Legislative Report: Use of Funds for Aerial Mapping Project

Legislative Oversight and Investigations Committee

December 2023

Summary

The General Assembly appropriated $8.5 million in each fiscal year of the current biennium for an aerial mapping project (22RS HB 1). This funding has been utilized to continue development of the Commonwealth's base mapping assets with a special focus on acquiring resources needed by state government agencies, PVAs, and other units of local government. The Commonwealth Office of Technology, Division of Geographic Information, in cooperation with the Department of Revenue, Office of Property Valuation, has collaborated on this matter to ensure the base mapping layers meet the needs of state government agencies and all units of local government.

Base Map Components

Statewide base mapping programs typically consist of two critical layers: 1) LiDAR-derived elevation data; 2) High-resolution, leaf-off ortho rectified digital aerial photography (top-down view). Only a handful of states, including Kentucky, have acquired both assets on a statewide basis. Some states include buy-up options for oblique digital aerial photography (side or angle view), thermal imagery, and discretely classified elevation layers.

Over the past decade, the KyFromAbove program achieved statewide coverage of LiDAR-derived elevation data and high-resolution (6") leaf-off aerial photography. The Phase 2 LiDAR effort now stands at 88% complete and statewide coverage of 6" aerial photography was achieved in April 2022. Current, and accurate LiDAR-derived elevation data is required to create ortho rectified digital aerial photography.

KyFromAbove's Phase 3 program is the first coordinated effort to procure statewide coverage of oblique aerial photography. According to the Department of Revenue, 76 counties now use a licensed data service to view oblique imagery. Kentucky's PVAs are the primary purchasers of this service as it can be used to assess properties without physically visiting the site. The oblique imagery licensing prohibits sharing with other units of government. This not only diminishes the value of the asset, but it also minimizes the return on investment of taxpayer dollars. Providing license-free, open access to current 3" ortho and oblique imagery will ensure that all units of government, the private sector, as well as citizens can use this valuable resource.

Technical Specifications

During 2022, the Kentucky Geographic Information Advisory Council (GIAC) adopted updated technical specifications for LiDAR, and both ortho and oblique leaf-off digital aerial photography. These three specifications documents were the cornerstone of *RFP 758 2200000397 – Digital Imagery Data*. Subject matter experts from state government, units of local government, higher education, and the federal government all participated on the technical advisory subcommittee that drafted the specifications. Inclusion of staff from the Department of Revenue insured that the specifications for oblique aerial photography would meet or exceed the needs of Kentucky's PVAs.

Acquisition Timeline

Unlike other procurements, the acquisition timeline for aerial mapping is driven by Mother Nature and it doesn't align well with the Commonwealth's July 1 – June 30 fiscal year framework. It is critical that all base map components are acquired during leaf-off conditions when leaves do not obscure features in the built or natural environment.

Additionally, aerial photography must be acquired when the days are long enough to achieve the most desirable sun angle (30°>). In the Commonwealth, these conditions only exist during the late-February to late-April timeframe or during a narrow three-to-four-week period in November. Other acquisition constraints include: 1) no cloud cover; 2) no snow on the ground; 3) no smoke; and 4) no flooding conditions.

Project Status

The project is well underway with an initial release of the oblique imagery on GIS Day, November 15th, 2023. Ortho and oblique imagery were acquired for 40 counties situated in the eastern and southern portion of the state during the first two flying seasons (Fall22/Spring23). More than 53,000 miles were flown over 43 days to acquire the Year 1 area of interest which accounts for 45% of the state's land area. The oblique imagery for these counties is now publicly accessible

in the KyFromAbove Explorer application. Review of the ortho imagery is ongoing with final delivery anticipated during late February.

During mid-November, another 4,740 square miles of imagery were acquired. Later than normal leaf-on conditions, declining sun angle, and smoke from the forest fires in Eastern, Kentucky were factors that limited the acquisition period. Approximately 56% of the Commonwealth's land area has now been acquired.

Planning for the balance of the state has been completed with the Golden Triangle area being highest priority for Spring of 2024. A dozen aircraft have been assigned to the upcoming cycle which will commence in early 2024 while sun angle and leaf-off conditions persist. Completing coverage of 3" resolution ortho and oblique imagery for the remainder of the Commonwealth during one spring and one fall flying window is very ambitious. Early leaf-on and spring flooding conditions have hampered efforts in the past forcing portions of a given project area to be deferred to the next flying season.

On January 10th, 2023, the KyFromAbove program was welcomed into the Amazon Open Data Sponsorship program. All Phase 1 and Phase 2 imagery and elevation data holdings can now be discovered in the Amazon Open Data Registry. The newly acquired Phase 3 oblique imagery is also being hosted in the publicly accessible Amazon Web Services (AWS) S3 bucket. No ingress or egress costs will be incurred by the Commonwealth if the data remains in the public domain. This democratizes access to the data resources, saves the Commonwealth in terms of storage costs, and further compounds the return on investment.

Use of Funds

To date, $4,822,656 of the appropriated funds have been expended. Acquisition and production costs totaled $4,472,656 and $350,000 was expended for dedicated on-premise ortho image storage. COT anticipates receiving the final Year 1 deliverables invoice of $3,509,665 within the next 60-90 days. Total cost for the first half of the state will be approximately $8,400,000. This total includes acquisition, post-processing, and on-premise storage of the ortho imagery. *Note: Invoicing for Spring 2024 flights will not occur until December of 2024, six months into the next biennium.*

Funding Timeline Considerations

The appropriated funds are sufficient to complete statewide coverage of both ortho and oblique imagery. However, achieving this goal in a 2-year period will be difficult at best. For this reason, Kentucky, and other similarly sized states have adopted a *3-year refresh rate on statewide imagery*. The state is divided into thirds, by county, and the pattern has been to move from East to West across the Commonwealth.

Importantly, this three-year cycle aligns well with state agency needs and is consistent with plans made by larger units of local government who already have programs that embrace this cadence. Those larger communities adopted a three-year cycle many years ago and alignment with their schedule and needs is critical. Kentucky's communities are excited about the program but need assurance that funding will be committed for ongoing refreshes.

A recurring appropriation each biennium aimed at funding a statewide refresh of imagery every three years would spread the costs across three fiscal years. Consistent funding $5.9 million per year, over three continuous biennia, would result in two full statewide acquisitions in just six years. The combined amount of cost-avoidance at the local level will be substantial if communities can be certain that a 3-year funding and acquisition cycle for ortho and oblique imagery will be supported with legislative funding.

**Funding contributions from state and federal partners will account for the largest portion of LiDAR funding. A small portion of the appropriated funds will be used for matching funds associated with federal dollars.*