Lidar Ground Control Final Survey Report

USGS/NGTOC
Task Order: LONG ISLAND, NEW YORK - SANDY LIDAR
Contract Number G10PC00057, Order Number: G14PD00296
Woolpert, Inc. Project Number 74257

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Summary of Contents

Introduction

This report contains an outline of the ground control surveys that supported the topographic lidar along the Atlantic coast of Long Island, New York; Contract Number G10PC00057, Order Number G14PD00296; Woolpert Number 74257.

Project Area

The project area encompasses over 1,225 square miles in Suffolk and Nassau Counties in New York.

Purpose

The purpose of this survey was to establish three-dimensional coordinates for airborne sensor system calibrations and ground-truthing in support of topographic lidar data acquisition on Long Island, New York.

Date of Survey

All ground control field operations took place between April 16, 2014 and April 22, 2014.

Existing Project Control

Prior to the LIDAR mission, Woolpert staff researched suitable NGS and KeyNetGPS stations staggered throughout the project limits. KeyNetGPS stations were KP18, MTG1, NYCI, NYQN and NYRH. Woolpert crews also performed reconnaissance on existing NGS control stations 11 E 12 N, Q 334 and U325 to compare resulting coordinates when processed with KeyNetGPS stations.

Ground Truthing and Calibration Sites

Information sheets for the newly established photogrammetric control stations can be found in Section 3 of this report. These information sheets consist of photographs, description of the point observed, and geographic coordinates. A diagram showing the ground control stations used to support this photogrammetric mapping project can be found in Section 5 of this report.

Methodology

The type of GPS survey technique that was performed for this project was Real-Time Kinematics (RTK) GPS. Conventional survey methodology was used as well in obscured areas.

Real-Time Kinematics (RTK) GPS

The field crews utilized RTK GPS by accessing real time corrections provided by KeyNetGPS via an internet connection in the field. RTK GPS is a technique used in land surveying based on the use of carrier phase measurements of the GPS and GLONASS signals where a network of reference stations provide the real-time corrections, consistently producing centimeter-level accuracies. This methodology allowed for efficient survey grade observations for sensor calibrations and ground-truthing. Woolpert utilized Trimble Navigation R8 dual-frequency geodetic GPS receivers on the rover end of the vector for this task. The survey was conducted using a 1-second epoch rate, in a fixed solution RTK mode with each GPS session lasting 90 seconds to 180 seconds each.

Datum Reference and Final Coordinates

All horizontal GPS control was based on the Universal Transverse Mercator (UTM) Zone 18, referenced to the North American Datum 1983, National Re-adjustment of 2002 (NAD83/2002). All vertical control was based on the North American Vertical Datum of 1988 (NAVD88). These final coordinates for the ground control survey are expressed in Meters and can be found in Section 2 of this report.

GPS Data Analysis and Processing

All session baselines were processed each day using *Trimble Navigation's* Trimble Business Center (TBX) version 3.1 baseline processor with the broadcast ephemeris.

Daily processing allowed immediate feedback to field crews to discover any weak links in the network and immediately schedule re-observations of the affected baselines. Once the fieldwork was complete, the processed baselines were then run through a rigorous loop closure analysis.

RTK-Rapid Static GPS Adjustment

Upon completion of all field data processing, Woolpert constrained to KeyNetGPS stations KP18, MTG1, NYCI, NYQN and NYRH using *Trimble Navigation's* Trimble Business Center (TBC) version 3.1. Geoid 12A was used to model the elevations.

Conventional Survey

Where obstructions precluded Woolpert crews from using GPS conventional survey methods were utilized. All conventional survey observations were referenced to control established from RTK GPS methods.

Accuracy Specifications

The final analysis of the GPS network indicates that the GPS and conventional survey observations used for ground-truthing and sensor calibration meet or exceed the accuracy criteria set forth in the statement of work.