

Estimates of Short-term Street Tree Work

Introduction

In an effort to obtain an accurate estimate of the pruning and removal needs for the street trees of Batavia, the City requested a random sample inventory from which an estimate could be extrapolated. This document joins the previously submitted Executive Summary and Management Review as elements in the development of a Tree Management Plan.

Methods

OFFICE: Starting with the *Batavia_StreetTreeInventory_2016* file that was submitted along with the Executive Summary at the end of June, I carried out the following steps:

1. Separated the trees marked for needing consultation (MtncTask=2) from those not so marked (MtncTask=1). Note that MtncTask values of null (empty) or zero are planting sites.
2. Created a sequence of random numbers using www.random.org, then pasted them in a new column of the two groups created by Step 1.
3. Sorted the groups by the numbers in the new column to produce a random ordering of the tree records.
4. Extracted the first 170 of the non-consult trees (5% of the population plus extra) to create the field list.
5. Because of the much smaller number of consult trees and the presence of a few dominant species (especially silver maple), a “stratified” sample was set up so that the species percentages of the sample would resemble those of the consult population. The first 70 of the consult trees (10% of the population plus extra) were extracted to create the field list.
6. After field work, a Pivot Table was used to extract work numbers for the sample. Then I projected those numbers to produce an estimate for the entire population.

FIELD: Data collection was carried out as follows:

1. A database app “Memento” running on an Android phone (Motorola Droid) was used to set up a simple data-collection mechanism with separate “libraries” for consult and non-consult trees.
2. Lists of the ID numbers as presented in the *Batavia_WorkingDatabase* were imported to the appropriate Memento library to create a quick pull-down menu that permitted linking the field work with the database of reference without ambiguity.
3. Fields were created as shown in Appendix A.
4. The addresses were imported into the free Android app “Best Route,” then produces a list of the addresses in the most economical order to minimize time and distance between trees.
5. Data collection was carried out October 4-6 with a windshield survey (ISA Risk Assessment BMP: “Level 1”), stepping outside for removal judgments.
6. Every 4 hours during field work I exported the records and emailed them to myself to create a backup.

Results

→ **NOTE:** details can be found in Appendix B

REMOVAL

- One-third of the consult trees and 6% of the non-consult ones should probably be removed over the next 5 years. Consult trees will continue to need aggressive treatment after that period.
- DBH to trees to be removed
 - Consistently high among consult trees, averaging 29”.
 - Great variation among non-consult trees, from 4 to 40 inches.
- Assumed a 5-year cycle and uniform harm potential (i.e., the failures would all have the same consequences)
- **Estimated 366 trees in total**, or over 50/year.

PRUNING

- 2-3 percent in each of the two groups.
 - Estimated 155 trees in total.
 - The Cornell inventory identified **237 high priority pruning needs** (MtnRec=4) for larger trees (average 24” DBH) in both groups. Since those numbers were based on a complete survey conducted on foot, they may represent the actual situation more accurately.
- Declining trees with > 50% crown dead → Removal, not Pruning
- **Safest estimate to report: 195 +/- 40**

SPECIES ERRORS

- Error rate of 4-5 percent in each of the two groups.
- **Estimated 175 trees** in total—very acceptable for a non-professional group.

Appendix A: data dictionary and field form for data collection

Field	Default	Other field	Other field	Other field
Tree ID	[Imported from spreadsheet]			
Found	Tree	Stump	Soil mark	Nothing
Species check	Yes	No		
Actual species*	[Manual entry]			
Pruning	0 (none)	1 (< 6" diam)	2 (> 6" diam)	
Removal	0 (none)	1 (small or short)	2 (tall or big)	

*hidden field unless Species check = No

The screenshot shows a mobile application interface for creating a data entry. At the top, the status bar shows 69° temperature, signal strength, 4G LTE, and the time 10:30. The app header is 'Create entry' with a checkmark icon on the left and a menu icon on the right. Below the header, there is a text input field containing '5% Sample'. The form consists of several dropdown menus: 'Tree ID' with the value '11_2145', 'Found' with the value 'Tree', 'Species check' with the value 'Yes', 'Pruning' with the value '0', and 'Removal' with the value '0'.

Appendix B: detailed results

Removals

Type	Status	Sample count	Sample Percentage	Population estimate
Consult				
	R1	5	9	47
	R2	14	25	133
	Total	19	34	180
Non-Consult				
	R1	8	5	155
	R2	2	1	31
	Total	10	6	186
GRAND TOTAL				366

Pruning

Type	Status	Sample count	Sample percentage	Population estimate
Consult				
	P1	0	0	0
	P2	1	2	62
	Total	1	2	62
Non-Consult				
	P1	5	3	93
	P2	0	0	0
	Total	5	3	93
GRAND TOTAL				155

Species

Type	Sample count	Sample percentage	Population estimate
Consult	2	4	19
Non-Consult	8	5	155
GRAND TOTAL			174

Appendix C: List of IDs for consult trees needing removal in next 5 years*

ID	Status
14_1497	1
12_3251	1
12_3218	1
12_1403	1
12_1398	1
11_6146	2
11_6123	2
11_4001	2
14_1749	2
11_2224	2
11_3133	2
11_3159	2
12_1357	2
14_1554	2
12_2096	2
14_1482	2
14_1011	2
14_1357	2
14_1306	2

*These IDs can be found in the first column of the *Batavia_WorkingDatabase* file, as well as in the longer *Batavia_StreetTreeInventory_2016*.