

ATTACHMENT A

PHOTOGRAMMETRY SCOPE OF SERVICES

Project Description

CONSULTANT shall provide LiDAR low-altitude mapping and survey services for an approximate 14 mile section of Interstate 20 and 8.5 mile section of Interstate 77 in Richland and Lexington County, SC. The planimetric mapping shall include a corridor with a total width of approximately 500' (250' on either side of the interstate) and include all un-obscured planimetric features. The topographic mapping shall include a two tier corridor width with the following approximate measurements:

Tier 1 - 300' Corridor (150' either side of interstate centerline) shall include 0.05' vertical accuracies on all paved surfaces and National Map Accuracy Standards (NMAS) vertical accuracies on soft surfaces.

Tier 2 - 100' Additional width (on either side of the 300' Corridor as described above) shall include vertical accuracies sufficient to show 2' contours.

Scope of Services

Task 1 - Survey Control

- The **CONSULTANT** shall paint control chevrons in pairs for the mapping within the shoulders on both sides of the Interstate at intervals not to exceed approximately 500'. All control will be observed using Digital Levels method and tied to the South Carolina State Plane Grid Coordinate System using NAD83 (current adjustment) horizontal datum and NAVD88 vertical datum. A Survey Report detailing methods, ID's and coordinates shall be supplied to **SCDOT** in a digital format.
- The **CONSULTANT** shall establish Primary Survey Control (PSC) points in accordance with the SCDOT Preconstruction Survey Manual (section 3.05.01) at the beginning and end of each project section and at approximately one mile intervals along the corridor at locations that should be outside of construction areas.
- The **CONSULTANT** anticipates 328 chevrons and PSC points for Interstate 20 and 216 chevrons and PSC points for Interstate 77. Any substantial variation from this quantity will require prior approval from the SCDOT Surveys Manager.

Task 2 - RGB Aerial Imagery

- Color Imagery shall be acquired with the sun angle being 30 degrees or higher, skies are free of haze, clouds and smoke.
- The **CONSULTANT** shall design a flight layout that is suitable for 0.25' pixel resolution digital orthos, controlled by Airborne GPS and ground control.
- The photography will be flown at 60% forward overlap, and will not contain any excessive tip, tilt, crab or cloud cover.
- All flight plans shall be designed by a Certified Photogrammetrist and approved prior to acquisition.

- The RGB Aerial Imagery shall be controlled with POS AV Airborne GPS, this leading inertial position and orientation system will provide accurate photo center positions to triangulate the entire block of imagery.
- The **CONSULTANT** shall be allowed to supplement project mapping data with other sources of data for the generation of the 2' contour intervals within the Tier 2 corridor.

Task 3 - LIDAR Data Capture

- The **CONSULTANT** shall capture the LiDAR data with their Helicopter mounted POD system which consists of a Riegel VQ-480i laser scanner, a Phase One iXA 80 MP Digital camera with a 55mm focal length lens and a Trimble AP50 GNSS-Inertial OEM board on a rotating turret mount.
- The LIDAR shall have a pulse rate to generate at least 8-12 points/m2.
- The high density scan and a laser point spacing along and across tract ensures exceptional coverage.

Task 4 - Digital Aerial Triangulation

- The **CONSULTANT** shall precisely perform automatic digital aerial triangulation based on the ABGPS/IMU data collected during the photography mission and the survey control panels.
- Automatic tie point matching shall be done on all image areas to best contribute to the strength and quality of the block.

Task 5 - LiDAR Data Processing & Ortho Rectification

- LiDAR flights shall be calibrated to each other and to the ground control panels.
- A statistics report showing delta XY & Z residuals shall be produced to insure the accuracy of the laser hits vs. ground control check panels.
- Using LiDAR processing software, the **CONSULTANT** shall classify all LiDAR data into bare earth models and vegetation classes (low, medium and high), and output all LiDAR classes such as buildings, hydro and model key points upon request.
- QA/QC of the LiDAR data shall be done in 3D on softcopy stereo plotters during classification.
- The **CONSULTANT** shall perform a rigorous ortho rectification of all imagery.
- The high quality orthophotos shall have a constant scale, and all ground features shall be presented in their true locations without disturbing relief displacements.
- A tiling scheme that matches shall be created, and all orthos shall be cut at 0.25' pixel in Tiff format.

Task 6 - Planimetric Mapping

- The **CONSULTANT** will map all physical features that lie within the project mapping limits to a minimum horizontal accuracy in accordance with the NMAS. Mapping will be delivered in Microstation format, using current SCDOT CADD standards, with a plot scale of 1"=50'. All items deemed to be significant within the project corridor will be mapped and shall include, but not limited to, the following:

- Hydrological features - ponds, lakes, rivers, etc.
 - Paved surfaces – roads, drives, etc.
 - Vegetation – wooded area boundaries, trees, hedges, etc.
 - Utilities – poles, towers, pedestals, billboards, manholes, catch basins, etc.
- The **CONSULTANT** shall collect profile at the edge of pavements, roadway crowns, and travelways as defined by **SCDOT** using Digital Terrain Methods (DTM) and shall be vertically accurate to within 0.05’ on all paved surfaces. On all other surfaces (ground), vertical accuracy will be in accordance with the National Mapping Standards. All mapping feature data shall be collected from the high density LiDAR point clouds utilizing Microstation and TOPODOT software suite.

Specifications

Production procedures for photogrammetric mapping surveys shall be in accordance with the standards established by the Federal Geographic Data Commission (FGDC) Geospatial Positioning Accuracy standard and applicable extensions and revisions.

Schedule

The **CONSULTANT** will provide **SCDOT** with the completed deliverables for the tasks as described in the **SCOPE OF SERVICES** within **90** days of the Notice to Proceed.

Deliverables

1. Statistics Report of LIDAR Data (showing density, XY&Z RMSE)
2. Calibrated and Classified LAS tiles.
3. Bare Earth LAS files (**CONSULTANT** can choose gridded or all points)
4. 5' grid ascii (if **CONSULTANT** prefers)
5. Signed and Sealed Survey and Mapping Report
6. Color Orthos @ 0.25’ pixel in Tiff format.
7. 2d Planimetric Microstation CADD file (.dgn)
8. 3d DTM Microstation file (.dgn)
9. GeoPak DTM Triangulated Integrated Network (.tin) file