

C. VERTICAL AND HORIZONTAL CONTROL

Refer to the Horizontal and Vertical Control Report for a detailed description of the horizontal and vertical control used during this survey. Refer to Appendix IV for specific times and dates of relevant tide data. A summary of horizontal and vertical control used for the survey follows.

C.1 VERTICAL CONTROL

Vertical control for this survey was based on MLLW at the National Water Level Observation Network (NWLON) station at Sand Point, AK (9459450).

Station details are as follows:

| | | NAD83 | |
|---------|------------|--------------|---------------|
| Gauge | Location | Latitude (N) | Longitude (W) |
| 9459450 | Sand Point | 55° 19.9' | 160° 30.2' |

C.2 ZONING

Tide zones covering the extent of the survey area were derived from tide zone coordinates supplied by NOAA. Each of these tide zones use time and range correctors relative to the Sand Point tide station. An additional tide zone was established over Popof Strait for the reduction of soundings over the depth benchmark areas. These are as follows:

| Tide Zone | GS Identifier | Time Corrector | Range Corrector | Reference Station |
|------------|---------------|----------------|-----------------|-------------------|
| SWA193 | TA1 | -6 minutes | x1.02 | 9459450 |
| SWA204 | TA2 | -6 minutes | x0.98 | 9459450 |
| Sand Point | TA3 | 0 minutes | x1.00 | 9459450 |

For final tide application, the time and range correctors were applied to NOAA verified tide data, smoothed by JOA. Soundings were then reduced to MLLW using these final tides. An analysis of depth benchmark and crossline comparisons, and overlaps of the mainlines of sounding concluded that final tide zoning was adequate.

The derived value for the difference between MLLW and MHW at the Sand Point tide gauge is 1.99m. From the final zoning, a range factor of 0.98 was applicable for Sheet B, resulting in a MHW value of 1.95m.

C.3 HORIZONTAL CONTROL

Data collection and processing were conducted on the AS and GS in World Geodetic System (WGS84) on Universal Transverse Mercator (Northern Hemisphere) projection UTM (N) in Zone 4, Central Meridian 159° W. This data was post-processed and all soundings are positioned relative to the North American Datum 1983 (NAD83). All units are in meters.

C.3.1 LADS Local GPS Base Station – Sand Point

Real-time positions were determined using an Ashtech GG24 GPS receiver on the aircraft, operating in autonomous GPS mode. A local GPS base station was established by JOA on the roof of the Popof Pizza building, Sand Point on March 28 and 29, 2004, and this site was reoccupied in order to post-process KGPS positions following survey flights.

The derived NAD83 coordinates for the local GPS base station are:

| NAD83 | | UTM (N) Zone 4 | | |
|-----------------|------------------|----------------|---------------|------------------------|
| Latitude (N) | Longitude (W) | Easting (m) | Northing (m) | Ellipsoidal Height (m) |
| 55° 20' 42.544" | 160° 28' 53.447" | 406 048.735 | 6 134 199.851 | 72.980 |

Post-processed KGPS positions were determined offline using data logged at the local GPS base station and on the aircraft. This data was processed with Waypoint GrafNav software to calculate a KGPS position solution for the survey flights. The post-processed KGPS positions were imported into the GS and applied to all soundings. This provided increased sounding position accuracy from the real-time autonomous GPS.