

**2016 Gentry East Neighborhood Tree Inventory:
An Analysis of the Neighborhood Street Tree
Population**

E522 Urban Forest Management Case Study

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I. Introduction

This paper details the street tree inventory and analysis, requested by the Gentry East neighborhood, completed on April 3, 2016. The integrity of the street tree population throughout the subdivision deteriorated as a result of a large windstorm that occurred in 2014. As a result, many damaged street trees were removed, creating potential planting sites and an opportunity to introduce diversity into the street tree population. Currently, Bradford pears (*Pyrus calleryana*)

dominate the neighborhood's right-of-way, and there is no homeowners' association or street

tree management plan to address this issue.

Figure 1. Bradford pear trees in full bloom lining Barnes Street in the Gentry East neighborhood.

The flowering Bradford pears lining the streets of the Gentry East neighborhood may be

aesthetically pleasing (Figure 1); however, this species comprises the overwhelming majority of the neighborhood trees – a “monoculture” – and is a non-native species. The developers of the

subdivision, Gentry Construction and Real Estate, did not prioritize species diversity in the street

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tree population, and native species are found almost only in private yards. There is a moderate amount of diversity of tree species within the private lots; however, it is not enough to offset the abundance of Bradford pears. In addition to the private trees, the residents maintain landscaped

garden beds and lawns.

The neighborhood, which is located on 446 East of Bloomington, is aimed to attract

middle to high-income homeowners (Figure 2). According to the most recent census, the average

age of homeowners in the neighborhood is 40 years. In 2010 there were 304 residents, but this number is likely to have increased since development continued (Nextdoor.com). There are 213 parcels and 152 houses in the neighborhood.

It is a common landscaping mistake for the same tree species to be planted side-by-side in order to create symmetry, and some residents enjoy the continuity throughout the neighborhood. However, other homeowners are aware that Bradford pears are harmful to

Indiana's ecology and would like to see more native trees. Once the homeowners' association is

established, it is possible homeowners in this neighborhood will increase diversity in the street

tree population. For this reason, it is important that the residents are informed on the condition of

the street tree population and species that could potentially replace the Bradford pears.

Figure 2. Map of the Gentry East neighborhood created with 39° North.

II. Methodologies Utilized

Pre-Study

In order to develop our understanding of the Gentry East neighborhood's desired

outcomes from this study, we met with resident Sadee VanRuler. She provided information regarding the authority and responsibilities of the homeowner's association. In addition, she notified us that the neighborhood has no formal street tree plan. We used this information as a

base for the rest of the

analysis.

Tree

Inventory

We conducted a street tree inventory at the Gentry East neighborhood in Bloomington,

Indiana during the first week of April 2016. The neighborhood covers approximately 120 acres.
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We only surveyed those trees located in the public right-of way; we did not survey trees in

private yards, although we recorded some observations which helped inform our report. Since

Gentry East will likely be incorporated into the City of Bloomington in the coming years, we

followed the City's methods for street tree inventory (Fischer et al., 2012). Data collected

includes street address, tree location (i.e. front or side of house), species, condition (i.e. good,

fair, poor), diameter at breast height (DBH), planting site width, maintenance needs of the tree,

potential for electrical wire conflict, and general comments. We measured DBH with two-inch

classes using a Biltmore stick. Finally, we recorded vacant tree spaces and noted their size.

Informal

Surveys

Formal surveys were not an option for this neighborhood because their homeowner's association does not keep contact information for residents, and the area was too large for the

neighborhood leader to canvas. However, during the street tree inventory we informally spoke

with Gentry East residents to engage them in the tree study and to further our understanding of

the neighborhood's position on tree presence. We spoke with passersby, informed them of the

inventory, and asked them their opinion regarding the state of the neighborhood forest. If they offered or requested, we exchanged contact information.

Data

Analysis

Upon completion of the street tree inventory, we entered the data into Microsoft Excel.

To examine the resource structure and compute benefits of the neighborhood trees, we

reformatted the data for iTree, created an iTree compatible Access database, and imported the

data into i-Tree Streets, selecting the Lower Midwest climate region. We also examined the size structure and overall condition of the neighborhood street trees to determine replacement needs

and street tree population sustainability.

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III. Results

The street tree inventory is summarized in Appendix Figures 2 through 5 and Tables 1 and 2. Results show an overwhelming abundance of Bradford pears, around 97% of all trees in

the neighborhood (Figure 3). Additionally, the population distribution is predominantly middle-

aged trees. Very few trees are between 0-6 inches DBH, and none of the trees are over 24 inches

in DBH (Figure 4). Most of the trees (88% of all trees) are in good condition (Figure 5). Previous

wind storms have knocked down the Bradford pear trees in the neighborhood, and only 77% of

the planting sites are being utilized with trees (Figure 6). About one quarter of planting sites are

vacant and could be planted with native species. The Bradford pears do provide a substantial

amount of ecosystem services to the neighborhood, over \$25,000 annually (Table 1). In

addition, the cost to remove all the Bradford pears in the neighborhood and replace them with

trees of similar size would be over \$215,000 (Table 2). Therefore, focusing on filling the vacant

planting sites is a priority moving forward.

IV. Issues Identified

After completion of our street tree inventory and data assessment, our group identified

several issues and threats to the street tree population of Gentry East. The lack of street tree

species diversity presents a serious threat to the overall health and sustainability of Gentry East's

urban forest. With the exception of a handful of street trees planted by homeowners (likely after

storm damage), Gentry East's street tree population was planted as a monoculture of Bradford pear, which remains the dominant species in the neighborhood street tree population (Figure 3).

An overreliance on any single species for street trees (or any part of a neighborhood's urban

forest) is an unsustainable management strategy, but the magnitude of this management decision

is compounded by the negative traits exhibited by Bradford pear. One of primary issues
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encountered in Bradford pear populations is a high degree of susceptibility to storm, wind, and

ice damage, a problem caused by the species' naturally poor branching structure and weak wood.

This weak structure has made its mark on Gentry East's street tree population, as many of the

vacant planting sites and replanted trees were made available after inclement weather conditions

in recent years destroyed the Pear trees that were previously planted. In addition to the outright

destruction of trees, some of the Bradford pear trees inventoried were assigned a rating of "Fair"

or "Poor" due to evidence of previous storm damage (i.e further damage from future storms as

well as continued tree decline from past damage).

In addition to these concerns about species diversity, Gentry East's street tree

population

exhibits an unsustainably homogenous age structure. The trees appear to have been planted as cohorts of identical species and age. As Bradford pears experience a rather short life span due to

their previously described structural weaknesses, these homogenous cohorts are susceptible to

simultaneous die-offs during storm events. During the street tree inventory, evidence of previous

cohort loss was observed in areas of the neighborhood devoid of any street trees after storm

events in recent years. With many of Gentry East's Bradford pear cohorts reaching the later stages of their life expectancy, future storm events are likely to significantly damage and/or destroy street tree populations across the neighborhood.

While the previously described issues concern physical problems with the

neighborhood's street tree population, the long-term sustainability of the subdivision's urban

forest is also harmed by the lack of a coordinated street tree management strategy. As there is no

street tree master plan in place, the developing urban forest lacks formal guidance, which further
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exacerbates and explains species diversity and structural issues. The negative effects of this

insufficient management practices can be seen by the fact that neither homeowners nor Gentry

Construction and Real Estate have reliably replaced lost trees, removed damaged trees, or

provided maintenance to still living trees.

Our group has identified the lack of community involvement as a contributing factor to

the absence of a concerted management strategy. Informal dialogue with Gentry homeowners indicates that street tree management responsibilities lie in somewhat of a grey area between the developer (Gentry Construction and Real Estate) and the homeowners. In many neighborhoods, street tree management is generally overseen by either the developers or a homeowner's

association. While a homeowners association has been established in Gentry, ownership has not

yet been transferred from the developer to the actual homeowners. This creates a barrier to effective community involvement and input, reflected by the poor state of the neighborhood's

street tree population and the dissatisfaction of many homeowners with whom our group spoke

with.

V. Recommendations and Conclusion

Completion of the Gentry East neighborhood tree inventory shows a monoculture of Bradford pears. Rather than immediately removing all the Bradford pears, residents of the

Gentry East subdivision should phase-out the monoculture strategically. This will be more economical due to the exorbitant replacement costs estimated by i-Tree (Table 2). The inventory shows that 23% of Gentry East's planting sites are vacant (Figure 6). The residents should plant

trees in these vacant spaces using the City of Bloomington tree guide to improve diversity of the street tree population. As trees are replaced, residents should refrain from planting Bradford

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pears, and plant a variety of native tree species.

Finally, the homeowners in the neighborhood should begin to form a neighborhood

association now, and maybe an initial subcommittee should be formed to address street trees and other landscaping issues. When the developers hand the homeowner's association (HOA) over to the neighborhood, part of the HOA fee should go into a street tree fund. In addition, the HOA should develop a long-term plan to manage street tree populations and ensure species diversity and maintenance of trees.

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Reference

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<http://www.itreetools.org>

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Appendix 1: Gentry East Data Figures and Tables

Species Distribution for Gentry East

Red maple, 1.0% Honeylocust, 1.0% Japanese tree lilac, 1.0%

Ginkgo, 0.3%

Callery pear

Japanese tree lilac

Red maple

Bradford pear, 96.8%

Honeylocust

Ginkgo

Figure 3: Tree species distribution in the Gentry East neighborhood. The neighborhood is predominantly Bradford pears (>96%), an invasive species.

Size Distribution of Trees in Gentry East

250
100
50
Callery pear
Japanese tree lilac
Red maple

250

100

50

Callery pear

Japanese tree lilac

Red maple

Honeylocust
 Ginkgo 00-3 3-6 6-12 12-18 18-24 24-30 30-36 36-42 > 42
 Neighborhood Total
 DBH (in.)

Figure 4. Tree species size distribution in the Gentry East neighborhood. Most trees are in the 6-12 inch age class, though native species are in smaller classes.

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Condition of Trees in Gentry East

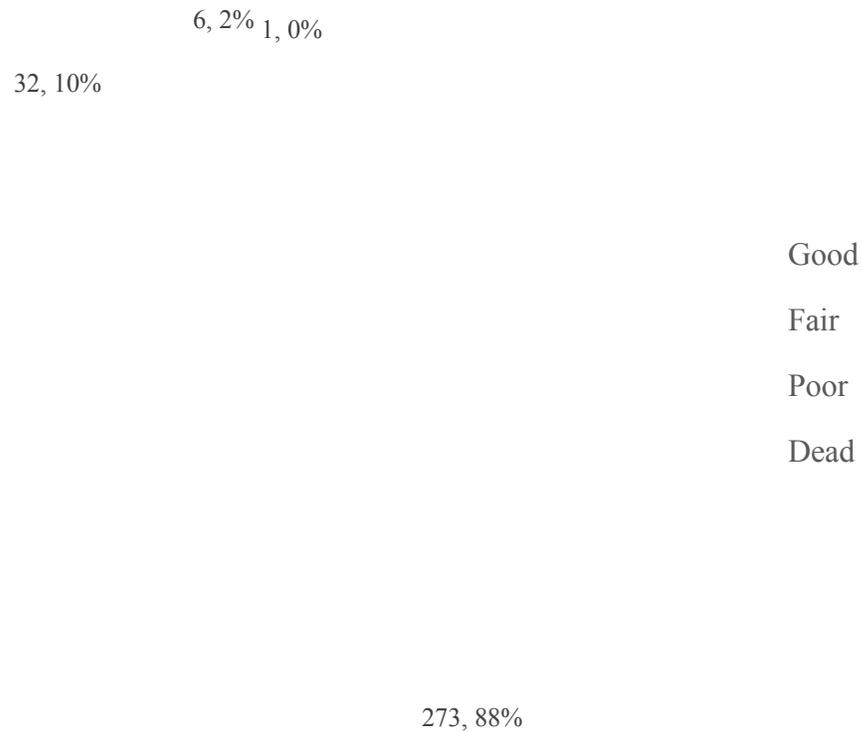


Figure 5. Condition of trees in the Gentry East neighborhood.

Planting Sites Available at Gentry East 7%

Trees Planted 13%
 Large Planting

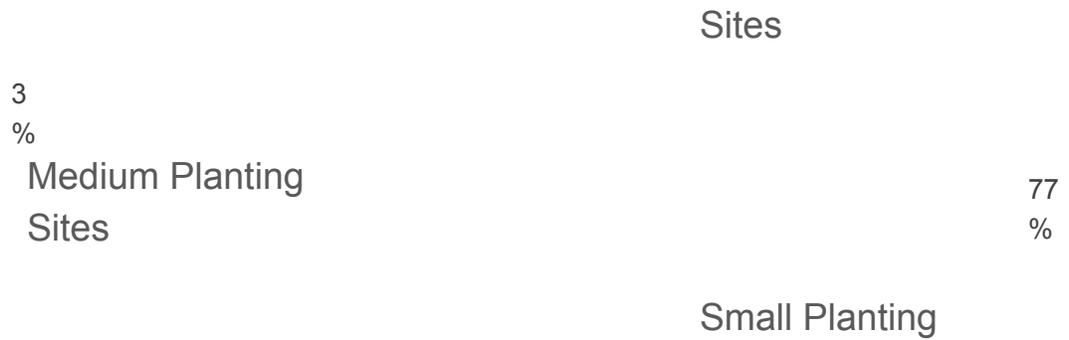


Figure 6. Planting sites available in the Gentry East neighborhood.

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Table 1. Annual benefits for all the trees in the Gentry East neighborhood, estimated by i-Tree.

Species	Energy (\$)	CO2 (%)	Air Quality	Stormwater	Aesthetic/Other	Total (\$)	% of Total
Callery pear	8,695	1,054	1,328	6,228	8,542	25,848	99.3
Japanese tree lilac	3	0	0	1	0	4	0.0
Red maple	27	3	4	18	30	81	0.3
Honeylocust	33	3	5	18	32	92	0.4
Ginkgo	1	0	0	0	0	1	0.0
Neighborhood Total	8,758	1,061	1,337	6,265	8,605	26,025	100.0

Table 2. Costs for replacing all the trees in the Gentry East neighborhood, estimated by i-Tree.

DBH Class (in.)	0-3	3-6	6-12	12-18	18-24	Total (\$)	% of Total
Callery pear	2,251	5,376	126,033	79,709	2,044	215,413	98.25
Red maple	634	0	678	0	0	1,312	0.60
Honeylocust	586	0	556	0	0	1,142	0.52
Japanese tree lilac	1036	0	0	0	0	1,036	0.47
Ginkgo	343	0	0	0	0	343	0.16
Neighborhood Total	\$4,850	\$5,376	\$127,267	\$79,709	\$2,044	\$219,246	100.00