CompassData

FEMA Region 10 Kittitas, WA
Ground Control Project Report for Aerometric
April 14th, 2010

Project Information

CDI Project Number: CDI1564
Geographic Location: Kittitas, Washington
Number of GCPs Requested: 20
Number of GCPs Collected: 20

Project Specifications

Precision (Horizontal/Vertical): 5 cm vertical
Coordinate System: UTM
Datum: NAD 83
Zone: 10 North
Altitude Reference: MSL (Geoid09)
Units: Meters

RTK GPS

All Ground Control Points for this project were collected within the boundaries of the state wide Virtual Reference Station System of Washington (Washington State Reference Network (WSRN)), which provides continuous real-time broadcast correction signals within a network of over 100 base stations distributed evenly in the state of Washington.

All Control Points were observed for 180 epochs to determine a coordinate < 8 cm in both Horizontal and Vertical to support subsequent LiDAR post-processing and bare earth deliverables generation.

All data collected were well within the confines of the Washington State Reference Network with multiple base locations providing position and correction data for each point collected.

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Summary

The purpose of this project was to locate and survey ground control points (GCPs) in the area of interest as defined by FEMA-supplied shape and kml files. The GCP coordinates were to be used to control the vertical aspect of all newly-flown LiDAR data during post-processing and subsequent deliverables creation. CompassData visited the project area, found suitable GCPs, and determined accurate coordinates for each GCP according to the customer's specifications.

Equipment

CompassData used a Trimble R8 antenna to perform the survey. This device is accurate to within 1 cm on a position-by-position basis per Trimble specifications. Operating within the VRS network provided accurate coordinate values at or around 3 cm H/V within a 3 minutes observation times. CompassData has consistently demonstrated this level of accuracy on many GCP collection jobs across North and South America and Africa. Specifications for the Trimble R8 are available upon request.

Survey Methodology

CompassData has met the required precision for this project by using a high-quality GPS receiver with differential corrections provided by a GPS base station close to the project area. The GPS antenna sat atop a bubble-leveled, fixed-height range pole that was placed over the center of the desired GCP. At least 180 positions (captured at a rate of one per second) were geometrically averaged to calculate a single coordinate for each GCP. All required field documentation was filled out and the points were marked on the supplied image chips (when available) and diagrammed on the CompassData-supplied sketch sheets. Digital pictures of each GCP location were collected in the field.

Quality Control Procedures

CompassData selects GCPs with an unobstructed view of the sky to ensure proper GPS operation. CompassData works to avoid potential sources of multipath error

such as trees, buildings, and fences that may adversely affect the GPS accuracy. Additional quality control comes from the fact that at least 480 GPS positions are collected for each GCP. While operating within a VRS, valid solutions are reached within seconds; however, we continue to collect additional data to ensure meeting collection specifications. To ensure accuracy, a GCP will be retaken or moved to a more suitable location if it does not meet these standards.

In addition to the aforementioned procedures, CompassData "surveys" existing geodetic control monuments to see if our coordinates match the published coordinates to the required accuracy. These monuments are usually established by the National Geodetic Survey (NGS) in the United States. If it is found that our coordinates are outside the acceptable accuracy, the reason for the difference will be found or the GCPs will be retaken and/or adjusted by the necessary amounts. There are certain geodetic considerations that must be taken into account that affect whether a GPS-derived coordinate will line up with a survey monument, especially when these monuments reference local coordinate systems or the systems of another country. Sometimes the published coordinates for a monument are not accurate, although this is very infrequent.

CompassData visited one or more survey monuments during the course of this project. The results of those monuments are summarized in the Accuracy Report.

Deliverables

Deliverables for this project include:

- Coordinates (in spreadsheet format)
- Image Chips (when available)
- Sketch Sheets
- Digital Pictures
- QA/QC Data
- A Copy of the Project on CD

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Project Notes

All collected points were retrieved from the Trimble Survey Controller in Northing, Easting, NAD83, MSL (Geoid09), Meters.

CorpsCon was used to generate files in the following format:
Degrees Minutes Decimal Seconds, NAD83 Hae
UTM Meters, NAD83, MSL

Geoid09 was then used to generate the geoid separation at every Lat/Long location. NAVD88(09) orthometric heights were then generated in spreadsheet form using the formula HAE – Geoid =Orthometric Height. Those values were then included into the final delivery coordinate CVS files and have been tested against NGS monuments collected during the course of this survey and are showing agreement.

The Horizontal and Vertical accuracies reported in the Final Coordinates file were obtained from the Survey Report generated by Trimble Survey Controller. The report contains all points collected during each daily survey deployment, including CVAs, FVAs and Ground Control. Copies of these reports can be provided upon request once CVA and FVA data has been redacted.

Contact Information

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