ARTICLE 1 – SCOPE OF SERVICES, JEFFERSON COUNTY, WISCONSIN

1.1 BASIC SERVICES

After written authorization to proceed, CONSULTANT shall:

1.1.1 Acquire aerial LiDAR (Light Detection And Ranging) in the Spring of 2019 for the project area shown on Attachment A. LiDAR will be acquired for the project area according to the following specifications:

a) Nominal point spacing for the LiDAR acquisition will be 0.7 meters, single swath.

b) LiDAR acquisition will be conducted when the ground is free of snow, and when the atmospheric conditions between the aircraft and the ground are free of clouds and fog.

c) LiDAR acquisition will be flown with an average of 30% overlap between swaths.

1.1.2 Perform GPS survey for calibration ground control and for quality control.

a) Ground control calibration points will be established to supplement the airborne GPS positional accuracy.

b) Ground control quality check points will be established for validation of positional accuracy.

c) 43 check points will be collected for assessment of Non-vegetated Vertical Accuracy (NVA). The NVA points will be collected in clear open terrain (bare earth) and urban land cover.

d) 36 check points will be collected for assessment of Vegetated Vertical Accuracy (VVA). The VVA points will be collected in representative land cover types across the project area.

1.1.3 Calibrate the LiDAR point cloud to support the development of a bare earth surface model (DEM) to meet the following vertical accuracy requirements:

a) RMSEz (non-vegetated) ≤ 10 cm (Point Cloud and DEM)

b) NVA ≤ 19.6 cm at 95% confidence level according to NSSDA standards (Point Cloud and DEM)

c) VVA ≤ 29.4 cm at 95th percentile level according to ASPRS guidelines (DEM only)

1.1.4 Prepare LiDAR data and derivative products to conform to specifications defined in the USGS “National Geospatial Program LiDAR Base Specification Version 1.3”. LiDAR data will meet the USGS definition of Quality Level 2 (QL2).

1.1.5 Compile hydro breaklines for ponded water that is 2 acres or greater and double lined streams with a minimum width of 20 feet. The streams will break at road crossings leaving the road over the culvert intact. The hydrographic features will be flattened as per the criteria outlined in “National Geospatial Program LiDAR Base Specification

Version 1.3". Specifically, ponds and lakes will have a flat and level water surface, streams and rivers will present a gradient downhill water surface, bridges will removed from the DEM, streams and rivers will not break at bridges, and when the identification of a feature as a bridge or culvert cannot be made reliably, the feature will be regarded as a culvert. The hydro breaklines will be delivered in ESRI polylineZ feature class.

1.1.6 Process and classify the calibrated LiDAR data to support bare earth surface model generation. The point cloud format will be LAS v1.4 format. The calibrated LiDAR point cloud will be classified to the following base classification scheme:

Class 1: Processed, but unclassified
Class 2: Bare-earth ground
Class 5: High Vegetation (automated)
Class 6: Buildings (automated)
Class 7: Low Noise
Class 9: Water
Class 17: Bridge Decks
Class 18: High Noise
Class 20: Ignored ground (breakline proximity)

1.1.7 Generate a bare earth Digital Elevation Model (DEM) from classified bare earth points (Class 2) and breaklines. Water bodies and streams will be hydro-flattened within the DEM. The cell size will be 2.0 feet. The delivery format will be 32-bit floating grid.

1.1.8 Tile the LiDAR deliverable products according to a 4,500-foot by 4,500-foot tile index across the project area. A tile schematic will be delivered in ESRI Shapefile format.

1.1.9 Prepare LiDAR deliverable products to full extent of the project area, which includes the 100-meter buffer shown on Attachment A.

1.1.10 Reference the LiDAR deliverable products to Wisconsin State Plane Coordinates, South Zone, NAD 83 (11), NAVD 88 (Geoid 12B), US Survey Feet.

1.1.11 Prepare a report on the assessed vertical accuracy of the bare earth surface (NVA and VVA) using the GPS survey data collected for the quality control.

1.1.12 Prepare ancillary data and reports for the LiDAR acquisition and processing phases of the project, including:

a) Data Collection report
b) Polygons representing individual raw swath boundaries
c) Survey report detailing the collection of ground control for calibration
d) Processing report detailing classification and breakline methodology, product generation, and QC procedures
e) Vertical accuracy assessment of the raw swath point cloud and the DEM
f) Boundaries of product extents

1.1.13 Prepare FGDC compliant metadata in .xml format

1.1.14 Deliver the final products on external USB hard drive

1.1.15 Deliver the following products to OWNER:

a) Classified Point Cloud, LAS v1.4 format
b) Hydro flattening breaklines, ESRI shapefile, polylineZ format
c) Bare Earth DEM, 32-bit floating point grid
d) Tile Schematic, ESRI shapefile format
e) LiDAR acquisition and processing reports, including:
    1) Data Collection report
    2) Polygons representing individual raw swath boundaries
    3) Survey report with calibration control points
    4) Processing report for generation of products
    5) Vertical Accuracy Report (NVA and VVA)
    6) FGDC metadata, XML format

Attachment A
Map of Project Area

Jefferson County Project Area, including 100 meter buffer