

## C. VERTICAL AND HORIZONTAL CONTROL

Refer to the OPR-L430-KR-09 Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used on this survey. No deviations from the report occurred. A summary of the project's horizontal and vertical control follows.

### C.1 Horizontal Control

The horizontal control datum for this survey was the North American Datum of 1983 (NAD83).

For real-time DGPS corrections, a CSI MBX-3 unit was tuned to the Pigeon Point, CA. USCG DGPS site. The unit output differentially corrected positions at 1 Hz to the (POS MV) 320 V4 where it was integrated with inertial data, and a position for the top-center of the IMU was generated. This position was logged concurrently with the bathymetry from WinFrog and the POS file by WinFrog PosMvLogger. It was later corrected for offsets to the multibeam echosounder (MBES) by CARIS HIPS in processing.

Final positioning, however, was done using post-processed kinematic (PPK) methods. Applanix POSpac software was used in conjunction with the POS files and local base station data to generate a higher accuracy position which was applied in processing, replacing the real-time position records.

See OPR-L430-KR-09 Horizontal and Vertical Control Report for a more detailed description of PPK positioning methods used.

### C.2 Vertical Control

All sounding data were initially reduced to mean lower low water (MLLW) using preliminary tidal data for gauges 9414290 & 9415020, from the National Water Level Observation Program accessed through the NOAA tides and currents website (<http://tidesandcurrents.noaa.gov/>). A cumulative file for the gauges was updated daily by appending the new data. Preliminary tidal zoning provided by NOAA was used in conjunction with the preliminary tide data for initial data processing.

On September 14, 2009, JOA issued verified tidal data and final zoning for H12109, H12110, H12111, H12112, and H12113 of OPR-L430-KR-09. The tidal zoning was modified by JOA, providing a more elaborate zoning scheme from those zones issued in the Statement of Work. Verified tidal data had a light smoothing applied to alleviate high frequency noise.

All sounding data were then re-merged using CARIS HIPS and SIPS tide routine. Verified tidal data from the San Francisco, CA (9414290) and Point Reyes, CA (9415020) tidal stations were used for the final Navigation Base Surfaces and S-57 Feature files.<sup>15</sup> Tidal Stations were owned and operated by NOAA's National Ocean Service through the National Water Level Observation Program.



**Table 2 – Tide Gauge**

<b>Gauge</b>	<b>Location</b>	<b>Latitude</b>	<b>Longitude</b>
9414290	San Francisco, CA	37° 48.4' N	122° 27.9' W
9415020	Point Reyes, CA	37° 59.7 N	122° 58.6 W

See OPR-L430-KR-09 Horizontal and Vertical Control Report for a more detailed description of final tidal zoning.