

Table C-1. Water Level Zoning Parameters Applied on Sheet H12002

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA45	0	1.05	8651370
SA46A	0	1.08	8651370

The survey data for sheet H12002 were collected in horizontal datum NAD-83, using geodetic coordinates, while data display and products used the UTM Zone 18 projection. The following equipment was used for positioning on the *M/V Atlantic Surveyor*:

- TSS POS/MV, Serial Number 2575 with a Trimble Probeacon Differential Receiver (primary sensor)
- Trimble 4000 DSi GPS Receiver, Serial Number 3504A09516 with a Trimble Probeacon Differential Receiver (12 July 2009-16 July 2009).
- Trimble 7400 RSi GPS Receiver, Serial Number 3815A22469 with a Trimble Probeacon Differential Receiver (16 July 2009-17 April 2010).

Differential correctors used for online data were from the U.S. Coast Guard Stations at Driver, VA, Annapolis, MD, and Reedy Point, DE. The differential receivers were programmed to only receive differential corrector data from these three stations.

Daily position confidence checks were conducted using the independent Trimble DGPS. A real-time **ISS-2000** survey monitor also raised an alarm to alert the survey watch if the position differences exceeded the maximum allowable distance. All positioning confidence checks were within an inverse distance of five meters.

Please refer to the Horizontal and Vertical Control Report for detailed descriptions of the procedures and systems used to attain hydrographic positioning. This report will be delivered with the Descriptive Report for the last sheet of this task order. ***Concur with clarification. The Horizontal and Vertical Control Report was added to the submitted field records for this survey upon its submission.***

D. RESULTS AND RECOMMENDATIONS

See also HCell Report & Appendix II

Feature descriptions in this section were reviewed based on the largest scale chart covering the respective area. Any features that the contractor re-addressed on the ENC have been stricken out (e.g., ~~example~~) by the AHB reviewer. This was done by AHB for the sake of clarity, so that each feature is only discussed once.

Refer to Appendix II as indicated by red notes following feature description for verified feature information and final feature disposition.

Table Appendix IV-1. Abstract Times of Hydrography, H12002

Begin Date	Begin Julian Day	Begin Time	End Date	End Julian Day	End Time
7/15/2009	196	01:49:34	7/15/2009	196	18:49:37
7/17/2009	198	01:43:36	7/18/2009	199	02:59:59
7/20/2009	201	03:32:43	7/26/2009	207	19:53:25
8/1/2009	213	22:50:45	8/8/2009	220	16:41:16
8/10/2009	222	03:32:17	8/10/2009	222	05:48:57
10/9/2009	282	07:19:24	10/9/2009	282	09:24:37
10/11/2009	284	23:32:57	10/12/2009	285	13:52:38
4/11/2010	101	01:39:30	4/12/2010	102	03:07:28
4/12/2010	102	12:42:12	4/12/2010	102	12:46:38
4/12/2010	102	15:07:35	4/12/2010	102	17:39:23
4/15/2010	105	01:16:40	4/15/2010	105	02:28:27

Final Tide Note

Observed verified water levels were downloaded from the [NOAA Tides and Currents](#) web site for the station in Duck, NC (8651370). Water Level correctors were prepared for each zone of the project using the **Create Water Level Files** routine in the **SABER** software. The **Apply Correctors** routine within **SABER** applied these files to the multibeam data according to the zone containing the nadir beam of each ping.

The H12002 multibeam data fell entirely within the preliminary water level zones SA45 and SA46A NOAA for Duck, NC, 8651370. Analysis of the multibeam data collected from all sheets of this project using **SABER's Multi-View Editor** and bathymetry grids, revealed minimal depth changes across the junction of the zones. A statistical analysis of the water level correctors for each zone and the differences observed at the boundaries of adjacent zones also confirmed the adequacy of zoning correctors based on Duck, NC (8651370). Refer to the DAPR for this project for a complete, detailed description of the

analysis. Differences computed at the zone boundaries are summarized in Table Appendix IV-2. As a result, the NOAA preliminary zone boundaries and zoning parameters, Table Appendix IV-3, for Duck, NC (8651370) were accepted as final and applied to all multibeam data for H12002

Table Appendix IV-2. Differences in Water Level Correctors between Adjacent Zones Using Zoning Parameters for Station 8651370 for Data Collected in 2009

Zone Boundary	SA46A – SA45
Minimum Difference	-0.007
Maximum Difference	0.054
Average Difference	0.021
Standard Deviation	0.012

A. VERTICAL CONTROL

For H12001, H12002, and H12003, the NOAA tide station 8651370 Duck, NC was the source of final verified water level heights for the Mid-Atlantic Corridor, Coast of Maryland surveys. All preliminary and verified tides obtained for the 2009 and 2010 survey seasons were downloaded from the National Oceanic and Atmospheric Administration (NOAA) [Tides and Currents](#) website. All water level data were annotated with Coordinated Universal Time (UTC).

Final water level files for each tide zone were created from downloaded verified tide data using the **SABER Create Water Level Files** tool. Water level files contained water level heights that were algebraically subtracted from depths to correct the sounding for tides and water levels. These water level files were applied to the multibeam data using the **SABER Apply Tides** program.

When it was necessary to apply updated tide correctors such as verified water levels to the GSF files, the program removed the previous tide corrector and applied the new corrector. Each time a processing routine was run on the GSF multibeam data file, a history record was appended to the end of the GSF file. For quality assurance, the **Check Tides** program was run on all GSF files to confirm that the appropriate water level corrector had been applied to the GSF file.

After confirmation that verified water levels were applied to all multibeam data, grids were created and analyzed using various color change intervals. The color intervals provided a means to check for significant, unnatural changes in depth across zone boundaries due to water level correction errors, unusual currents, storm surges, etc.

In addition, cross line analysis using the **SABER Analyze Crossings** software was used to identify possible depth discrepancies resulting from the applied water level corrector. Discrepancies were further analyzed to determine if they were the result of incorrect zoning parameters or weather (wind) conditions between the tide station and the survey area. The NOAA provided preliminary zone boundaries and zoning parameters are presented in Table A-1.

Table A-1. Preliminary Tide Zone Parameters

Zone	Time Corrector (minutes)	Range Ratio	Reference Station
SA45	0.00	1.05	8651370
SA46A	0.00	1.08	8651370

A.1 FINAL TIDE NOTE

H12001, H12002, and H12003 surveys were entirely within preliminary water level zones SA45 and SA46A for Duck, NC 8651370. Analysis of the multibeam data from all three surveys in **MVE** and in depth grids revealed minimal depth jumps across the junction of the

zones. A spreadsheet analysis of the correctors for each zone (summarized in Table A-2) also confirmed the adequacy of zoning correctors based on Duck, NC (8651370). For this analysis, observed verified water levels from 12 July 2009 through 18 April 2010, were entered into the spreadsheet. Correctors were computed at 6 minute intervals for each zone. Differences were computed zone-to-zone. As a result, the NOAA preliminary zone boundaries and zoning parameters for Duck, NC (8651370) were accepted as final and applied to all multibeam data for H12001, H12002, and H12003.

Table A-2. Comparison of Water Level Correctors with Zoning Parameters for Station 8651370

Zone Boundary	SA46A – SA45
Minimum Difference	-0.007
Maximum Difference	0.054
Average Difference	0.021
Standard Deviation	0.012

Analysis of the PFM gridded multibeam data in **MVE** and in depth grids revealed vertical offsets of 20 to 25 centimeters between some overlapping lines of survey data within a single tide zone. These offsets are attributed to different environmental conditions between the survey area and tide gauge location at Duck, NC.