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. A summary of horizontal and vertical control used for the survey follows.

C.1 VERTICAL CONTROL

Vertical control for the survey was based on the Mean Lower Low Water (MLLW) tidal datum. A temporary gauge installed by John Oswald and Associates (JOA) at Craig, AK served as vertical control for the project area.

Station details are as follows:

		WGS84	
Gauge	**Location**	**Latitude**	**Longitude**
9450551	Craig Petro-Marine dock	55° 29.3' N	133° 08.5' W

C.2 ZONING

NOAA initially supplied tide zones and correctors relative to Sitka (9451600) in the Statement of Work (SOW), covering the extent of the survey area. During field operations tide data for the National Water Level Observation Network (NWLON) station at Sitka was downloaded from the CO-OPS website and these preliminary tide values were used to reduce depth soundings.

Following data acquisition JOA supplied verified tides for the temporary Craig gauge and new time and range correctors were computed for the tide zone areas provided in the SOW. The new zone correctors relative to the subordinate gauge at Craig were approved for final tide reduction by CO-OPS and these supplemental instructions are provided at Appendix V. The final tide zone parameters are presented in the table below:

Tide Zone	GS Identifier	Time Corrector	Range Corrector	Reference Station
SA227	TA1	+0 minutes	x 1.03	9450551
SA228	TA2	+0 minutes	x 1.02	9450551
SA229	TA3	+6 minutes	x 1.00	9450551
SA250	TA4	+0 minutes	x 1.00	9450551
SA227A	TA5	-12 minutes	x 1.06	9451600

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

Tide zone SA227A was created to reduce soundings over the LADS depth benchmark in the Gulf of Esquibel, in order to check vertical accuracy performance at the beginning and throughout the survey period. Time and range correctors for this tide zone were sourced from the SOW for OPR-O167-KRL-04, conducted by TLI in 2004. It was necessary to create this additional tide zone, outside the survey area, to compare reduced depth soundings in 2007 to the same vertical datum used to establish the depth benchmark area in 2004.

The derived value for the difference between MLLW and MHW at the Craig subordinate tide gauge is 2.840m. From the final zoning, a range factor of 1.00 was applicable for Sheet E, resulting in a MHW value of 2.84.

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 8, Central Meridian 135° 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 – Ketchikan

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 Best Western Hotel in Ketchikan, AK on April 10, 2007, 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 8		
Latitude (N)	**Longitude (W)**	**Easting (m)**	**Northing (m)**	**Ellipsoidal Height (m)**
55° 21' 18.1747"	131° 41' 28.1482"	709 747.774	6 139 286.936	12.85

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 Ashtech PNAV software to calculate both a DGPS and 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.