

Sample Survey Work Product Notes

Example #1 (GPS and Total Station – Least Squares Adjustment With Exceptions)

Methods: The positions of found property corner monuments shown on this boundary survey map were determined using fast static and total station surveying methods. Fast static occupations were at least 15 minutes in length and were collected with Trimble R8 and Trimble R10 GNSS receivers. All rod heights for static GNSS observations were set at 2.000 meters. Total station observations were performed using a Trimble S6 robotic total station and a 360-degree prism. The prism was mounted to a survey rod and observations to property corner monuments were made using a bipod. All property corner monuments located with a total station on this boundary survey were observed from multiple control points, except for M3 and M11. M3 and M11 were observed using a single total station observation because site conditions prevented redundant observations. Raw field data was processed in Trimble Business Center Version 5.10. Fast static GPS observations and redundant total station observations were adjusted in a combined network.

Accuracy and Precision: The least squares adjustment for this survey had 84 degrees of freedom and resulted in a local network accuracy of plus or minus 0.02 feet horizontally at the 95% confidence level. Based on prior surveys using the same equipment and methods, it is expected the positions of M3 and M11 are plus or minus 0.08 feet at the 95% confidence level.

Example #2 (Total Station Traverse With Sideshots – Compass Adjustment)

Methods: The positions of found property corner monuments shown on this boundary survey map were determined using total station surveying methods. Total station observations were performed using a Trimble S6 robotic total station and a 360-degree prism. The prism was mounted to a survey rod and observations to all control points and found property corner monuments were made using a bipod. CP4 and CP8 were set using a single direct/reverse observation and were not included in the traverse because of site conditions. The traverse was adjusted using Microsoft Excel Version 2020.

Accuracy and Precision: The traverse adjustment had a raw horizontal closure of 0.06 feet and a horizontal angle misclosure of 13 seconds, and a precision of 1:18,000. The compass balance adjustment method was used to adjust the traverse. The average adjustment to each control point in the traverse was 0.007 feet horizontally. Based on prior surveys using the same equipment and methods, it is expected the positions of CP4 and CP8 (which were not included in the traverse) are plus or minus 0.1 feet at the 95% confidence level.

Example #3 (RTK Survey and UAV Aerial Mapping)

Methods: The aerial targets for this topographic survey were set using RTK GPS surveying methods with a single on-site base. GPS observations were collected with a Trimble 5800 GPS receiver on a fixed height 2.000 meter rover pole. RTK observations on aerial targets were 30 seconds with a 1-second

epoch. 8 ground truth points were collected on hardscape features within the mapping limits using 10-second GPS observations with a 1-second epoch. This is a radial survey with no redundant or independent observations and no adjustment of the survey vectors or aerial target coordinates was performed. Aerial mapping was performed using a Phantom 4 Pro UAV. Aerial photogrammetry was processed in Pix4D.

Accuracy and Precision: Based on a statistical analysis of residuals between RTK positions for ground truth points and the position of ground truth points extracted from the final processed point cloud in Pix4D, it is expected the horizontal accuracy of features in the topographic mapping are plus or minus 0.3 feet horizontally and 0.5 feet vertically at the 95% confidence level.