

Agreement for Specification of Work
GIS-Based Public Tree Inventory and Associated Services
City of West Lafayette, Indiana (April 11, 2016)

The following work specification details all services and deliverables including deliverable products and work to be performed by Davey Resource Group, a division of The Davey Tree Expert Company, in connection with the City of West Lafayette, Indiana (hereinafter referred to as Client). This document does not replace any prior correspondence, including proposals, and written correspondence, but is instead part of a development process that will move the project from proposal, to final delivery and acceptance by the client.

Davey Resource Group and the Client project managers will be the primary points of contact for all critical project-related communication. This will ensure frequent communication so that both parties are informed of project progress, challenges, and any resultant changes in requirements or schedules. Projected delivery dates contained in this document are approximate and based on conditions at the time of the agreement. Changes to this agreement should be noted in writing to both the client and Davey Resource Group representative with documentation of the need for a change. Changes to either the client representative or the Davey Resource Group representative should also be noted in writing.

Client Contact Information	
<i>Primary Contact, Title:</i>	Beverly Shaw, Marketing, Grants & Greenspace Administrator
<i>Primary Phone:</i>	765-775-5161
<i>Email:</i>	bshaw@westlafayette.in.gov
<i>Mailing Address:</i>	City of West Lafayette 222 North Chauncey, Room 102 West Lafayette, Indiana 47906

Davey Resource Group Contact Information	
<i>Business Manager:</i>	Aren Flint, Project Manager
<i>Primary Phone:</i>	765-430-9020
<i>Email:</i>	aren.flint@davey.com
<i>Mailing Address:</i>	257 Brooks Bend Brownsburg, Indiana 46112

Schedule of Deliverables

Deliverable	Comments	Estimated Delivery Date	Price
Task One: Tree Inventory Attachments A & B	Inventory of up to 7,500 trees and stumps along Public Streets. Tree inventory data will be delivered as ESRI® shapefile, an Access™ database, an Excel™ spreadsheet, and iTree Streets project file.	June 2016	\$30,000 Lump sum up to 7,500 sites \$4.00/site over 7,500 sites
Task Two: Tree Management Plan Attachment C	One bound color copy and one electronic PDF copy on CD-ROM	December 2016	\$3,100
Total			\$33,100

Notice of Disclaimer

This pricing is based on inventorying an estimated 7,500 trees and stumps. This estimate is based on information provided by the Client. As with any estimate, Davey Resource Group does not provide assurance that this number is accurate to any degree of certainty. However, any significant deviation between actual and estimated tree counts will be identified as soon as possible while Davey Resource Group’s inventory staff is on the job.

Inventory data provided by Davey Resource Group are based on visual recording at the time of inspection. Visual records do not include individual testing or analysis and do not include aerial or subterranean inspection. Davey Resource Group is not responsible for discovery or identification of hidden or otherwise non-observable hazards. Records may not remain accurate after inspection due to variable deterioration of inventoried material. Davey Resource Group provides no warranty with respect to the fitness of the urban forest for any use or purpose whatsoever.

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, assess their condition, and recommend measures to enhance the beauty and health of trees, while attempting to reduce risk. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the failure of a tree. Trees are living organisms that fail in ways that cannot always be predicted. Conditions are often hidden within trees and below ground, and can develop quickly after an inspection. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments cannot be guaranteed.

Important: Know and understand that this basic visual assessment is confined to the designated subject tree(s), and that this consultation was performed in the interest of facts of the tree(s) without prejudice to or for any other service or any interested party.

Clients may choose to accept or disregard Davey Resource Group’s recommendations, or to seek additional advice.

Client Responsibilities

- Provide Davey Resource Group with all maps and other necessary information at no charge. This includes: digital orthophotographs, available GIS data layers, and/or other electronic or paper copies of maps for roads; pavement widths; right-of-way widths; boundaries and utilities; and an electronic file or printed list of street names and end points.
- Provide daily contact information and directions as needed throughout the inventory process.
- For the management plan, Davey Resource Group requests that West Lafayette complete an urban forest management questionnaire and provide an electronic or printed copy of current tree ordinances, landscape regulations, and other urban forestry program information as needed.
- For i-Tree benefit-cost analyses, Davey Resource Group requests that West Lafayette provide the most recent urban forest management program costs.
- West Lafayette is requested to coordinate with Davey Resource Group project staff to host and conduct an informational kick-off meeting immediately prior to the start of fieldwork.

AUTHORIZATION WORK SPECIFICATION: <i>GIS-Based Public Inventory and Associated Services</i> <i>City of West Lafayette, Indiana</i>	
<i>Total</i>	\$33,100
Purchase Order Number:	
<i>Authorized Client Representative:</i>	
	Date:
	Signature:
	Title:
<i>Davey Representative:</i>	
	Date: 4/11/16
	Signature: 
	Title: Project Manager

Attachment A

Public Tree Inventory Data Field Definitions

The data fields definitions that will be collected for each tree and stump during the inventory are defined as follows:

Address Input Fields

- **Address.** Address number of property will be recorded.
- **Street.** Street name of property will be recorded. Park and open space trees will use the property name.
- **On Street.** The street the tree/site is on.
- **GPS Lat and Long or GIS X and Y coordinates.** Format specified by the City.
- **Land Use.** A description of the type of area where the tree is growing:
 - Single-family residential
 - Multi-family residential - duplex, apartments, condos
 - Industrial/large commercial
 - Park/vacant/other - agricultural, riparian areas, greenbelts, park, etc.
 - Small commercial - minimart, retail boutiques, etc.

Site Input Fields

- **Growing Space Type.** Growing space locations are categorized as:
 - Island—Sites surrounded by pavement or hardscape (eg., parking lot, cul-de-sac).
 - Median—Sites located between opposing lanes of traffic.
 - Natural Area—Sites developed through natural growth instead of design or planning.
 - Open/Restricted—Open sites with restricted growing space on 2 or 3 sides.
 - Open/Unrestricted—Open sites with unrestricted growing space on at least 3 sides.
 - Raised Planter—Sites located in an above-grade or elevated planter.
 - Tree Lawn/Parkway—Sites located between the street curb and the public sidewalk.
 - Unmaintained Area—Sites located in areas that do not appear to be regularly maintained.
 - Well/Pit—Sites at grade level and completely surrounded by sidewalk.

- **Aboveground Utilities**—For each tree or site, it will be recorded if utilities are:
 - Conflicting
 - Present
 - Not present.
- **Hardscape Damage**—For each tree, it will be recorded if lift of a sidewalk slab or curb from tree roots are
 - Present
 - Not present

Tree Input Fields

- **Species.** Trees will be identified by genus and species, with the exception of genera such as *Crataegus* or *Malus*, where identification of species is often not practical..
- **Diameter.** Diameter is measured in size classes at 4-1/2 feet above the ground, or diameter-breast-height (DBH).
- **Condition.** In general, the health and structure of each tree will be recorded in one of the following categories based on visible root, trunk, scaffold, branch, twig, and foliage conditions at the time of the inventory and adapted from the rating system established by the International Society of Arboriculture and based on visible root, trunk, scaffold branch, twig, and foliage conditions at the time of the inventory:

<i>Good</i>	> 80%
<i>Fair</i>	80 - 50%
<i>Poor</i>	< 50%
<i>Dead</i>	0%

- **Primary Maintenance Need.** The following primary maintenance needs will be determined based on ANSI A300 standard specifications:
 - Priority 1 Removal—Trees designated for removal have defects that cannot be cost-effectively or practically treated. The majority of the trees in this category have a large percentage of dead crown and pose an elevated level of risk for failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities to the client would be in this category. Large dead and dying trees that are high-liability risks are included in this category. These trees are the first ones that should be removed.
 - Priority 2 Removal—Trees that should be removed but do not pose a liability as great as the first priority will be identified here. This category would need attention as soon as “Priority One” trees are removed.
 - Priority 3 Removal—Trees that should be removed, but that pose minimal liability to persons or property, will be identified in this category.
 - Priority 1 Prune—Trees that require Priority One Pruning are recommended for trimming to remove hazardous deadwood, hangers, or broken branches. These trees have broken or hanging limbs, hazardous deadwood, and dead, dying, or diseased limbs or leaders greater than four inches in diameter.

- Priority 2 Prune—These trees have dead, dying, diseased, or weakened branches between two and four inches in diameter and are potential safety hazards.
- Routine Prune—These trees require selective removal of dead, diseased, dying, and/or broken wood to minimize potential risk. Priority of work should be dependent upon the Risk associated with the individual trees.
- Training Prune—These are young trees that must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. Generally, these trees may be up to 20 feet in height and can be worked with a pole pruner by a person standing on the ground.
- Stump Removal—This category indicates a stump that should be removed. Lacking specific information on stump removal required by local code requirements per the client.
- **Clearance Priority.** Trees which are causing or may cause visibility or clearance difficulties for pedestrians or vehicles will be identified, as well as those trees blocking clear visibility of signs or traffic signals
 - Priority 1 - Risk of Life, Limb or Property
 - Priority 2 - Potential Liability
 - None
- **Further Inspection.** This field will be used to indicate that a particular tree will require further or periodic inspection due to particular conditions with the tree that could cause it to be a safety risk and, therefore, potentially hazardous to the public. It will require the utilization of an advanced technique including but not limited to aerial inspection, assessment of internal decay via drilling or sonic stress, root inspection and evaluation of decay, measuring of tree lean, and load testing through hand, static, or dynamic methods, where previous visual and simple tool assessment have occurred. Further inspection typically requires a Level III Risk Assessment.

Other Input Fields

- **Notes.** Additional information that may pertain to the tree of the site location will be recorded here.
- **Serial Number.** A unique identifier will be recorded for each site.
- **Date.** Date of assessment will be recorded for each site.
- **Time.** Time of assessment will be recorded for each site.
- **Staff.** Staff initials of the inventory arborist providing the assessment will be recorded for each site.

Attachment B

Public Tree Inventory Data Field Descriptions and Sizes

The following data fields and input/collection code formats will be collected for each tree and stump during the inventory. These fields and their values will be programmed into Davey Resource Group's hand-held field computers for the inventory data collection.

Data Field Name	Field Format	Input Notes	Definition
Address Input Fields			
Address	Open Entry	Numeric	Property address
Street	Pick List	Street name: master file	
On Street	Pick List	Street name: master file	
GIS X and Y Coordinate	Easting and Northing	Numeric	Projected longitude and latitude coordinate
Land Use	Radio	Single-family Residential Multi-family Residential Industrial/Large Commercial Park/Vacant/Other Small Commercial	
Site Input Fields			
Growing Space Type	Radio	Island Median Natural Area Open/Restricted Open/Unrestricted Raised Planter Tree Lawn Unmaintained Area Well/Pit	
Aboveground Utilities	Radio	Present Conflicting Present Not Conflicting Not Present	
Hardscape Damage	Radio	Present Not Present	
Tree Input Fields			
Species	Pick List	Species: master file	
Diameter	Pick List	Numeric	DBH (inches)
Condition	Radio	Good Fair Poor Dead	>80% 80-50% <50% 0%

Data Field Name	Field Format	Input Notes	Definition
Primary Maintenance Need	Radio	Priority 1 Removal Priority 2 Removal Priority 3 Removal Priority 1 Prune Priority 2 Prune Routine Prune Training Prune Stump Removal	
Clearance Priority	Radio	Priority 1 Priority 2 None	
Further Inspection	Radio	No (default) Yes	No Further Inspection Level 3 Risk Assessment Recommended
Other Input Fields			
Notes	Open entry	Alpha & Numeric	Special conditions noted
Serial Number	Open entry	Alpha & Numeric	Unique identifier #
Date	MM/DD/YY	Numeric	Date collected or edited
Time	0:00:00	Numeric	Time collected (24 hour)
Staff	Pick List	Alpha	Staff name or initials

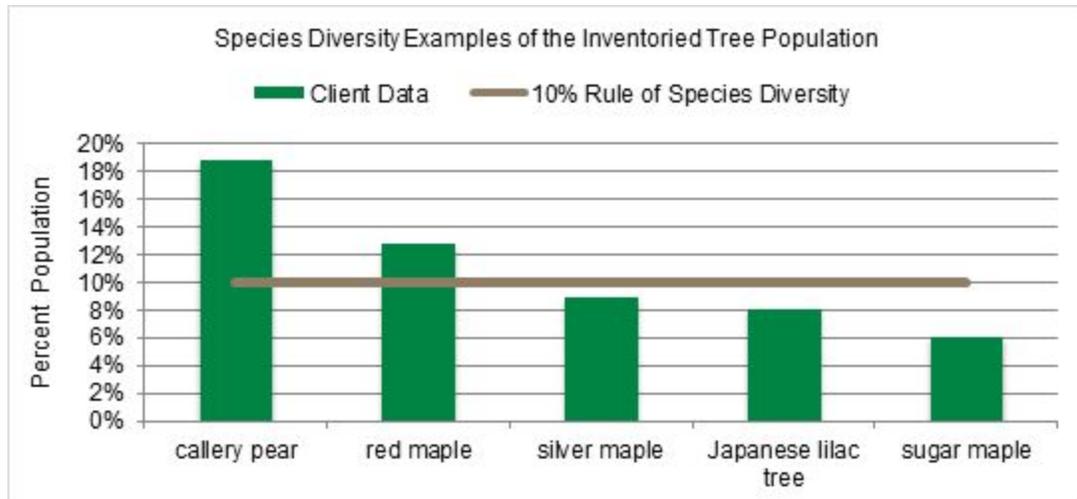
Attachment C

Tree Management Plan

This *Tree Management Plan* details a proactive approach for urban forest maintenance based on an analysis of tree inventory data. The plan includes a standardized presentation and analysis of tree population statistics and a variety of recommended maintenance strategies. Annual budget projections for these recommendations are provided as a multi-year maintenance schedule.

Management Plan Sections

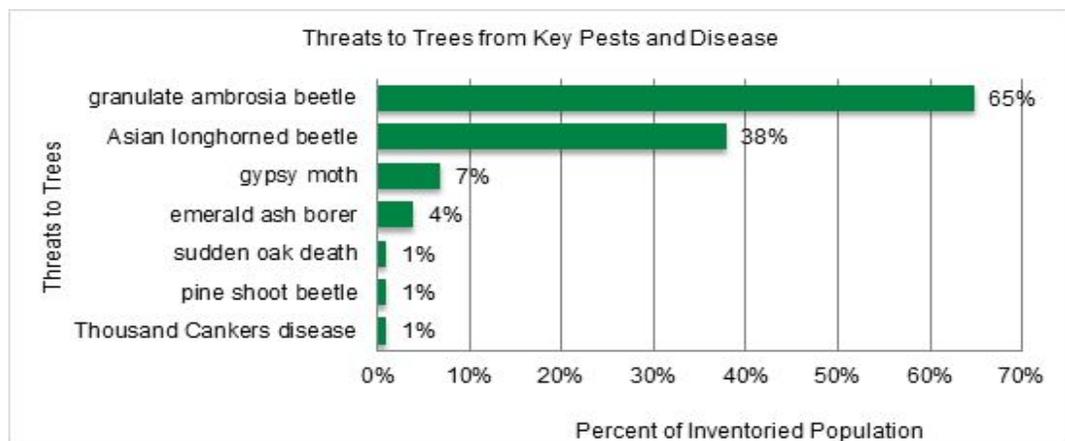
- **Executive Summary.** This section presents a brief overview of inventory findings including the current state of the urban forest and recommended tree maintenance needs.
- **Urban Tree Canopy (UTC) Cover and Benefits Analysis**
Using i-Tree Canopy, the value of the tree canopy's ecosystem services, such as air pollution removal, carbon storage, and carbon sequestration, will be calculated. The section will discuss total community tree canopy, benefits provided, and compare canopy levels to similar communities in the region. This section will discuss the value of measuring tree canopy and provide a brief overview of establishing canopy goals and their role in urban forest management.
- **Benefits of the Inventoried Trees.** Tree inventory data will be used to estimate the economic and environmental benefits West Lafayette's inventoried trees provide the community. i-Tree tools are used to determine annual benefits, which are accurately quantified and monetarily presented as value per capita, value per tree, net value (gross benefit minus maintenance costs), and benefit-cost ratio. The report will also provide recommendations on how to manage and plant trees to maximize their future benefits.
- **Inventory Analysis.** Identifies the inventoried area and discusses the tree population characteristics that direct management, including: species diversity, diameter size class distribution, general health, trees per street mile, and potential pest-related threats to trees. Trends, observations, and concerns noted during the inventory or identified during analysis of the data are also discussed in this section.



- Tree Management Program.** Details the processes and activities that comprise a multi-year urban forest management program. Headings in this section include: risk assessment during the tree inventory; priority and proactive maintenance, including priority tree removal and pruning; routine tree pruning and young tree training pruning cycles; inspections; community outreach; and plan and inventory updates.

An important component of the Tree Management Program section, is knowing what your budget will be for accomplishing the tree maintenance recommendations made during the inventory. Therefore, a multi-year, editable Excel™ maintenance schedule and cost spreadsheet is provided in the Appendix. This complete maintenance schedule estimates the total costs over a multi-year period for each tree maintenance activity based on approximate and local costs to perform similar work.

- References, Glossary, and Appendices.** The management plan also provides a list of reference materials, a glossary of terms used in the plan, and relevant appendices, which includes: species recommended for future planting, regional and damaging invasive pests and diseases, and estimated costs for the multi-year tree management program.



Kickoff Meeting Notes

Additional Client Contact Information:

Scope Clarification: (planting site distances, multi-stem measurements, natural areas, etc.)

Client Data Collection Method Specifics:

Prioritized Project Progression:

Client Update Requests:

Internal Follow-up (GIS/IT, Business Developer, and Project Manager):

Additional Notes: