F00596

NOAA FORM 76-35A

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

DESCRIPTIVE REPORT

Type of Survey Hydrographic Survey

Field No. N/A

Registry No. F00596

LOCALITY

State New York

General Locality Hudson River

Sublocality South of Stockport Middle Ground

2010

CHIEF OF PARTY

Nicholas A. Forfinski

LIBRARY & ARCHIVES

DATE

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

HYDROGRAPHIC TITLE SHEET

REGISTRY No

F00596

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: N/A

State New York

General Locality Hudson River

Sub-Locality South of Stockport Middle Ground

Scale 1:10,000 **Date of Survey** 11/26/2010

Instructions dated 10/22/2010 **Project No.** S-B916-NRT5-10

Vessel S3002 (NOAA NRT-5)

Chief of party Nicholas A. Forfinski

Surveyed by NOAA Navigation Response Team 5 Personnel

Soundings by Kongsberg EM 3002 multibeam echosounder

SAR by Tyanne Faulkes Compilation by Martha Herzog

Soundings compiled in Feet

REMARKS: All times are UTC. UTM Zone 18

The purpose of this survey is 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. The processing branch concurs with all information and recomendations in the DR unless otherwise noted. Page numbering may be interrupted or non sequential.

All pertinent records for this survey, including the Descriptive Report, are archived at the National Geophysical Data Center (NGDC) and can be retrieved via http://www.ngdc.noaa.gov/.

DESCRIPTIVE REPORT

to accompany
HYDROGRAPHIC SURVEY F00596

Scale of Survey: 1:10,000
Year of Survey: 2010
NOAA Navigation Response Team 5
Nicholas A. Forfinski, Team Lead

A. AREA SURVEYED

The purpose of project S-B916-NRT5-10, which was requested by the NOAA Coastal Services Center (CSC), was to provide a contemporary multibeam echosounder (MBES) survey for comparison with prior surveys. F00596 covered an area of approximately 0.05 nm^2, south of Stockport Middle Ground, on the Hudson River, near Coxsackie, NY.[1]

The chart datum in the area is a non-tidal dredge datum maintained by the U.S. Army Corps of Engineers. The chart datum (Hudson River Datum, or HRD) is defined to be 1 foot (0.305 m) below "mean sea level" (NGVD29).

Although not required by the project instructions, the very small survey was processed twice – once reducing the bathymetry data to chart datum via conventional water level corrections and once reducing the bathymetry to chart datum via an ellipsoid separation model (see section C.1 for more details). The bathymetry data were processed both ways because key interests in the underlying CSC project are the relationships among the various vertical data in the area, including NAVD88, GRS80, and HRD. Each dataset was processed as a separate Caris HIPS project, with different HVFs (HIPS vessel files) (see Tab. 1). See section B.2.1 for a discussion of the differences between the HVF used with the conventional dataset and the HVF used with the ERS dataset.

Table 1: F00596 Datasets

Project	***HVF***	***Description***
F00596	NRT5_S3002_EM3002_MBES	Bathymetry processed using conventional water-level reducers
F00596_ERS	NRT5_S3002_EM3002_MBES_ERS	Bathymetry processed using ellipsoid separation model

HYDROGRAPHER RECOMMENDATION: The hydrographer recommends that chart compilation be based on the bathymetry reduced via the ellipsoid separation model because its vertical uncertainty is noticeably less than the vertical uncertainty of the traditional reduction method.[2] A comparison of the two datasets revealed a likely bias in the tide-zoning used in the conventional reduction method. See section C.1 for more details.

In support of the underlying CSC project, the inshore limit of hydrography was not the conventional 4-m curve, but as close to the 0-meter curve as the chief-of-party deemed safe. See Figure 1 on the following page for the survey limits, and see Table 2 for a summary of acquisition statistics.

Table 2: Acquisition Summary Statistics

	Ellipsoid-referenced survey
Mainscheme single beam sonar only	0 nm
Mainscheme side scan sonar only	0 nm
Mainscheme multibeam sonar only	6.4 nm
Mainscheme single beam sonar/side scan sonar	0 nm
Crosslines (single beam/multibeam)	0 nm/0 nm
Developments (single beam/multibeam)	0 nm/0 nm
Shoreline/nearshore investigation	0 nm
# of bottom samples	0
# of items requiring additional effort	0
Total square nautical miles	0.043
Dates of data acquisition	11/26/10

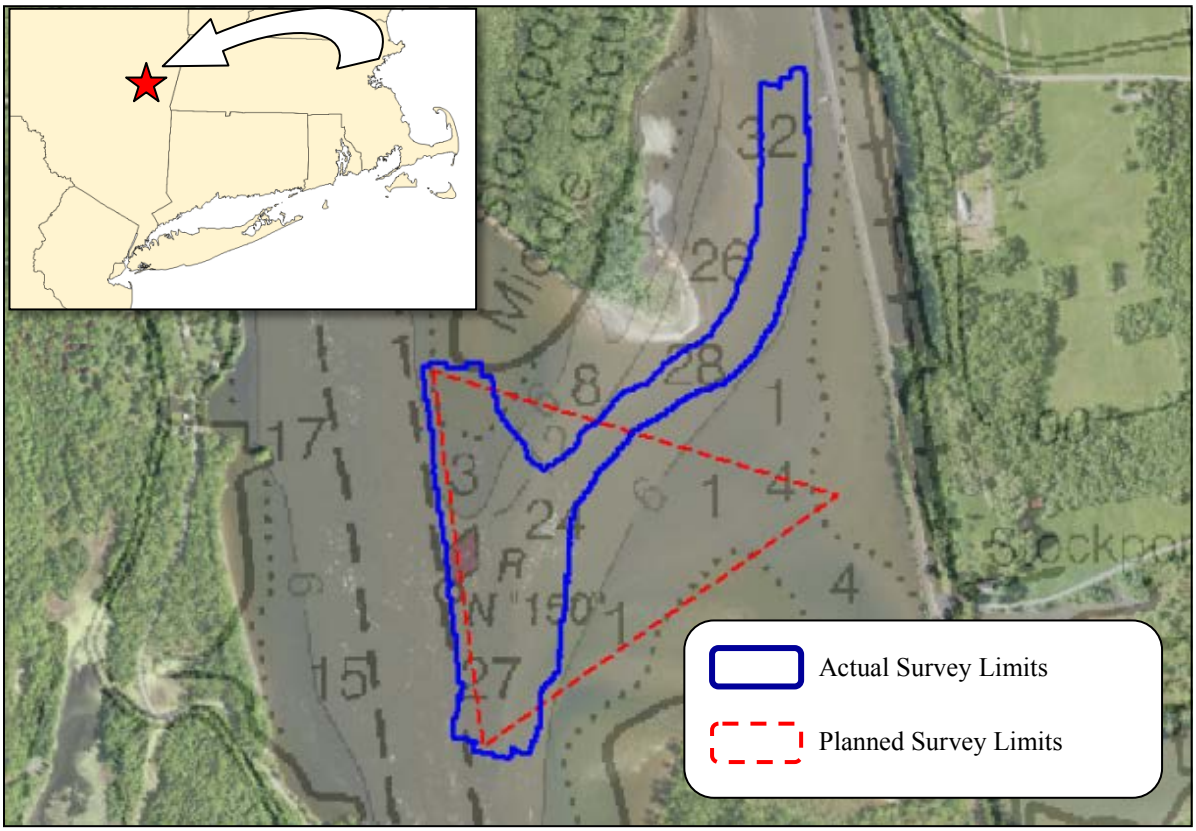


Figure 1: F00596 Survey Area

B. DATA ACQUISITION AND PROCESSING

B.1 EQUIPMENT

Data were acquired by NOAA S3002 (NRT-5). NOAA Survey Vessel S3002 is a 9.8-m (overall) aluminum SeaArk outboard-driven vessel with a nominal multibeam transducer draft of 0.6 meters. Mainscheme bathymetry data were acquired with a Kongsberg EM 3002 multibeam echosounder. Pseudo-side-scan data were acquired for general reference, but the data were not routinely processed or included as a deliverable. Positioning and attitude were determined with a TSS POS/MV 320 (version 4) GPS aided inertial navigation system. Refer to the Data Acquisition and Processing Report (DAPR) for a detailed description of the equipment used.

B.2 QUALITY CONTROL

B.2.1 Multibeam Echosounder Quality Control

There were no faults with the MBES system which adversely effected data integrity. Refer to the DAPR for a detailed discussion of MBES system calibrations, data acquisition, and data processing.

Hysweep Hardware EM3002 Device Configuration

One particular acquisition setting to note is the "Use Combined Heave/Draft" option for the EM3002 device driver in Hysweep Hardware. This option was unchecked during data acquisition, which meant that the depths logged by Hypack were relative to the transducer, i.e., the logged depths did not include the sonar "draft" (the sum of the transducer z offset and waterline value) and heave.

Conventional HVF v. ERS HVF

The difference between the conventional HVF and the ERS HVF was in the application of dynamic draft and waterline and the modeling of component uncertainties (see section B.2.2). The dynamic draft and waterline values are accounted for in the conventional HVF but not in the ERS HVF. In the case of the ERS dataset, the vertical offsets due to dynamic draft and waterline are inherent in the reference-point ellipsoid heights.

Total Propagated Uncertainty

Total propagated uncertainty (TPU) values for F00596 are shown in Table 3. Note the different values for loading, dynamic draft, and static draft (water level). These values are 0 because the vertical offsets due to dynamic draft and waterline are inherent in the reference-point ellipsoid heights. See section C.1 for a more detailed discussion of the vertical uncertainties associated with tide zoning and the ellipsoid/chart-datum separation.

Table 3: Total Propagated Uncertainty Values

	TPU Parameter	Conventional-HVF Value	ERS-HVF Value
HVF	Motion Gyro (deg)	0.02	0.02
	Heave % Amplitude	5%	5%
	Heave (m)	0.01	0.01
	Roll & Pitch (deg)	0.02	0.02
	Position Nav. (m)	0.01	0.01
	Timing (s)	0.01	0.01
	X, Y, & Z Offset (m)	0.001	0.001
	Vessel Speed (m/s)	0.03	0.03
	Loading (m)	**0.005**	**0**
	Dynamic Draft (m)	**0.03**	**0**
	Static Draft (m)	**0.02**	**0**
	MRU gyro (deg)	0.2	0.2
	MRU Roll/Pitch (deg)	0.05	0.05
TPU	Tide – Measured	0.01	0
	Tide – Zoning	0.45	0.054*
	Sound Speed – Measured	1	1
	Sound Speed – Surface	0.5	0.5

**See section C.1.2*

Comparing Dataset Uncertainties

As seen in Figure 7, the distributions of uncertainties for each dataset (as calculated using the Caris HIPS total-propagated-uncertainty model populated with the uncertainties in Table 3) are noticeably different. The difference in uncertainties is mainly a result of the different tide TPU values used for each dataset. The different static draft, dynamic draft, and loading TPU values also have an effect. The conventional dataset does not meet NOS hydrographic survey specifications for vertical uncertainty. See section C.1 for a detailed discussion of the vertical uncertainties associated with each dataset.

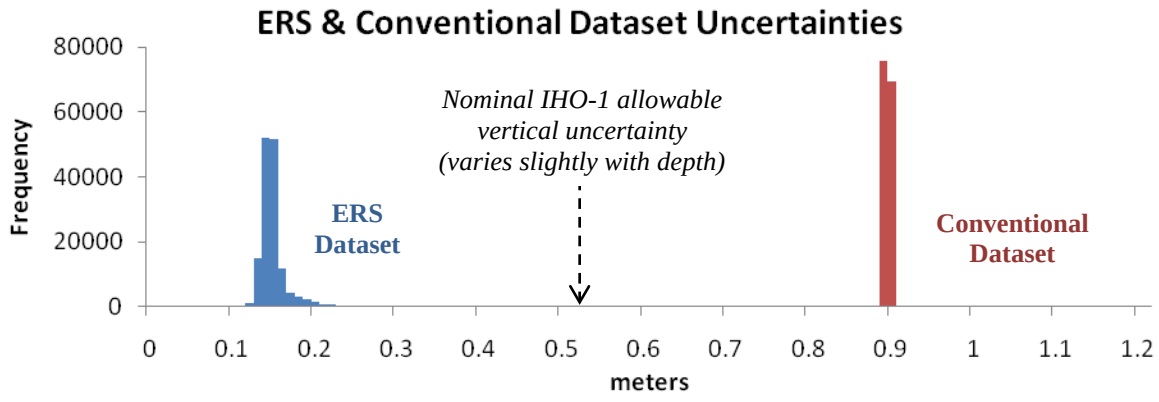


Figure 2: Conventional & ERS Dataset Vertical Uncertainties

B.2.5 Fieldsheets and Navigation Surfaces

Caris CUBE surfaces were created for this project. The surfaces were created at 1-m resolution. Table 4 lists all surfaces and mosaics submitted with this survey.

Table 4: Bathymetry surfaces[3]

Fieldsheet	Surface/Mosaic Name	Grid Type	Resolution
F00596	F00596_MBES_CUBE_1m	Source CUBE	1 m
	F00596_MBES_CUBE_1m_Final	Finalized CUBE	1 m
	F00596_MBES_CUBE_1m_ERS	Source CUBE	1 m
	F00596_MBES_CUBE_1m_ERS_Final	Finalized CUBE	1 m

B.2.6 Crosslines

No crosslines were acquired for this very small field examination; however, the data show excellent internal consistency in areas of overlapping lines.[4]

B.2.7 Junctions

F00596 has no junction surveys.

B.3 CORRECTIONS TO ECHO SOUNDING

All sound-speed, vessel (static and dynamic), and patch test correctors were applied as described in the DAPR, except as described in section B.2.1.

C. VERTICAL AND HORIZONTAL CONTROL

The vertical and horizontal control for F00596 was significantly different from the process documented in the DAPR. Unlike the conventional processing scheme, the horizontal control for each dataset was based on a PPK solution (rather than a DGPS solution). For the ERS dataset, both the horizontal and vertical PPK solutions were applied.

C.1 VERTICAL CONTROL

The survey was processed twice – once reducing the bathymetry data to chart datum via conventional water level corrections and once reducing the bathymetry to chart datum via an ellipsoid separation model.

C.1.1 Conventional Dataset

The operating National Water Level Observation Network (NWLON) station at The Battery, NY, (851-8750) served as datum control for the survey area. A Request for Approved Tides (included in Appendix IV) was sent to N/OPS1 on 12/3/10. The original final tide note (included in Appendix IV) was received on 12/21/10. A revised final tide note (also included in Appendix IV), clarifying the application of the NGVD29-to-HRD separation, was received on 4/29/11.[5]

As per the revised final tide note, 1.511 meters was subtracted from the station-datum data to reduce the water-level data to NGVD29 (see Fig. 3). Zoning was then applied to the bathymetry to reduce the depths to NGVD29. Comprised of a single time corrector (456 minutes) and a single range corrector (0.87), the zoning model predicts the NGVD29 water level in the survey area (the dotted dark blue line in Fig. 3) based on the observed NGVD29 water level at The Battery gauge. In turn, the bathymetry was reduced to HRD, which is 0.305 m below NGVD29 (in the survey area). See Figure 3 for a schematic summarizing the relationships among the various vertical data.

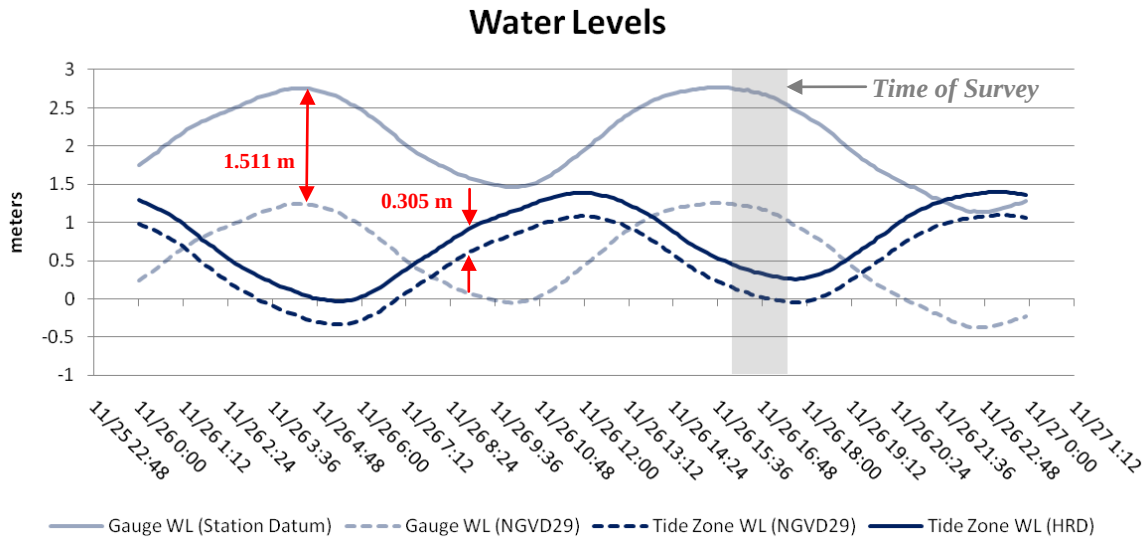


Figure 3: Gauge and Zone Water Levels

Because Caris HIPS does not have a specific function to apply a datum-to-datum shift (e.g., NGVD29 to HRD) to the sounding data, the NGVD29-to-HRD separation value was incorporated into the waterline sensor in the HVF (HIPS vessel file). Instead of 0.052 m (the measured vertical distance from the RP to the water surface) value for the waterline, 0.253 m (0.305 m – 0.052 m) was used.

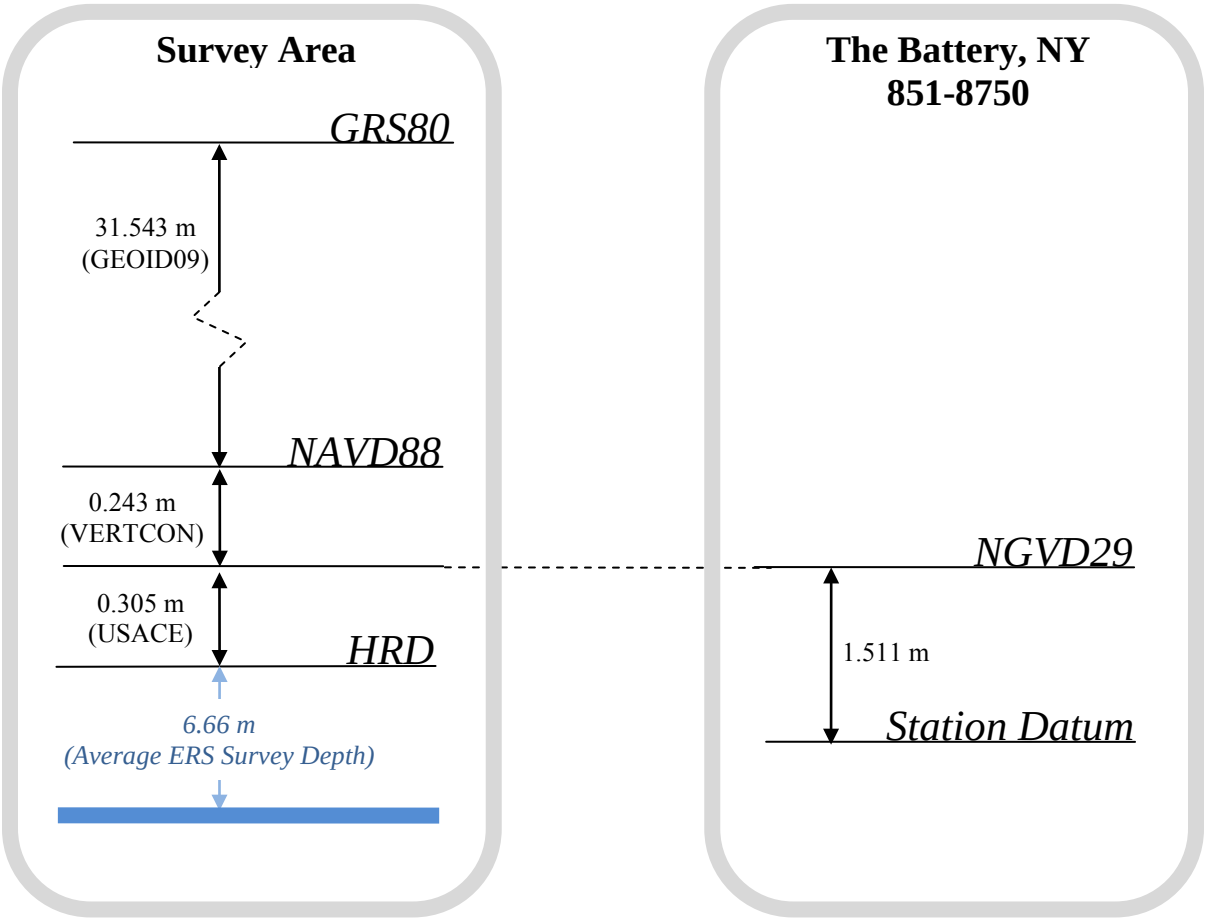


Figure 4: Vertical Data Relationships (not drawn to vertical scale)

Conventional Water-Level Uncertainty

The tide uncertainty for the F00596 is approximately 0.45 m (see the additional correspondence from CO-OPS in Appendix V). This 0.45-m value includes the tidal zoning error, tidal datum error, measurement error, and data processing error. The relatively large tide error results from the survey area being >100 miles from *The Battery* and *Albany* water level gauges. Additionally, the zoning is based on historical data from 1930 to 1932.

C.1.2 Ellipsoidally Referenced Dataset

Vertical control for the ellipsoid-referenced survey was based on the vertical PPK solution and the GPS-tide functionality in Caris HIPS. Summarized, the ellipsoid height of the vessel reference point was combined with the observed depths and the ellipsoid-to-chart-datum separation value to reduce survey depths to chart datum (see Fig. 4). The details of the processing workflow were as per the NOAA HSD (Hydrographic Surveys Division) ERS single-base-station standard operating procedure (included as an appendix to the DAPR).

The Caris HIPS *Compute GPS Tide* function was performed with a single sounding datum offset of 32.091 m, the sum of the GEIOD09, VERTCON, and NGVD29-HRD separation values at the position 42° 18.7'N, 73° 46.78'W. The GRS80-NAVD88 separation value was obtained from the interactive NGS GEOID09 website (http://www.ngs.noaa.gov/cgi-bin/GEOID_STUFF/geoid09_prompt1.prl). The NAVD88-NGVD29 separation value was obtained from the interactive NGS VERTCON website (http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl). The NGVD29-HRD separation value was obtained from the revised final tide note, included in Appendix IV.

Datum-Separation Uncertainty

The GRS80-to-NGVD29 separation uncertainty value used for F00596 was 0.064 m. This value was obtained by taking the square root of the sum of the squares of the component transformation uncertainties as per the NOAA VDatum model (see Tab. 5).

Table 5: VDatum Transformation Uncertainties

Transformation	***Uncertainty (m)***
NAD83 (GRS80 ellipsoid) to NAVD88	0.05
NAVD88 to NGVD29	0.02

C.1.3 Comparison between Conventional and ERS Datasets

A preliminary comparison between the conventional water-level data and concurrently acquired "GPS tide" data revealed a bias that is attributed to the relatively large uncertainty of the tide zone model.

The ellipsoid height of the vessel reference point (RP) (see Fig. 4) is a very rough approximation of the ellipsoid height of the changing water level because the RP is close (within centimeters) to the water surface. Factors contributing to the vertical difference between the RP and the water surface include the static water-level offset and dynamic draft.

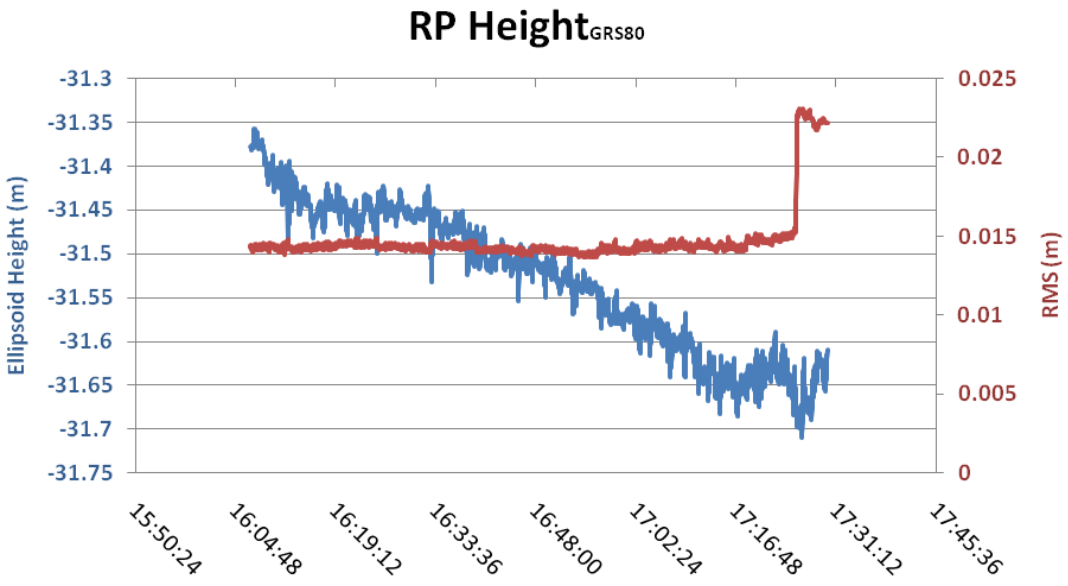


Figure 5: RP Ellipsoid Height (GRS80)

Ignoring certain rigorous fine-scale geodetic relationships among GEOID09, GRS890, and NGVD29, the difference between RP Height$_{GRS80}$ and the GRS80-to-NGVD29 separation should generally match the water level as predicted by the tide zone definition file, which is with regard to NGVD29; however, a bias exists between the two data series (see Fig. 5).

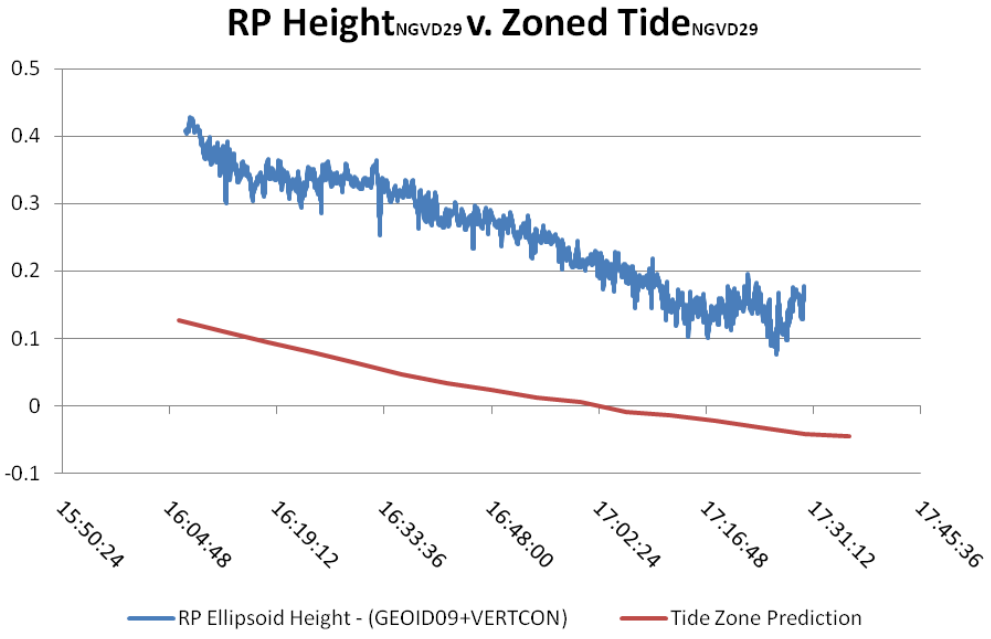


Figure 6: GPS Height$_{NGVD29}$ v. Zoned Tide$_{NGVD29}$

Part of this bias is due to, as previously mentioned, static draft and dynamic draft; however, the difference between the expected zone water level and RP_{NGVD29} is greater than the combined static and dynamic draft values and the corresponding uncertainties. The static draft value applied to the survey data was 0.052 m (with an anecdotal uncertainty of 0.02 m), and the dynamic draft values ranged from -0.05 to -0.01 m (with an anecdotal uncertainty of 0.03 m). The difference between the RP height above NGVD29 and the height of the water level above NGVD29 ranges from approximately 0.1 to 0.3 m.

The bias is also observed in the separation between the conventional and ERS bathymetric datasets (see Fig. 7). The temporal distribution of the differences between the two bathymetry models supports the claim of a tide zone bias. As seen in Figure 7, the magnitudes of the differences decreased, correspondingly to those shown in Figure 6, as the survey progressed, i.e., as the bias decreased over time, as the water level was changing. The geoid-ellipsoid, NAVD88-NGVD29, and NGVD29-HRD separations were assumed to be constant over the very small survey area. The short-frequency noise in the difference surface is a gridding artifact due to minute horizontal differences in the two source surfaces.

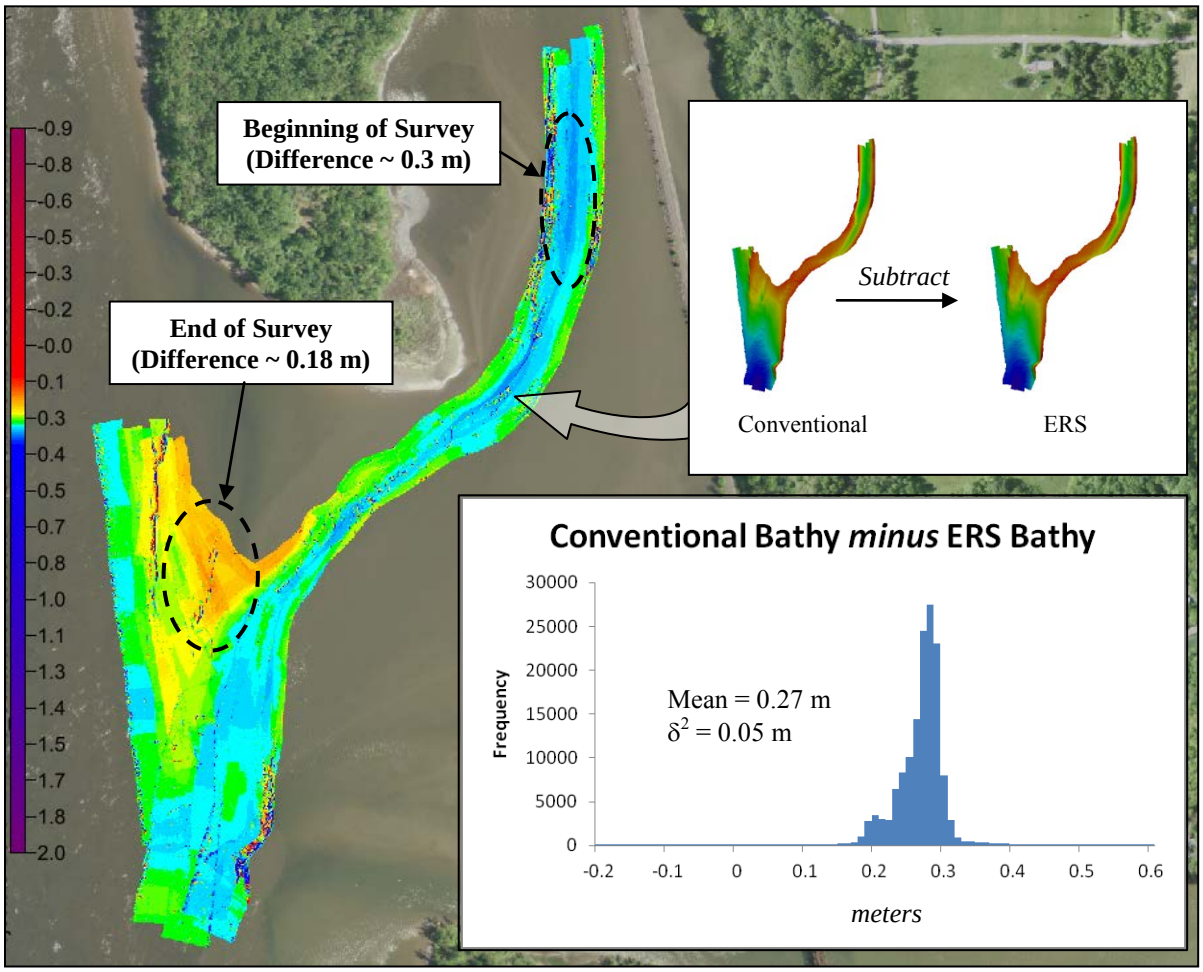


Figure 7: Conventional Bathy minus ERS Bathymetry

C.2 HORIZONTAL CONTROL

The horizontal datum used for both datasets was the North American Datum of 1983 (NAD 83), projected using UTM zone 18. Horizontal control for both datasets was obtained through a post-processed kinematic (PPK) routine using a single CORS station (NYHS). The datasheet for CORS station NYHS is included in Appendix V. The PPK process was as per the NOAA HSD ERS single-base-station standard operating procedure (included as an appendix to the DAPR). Overall, the PPK GPS process resulted in reference-point positional uncertainty on the order of 6-14 mm (see Fig. 8).

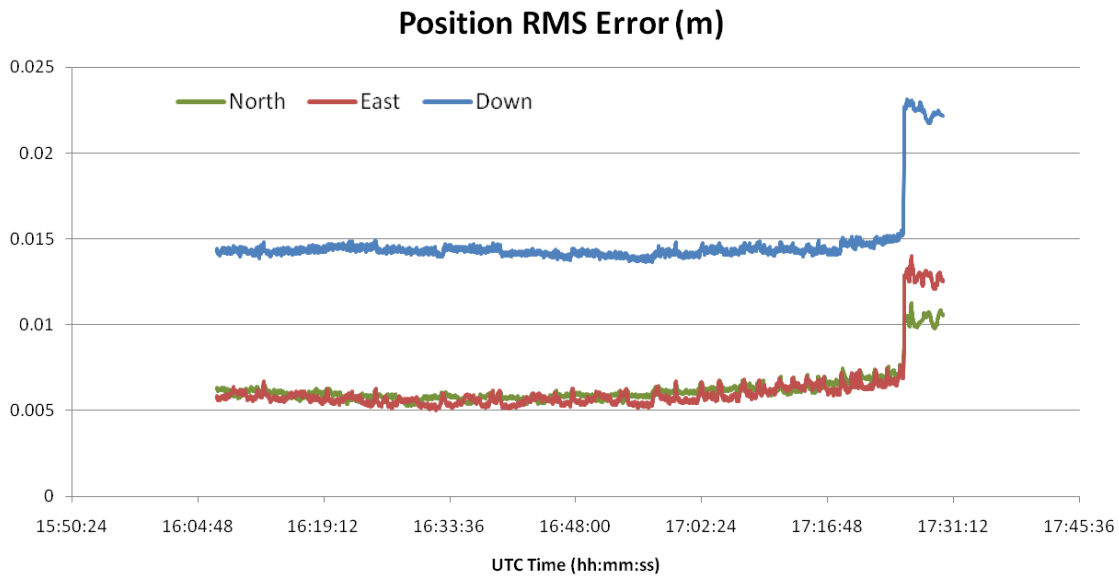


Figure 8: RMS Position Error

D. RESULTS AND RECOMMENDATIONS

D.1 CHART COMPARISON

The following RNCs (raster navigational charts) and ENCs (electronic navigation charts) are affected by F00596:

Table 6: RNCs and ENCs affected by F00596

RNC	Edition	Edition Date	Scale
12348	33	12/23/00	1:40,000

ENC	Edition	Issue Date
US5NY44M	8	7/30/09

D.1.1 General Agreement with Charted soundings

Sounding data generally agreed with charted depths to within 1-2 feet.[6] Navigationally significant differences from charted depths are addressed in Appendix II of this report.[7]

D.1.2 Dangers to Navigation

There were no DToNs submitted for survey F00596.[8]

D.1.3 AWOIS Items

There were no AWOIS (Automated Wreck & Obstruction Information System) items assigned for F00596.

D.1.4 Charted Features

No charted features are addressed by F00596.

D.1.5 Uncharted Features

No uncharted features are addressed by F00596.

D.2 ADDITIONAL RESULTS

D.2.1 Aids to Navigation (AToNs)

No AToNs within the survey limits of F00596 were found to be significantly off station.

D.2.2 Bridges and Overhead Cables

There are no bridges or overhead cables in the survey area.

D.2.3 Submarine Cables and Pipelines

There are no submarine cables or pipelines in the survey area.

E. APPROVAL SHEET

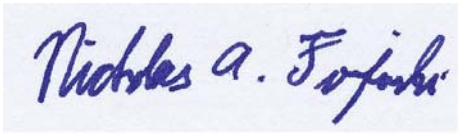
S-B916-NRT5-10
F00596
Hudson River, New York
South of Stockport Middle Ground

Field operations for this survey were conducted under my daily supervision with frequent checks of progress and adequacy. All fieldsheets, bathymetry models, this Descriptive Report, and all accompanying records and data are approved.

The 2010 NRT-5 Data Acquisition and Processing Report (DAPR) is submitted in association with this descriptive report.

This survey is adequate to supersede all prior surveys in common areas and for application to the relevant NOS nautical charts.

Respectfully,



Nicholas A. Forfinski
NRT-5 Team Lead

Revisions Complied During Office Processing and Certification

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[1] F00596 was submitted to the Pacific Hydrographic Branch for review and compilation.
[2] PHB confirmed approval to use ellipsoidally reduced data for HCell compilation and charting with the Hydrographic Surveys Division Chief.
[3] A 1-meter finalized surface (F00596_Office_1m_ERS.csar) was used for compilation of the HCell.
[4] Concur with clarification; HCell is adequate to supersede charted data.
[5] The Final Tide Note is appended to this report.
[6] Do not concur. Significant differences on the order of 5 to 18 feet between the chart and all areas of the survey were found. Chart per F00596_CS.000.
[7] Do not concur. No features were addressed in this survey.
[8] Three DTONs were submitted by PHB and applied to the chart.

F00596 Dangers to Navigation

Registry Number: F00596
State: New York
Locality: Hudson River
Sub-locality: South of Stockport Middle Ground
Project Number: S-B916-NRT5-10
Survey Date: 11/26/2010

Three Dangers to Navigation for F00596.

Charts Affected

Number	Edition	Date	Scale (RNC)	RNC Correction(s)*
12348	34th	06/01/2010	1:40,000 (12348_1)	USCG LNM: 4/19/2011 (5/17/2011) CHS NTM: None (4/29/2011) NGA NTM: None (5/28/2011)
13006	34th	05/01/2007	1:675,000 (13006_1)	[L]NTM: ?
13003	49th	04/01/2007	1:1,200,000 (13003_1)	[L]NTM: ?
14500	27th	10/01/2002	1:1,500,000 (14500_1)	[L]NTM: ?

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

Features

No.	Feature Type	Survey Depth	Survey Latitude	Survey Longitude	AWOIS Item
1.1	Shoal	3.07 m	42° 18' 48.6" N	073° 46' 36.2" W	---
1.2	Shoal	2.48 m	42° 18' 44.4" N	073° 46' 43.0" W	---
1.3	Shoal	2.92 m	42° 18' 40.0" N	073° 46' 44.8" W	---

1 - Danger To Navigation

1.1) Profile/Beam - 2898/23 from f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1607

DANGER TO NAVIGATION

Survey Summary

Survey Position:	42° 18' 48.6" N, 073° 46' 36.2" W
Least Depth:	3.07 m (= 10.06 ft = 1.677 fm = 1 fm 4.06 ft)
TPU (±1.96σ):	**THU (TPEh)** ±0.171 m ; **TVU (TPEv)** ±0.123 m
Timestamp:	2010-330.16:09:07.006 (11/26/2010)
Survey Line:	f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1607
Profile/Beam:	2898/23
Charts Affected:	12348_1, 13006_1, 13003_1, 14500_1

Remarks:

Surveyed 10 ft sounding in the vicinity of 28 ft sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
f00596_ers/nrt5_s3002_em3002_mbes_ers/2010-330/000_1607	2898/23	0.00	000.0	Primary

Hydrographer Recommendations

Chart new sounding.

Cartographically-Rounded Depth (Affected Charts):

10ft (12348_1)

1 ½fm (13006_1, 13003_1, 14500_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	QUASOU - 1:depth known
	SORDAT - 20101126
	SORIND - F00596
	TECSOU - 3:found by multi-beam

Feature Images

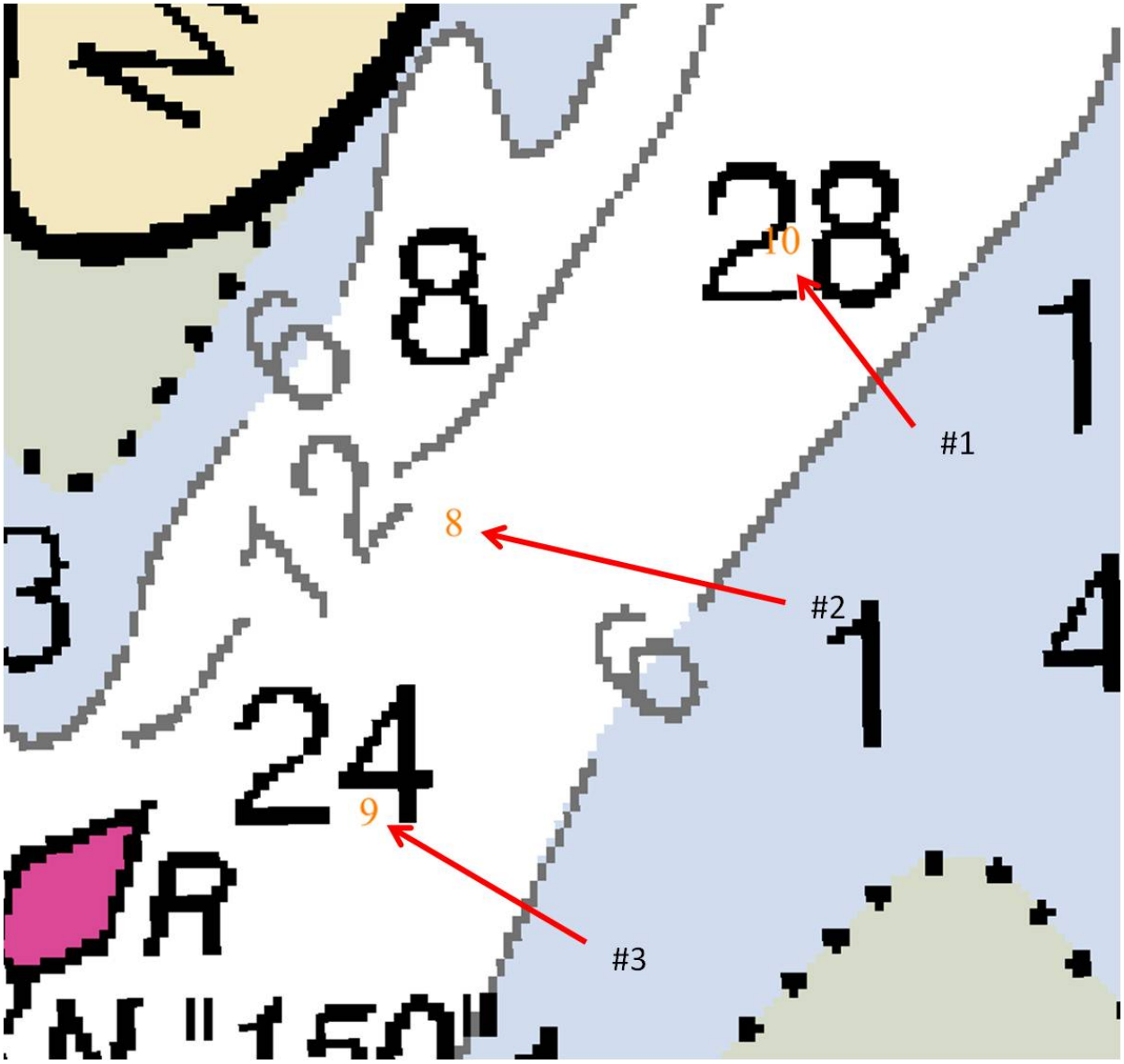


Figure 1.1.1

1.2) Profile/Beam - 4632/161 from f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1607

DANGER TO NAVIGATION

Survey Summary

Survey Position:	42° 18' 44.4" N, 073° 46' 43.0" W
Least Depth:	2.48 m (= 8.13 ft = 1.356 fm = 1 fm 2.13 ft)
TPU (±1.96σ):	**THU (TPEh)** ±0.152 m ; **TVU (TPEv)** ±0.141 m
Timestamp:	2010-330.16:09:56.193 (11/26/2010)
Survey Line:	f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1607
Profile/Beam:	4632/161
Charts Affected:	12348_1, 13006_1, 13003_1, 14500_1

Remarks:

Surveyed 8 ft sounding in the between 24 ft and 28 ft soundings.

Feature Correlation

Address	Feature	Range	Azimuth	Status
f00596_ers/nrt5_s3002_em3002_mbes_ers/2010-330/000_1607	4632/161	0.00	000.0	Primary

Hydrographer Recommendations

Chart new sounding.

Cartographically-Rounded Depth (Affected Charts):

8ft (12348_1)

1 ¼fm (13006_1, 13003_1, 14500_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	QUASOU - 1:depth known
	SORDAT - 20101126
	SORIND - US,US,graph,F00596
	TECSOU - 3:found by multi-beam

Feature Images

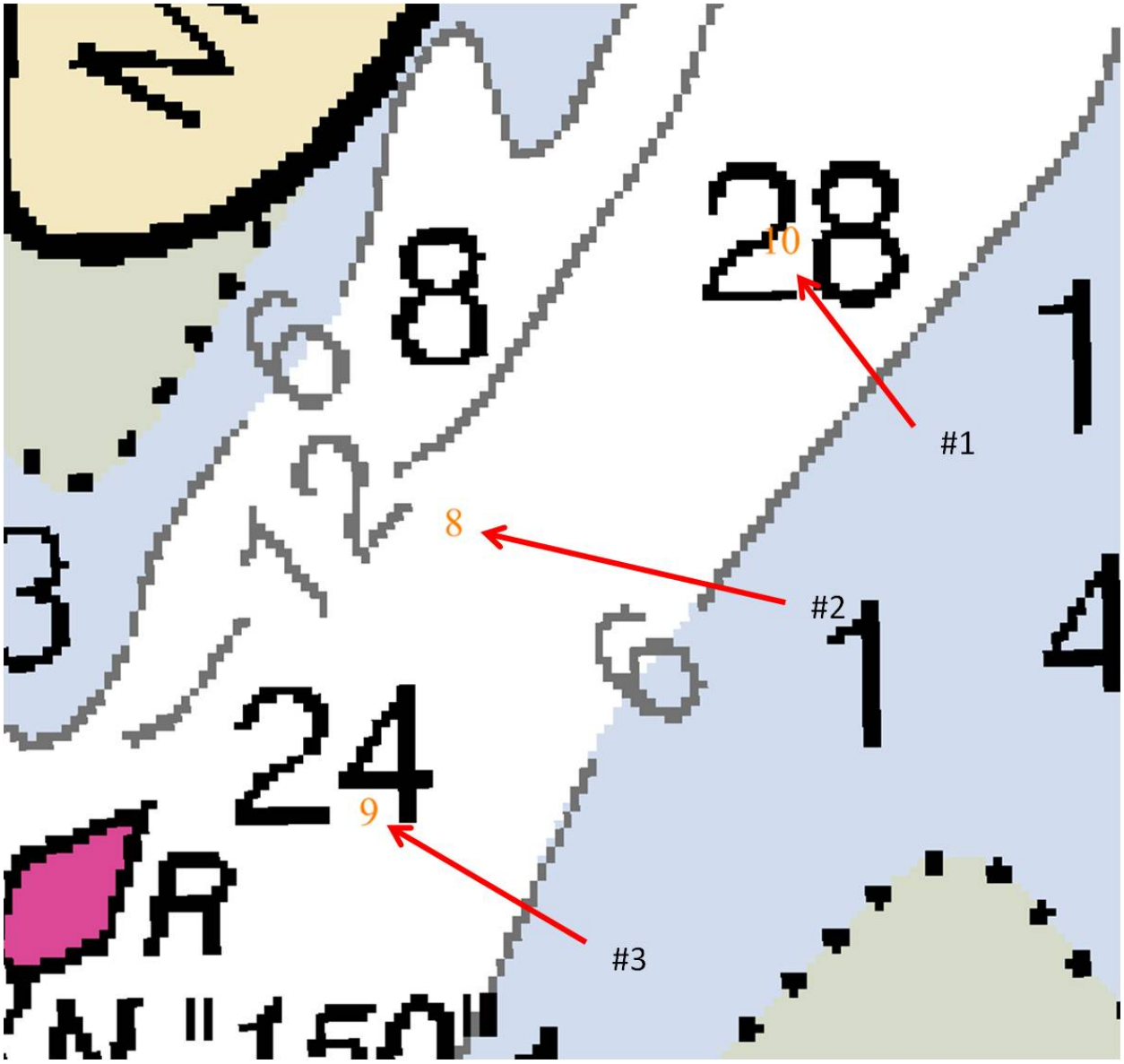


Figure 1.2.1

1.3) Profile/Beam - 7932/3 from f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1648

DANGER TO NAVIGATION

Survey Summary

Survey Position:	42° 18' 40.0" N, 073° 46' 44.8" W
Least Depth:	2.92 m (= 9.58 ft = 1.596 fm = 1 fm 3.58 ft)
TPU (±1.96σ):	**THU (TPEh)** ±0.156 m ; **TVU (TPEv)** ±0.121 m
Timestamp:	2010-330.16:52:16.876 (11/26/2010)
Survey Line:	f00596_ers / nrt5_s3002_em3002_mbes_ers / 2010-330 / 000_1648
Profile/Beam:	7932/3
Charts Affected:	12348_1, 13006_1, 13003_1, 14500_1

Remarks:

Surveyed 9.5 ft sounding in the vicinity of 24 ft sounding.

Feature Correlation

Address	Feature	Range	Azimuth	Status
f00596_ers/nrt5_s3002_em3002_mbes_ers/2010-330/000_1648	7932/3	0.00	000.0	Primary

Hydrographer Recommendations

Chart new sounding.

Cartographically-Rounded Depth (Affected Charts):

9ft (12348_1)

1 ½fm (13006_1, 13003_1, 14500_1)

S-57 Data

Geo object 1:	Sounding (SOUNDG)
Attributes:	QUASOU - 1:depth known
	SORDAT - 20101126
	SORIND - US,US,graph,F00596
	TECSOU - 3:found by multi-beam

Feature Images

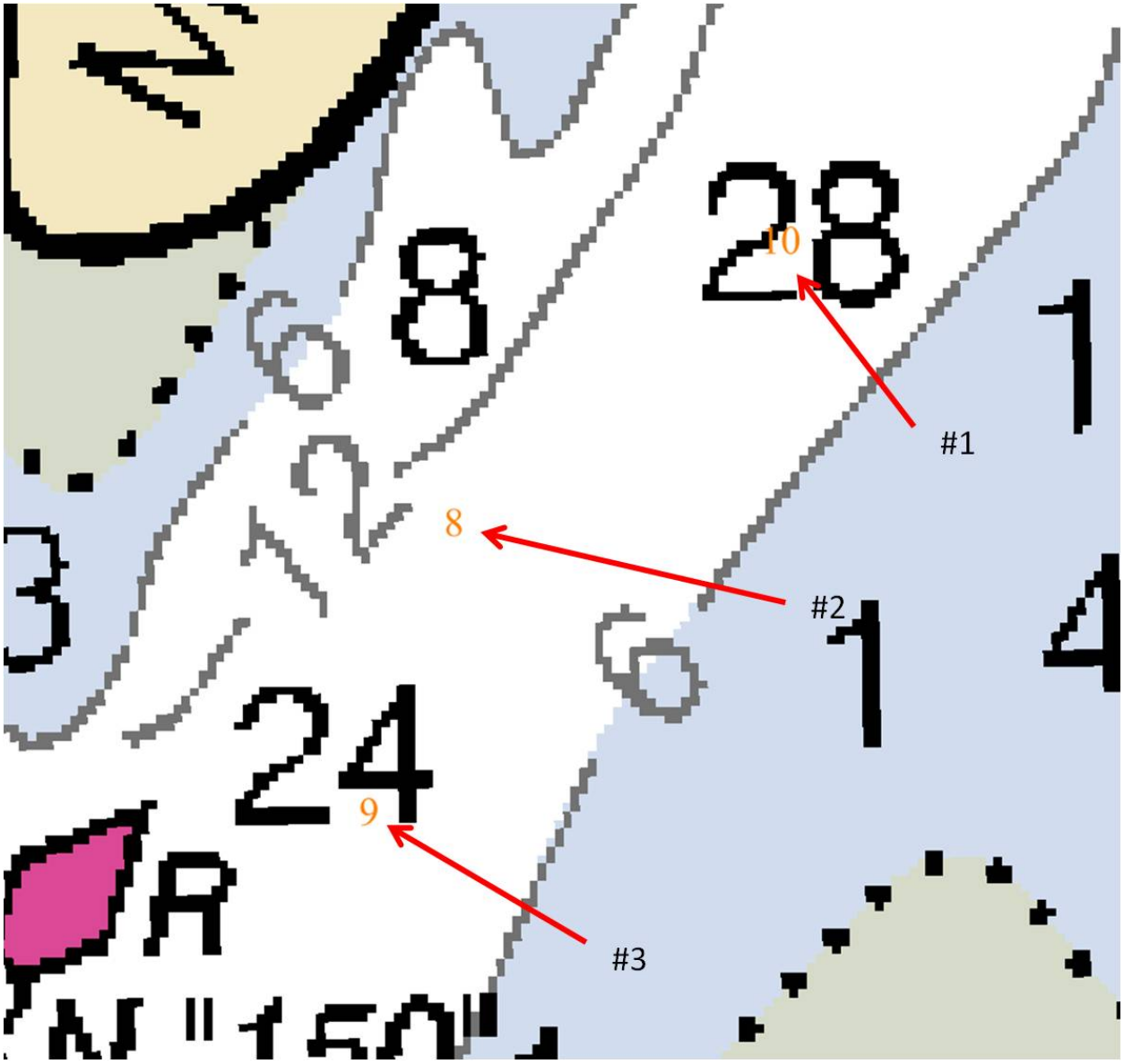


Figure 1.3.1

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

TIDE NOTE FOR HYDROGRAPHIC SURVEY

DATE : December 21, 2010

HYDROGRAPHIC BRANCH: Atlantic
HYDROGRAPHIC PROJECT: S-B916-NRT5-2010
HYDROGRAPHIC SHEET: F00596

LOCALITY: South of Stockport Middle Ground
TIME PERIOD: November 26, 2010

TIDE STATION USED: 851-8750 The Battery, NY
Lat. 40° 42.0'N Long. 74° 0.9' W
PLANE OF REFERENCE (HUNDSON RIVER DATUM): 0.000 meters
HEIGHT OF HIGH WATER ABOVE PLANE OF REFERENCE: 1.239 meters

REMARKS: RECOMMENDED ZONING
Use zone(s) identified as: HR101

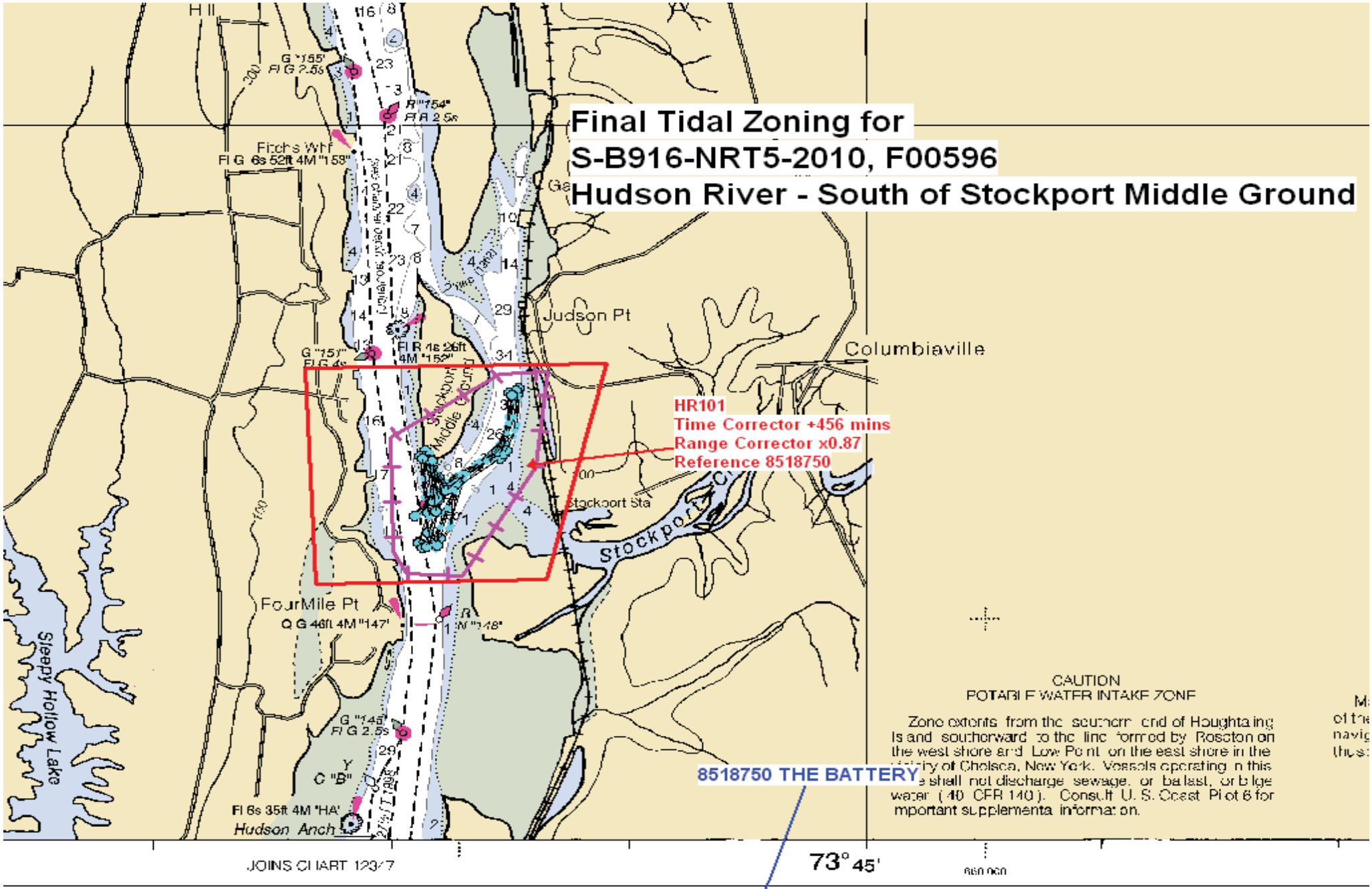
Refer to attachments for zoning information.

Note 1: Retrieve the verified six-minute water level data relative to Station Datum in metric units on Greenwich Mean Time from CO-OPS. Subtract 1.511 m to the retrieved water level to obtain water level data relative to NGVD29. Apply the zone correctors to the verified data to reduce the collected bathymetry data to NGVD29. Hudson River Datum (HRD) is 0.305m below NGVD29 at the survey area. Subtract 0.305m offset to the reduced bathymetry data to obtain the bathymetry data relative to HDR.

Peter J. Stone

Digitally signed by Peter J. Stone
DN: cn=Peter J. Stone, o=NOAA/NOS/CO-OPS, ou=Oceanographic Division, email=peter.stone@noaa.gov, c=US
Date: 2011.04.29 13:35:52 -04'00'

CHIEF, OCEANOGRAPHIC DIVISION



CAUTION

This chart has been corrected from the Notice to Mariners published weekly by the National Imagery and Mapping Agency and the Local Notice to Mariners issued periodically by each U.S. Coast Guard district to the date shown in the lower left hand corner.

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U.S. DEPARTMENT O
NATIONAL OCEANIC AND ATMOS
NATIONAL OCEAN
COAST SUR

PHB Compilation Log

General Survey Info

Survey Number	F00596	Field Unit	NRT-5	State	New York	UTM Zone	18
Project Date	S-B916-NRT5-10	Project Name (Locality)	Hudson River				
Start Date	11/26/2010	Sublocality	South of Stockport Middle Ground				
End Date	11/26/2010	Survey Scale	1:10,000	Compilation Scale	1:40,000		

Affected Raster Charts

Chart	KAPP	Scale	Edition	Date	NTM Date
12348	2223	1:40,000	34th	06/01/2010	011/26/2011

Add Chart | Remove Chart

Affected Electronic Charts

ENC	Scale
US5NY44M	1:40,000

Add ENC | Remove ENC

Spatial Refrence

Horizontal Datum	WGS84
Coordinate System	LLDG
Sounding Datum	MLLW
Vertical Datum	MHW

Junction Surveys

Survey Number	Survey Date	Location Relative to Current Survey
No junction surveys		

Add Survey | Remove Survey

Processing Info

HCell Compiler	Martha Herzog	**QC Reviewer**	Pete Holmberg	**SAR Reviewer**	Tyanne Faulkes

Source Surfaces

Resolution	File Name
1m	F00596_Office_1m_ERS_Final

Add Surface | Remove Surface

Supporting Documents

Name	Version
Specs and Deleverables	April 2011
HCell Specs	6.1

Add Doc | Remove Doc

PHB Compilation Log

Software Used

Software	Version, Hot Fix	Used For
CARIS HIPS	7.0 SP2 HF7	SAR Review. Inspection of Combined BASE Surfaces.
Pydro	11.10	SAR Review. Generation of Features Reports.
CARIS BASE Editor	3.2 SP1	Creation of soundings and bathy-derived features, meta area object, and Blue Notes; Survey evaluation and verification; Initial HCell assembly.
CARIS S-57 Composer	2.2 SP1 FH3	Final compilation of the HCell, correct geometry and build topology, apply final attributes, export the HCell, and QA.
CARIS GIS	4.4a	Setting the sounding rounding variable for conversion of the metric HCell to NOAA charting units with NOAA rounding. (For Fathoms and Feet chart units only.)
CARIS HOM	3.3 SP3 HF8	Perform conversion of the metric HCell to NOAA charting units with NOAA rounding. (For Fathom and Feet chart units only)
CARIS Plot Composer	5.1 SP1	Generate plots of CARIS Session files used for QC.
HydroService, dKart Inspector	5.1	Validation check of the base cell file.
Fugawi View ENC	1.0.0.3	Independent inspection of final HCells using COTS viewer.

Product Info

Deleverables

Survey Scale HCell	F00596_CS.000
HCell Report for MCD	F00596_SS.000
Feature Listing	F00596_HR.pdf
Descriptive Report	F00596_FL.txt
Survey Outline	F00596_DR.pdf
Chart Scale HCell	F00596_Outline.gml and .xsd

Horizontal and Vertical Units

During creation of the HCell all soundings and features are maintained in metric units with as high precision as possible. Depth units for soundings measured with sonar maintain millimeter precision. Depths on rocks above MLLW and heights on islets above MHW are typically measured with range finder, so precision is less.

Depth Units (DUNI)	Feet
Positional Units (PUNI)	Feet
Height Units (HUNI)	Meters

Radius Setting

A survey-scale sounding (SOUNDG) feature object layer was built from the Combined Surface in CARIS BASE Editor. A shoal-biased selection was made at survey scale using a Radius Table file with values shown below.

Radius (mm)	Min. Depth (m)	Max Depth
2	0	10
3	10	20
3.5	20	50
4	50	100

Contours

Depth contours at the intervals on the largest scale chart are included in the SS HCell for MCD raster charting division to use for guidance in creating chart contours. With the exception of the zero contours included in the *_CS file, contours have not been deconflicted against shoreline features, soundings and hydrography.

Charted Contours	Metric Equivalent	Metric NOAA Rounded	Charted NOAA Rounded
6 ft	1.8288 m	2.0574 m	6.75 ft
12 ft	3.6576 m	3.8862 m	12.75 ft

Add Contour | Remove Contour

PHB Compilation Log

Additional Info

Contact Information Inquiries regarding this HCell content or construction should be directed to:	
HCell Compiler	Martha Herzog
Phone Number	206 526-6730
Email	martha.herzog@noaa.gov

Compilation Comments

APPROVAL SHEET
F00596

Initial Approvals:

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

Martha Herzog
2011.12.27 14:49:32
-08'00'

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 Pete Holmberg
DN: cn=Pete Holmberg, o=NOAA, ou=PHB, email=peter.holmberg@noaa.gov, c=US
Date: 2011.12.28 14:02:32 -08'00'

I have reviewed the HCell, 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.

Digitally signed by Peter Holmberg signing for David Zezula
DN: cn=Peter Holmberg signing for David Zezula, o=PHB, ou=NOAA, email=david.j.zezula@noaa.gov, c=US
Date: 2011.12.28 14:10:58 -08'00'