### Aerial Image & LiDAR Collection/Processing - Manned Aircraft

**Description of Work:** The work consists of acquiring large format, frame metric camera aerial imagery and airborne topographic LiDAR data using a manned platform at various altitudes above mean ground level. The aerial camera and topographic LiDAR systems must be integrated with on board Global Navigation Satellite System/Inertial Measurement Units (GNSS/IMU) equipment to collect data for high accuracy sensor position and orientation determination. The work also includes flight and control plan preparation, image and LiDAR post-processing, and certifying Reports for acquisition, position and orientation data, and LiDAR derived elevation products.

**Key Personnel Required:** Land Surveyor

**Employee Registration Required:** P.L.S.

**Minimum Years of Experience:** P.L.S.

**Additional Requirements:**
- All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Reports for acquisition, position and orientation data, and LiDAR derived elevation products must be certified by an NC PLS. The large format, frame metric camera shall be capable of acquiring frame imagery with the exposure station’s nadir Ground Sample Distance (GSD) generally between 0.10 foot and 0.45 foot with 60% forward overlap. Deviations from this GSD range should be noted in the LiDAR post-processing products. All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Aerotriangulation and Airborne Survey Reports must be certified by an NC PLS. The firm must be capable of providing full photogrammetric services with large format, frame metric camera imagery, including aerotriangulation, DTMs, digital data delivery, global orthophotography, structure and orientation specifications; meet the global and working units found in the NCDOT Workstation Standards, and be compatible with the latest current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.

### Large Format, Metric Camera Photogrammetric Services

**Description of Work:** The work consists of performing UC/ordinary image measurements for computing position and orientation of large format, frame metric camera aerial imagery and photogrammetrically stores compiling planimetric, topographic, and DTMs; merging the completed photogrammetric data with field data such as planimetric classification, cadastral data, and utility data; field classifying planimetric features; collecting and mapping cadastral data from existing county tax bases; producing planimetric maps, topographic maps, base plan sheets, digital orthophotographs, DTMs and data and Airtrajectories and Airborne Survey Reports is specified in the NCDOT Photogrammetry Unit manuals; and delivering the planimetric maps, topographic maps, base plan sheets, digital orthophotographs, DTMs and data and Reports in digital formats. All mapping and base plan sheet digital data and DTMs shall be delivered in 3-D design files that conform to the NCDOT Photogrammetry level structure and symbology specifications; meet the global-origin and working units found in the NCDOT Workstation Standards, and be compatible with the most current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.

**Key Personnel Required:** Land Surveyor

**Employee Registration Required:** P.L.S.

**Minimum Years of Experience:** P.L.S.

**Additional Requirements:**
- All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Aerotriangulation and Airborne Survey Reports must be certified by an NC PLS. The firm must be capable of providing full photogrammetric services with large format, frame metric camera imagery, including aerotriangulation, DTMs, digital data delivery, global orthophotography, structure and orientation specifications; meet the global and working units found in the NCDOT Workstation Standards, and be compatible with the latest current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.

### Aerial Image Collection & Mapping Products w/LiDAR

**Description of Work:** The work consists of using small format, frame non-metric camera imagery for generation of geoplastic products to include image position and orientation determination, orthophotos, and elevation data. The work includes acquiring small format, frame aerial imagery with a mechanical shutter, non-metric camera on an unmanned aerial system (UAS) platform at various altitudes above mean ground level. Primary focus is for Vertical Take Off/Landing (VTOL) UAS but fixed wing platforms are not precluded. For UAS operation, either a FAA Remote Pilot Certificate with an UAS rating under 14 CFR Part 107 (small UAS) – section-9007 exemption of the FAA Reauthorization Act of 2018, or a Special Airworthiness Certificate (SAC) will be required. The firm must adhere to all current and future FAA and NC regulations regarding UAS operations including obtaining a NC Commercial UAS Operator Permit. The work also includes flight and control plan preparation, delivering geoplastic products, and certifying Reports for acquisition, position and orientation data, orthophotos, and elevation data products.

**Key Personnel Required:** Land Surveyor

**Employee Registration Required:** P.L.S.

**Minimum Years of Experience:** P.L.S.

**Additional Requirements:**
- All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Reports for acquisition, position and orientation data, orthophotos, and elevation data products must be certified by an NC PLS. The small format, frame non-metric camera must have a mechanical shutter and be capable of acquiring frame imagery with the exposure station’s nadir Ground Sample Distance (GSD) generally between 0.10 foot and 0.45 foot with 60% forward overlap at altitudes between 100 to 400 feet above mean ground level. Deviations from this GSD range should be noted in the LiDAR post-processing products. All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Aerotriangulation and Airborne Survey Reports must be certified by an NC PLS. The firm must be capable of providing full photogrammetric services with small format, frame non-metric camera imagery, including aerotriangulation, DTMs, digital data delivery, global orthophotography, structure and orientation specifications; meet the global-origin and working units found in the NCDOT Workstation Standards, and be compatible with the latest current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.

### Aerial LiDAR Collection/Processing & Elevation Data w/LiDAR

**Description of Work:** The work consists of using a lightweight, small format, topographic LiDAR system for generation of LiDAR derived elevation data products. The work includes acquiring small format, topographic LiDAR data on board an unmanned aerial system (UAS) platform at various altitudes above mean ground level. Primary focus is for Vertical Take Off/Landing (VTOL) UAS but fixed wing platforms are not precluded. For UAS operation, either a FAA Remote Pilot Certificate with an UAS rating under 14 CFR Part 107 (small UAS) – section-9007 exemption of the FAA Reauthorization Act of 2018, or a Special Airworthiness Certificate (SAC) will be required. The firm must adhere to all current and future FAA and NC regulations regarding UAS operations including obtaining a NC Commercial UAS Operator Permit. The work also includes flight and control plan preparation, delivering elevation data products, and certifying Reports for acquisition, position and orientation data, orthophotos, and elevation data products.

**Key Personnel Required:** Land Surveyor

**Employee Registration Required:** P.L.S.

**Minimum Years of Experience:** P.L.S.

**Additional Requirements:**
- All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Reports for acquisition, position and orientation data, orthophotos, and elevation data products must be certified by an NC PLS. The small format, frame non-metric camera must have a mechanical shutter and be capable of acquiring frame imagery with the exposure station’s nadir Ground Sample Distance (GSD) generally between 0.10 foot and 0.45 foot with 60% forward overlap at altitudes between 100 to 400 feet above mean ground level. Deviations from this GSD range should be noted in the LiDAR post-processing products. All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Aerotriangulation and Airborne Survey Reports must be certified by an NC PLS. The firm must be capable of providing full photogrammetric services with small format, frame non-metric camera imagery, including aerotriangulation, DTMs, digital data delivery, global orthophotography, structure and orientation specifications; meet the global-origin and working units found in the NCDOT Workstation Standards, and be compatible with the latest current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.

### Aerial Mapping Control

**Description of Work:** This work consists of establishing ground control for aerial mapping and small format, frame non-metric camera imagery for generation of geoplastic products to include image position and orientation determination, orthophotos, and elevation data. The work includes acquiring small format, frame aerial imagery with a mechanical shutter, non-metric camera on an unmanned aerial system (UAS) platform at various altitudes above mean ground level. Primary focus is for Vertical Take Off/Landing (VTOL) UAS but fixed wing platforms are not precluded. For UAS operation, either a FAA Remote Pilot Certificate with an UAS rating under 14 CFR Part 107 (small UAS) – section-9007 exemption of the FAA Reauthorization Act of 2018, or a Special Airworthiness Certificate (SAC) will be required. The firm must adhere to all current and future FAA and NC regulations regarding UAS operations including obtaining a NC Commercial UAS Operator Permit. The work also includes flight and control plan preparation, delivering elevation data products, and certifying Reports for acquisition, position and orientation data, orthophotos, and elevation data products.

**Key Personnel Required:** Land Surveyor

**Employee Registration Required:** P.L.S.

**Minimum Years of Experience:** P.L.S.

**Additional Requirements:**
- All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Reports for acquisition, position and orientation data, orthophotos, and elevation data products must be certified by an NC PLS. The small format, frame non-metric camera must have a mechanical shutter and be capable of acquiring frame imagery with the exposure station’s nadir Ground Sample Distance (GSD) generally between 0.10 foot and 0.45 foot with 60% forward overlap at altitudes between 100 to 400 feet above mean ground level. Deviations from this GSD range should be noted in the LiDAR post-processing products. All work must be performed under the responsible charge of a North Carolina (NC) registered Professional Land Surveyor (PLS). All Aerotriangulation and Airborne Survey Reports must be certified by an NC PLS. The firm must be capable of providing full photogrammetric services with small format, frame non-metric camera imagery, including aerotriangulation, DTMs, digital data delivery, global orthophotography, structure and orientation specifications; meet the global-origin and working units found in the NCDOT Workstation Standards, and be compatible with the latest current and future versions of Bentley Context (VDA). Digital orthophotographs shall be delivered in MrSID or TIF format with associated world files with specified compression.