2024 NDOR AIRBORNE LiDAR MAPPING GUIDELINES

This document presents guidelines and specifications that must be followed by consultants using Airborne Light Detection and Ranging (LiDAR) systems for gathering data necessary to create Digital Terrain Model (DTM) products for the Nebraska Department of Roads (NDOT). Upon notice to proceed, the consultant shall provide services as specified in these guidelines.

I. GENERAL DESCRIPTION

Work consists of LiDAR data collection in International Feet. Deliverables must conform to the projection, datum, DAF, and coordinate system specified by NDOT. The Technical Requirements section of this document indicates more specific requirements.

II. TECHNICAL REQUIREMENTS

A. NDOT shall furnish ground control points within the project area.

B. The consultant shall make necessary adjustments to insure LiDAR DTM data fits the NDOT provided control points to an accuracy of 0.16 feet to 0.23 feet vertically and 0.32 feet to 0.92 feet (5cm, 7cm, or 14cm), horizontally throughout the project area.

C. MicroStation design files delivered shall be in the NDOT seed file (NDOT_3D_Seed_Int_FT.dgn) located at the following website link: http://roads.nebraska.gov/business-center/design-consultant/

D. MicroStation file working units must be:

    Master Unit: International Feet
    Sub Unit: Inches

E. LiDAR DTM files shall consist of elevation data using MASS POINTS for elevation returns to accurately define the general terrain. Where required, BREAK LINES will be read using LiDARgrammetry to define change in grade. BREAK LINE data shall consist of a line of elevations taken at elevation breaks such as drainage, toe of slopes, bottom of ditches, ridge lines, saddles and other features. BREAK LINES must not cross. Each DTM design file shall fit against adjacent DTM files without gaps.

F. Accuracy of MASS POINTS and BREAK LINES will be equal to that of spot elevations for contour mapping in accordance with United States National Map Accuracy Standards, having a 90% vertical accuracy confidence of 0.5 feet.

G. MASS POINT and BREAK LINE data shall be at intervals so contours or cross-sections generated will meet United States National Map Accuracy Standards. MASS POINT spacing will be determined by the consultant to provide a point density most appropriate for a DTM.

H. LiDAR DTM data shall be separated into two MicroStation design files:

    1. An unthinned bare-earth LiDAR data file containing all the data points that depict the ground surface with all elevation points which represent vegetation, bridges, buildings, other structures, or other non-surface features removed.

2. A thinned bare-earth LiDAR data file containing those data points needed to accurately depict the ground surface with all points that represent vegetation, bridges, buildings, other structures, and other non-surface features deleted. Care should be taken to ensure that steep terrain areas are not accidentally filtered out with the vegetation. Major thinning of data should only be performed where there is little elevation change to ensure accurate data around grade changes. Thinning is deemed necessary to prevent datasets from becoming too large and unusable.

I. Quality Control/Quality Assurance of the LiDAR DTM data shall be the primary responsibility of the consultant.

J. NDOT will do whatever testing, editing, and checking deemed necessary. If LiDAR DTM inaccuracies are discovered, and adjustments and corrections are necessary, the consultant shall make those corrections, and/or adjustments when requested to do so.

K. At the conclusion of the work, the consultant shall deliver:

1. MicroStation DTM design files on DVD or portable hard disk.
2. Ground control report.
3. Flight index maps.
4. Documentation specifying flight date, altitude, airspeed, scan angle, scan rate, LiDAR pulse rates, and other flight and equipment information deemed appropriate.
5. LiDAR system calibration report.