GeoTerra

Proposal for Aerial Mapping Services

Date: 4/13/2026

Job # 260133

Submitted to:
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Project Name: **2026 Redmond eCityGov Supplementals**

Location: **Redmond, WA**

Lidar / Impervious / Summer Orthos

Acquire new Lidar at a minimum density of 16 pts/m² during summer leaf-on conditions. Calibrate and adjust to existing control. Deliver classified Lidar, DEM / DSM / CHM rasters, tree canopy polygons, 1-foot contours with supporting terrain. **Collect new impervious surfaces** using stereo imagery flown for the 2026 eCityGov project. **Fly new summer 4-band aerial imagery** suitable to produce 0.5' pixel orthophotography.

Specifications		*Notes*
Project Type	Lidar / Impervious / Orthos	*Supplemental Data provided as part of the 2026 eCityGov Alliance project*
eCityGov Alliance Base Products	7cm stereo imagery	*Flown during spring leaf-off of 2026*
Aerial Topographic Lidar	22,970 acres	*Includes 100ft buffer (see map on p. 3)*
Terrestrial Lidar Sensor	Optech Galaxay T2000	*Up to 8 returns per pulse; system uses SwathTracker ™ to prevent data gaps*
Time of Flight	Leaf-on season	*Early summer*
Pulse Density	16 pts/m²	*Minimum aggregate pulse density*
Swath-Swath Overlap	≥ 50%	*Helps reduce laser shadowing and increase accuracy*
Classification	Yes	*LAS v1.4; see classification table on page 4*
Hydro-flattened	Yes	*Breaklines will be collected at bridge abutments, water bodies ≥ 2 acres in size, and streams or rivers ≥ 100 ft in width.*
Survey Data	Existing Control	*Historical survey control will be used for data calibration for a significant cost savings*
Vertical Accuracy	RMSEz ≤ 0.1 m (0.33 ft)	*Designed to meet this minimum vertical accuracy*
Accuracy Validation Points	Existing Data	*No additional QC checkpoints will be collected*
Impervious Features	11,486 acres	*Includes 100ft buffer (see map on p. 3)*
Collection Method	Photogrammetric	*Stereo collection of features using leaf-off 2026 imagery flown for eCityGov Alliance.*
Map Scale	1" = 100'	*Accuracy of final data*
Topology	Validated	*Polygons checked and corrected for gaps and overlaps*
Preferred Schema	Yes	*Client-provided; see Attachment A*
Summer Orthophotography	22,970 acres	*Includes 100ft buffer (see map on p. 3)*
Flight	Leaf-on season	*Summer, leaf-on time period; sun angles > 40-degrees above horizon*
Resolution	0.5' pixel	*4-band (RGB-Nir) GeoTIFF delivery*
Delivery via	HDD / FTP / OneDrive	*Lidar will be delivered via HDD; impervious features and orthos delivered via Online*

Summer Lidar Deliverables:
* Leaf-on Aerial Lidar at > 16 pts/m² density, with classification, LAS v1.4
* 3' DEM (Bare Earth) Hydro-flattened raster data in GeoTIFF format
* 3' DSM (Highest Hit) raster data in GeoTIFF format
* 3' CHM (Canopy Height Model) raster data in GeoTIFF format
* Tree canopy polygons (≥ 10' in height and ≥ 5 ' in diameter) in ESRI geodatabase format
* 1' Contours with terrain surface, in ArcGIS geodatabase format.
* Flight Index in geodatabase format
* Lidar Report in PDF format
* Project metadata in FGDC-compliant XML format

Impervious Deliverables:
* Impervious feature polygons, including building elevation and heights, in ArcGIS geodatabase format using city-supplied schema.
* Project metadata in FGDC-compliant XML format

Summer Ortho Deliverables:
* 0.5' pixel RGB-NIr Ortho Tiles in uncompressed GeoTIFF and 10:1 compressed SID/SDW formats
* Flight Index in geodatabase format
* Project metadata in PDF format
* Project metadata in FGDC-compliant XML format

(Cost Table shown on page 2)

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Total cost approved by City of Redmond for supplemental products to include with 2026 eCityGov Alliance contract =

Approved By: _____

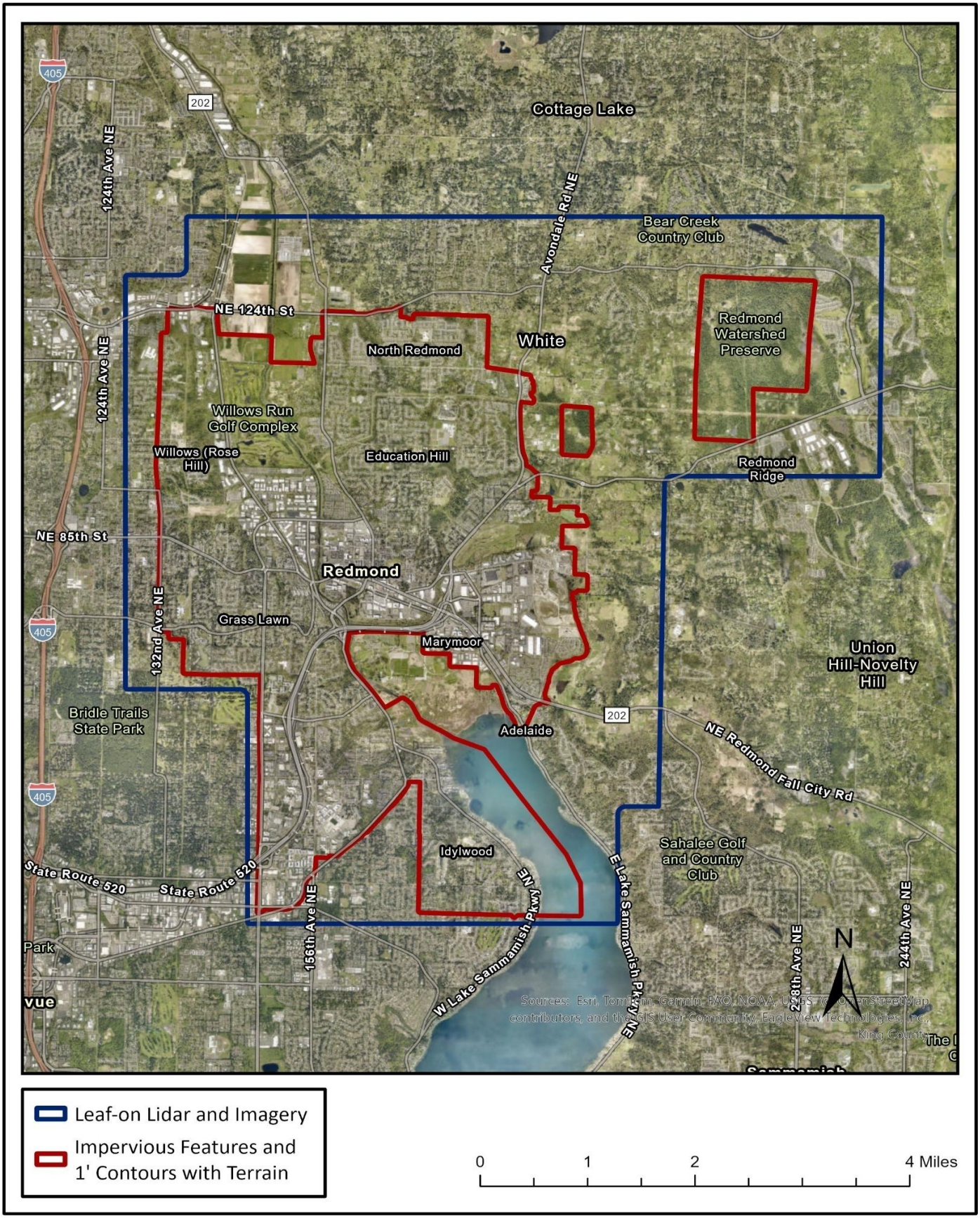
Signature: _____

Date: _____

2026 Redmond eCityGov Supplementals

Product	COST	Notes
16 ppsm Aerial Lidar	**$36,650**	Flown during early summer leaf-on conditions with focus on tree canopy returns. Includes: calibration, classificatio; terrain and 1' contours; tree canopy polygons; and DEM, DSM and CHM raster models.
New Impervious Features	**$39,800**	Includes topology-corrected polygons and buildings attributed with roof elevation, floor elevation, and height. Data delivered in ArcGIS geodatabase format using the city's supplied data schema
Option 1 - Stand Alone Summer 0.5' Pixel Orthos	**$9,450**	Includes *solo* summer flight of 4-band (RGB-Nir) aerial imagery and production of 0.5'-pixel orthophotography
Option 2 - Shared Summer 0.5' Pixel Orthos	**$3,685**	Total cost assuming imagery flight and production of orthophotography is *performed with Sammamish.*
Additional 5 tiles of 0.25'-pixel Leaf-off Orthos for eCityGov Alliance	**$1,040**	Cost to flight and produce 5 additional 3000'x3000' 4-band leaf-off ortho tiles that were not included in the final 2026 contract.

2026 City of Redmond - eCityGov Supplemental Data



Proposed Lidar Classification Scheme	
LAS Classification	**Description**
01_Unclassified	Non-ground points
02_Ground Points	Bare earth points
04_Tree Canopy	Trees ≥ 10 ft in height
06_Building Points	All returns on buildings at least > 100 ft² in size
07_Low Noise	Anomalous points below ground – flagged as withheld
09_Water	Point returns found on water
17_Bridge	Point returns on bridge decks
18_High Noise	Anomalous points above ground – flagged as withheld
20_Ignored Ground	Near breaklines

Proposed Impervious Features
Impervious Features will be delivered in the City's Data Shema as shown in Attachment A.

Project Methodology

Summary

Several aerial mapping products are included in this proposal to support the City's interest in impervious features, forest canopy metrics, summer imagery, and terrain products. Boundaries for each area of interest are shown on page 3. Impervious features will be produced using the 2026 eCityGov Alliance's 0.25'-pixel leaf-off imagery. New aerial Lidar and imagery will be flown during the early summer leaf-on timeframe to support urban forest canopy assessment. The key to Lidar acquisition and processing is to allow consistent repeatability every one to two years to account for changes in forest canopy over time.

Leaf-on Aerial Lidar Acquisition

Lidar will be acquired using an Optech Galaxy T2000 sensor mounted in a fixed-wing aircraft for an AOI of 22,970 acres; see map on page 3. The Galaxy is designed to achieve up to 8 returns for each pulse emitted. Data will be captured at a pulse density of at least 16 pts/m² during the summer leaf-on season using a fixed-wing aircraft. The summer timing of flight, point density, and returns per pulse will ensure a robust canopy definition. Planned point density will be achieved by acquiring at > 55% lateral overlap between swaths. This acquisition strategy reduces "laser shadows" by allowing at least two sensor angles to assist with better definition of both vegetation, features, and ground. At least one cross flight will be flown at 90-degrees across all main flight lines and used to assist with calibration and adjustment.

Survey Control for Lidar Adjustment

As a substantial cost savings measure, existing or historical control will be used to adjust the calibrated Lidar data to ground coordinates. As additional savings, data accuracy will be validated using existing Lidar sources as a relative comparison with results reported in the final Lidar report. Final data will be produced to meet ASPRS Positional Accuracy standards for a 0.33-foot RMSEv Non-Vegetated Accuracy (NVA) Class.

Unless otherwise requested, data will be delivered in the following coordinate system:

- Washington State Plane, North Zone
- Horizontal datum: NAD83(HARN)
- Vertical datum: NAVD88, Geoid 12B
- Unit of Measure: US Survey Feet

Lidar Calibration and Processing

A rigorous calibration of all Lidar swaths will be performed using *TerraMatch* software to achieve a tight relative fit of all data (+/- 8cm). Once calibration is achieved, Lidar returns will be auto classified using *TerraScan* software with algorithms specifically designed for the type of terrain and above ground features found within the AOI. For this project, the focus will be on identifying tree canopy returns for urban forest analysis and ground points for creating terrain and 1' contours. After calibration and autoclassification, data will be adjusted to the project coordinate system using historical ground control. Lidar returns will be classified using the scheme shown in the table on page 4 and delivered in LAS v1.4 format in an edge-matched tile scheme that is georeferenced to the project coordinate system.

Terrain and Contours

Contours will be created for 11,486 acres using the aerial Lidar; see boundary on page 3. Ground classified Lidar returns will be filtered into a limited set of Model Key Points (MKP) and used as the basis of terrain. 3D breaklines will be collected along significant sharp breaks in terrain such as bridge abutments where needed to improve terrain definition. The final terrain will be hydro flattened using 3D vectors collected at the edges of lakes and ponds greater than 2 acres in size and along the edges of creeks and rivers greater than 100 feet in width. The resulting MKP, breaklines, and hydro features will be combined into a terrain surface and used to create 1-foot contours with delivery in geodatabase format. Final data will be

Vegetation Metrics

Processed Lidar will be used to create additional products for use in forest metrics for the Lidar AOI shown on page 3. Highest hit returns will be used to create a Digital Surface Model (DSM). Ground returns will be used to create a Digital Elevation Model (DEM). A Canopy Height Model (CHM) will be created by subtracting the DEM from the DSM. The DEM, DSM, and CHM raster data will be delivered at a 3-foot resolution in GeoTIFF format for 22,970 acres; see map on page 3.

Canopy polygons will be created using classified pulse returns on trees ≥ 10-foot in height and greater than 5-feet in diameter or the equivalent of 20 ft^2. For large canopy polygons, openings less than 10 ft^2 in size will be eliminated to provide a "cleaner" data set. All processes used to create the final data will be carefully noted and archived with the project to allow consistent repeatability for future Lidar flights and products.

Impervious Feature Collection

Impervious features will be photogrammetrically collected for 11,486 acres within the City Limits using the spring leaf-off 0.25'-pixel imagery collected for the 2026 eCityGov Alliance project; see map on page 3. Data will be provided in polygon format, and topology checks will be performed to identify and correct any gaps or overlapping data. Each building polygon will be attributed with the following: highest elevation; estimated elevation at floor level; and height. Resulting data will be suitable for a 1" = 100' mapping scale and produced to meet a final horizontal accuracy of $RMSE_H$ = 1.4'. A proposed impervious feature list is provided on page 4. Delivery will be provided in ESRI geodatabase format in the city's provided schema.

Leaf-on 4-Band Orthophotography

Aerial imagery will be flown using a large format digital camera with gyro mount and coupled with Airborne GPS and IMU. Imagery will be captured during the early summer months to support urban forest health evaluation. Raw data will be radiometrically adjusted and color balanced on a project-wide basis. Resulting photography will be aerially triangulated using existing control and rectified to a suitable terrain surface to correct for horizontal displacement.

Resulting rectified photos will be mosaicked together to produce 4-band (RGB-Nir) orthophotography at a pixel resolution of 0.5'. Horizontal accuracy will meet $RMSE_H$ = 1.39'. The orthophotography will be delivered in edge-matching tiles and georeferenced to the project coordinate system. The final product will be delivered in GeoTIFF format as tiles and in a 10:1 compressed MrSID format for tiles and mosaic(s).