

2013

East Row Urban Forest Inventory & Analysis



By Rachel Comte
ISA Certified Arborist OH #6296-A

IN PARTNERSHIP WITH
Horticulture & Urban Planning
DAAP, University of Cincinnati
and the East Row Garden Club

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EXECUTIVE SUMMARY

This report details the results of the recent citizen-driven, 100% volunteer street tree inventory for the East Row neighborhood in Newport, KY. It was done to provide a basis for developing a working plan to proactively manage the valuable street trees.

Highlights of the inventory report and results follow:

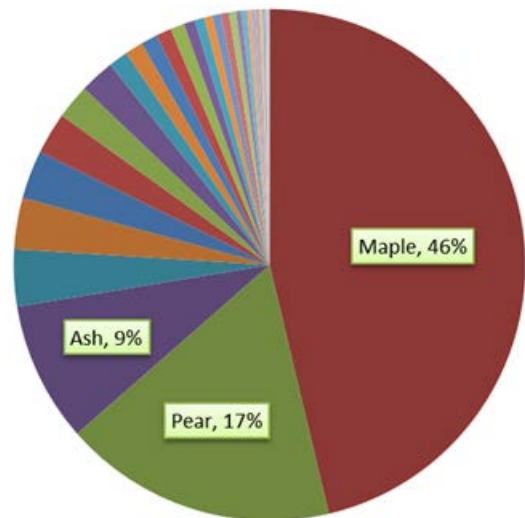
Diversity Needed. Maples and Pears make up a combined 63% of all species in the East Row. Species diversity goals dictate that no one genus/species should represent more than 5-10% of the total urban tree canopy. Any further planting should exclude maples and pears to diversify tree species within the neighborhood.

Significant Benefit of Street Trees. It was found that the street trees in the East Row provide a multitude of benefits, including:

- an estimated \$8-\$32 million boost to property values,
- over \$43,000 in annual energy savings for residents,
- removal of 283 pounds of particulate matter and 2,424 pounds (over 2 tons) of chemical pollution from the air annually,
- reduction of 754,237 pounds (over 375 tons) of carbon dioxide from the atmosphere annually,
- interception of over 1.6 million gallons of stormwater runoff each year – a value of \$44,837,
- noise reduction from I-471 (just one tree-lined block away from I-471 lowers highway noise by over 15dB),
- and finally, street trees play a large role in building the solid community we are so fortunate to have through temperature moderation, better health, and more successful business districts.

Inventory Levels Dropping. The total number of street trees added and removed over the last 10 years by individual and city activity has dropped by 52, or 5% (excluding a community garden club project). More new plantings are needed on a community scale to maintain and increase the urban tree canopy.

Species Diversity
2013 East Row Tree Inventory



Challenges. There are a number of challenges facing the East Row urban tree canopy.

- **Pests.** There are two major pests with the potential for large impact on our street trees:
 - **EAB.** The Emerald Ash Borer has already made an impact and will cause an additional 9% drop in inventory from the loss of Ash trees. A proactive replacement plan is needed for the Ash population.
 - **ALB.** The Asian Longhorned Beetle was found nearby and constitutes a bigger threat than any pest seen in decades. 48% of the East Row tree canopy is susceptible to this pest. As treatment is not currently available, containment is the only option to avoiding mass tree loss. Containment requires spread prevention and early detection education. Further diversity in tree species is also critical.

The EAB and ALB together have the potential to decimate 58% of the current tree canopy, as shown in the images below.



- **Resident/City Responsibility.** Most East Row residents are not aware that they (not the city) are responsible for regular care and pruning of their street trees.
- **Tree Education** (care and selection). Much of the damage to street trees today come from lack of education on how to care for trees, along with the fact of unawareness of responsibilities mentioned above. A significant education campaign is needed.
- **City Capabilities.** The Newport Tree Board is inactive and there is no urban forester on staff. On top of which, Public Works staff has been cut substantially in past years.

Next Steps. The East Row committee on street trees will be meeting to develop a plan/program to protect and proactively manage our street trees based on this report. The plan will likely include a planting program, significant education on tree selection and care, a “Heritage Tree” program created to build appreciation for existing significant trees, and possibly in future years work to improve the minimal tree canopy on the west side of Newport. We will be exploring grant funding as well.

It is vital to the success of this work for the committee to partner with the city to determine how to work together to achieve many of these initiatives. A meeting with city staff is an important next step to discuss initiatives, parameters, the tree board, and more.

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Author: Rachel Comte

INTRODUCTION

The tree-lined streets of Newport's East Row Historic District are one of the neighborhood's defining characteristics and most valuable assets. Because the local tree board is currently inactive and the city tree ordinance places much of the responsibilities for these trees in the hands of residents, they are also the least understood and currently receiving the least care.

Working Group Formed. After an arborist walk held during a garden club meeting, residents collectively expressed the desire and need to proactively invest in their street trees; both caring for the existing trees (often referred to as the "canopy" or "urban forest") and planting additional trees. To do this, the East Row Garden Club formed a street tree working group and dedicated initial funding. Led by a certified arborist and graduate student of urban and environmental planning at the University of Cincinnati (author), the group kicked off the project with a street tree inventory.

Street Tree Inventory. During the summer of 2013, 45 volunteers were trained and sent out to collect street tree inventory data (training manual, tree key and forms used can be found in the appendices). The data was compiled and imported into a GIS system for analysis¹, together with data from a 2004 tree inventory (provided by Newport Public Works).

Analysis. Since completion of the inventory, the working group has met to review and analyze the inventory results, and to begin to formulate a long-term management strategy.

This report will summarize the findings from the inventory project, highlight opportunities and challenges facing the community relating to urban trees, and form an initial structure of a management plan. The working group will further expand this plan in the coming months.

After each forestry topic discussed in this report, there will be a **For East Row Consideration** paragraph highlighting opportunities or challenges relevant to the East Row specifically. These comments will be later summarized in the Recommendations section.

The East Row has a substantial canopy of mature urban street trees with a replacement value of approximately \$1.4 million.



¹ "Geographic Information Systems" combine the spatial references of an online mapping tool with a database.

Why Trees?

There is a general lack of awareness and appreciation by the public on of the value of urban trees. They offer significantly more than just shade and aesthetics, performing a number of valuable functions - functions that can be expensive to re-create.²

Benefits of street trees in general and the specific benefits of East Row's street trees are cataloged below:

Increase in Property Values. A shade tree can add anywhere from 5-20% to the property value. (Lexington, 2013) Conversely, property values declined by as much as 20% for properties in proximity to lots with no trees. (PHS, 2010) "The most pleasant and appealing city neighborhoods are almost always those that have well-tended, tree lined boulevards and neighborhood parks full of people using them." (Garvin, 1997) Tree-lined streets raise property values, and the demand for greener neighborhoods continues to grow.

East Row street trees can contribute to \$8-\$32 million to total property value.¹

Energy Savings. Shade provided by trees in the summer can reduce home cooling costs by up to 58%. In the winter, those same trees lose their leaves, allowing sun to reach and warm homes in the winter, while evergreens block harsh winter winds reducing heating needs. One study equated 2,000 trees to \$80,000 worth of energy savings. (Nine Mile, 2012)

East Row street trees are responsible for over \$43,000 in annual energy savings for residents.

Cleaner Air.³ Suffer from allergies or asthma? Trees improve air quality by trapping and holding a significant percentage of pollen, dust and smoke ("particulate matter") from the air. (ADF, 2013) They also mitigate ozone, nitrogen dioxide and sulfur dioxide pollution.



East Row street trees are responsible for removing 283 pounds of particulate matter and 2,424 pounds (over 2 tons) of chemical pollution from the air each year.

Better Health. Aside from the benefits for those sensitive to air quality, trees have been shown to be beneficial for physical and mental health. Tracking patient recovery in hospitals, one study found that patients with trees outside their window (vs. parking lot or brick walls) recovered an average of one day faster and with fewer required pain killers. (Nine Mile, 2012) Trees can influence mental health as well, as reported in their calming and healing effect on ADHD adults and teens. (Burden, 2008)

¹This is assuming an average home value of \$150,000, 1,070 homes within the East Row, 5-20% property value increase.

²Unless noted otherwise, benefits of East Row trees described throughout this section come from computations of the inventory data through the US Forest Service's iTree valuation software.

³Image source: <http://greenschools.net>

Temperature Moderation. Ever wonder why it always feels cooler in the woods? It's not just due to shade. Leaves emit water vapor making the ambient temperature lower. Temperature differences of 5-15 degrees can be felt when walking under tree canopied streets. Cooler temperatures also reduce asthma attacks. (Miller, 1997)

Stronger Communities & Positive Social Impacts. Sense of community is an extremely valuable asset to a neighborhood, yet almost impossible to quantify. Tree-lined streets entice neighbors outdoors on a regular basis. Such settings support frequent, friendly interaction among neighbors--the foundation of neighborhood social ties. These ties are the heart of a neighborhood's strength, encouraging neighbors to help and protect each other. (Kuo, 2010) In a Chicago study, residents of buildings with more trees reported that they knew their neighbors better, socialized with them more often, had stronger feelings of community, and felt safer and better adjusted than did residents of more barren, but otherwise identical areas.



East Row street trees play a large role in building the solid community we are so fortunate to have. While only an opinion, this is another defining and beneficial characteristic of the East Row.

Carbon Dioxide Removal. The moment a tree is planted it starts removing CO₂ from the air. Over its lifetime, one tree can pull approximately 2,000 lbs. (one ton) of carbon dioxide from the atmosphere. (ADF, 2013) How significant is this number? Consider as a reference that a medium-sized car generates about 11,000 pounds of CO₂ every year. (NTBC, 2013)

*East Row street trees are responsible for an **annual reduction of 754,237 pounds (over 375 tons) of carbon dioxide** from the atmosphere.*

Lower Crime. A recent study found that Chicago neighborhoods with trees and other vegetation had 48% fewer property crimes and 56% fewer violent crimes than those without trees. (PHS, 2010)

Successful Business Districts. A recent study shows shaded business districts attract more shoppers and are responsible for longer shopping visits, as well as a sales increase of 11%. It was also shown that shoppers are willing to pay more for products found in business districts with an attractive tree canopy. (PHS, 2010)

| *Where would you rather shop?*



Comparison of shopping districts with and without street trees.

Images source: <http://montgomeryplanning.org/blog-design/?p=3295>

River Pollution Prevention. The sewer districts in Cincinnati (MSD) and Northern KY (SD1) alone dump *14 billion gallons* of combined sewage and runoff into the Ohio River every year. Why? Water treatment plants are overwhelmed as cities expand. More pavement means more rain runs directly into storm sewers instead of naturally soaking into the ground. The system in greater Cincinnati uses the same pipes for stormwater and raw sewage, so when huge amounts of this mixture can't be handled by the treatment plants when it rains, it overflows into the Ohio River.



Combined sewer overflow after a rain event.

Image source: <http://www.wkyc.com/news/article/267204/226/NE-Ohio-Water-treatment-plants-at-capacity>

What does this have to do with trees? Trees can stop stormwater from reaching the sewer systems. “A mature shade tree can hold over 100 gallons of rainwater on its leaf and branch surface, and forest cover can intercept up to 50% of a rainfall.” (ADF, 2013) And studies have shown that trees do this at lower costs than engineered alternatives like pipes and treatment plants. (Schwab, 2008) As cited by the Green Umbrella’s *The Economic Case for Preserving Greenspace* report, a 10% reduction in the region’s forest greenspace would cost at least \$10 million for equivalent storm sewer capacity.” (Taking Root, 2013)

| *East Row street trees are responsible for **intercepting over 1.6 million gallons of stormwater** runoff each year – a services value of **\$44,837**.*

Visual and Noise Screens. Trees dampen noise from nearby highways and create a sense of privacy, which is especially valuable in urban areas. A planted 100' buffer can reduce noise levels by a minimum of 6 decibels, which increases with distance.⁴ (Bentrup, 2010)



East Row street trees provide an important service of noise reduction as the neighborhood is located immediately adjacent to I-471. Just one tree-lined block away from I-471 lowers highway noise by over 15dB.

Water Treatment. Trees can actually *clean* polluted water that run off streets and parking lots. Soil, roots and leaves act as natural filters for polluted water, cleaning it before it reaches groundwater tables or storm sewers (and later local waterways).



⁴ For reference, decibel levels on a busy highway average around 74dB, while normal speech averages at 50dB.

The Study Area

The East Row Historic District covers an area at the northern corner of Newport, KY, directly across the Ohio River from downtown Cincinnati. The East Row neighborhood features Victorian era homes, all of which are on the National Register of Historic Places.

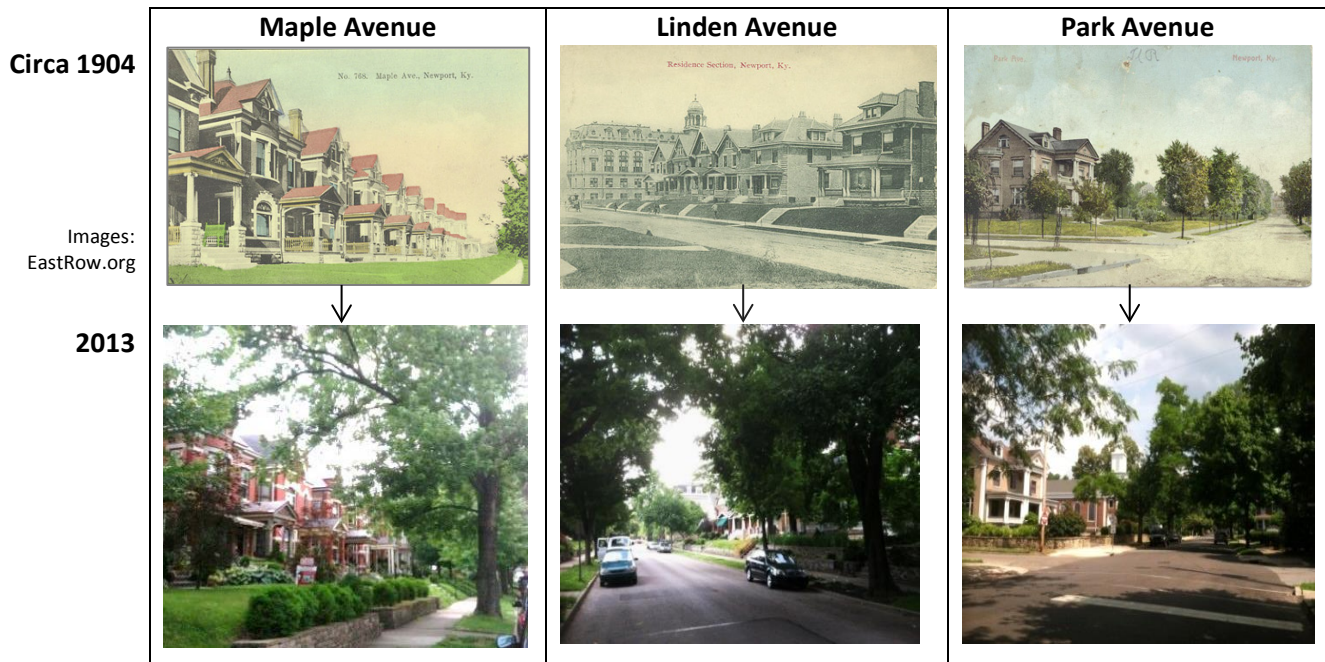
The street tree study area covers the entire historic district, along with a number of blocks just outside the district, as shown in red on the map.



East Row History. The East Row was “once home to late-19th-century riverboat captains and captains of industry, including brewers and bankers. When river-based industries declined, Newport took an alternative approach to diversifying its economy, as casinos, saloons, and houses of ill repute turned this into the Boardwalk Empire of the South.” (Pandolfi, 2012) “At one point, it was common to see celebrities like Frank Sinatra, Dean Martin and others walking along Newport’s downtown streets.” But the rise of Las Vegas gambling sent Newport on another downturn, and the city’s entertainment took on a “seedier air.” The city continued to suffer until citizens banded together in the late 1970s/1980s and started restoring homes. (ERHF, 2013)



The following pictures show historic photos of the East Row neighborhood in the late 1800s/early 1900s, next to the same view point in 2013. The tree planting by the residents and city through the years is evident, as is the image of what our neighborhood would be like without trees.



INVENTORY RESULTS

Tree inventory data collection included information on tree species, size, location, overall condition, overhead utilities and sidewalk condition on every street tree in the study area. The following sections detail findings from the inventory.

- Species of Existing Trees
- Size/Ages Existing Trees
- Planting and Removals Since 2004
- Growth Rates Since 2004

Analysis and application of this information follows in the next few sections.

Species of Existing Trees

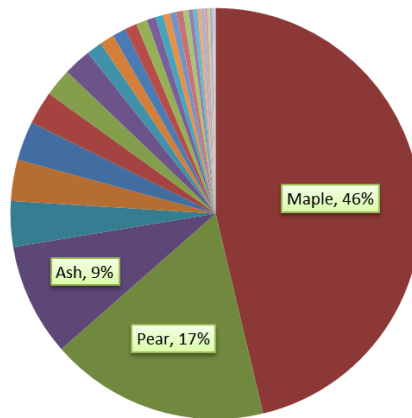
Data collected on tree species in the East Row show a large percentage (46%) of the street trees are maples, followed by 17% pears and 9% ash trees.

Species diversity goals dictate that **no one genus/species should represent more than 5-10%** of the total urban tree canopy.

Urban forest diversity (or lack thereof) has real consequences. Years ago, the American Elm was the “tree of choice” for many communities as it was tolerant of urban conditions, had few health problems, and was affordable to purchase and install. Many communities overplanted this species and were later devastated when Dutch Elm Disease spread through the U.S. in late 1900s. Some communities are still recovering from those losses today. (Miller, 1997)

Species Diversity

2013 East Row Tree Inventory



Species	Qty	%
Maple	528	46%
Pear	197	17%
Ash	101	9%
Crabapple	41	4%
Linden	37	3%
Tree Lilac	35	3%
Tuliptree	30	3%
Hawthorne sp.	25	2%
Honeylocust	25	2%
Cherry/Plum sp.	14	1%
Oak	13	1%
Hornbeam	12	1%
Elm	11	1%
Sweetgum	10	1%
Dogwood	8	1%
Planetree	7	1%
Redbud, Cottonwood, Zelkova	6 each	1%
Gingko	5	0.4%
Magnolia sp., Rose of Sharon	4 each	0.3%
Birch, Catalpa, Hackberry	3 each	0.3%
Horsechestnut, Mimosa	2 each	0.2%
Serviceberry/Beech	1 each	0.1%



A lack of species diversity can be fatal to an urban forest. Shown above are pictures of a suburban Detroit street before and after the onset of the Dutch elm disease.

Images Source: <http://www.athensclarkecounty.com/DocumentCenter/Home/View/706>

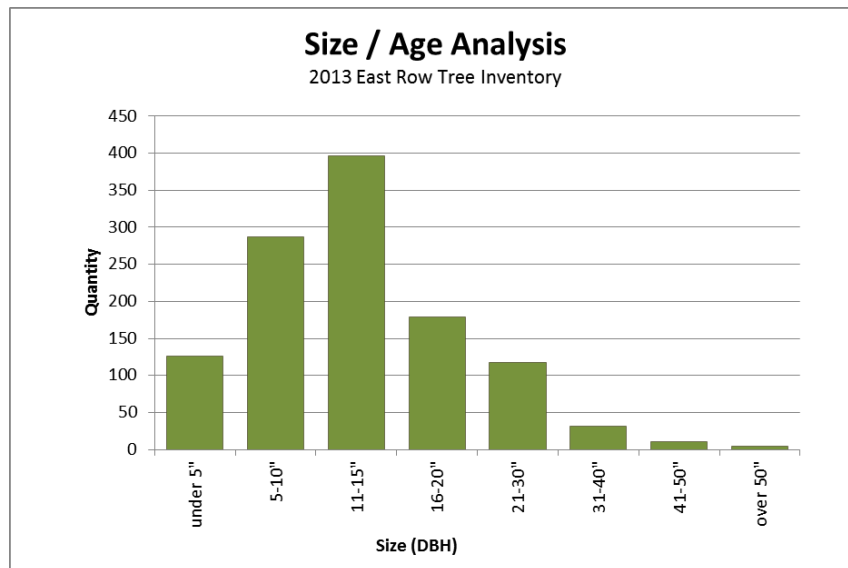
Then came the Emerald Ash Borer which is currently wiping out the ash tree population and forcing cities to deal with substantial losses again. The Asian Longhorned Beetle (killing multiple species and looming on the horizon) has the potential for more devastation than all pests to-date combined. (Discussed in more detail in the Pest Threats section.)

Diseases are not the only threat communities face with low diversity. Many Callery Pears planted in the mid-late 1900s have been found to be structurally unsound in its maturity and are failing today, causing large gaps in city tree canopies.

For East Row Consideration: Any further planting should exclude maples and pears to diversify tree species within the neighborhood.

Size/Age of Existing Trees

Diversity is important not only in species, but in diversity of ages. Evenly-aged rows of street trees can be attractive, but will also mature and decline together as well.



Overall, the East Row has a good diversity of ages throughout the neighborhood⁶, though if examined block by block unevenness may become more evident. Mass plantings where entire blocks are planted all at once create less diverse urban forests than individual plantings throughout a neighborhood. (Miller, 1997)

DBH ⁵	Qty	%
under 5"	126	11%
5-10"	287	25%
11-15"	396	35%
16-20"	179	16%
21-30"	118	10%
31-40"	31	3%
41-50"	11	1%
over 50"	5	0.4%

For East Row Consideration. Ongoing additions and replacements of trees throughout the neighborhood will help maintain and increase age diversity.

⁵ DBH = Diameter (of trunk) at Breast Height, the standard tree size metric.

⁶ Data on exact ages for East Row street trees were not available. Size was used as a substitution for age.

Planting & Removals Since 2004

By comparing data from the 2004⁷ and 2013 inventories, the location and species of both newly planted and removed trees were identified.



Activity	Tree Qty	Net
2004 Inventory	1,158	
Removed Since 2004	-173	
Planted Since 2004	+159	
2013 Inventory	1,144	-14

Species	Removed Since 2004	Planted Since 2004	NET
Tree Lilac	4	31	27
Hornbeam	0	11	11
Gingko	0	3	3
Ash	6	8	2
Oak	1	3	2
Elm	1	2	1
Cherry/Plum	6	6	0
Other	25	24	-1
Planetree	3	1	-2
Hawthorne	7	1	-6
Linden	10	4	-6
Pear	25	18	-7
Crabapple	14	7	-7
Honeylocust	9	2	-7
Maple	62	38	-24
	173	159	-14

Total street count has dropped by 14 since 2004, though removals and plantings are well spread throughout the study area. Additionally, the number of maples and pears have dropped, which is a positive change as well.

The large number of Tree Lilacs and Hornbeams installed stem from a recent planting project on Hamlet Street by the East Row Garden Club. If we exclude this community group project, the number of street trees (by individual and city activity) has dropped by 52, or 5%.

For East Row Consideration. We are making progress toward diversity of species, but efforts are needed. Continue pushed toward greater diversity. More new plantings are needed on a bigger scale to maintain and increase the urban canopy.

Growth Since 2004 (9 yrs.)

By comparing these two inventories, growth rates of the existing trees over the last 9 years were reviewed. No significant findings or learnings emerged from this analysis.

⁷ Paid for by the city, implemented by Davey Resource Group

ANALYSIS, CHALLENGES & OPPORTUNITIES

The following sections highlight a number of issues requiring attention based on inventory results and current urban forestry planning challenges.

- Immediate Removals
- Pest Threats
- Flowering Callery Pears
- Overhead Utilities & Street Trees
- City Ordinances / City Staff
- Sidewalks
- Tree Care Best Practices
- Asset Trees

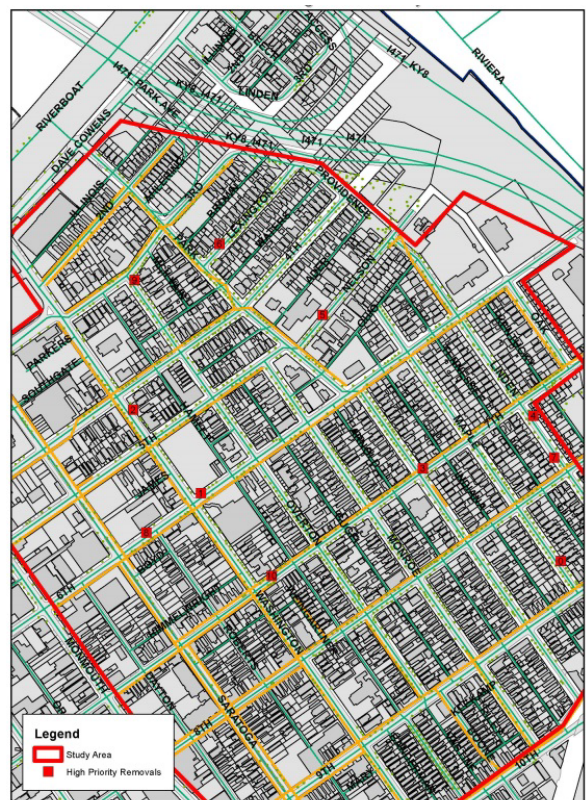
Immediate Removals

After all data from the inventory was cataloged, there were a number of dead/dying trees that were considered an immediate safety concern.

Instead of waiting until the report was completed, a list of 11 trees was submitted to the Newport Public Works department in September 2013 for immediate consideration for removal.

By identifying these 11 hazardous trees, the author is not indicating that trees *not* identified *are* safe; conditions and storms may render any tree to become hazardous in a short period of time. It is strongly recommend that the city of Newport use their resources and expertise to investigate hazardous trees in more detail.

As of December 2013, the city has removed a number of these trees already.



Pest Threats

There are two significant threats from pests that warrant discussion: the loss of ash trees from the Emerald Ash Borer and the potential threat to maples and elms (among others) from the Asian Longhorned Beetle.

Ash Tree Loss

The Emerald Ash Borer (EAB) is a non-native beetle spreading through the Midwest killing any ash tree in its path. First discovered near Detroit in 2002 (from Asia, likely in wood packing crates), and found locally in Warren County in 2006, the EAB has now infiltrated all seven local counties in Greater Cincinnati and Northern Kentucky. (Truong, 2011)



The greater Cincinnati area has tens of thousands of ash trees, many of which are on private property and along streets. Economic losses of such large trees near homes are felt from decreases in property values and high removal costs. Consider the Toledo example (at right) after the loss of ash trees lining the street. Imagine the financial impact of property values and energy costs alone.

The most common symptoms of infestation are dieback starting from the tops and shoots emerging from the trunk and base of tree as it struggles to survive. While treatment⁸ is an option for EAB, it is expensive and requires reapplication every two years by a professional service.

The City of Newport has chosen not to treat ash trees. Many municipalities, even those with potential financial means, have opted not to treat, as it does not make economic sense in the long term.



Ash trees pre-EAB. Belvedere Dr, Toledo. June 2006



Untreated ash after EAB, same location. June 2009



Infestation Symptoms: canopy dieback, shoots from trunk



All dead ash street trees removed, same location.

Source: EmeraldAshBorer.info

⁸ Treatment via injection can be done in late spring, and has been proven to give two years control. Once an ash is showing signs of infestation, the treatments are then only prolonging the life of the tree by a few years and not recommended.

There are 101 ash street trees in the East Row, representing 9% of the total street tree inventory.

A large portion of ash are located along the Washington Avenue corridor and will eventually need to be removed. This will leave a significant gap in the tree canopy in the coming years.

Only 24 of the 101 trees are considered candidates for treatment, as half of all the ash trees are already showing signs of infestation, and another quarter are under utility lines.

Treatment for the 24 trees would cost approximately \$4,000 every two years. Four of these trees are known to have been treated by private homeowners over the past years – one on Nelson and three on Lexington.

For East Row Consideration. A decision on whether to treat the remaining 24 ash trees needs to be made. If not, discussion with the city on removal and replacement is advised.



	Qty	Total DBH*	Treatment (incurred every two years)
Total Ash Trees	101	1,424"	\$18,512
Showing Signs	-50	742"	\$ 9,646
Under Utility Lines	-29	283"	\$3,679
<i>Eligible for Treatment</i>	<i>24</i>	<i>299"</i>	<i>\$3,887</i>

Asian Longhorned Beetle

The Asian Longhorned Beetle (ALB) has the potential to be more devastating than the chestnut blight, dutch elm disease, and EAB all together. Also from Asia (China/Koreas), the ALB was first found in the US in NYC in 1996.

There are two factors making this beetle such a serious threat: 1) it has an appetite for a large number of common tree species, and 2) no treatment is currently available. For this reason, removal and containment is critical.

The ALB prefers all maples, horsechestnuts/buckeyes, elms and willows. It will also settle for birch, planetree, mimosa, ash, goldenraintree, and mountainash as secondary hosts. Depending on where you live, a community could lose up to 70% of its trees from this one beetle. (Boggs, 2012)



The bad news is that the ALB appeared in Clermont County, OH (city of Bethel) just east of Cincinnati in 2011. When beetles are found, the area is quarantined by federal forces and host trees within a ¼ to ½ mile radius are removed immediately. To date, over “9,000 trees [have been] removed in Clermont County and an allocation of \$15 million in federal funds was made to prevent the beetle’s spread.” (Taking Root, 2013)

The good news is that eradication has been successful in other places, thanks to the beetle’s large size, distinctive look, and the fact that it moves slowly and breeds in small numbers per year (30+ eggs vs. 1,000s of eggs with other species). (Boggs, 2012)

What not to do: Both EAB and ALB travel by car (hitchhiking) and by movement of firewood (usually camping related). It is critical to not move any firewood and instead buy it at your destination camp site. Or if you buy firewood for home use, ask where it is coming from and make sure it is local.

What to do: Keep your eyes open for the beetle, or signs of the beetles. Unlike the Emerald Ash Borer, canopy damage is not the first symptom of infestation. However, the beetle is large and the damage it produces is easily seen. Brittle limbs (both living and dead) from all the holes result in frequent occurrence of broken branches on the ground. (Boggs, 2012)



Image source: <http://dnr.wi.gov>



Trunk Damage from ALB
Image source: <http://www.dnr.state.oh.us/health/asianlonghorned>

48% of the street trees in the East Row are susceptible to the ALB. “Primary host” species make up 541 trees, or 47%, of the tree canopy in the East Row study area, with the “secondary hosts” representing another 12 trees, or 1%.

The series of three maps below demonstrate the potential tree loss in the East Row from both EAB and ALB. First map depicts the current tree inventory, second is the street tree inventory after the ash are gone, and the last map removes all trees susceptible to the ALB.

Species	Qty in	
	East Row	% of all trees
Maple	528	46%
Horsechestnut/Buckeyes	2	0%
Willow	0	0%
Elm	11	1%
Total	541	47%

Current Tree Inventory



- minus ash trees



- minus ALB affected trees



For East Row Consideration. East Row residents should be educated on early detection of this pest, spread the word about the issue and why firewood should not be moved. Newport city staff should be trained (if not already) on ALB detection. And lastly, species diversification efforts continue to be important.

Flowering Callery Pears

Callery pears have been planted throughout Eastern and Midwestern urban areas in high numbers. There are two issues with callery pears that make them poor choices for urban trees: first an early cultivar is proving to be structurally unsound in its maturity, and second this species has become invasive in the local landscape.

Structurally Unsound. The first widely distributed cultivar of the callery pear was the Bradford. Bradford pears have been found to suffer from severe branch splitting in its maturity, with often an entire quarter or half section of the tree prone to breaking off. This can create a dangerous situation, especially in a street tree.



Pear structural failure

Source: <http://www.walterreeves.com/landscaping>

Invasive. Callery pears have now begun to “aggressively appear in many natural areas and take over native habitat...Once established, callery pears form dense thickets that push out other plants including native species that can’t tolerate the deep shade or compete with pear for resources.” (Taking Root, 2013)

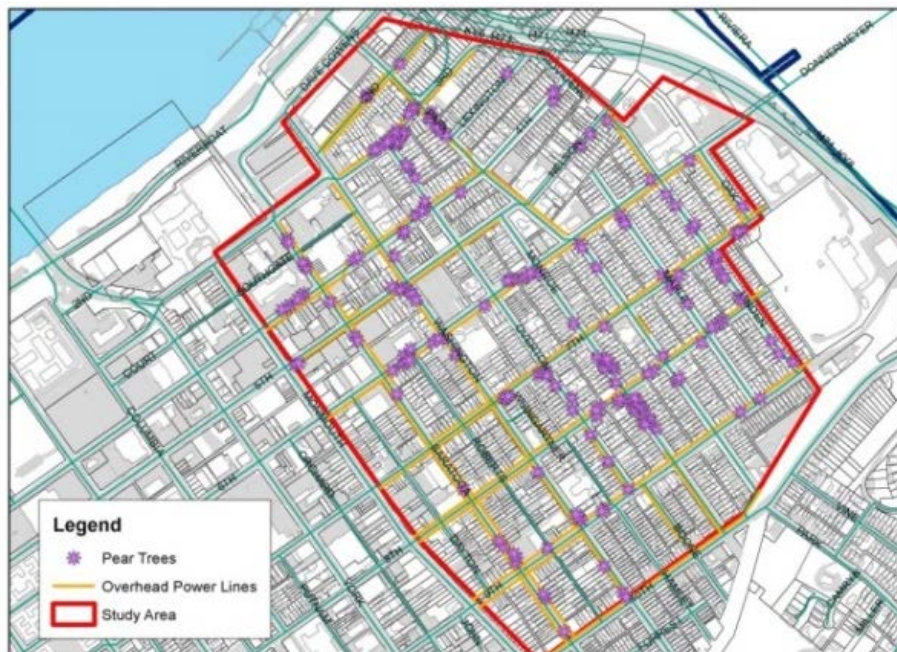


Pears in spring bloom spreading along highways

Image source: <http://www.takingroot.info>

There are 197 flowering pears street trees in the East Row study area, representing 17% of the total street tree population.

For East Row Consideration. A restriction on planting any further pears is should be considered because of their structure, invasiveness, high percentage of tree population. (See Species section for more on diversity issues.)



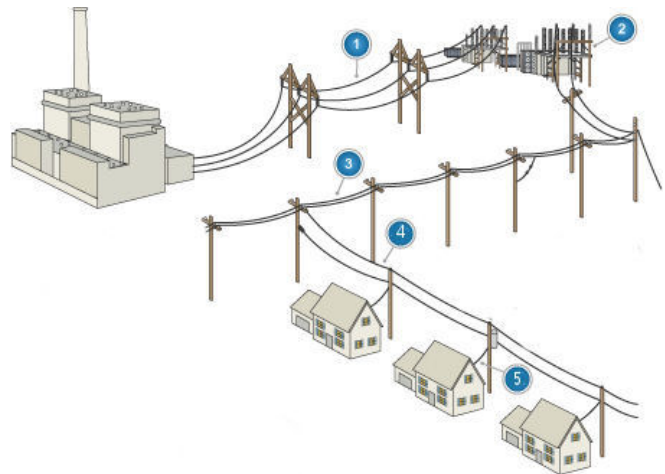
Overhead Utilities and Street Trees

Power line clearance is important for preventing outages, fires, personal property damage and even personal injury. A significant number of street trees in the East Row have been pruned under and around utility lines, often resulting in both a misshapen tree and unhappy residents. While many lament the practices of Duke Energy's line clearance work, there are two important points to note:

1. The practice is necessary and unavoidable if the wrong tree is planted under power lines.
2. Pruning practices used by Duke and other utility companies are appropriate, approved methods.



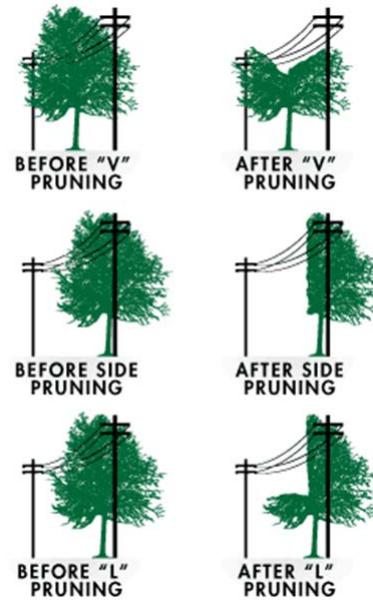
About Utility Lines. There are numerous overhead utility lines crisscrossing the East Row of varying power levels and it is important to note the differences. *Transmission lines (1)* are overhead high current lines carrying high voltage over long distances from point to point in a power system, usually to a *substation (2)*. *Main distribution lines (3)* carry lower voltage on wooden poles along roadways or alleys from a substation to a neighborhood area. *Local distribution lines (4)* take the power to a location accessible by individual homes or businesses, which then access that power through *overhead service lines (5)*. (OSHA, 2013) (DTE, 2013)



In the East Row, the majority of pruning performed by Duke Energy has been under the main distribution lines (3), requiring a minimum clearance of 10'. (Duke, 2013) As part of the inventory data collection process, these lines were cataloged along with the tree data. The findings follow:

- **26%** (295) of the street trees in the East Row are located under main distribution lines.
- **84%** (248) of those are inappropriate-sized species (wrong tree, wrong place)
- 16% (47) are small to medium sized trees that won't need to be harshly pruned in future years (right tree, right place)

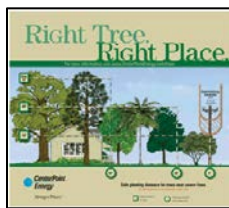
Utility Pruning Practices. Energy companies across the country use a widely accepted technique called “directional pruning” to train trees to grow away from overhead lines while protecting the health of the tree. This technique was developed by the National Arborist Association, is published by the American National Standards Institute (ANSI A300), and is endorsed and promoted by the National Arbor Day Foundation and the International Society of Arboriculture. Directionally pruned trees may look odd at first, but in the long run, such trees are less susceptible to pest, decay and storm damage.⁹ (First, 2013)



Don't want this kind of pruning to your street trees? There is only one solution: ensure the right tree is planted in the right place. Across the urban forestry industry, and within energy companies and municipalities, the goal is the same, as shown in the various campaign examples below. Get the right tree in the right place and the issue is handled.



Rochester, MN municipal campaign



Center Point Energy



Connecticut Nursery Landscape Association



NIPSCO Energy Co.



Nashville Electric

Potential Partner. Duke also has a substantial stake in maintaining a well-planned and maintained urban forest canopy. Reduction of energy usage is always a goal of energy companies, and they would rather not spend the money to clear utility lines any more than residents want them “hacking” up street trees.

For East Row Consideration. Get the right tree in the right place during new planting projects. Duke Energy may be open to a partnership in this effort.

⁹ Image source: <http://www.srpnet.com/electric/trees.aspx>

Cities own trees in the public right of way (often between sidewalk and street), but vary in their division of responsibilities for care of those trees. This responsibility is usually spelled out in city tree ordinances, which sets the rules for street tree management, and a tree board is often formed to assist city staff in making resident decisions for planting and removals.

Many cities (including Cincinnati and Covington) manage all aspects of tree care (planting, care, removal). Funds for this work and staff expertise can come from the general fund (Covington) or from an annual assessment on the city tax bill (Cincinnati).¹⁰

Other cities (including Newport and Lexington KY) place most of the responsibility and care of these trees in abutting homeowners' hands. Newport will remove any dangerous trees, but otherwise the care is with the homeowner. Specifics for the care of Newport street trees can be found in Chapter 94 of the Newport, KY Code of Ordinances (full document can be found in Appendices) and is summarized below.

It costs money to care for street trees. The question comes down to whether residents want to pay for it in taxes and get a forestry team to manage the street trees, or save on taxes and manage them individually without the expertise. Every community has to determine this individually.

Newport Street Tree Ordinance (Chapter 94) Summary

The wording and rules have been simplified for easier understanding. The full ordinance should be referenced before any actions are taken.

- All street trees located in tree lawn (between sidewalk and street) are owned by city, but shall be maintained by the abutting property owner (pruning included).
- City staff can and will limb up trees for pedestrian and vehicle clearance as needed.
- When a tree removal is required, the cost to remove and replace the tree will be paid for by city *unless the owner does not want the tree replaced*. If this is the case, the owner will be charged for the removal.
- City staff will cut new tree wells and install trees at no cost to owner, if recommended by tree board.
- Any construction done by city or homeowners around street trees will be done in effort to preserve as many trees/tree roots as possible

¹⁰ Cincinnati, for example, charges \$0.18 per front footage tax to fund urban forestry program. A property owner with 100' along the public right of way (road) would be charged \$18 on their property tax bill.

It is against the rules to do the following without prior approval:

- fasten anything to tree except city notices
- alter or install any tree guards
- close or obstruct planting area around base of tree (concrete, stone, etc.)
- excavate, expose or cut any roots
- operate heavy machinery or place heavy objects around roots

What is the Newport Tree Board? According to NewportKY.gov web site: “The Tree Board was created by city ordinance and its members are appointed by the Board of Commissioners. The Tree Board has authority to review plans for planting and removal of trees in the public right-of ways and on public property and also reviews development plans on private property for compliance with the requirements of the Tree Ordinance. The Tree Board shall consist of 5 members for 4-year terms.” Currently, this board is inactive. The ordinance calling for the formation and structure of the tree board can be found in the Appendices.

City Staff. Currently, any work done to street trees in Newport is handled through the Department of Public Works. Some work is done by tree contractors hired by the city; some is done by city staff. There is no forester or arborist on city staff, though the city uses the local extension office arborist for forestry expertise. Public Works staff levels have been cut dramatically over the past years, which also creates challenges to tree care management.

For East Row Consideration. Homeowners need to be educated on city and homeowner responsibilities for street trees. A continued partnership with city staff is critical to making any plans effective, and further information on the status and future of the Newport tree board should be determined.

Sidewalks & Street Trees

When considering sidewalk damage and replacements, it is important to recognize two concepts: roots disturbance has consequences, and sidewalks are only engineered to last for 15-20 years.

Impacts of Root Cutting. When sidewalks are replaced near a street tree, it is critical to avoid destroying important root structure – for both the health and stability of the tree. To understand how trees are affected by root disturbance it is important to understand the structure of a tree’s root system.

90% of the root system is located in the first 12 to 18 inches (depth) of soil. The roots extend radially from the trunk one to two times the height of the tree. (ISA, 2013)



Tree Root Structure Illustration

Image source: <http://www.fcgov.com/forestry>

During construction, root systems can be cut to install foundations, sidewalks, driveways, utilities, pools, landscape beds, and irrigation systems. The closer to the tree the construction occurs, the more destructive it can be.

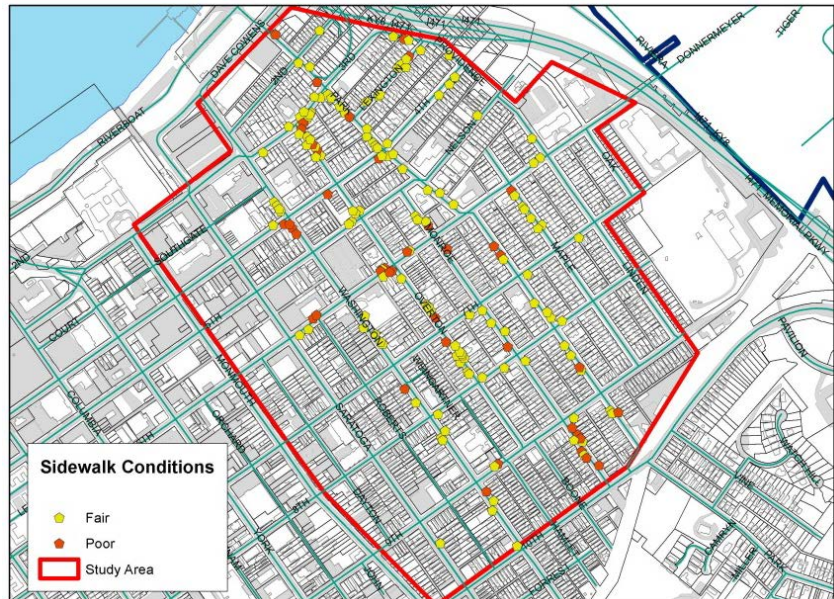


Damage after roots are cut

Image source: <http://www.startribune.com/local/minneapolis/213054631.html>

Secondly, residents across the country lament street tree root damage to sidewalks, and often then advocate for the tree's removal. However, a recent study out of Ohio State University has identified that the failure actually occurs after the life span of the sidewalk has expired.

Sidewalks in Cincinnati are engineered to last between 15-20 years. Failure rates were not found to correlate with proximity to trees, nor did the majority of failures occur during the first 15-20 years of the sidewalk's life. Tree roots were found to move into a sidewalk's realm only after cracks and failures in the material occurred. (Sydnor, 2000) So is the root growing beneath the sidewalk the source of failure, or is it a structure beyond its life span?



This is not to suggest that trees cannot displace sidewalks. It is simply examining the actual science behind a problem.

Consider the values and cost of each asset when decided how to handle a sidewalk repair:

- Sidewalk Value: A sidewalk replacement can cost approximately \$10 per square foot. If for this example we assume the replaced area 20' length at a width of 5' width for a total of \$1,000.
- Tree Value: The replacement value of a red maple (medium sized, 20" DBH) averages \$2,300 (CTLA), while providing additional benefits in environmental services: annually intercepting 5,400 gallons of stormwater, removing 350 lbs. of CO₂ from the air, saving hundreds in energy costs, and filtering dust, smoke and ash from the air. (See the previous Why Trees section for details on these benefits). Total value: \$2300 + environmental services

The sidewalk value is approximately 40% of the value of the street tree in this instance.

For East Row Consideration. Consider the value of trees versus sidewalks when requesting tree removals based on sidewalk damage, and consider stability of trees when having sidewalks replaced.

Homeowners are responsible for sidewalk repair unless the damage has occurred from street tree roots.

During the initial discussion with Public Works, the plans for the inventory and neighborhood project were discussed to identify areas to work together. It was requested that sidewalk condition information be collected during the inventory. Sidewalk condition data collected during the summer of 2013 has been given to the head of Public Works, per their request.

Tree Care Practices by Residents

Based on four months of close observation during the inventory process, the following list of care issues emerged as points to be addressed with residents in the future. This is only a list of issues; details on each practice will be provided during future education efforts.

- **Mulching.** Improper mulching can kill a tree.
- **Water.** Watering requirements for both new and mature trees should be clarified.
- **Trunk Ivy.** Ivy on street trees should be discouraged to alleviate safety issues.
- **Planting.** Proper tree selection and installation is critical for healthier trees with lower maintenance needs in the long run.
- **Pruning.** *Proper* cuts avoid decay and ensure a healthier tree.
- **Damage to Trunks.** Avoiding damage from mowers, accidents, and over mulching.
- **Root Awareness.** Cutting large roots during a sidewalk repair can create an unstable tree. Large equipment compacting the soil, as well as soil piled up around roots can also damage trees.

For East Row Consideration. A significant piece of East Row tree management needs to be a campaign to educate residents on a multitude of tree care practices.



Over mulching, also termed a “mulch volcano”



Mechanical trunk damage

Asset Trees

There are a number of trees in the neighborhood that, while not publically owned street trees, are true valuable and unique assets (due to size, form). These trees can and should be recognized and appreciated.

For East Row Consideration. A program could be designed for “heritage” tree designation to start residents thinking about and valuing a champion tree.



Bald Cypress (across from the Levee)



Ginkgo (corner of 6th & Overton)



Oak (corner of Washington & 4th)



Linden (Washington between 3rd & 4th)

RECOMMENDATIONS

Over the next few months, the street tree working group will be forming an action plan for addressing many of the topics covered in this report. Plan goals can be organized into three overarching categories: care & maintenance, new plantings, and education/appreciation. The points of consideration made throughout this report are compiled below, and will provide the basis for this plan:

Planting in the East Row

- Any new tree plantings should exclude maples and pears to diversify tree species (page 11).
- Continue species diversification efforts to aid in dealing with pest threats like ALB (page 17).
- Ongoing additions and replacements of trees throughout the neighborhood (as opposed to large projects on one block) will help maintain and increase age diversity (page 13).
- Ensure the right tree is planted in the right place for long term success (page 21).

Education

- Effective care of street trees requires a campaign to educate residents on tree care (page 26).
- Consider the value of trees when requesting tree removals (page 6).
- Consider stability of trees when having sidewalks replaced (page 24).
- Homeowners need education on city vs. homeowner responsibilities for street trees (page 22).
- Residents need to be educated on early detection of the ALB. This includes spread the word about the ALB and why firewood should not be moved (page 17).
- Newport city staff should be trained (if not already) on ALB detection (page 17).

Pests

- A decision is needed whether to treat the remaining 24 ash trees (page 15).
- Newport city staff should be trained (if not already) on ALB detection (page 17).

Appreciation

- A program could be designed for “heritage” tree designation to start residents thinking about and valuing a champion tree (page 27).
- Full value of a tree should be considered, especially before removal (pages 6 and 25).

Partnerships

- A continued partnership with city staff is critical to making any plans effective (page 22).
- Further information on the status and future of the Newport tree board should be determined (page 22).
- Discussion with the city on removal and replacement of ash trees is advised (page 15).
- Duke Energy may be open to a partnership to getting the right trees under utility lines (page 20).



Trees Give Back Tag

Image Source: <http://www.mnn.com/your-home/organic-farming-gardening/stories/how-to-celebrate-arbor-day-without-a-yard>

RESOURCES

Asian Longhorned Beetle

<http://asianlonghornedbeetle.com/> (USDA information site)

<http://www.bethelalb.com/> (Bethel Ohio Citizen Action site)

Emerald Ash Borer

<http://www.emeraldashborer.info>

National Tree Benefit Calculator

<http://www.treebenefits.com/calculator>

Greater Cincinnati's Taking Root Campaign

<http://www.takingroot.info>

Invasive Callery Pears

http://www2.ca.uky.edu/KYWoodlandsmagazine/Vol_6_No_2/FHpg20_21.pdf

22 Benefits of Street Trees

<http://www.walkable.org/assets/downloads/22%20Benefits%20of%20Urban%20Street%20Trees.pdf>

Northern KY Urban & Community Forestry Council

<http://www.nkyurbanforestry.org>

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APPENDICES

TREE INVENTORY

East Row Tree Inventory 2013



ACTIVITY SINCE 2004 East Row Tree Inventory 2013

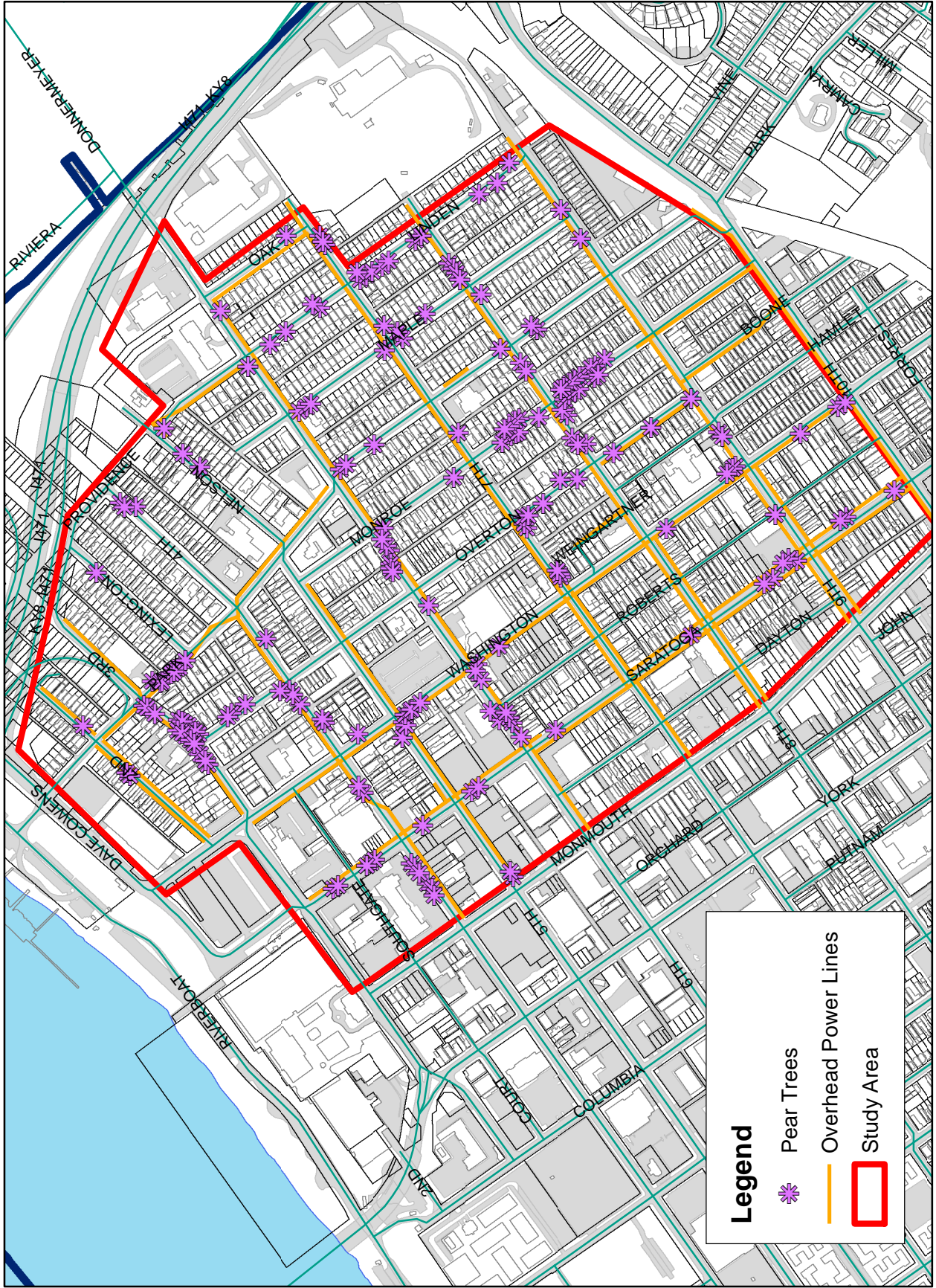


ASH TREES East Row Tree Inventory 2013




ALB / EAB LOSS POTENTIAL East Row Tree Inventory 2013




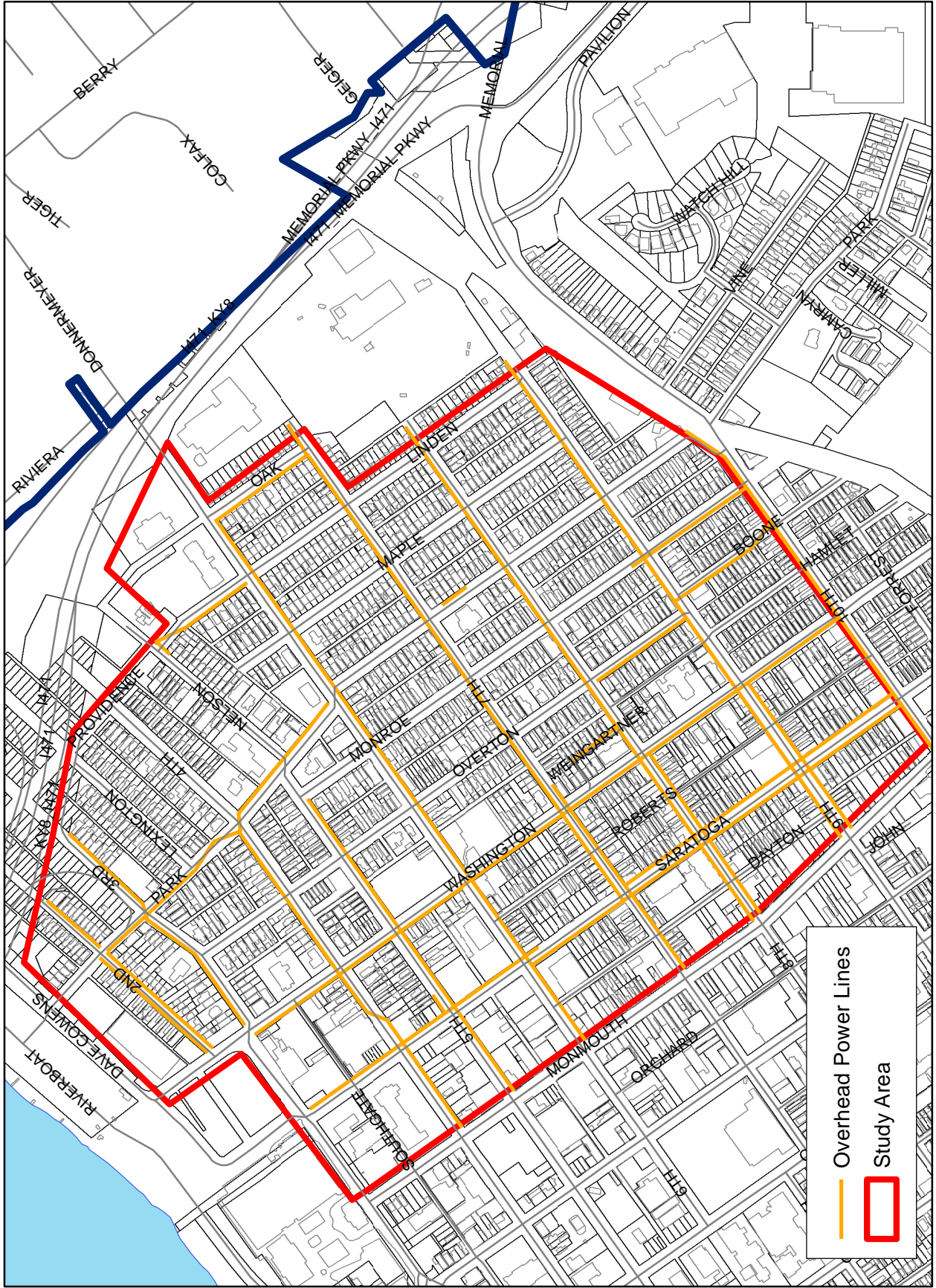


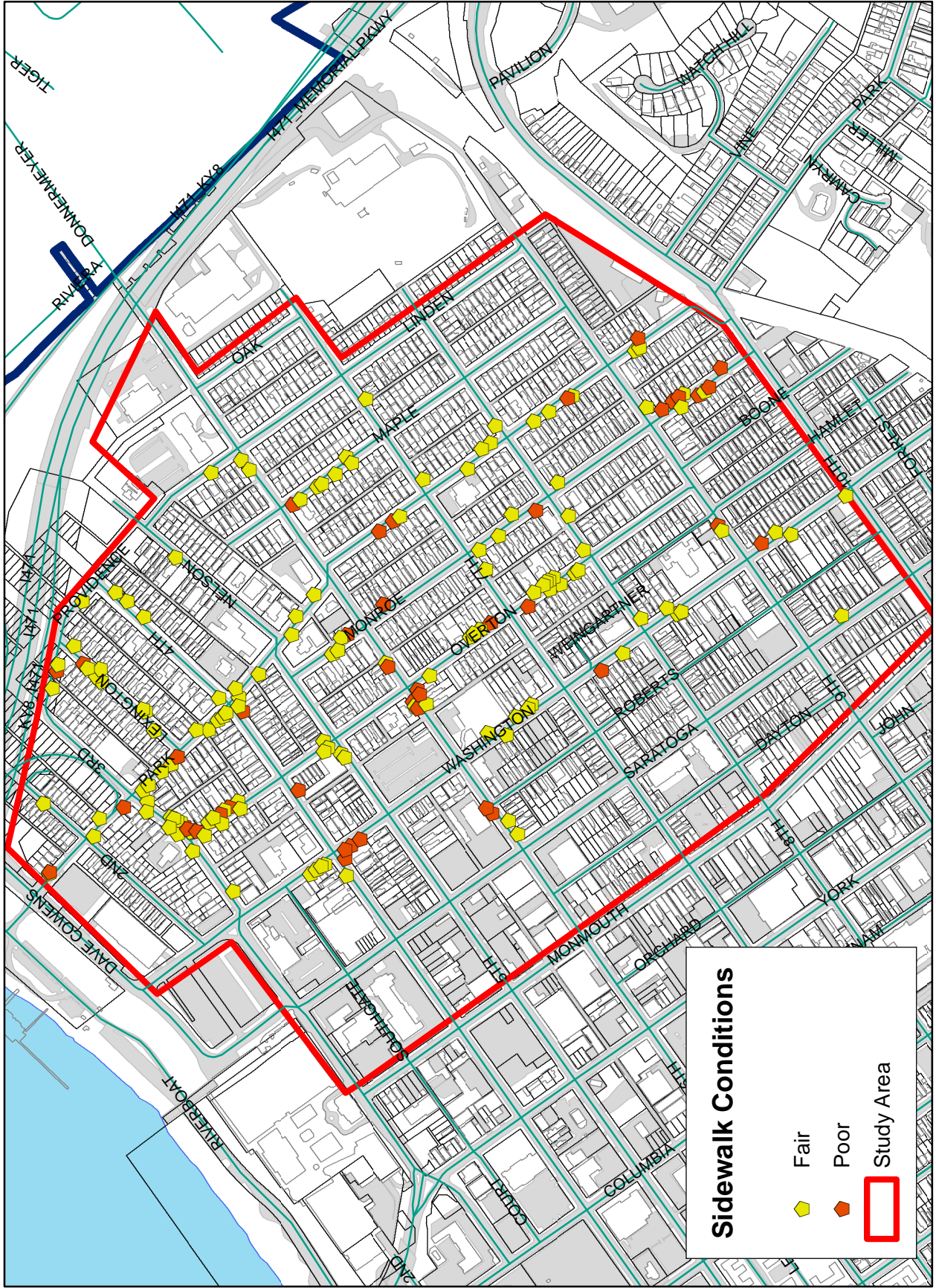
Legend

 Pear Trees

 Overhead Power Lines

 Study Area



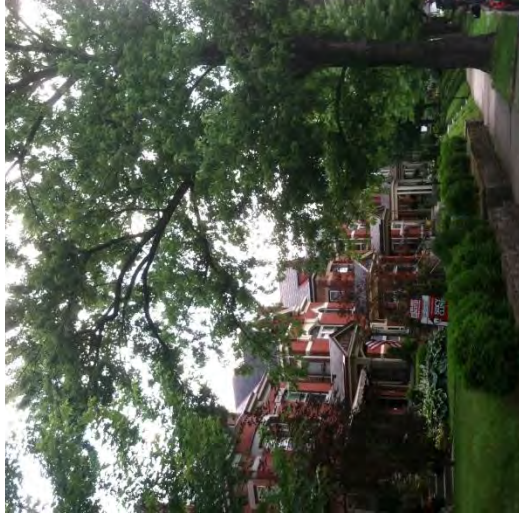


Sidewalk Conditions

- Fair
- Poor
- Study Area

East Row Street Tree Inventory Manual

Summer 2013



What is a street tree?

A street tree is one that is located within the right-of-way or layout of a public road. Usually the laws of the individual state grant authority to the local municipalities for the street trees and public shade trees within their geographical area. Inventory volunteers should follow the guidelines below to determine whether a particular tree should be counted. A street tree will be located relative to a public street in one of the following ways:

<p>Tree Lawn: The tree is located between the curb and the sidewalk.</p>	
<p>Tree Well: The tree is located within the sidewalk in a tree well or pit.</p>	
<p>Median: The tree is located on a traffic island or median strip.</p>	

What is NOT a street tree? A tree located between the sidewalk and house or in the front yard of a property. A tree might appear to be a street tree because it arches over the street. While that tree is a valuable component of the community forest, it will not be counted in the inventory. These trees are the responsibility of the property owner to maintain.

PROCESS

Data to be collected in teams of two. You will choose your block area(s) and receive a data entry form and a map. Your team will then have two weeks to return the map/forms. Tree number and utility lines need to be drawn on map. All other data is recorded on the data form provided.

1. Tree Location

Assign a location to the tree and note it in two places – a number on the map, and an address on the form. If a tree falls in between two homes, just choose the closest property address.

2. Size (DBH)

Trees will be measured at DBH (Diameter at Breast Height) which is considered 4.5' above ground level.

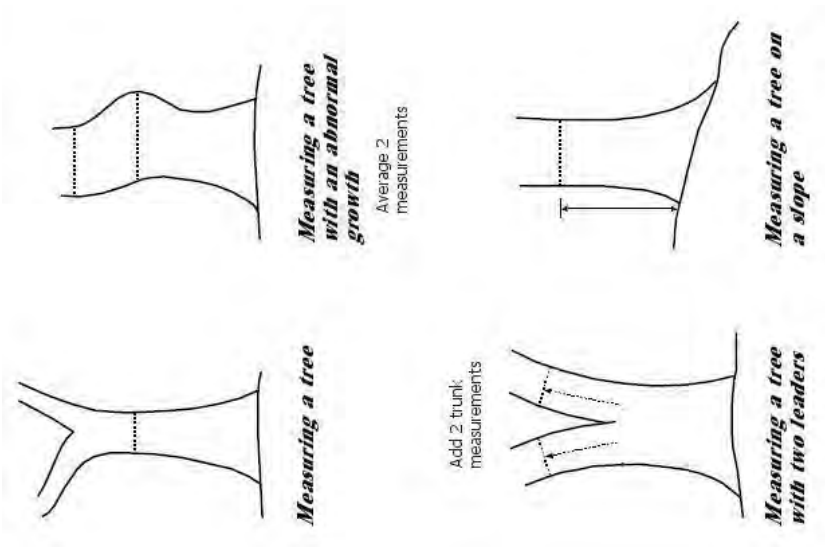
Two common ways to measure DBH:

- a. Use a standard tape measure around the trunk of the tree. Calculate diameter with the following equation:

$$\text{Diameter} = \text{Circumference} / 3.14$$

- b. Using a tree tape.




All trees are not the same shape, and because of this characteristic you may run into some problems measuring DBH. To get accurate measurements, you must adjust the position of the measurement. Some of the common problems you might face when measuring DBH are shown to the right.



3. Utility Lines Overhead

Please note whether there are lines overhead, and draw in the lines locations on the map provided.



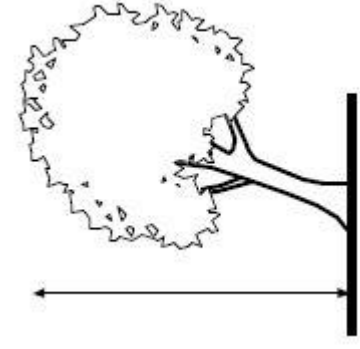








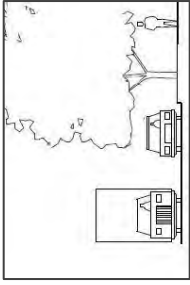
4. Growing Space Type & Size

GROWSPACE Type	Picture Example	SIZE of Growspace
Tree Lawn		Measure depth of tree lawn only – linear distance from sidewalk to street. Example: 10 lf (linear feet)
Tree Well		Measure square footage of tree well opening. Example: 6 sf (square feet)
Median		Measure width of green space in median. Example: 6 lf (linear feet)
Open/Unrestricted	Parks, right of ways ,etc.	No measurement needed.

5. Sidewalk Condition

Condition	Picture Example	Description
<p style="text-align: center;">GOOD</p>		<p style="text-align: center;">Mostly level Only minor defects</p>
<p style="text-align: center;">FAIR</p>		<p style="text-align: center;">Some damage Bumps under 2" Still navigable</p>
<p style="text-align: center;">POOR</p>		<p style="text-align: center;">Severe trip hazard (over 2") Would not be able to get stroller or walker over without problems.</p>

6. Observations / Notes

<p>POWER LINES OBSTRUCTION</p> 	<p>TRUNK IVY</p> 	<p>LEANING</p> 	<p>CONKS / FUNGI</p> 
<p>CANOPY DIEBACK</p>			
 <p>Minor</p>	 <p>Moderate</p>	 <p>Severe</p>	 <p>Dead</p>
<p>MULCH VOLCANOS</p>			
<p>Mulch Volcano - BAD</p> 	<p>Proper Mulching</p>  <p>Note visible 'flare' at base of trunk.</p>		
<p>CANOPY TOO LOW</p>			
<p>(can't drive or walk under)</p> 			
<p>OTHER NOTES</p> <p>Possible things: mechanical injury, bark falling off, etc.</p>			

7. Tree ID

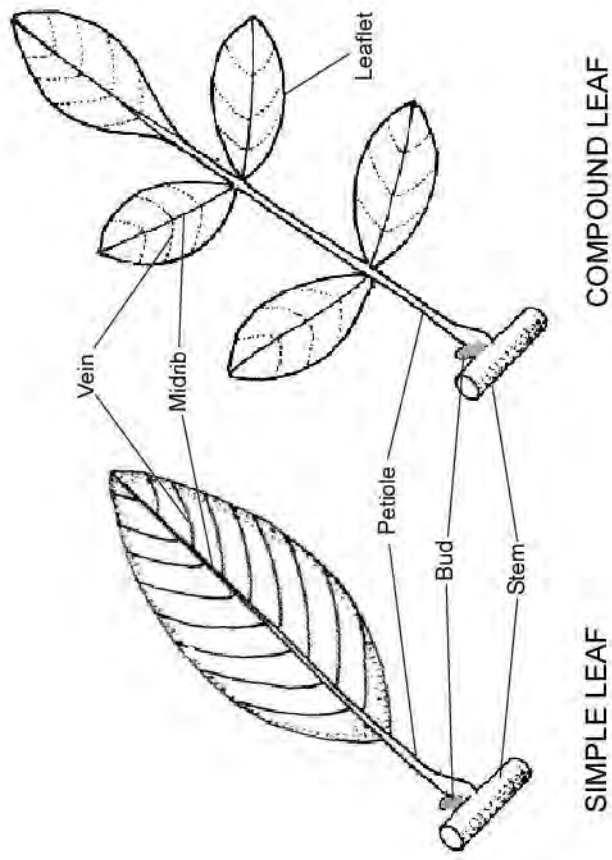
Options. 90% of the street trees in the East Row will fall under one of these genus/species below.

Apple / Crabapple	Locust, Black	Sweetgum
Catalpa	Locust, Honey	Tree Lilac
Cottonwood	Maple, Red	Tuliptree
Dogwood	Maple, Silver	Yellowwood
Elm	Maple, Sugar	Zelkova
Ginkgo	Oak	
Goldenraintree	Pear	Stump
Hawthorn	Planetree	Unknown
Linden	Redbud	

Leaf Parts & Terms.

To identify genus or species of tree, we will use a tree key.

In order to use the tree key, a basic knowledge of tree parts and terminology is required.

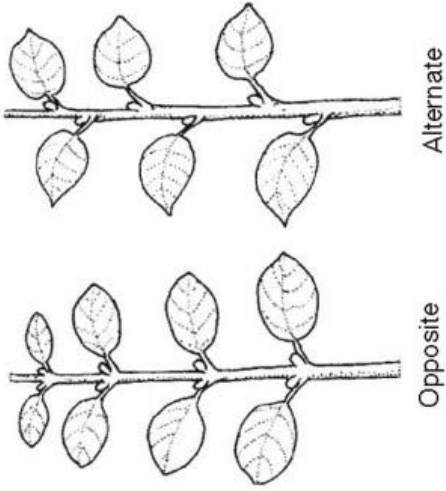


SIMPLE LEAF

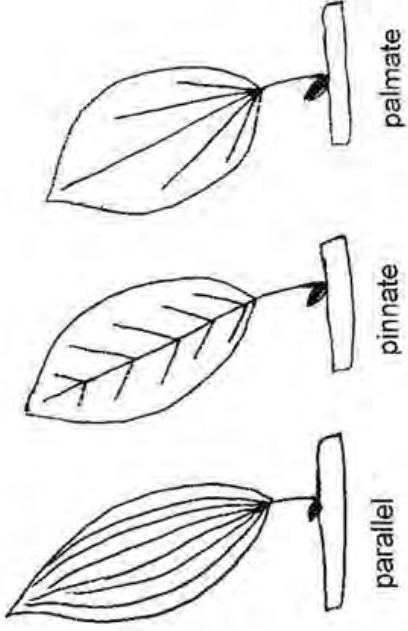
COMPOUND LEAF

BRANCH/LEAF PATTERN

The pattern can sometimes be difficult to ascertain in older growth. Be sure to look at many different branches to determine the dominant pattern.

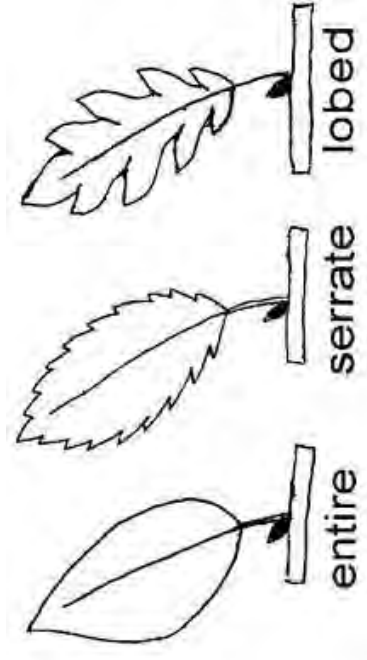


VEIN LAYOUT



(Pinnate -branching from an axis) (Palmate -branching from a point)

LEAF MARGINS and SHAPES



Entire - edge margin of leaf lacks teeth or lobes

Serrate -edge margin of leaf has teeth

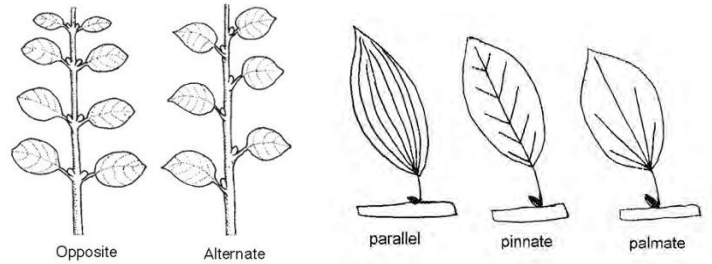
Lobed - having deeply indented margins

EAST ROW TREE KEY

1. Leaves/branches opposite. 2
1. Leaves/branches alternate. 4

OPPOSITE

2. Leaves simple. 3
2. Leaves compound. ASH








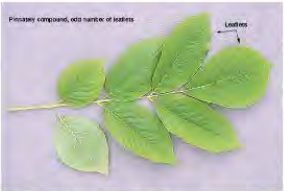
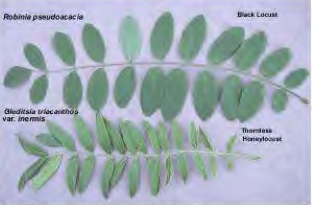



3. Leaves pinnately veined. TREE LILAC, CATALPA, DOGWOOD (go to photo box A)
3. Leaves palmately veined. MAPLE species (go to photo box B).

ALTERNATE

4. Leaves compound. LOCUST, GOLDENRAINTREE, YELLOWWOOD (go to photo box C)
4. Leaves simple. 5
5. Leaves lobed. 6
5. Leaves not lobed. 8
6. Leaves palmately veined. PLANETREE, SWEETGUM (go to photo box D)
6. Leaves pinnately veined. 7
7. Has thorns HAWTHORN
7. No thorns OAK, TULIPTREE (go to photo box E)
8. Leaves pinnately veined. 9
8. Leaves palmately veined. GINGKO, REDBUD, LINDEN (go to photo box F)
9. Petiole is long (more than 1/2 as long as leaf blade, often as long). PEAR or COTTONWOOD (go to photo box G)
9. Petiole is short (less than 1/2 as long as leaf blade). ELM, ZELKOVA, BIRCH (go to photo box H)

PHOTO BOXES for TREE KEY

<p>A</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>JAP. TREE LILAC <i>Syringa reticulata</i></p> <p>Dark green color on top Lilac flower remnants *Horizontal lenticels</p> </div> <div style="text-align: center;">  <p>CATALPA <i>Catalpa sp.</i></p> <p>Heart shape Large leaves *Beans</p> </div> <div style="text-align: center;">  <p>DOGWOOD <i>Cornus sp.</i></p> <p>Elliptical shape *Veins curve upward along leaf Pointy tip</p> </div> </div>
<p>B</p>	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>SUGAR MAPLE</p> </div> <div style="text-align: center;">  <p>SILVER MAPLE</p> </div> <div style="text-align: center;">  <p>RED MAPLE</p> </div> <div style="text-align: center;">  <p>JAPANESE MAPLE</p> </div> </div>
<p>C</p>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>YELLOWWOOD Odd number of leaflets (7-9) Smooth bark</p> </div> <div style="text-align: center;">  <p>BLACK LOCUST Ovate (egg-shaped) leaflets, usually once compound only. Less than 20 leaflets per leaf.</p> <p>HONEY LOCUST Lanceolate (narrow) leaflets, multiple compounded. Often more than 20 leaflets per leaf.</p> </div> <div style="text-align: center;">  <p>GOLDENRAINTREE Serrated leaflets Yellow flowers, large seed pods</p> </div> </div>

D

PLANETREE
* smooth white/yellow bark, like a sycamore



SWEETGUM



E

TULIPTREE / TULIP POPLAR



OAK Sp.



F

GINGKO



REDBUD



LINDEN
*seed pod



G

PEAR

- look for fruit, shiny leaves



COTTONWOOD

- very large leaves, chunky bark



H

ELM

- Doubly serrated
**uneven at base



ZELKOVA

- singly serrated, somewhat
scalloped shape teeth



Zelkova

BIRCH

- peeling bark, often
multistemmed
- triangle shaped leaf
-doubly serrated



EAST ROW TREE INVENTORY PROJECT

DIRECTIONS:

1. Record tree number on map.
2. Draw in any overhead utility lines.

Assignment: _____

