TREE INVENTORY vs TREE CANOPY ASSESSMENT

WHAT'S THE DIFFERENCE?

PLANIT GEO™
mapping a greener future

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INTRODUCTION

The distinction between tree inventories and tree canopy assessments can be confusing. Both are tools for collecting comprehensive information about an urban forest, however, the insights they offer are very different. This guide will provide a foundational understanding of both tools and demonstrate how to capitalize on the data they provide for more effective urban forest management.

TREE INVENTORY

Micro Level View

A bottom-up strategy, completed on the ground to map the location and record the condition of individual trees in a defined area.

Also known as:

Urban Tree Inventory

Tree Survey

VS

TREE CANOPY ASSESSMENT

Macro Level View

A top-down strategy that uses satellite imagery to map out the coverage of tree canopies over a defined area.

Also known as:

Urban Tree Canopy (UTC) Assessment

Tree Canopy Analysis

Terminology note: You may encounter the phrase “tree assessment”. This most commonly refers to the evaluation process an arborist or volunteer completes for an individual tree during a tree inventory. Dozens, hundreds, or thousands of tree assessments make up a tree inventory.

TREE INVENTORY

A tree inventory is when trees in a defined area are assessed on a set of criteria and their location is plotted by personnel on the ground. It is of course easier to manage trees when you know their quantity and quality. Other benefits of a tree inventory include:

- Learning the species composition and age diversity of your trees
- Identifying high risk trees to better prioritize maintenance efforts
- Getting comprehensive statistics that are ideal for internal tracking efforts and external public engagement

PlanIT Geo™ has completed inventories for cities, counties, nonprofits, as well as corporate and university campuses. If an organization is responsible for a multitude of trees, they will likely benefit from a tree inventory.

TREE INVENTORY VARIATIONS

Tree inventories are not one size fits all. There are several possible variations in scope and execution that influence the final output. The two primary questions that will guide the planning of a tree inventory are:

- What information about the trees is desired?
- What is possible with the available resources and funding?

The cost of a tree inventory can be quite flexible, and the scope can be dialed up and down to offer the maximum information return on the capital available. The spectrum ranges from volunteers completing drive-by tree counts to Certified Arborists conducting in-depth assessments on each tree. Tree inventories are usually limited to public trees and may look exclusively at street trees, park trees, trees in certain high profile locations, or may include all public trees in a defined area.

For a review of the implementation phase of a tree inventory and first-hand tips and tricks from the field check out this webinar from the PlanIT Geo tree inventory team. Below we'll explore the main points to consider when planning a tree inventory.

Set the Scope

Full, phased, or sample?

A **full inventory** will look at all public trees in the community and therefore offers the truest measure of the health and needs of the urban forest. However, if the funds are not available for a full inventory there are other less comprehensive variations.

An approach that has been growing in popularity over the last few years is the **phased inventory**. This is a full inventory completed in stages over several years as funds allow. Communities still get a comprehensive understanding of their tree needs but the financial burden is distributed over a longer period of time.

The smallest and quickest inventory scope is a **sample inventory**, which looks at a random selection of trees in the community and extrapolates those results to represent the whole urban forest. With just a 3 – 6% sampling it is possible to get a statistically valid representation of urban tree conditions.

Volunteers or Professionals

A tree inventory can be completed by volunteers, interns, staff, or professional arborists. With training, volunteers can be a cost-effective way to complete an inventory while still getting significant tree data. With user-friendly software like TreePlotter™ INVENTORY, volunteers can use a smartphone or tablet to easily record key tree metrics in a database that can then be managed and reviewed by supervisory forestry staff.

However, there is a limit to the depth of information volunteers can accurately provide. Volunteers can provide basic measurements and common species identification, but should not be relied on for more specific assessments like tree condition, decay, poor branching habitat, or determining hazard and risk status.

Hiring professional arborists is a substantial expense compared to relatively free volunteers, but it means more advanced tree metrics can be captured. The advanced data collected by certified arborists can most directly inform forest management and budget planning.

Choosing Data Fields

There are basic metrics that should be included in every tree inventory, including species, location, diameter at breast height (DBH), and condition. Beyond those, there is an abundance of supplementary data fields to choose from. Many of these metrics are dependent on the level of expertise of those conducting the inventory. Also keep in mind the more data fields included, the more time the inventory will take.

One of the top suggestions from our tree inventory team is to use a general observations list, which includes fields for commonly detected issues like cavity decay, poor root systems, and crown dieback. Other data fields experts can provide are maintenance recommendations, such as crown cleaning, sidewalk damage, or removal. These recommendations can be scaled by priority to immediately inform maintenance efforts.

For the highest level of detail, an ISA Level 2 Tree Risk Assessments can be completed, which requires the assessor to complete a detailed form for each tree (also available as an add-on module within TreePlotter INVENTORY).

Inform the Public

We don't see it as often as we like, but it is worthwhile to notify the public of an impending tree inventory and establish an open line of communication for comments or reporting issues. Citizens are usually curious about the person in front of their house looking intently at their trees, and getting advanced notice or having additional information ready to distribute is helpful to all parties.

THE TREE INVENTORY IS COMPLETE. WHAT'S NEXT?

So the tree inventory is complete and you now have a new wealth of new data on your trees. Here are some ways to put that data to work.

Proactive Maintenance

One of the best perks of recent tree inventory data is using it to set up a proactive maintenance schedule. Instead of responding to urgent individual requests, tree inventories that include maintenance recommendations provide a clear guide on which trees should be prioritized.

Inventory software can be updated so maintenance priorities are continually revised and work orders can be managed within the same platform to track tree bid estimates, service requests, and invoices. The species diversity and composition statistics gathered by a tree inventory also help inform resiliency-focused planting strategies.

Risk Mitigation

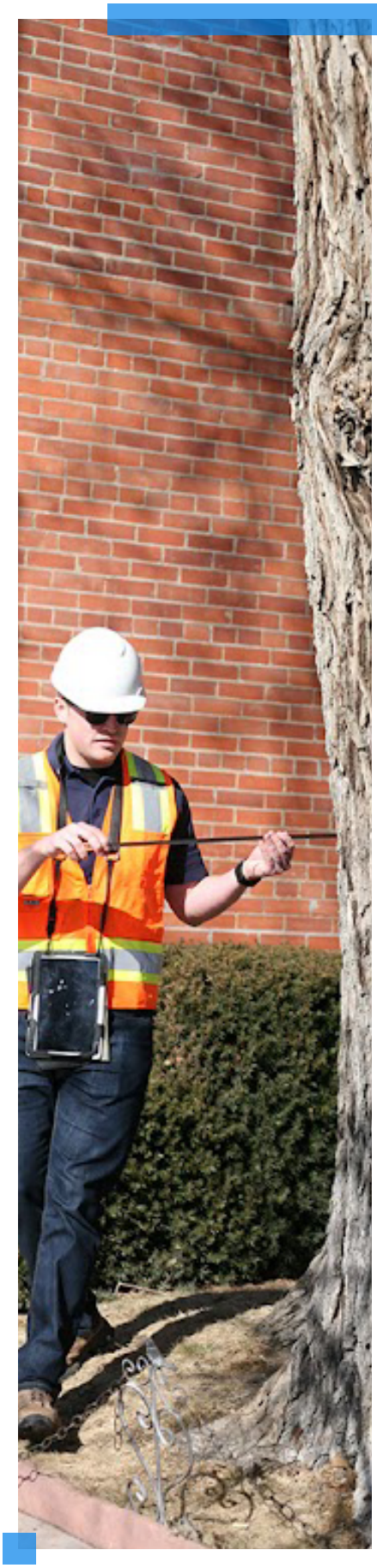
Mitigating urban forest risks becomes a lot easier when you are equipped with detailed health and hazard reports for all the trees under your responsibility. By prioritizing the highest risk trees, maintenance operations dramatically reduce potential tree hazards quickly. Additionally, inventory software can provide a record of complaints, inspections, and maintenance should legal issues arise.

Communicate Ecosystem Benefits

The ecosystem services provided by the urban forest can be accurately estimated from a tree inventory. Having dollar amounts at the ready is a powerful tool for connecting internally across siloed government departments benefitting from urban trees without knowing it. Comprehensive urban forest statistics are also the perfect material to share with the community to inspire appreciation and support.

A CONTINUAL PROCESS

A tree inventory is a snapshot of an urban forest in time. Trees are always changing and tree inventory data loses value over time if it is not updated. To continue to get the most from a tree inventory, update your data management platform with maintenance operations, removals, and new plantings to keep it as representative as possible.



TREE CANOPY ASSESSMENT

An urban tree canopy (UTC) assessment measures a community's tree canopy cover via satellite imagery. It shows the percentage of the total land area covered by tree canopy and can also identify available planting space. Additionally, since most of the benefits of trees are causally linked to a healthy spread of leaves and branches, canopy cover information can be used to create estimates of ecosystem services too.

Unlike tree inventories, a tree canopy assessment looks at all trees in the city, both public and private, so it is excellent for tracking large scale trends, setting canopy goals, and measuring the effectiveness of urban forest management programs over time.

The United States is losing urban tree canopy to the tune of 175,000 acres or 36 million trees a year. That represents a loss of $96 million a year in tree benefits, and those benefits, like heat reduction and public health improvements, are growing in necessity. Urban tree canopies are in perpetual motion as growth and regeneration push against destructive forces, both natural and anthropogenic. Reversing this course starts with measuring the canopy you have now.

METHODS OF TREE CANOPY ASSESSMENTS

There are multiple methods for completing a UTC assessment that vary in scope, cost, and data output.

Point Sampling

This is the simplest method and can be completed using the i-Tree Canopy tool. Random points are generated within an area and manually assigned a value of "tree" or "non-tree" until a 1-2% standard error is reached. By dividing the number of "tree" points by the total number of points, you can quickly get an estimate of the percent canopy cover or any other land cover type.

For example, 1,500 points were classified to estimate 25% tree canopy cover in South Bend, Indiana. The downside to this method is that there is no way to understand the location and distribution of tree canopy, plantable space, or other land cover types.

i-Tree Landscape

Another way to measure tree canopy is through the i-Tree Landscape tool. This tool uses land cover data from the National Land Cover Database. Once a location is selected, an estimate of the amount of tree canopy is provided. You can also explore location data (census data, forest risk, future climate, etc.), see tree benefits, prioritize tree plantings, and generate reports.

This is a great, free tool from i-Tree with lots of information to explore. However, the land cover data is typically lower resolution (30-meter) than what the third method provides (1-meter).

High Resolution Land Cover Mapping

The third method uses remote sensing technology and high-resolution imagery (aerial or satellite) and elevation (LiDAR) datasets to create detailed land cover data. These data inform all other aspects of the project by categorizing a given landscape into specific classes such as tree canopy, other non-canopy vegetation, impervious or hardscape, bare soil, or water. This method provides the highest level of detail.

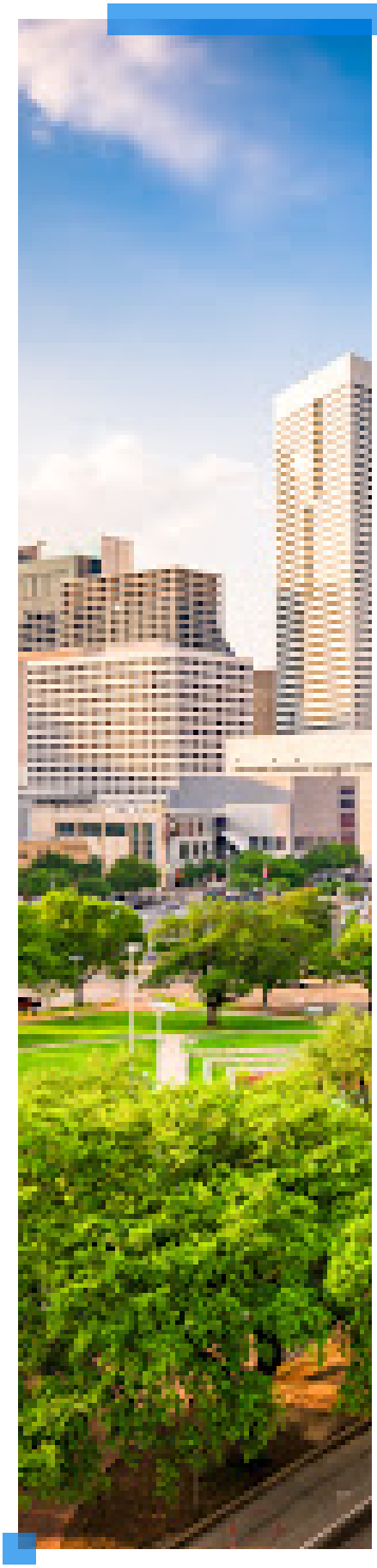
Artificial Intelligence Driven Assessments

This is a new innovation in canopy assessment technology available through PlanIT Geo in partnership with EarthDefine. The methodology is similar to high resolution land cover mapping, but the process is partially automated using the power of artificial intelligence and machine learning. What this means is the delivery time for UTC assessments can be days instead of months and can be updated at a higher frequency.

GEOGRAPHIC SCALES

UTC assessments can be calculated using a variety of spatial scales. For example, PlanIT Geo analyzed 9 distinct geographic boundaries for a UTC Assessment of Colorado Springs, including council districts, watersheds, land use types, and census blocks.

These different scales can benefit city departments by providing detail on the current level of canopy cover, where plantable spaces exist, and where trees can be planted to address issues specific to their responsibility. For example, stormwater staff may be interested in expanding canopy cover to help reduce runoff in certain watersheds or council members may want to add more green space and recreation opportunities in their own district.



THE TREE CANOPY ASSESSMENT IS COMPLETE. WHAT'S NEXT?

One of the best uses of UTC assessment data is to set a baseline for a citywide canopy cover goal. Urban tree canopy percentage is ideal for goal setting because it represents the complex distribution and benefits of an urban forest within a single metric. Cities around the world use tree canopy goals, such as "Acheive 30% canopy cover by 2030", to guide and motivate their urban forest management.

Establishing a canopy cover goal is usually the beginning of the process to define and adopt an official planting strategy that will be included in an urban forest management plan. It is a crucial first step though, and a tree canopy goal is a powerful tool. It helps prioritize forest management actions, motivate the public and officials, and inspire funding and stewardship.

Tree canopy data is also an indispensable tool for educating government leadership and advocating for forestry-friendly budget and code changes. Internal discussions about urban forest benefits can be backed by empirical evidence, which reframes the conversation as one of reality, instead of feelings.

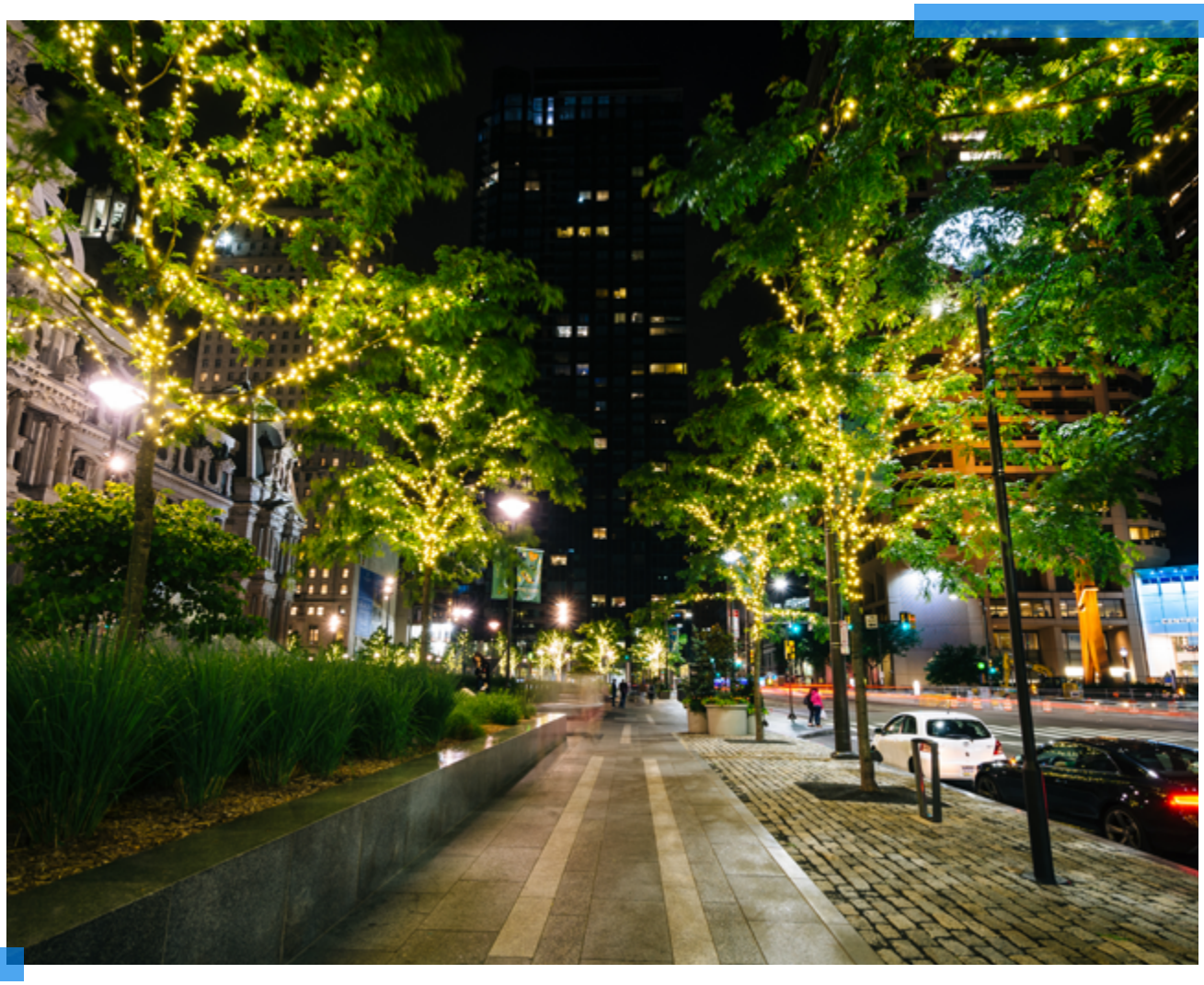
There is admittedly a ton to consider when looking through data provided by a UTC assessment. Luckily there are decision support tools that can simplify this process, such as TreePlotter™ CANOPY. CANOPY integrates the information gathered from UTC assessments and creates easy-to-use visualizations and can show how new plantings address environmental or socioeconomic issues and test different planting scenarios.

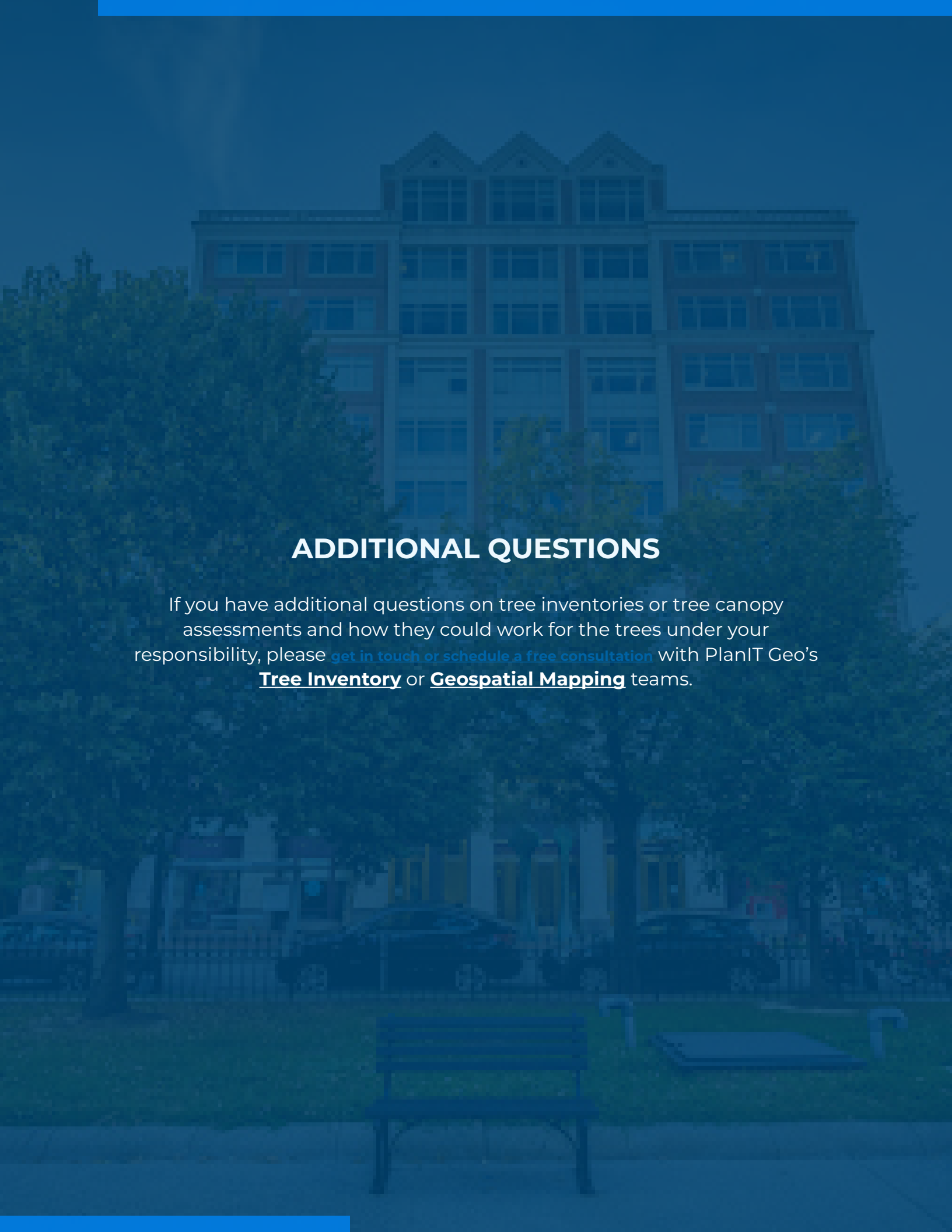
FUNDING

Tree inventories and tree canopy assessments are periodic but significant expenditures to budget for. There are strategies to distribute these large, one-time costs over longer periods of time. For tree inventories this is achieved through a phased approach, where the inventory is completed over several years. For UTC assessments this can be achieved with PlanIt Geo's new AI-driven canopy assessments, which operates on a smaller annual subscription basis, instead of one expense every 3-5 years.

Grants are well suited for discrete projects like tree inventories and canopy assessments. It is worth exploring federal, state, and local grant opportunities in your area. For federal grants, the best place to start is grants.gov. Your state forester is a great resource for learning about more local grant opportunities.

Nonprofit grants and private donations can also help fund tree inventories and canopy assessments. Colorado Springs was able to complete its first UTC assessment with full funding provided by the private foundation, Lyda Hill Philanthropies. For a comprehensive list of funding sources available for urban forestry programs check out our How To Fund Your Urban Forestry Program eBook.





ADDITIONAL QUESTIONS

If you have additional questions on tree inventories or tree canopy assessments and how they could work for the trees under your responsibility, please get in touch or schedule a free consultation with PlanIT Geo's **Tree Inventory** or **Geospatial Mapping** teams.