	1.88	3.52	2.11	-0.11
118	49	1.63	3.23	2.04	-0.04
119	49	1.86	2.14	1.99	0.01
120	47	1.59	2.25	2.00	0.00
121	49	1.62	2.14	1.98	0.02
122	47	1.68	2.25	1.98	0.02
123	46	1.68	3.04	2.01	-0.01
124	47	1.80	3.36	2.02	-0.02
125	47	1.85	3.50	2.04	-0.04
126	45	1.64	2.16	1.97	0.03
127	23	1.78	2.11	1.96	0.04
128	11	1.84	2.03	1.93	0.07

C.3 Heave, Pitch, Roll, Heading, and Timing

The TSS VRU-210 provided attitude data to Hypack, which is stored in the HSX multibeam file. Attitude data quality is monitored while surveying by monitoring the Hysweep device interface. Alarms are triggered when accuracy values fall below user-defined values.

As discussed in the previous section, navigation timing error is determined using the patch test and applied to data in the Hysweep survey interface.

C.4 Water Level Correctors

Soundings were reduced to Mean Lower-Low Water (MLLW) using verified tides, taken from station 9751639 Charlotte Amalia , St Thomas, VI from 2100518 to 20100520

D. Approval

As Chief of Party, I have ensured that standard field surveying and processing procedures were used during this project in accordance with the Field Procedures Manual, and the NOS Hydrographic Surveys Specifications and Deliverables Manual, as updated for 2009.

I acknowledge that all of the information contained in this report is complete and accurate to the best of my knowledge.

Approved and Forwarded: _____



Frank J. Sawyer, President

Date:
Oct 17, 2009

Serial #:
SN:98125-101705

DIGIBAR CALIBRATION REPORT

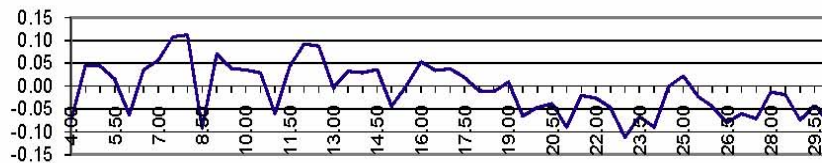
version 1.0 (c) 2004

ODOM HYDROGRAPHIC SYSTEMS, Inc.



STANDARD DEL GROSSO H₂O

TEMP	VELOCITY	MEASURED	RES_VEL	OBS-CAL	TEMP	VELOCITY	MEASURED	RES_VEL	OBS-CAL
FREQUENCY					FREQUENCY				
4.00	1421.62	5552.12	1421.54	-0.08	17.50	1474.38	5755.20	1474.40	0.02
4.50	1423.90	5561.35	1423.95	0.05	18.00	1476.01	5761.35	1476.00	-0.01
5.00	1426.15	5570.00	1426.20	0.04	18.50	1477.62	5767.52	1477.61	-0.01
5.50	1428.38	5578.44	1428.39	0.02	19.00	1479.21	5773.70	1479.21	0.01
6.00	1430.58	5586.59	1430.51	-0.06	19.50	1480.77	5779.43	1480.71	-0.07
6.50	1432.75	5595.32	1432.79	0.04	20.00	1482.32	5785.44	1482.27	-0.05
7.00	1434.90	5603.65	1434.96	0.06	20.50	1483.84	5791.33	1483.80	-0.04
7.50	1437.02	5612.00	1437.13	0.11	21.00	1485.35	5796.91	1485.25	-0.09
8.00	1439.12	5620.07	1439.23	0.11	21.50	1486.83	5802.88	1486.81	-0.02
8.50	1441.19	5627.24	1441.09	-0.09	22.00	1488.29	5808.48	1488.27	-0.03
9.00	1443.23	5635.73	1443.30	0.07	22.50	1489.74	5813.95	1489.69	-0.05
9.50	1445.25	5643.37	1445.29	0.04	23.00	1491.16	5819.17	1491.05	-0.11
10.00	1447.25	5651.03	1447.29	0.04	23.50	1492.56	5824.74	1492.50	-0.07
10.50	1449.22	5658.58	1449.25	0.03	24.00	1493.95	5829.97	1493.86	-0.09
11.00	1451.17	5665.72	1451.11	-0.06	24.50	1495.32	5835.56	1495.31	0.00
11.50	1453.09	5673.51	1453.14	0.04	25.00	1496.66	5840.82	1496.68	0.02
12.00	1454.99	5681.00	1455.09	0.09	25.50	1497.99	5845.75	1497.97	-0.02
12.50	1456.87	5688.19	1456.96	0.09	26.00	1499.30	5850.69	1499.25	-0.05
13.00	1458.72	5694.96	1458.72	0.00	26.50	1500.59	5855.51	1500.51	-0.08
13.50	1460.55	5702.13	1460.59	0.03	27.00	1501.86	5860.47	1501.80	-0.06
14.00	1462.36	5709.06	1462.39	0.03	27.50	1503.11	5865.24	1503.04	-0.07
14.50	1464.14	5715.94	1464.18	0.04	28.00	1504.35	5870.21	1504.33	-0.01
15.00	1465.91	5722.40	1465.86	-0.04	28.50	1505.56	5874.86	1505.54	-0.02
15.50	1467.65	5729.25	1467.64	0.00	29.00	1506.76	5879.25	1506.69	-0.07
16.00	1469.36	5736.05	1469.41	0.05	29.50	1507.94	5883.91	1507.90	-0.04
16.50	1471.06	5742.49	1471.09	0.03	30.00	1509.10	5888.24	1509.03	-0.08
17.00	1472.73	5748.93	1472.77	0.04					



Odom Hydrographic Systems, Inc.

1450 SeaBoard Avenue, Baton Rouge, Louisiana 70810-6261, USA

Telephone: (225)-769-3051, Facsimile: (225)-766-5122

E-mail: email@odomhydrographic.com, HTTP: www.odomhydrographic.com

Date:
Oct 17, 2009

Serial #:
SN.98125-101705

DIGIBAR CALIBRATION REPORT

version 1.0 (c) 2004

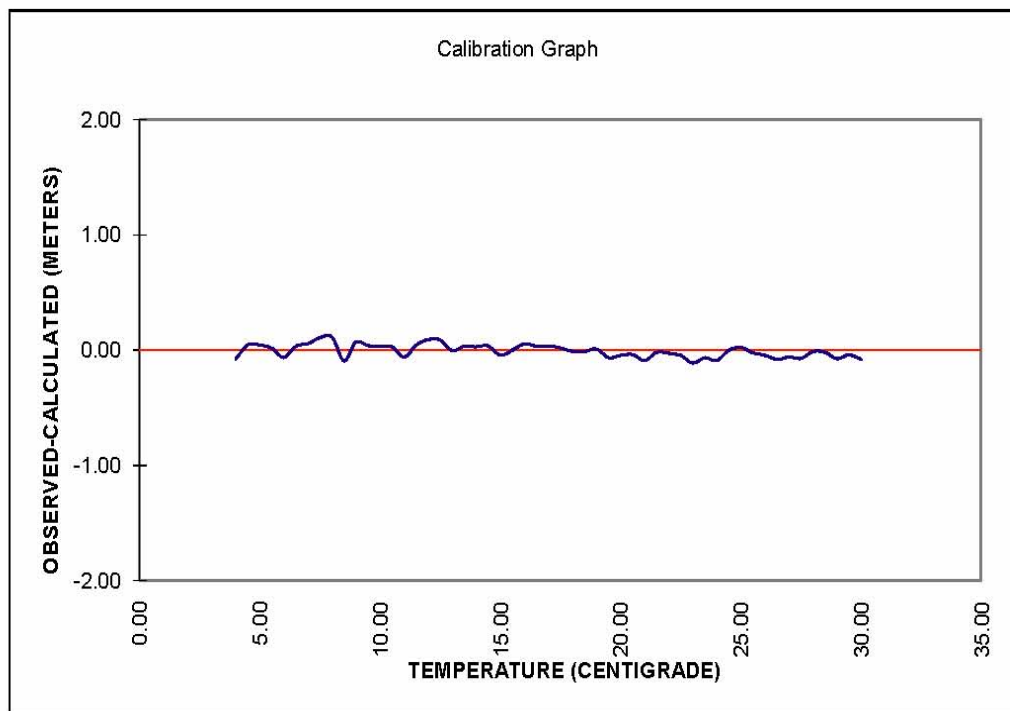
ODOM HYDROGRAPHIC SYSTEMS, Inc.



Burn these numbers to EPROM:

Gradient
Intercept

3332
236



Odom Hydrographic Systems, Inc.

1450 SeaBoard Avenue, Baton Rouge, Louisiana 70810-6261, USA

Telephone: (225)-769-3051, Facsimile: (225)-766-5122

E-mail: email@odomhydrographic.com, HTTP: www.odomhydrographic.com

Appendix I

Danger(s) to Navigation

There were no danger(s) to navigation present on this survey.

Appendix II

Features Report

W00212 Appendix II Charted Features

Registry Number: W00212
State: Virgin Islands
Locality: St. Thomas
Sub-locality: Crown Bay
Project Number: USVI-KR-1010
Survey Dates: 05/20/2010 - 06/25/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
25649	19th	08/01/2003	1:10,000 (25649_1)	USCG LNM: 06/16/2009 (04/20/2010) NGA NTM: 07/27/2002 (05/01/2010)
25641	27th	01/01/2004	1:100,000 (25641_1)	[L]NTM: ?
25650	34th	04/01/2004	1:100,000 (25650_1)	[L]NTM: ?
25640	43rd	11/01/2008	1:326,856 (25640_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	404/122 - Charted 22ft Wk	Wreck	7.24 m	18° 19' 49.4" N	064° 57' 16.1" W
1.2	6532/18 - Charted 32ft Wreck	Wreck	9.93 m	18° 19' 45.0" N	064° 57' 01.1" W
1.3	570/46 - Charted 30ft Obstn	Obstruction	9.14 m	18° 19' 59.9" N	064° 56' 41.4" W
1.4	mooring dolphin	Dolphin	[None]	18° 19' 53.2" N	064° 57' 05.9" W

1 - DR_Charted

1.1) Profile/Beam - 404/122 from w00212 / red_witch / 2010-139 / 015_1936

Survey Summary

Survey Position: 18° 19' 49.4" N, 064° 57' 16.1" W
Least Depth: 7.24 m (= 23.75 ft = 3.959 fm = 3 fm 5.75 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.994 m ; TVU (TPEv) ± 0.305 m
Timestamp: 2010-176.19:37:25.399 (06/25/2010)
Survey Line: w00212 / red_witch / 2010-139 / 015_1936
Profile/Beam: 404/122
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Charted 22ft Wk was completely ensonified and found to have a least depth of 23.75 ft.

Feature Correlation

Address	Feature	Range	Azimuth	Status
w00212/red_witch/2010-139/015_1936	404/122	0.00	000.0	Primary
W00212_targets.tgt	17	0.13	024.0	Secondary
W00212_targets.tgt	16	3.76	127.6	Secondary
ChartGPs - Digitized	1	5.45	149.6	Secondary (grouped)
ChartGPs - ENC US5PR21M	Danger 16	6.98	131.3	Secondary (grouped)

Hydrographer Recommendations

Recommend to delete charted 22ft Wk. Recommend add 24ft Wk at surveyed location.

Cartographically-Rounded Depth (Affected Charts):

24ft (25649_1)

4fm (25641_1, 25650_1, 25640_1)

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 3:distributed remains of wreck
 QUASOU - 6:least depth known
 SORDAT - 20100520

SORIND - US,US,Graph,W00212

TECSOU - 3:found by multi-beam

VALSOU - 7.240 m

WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

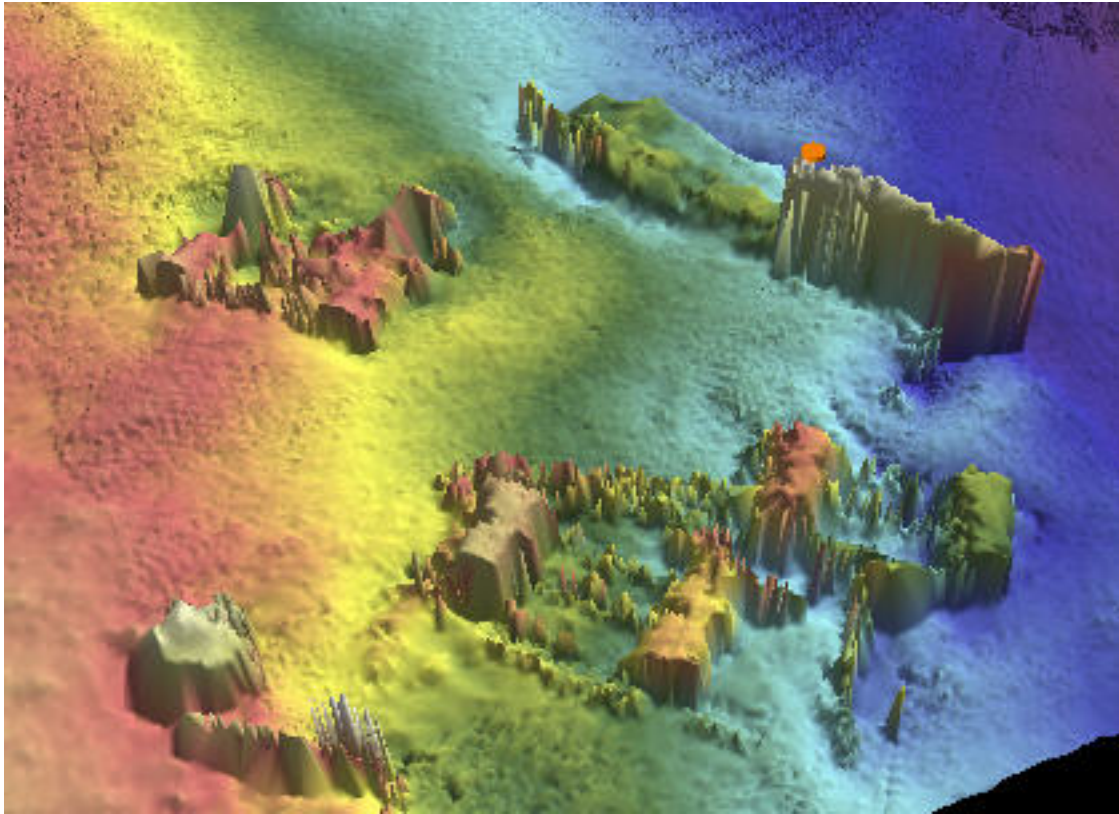


Figure 1.1.1

1.2) Profile/Beam - 6532/18 from w00212 / red_witch / 2010-139 / 038_1636

Survey Summary

Survey Position: 18° 19' 45.0" N, 064° 57' 01.1" W
Least Depth: 9.93 m (= 32.58 ft = 5.430 fm = 5 fm 2.58 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 2.119 m ; TVU (TPEv) ± 0.718 m
Timestamp: 2010-176.16:42:43.250 (06/25/2010)
Survey Line: w00212 / red_witch / 2010-139 / 038_1636
Profile/Beam: 6532/18
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Charted wreck located within survey data as currently charted.

Feature Correlation

Address	Feature	Range	Azimuth	Status
w00212/red_witch/2010-139/038_1636	6532/18	0.00	000.0	Primary
ChartGPs - Digitized	2	0.88	241.7	Secondary (grouped)
W00212_targets.tgt	13	1.64	155.5	Secondary
W00212_targets.tgt	12	1.97	121.6	Secondary
ChartGPs - ENC US5PR21M	Danger 17	2.19	348.0	Secondary (grouped)
W00212_targets.tgt	28	2.32	105.1	Secondary

Hydrographer Recommendations

Recommend to retain wreck's location as currently charted, and update least depth of wreck based upon current survey data (9.93m, 32.58ft).

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 2:dangerous wreck
 QUASOU - 6:least depth known
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212
 TECSOU - 3:found by multi-beam

VALSOU - 9.930 m

WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

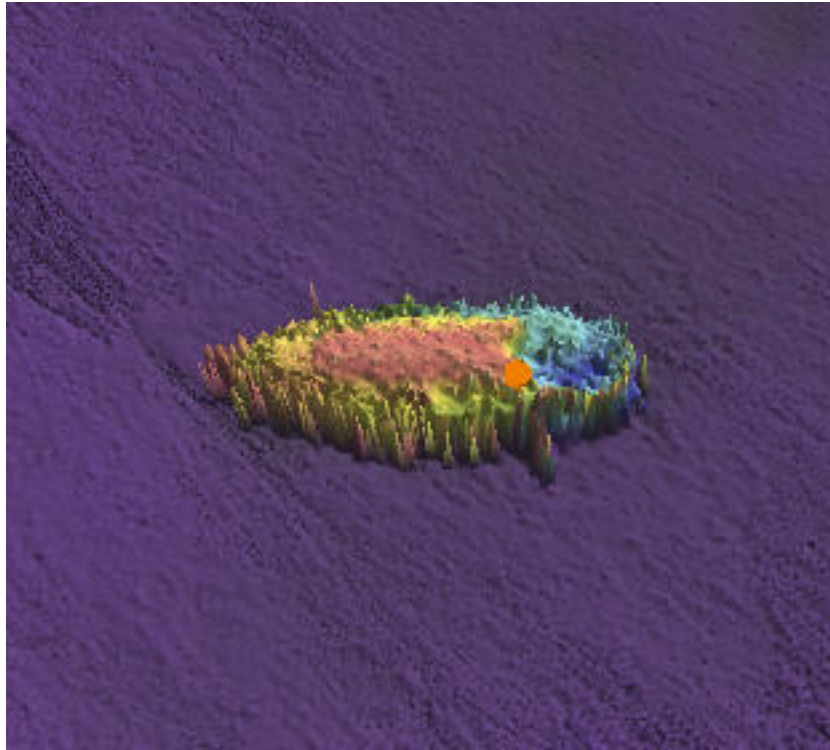


Figure 1.2.1

1.3) Profile/Beam - 570/46 from w00212 / red_witch / 2010-139 / 045_1557

Survey Summary

Survey Position: 18° 19' 59.9" N, 064° 56' 41.4" W
Least Depth: 9.14 m (= 29.99 ft = 4.998 fm = 4 fm 5.99 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 2.056 m ; TVU (TPEv) ± 0.489 m
Timestamp: 2010-176.15:58:05.444 (06/25/2010)
Survey Line: w00212 / red_witch / 2010-139 / 045_1557
Profile/Beam: 570/46
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Charted 30ft Obstn was located at charted location.

Feature Correlation

Address	Feature	Range	Azimuth	Status
w00212/red_witch/2010-139/045_1557	570/46	0.00	000.0	Primary
W00212_targets.tgt	11	0.18	043.1	Secondary
W00212_targets.tgt	6	0.28	021.4	Secondary
ChartGPs - ENC US5PR21M	Danger 4	1.72	029.0	Secondary (grouped)
ChartGPs - Digitized	3	4.23	230.5	Secondary (grouped)

Hydrographer Recommendations

Update features location and depth as per current survey data. Recommend delete charted 30ft Obstn. Recommend to add 30ft Obstn at current surveyed location with least depth of 9.14m,29.99ft.

S-57 Data

Geo object 1: Obstruction (OBSTRN)
Attributes: QUASOU - 6:least depth known
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212
 TECSOU - 3:found by multi-beam
 VALSOU - 9.140 m
 WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

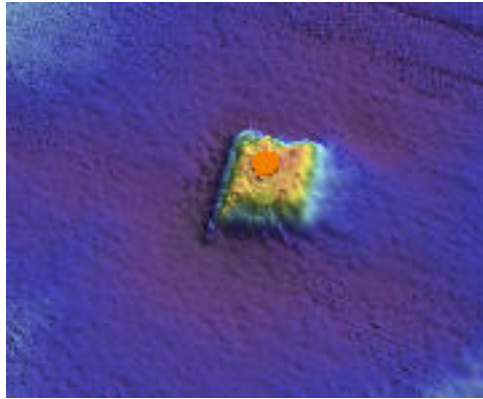


Figure 1.3.1

1.4) GP No. - 1 from W00212_targets2.tgt

Survey Summary

Survey Position: 18° 19' 53.2" N, 064° 57' 05.9" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2010-140.20:24:22.000 (05/20/2010)
GP Dataset: W00212_targets2.tgt
GP No.: 1
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Concrete filled Mooring Dolphin

Feature Correlation

Address	Feature	Range	Azimuth	Status
W00212_targets2.tgt	1	0.00	000.0	Primary
ChartGPs - Digitized	4	2.54	131.9	Secondary (grouped)
W00212_targets.tgt	22	3.54	355.2	Secondary
W00212_targets.tgt	23	6.03	205.6	Secondary
W00212_targets.tgt	21	6.80	111.8	Secondary (grouped)
W00212_targets.tgt	20	31.18	105.0	Secondary
W00212_targets.tgt	24	41.15	133.6	Secondary
W00212_targets.tgt	25	45.80	133.9	Secondary

Hydrographer Recommendations

Chart dolphin at surveyed location.

S-57 Data

Geo object 1: Mooring/warping facility (MORFAC)
Attributes: CATMOR - 1:dolphin
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212

STATUS - 1:permanent

Office Notes

Concur.

W00212 Appendix II Uncharted Features

Registry Number: W00212
State: Virgin Islands
Locality: St. Thomas
Sub-locality: Crown Bay
Project Number: USVI-KR-1010
Survey Dates: 05/19/2010 - 07/02/2010

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
25649	19th	08/01/2003	1:10,000 (25649_1)	USCG LNM: 06/16/2009 (04/20/2010) NGA NTM: 07/27/2002 (05/01/2010)
25641	27th	01/01/2004	1:100,000 (25641_1)	[L]NTM: ?
25650	34th	04/01/2004	1:100,000 (25650_1)	[L]NTM: ?
25640	43rd	11/01/2008	1:326,856 (25640_1)	[L]NTM: ?

* Correction(s) - source: last correction applied (last correction reviewed--"cleared date")

Features

No.	Name	Feature Type	Survey Depth	Survey Latitude	Survey Longitude
1.1	314/64 - Uncharted 17ft Wreck	Wreck	5.19 m	18° 19' 47.1" N	064° 57' 16.7" W
1.2	red can 6 white light - Uncharted	Red buoy, lighted	9.68 m	18° 19' 52.8" N	064° 56' 52.9" W
1.3	1117/140 - Uncharted 49ft Rk	Rock	15.04 m	18° 19' 39.4" N	064° 57' 11.9" W
1.4	Uncharted Mooring Dolphin	Dolphin	[None]	18° 19' 53.2" N	064° 57' 06.0" W

1 - DR_UnCharted

1.1) Profile/Beam - 314/64 from w00212 / red_witch / 2010-139 / 017_1929

Survey Summary

Survey Position: 18° 19' 47.1" N, 064° 57' 16.7" W
Least Depth: 5.19 m (= 17.03 ft = 2.838 fm = 2 fm 5.03 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 1.985 m ; TVU (TPEv) ± 0.332 m
Timestamp: 2010-176.19:29:57.430 (06/25/2010)
Survey Line: w00212 / red_witch / 2010-139 / 017_1929
Profile/Beam: 314/64
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Wreck located within the survey data in the nearshore area. Least depth from multibeam is 5.19m (17.03Ft). The data is interpreted as a wreck (barge).

Feature Correlation

Address	Feature	Range	Azimuth	Status
w00212/red_witch/2010-139/017_1929	314/64	0.00	000.0	Primary

Hydrographer Recommendations

Recommend to chart 17 wreck.

S-57 Data

Geo object 1: Wreck (WRECKS)
Attributes: CATWRK - 2:dangerous wreck
 QUASOU - 6:least depth known
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212
 TECSOU - 3:found by multi-beam
 VALSOU - 5.190 m
 WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

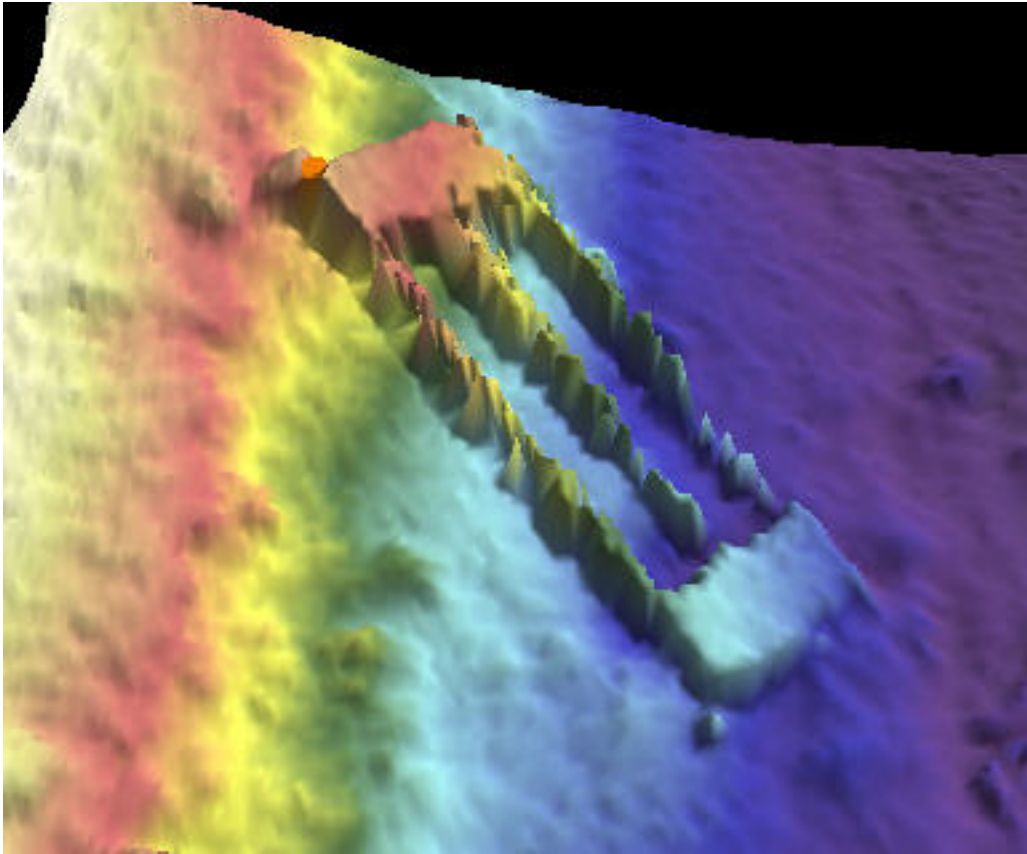


Figure 1.1.1

1.2) GP No. - 39 from W00212_targets.tgt

Survey Summary

Survey Position: 18° 19' 52.8" N, 064° 56' 52.9" W
Least Depth: 9.68 m (= 31.76 ft = 5.293 fm = 5 fm 1.76 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2010-139.21:18:33.000 (05/19/2010)
GP Dataset: W00212_targets.tgt
GP No.: 39
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Located nav aid, red can 6, with white light. Appears to be a private marker as the light is not normal USCG light for a red nun (buoy) nav aid

Feature Correlation

Address	Feature	Range	Azimuth	Status
W00212_targets.tgt	39	0.00	000.0	Primary

Hydrographer Recommendations

Chart red nun navigational buoy in surveyed position.

Cartographically-Rounded Depth (Affected Charts):

32ft (25649_1)

5 ¼fm (25641_1, 25650_1, 25640_1)

S-57 Data

Geo object 1: Buoy, lateral (BOYLAT)
Attributes: BOYSHP - 2:can (cylindrical)
 CATLAM - 2:starboard-hand lateral mark
 COLOUR - 3:red
 INFORM - "6"
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212

Office Notes

Concur.

1.3) Profile/Beam - 1117/140 from w00212 / red_witch / 2010-139 / 006_2052

Survey Summary

Survey Position: 18° 19' 39.4" N, 064° 57' 11.9" W
Least Depth: 15.04 m (= 49.34 ft = 8.224 fm = 8 fm 1.34 ft)
TPU ($\pm 1.96\sigma$): THU (TPEh) ± 2.104 m ; TVU (TPEv) ± 0.336 m
Timestamp: 2010-176.20:53:53.743 (06/25/2010)
Survey Line: w00212 / red_witch / 2010-139 / 006_2052
Profile/Beam: 1117/140
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

[None]

Feature Correlation

Address	Feature	Range	Azimuth	Status
w00212/red_witch/2010-139/006_2052	1117/140	0.00	000.0	Primary
W00212_targets.tgt	14	0.51	131.2	Secondary
W00212_targets.tgt	15	0.66	157.1	Secondary

Hydrographer Recommendations

Chart 49 Sounding.

S-57 Data

Geo object 1: Underwater rock / awash rock (UWTROC)
Attributes: QUASOU - 6:least depth known
 SORDAT - 20100520
 SORIND - US,US,Graph,W00212
 TECSOU - 3:found by multi-beam
 VALSOU - 15.040 m
 WATLEV - 3:always under water/submerged

Office Notes

Concur.

Feature Images

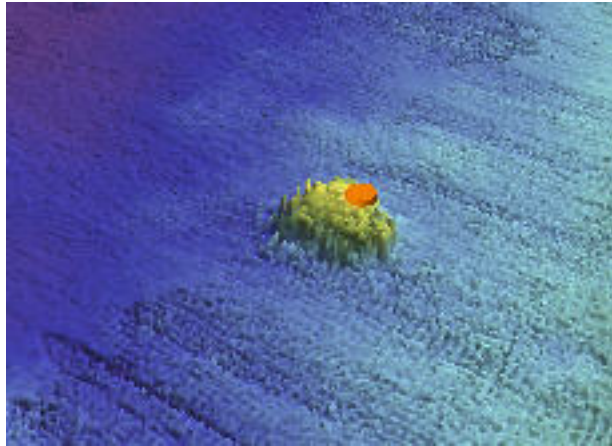


Figure 1.3.1

1.4) GP No. - 4 from ChartGPs - Digitized

Survey Summary

Survey Position: 18° 19' 53.2" N, 064° 57' 06.0" W
Least Depth: [None]
TPU ($\pm 1.96\sigma$): THU (TPEh) [None] ; TVU (TPEv) [None]
Timestamp: 2010-183.13:18:35 (07/02/2010)
GP Dataset: ChartGPs - Digitized
GP No.: 4
Charts Affected: 25649_1, 25641_1, 25650_1, 25640_1

Remarks:

Concrete filled lighted mooring dolphin.

Feature Correlation

Address	Feature	Range	Azimuth	Status
W00212_targets2.tgt	1	0.00	000.0	Primary
ChartGPs - Digitized	4	2.54	131.9	Secondary (grouped)
W00212_targets.tgt	22	3.54	355.2	Secondary
W00212_targets.tgt	23	6.03	205.6	Secondary
W00212_targets.tgt	21	6.80	111.8	Secondary (grouped)
W00212_targets.tgt	20	31.18	105.0	Secondary
W00212_targets.tgt	24	41.15	133.6	Secondary
W00212_targets.tgt	25	45.80	133.9	Secondary

Hydrographer Recommendations

Chart mooring facility at surveyed position.

S-57 Data

Geo object 1: Mooring/warping facility (MORFAC)
Attributes: CATMOR - 1:dolphin
 CONRAD - 1:radar conspicuous
 SORDAT - 20100520

SORIND - US,US,Graph,W00212

STATUS - 1:permanent

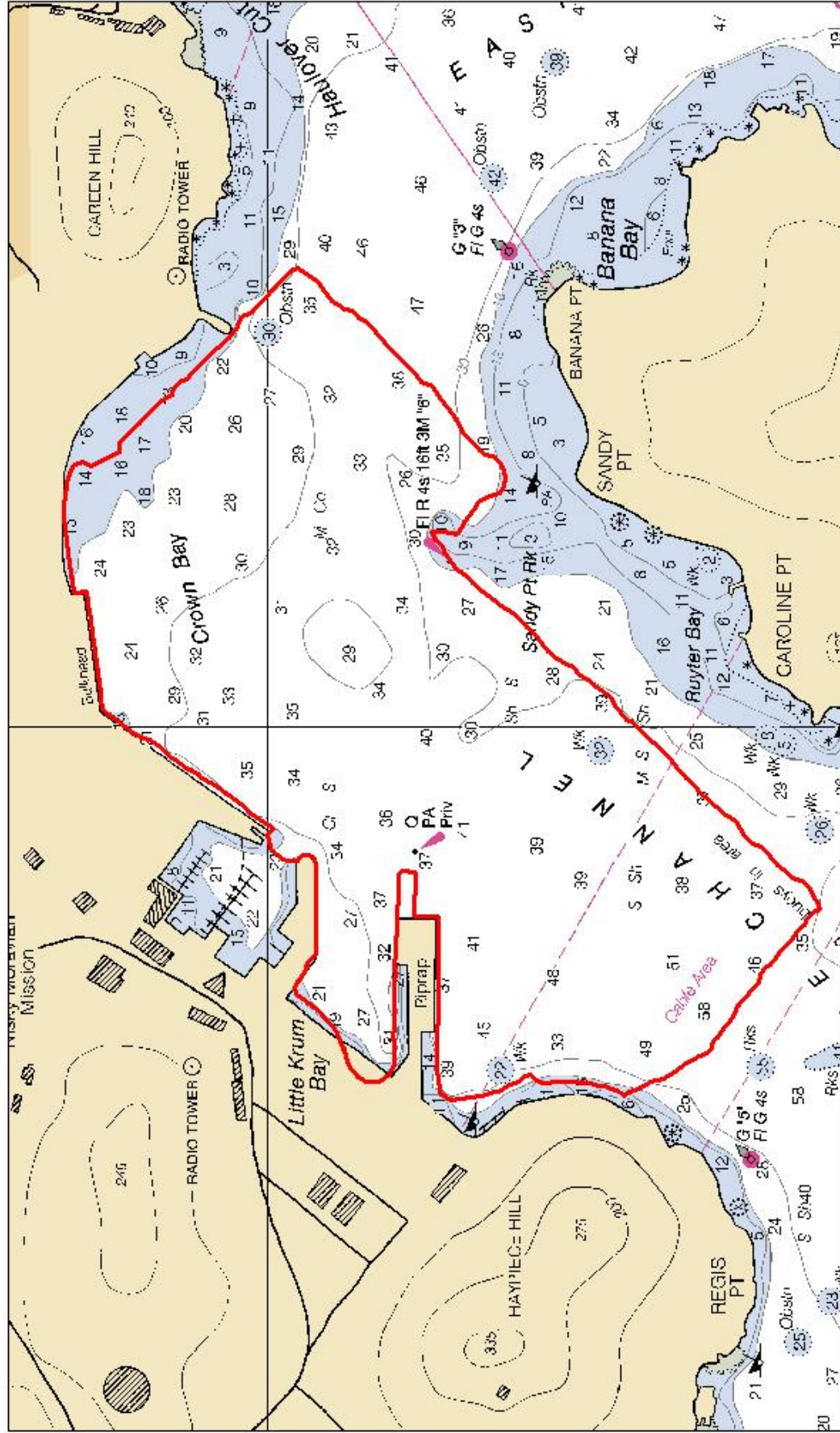
WATLEV - 2:always dry

Office Notes

Concur.

Appendix III

Survey Outline



W00212 Survey Outline CHART 25649

NOT FOR NAVIGATION



NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE

Project: OSD-ARC-10
Survey: W00212
State: St Thomas, USVI
Locality: Charlotte Amalie
Sub-locality: Crown Bay
Survey Scale: 1:10,000

Feet
Sounding Units: MLLW
Sounding Datum: NAD 83
Horizontal Datum: UTM 20
Projection: 063° 00 00
Central Meridian: 063° 00 00
Scale Factor: 0.9996

ARC Surveying & Mapping
Frank Sawyer, Chief of Party

May 19 to
May 20, 2010

Appendix IV

Tides and Water Levels

STATEMENT OF WORK
USVI-KR-2010 Crown Bay, St. Thomas, VI
(05/13/2010 DW)

1.0. TIDES AND WATER LEVELS

1.1. Specifications

Tidal data acquisition, data processing, tidal datum computation and final tidal zoning shall be performed utilizing sound engineering and oceanographic practices as specified in National Ocean Service (NOS) Hydrographic Surveys Specifications and Deliverables (April 2009).

1.2. Vertical Datums

The tidal datums for this project are Chart Datum, Mean Lower Low Water (MLLW) and Mean High Water (MHW). Soundings are referenced to MLLW and heights of overhead obstructions (bridges and cables) are referenced to MHW.

1.2.1. The operating National Water Level Observation Network (NWLON) station at Charlotte Amalie, St. Thomas (9751639) will serve as datum control for this project.

During periods of hydrography, CO-OPS is only responsible for the operation and maintenance of NWLON control stations and the contractor is responsible for the maintenance and operations of all contractor installed (tertiary) stations. The contractor is required to monitor the NWLON control water level data via the CO-OPS website at <http://tidesandcurrents.noaa.gov/hydro.shtml> or through regular communications with the OCS COTR or the OCS COTR's CO-OPS authorized point of contact (Thomas Landon at 301-713-2897 x 191 or via email: nos.coops.oetteam@noaa.gov) before and during operations. The OCS COTR or the COTR's CO-OPS authorized point of contact (Thomas Landon) will serve as liaison between the contractor and NOS/CO-OPS to confirm operation of this station and to ensure the acquisition of NWLON control water level data during periods of hydrography. Problems or concerns regarding the acquisition of valid water level data identified by the contractor shall be communicated with the OCS COTR or the COTR's CO-OPS authorized point of contact (Thomas Landon) to coordinate the appropriate course of action to be taken such as gauge repair and/or developing contingency plans for hydrographic survey operations.

1.3. Tide Reducer Stations

The operating water level station at Charlotte Amalie, St. Thomas (9751639) will provide water level reducers for this project. Therefore it is critical that it remain in operation during the survey.

1.3.1. No subordinate water level stations are required for this project

1.3.2. This section is not applicable to this project.

1.3.3. Water Level Records: If subordinate water level stations are installed, submit water level data, such as leveling records, field reports, and any other relevant data/reports, including the data downloaded onto diskette/CD as specified in the latest version of the NOS Specifications and Deliverables document.

1.3.3.1. Tidal records should be forwarded to the following address:

NOAA/National Ocean Service/CO-OPS
Chief, Engineering Division
N/OPS1 - SSMC4, Station 6531
1305 East-West Highway
Silver Spring, MD 20910

1.3.4. This section is not applicable to this project.

1.3.4.1. This section is not applicable to this project.

1.3.5. This section is not applicable to this project.

1.4. Zoning

1.4.1. The water level station at Charlotte Amalie, St. Thomas (9751639) is the reference station for predicted tides for hydrography at Crown Bay, St. Thomas, VI. The time and height correctors listed below for applicable zones should be applied to the predicted tides at the station indicated during the acquisition and preliminary processing phases of this project.

Predictions may be retrieved in one month increments over the Internet from CO-OPS SOAP web services at <http://opendap.co-ops.nos.noaa.gov/axis/text.html>. The contractor must notify the COTR or the COTR's authorized representative immediately of any problems concerning the predicted tides. Predictions are six-minute time series data relative to MLLW in metric units on Greenwich Mean Time. For the time corrections, a negative (-) time correction indicates that the time of tide in that zone is earlier than (before) the predicted tides at the reference station. A positive (+) time correction indicates that the time of tide in that zone is later than (after) the predicted tides at the reference station. For height corrections, the water level heights **relative to MLLW** at the reference station are multiplied by the range ratio to estimate the water level heights relative to MLLW in the applicable zone.

<u>Zone</u>	<u>Time Corrector (min)</u>	<u>Range Ratio</u>	<u>Predicted Reference Station</u>
VIR4C	-6	1.08	9751639
VIR24	0	1.01	9751639

1.4.2. Polygon nodes and water level corrections referencing Charlotte Amalie, St. Thomas (9751639) are provided in ASCII format denoted by a *.zdf extension file name. Zoning diagrams, created in MapInfo, are provided in both digital and hard copy format to assist with the zoning. Longitude and latitude coordinates are in decimal degrees. Negative (-) longitude is a MapInfo representation of West longitude.

“Preliminary” data for the control water level station, Charlotte Amalie, St. Thomas (9751639), are available in near real-time and verified data will be available on a weekly basis for the previous week. **These water level data may be obtained from CO-OPS SOAP web services at <http://opendap.co-ops.nos.noaa.gov/axis/text.html>.**

Please contact the Office of Coast Survey COTR **before** survey operations begin and **once survey operations are completed** so that this project number and the appropriate CO-OPS NWLON (National Water Level Observation Network) water level stations are added to or removed from the CO-OPS Hydro Hot List (<http://tidesandcurrents.noaa.gov/hydro>).

1.4.3. Tide Component Error Estimation

The estimated total error contribution to the total survey error budget in the vicinity of Gregerie Channel and St. Thomas Harbor is 0.09m at the 95% confidence level, and includes the estimated gauge measurement error, tidal datum computation error, and tidal zoning error. It should be noted that the tidal error component can be significantly greater than stated if a substantial meteorological event or condition should occur during the time of hydrography.

1.5. Final Zoning

1.5.1. For final processing, apply tidal zoning correctors to “verified” observed data of the NOS control station and/or the final processed data of the subordinate stations.

APPENDIX V

Supplemental Survey Records and Correspondence

Subject: Re: W00212 Progress

From: Wesley Kitt <wesley.kitt@noaa.gov>

Date: Fri, 09 Jul 2010 07:49:28 -0400

To: Frank Sawyer <no2saw@aol.com>

CC: Richard.T.Brennan@noaa.gov, Castle.E.Parker@noaa.gov, jsawyer@arcsurveyors.com

Good morning Frank,

Sorry about the picture. I've attached it as a separate file this time but I think you've answered my questions. I recall that fixed Nav Aid was in pretty poor shape, ie, rust had eaten almost all the way through the supports. But it was still there so it will have to stay on the chart for now.

I hear ya about the time crunch. The descriptive report is a necessary deliverable but between the DAPR and myself being present during operations, I can work with what we have for now.

Thanks for getting back to us so quickly!

Respectfully,
Wes

Frank Sawyer wrote:

Wes, Glad to here everything is looking good .I cant see the image you sent but I can answer your questions

A. There is no light at the new mooring dolphin.

B.The Red nav aid looks like a replacement for the existing Red Day Marker that is shown on the chart.

C.Working on the report. I need more hours in a day...

Hope this helps

Please call or email if you have any questions.

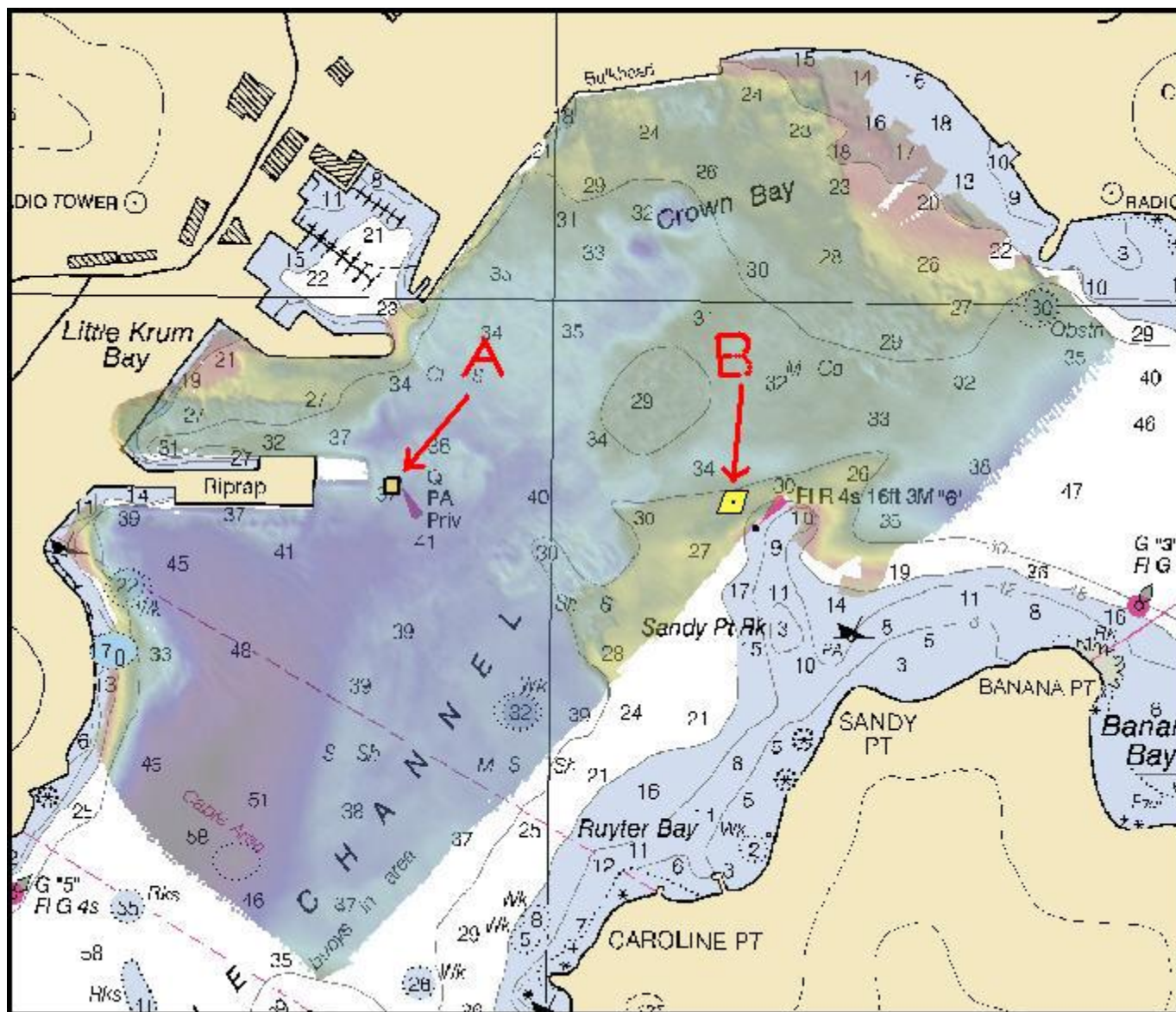
Frank Sawyer, President

Arc Surveying and Mapping

904-384-8377 office

904-237-5946 cell

www.arcsurveyors.com



Item_Clarification.jpg

Content-Type: image/jpeg
Content-Encoding: base64

Subject: Re: W00212 Progress

From: Frank Sawyer <no2saw@aol.com>

Date: Wed, 21 Jul 2010 16:43:05 -0400

To: Wesley Kitt <Wesley.Kitt@noaa.gov>

CC: "LCDR Rick Brennan, NOAA" <Richard.T.Brennan@noaa.gov>, "Castle.E.Parker" <Castle.E.Parker@noaa.gov>

Wes, We will get with the port about the nav aid. I'm sure they can send us a photo of it.

Frank Sawyer, President
Arc Surveying and Mapping
904-384-8377 office
904-237-5946 cell

On Jul 20, 2010, at 8:31 AM, Wesley Kitt <Wesley.Kitt@noaa.gov> wrote:

Good morning Frank,

We're moving along nicely with W00212 and have started compilation. We foresee completion and referral to Marine Chart Division before the end of the month. A major interest item that came out of the SAR review meeting centers around that Nav Aid described in the target file as "red can "6" Lt." We need clarification on this. If the buoy is from the USCG, it cannot be a red can. Was it a red nun? And, if so, then it wouldn't have a white light but rather a red light. Either way, we'll need clarification. Perhaps through the Port Authority?

FYI, the soundings matched very well with the soundings originally sent in a couple years ago. Some soundings in question from the original set were shown to be fliers when this year's collection was scrutinized.

Because of the fast track nature of this survey, we are proceeding with compilation without being in possession of the descriptive report with the understanding that one is "on the way."

Sincerely,
Wes Kitt

Frank Sawyer wrote:

Wes, Glad to here everything is looking good .I cant see the image you sent but I can answer your questions
A. There is no light at the new mooring dolphin.
B.The Red nav aid looks like a replacement for the existing Red Day Marker that is shown on the chart.
C.Working on the report. I need more hours in a day...
Hope this helps
Please call or email if you have any questions.
Frank Sawyer, President
Arc Surveying and Mapping
904-384-8377 office
904-237-5946 cell
www.arcsurveyors.com

-----Original Message-----

From: Wesley Kitt <Wesley.Kitt@noaa.gov>

To: Frank Sawyer <no2saw@aol.com>

Cc: LCDR Rick Brennan, NOAA <Richard.T.Brennan@noaa.gov>; Castle.E.Parker <Castle.E.Parker@noaa.gov>

Sent: Thu, Jul 8, 2010 10:48 am

Subject: W00212 Progress

Good morning Frank,

Hope you had a great Independence Day!

I'm in the midst of a survey acceptance review of W00212, Crown Bay, St. Thomas, and will move on to compilation to try and fast track this survey. The HS2 files converted easily thru CARIS and the data looks quite good! Using the latest ortho imagery, the data matches with the changed shoreline shown on the raster. I do have a couple questions concerning new items. Please refer to the attached image:

A: This is the huge mooring dolphin that is not currently charted. Was the light (Q PA Priv) that is charted at approximately the same location still there? I don't recall seeing it.

B: The red can buoy. Was this a private Nav Aid?

I assume these items are addressed in the descriptive report but to my knowledge we have yet to receive it. Any clarification concerning these items would be most helpful.

Thanks and,

Respectfully,
Wes Kitt, PS-AHB

Subject: RE: W00212 Progress

From: John Sawyer <jsawyer@arcsurveyors.com>

Date: Thu, 22 Jul 2010 11:38:17 -0400

To: 'Frank Sawyer' <no2saw@aol.com>, 'Wesley Kitt' <Wesley.Kitt@noaa.gov>

CC: "LCDR Rick Brennan, NOAA" <Richard.T.Brennan@noaa.gov>, "Castle.E.Parker" <Castle.E.Parker@noaa.gov>, 'Patrick Sawyer' <swyptr@aol.com>, rsawyer@arcsurveyors.com, dwenning@arcsurveyors.com

Frank/Wes

I talked with USVI Ports Marine Manager (Calvin Industria) this morning regarding Buoy #6. Mr. Industria will send either a photo or a description via email.

Glad to hear charting Crown Bay is moving along.

Thanks, John

John F. Sawyer, Vice President
Arc Surveying & Mapping, Inc.
5202 San Juan Avenue
Jacksonville, Florida 32210
Office (904) 384-8377
Fax (904) 384-8388
Cell (904) 237-5949
www.arcsurveyors.com

Subject: Re: W00212 Progress

From: "Frank Sawyer" <no2saw@aol.com>

Date: Wed, 21 Jul 2010 16:43:05 -0400

To: "Wesley Kitt" <Wesley.Kitt@noaa.gov>

CC: "LCDR Rick Brennan, NOAA" <Richard.T.Brennan@noaa.gov>, "Castle.E.Parker" <Castle.E.Parker@noaa.gov>

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904-384-8377 office
904-237-5946 cell

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FYI, the soundings matched very well with the soundings originally sent in a couple years ago. Some soundings in question from the original set were shown to be fliers when this year's collection was scrutinized.

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Sincerely,
Wes Kitt

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A. There is no light at the new mooring dolphin.
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C.Working on the report. I need more hours in a day...
Hope this helps
Please call or email if you have any questions.
Frank Sawyer, President
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-----Original Message-----

From: Wesley Kitt <Wesley.Kitt@noaa.gov>
To: Frank Sawyer <no2saw@aol.com>
Cc: LCDR Rick Brennan, NOAA <Richard.T.Brennan@noaa.gov>;
Castle.E.Parker <Castle.E.Parker@noaa.gov>
Sent: Thu, Jul 8, 2010 10:48 am
Subject: W00212 Progress

Good morning Frank,

Hope you had a great Independence Day!

I'm in the midst of a survey acceptance review of W00212, Crown Bay, St. Thomas, and will move on to compilation to try and fast track this survey. The HS2 files converted easily thru CARIS and the data looks quite good! Using the latest ortho imagery, the data matches with the changed shoreline shown on the raster. I do have a couple questions concerning new items. Please refer to the attached image:

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B: The red can buoy. Was this a private Nav Aid?

I assume these items are addressed in the descriptive report but to my knowledge we have yet to receive it. Any clarification concerning these items would be most helpful.

Thanks and,

Respectfully,
Wes Kitt, PS-AHB

Re: W00212 Progress.eml	Content-Type: message/rfc822
-------------------------	------------------------------

Content-Encoding: 7bit

Subject: [Fwd: Re: [Fwd: Re: HURL survey for Virgin Islands chart 25649]]
From: "LCDR Rick Brennan, NOAA" <Richard.T.Brennan@noaa.gov>
Date: Wed, 28 Jul 2010 12:46:25 -0400
To: Wesley Kitt <Wesley.Kitt@noaa.gov>
CC: Edward Owens <Edward.Owens@noaa.gov>

Wes,

This just came in from Mark Griffin. I would include this in the supplemental correspondence and as per MCD direction remove any SLCONS.

Rick

--



LCDR Rick Brennan, NOAA
Chief, Atlantic Hydrographic Branch
439 West York Street
Norfolk, VA 23510
Office: 757-441-6746
Cell: 443-994-3301

Learn about "America's Seventh Service":

www.noaacorps.noaa.gov

Learn about NOAA's Office of Coast Survey:

www.nauticalcharts.noaa.gov

Subject: Re: [Fwd: Re: HURL survey for Virgin Islands chart 25649]
From: "Mark.Griffin" <Mark.Griffin@noaa.gov>
Date: Wed, 28 Jul 2010 10:09:30 -0400
To: "LCDR Rick Brennan, NOAA" <Richard.T.Brennan@noaa.gov>
CC: "Kyle.Ward" <Kyle.Ward@noaa.gov>

Rick,

Following up on my phone message. Heres the attached GC project report. Again probably will be better for you to leave your shoreline out of your Hcell. I have compiled the shoreline to my raster files but ENC is not in continual maintenance so they haven't gotten this compiled to their product yet. I can probably process the raw data into a shape file, which is what ENC would be using to compile with but again it's not the compiled version just the raw deliverable.

LCDR Rick Brennan, NOAA wrote:

We did not receive this GC for this survey. If it was applied to the chart - it has been recently, because the chart we are compiling to still has the old pier in Crown Bay. If there is better source please provide it, because we hope to transmit this survey by Friday.

Rick

Kyle.Ward wrote:

Mark,

I do not have an outline for W00212.

Rick,
Was the GC listed below referenced during the compilation and evaluation of W00212?
Mark was curious because they recently applied the GC to the chart.

Project ID: /VI0801/

Date: /20091211/

Description: /ST. THOMAS HARBOR, VI/

Regards,
Kyle

Mark.Griffin wrote:
fyi

Mark Griffin
Chief, Product Branch E
Marine Chart Division
Office of Coast Survey

Re: [Fwd: Re: HURL survey for Virgin Islands chart 25649].eml

Content-Type: message/rfc822

Content-Encoding: 7bit

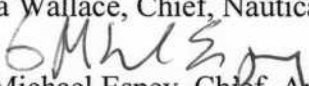
L270-2010[1].pdf

Content-Type: application/pdf

Content-Encoding: base64

APPLICATIONS BRANCH MEMORANDUM

11 March 2010

To: Tara Wallace, Chief, Nautical Data Branch, MCD, CS
From: 
G. Michael Espey, Chief, Applications Branch
Subject: Release of Project VI0801 – St. Thomas Harbor, U.S. Virgin Islands

Message:

NOAA Coastal Mapping Program Project VI0801 – St. Thomas Harbor, U.S. Virgin Islands, has been approved for release. This project consists of full shoreline update of the project area, and covers 1 of the 175 ports tracked by the NOAA Marine Transportation System performance measure (St. Thomas Harbor). The Geographic Cell, GC10799, containing 29 nautical miles of compiled vector shorelines and alongshore features, has been posted to the NOAA Shoreline Data Explorer (NSDE) in shapefile format. An associated FGDC compliant metadata file has also been posted to the NSDE. A Project Completion Report (PCR) was created which contains information sufficient to support MCD application of this data. The metadata file contains a link to an online copy of the PCR in Adobe Acrobat (PDF) format. This project provides chart validation and update data applicable to the following NOAA nautical charting products:

RNC No.	RNC Ed.	RNC Edition/Correction Dates	RNC Download Date
25649_1	19	Aug. /03, corrected through NM Aug. 9/03	29-May-2008

Forwarded with this memo is a CD containing the Chart Evaluation File (CEF) in shapefile format, associated RNC, the CSCAP Evaluation Memo (Word), and the georeferenced aerial mosaic imagery (GeoTIFF) used in the CSCAP evaluation and chart update.

For questions on the posting of project products, please contact Doug Graham, RSD Data Base Coordinator, via telephone at 713-2676 x170, via email at Doug.Graham@noaa.gov, or in person at SSMC3 Station 5126.

cc: N/NGS3 - S. Matula
N/NGS31 - D. Graham, T. Blackford
N/NGS33 - AB Project Archive

Attachments

NOAA COASTAL MAPPING PROGRAM PROJECT COMPLETION REPORT

PROJECT VI0801

St. Thomas Harbor, U.S. Virgin Islands

Introduction

NOAA Coastal Mapping Program (CMP) Project VI0801 provides a highly accurate database of new digital shoreline data for St. Thomas Harbor, U.S. Virgin Islands, and surrounding coastal areas. The project extends from Green Cay westward to Brewers Bay and includes both East and West Gregerie Channel.

Successful completion of this project resulted in a densification of the National Spatial Reference System (NSRS), a set of controlled metric-quality digital aerial images, and digital feature data of the coastal zone which complements the Nautical Charting Program (NCP) as well as geographic information systems (GIS) for a variety of coastal zone management applications.

The project database consists of information measured and extracted from digital aerial images and metadata related to photogrammetric compilation. Base mapping was conducted in a digital environment using stereo softcopy photogrammetry and associated cartographic practices.

Project Design

The design of Project VI0801 was accomplished by the Requirements Branch (RB) of the Remote Sensing Division (RSD) in response to the need for timely updates to the NOAA Electronic Navigational Chart (ENC) series. Project requirements were originally formulated as a result of analysis conducted within the Coast and Shoreline Change Analysis Program (CSCAP), in which NOAA nautical chart products are compared to contemporary high resolution imagery in order to ascertain the need for more current shoreline data. Subsequent to the change analysis, RSD received a request from the Office of Coast Survey (OCS) Navigation Manager in the region for updated shoreline of St. Thomas Harbor to support the application of a new hydrographic survey. Given the special request, as well as the availability of stereo color and IR imagery, the Applications Branch (AB) of RSD elected to provide full compilation of the entire project area.

Field Operations

The field operations consisted of the collection of kinematic Global Positioning System (GPS) and Inertial Measurement Unit (IMU) data and the acquisition of digital aerial imagery. The photographic mission operations were conducted on April 9th, 2009 with the NOAA Cessna Citation II (N52RF) aircraft. Two strips of natural color digital images and two strips of black & white infrared (IR) for a total of forty-six (46) images

were acquired simultaneously through the use of an Applanix DSS-439 digital camera with dual 60 mm lenses at an approximate ground sample distance (GSD) of 0.35 meters.

Instead of establishing a GPS base station for this project, static GPS data was collected from the CORS station (ZSU1) at Luis Munoz Marin Intl. Airport (San Juan, PR). Airborne kinematic GPS/IMU data was collected to determine precise camera positions and orientations in order to establish control network necessary for aerotriangulation. Data collection operations were conducted in accordance with the GPS Controlled Photogrammetry Field Operations Manual. No ground control survey operations were required for this project.

GPS Data Reduction

GPS and IMU data was processed by RSD personnel to provide precise positions of camera centers for application as photogrammetric control in the aerotriangulation phase of project completion. The airborne kinematic data was processed using Applanix POSPAC (ver. 4.4) software also in May 2008. For further information refer to the Airborne Positioning and Orientation Report (APOR) on file with other project data within the RSD Applications Branch (AB) Project Archive.

Aerotriangulation

Routine softcopy aerotriangulation methods were applied to establish a network of precise camera positions and other control for mapping, and to provide model parameters and orientation elements required for digital compilation. This work was initiated by RSD personnel in December 2009 utilizing a Digital Photogrammetric Workstation (DPW), which is a configuration of computer hardware, modular software components and other associated peripheral devices. BAE Systems SOCET SET® v. 5.4.1 softcopy photogrammetry suite was used for both project setup and aerotriangulation, using the Multi-Sensor Triangulation (MST) module.

The color digital images were bridged first as a single block. The B&W IR images were then tied together with the color images using photo control points measured from the aerotriangulated color imagery. Upon successful completion of the aerotriangulation process, the MST software provided the standard deviations of the residuals for each aerotriangulated ground point, which were used to compute a predicted horizontal circular error of 0.3 meters based on a 95% confidence level for the final adjusted block of all images. An Aerotriangulation Report was written and is on file with other project data within the RSD Project Archive.

The project database consists of project parameters and options, camera calibration data, ground control parameters, adjusted exterior orientation parameters, and positional listing of all measured points. Positional data is referenced to the North American Datum of 1983 (NAD 83).

Compilation

The data compilation phase of the project was initiated by RSD personnel in January 2010. Digital mapping was performed using a DPW in conjunction with the SOCET

SET Feature Extraction module. Feature identification and attribution within the Geographic Cell (GC) were based on image analysis of the digital aerial imagery and information extracted from the appropriate NOAA nautical charts, US Coast Guard Light List and other ancillary sources. Feature attribution was assigned in compliance with the Coastal Cartographic Object Attribute Source Table (C-COAST), which provided the definition and attribution scheme for the full range of cartographic features pertinent to the CMP. Selected features were further modified with additional descriptive information to refine general classification.

Spatial data accuracies for Project VI0801 were determined according to standard Federal Geographic Data Committee (FGDC) practices. Cartographic features were compiled to meet a horizontal accuracy of 0.6 meters at the 95% confidence level. This predicted accuracy of compiled, well defined points is derived by doubling the circular error computed from the aerotriangulation statistics.

The following table provides information on the digital imagery used in the project completion:

Date	Time (UTC)	Roll Number	Photo Numbers	GSD (nominal)	Tide Level*
4-09-08	17:50-17:51	08NC03	150001_0489 - 150001_0499	0.35 m	-0.1 m
4-09-08	17:56-17:58	08NC03	150002_0500 - 150002_0511	0.35 m	-0.1 m
4-09-08	17:50-17:51	08NR02	350001_0120 - 350001_0130	0.35 m	-0.1 m
4-09-08	17:56-17:58	08NR02	350002_0131 - 350002_0142	0.35 m	-0.1 m

* Tide levels are given in meters above MLLW and are based on actual observations recorded by the NOS gauge at Charlotte Amalie, St. Thomas reference station at the time of photography. The elevation of MHW at Charlotte Amalie is equal to 0.7 meters above MLLW.

Quality Control / Final Review

Quality control tasks were conducted during all phases of project completion by a senior member of AB. The final QC review was completed in February 2010. The review process included analysis of aerotriangulation results and assessment of the identification and attribution of digital feature data within the GC according to image analysis and criteria defined in C-COAST. The quality control process concluded with an inspection of topological connectivity within the GC using ArcGIS 9.3 software. All project data was evaluated for compliance to CMP requirements.

Comparisons of the largest scale NOAA nautical charts with the imagery and compiled project data resulted in creation of the Chart Evaluation File (CEF). The following nautical chart was used in the comparison process:

25649, St. Thomas Harbor, West Indies, 1:10,000 scale, 19th Ed.

End Products and Deliverables

The following specifies the location and identification of the products generated during the completion of this project:

RSD Applications Branch Archive

- Hardcopy of the Airborne Positioning and Orientation Report (APOR)
- Hardcopy of the Aerotriangulation Report
- Hardcopy of the Project Completion Report (PCR)
- Page-size graphic plot of GC10799 file contents, attached to PCR

Remote Sensing Division Electronic Data Library

- Project database
- GC10799 in shapefile format
- Digital copy of the PCR in Adobe PDF format
- Chart Evaluation File in shapefile format

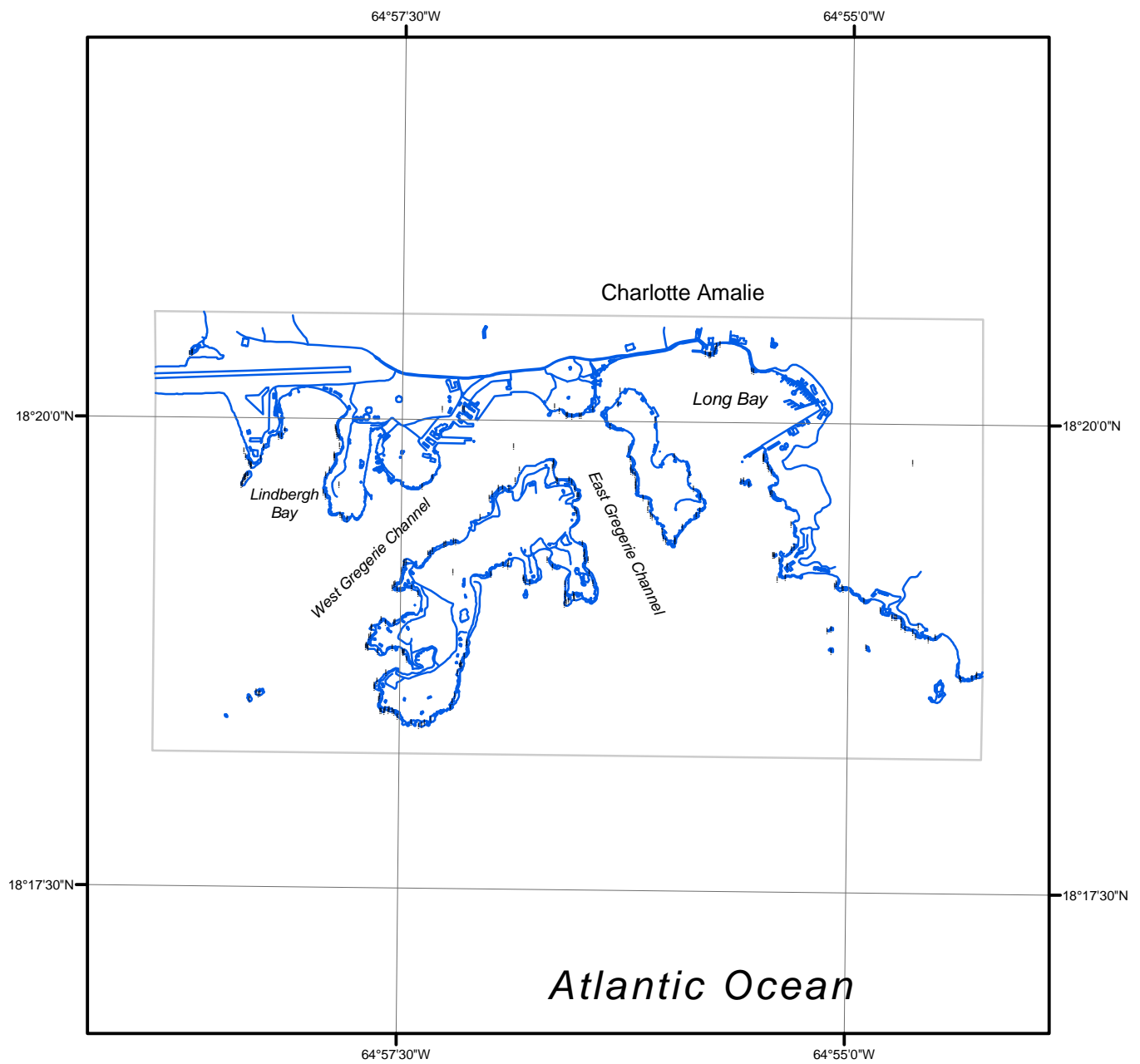
NOAA Shoreline Data Explorer

- GC10799 in shapefile format
- Metadata file for GC10799
- Digital copy of the PCR in Adobe PDF format

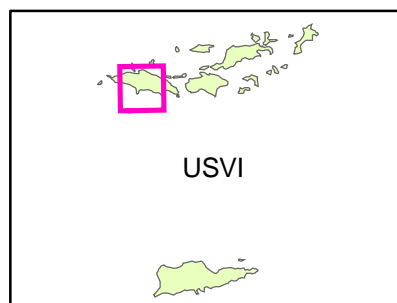
End of Report

ST. THOMAS HARBOR

U.S. VIRGIN ISLANDS



Overview



VI0801

GC10799

AHB PRE-COMPILATION LOG

General Survey Information	
REGISTRY No.	W00212
PROJECT No.	OSD-ARC-10
FIELD UNIT	ARC SURVEYING & MAPPING
DATE OF SURVEY	MAY 19-20, 2010
LARGEST SCALE CHART	25649, edition 19, 20030800, 1: 10,000
ADDITIONAL CHARTS	N/A
PRE-COMPILER	Wesley Kitt

Source Grids	File Location & Name
	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\SAR Final Products\GRIDS\W00212_Uncertainty_50cm_Final.csar
Surfaces	File Location & Name
<i>Combined</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\SAR Final Products\GRIDS\W00212_Uncertainty_50cm_Final.csar
<i>Interpolated TIN</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\Interpolated TIN\W00212_1m_InterpTIN.csar
<i>Shifted Interpolated TIN</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\Interpolated TIN\Shifted Surface\W00212_1m_InterpTIN_Shifted_ft.csar
Final HOBs	File Location & Name
<i>Survey Scale Soundings</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\W00212_SS.hob
<i>Chart Scale Soundings</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\W00212_CS.hob
<i>Contour Layer</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\W00212_Contours.hob
<i>Feature Layer</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\W00212_Features.hob
<i>Meta-Objects Layer</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\MetaObjects.hob
<i>Blue Notes</i>	T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\HOB's\W00212_Bluenotes.hob
<i>ENC Retain Soundings</i>	N/A

SPECIFICATIONS:

- I. COMBINED SURFACE:
 - a. Number of ESAR Final Grids: 1
 - b. Resolution: 50 cm

- II. SURVEY SCALE SOUNDINGS (SS):
 - a. Radius
 - b. Shoal biased
 - c. Use Single-Defined Radius (mm at Map Scale): 1:10,000 ; Radius Value = 1
 - d. Queried Depth of All Soundings
 - i. Minimum: 2.5 m
 - ii. Maximum: 19.5 m

- III. INTERPOLATED TIN SURFACE:
 - a. Resolution (m): 50cm

[Type text]

This Document is for Office Process use only and is intended to supplement, not supersede or replace, information/recommendations in the Descriptive or Evaluation Reports

- b. Natural Neighbor
- c. Shifted value: -0.75 ft

IV. CONTOURS:

- a. Use a Depth List: T:\SAR\W00212-OSD-ARC-10\AHB_W00212-ARC-10\AHB_W00212\COMPILE\Working\Reference\W00212_NOAA_depth_curves_list.txt
- b. Line Object: DEPCNT
- c. Value Attribute: VALDCO

V. FEATURES:

- a. Total Number of Features: 7
- b. Number of Insignificant Features: 5

VI. CHART SURVEY SOUNDINGS (CS):

- a. Number of ENC CS Soundings: N/A
- b. Radius
- c. Shoal biased
- d. Use Single-Defined Radius: m on the ground
 - i. Radius Value (m): 120
 - ii. Or use a Sounding Space Range Table (if applicable): N/A
- e. Filter: Interpolated != 1
- f. Number Survey CS Soundings: 68

VII. Notes:

**ATLANTIC HYDROGRAPHIC BRANCH
H-CELL REPORT to ACCOMPANY
SURVEY W00212 (2010)**

This H-Cell Report has been written to supplement and/or clarify the original Descriptive Report and Data Acquisition and Processing Report (DAPR) and pass critical compilation information to the cartographers in the Marine Chart Division.

B. DATA ACQUISITION AND PROCESSING

B.1 DATA PROCESSING

The following software was used to process data at the Atlantic Hydrographic Branch:

CARIS Bathy Manager version 2.3, HF 16
CARIS S-57 Composer version 2.1, HF 4
CARIS HOM version 3.3, SP3, HF 8
dKart Inspector 5.0

B.2 QUALITY CONTROL

B.2.1 H-Cell

The AHB source depth grid for the survey's nautical chart update product was a Shoal layer 50cm resolution Uncertainty surface (*.CSAR) originally created from the submitted Hysweep HS2 files from the field. The survey scale soundings were created from the surface at a single defined radius of one millimeter (at chart scale) for the 1:10,000 chart scale. A TIN was created from the survey scale soundings, from which an interpolated surface was generated. The chart scale soundings were selected from the filtered interpolated surface using a single defined radius at the 10,000 chart scale. The chart scale soundings are a subset of the survey scale soundings. The surface model was referenced when selecting the chart scale soundings, to ensure that the selected soundings portrayed the bathymetry within the common area.

Depth contours were created from a shifted interpolated TIN surface of 1m resolution (shifted value of -0.75 ft) for the contours in feet (12, 18, 30, and 60 feet). The depth contours are forwarded to MCD for reference only. The contours were utilized during chart scale sounding selection and quality assurance efforts at AHB. The depth contours are incorporated into the SS H-Cell product as per 2009 H-Cell Specifications.

The pre-compilation products or components (Stand Alone *.HOB files, or SAHOB) are detailed in the W00212 Compile Log attached at the end of this document. The SAHOB files

included depth areas (DEPARE), depth contours (DEPCNT), soundings (SOUNDG), meta-objects (M_QUAL, M_COVR), and cartographic Blue Notes (\$CSYMB).

As dictated by Hydrographic Technical Directive 2008-8, these SAHOB files were combined into two separate files in S-57 format. Both S-57 files were processed in CARIS HOM to convert the metric units to feet/fathoms and feet. The final products are two S-57 files, in Lat/Long NAD-83. One S-57 file contains the chart scale soundings, the meta-objects, and the Blue Notes (W00212_CS.000), and the other S-57 file contains the depth contours and the survey scale soundings (W00212_SS.000). Finally, quality assurance and bathymetry checks were made utilizing dKart Inspector 5.0 validation.

W00212 CARIS H-Cell final deliverables include the following products:

W00212_CS.000	1:10,000 Scale	W00212 H-Cell with chart scale soundings, meta-objects, features, etc.
W00212_SS.000	1:10,000 Scale	W00212 H-Cell with survey scale soundings and depth contours

C. VERTICAL AND HORIZONTAL CONTROL

The OSD-ARC-10 Horizontal and Vertical Control Report (HVCR) was not submitted with survey W00212.

Final water levels were applied for tide correction.

Horizontal control used for this survey during data acquisition is based upon the North American Datum of 1983 (NAD83), UTM Projection Zone 20 North.

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON **25649 (19th Edition, Aug/03)**

Saint Thomas Harbor
Corrected through NM 8/9/2003
Corrected through LNM 7/29/2003
Scale 1:10,000

ENC Comparison **US5PR21M**

Saint Thomas Harbor
Edition 6
Application Date 2010/03/01
Issue Date 2010/03/01
Chart 25649

D.1.1 Dangers to Navigation

There were no Dangers to Navigation reported for survey W00212.

D.1.2 Charted Depths and Features

No AWOIS items were assigned. Please see Appendix II for recommendations concerning charted and uncharted features.

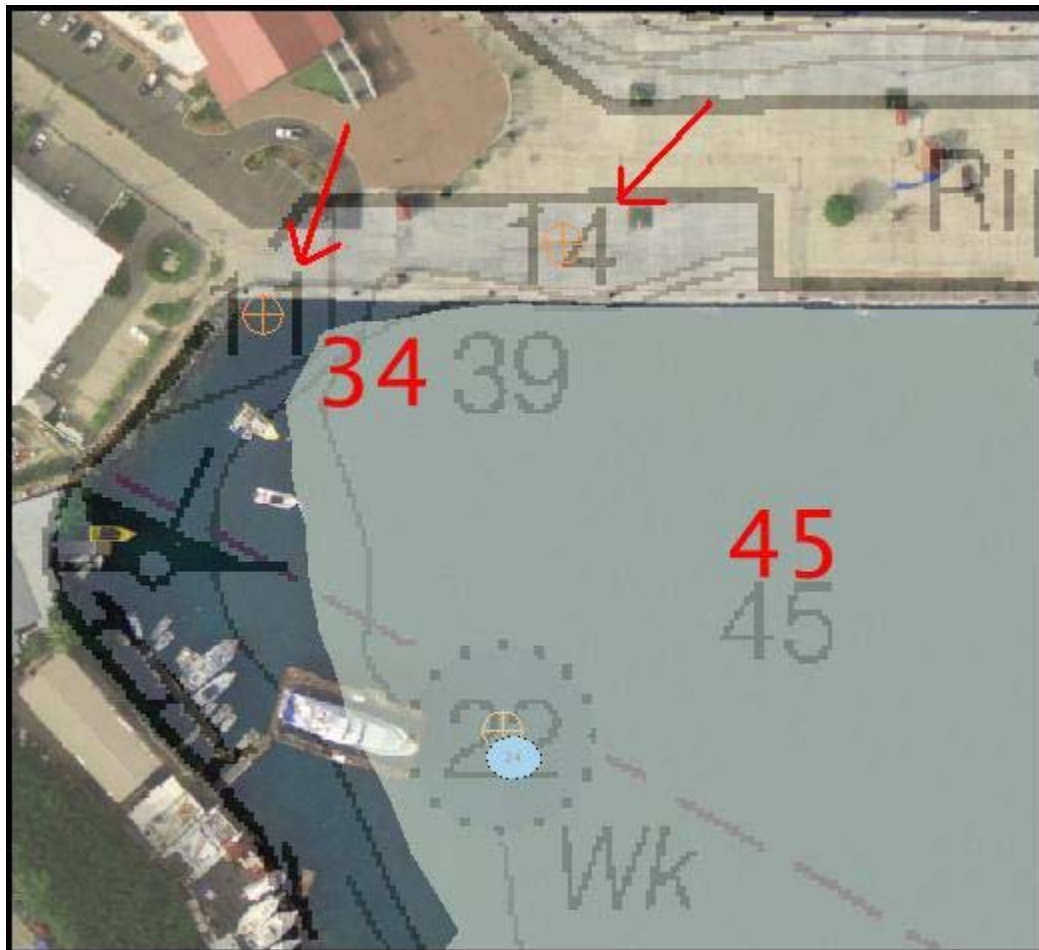
D.1.3 Detailed Chart Comparison

The charted hydrography originates with prior surveys and requires no further consideration. The hydrographer recommends retaining all seabed characteristic point features as charted and brought into the H-Cell from the ENC.

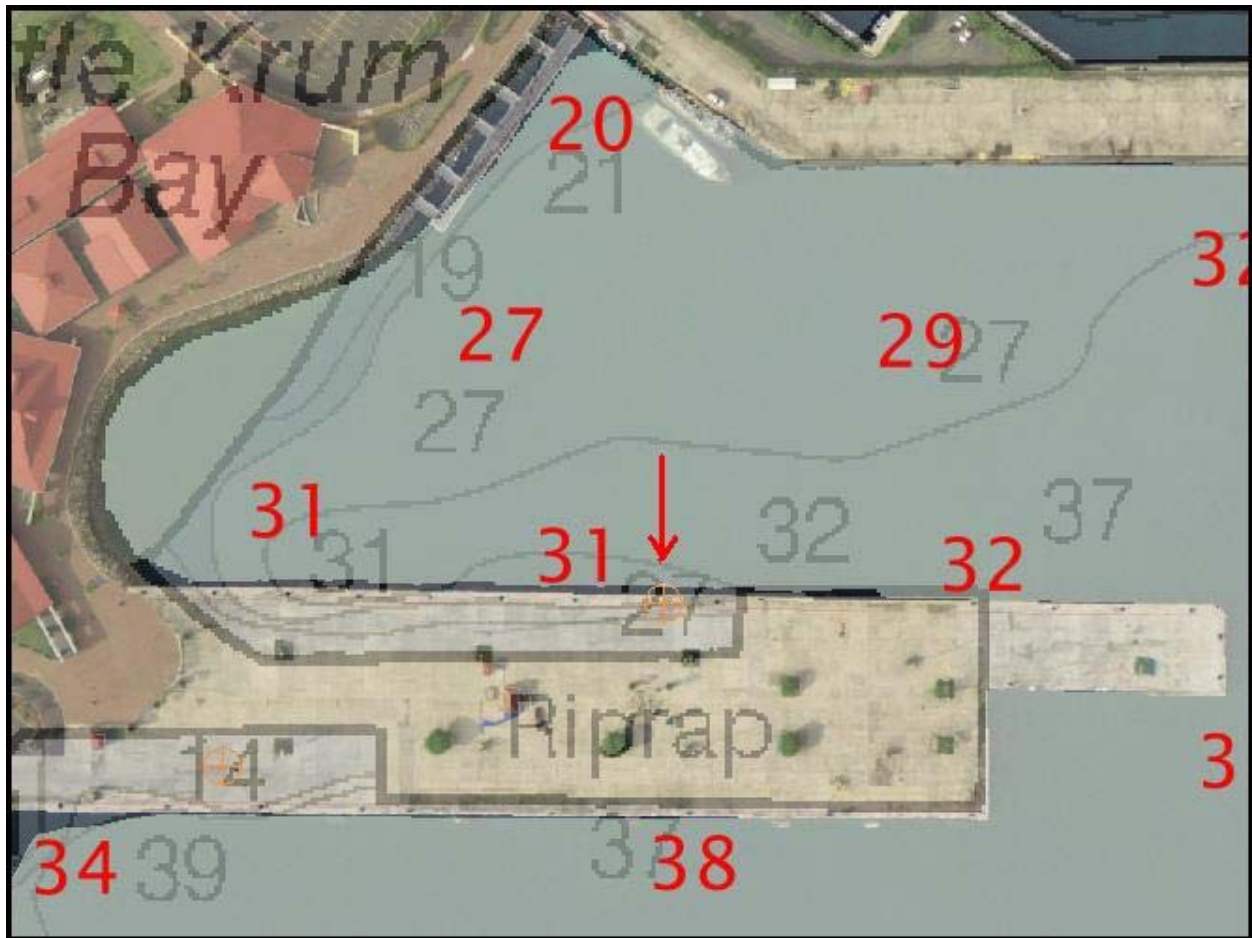
Please refer to the following image. A “13” at 18°20’09.01”N, 064°56’49.76”W was selected because of its critical nature. Vessels such as small container ships and ferries often butt up against the sea wall stern to as seen in the ortho image.



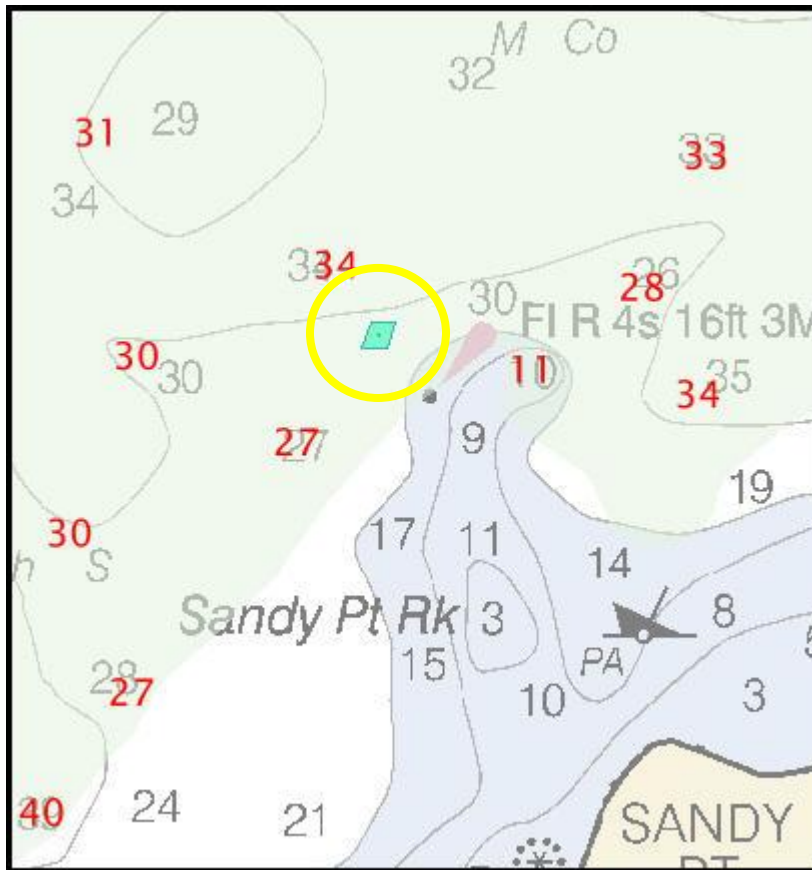
As seen in the following image: A charted 11-ft and 14-ft are recommended for removal and are included in the H-Cell bluenotes. They have been obscured by new shoreline construction.



As seen in the following image: A charted 27-ft is recommended for removal and is included in the H-Cell bluenotes. It has been obscured by new shoreline construction.



A red buoy is currently on station at 18°19'52.78"N, 064°56'52.93"W. We are currently awaiting on up-to-date characteristic information. It is currently believed that the buoy in question will eventually replace the fixed aid just to the southeast.



D.3 MISCELLANEOUS

Chart compilation was completed by Atlantic Hydrographic Branch personnel in Norfolk, Virginia. Compilation data will be forwarded to the Marine Chart Division in Silver Spring, Maryland. See Section D.1 of this report for a list of the Raster Charts and Electronic Navigation Charts (ENC) used for compiling the present survey.

D.4 ADEQUACY OF SURVEY

The present survey is adequate to supersede the charted bathymetry within the common area. Any features not specifically addressed either in the H-Cell files or the Blue Notes should be retained as charted. Refer to the Descriptive Report for further recommendations by the hydrographer.

APPROVAL SHEET
W00212

Initial Approvals:

The completed survey has been inspected with regard to survey coverage, delineation of depth contours, disposition of critical depths, cartographic symbolization, and verification or disproof of charted data. All revisions and additions made to the H-Cell files during survey processing have been entered in the digital data for this survey. The survey records and digital data comply with National Ocean Service and Office of Coast Survey requirements except where noted in the Descriptive Report and the H-Cell Report.

All final products have undergone a comprehensive review per the Hydrographic Surveys Division Office Processing Manual and are verified to be accurate and complete except where noted.

Wesley G Kitt
Physical Scientist
Atlantic Hydrographic Branch

I have reviewed the H-Cell files, accompanying data, and reports. This survey and accompanying Marine Chart Division deliverables meet National Ocean Service requirements and standards for products in support of nautical charting except where noted.

Approved: _____
Richard T. Brennan
Lieutenant Commander, NOAA
Chief, Atlantic Hydrographic Branch