STANDARD CONTRACT FOR SERVICES

1. ***Parties*.** This is a contract for services between the State of Vermont, Department of Building and General Services, Office of Purchasing and Contracting on behalf of the State of Vermont (hereinafter called "State"), and The Sanborn Map Company Inc**.**, with a principal place of business in Colorado Springs, CO, (hereinafter called "Contractor"). Contractor's form of business organization is a corporation. It is Contractor's responsibility to contact the Vermont Department of Taxes to determine if, by law, Contractor is required to have a Vermont Department of Taxes Business Account Number.

2. ***Subject Matter*.** The subject matter of this contract is professional services related to the acquisition and delivery of new statewide, color, leaf-off, digital base orthoimagery and related optional "buy-up" products. Detailed services to be provided by Contractor are described in Attachment A.

3. ***Maximum Amount*.** In consideration of the services to be performed by the Contractor, the State agrees to pay the Contractor in accordance with the payment provisions specified in Attachment B, a sum not to exceed $950,000.00.

4. ***Funding Availability*.** Funding for this 5-year contract is contingent upon annual availability of state funds. There is no guarantee of annual state funding from year-to-year. As a result, one or all years may be skipped. Primary funding will be appropriated on a yearly basis by the VT Legislature through the State's Capital Fund and/or other funding mechanisms. When adequate funding is not available, the State reserves the right to skip one or all years until-and-if adequate funding becomes available.

5. ***Contract Term*.** The period of contractor's performance shall begin on April 1, 2021 and end on March 31, 2026.

6. ***Prior Approvals*.** This Contract shall not be binding unless and until all requisite prior approvals have been obtained in accordance with current State law, bulletins, and interpretations.

7. ***Amendment*.** No changes, modifications, or amendments in the terms and conditions of this contract shall be effective unless reduced to writing, numbered and signed by the duly authorized representative of the State and Contractor.

8. ***Termination for Convenience*.** This contract may be terminated by the State at any time by giving written notice at least thirty (30) days in advance. In such event, Contractor shall be paid under the terms of this contract for all services provided to and accepted by the State prior to the effective date of termination.

9. ***Attachments***. This contract consists of 32 pages including the following attachments which are incorporated herein:

Attachment A - Specifications of Work to be Performed

Attachment B - Payment Provisions

Attachment C – "Standard State Provisions for Contracts and Grants" a preprinted form (revision date 12/15/2017)

Attachment D – "Information Technology Profession Services – Terms and Conditions (revision date 3/21/2019)

10. ***Order of Precedence***. Any ambiguity, conflict or inconsistency between the documents comprising this contract shall be resolved according to the following order of precedence:

(1) Standard Contract
(2) Attachment D
(3) Attachment C (Standard State Provisions for Contracts and Grants)
(4) Attachment A
(5) Attachment B

WE THE UNDERSIGNED PARTIES AGREE TO BE BOUND BY THIS CONTRACT

By the State of Vermont:

Date: _____

Signature: _____

Name: Jennifer Fitch

Title: Acting Commissioner
Buildings & General Services

By the Contractor:

Date: _____

Signature: _____

Name: _____

Title: _____

ATTACHMENT A – STATEMENT OF WORK

The Contractor shall:

1. **DETAILED REQUIREMENTS:**

1.1. Project Responsibilities:

1.1.1. The Project Area (PA) being contracted includes the entirety of the State of Vermont. The Contractor is responsible for acquiring 30cm GSD orthoimagery for the entire project area. A boundary dataset (Shapefile) for the state is available from the Vermont Center for Geographic Information (VCGI).

1.1.2. The Project Area shall include data coverage outside of the state boundary with a minimum of a 500 meter buffer on all sides.

1.1.3. Imagery shall be collected over consecutive or non-consecutive leaf-off seasons (spring) starting in 2021 and ending in 2025. At a minimum the entire state will be collected. Areas may be collected multiple times over the contract period. Only a portion of the state may be collected in some years. The entire state may be collected in others. The year's collection area shall be determined by the State based upon available funding for that year, previous collection dates for that area, as well as acquisition status from the previous season. *NOTE: The State shall have the option to acquire the entire state in a single-year as defined in section 1.5.9, and may choose to do so multiple times during contract's life cycle.*

1.1.4. Weather and ground conditions in Vermont do not always ensure that acceptable conditions will exist in a given spring season to acquire imagery. The Contractor shall be required to coordinate acquisition with VCGI each spring and cannot move forward with that year's acquisition flight without VCGI's prior approval. The Contractor should be aware that in past years weather and ground conditions have severely limited acquisition. VCGI shall be responsible for determining when to open flight lines for the season based on an assessment of ground conditions (snow, flooding), and shall also be responsible for closing flight lines at the end of the season (leaf-out). However, the Contractor shall be responsible for all day-to-day operational decisions based on weather, flying conditions, and other parameters (wind, clouds, smoke, haze, etc). VCGI will work in collaboration with the Contractor to prioritize targeted areas within a given acquisition season.

1.1.5. The collection of aerial orthoimagery under this contract shall be dependent upon available future funding from the State of Vermont. Funding over the 5-year period shall be dependent upon the State allocating adequate funds each year for the next year's planned acquisition activities.

1.1.6. The Contractor shall furnish all materials, superintendence, labor, equipment, and transportation and shall execute and complete all of the work required by the contract in conformance with these specifications and any contractual modifications to these specifications. Any deviation from these specifications, unless specifically authorized in writing by the Contracting Officer or his representative, shall be sufficient cause for rejection of any part or all of the work performed.

1.1.7. It shall be the responsibility of the Contractor to secure all licenses and authorizations for overflight of contract areas and to secure necessary permits or clearances for controlled or restricted airspace areas. The Contractor shall notify the VCGI as soon as possible if difficulties in obtaining the appropriate authorizations are encountered. The Contractor shall be responsible for operating and maintaining the aircraft in accordance with all applicable regulations of the Federal Aviation Administration.

1.1.8. All lower tier subcontract documents shall be provided to VCGI upon request.

1.1.9. Independent QA will be performed by VCGI or a separate contractor not engaged through this contract. The Contractor must correct at no additional fee, orthoimagery that does not meet specifications as identified in this Contract.

1.1.10. All re-flights shall be centered on the plotted flight lines and shall be taken with the same sensor/camera.

1.1.11. Work Product Ownership: Upon full payment by the State, all products of the Contractor's work, including outlines, reports, data, metadata, images, models, diagrams, charts, sketches, drawings, art work, plans, photographs, specifications, estimates, computer programs, or similar documents, shall become the sole property of the State of Vermont and may not be copyrighted or resold by the Contractor.

1.1.12. Product Delivery Timeline: The anticipated delivery timeline for 30cm and 15cm buy-ups is as follows:

- **June 1st:** Mobilization, aerial photography acquisition, and delivery of the unproccessed digital imagery (1.4.2 in SOW).
- **June 15th:** Delivery of Aerial Triangulation Report.
- **August 1st:** Initial delivery of DEM and tiled orthoimagery.
- **September 15th:** Delivery of compressed orthoimagery as well as compressed and uncompressed black and white (greyscale) orthoimagery.
- **October 1st:** Final delivery of all deliverables including metadata and an other remaining project deliverables.

1.2. **Orthoimagery Acquisition and Production**:

1.2.1. Orthoimagery shall be collected with a large format frame or push broom digital sensor with a capture width approximately 12,000 pixels or greater.

1.2.2. The entire mission in a given year must be flown with the same digital camera model using the same configuration.

1.2.3. The digital sensor system shall have the following general characteristics:

- Simultaneous capture of red, green, blue and Near-Infared for each exposure.
- The system shall use square pixels (ground footprint) at all times during processing. The technique of using aggregated detectors resulting in a rectangular pixel before blending with other channels shall not be used.
- The aerial sensor shall be a precision aerial mapping sensor equipped with a low distortion, high resolution lens.
- Camera characteristics shall be such that the aerial imagery taken can be satisfactorily used with the vendor's proposed photogrammetric compilation equipment and environment.
- The camera shall be equipped with and utilize electronic Forward Motion Compensation. It must also be properly installed on a Gyro-Stabilized Mount.
- The Contractor shall provide calibration certificates for all systems to be used for acquisition.

1.2.4. Imagery shall be acquired in the Spring during minimal shadow conditions. Imagery acquisition shall occur when the sun angle is greater than 30-degrees. However, every effort shall be made to acquire areas with tall buildings (> 60ft) at the highest solar possible in the day.

1.2.5. Overlapping imagery in each flight line shall provide full stereoscopic coverage of the area to be mapped. The imagery shall have an average endlap of sixty percent, (60%) with a maximum of +/- 10% between images; sidelap between adjacent parallel flight lines shall average thirty percent (30%) with a maximum of +/- 10% between images; crab shall not be in excess of three (3) degrees; and, tilt of the camera from verticality at the instant of exposure shall not exceed three (3) degrees.

1.2.6. Flight line orientation shall be in a North-South Orientation for all imagery acquired. Planned Flight Lines must be approved by VCGI before VCGI will allow imagery acquisition for that season.

1.2.7. The flying height for each flight line should be chosen in accordance with the sensor manufacturer's recommended flying height to produce digital orthoimagery to meet ASPRS Accuracy Standards (2014) for 15cm or 30cm RMSEx and RMSEy Horizonal Accuracy Classes.

1.2.8. Imagery shall be acquired only under conditions free from snow (beyond the very highest summits), flooding, clouds and cloud shadows, smoke, and haze.

1.2.9. Spatial Resolution: Imagery shall be captured at a Ground Sample Distance (GSD) sufficient for the production of ASPRS Accuracy Standards (2014) compliant digital orthoimagery at 15cm or 30cm (depending on product being produced) RMSEx and RMSEy Horizonal Accuracy Classes. The Ground Sampling Distance as acquired by the camera sensor (and as computed by mean average terrain) should not be more than 95% of the final image pixel size.

1.2.10. Spectral resolution: All imagery shall be collected and delivered as 32-bit images. The sensor shall capture light bands corresponding to natural color (red, green and blue - RGB) as well as near-infrared (IR), resulting in 32-bit 4-band (8-bit per band) RGB-IR images. Bands shall be saved in the following order: 1) Red, 2) Green, 3) Blue, and 4) Near-Infrared.

1.2.11. Radiometric resolution: The digital images shall be clear and sharp in detail and of high radiometric quality. The sensor shall capture the images in an uncompressed "lossless" image format. The sensor shall, at minimum, utilize a 12-bits per pixel radiometric resolution. Up-sampling from a lower bit depth to a higher bit depth is not allowed (e.g. resampling 8-bit data to 12-bit data).

1.2.12. Coordinate System: All orthoimagery and related products shall be delivered in the current Vermont State Plane Coordinate System (State Plane Meters NAD83-2011, EPSG:6589). *NOTE: The National Geodetic Survey (NGS) is expected to release a new State Plane Coordinate System for Vermont in 2022 (SPCS2022), built upon the new National Spatial Reference System (NSRS) of 2022 and its associated North American Terrestrial Reference Frame (NATRF2022). As a result, the Contractor shall be prepared to shift to delivering all orthoimagery and products to the new SPCS2022 once it becomes available.*

1.2.13. Horizontal and Vertical Datums: The horizontal datum shall be North American Datum of 1983 (NAD83 - 2011) in US Survey Meters. The vertical datum shall be referenced to the North American Vertical Datum of 1988 (NAVD88). The geoid model used shall be the latest hybrid geoid model of NGS, supporting the latest realization of NAD83 (currently GEOID18 model). *NOTE: The National Geodetic Survey (NGS) is expected to release new horizontal and vertical datums built upon the National Spatial Reference System (NSRS) of 2022. These will include North American Terrestrial Reference Frame (NATRF2022) and North American-Pacific Geopotential Datum of 2022 (NAPGD2022), along with a new geoid model (GEOID2022). As a result, the Contractor shall be prepared to shift to delivering all orthoimagery and products in these new datums once they become available.*

1.2.14. Horizontal Accuracy: The horizontal accuracy of the orthorectified imagery shall not exceed a verified ASPRS Accuracy RMSEx and RMSEy Horizonal Accuracy Classes (2014) for 15cm or 30cm digital orthoimagery products (depending on product being produced). A complete quantitative analysis of the data shall be performed and a report provided showing the final RMSE and Accuracy errors using the NSSDA and ASPRS (2014) guidelines for product testing and reporting.

1.2.15. DEM and Vertical Accuracy: A new, bare earth digital elevation model with integrated mass point and breakline data shall be produced for the entire project area. The DEM shall consist of points spaced at regular intervals along a grid, points of significant high or low elevations, and ortho specific breaklines at all significant terrain breaks. It is not necessary to capture breaklines at all curbs, ditches, stream banks, or other similar minor terrain breaks. The DEM shall be free of artifacts and data voids. The vertical accuracy of the DEM(s) developed to support production of the digital orthophotos shall be sufficient to guarantee the horizontal accuracy specified above. Accuracy testing should comply with FGDC Geospatial Positioning Accuracy Standards, National Standard for Spatial Data Accuracy (NSSDA), and ASPRS (2014) guidelines.

A copy of the statewide DEM dataset created for prior statewide orthoimagery production in Vermont is available for use by the contractor for this project. However, VCGI does not guarantee that the available DEM will be adequate to meet the final product accuracy specifications being required in this Contract. It is the Contractor's responsibility to update the supplied DEM as necessary in order to support the orthoimagery production specifications and accuracy standards of ASPRS (2014) as specified in this Contract.

Updates to the existing DEM need only support the orthorectification and are not required to support contour modeling or other DEM applications. *NOTE: It should also be noted that the State of Vermont has statewide Quality Level-2 (QL2) lidar for the entire state.*

The DEM data is not to be stored as a record (Z component) for each pixel of the orthoimagery.

Elevation data created or modified for use in the orthorectification process shall be integrated into the supplied digital terrain model and submitted as a deliverable in a non-proprietary format on portable media. FGDC compliant metadata for the final DEM must also be provided at delivery.

1.2.16. Horizontal and Vertical Control (Project Control Points): The Contractor shall use photo-identifiable points (PIDs) for ground control. The Contractor shall collect, describe, photograph and survey all photo-identifiable ground control points in a manner sufficient to support the deliverable specifications outlined in this Contract, including a description of the ground control feature and an on-the-ground photo. The horizontal and vertical datums of the surveyed points shall be consistent with section 1.2.13. The Contractor shall obtain permission from private landowners as needed. The points (x,y, z values), descriptions, and photos shall be submitted as a deliverable as specified under section 1.4.16. *NOTE: PIDs collected during the 2016-2020 acquisition cycle are available for download from this web page (https://vcgi.vermont.gov/ortho-vintage5-rfps). However, the Contractor should NOT assume these are reusable for the 2021-2015 acquisition cycle and therefore should plan accordingly.*

1.2.17. Aerial Triangulation Data: The Contractor shall use fully analytical, softcopy aerial triangulation procedures to extend the horizontal control from relatively few ground survey control points to additional supplemental control points or pass points. The Contractor shall follow accepted softcopy aerial triangulation procedures and utilize equipment that shall achieve the aerial triangulation accuracy required to meet or

exceed required orthoimagery accuracy standards. Each stereomodel is to be scaled and leveled using the adjusted coordinate values of the pass points located in the stereomodel. The use of airborne GPS (ABGPS) in combination with ground survey is required. An aerial triangulation solution shall never be extended beyond the ground control of the project area. In conducting the aerial triangulation, the Contractor shall perform a fully analytical simultaneous bundle adjustment using a weighted least squares adjustment to meet accuracy requirements. Aerial triangulation data shall consist of a minimum of refined plate coordinates, adjusted ground coordinates, and a statistical summary report shall be submitted in softcopy format as a deliverable. Contractor shall use a combined aerial triangulation solution to ensure consistent horizontal alignment between the 15cm and 30cm imagery products. This requirement only applies for years in which the 15cm “buy-ups” and 30cm base imagery are flown in the same season. In years where the 15cm and 30cm are not collected in the same season, the AT shall not be combined. Instead, it must be bridged via points from the existing AT in the area. All ground positions determined by aerial triangulation must be based on the coordinate system and datums specified in section 1.2.12 and 1.2.13.

1.2.18. Metadata: Metadata compliant with the Federal Geographic Data Committee's (FGDC) Content Standard for Spatial Metadata in an Esri ArcGIS compatible XML format shall be delivered. Metadata shall be supplied for each individual image tile. At a minimum, the metadata shall include the following information:

- TileID:
- Project Name:
- Location:
- Ground Sample Distance:
- Output format:
- Output Media:
- Spectrum: 4 separate, distinct bands (red, blue, green, near infrared)
- Output:
- Contractor:
- Project acquisition date(s) and, for each day, beginning and ending time of day in local standard time:
- Detector type(s) and manufacturer:
- Spacing between CCD detectors (in micrometers):
- Array size:
- Nominal ground swath or footprint of the detector:
- Spectral sensitivity of the detector (in nanometers):
- Filters used (if any):
- Scene to scene edge-matching accuracy (in pixels):
- Band to band registration accuracy (in pixels):
- Horizontal accuracy (in units):
- Horizontal Datum:
- Vertical Datum:

- Image Processing Description (brief description of processing and data used in processing): FGDC compliant metadata describing the image production process shall be provided for each image tile and at a minimum shall include information on flight dates, processing software, processing methodology, control point location and positional accuracies.

1.3. Orthoimagery Quality Assurance and Quality Control:

1.3.1. The finished digital orthoimagery shall have an image quality the same as or better than the original unrectified input image. The degradation of image quality by reprocessing shall be grounds for rejection of the project. Data shall not be compressed during ANY PHASE of the production process. Presence of compression artifacts shall be cause for rejection. Best-of-breed photogrammetric software shall be used during all phases of image processing. Use of non-standard photogrammetric software (eg: Adobe Photoshop) for image processing/manipulation is NOT allowed without previous approval from VCGI.

1.3.2. Quality Assurance and Quality Control (QA/QC) shall be performed to ensure that all processes and procedures used, and metadata produced were adequate to meet all specifications cited as deliverables. Visual inspection of the data shall be performed for the following:

1.3.2.1. **Atmospheric artifacts:** Cloud cover, smoke and haze shall be absent.

1.3.2.2. **Misalignment:** Excessive horizontal displacement, relative join (misalignment) of transportation features between adjacent image chips/tiles or seamlines shall not exceed 2 pixels.

1.3.2.3. **Tonal balance:** Orthophotos shall be tonally balanced to produce a uniform contrast and tone across the block and the entire project. Extreme tonal or color variation across seamlines shall be avoided. Changes in color balance across the project, if they exist, shall be gradual. Abrupt tonal variations between tiles or inconsistencies in tone and density between individual orthophotos and/or adjacent sheets are not acceptable. All images should have a neutral tonal range without the dominance of any individual color. The difference between the minimum and maximum value in a RGB triplet of any nearly neutral objects within the image shall be less than 10, with a preferred value greater than 5. Misregistration between color bands are not acceptable.

1.3.2.4. **Structural Lean:** Excessive lean in bridges, buildings, and other raised structures shall be corrected if they obscure adjacent structures and/or transportation features such as roads, rail lines, and sidewalks. Structural lean greater than 5 pixels (GSD) per “floor” (defined as 4-vertical-meters) in bridges, buildings, and other raised structures shall be corrected by adjusting seamlines to utilize the most nadir image.

1.3.2.5. **Feature occultation:** All reasonable effort (eg: seamline adjustments) shall be made to ensure that features, particularly transportation features or adjacent structures, are not obscured by shadows or buildings. All reasonable effort should be made to acquire areas with tall buildings (> 60ft) at the highest solar possible in the day.

1.3.2.6. **Clipping:** Ground features appearing in the orthoimagery, such as building roof tops, water towers, and radio towers, shall not be clipped at seamlines or between individual tiles.

1.3.2.7. **Image mosaicking/tiling and quality:** The image with the best contrast shall be used as a reference image when the color digital orthoimagery tiles are created. All other images shall have their brightness values adjusted to

that of the reference image. Acceptable mosaicking must produce quality orthoimagery of consistent tone and contrast and must do so without obvious join lines.

Interior mosaicking, edge mosaicking and feathering may be used, but when used the join line between photograph images shall be chosen so as to minimize the obtrusiveness of the join itself and to reduce the difference in brightness, tone and contrast between the different photograph images. Interior mosaicking, edge mosaicking and feathering shall not affect the positional accuracy of the orthophoto.

1.3.2.8. **Image artifacts:** The delivered color digital orthophotos shall not contain defects such as out-of-focus imagery, blurs, whorls, twists, color blemishes. The images shall also be free from image blurs, smears, voids, image artifacts, “cold” or “hot” pixels, color distortion, color balance or tonal problems, or any other kind of “digital blemish” or data corruption. Evidence of oversaturation or undersaturation as a result of image processing or histogram manipulation shall be avoided. Evidence of image compression: artifacts due to image compression shall be absent.

1.3.2.9. **Building/structure warp:** Shall not be present in the final image product.

1.3.2.10. **Completeness:** There shall be no areas of an orthoimagery where ortho production process was incomplete due to incomplete data (i.e., lack of DTM/DEM data, image gaps, etc.)

1.3.3. Ground Sampling Distance: The horizontal ground resolution (pixel - x and y components) of the finished digital orthoimagery shall be 15cm or 30cm depending on product .

1.3.4. Perform Horizontal Accuracy Test: Accuracy testing must comply with FGDC Geospatial Positioning Accuracy Standards, National Standard for Spatial Data Accuracy (NSSDA), and ASPRS Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0 – November 2014).

1.3.5. Verify Metadata Adequacy: Verify that accompanying metadata is complete as defined by FGDC metadata standards.

1.4. List of Deliverables:

1.4.1. Media: All media supplied in the delivery of the following products shall be in new condition and shall become the property of VCGI and the State of Vermont.

1.4.2. Unprocessed Digital Imagery: One set of unprocessed statewide digital imagery shall be prepared from the original digital exposures. This digital imagery shall be in uncompressed TIFF image format containing the full 16-bit (per band) radiometric pixel values for each of the four (4) wavelengths that are collected and shall be sent to the VCGI for evaluation prior to initiating production of orthoimagery. All digital imagery data shall be supplied on a new Microsoft Windows compatible USB hard drive.

1.4.3. Reference Product: Prior to initiating final orthoimage production, the Contractor shall provide sample ortho images for evaluation and acceptance as a baseline for visual image quality. This Reference Product shall be the project visual quality control reference standard. If visual quality control issues arise during final review, this Reference Product shall be used as the project standard. The sample ortho images shall be supplied on a Microsoft Windows compatible USB drive and/or FTP download.

1.4.4. Statewide Tiled Digital Orthoimagery: Digital, Orthorectified, 32-bit, RGBN (bands ordered 1=Red, 2=Green, 3=Blue, 4=Near-Infrared) true color images in GeoTIFF

format, shall be submitted on a new Microsoft Windows compatible USB hard drive. 8-bit greyscale versions of the orthoimagery shall also be delivered.

The orthorectified GeoTIFF files shall be organized as representing “tiles” on a tile grid. Tiles shall be numbered and organized according to the 15cm and 30cm tiling indexes established by VCGI, which are available for download (https://vcgi.vermont.gov/ortho-vintage5-rfps). GeoTIFF files shall be accompanied by an index shapefile suitable for loading into ArcGIS. The index shapefile shall include tile polygon boundaries with the following attributes:

- Tile number
- File name (GeoTIFF)
- Acquisition date
- Ground Sample Distance (GSD)
- Name of Acquisition Contractor
- Name and license number of photogrammetrist in charge of project
- Coordinate system (EPSG code)
- Horizontal datum
- Horizontal units
- Digital sensor type
- Horizontal accuracy

1.4.5. Compressed Imagery: In addition to the uncompressed Digital Color Orthophotgraphy images and after the color images have been accepted, the Contractor shall also deliver to VCGI a set of statewide orthoimagery as compressed JPEG2000 files. The Contractor shall create the compressed orthophotos using a 1/18 compression ratio (or other negotiated compression ratio). The compressed images shall be supplied on a Microsoft Windows compatible USB hard drive.

1.4.6. Digital Elevation Model (DEM): A Digital Elevation Model (DEM) shall be developed at a density level necessary to support the orthoimagery production accuracy standards of ASPRS (2014) for 15cm and 30cm RMSEx and RMSEy Horizonal Accuracy Classes as defined in this RFP. The Contractor shall provide to VCGI the DEM in a nonproprietary geospatial format on Microsoft Windows compatible hard drive. FGDC compliant metadata for the final DEM shall also be provided at delivery.

1.4.7. Calibration Reports: Camera Calibration Report(s) for Aerial Camera(s), or in the case of digital sensors, a current Product Characterization Report of the instrument used shall be included as a deliverable. A copy of the Calibration Report shall be provided in PDF format.

1.4.8. Aerial Triangulation Data Report: Immediately upon completion of all aerial triangulation, the Contractor shall prepare a formal aerial triangulation report for submission to VCGI. The AT Report shall be provided in PDF format. The report shall include, but not be limited to, the following:

- Flight lines
- Sigma naught.
- GPS accuracy of camera station.
- Standard errors of adjusted tie-point terrain coordinates (RMS errors in x, y for horizontal coordinates) referenced to photo scale in micron and ground units.

- Standard error of adjusted tie-point terrain coordinates (RMS errors of z vertical coordinates) referenced to photo scale in micron and ground units.
- All misclosures at ground control points.
- Computer printout of the final adjusted aerial triangulation solution to horizontal and vertical ground control. The printout should contain the final State Plane Coordinates for all ground control points, tie points and pass points.
- Identification of the weighting factors applied to all points used in the final solution.
- An ASCII file on approved electronic media containing the coordinate data and the results of the fully analytical aerial triangulation (FAAT) adjustments (*printout.0 file*).

The aerial triangulation report shall include a brief narrative including descriptions of equipment, procedures, and computer programs used. Root-mean square (RMS) error summaries shall be provided for bundle adjustment photographic measurement residuals or strip tie point residuals and misclosures and misclosures at control points. In addition, significant misfits encountered at control points, and steps taken to analyze such misfits and to rectify the discrepancies, shall be described. All control shall be listed in the report with an explanation of how the control was used in the FAAT.

1.4.9. Airborne GPS: A statistical report shall be produced and delivered, summarizing the results of the airborne GPS adjustment.

1.4.10. IMU Data: Sensor orientation data and a statistical summary report shall be prepared and submitted on portable media, in a nonproprietary format. A statistical report summarizing the overall accuracy of the adjusted IMU data shall also be submitted.

1.4.11. Flight Diagram: Upon completion of all aerial acquisition, a flight diagram that illustrates each year's project area outline, the location of the flight lines and the approximate location of image centers shall be included as a deliverable. This diagram shall be provided in a softcopy PDF report AND in shapefile format suitable for loading into ArcGIS.

Each flight line shall be flown continuously in a north-south direction across the project area. Every effort shall be made to avoid breaks within individual flight lines. When breaks within a flight line are necessary, the entire flight line composed of the resulting segments shall meet all of the requirements set forth in these specifications. Where breaks occur, there shall be sufficient overlap to ensure a stereo model of overlap or tie.

All photos within a single flight line shall be acquired with the same aerial camera and with the camera oriented in the same direction. The principal points of the first two and the last two exposures of each flight strip shall fall outside the boundaries of the area to be mapped. All side boundaries shall be covered by a minimum of twenty-five percent (25%) of the photo image format (keeping in mind the required 500 meter buffer around the state boundary.

1.4.12. Imagery Supplemental Report: A report of all imagery flown shall be produced for and included with each flight line. The report shall show the flight line numbers and flight track. The report shall be softcopy (PDF file).

1.4.13. Georeferencing/header File: One copy of each digital orthoimagery and its associated georeferencing/header file on the selected media. The georeferencing/header file shall contain the following items:

- Georeferencing information
- Tile number

- Name of Acquisition Contractor
- Name and license number of photogrammetrist in charge of project
- Coordinate system (EPSG code)
- Horizontal datum
- Horizontal units
- Ground Sample Distance (GSD)
- Lower left map coordinate
- Upper left map coordinate
- Upper right map coordinate
- Lower right map coordinate
- Digital sensor type
- Sensor serial number
- Acquisition date
- Horizontal accuracy

1.4.14. Metadata: Metadata compliant with FGDC standard for both the full project (bounding coordinates for the full project) and individual images is required.

1.4.15. Project Report: A project report shall be prepared to document all aircraft global positioning system, aerial triangulation, DEM creation, photo identification (horizontal and vertical) check points, and orthorectification processes used in the project. It shall include an ortho map tile index in softcopy (PDF) and GIS format (shapefile) showing the layout/location of the orthoimagery. The report shall also include an accuracy report and statement of accuracy complying with FGDC Geospatial Positioning Accuracy Standards, National Standard for Spatial Data Accuracy (NSSDA). The report shall include a map delineating flight line locations and flight dates. Identify sensor used and bands collected and the altitude of the sensor. Include date(s) of photography and date(s) of compilation.

The report shall be delivered in softcopy (as a PDF file) with the final delivery of the digital orthoimagery.

1.4.16. Horizontal and Vertical Control (Project Control Points): All photo-identifiable ground control points shall be listed in a MS Excel spreadsheet with the following minimum columns

- Point ID
- Point Name
- Point X Coordinate
- Point Y Coordinate
- Point Z value
- Point Description

At least one ground-based photo shall be provided (in JPEG format) for each photo-identifiable target. The Point ID shall be in the file name.

1.4.17. Verify Metadata Adequacy: Verify that accompanying metadata is complete as defined by FGDC metadata standards.

1.5. **OPTIONAL PRODUCTS *(Buy-up Options):*** Buy-up options are optional products and services that the State of Vermont, Regional Planning Commissions, or municipalities may choose to

purchase in any given year within the contract period. The following "Buy-up Options" shall be available for purchase by the State of Vermont and municipalities within Vermont under this Contract.

The following size tiers apply to orthoimagery, lidar, and planimetric buy-up options only.

- **Small Buy-up Areas:** Less than 50 square miles.
- **Medium Buy-up Areas:** Greater than or equal to 50 square miles; less than 700 square miles.
- **Large Buy-up Areas:** Greater than or equal to 700 square miles.

1.5.1. 15cm GSD orthoimagery in alignment with base ortho specifications defined in this Contract including JPEG2000 and grayscale (black and white) deliverables.

Pixel Size GSD	ASPRS Horizontal Accuracy Class RSMEx and RSMEy	Orthoimage RMSEx and RMSEy in terms of pixels	Associated Map Scale	ASPRS 1990 Accuracy Class
15 cm	15 cm	2-pixels	1:1,200	1

1.5.2. Additional Photo Identifiable Points (PIDs): Collection of additional ground survey points supporting 15cm GSD ortho imagery in alignment with specifications defined in section 1.4.16.

1.5.3. Lidar QL1 data in alignment with the latest USGS's Lidar Base Specification[1] - Quality Level (QL) 1 and including

1.5.3.1. Break lines, Esri Shapefile format

1.5.3.2. 0.5 meter hydro-flattened, hydro-enforced Bare Earth Digital Elevation Model (DEM)

1.5.3.3. 0.5 meter resolution Intensity Image: intensity recorded from reflective surface (first return) pulse.

1.5.3.4. 0.5 meter Digital Surface Model (DSM)

1.5.3.5. 0.5 meter Normalized Digital Surface Model (nDSM)s

1.5.3.6. Point cloud in .las 1.4 or higher format; all returns

1.5.3.7. Ground returns, overlap points, and low/high points should be classified in the full point cloud and all returns .las files.

1.5.3.8. ½ foot contours.

1.5.3.9. The Contractor shall be responsible for all vertical and horizontal project control in support of Lidar data acquisition and processing.

1.5.3.10. Hydro-enforcement standards for QL1: The following standard shall be applied to ensure proper hydro-enforcement at locations where bridges or culverts exist under road or rail infrastructure to allow for the movement of water. Hydro-enforcement must be implemented using breaklines as defined in the current USGS Lidar Base Specification. These and all other breaklines must be included with all lidar deliverables. Breaklines must be created and enforced for the following features (see section 1.5.5 for acceptable sources of data)

1.5.3.10.1. Town Culverts >= 24 inches ("height" or "width" >= 24)

[1] https://www.usgs.gov/core-science-systems/ngp/ss/lidar-base-specification-online

1.5.3.10.2. Town Bridges = All structures

1.5.3.10.3. State Long Structures = All structures

1.5.3.10.4. State Short Structures = All structures

1.5.3.10.5. State Ultra-Short Structures >= 24 inches ("size" >= 24)

1.5.3.10.6. State Rail Bridges = All structures

1.5.4. Lidar QL2 data in alignment with the latest USGS's Lidar Base Specification[2] - Quality Level (QL) 2 and including

1.5.4.1. Break lines, Esri Shapefile format

1.5.4.2. 0.7 meter hydro-flattened, hydro-enforced Bare Earth Digital Elevation Model (DEM)

1.5.4.3. 0.7 meter resolution Intensity Image: intensity recorded from reflective surface (first return) pulse.

1.5.4.4. 0.7 meter Digital Surface Model (DSM)

1.5.4.5. 0.7 meter Normalized Digital Surface Model (nDSM)

1.5.4.6. Point cloud in .las 1.4 or higher format; all returns

1.5.4.7. Ground returns, overlap points, and low/high points should be classified in the full point cloud and all returns .las files.

1.5.4.8. 1-foot contours.

1.5.4.9. The Contractor shall be responsible for all vertical and horizontal project control in support of Lidar data acquisition and processing.

1.5.4.10. Hydro-enforcement standards for QL2: The following standard shall be applied to ensure proper hydro-enforcement at locations where bridges or culverts exist under road or rail infrastructure to allow for the movement of water. Hydro-enforcement must be implemented using breaklines as defined in the current USGS Lidar Base Specification. These and all other breaklines must be included with all lidar deliverables. Breaklines must be created and enforced for the following features (see section 1.5.5 for acceptable sources of data)

1.5.4.10.1. Town Culverts >= 36 inches ("height" or "width" >= 36)

1.5.4.10.2. Town Bridges >= 6 feet ("span" >= 6)

1.5.4.10.3. State Long Structures = All structures

1.5.4.10.4. State Short Structures = All structures

1.5.4.10.5. State Ultra-Short Structures >= 36 inches ("size" >= 36)

1.5.4.10.6. State Rail Bridges = All structures

1.5.5. Lidar hydro-enforcement: Acceptable data sources. Additional and/or alternative data sources must be pre-approved by VCGI before they can be used by the Contractor.

1.5.5.1. Town Structures: Download from https://vtculverts.org/exportstructures and select "Structure Type = All" and "Export = All Structures". Refer to "height" and "width" specifications for culverts.shp and "span" for bridges.shp.

1.5.5.2. State Structures

[2] https://www.usgs.gov/core-science-systems/ngp/ss/lidar-base-specification-online

1.5.5.2.1. Long: https://geodata.vermont.gov/datasets/VTrans::vt-long-structures-bridges-and-culverts

1.5.5.2.2. Short: https://geodata.vermont.gov/datasets/VTrans::vt-short-structures-bridges-and-culverts

1.5.5.2.3. Ultra-Short: https://maps.vtrans.vermont.gov/arcgis/rest/services/Master/AMP/FeatureServer/5 (not available for download but can be loaded into ArcGIS software)

1.5.5.2.4. State Rail Bridges: https://maps.vtrans.vermont.gov/arcgis/rest/services/Rail/RailroadBridges/MapServer (not available for download but can be loaded into ArcGIS software)

1.5.6. Raster Tile Packages – Production and delivery of the following raster tile packages compliant with Esri's Tile Package specification[3] (compact cache v2). Raster tiles must be provided down to 1:600 scale for State Plane tiles and 1:564.248588 for Web Mercator tiles. Each raster tile package must include 15cm GSD "buy-ups" if acquired the same year.

Package Name	Package Desc	EPSG[4]	Tile Scheme	Tile Format
CLR<YYYY>_SP_CACHE	Color by Year – State Plane	32145	Custom	Esri Mixed
CLR<YYYY>_WM_CACHE	Color by Year – Web Mercator	3857	Google/Bing	Esri Mixed
CIR<YYYY>_SP_CACHE	Color Infrared by Year – State Plane	32145	Custom	Esri Mixed
CIR<YYYY>_WM_CACHE	Color Infrared by Year – Web Mercator	3857	Google/Bing	Esri Mixed
BW<YYYY>_SP_CACHE	Black & White by Year – State Plane	32145	Custom	Esri Mixed
BW<YYYY>_WM_CACHE	Black & White by Year – Web Mercator	3857	Google/Bing	Esri Mixed
CLR2021_2025_SP_CACHE	Color all Years – State Plane	32145	Custom	Esri Mixed
CLR2021_2025_WM_CACHE	Color all Years – Web Mercator	3857	Google/Bing	Esri Mixed
CIR2021_2025_SP_CACHE	Color Infrared all Years – State Plane	32145	Custom	Esri Mixed
CIR2021_2025_WM_CACHE	Color Infrared all Years – Web Mercator	3857	Google/Bing	Esri Mixed
BW2021_2025_SP_CACHE	Black & White all Years – State Plane	32145	Custom	Esri Mixed
BW2021_2025_WM_CACHE	Black & White all Years – Web Mercator	3857	Google/Bing	Esri Mixed

1.5.7. Web Map Tile Services: Annual hosting of raster tile packages (section 1.5.6) as Open Geospatial Consortium (OGC) compliant Web Map Tile Services[5] (WMTS) over https.

1.5.8. Planimetric features (2D) shall be in alignment with the following specifications

1.5.8.1. Horizontal Accuracy: Consistent with ortho base specification used to capture features. For example, planimetric features captured using 30cm pixel size GSD ortho imagery shall meet ASPRS Horizontal Accuracy Class of 30cm RSMEx and RSMEy. Planimetric features captured using 15cm pixel size GSD ortho imagery shall meet ASPRS Horizontal Accuracy Class of 15cm RSMEx and RSMEy.

1.5.8.2. Feature specifications:

1.5.8.2.1. Structures: Buildings over 200 sq. ft. including mobile homes; Towers and antennas over 200 ft.; Tanks over 500 sq. ft.; Train stations and platforms; Miscellaneous structures (stadia, large monuments).

[3] https://github.com/Esri/tile-package-spec
[4] https://epsg.io/
[5] https://www.opengeospatial.org/standards/wmts

1.5.8.2.2. Impervious Surfaces: Roads and walkways to edge-of-pavement. Includes paved and unpaved roads and alleys; paved medians; sidewalks; and parking areas. All driveways paved and unpaved. Sidewalks include paved walkways adjacent to public right-of-ways as well as major walkways on government, corporate or institutional campuses (eg: College/University). Sidewalks exclude all un-paved walkways, and walkways (paved or unpaved) along private roads, private residential yards, or leading from driveways to front doors.

1.5.9. Single-Year Statewide Imagery Acquisition Option: This option is to acquire and deliver the base 30cm GSD products (all deliverables defined in section 1.4) within a single spring acquisition season (single-year) in alignment with base ortho specifications defined in this Contract. Additional this option includes all deliverables defined in section 1.5.6 (Raster Tile Packages) and 1.5.7 (Raster Tile Web Hosting).

1.6. PROJECT MANAGEMENT:

1.6.1. The Contractor shall be required to interact regularly with personnel from VCGI and its sub-contractors to resolve problems or issues related to:

- project schedule,
- coordination of acquisition planning and preparation for each year's scheduled acquisition,
- approval to begin acquisition each Spring,
- achieving final acceptance of the contract deliverables.

1.6.2. The Contractor shall be required to notify VCGI of any changes in project personnel or changes in subcontractors as well as the reason for the change for the duration of the project. Notification of personnel or subcontractor change should occur prior to the change implementation. The Contractor is responsible for replacing project subcontractors or project personnel with personnel of equal or better skills and experience for the project.

1.6.3. The Contractor must have an ASPRS Certified Photogrammetrist on staff and responsible to the quality of the project deliverables.

1.6.4. The Contractor shall be responsible to VCGI for project management.

1.6.5. The Contractor shall provide a bi-monthly (every other week) progress report to VCGI's assigned Project Manager starting prior to Spring acquisition planning and through to delivery of that year's deliverables. This report shall include: all tasks accomplished, incomplete, or behind schedule in the previous week (with reasons given for those behind schedule); and all tasks planned for the coming weeks.

(End of Attachment A)

ATTACHMENT B
PAYMENT PROVISIONS

The maximum dollar amount payable under this contract is not intended as any form of a guaranteed amount. The Contractor will be paid for products or services actually delivered or performed, as specified in Attachment A, up to the maximum allowable amount specified on page 1 of this contract.

1. Prior to commencement of work and release of any payments, Contractor shall submit to the State:
    a. a certificate of insurance consistent with the requirements set forth in Attachment C, Section 8 (Insurance), and with any additional requirements for insurance as may be set forth elsewhere in this contract; and
    b. a current IRS Form W-9 (signed within the last six months).
2. Payment terms are **Net 30** days from the date the State receives an error-free invoice with all necessary and complete supporting documentation.
3. Contractor shall submit detailed invoices itemizing all work performed during the invoice period, and any other information and/or documentation appropriate and sufficient to substantiate the amount invoiced for payment by the State. All invoices must include the Contract # for this contract.
4. Contractor shall submit invoices to the State in accordance with the schedule set forth in this Attachment B. Unless a more particular schedule is provided herein, invoices shall be submitted not more frequently than monthly.
5. Invoices shall be submitted to the State at the following address:

    ATTN: VT Center for Geographic Information
    State of Vermont – Agency of Digital Services
    1 National Life Drive – Dewey Building 2nd Floor
    Montpelier, VT 05620-0501

6. The payment schedule for delivered products, or rates for services performed, and any additional reimbursements, are as defined below:

30CM BASE ORTHOIMAGERY

A. Cost of each annual 30cm GSD orthoimagery product task order shall be for a firm fixed price, and shall be based on the rates defined in section E and methodology outlined in section F.

B. See “BUY-UP OPTIONS” section for payment provisions for “buy-up options” in the Contract.

C. The state shall not be responsible for any expenses of the contractor.

D. Progress Payments per annual area of acquisition. The percentage payments defined below shall be <u>percentages of the total firm fixed price</u> agreed upon in the task order.

30cm Orthoimagery

1. Mobilization, aerial photography acquisition, and delivery of the unproccessed digital imagery, Aerial Triangulation Report, DEM and tiled orthoimagery. - 50% payment upon acceptance
2. Delivery of final orthoimagery, compressed orthoimagery including compressed and uncompressed black and white (greyscale) imagery, metadata and any other remaining project deliverables. - 50% payment upon acceptance

VCGI is responsible for final review and approval of all contract deliverables and services received by the State of Vermont.

E. The following pricing schedule designates the agreed upon price for statewide 30cm GSD orthoimagery under this contract.

VT Statewide Orthoimagery Acquisition Services Agreed Upon Cost by Product		
Products	**Description**	**Statewide Cost[6] 30cm**
Base - 1	Production of Statewide Raw Digital Imagery, TIFF image format. (Also including Flight Diagram, Calibration Reports, Airborne GPS Report, IMU Data Report, Reference Product, and Imagery Supplemental Report Deliverables)	**$172,932.39**
Base - 2	Aerial Triangulation (Including Triangulation Report)	**$11,387.91**
Base - 3	Creation and Delivery of Statewide DEM (Including Updating of Provided DEM to Meet Designated Orthoimagery Accuracy Specifications)	**$7,378.25**
Base - 4	Production of Statewide Tiled 4-band Digital Orthoimagery Delivered in GeoTIFF Format (Including Project Report Deliverables, Seamlines, and FGDC Compliant Metadata For Each Orthoimage and the Full Project)	**$30,485.51**
Base - 5	Production of Statewide, Tiled, Digital Color Orthos, JPEG2000 Compressed Imagery (at 1:18 compression)	**$6,370.34**
Base - 6	Statewide Digital Black and White Orthophotography (Greyscale[7], Compressed and Uncompressed at Baseline Product Specification)	**$6,370.34**
Total		**$234,924.74**

F. Individual annual task order payments shall be determined by the number of 30cm image tiles collected in that year's acquisition. There are 8169 (1800m X 1800m) VT ortho tiles necessary to cover Vermont. By dividing by 8169 tiles we

[6] Includes all expenses for statewide ortho imagery acquisition. "Statewide" means all areas represented in the VT Ortho Acquisition Project Area shapefile (https://vcgi.vermont.gov/ortho-vintage5-rfps). The statewide orthoimagery will be acquired over a 5-year period.

[7] The State of Vermont will accept "black and white" imagery (8-bit greyscale images) converted from the Red, Green, and Blue bands of the base orthoimagery

determine a per tile price of $28.75. The expected cost for each year's task order shall be $28.75 times the number of tiles collected in that year.

G. Terms of payment shall be net 30 days.

BUY-UP OPTIONS

A. Each buy-up task order shall identify in writing the entity exercising the buy-up option (eg: VCGI, other VT State agencies, VT Regional Planning Commissions, or municipalities), as well as the product(s), geographic footprint, and total square miles to be collected. Payment for each yearly "buy-up" product task order shall be for a firm fixed price based on the rates defined in section E below. The entity receiving the buy-up products (eg: VCGI, other VT State agencies, VT Regional Planning Commissions, or municipalities) agrees to pay the Contractor, and the Contractor agrees to accept as full compensation for the performance of all services and expenses encompassed under a buy-up task order, a firm fixed price which shall be approved individually for each buy-up task order.

B. The state shall not be responsible for any expenses of the contractor.

C. Progress Payments per annual "buy-up option". The percentage payments defined below shall be <u>percentages of the total firm fixed price</u> agreed upon in the buy-up task order.

15cm Orthoimagery

1. Mobilization, aerial photography acquisition, and delivery of the unproccessed digital imagery, Aerial Triangulation Report, DEM and tiled orthoimagery. - 50% payment upon acceptance
2. Delivery of final orthoimagery, compressed orthoimagery including compressed and uncompressed black and white (greyscale) imagery, metadata and any other remaining project deliverables. - 50% payment upon acceptance

Lidar

1. Mobilization and LIDAR acquisition, delivery of processed LIDAR data and Aerial Triangulation Report. - 50% payment upon acceptance
2. Delivery of all final LIDAR deliverables, metadata and any remaining project deliverables. - 50% payment upon acceptance

Planimetrics and/or Impervious Surfaces

1. Initial draft product delivery. - 50% payment upon acceptance
2. Delivery of all final deliverables, metadata and any remaining project deliverables. - 50% payment upon acceptance

Raster Tile Packages

1. Initial draft product delivery, paid upon acceptance. 50% payment
2. Delivery of final deliverables, paid upon acceptance of same. 50% payment

Raster Tile Web Hosting

1. Initial draft product delivery, paid upon acceptance. 50% payment

2. Delivery of final deliverables, paid upon acceptance of same. 50% payment

Single-Year Statewide Imagery Acquisition Option

1. Mobilization, aerial photography acquisition, and delivery of the unproccessed digital imagery, Aerial Triangulation Report, DEM and tiled orthoimagery. - 50% payment upon acceptance
2. Delivery of final orthoimagery, compressed orthoimagery including compressed and uncompressed black and white (greyscale) imagery, metadata and any other remaining project deliverables. - 50% payment upon acceptance
3. ***NOTE:*** *If the Contractor fails for any reason to acquire 100% of the State's Project Area (as defined in section 1.1.1 of Attachment A - SOW), the State of Vermont will prorate payments based upon the actual number of square miles successfully acquired AND delivered multiplied by the cost per square mile specified in section D below for the single-year buy-up option.*

D. The following pricing schedule designates the agreed upon price for all buy-up options under this contract.

- **Small Buy-up Areas:** Less than 50 square miles.
- **Medium Buy-up Areas:** Greater than or equal to 50 square miles; less than 700 square miles.
- **Large Buy-up Areas:** Greater than or equal to 700 square miles.

Optional Products (Orthoimagery, Lidar, and Planimetrics)

Product	Description	Small Areas (per sq mile)	Medium Areas (per sq mile)	Large Areas (per sq mile)	Cost per Unit
Optional	Buy-up: 15cm GSD ortho imagery	**$342.35**	**$103.52**	**$76.54**	**X**
	Buy-up: Ground survey supporting 15cm GSD ortho imagery – Additional cost per PID above base imagery survey – as required	**X**	**X**	**X**	**$466.00**
Optional	Buy-up: Lidar data and derivatives – USGS QL1	**$1024.31**	**$413.75**	**$404.05**	**X**
Optional	Buy-up: Lidar data and derivatives – USGS QL2	**$978.85**	**$340.66**	**$275.74**	
Optional	Buy-up: Planimetric features itemized by type • Structures • Impervious	**$144.01** **$95.17**	**$66.44** **$47.64**	**$18.00** **$17.95**	

Optional Products (Raster Tiles, Raster Hosting, Other)

Product	Description	Cost per Sq Mile	Cost per Unit
Optional	Buy-up: Raster Tile Generation per package per year	**X**	**$1400**
Optional	Buy-up: Raster Tile Web Hosting per package per year	**X**	**$6000**
Optional	Buy-up: Single-Year Statewide Imagery Acquisition Option	**$19.50**	**$198,705.00**

E. For items priced by square mile, individual buy-up task order payments shall be based on the number of optional buy-up products AND the number of square miles in that year's buy-up acquisition area. For example, 700 square miles of 15cm GSD orthoimagery at $76.54 per square mile would cost $53,578 (700 sq miles X $76.54).

F. For items priced by unit, individual buy-up task order payments shall be based on the number of units per product. For example, 6 Raster Tile Packages at $1,400 per package/unit would cost $8,400 (6 units X $1,400 per unit)**.**

G. There is no minimum buy-up area for any of the optional buy-up products.

H. Terms of payment shall be net 30 days for invoices paid by the State of Vermont. Terms of payment with Regional Planning Commissions and/or municipalities shall be defined in the task order with that entity.

ATTACHMENT C: STANDARD STATE PROVISIONS
FOR CONTRACTS AND GRANTS
REVISED DECEMBER 15, 2017

"Attachment C: Standard State Provisions for Contracts and Grants" (revision version dated December 15, 2017) constitutes part of this Agreement and is hereby incorporated by reference as if fully set forth herein and shall apply to the purchase of all goods and/or services by the State under this Agreement. A copy of this document is available online at: https://bgs.vermont.gov/purchasing-contracting/forms.

ATTACHMENT D

INFORMATION TECHNOLOGY PROFESSIONAL SERVICES

TERMS AND CONDITIONS (rev. 3/21/19)

1. OWNERSHIP AND LICENSE IN DELIVERABLES

1.1 Contractor Intellectual Property. Contractor shall retain all right, title and interest in and to any work, ideas, inventions, discoveries, tools, methodology, computer programs, processes and improvements and any other intellectual property, tangible or intangible, that has been created by Contractor prior to entering into this Contract ("Contractor Intellectual Property"). Should the State require a license for the use of Contractor Intellectual Property in connection with the development or use of the items that Contractor is required to deliver to the State under this Contract, including Work Product ("Deliverables"), the Contractor shall grant the State a royalty-free license for such development and use. For the avoidance of doubt, Work Product shall not be deemed to include Contractor Intellectual Property, provided the State shall be granted an irrevocable, perpetual, non-exclusive royalty-free license to use any such Contractor Intellectual Property that is incorporated into Work Product.

1.2 State Intellectual Property. The State shall retain all right, title and interest in and to (i) all content and all property, data and information furnished by or on behalf of the State or any agency, commission or board thereof, and to all information that is created under this Contract, including, but not limited to, all data that is generated under this Contract as a result of the use by Contractor, the State or any third party of any technology systems or knowledge bases that are developed for the State and used by Contractor hereunder, and all other rights, tangible or intangible; and (ii) all State trademarks, trade names, logos and other State identifiers, Internet uniform resource locators, State user name or names, Internet addresses and e-mail addresses obtained or developed pursuant to this Contract (collectively, "State Intellectual Property").

Contractor may not use State Intellectual Property for any purpose other than as specified in this Contract. Upon expiration or termination of this Contract, Contractor shall return or destroy all State Intellectual Property and all copies thereof, and Contractor shall have no further right or license to such State Intellectual Property.

Contractor acquires no rights or licenses, including, without limitation, intellectual property rights or licenses, to use State Intellectual Property for its own purposes. In no event shall the Contractor claim any security interest in State Intellectual Property.

1.3 Work Product. All Work Product shall belong exclusively to the State, with the State having the sole and exclusive right to apply for, obtain, register, hold and renew, in its own name and/or for its own benefit, all patents and copyrights, and all applications and registrations, renewals and continuations thereof and/or any and all other appropriate protection. To the extent exclusive title and/or complete and exclusive ownership rights in and to any Work Product may not originally vest in the State by operation of law or otherwise as contemplated hereunder, Contractor shall immediately upon request, unconditionally and irrevocably assign, transfer and convey to the State all right, title and interest therein.

"Work Product" means any tangible or intangible ideas, inventions, improvements, modifications, discoveries, development, customization, configuration, methodologies or processes, designs, models, drawings, photographs, reports, formulas, algorithms, patterns, devices, compilations, databases, computer programs, work of authorship, specifications, operating instructions, procedures manuals or other documentation, technique, know-how, secret, or intellectual property right whatsoever or any interest therein (whether patentable or not patentable or registerable under copyright or similar statutes or subject to analogous protection), that is specifically made, conceived, discovered or reduced to practice by Contractor, either solely or jointly with others, pursuant to this Contract. Work Product does not include Contractor Intellectual Property or third party intellectual property.

To the extent delivered under this Contract, upon full payment to Contractor in accordance with Attachment B, and subject to the terms and conditions contained herein, Contractor hereby (i) assigns to State all rights in and to all Deliverables, except to the extent they include any Contractor Intellectual Property; and (ii) grants to State a perpetual, non-exclusive, irrevocable, royalty-free license to use for State's internal business purposes, any Contractor Intellectual Property included in the Deliverables in connection with its use of the Deliverables and, subject to the State's obligations with respect to Confidential Information, authorize others to do the same on the State's behalf. Except for the foregoing license grant, Contractor or its licensors retain all rights in and to all Contractor Intellectual Property.

The Contractor shall not sell or copyright a Deliverable without explicit permission from the State. If the Contractor is operating a system or application on behalf of the State of Vermont, then the Contractor shall not make information entered into the system or application available for uses by any other party than the State of Vermont, without prior authorization by the State. Nothing herein shall entitle the State to pre-existing Contractor Intellectual Property or Contractor Intellectual Property developed outside of this Contract with no assistance from State.

2. CONFIDENTIALITY AND NON-DISCLOSURE; SECURITY BREACH REPORTING

2.1 For purposes of this Contract, confidential information will not include information or material which (a) enters the public domain (other than as a result of a breach of this Contract); (b) was in the receiving party's possession prior to its receipt from the disclosing party; (c) is independently developed by the receiving party without the use of confidential information; (d) is obtained by the receiving party from a third party under no obligation of confidentiality to the disclosing party; or (e) is not exempt from disclosure under applicable State law.

2.2 Confidentiality of Contractor Information. The Contractor acknowledges and agrees that this Contract and any and all Contractor information obtained by the State in connection with this Contract are subject to the State of Vermont Access to Public Records Act, 1 V.S.A. § 315 et seq. The State will not disclose information for which a reasonable claim of exemption can be made pursuant to 1 V.S.A. § 317(c), including, but not limited to, trade secrets, proprietary information or financial information, including any formulae, plan, pattern, process, tool, mechanism, compound, procedure, production data, or compilation of information which is not patented, which is known only to the Contractor, and which gives the Contractor an opportunity to obtain business advantage over competitors who do not know it or use it.

The State shall immediately notify Contractor of any request made under the Access to Public Records Act, or any request or demand by any court, governmental agency or other person asserting a demand or request for Contractor information. Contractor may, in its discretion, seek an appropriate protective order, or otherwise defend any right it may have to maintain the confidentiality of such information under applicable State law within three business days of the State's receipt of any such request. Contractor agrees that it will not make any claim against the State if the State makes available to the public any information in accordance with the Access to Public Records Act or in response to a binding order from a court or governmental body or agency compelling its production. Contractor shall indemnify the State for any costs or expenses incurred by the State, including, but not limited to, attorneys' fees awarded in accordance with 1 V.S.A. § 320, in connection with any action brought in connection with Contractor's attempts to prevent or unreasonably delay public disclosure of Contractor's information if a final decision of a court of competent jurisdiction determines that the State improperly withheld such information and that the improper withholding was based on Contractor's attempts to prevent public disclosure of Contractor's information.

The State agrees that (a) it will use the Contractor information only as may be necessary in the course of performing duties, receiving services or exercising rights under this Contract; (b) it will provide at a minimum the same care to avoid disclosure or unauthorized use of Contractor information as it provides to protect its own similar confidential and proprietary information; (c) except as required by the Access to Records Act, it will not disclose such information orally or in writing to any third party unless that third party is subject to a written confidentiality agreement that contains restrictions and safeguards at least as restrictive as those contained in this Contract; (d) it will take all reasonable precautions to protect the Contractor's information; and (e) it will not otherwise appropriate such information to its own use or to the use of any other person or entity.

Contractor may affix an appropriate legend to Contractor information that is provided under this Contract to reflect the Contractor's determination that any such information is a trade secret, proprietary information or financial information at time of delivery or disclosure.

2.3 Confidentiality of State Information. In performance of this Contract, and any exhibit or schedule hereunder, the Party acknowledges that certain State Data (as defined below), to which the Contractor may have access may contain individual federal tax information, personal protected health information and other individually identifiable information protected by State or federal law or otherwise exempt from disclosure under the State of Vermont Access to Public Records Act, 1 V.S.A. § 315 et seq ("State Data"). Before receiving or controlling State Data, the Contractor will have an information security policy that protects its systems and processes and media that may contain State Data from internal and external security threats and State Data from unauthorized disclosure, and will have provided a copy of such policy to the State.

State Data shall not be stored, accessed from, or transferred to any location outside the United States.

The Contractor agrees that (a) it will use the State Data only as may be necessary in the course of performing duties or exercising rights under this Contract; (b) it will provide at a minimum the

same care to avoid disclosure or unauthorized use of State Data as it provides to protect its own similar confidential and proprietary information; (c) it will not publish, reproduce, or otherwise divulge any State Data in whole or in part, in any manner or form orally or in writing to any third party unless it has received written approval from the State and that third party is subject to a written confidentiality agreement that contains restrictions and safeguards at least as restrictive as those contained in this Contract; (d) it will take all reasonable precautions to protect the State's information; and (e) it will not otherwise appropriate such information to its own use or to the use of any other person or entity. Contractor will take reasonable measures as are necessary to restrict access to State Data in the Contractor's possession to only those employees on its staff who must have the information on a "need to know" basis. The Contractor shall not retain any State Data except to the extent required to perform the services under this Contract.

Contractor shall not access State user accounts or State Data, except in the course of data center operations, response to service or technical issues, as required by the express terms of this Contract, or at State's written request.

Contractor may not share State Data with its parent company or other affiliate without State's express written consent.

The Contractor shall promptly notify the State of any request or demand by any court, governmental agency or other person asserting a demand or request for State Data to which the Contractor or any third party hosting service of the Contractor may have access, so that the State may seek an appropriate protective order.

3. SECURITY OF STATE INFORMATION.

3.1 Security Standards. To the extent Contractor has access to, processes, handles, collects, transmits, stores or otherwise deals with State Data, the Contractor represents and warrants that it has implemented and it shall maintain during the term of this Contract the highest industry standard administrative, technical, and physical safeguards and controls consistent with NIST *Special Publication 800-53* (version 4 or higher) and *Federal Information Processing Standards Publication* 200 and designed to (i) ensure the security and confidentiality of State Data; (ii) protect against any anticipated security threats or hazards to the security or integrity of the State Data; and (iii) protect against unauthorized access to or use of State Data. Such measures shall include at a minimum: (1) access controls on information systems, including controls to authenticate and permit access to State Data only to authorized individuals and controls to prevent the Contractor employees from providing State Data to unauthorized individuals who may seek to obtain this information (whether through fraudulent means or otherwise); (2) industry-standard firewall protection; (3) encryption of electronic State Data while in transit from the Contractor networks to external networks; (4) measures to store in a secure fashion all State Data which shall include multiple levels of authentication; (5) dual control procedures, segregation of duties, and pre-employment criminal background checks for employees with responsibilities for or access to State Data; (6) measures to ensure that the State Data shall not be altered or corrupted without the prior written consent of the State; (7) measures to protect against destruction, loss or damage of State Data due to potential environmental hazards, such as fire and water damage; (8) staff training to implement the information security measures; and (9) monitoring of the security of any portions

of the Contractor systems that are used in the provision of the services against intrusion on a twenty-four (24) hour a day basis.

3.2 Security Breach Notice and Reporting. The Contractor shall have policies and procedures in place for the effective management of Security Breaches, as defined below, which shall be made available to the State upon request.

In addition to the requirements set forth in any applicable Business Associate Agreement as may be attached to this Contract, in the event of any actual security breach or reasonable belief of an actual security breach the Contractor either suffers or learns of that either compromises or could compromise State Data (a "Security Breach"), the Contractor shall notify the State within 24 hours of its discovery. Contractor shall immediately determine the nature and extent of the Security Breach, contain the incident by stopping the unauthorized practice, recover records, shut down the system that was breached, revoke access and/or correct weaknesses in physical security. Contractor shall report to the State: (i) the nature of the Security Breach; (ii) the State Data used or disclosed; (iii) who made the unauthorized use or received the unauthorized disclosure; (iv) what the Contractor has done or shall do to mitigate any deleterious effect of the unauthorized use or disclosure; and (v) what corrective action the Contractor has taken or shall take to prevent future similar unauthorized use or disclosure. The Contractor shall provide such other information, including a written report, as reasonably requested by the State. Contractor shall analyze and document the incident and provide all notices required by applicable law.

In accordance with Section 9 V.S.A. §2435(b)(3), the Contractor shall notify the Office of the Attorney General, or, if applicable, Vermont Department of Financial Regulation ("DFR"), within fourteen (14) business days of the Contractor's discovery of the Security Breach. The notice shall provide a preliminary description of the breach. The foregoing notice requirement shall be included in the subcontracts of any of Contractor's subcontractors, affiliates or agents which may be "data collectors" hereunder.

The Contractor agrees to fully cooperate with the State and assume responsibility at its own expense for the following, to be determined in the sole discretion of the State: (i) notice to affected consumers if the State determines it to be appropriate under the circumstances of any particular Security Breach, in a form recommended by the AGO; and (ii) investigation and remediation associated with a Security Breach, including but not limited to, outside investigation, forensics, counsel, crisis management and credit monitoring, in the sole determination of the State.

The Contractor agrees to comply with all applicable laws, as such laws may be amended from time to time (including, but not limited to, Chapter 62 of Title 9 of the Vermont Statutes and all applicable State and federal laws, rules or regulations) that require notification in the event of unauthorized release of personally-identifiable information or other event requiring notification.

In addition to any other indemnification obligations in this Contract, the Contractor shall fully indemnify and save harmless the State from any costs, loss or damage to the State resulting from a Security Breach or the unauthorized disclosure of State Data by the Contractor, its officers, agents, employees, and subcontractors.

4. CONTRACTOR'S REPRESENTATIONS AND WARRANTIES

4.1 General Representations and Warranties. The Contractor represents, warrants and covenants that:

(i) The Contractor has all requisite power and authority to execute, deliver and perform its obligations under this Contract and the execution, delivery and performance of this Contract by the Contractor has been duly authorized by the Contractor.

(ii) There is no pending litigation, arbitrated matter or other dispute to which the Contractor is a party which, if decided unfavorably to the Contractor, would reasonably be expected to have a material adverse effect on the Contractor's ability to fulfill its obligations under this Contract.

(iii) The Contractor will comply with all laws applicable to its performance of the services and otherwise to the Contractor in connection with its obligations under this Contract.

(iv) The Contractor (a) owns, or has the right to use under valid and enforceable agreements, all intellectual property rights reasonably necessary for and related to delivery of the services and provision of the services as set forth in this Contract; (b) shall be responsible for and have full authority to license all proprietary and/or third party software modules, including algorithms and protocols, that Contractor incorporates into its product; and (c) none of the services or other materials or technology provided by the Contractor to the State will infringe upon or misappropriate the intellectual property rights of any third party.

(v) The Contractor has adequate resources to fulfill its obligations under this Contract.

(vi) Neither Contractor nor Contractor's subcontractors has past state or federal violations, convictions or suspensions relating to miscoding of employees in NCCI job codes for purposes of differentiating between independent contractors and employees.

4.2 Contractor's Performance Warranties. Contractor represents and warrants to the State that:

(i) Each and all of the services shall be performed in a timely, diligent, professional and skillful manner, in accordance with the highest professional or technical standards applicable to such services, by qualified persons with the technical skills, training and experience to perform such services in the planned environment.

(ii) Any time software is delivered to the State, whether delivered via electronic media or the internet, no portion of such software or the media upon which it is stored or delivered will have any type of software routine or other element which is designed to facilitate unauthorized access to or intrusion upon; or unrequested disabling or erasure of; or unauthorized interference with the operation of any hardware, software, data or peripheral equipment of or utilized by the State. Without limiting the generality of the foregoing, if the State believes that harmful code may be present in any software delivered hereunder, Contractor will, upon State's request, provide a new or clean install of the software. Notwithstanding the foregoing, Contractor assumes no responsibility for the State's negligence or failure to protect data from viruses, or any unintended modification, destruction or disclosure.

(iii) To the extent Contractor resells commercial hardware or software it purchased from a third party, Contractor will, to the extent it is legally able to do so, pass through any such third party warranties to the State and will reasonably cooperate in enforcing them. Such warranty pass-through will not relieve the Contractor from Contractor's warranty obligations set forth herein.

5. **REMEDIES FOR DEFAULT.** In the event either party is in default under this Contract, the non-defaulting party may, at its option, pursue any or all of the remedies available to it under this Contract, including termination for cause, and at law or in equity.

6. **TERMINATION**

7.1 Contractor shall reasonably cooperate with other parties in connection with all services to be delivered under this Contract, including without limitation any successor provider to whom State Data, State Intellectual Property or other State information and materials are to be transferred in connection with termination. Contractor shall assist the State in exporting and extracting any and all State data, in a format usable without the use of the Services and as agreed to by State, at no additional cost. Any transition services requested by State involving additional knowledge transfer and support may be subject to a contract amendment for a fixed fee or at rates to be mutually agreed upon by the parties.

If the State determines in its sole discretion that a documented transition plan is necessary, then no later than sixty (60) days prior to termination, Contractor and the State shall mutually prepare a Transition Plan identifying transition services to be provided.

7.2 Return of Property. Upon termination of this Contract for any reason whatsoever, Contractor shall immediately deliver to State all State Intellectual Property and State Data (including without limitation any Deliverables for which State has made payment in whole or in part), that are in the possession or under the control of Contractor in whatever stage of development and form of recordation such State property is expressed or embodied at that time.

7. **DESTRUCTION OF STATE DATA.** At any time during the term of this Contract within thirty days of (i) the State's written request or (ii) termination or expiration of this Contract for any reason, Contractor shall securely dispose of all copies, whether in written, electronic or other form or media, of State Data according to National Institute of Standards and Technology (NIST) approved methods, and certify in writing to the State that such State Data has been disposed of securely. Further, upon the relocation of State Data, Contractor shall securely dispose of such copies from the former data location according to National Institute of Standards and Technology (NIST) approved methods and certify in writing to the State that such State Data has been disposed of securely. Contractor shall comply with all reasonable directions provided by the State with respect to the disposal of State Data.

8. **IRS TERMS IF FEDERAL TAX INFORMATION WILL BE PROCESSED OR STORED (Per IRS Publication 1075)**

To the extent Contractor's performance under this Contract involves the processing or storage of Federal tax information, then, pursuant to IRS Publication 1075, the following provisions shall apply in addition to any other security standard or requirements set forth in this Contract:

A. PERFORMANCE

In performance of this Contract, the Contractor agrees to comply with and assume responsibility for compliance by its employees with the following requirements:

1. All work will be done under the supervision of the Contractor or the Contractor's employees.
2. The Contractor and the Contractor's employees with access to or who use Federal tax information must meet the background check requirements defined in IRS Publication 1075.
3. Any return or return information made available in any format shall be used only for the purpose of carrying out the provisions of this Contract. Information contained in such material will be treated as confidential and will not be divulged or made known in any manner to any person except as may be necessary in the performance of this Contract. Disclosure to anyone other than an officer or employee of the Contractor will be prohibited.
4. All returns and return information will be accounted for upon receipt and properly stored before, during, and after processing. In addition, all related output will be given the same level of protection as required for the source material.
5. The Contractor certifies that the data processed during the performance of this Contract will be completely purged from all data storage components of his or her computer facility, and no output will be retained by the Contractor at the time the work is completed. If immediate purging of all data storage components is not possible, the Contractor certifies that any IRS data remaining in any storage component will be safeguarded to prevent unauthorized disclosures.
6. Any spoilage or any intermediate hard copy printout that may result during the processing of IRS data will be given to the State or his or her designee. When this is not possible, the Contractor will be responsible for the destruction of the spoilage or any intermediate hard copy printouts, and will provide the State or its designee with a statement containing the date of destruction, description of material destroyed, and the method used.
7. All computer systems processing, storing, or transmitting Federal tax information must meet the requirements defined in IRS Publication 1075. To meet functional and assurance requirements, the security features of the environment must provide for the managerial, operational, and technical controls. All security features must be available and activated to protect against unauthorized use of and access to Federal tax information.
8. No work involving Federal tax information furnished under this Contract will be subcontracted without prior written approval of the IRS.
9. The Contractor will maintain a list of employees authorized access. Such list will be provided to the State and, upon request, to the IRS reviewing office.
10. The State will have the right to void the Contract if the Contractor fails to provide the safeguards described above.

B. CRIMINAL/CIVIL SANCTIONS:

1. Each officer or employee of any person to whom returns or return information is or may be disclosed will be notified in writing by such person that returns or return information disclosed to such officer or employee can be used only for a purpose and to the extent authorized herein, and that further disclosure of any such returns or return information for

a purpose or to an extent unauthorized herein constitutes a felony punishable upon conviction by a fine of as much as $5,000 or imprisonment for as long as 5 years, or both, together with the costs of prosecution. Such person shall also notify each such officer and employee that any such unauthorized further disclosure of returns or return information may also result in an award of civil damages against the officer or employee in an amount not less than $1,000 with respect to each instance of unauthorized disclosure. These penalties are prescribed by IRC sections 7213 and 7431 and set forth at 26 CFR 301.6103(n)-1.

2. Each officer or employee of any person to whom returns or return information is or may be disclosed shall be notified in writing by such person that any return or return information made available in any format shall be used only for the purpose of carrying out the provisions of this Contract. Information contained in such material shall be treated as confidential and shall not be divulged or made known in any manner to any person except as may be necessary in the performance of the Contract. Inspection by or disclosure to anyone without an official need to know constitutes a criminal misdemeanor punishable upon conviction by a fine of as much as $1,000 or imprisonment for as long as 1 year, or both, together with the costs of prosecution. Such person shall also notify each such officer and employee that any such unauthorized inspection or disclosure of returns or return information may also result in an award of civil damages against the officer or employee in an amount equal to the sum of the greater of $1,000 for each act of unauthorized inspection or disclosure with respect to which such defendant is found liable or the sum of the actual damages sustained by the plaintiff as a result of such unauthorized inspection or disclosure plus in the case of a willful inspection or disclosure which is the result of gross negligence, punitive damages, plus the costs of the action. These penalties are prescribed by IRC section 7213A and 7431, and set forth at 26 CFR 301.6103(n)-1.
3. Additionally, it is incumbent upon the Contractor to inform its officers and employees of the penalties for improper disclosure imposed by the Privacy Act of 1974, 5 U.S.C. 552a. Specifically, 5 U.S.C. 552a(i)(1), which is made applicable to contractors by 5 U.S.C. 552a(m)(1), provides that any officer or employee of a contractor, who by virtue of his/her employment or official position, has possession of or access to State records which contain individually identifiable information, the disclosure of which is prohibited by the Privacy Act or regulations established thereunder, and who knowing that disclosure of the specific material is prohibited, willfully discloses the material in any manner to any person or agency not entitled to receive it, shall be guilty of a misdemeanor and fined not more than $5,000.
4. Prior to Contractor having access to Federal tax information, Contractor shall certify that each Contractor employee or other individual with access to or who use Federal tax information on Contractor's behalf pursuant to this Contract understands the State's security policy and procedures for safeguarding Federal tax information. Contractor's authorization to access Federal tax information hereunder shall be contingent upon annual recertification. The initial certification and recertification must be documented and placed in the State's files for review. As part of the certification, and at least annually afterwards, Contractor will be advised of the provisions of IRCs 7431, 7213, and 7213A (see IRS Publication 1075 *Exhibit 4, Sanctions for Unauthorized Disclosure,* and *Exhibit 5, Civil Damages for Unauthorized Disclosure*). The training provided before the initial certification and annually thereafter must also cover the incident response policy and

procedure for reporting unauthorized disclosures and data breaches (See Publication 1075, Section 10). For both the initial certification and the annual certification, the Contractor must sign a confidentiality statement certifying its understanding of the security requirements.

C. INSPECTION:

The IRS and the State, with 24 hours' notice, shall have the right to send its officers, employees, and inspectors into the offices and plants of the Contractor for inspection of the facilities and operations provided for the performance of any work under this Contract. for compliance with the requirements defined in IRS Publication 1075. The IRS's right of inspection shall include the use of manual and/or automated scanning tools to perform compliance and vulnerability assessments of information technology assets that access, store, process or transmit Federal tax information. On the basis of such inspection, corrective actions may be required in cases where the Contractor is found to be noncompliant with Contract safeguards.

10. SOV Cybersecurity Standard 19-01

All products and service provided to or for the use of the State under this Contract shall be in compliance with State of Vermont Cybersecurity Standard 19-01, which Contractor acknowledges has been provided to it, and is available on-line at the following URL:

https://digitalservices.vermont.gov/cybersecurity/cybersecurity-standards-and-directives