



*A Division of The Davey Tree Expert Company*

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City of DuPont  
1700 Civic Dr.  
DuPont, WA 98327

Dear City of DuPont,

An assessment of one thousand two hundred and eighty eight (1288) tree sites was conducted in August 2011 by Ruth Williams, a Certified Arborist from The Davey Resource Group. The trees were evaluated for health, structure and site condition, and maintenance priorities were recommended. The individual tree assessment results are listed in the tables and recommendations are discussed in the attached report.

This report provides a summary of the age and condition of the trees inventoried in the City of DuPont. Maintenance recommendations are provided and prioritized, although timing and budget constraints may require managers to adjust these priorities based on community needs.

Thank you for this opportunity to work with the City of DuPont to evaluate your trees. If you have further questions about the inventory, or about our evaluation methods, please do not hesitate to call.

Sincerely,

Ruth Williams  
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Enclosures (2): Data Summary, Data Specification

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## Introduction

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A survey of one thousand two hundred and eighty eight (1288) tree sites, including ten (10) vacant sites, was conducted in August, 2011 by a Certified Arborist from The Davey Resource Group. The results of this inventory are listed in the attached table and recommendations are discussed in this report.

The purpose of this inventory was to catalogue selected street trees, identify hazards and make tree maintenance recommendations to increase the health and benefits of the urban forest. Evaluation methods were based on International Society of Arboriculture (ISA) industry standards and the data collection specification provided as an appendix. The valuation protocol was based on the 9<sup>th</sup> Edition Guide for Plant Appraisal, published by the Council of Tree and Landscape Appraisers. Only street trees located in planting strips between the sidewalk and street curb and selected medians were assessed. The inventory was conducted on the streets specified by the city representative and was confined to the Palisade Village neighborhood.

## Observations

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The trees inventoried were primarily ornamental species planted along road edges and in traffic circles. The majority were surrounded by irrigated turf, although some areas were clearly not irrigated. Street trees were typically a single species along an entire street, and appeared to be even-aged stands with some replanting apparent where trees failed.

The City's three primary issues of concern were pavement disruption, poor spacing and insect infestation. In addition, the inventory revealed that many of the trees inventoried displayed codominant stems (23.2% of the population) or structural problems (36.3% of population) that may be mitigated with appropriate structural pruning. For the most part, the condition of the trees was very good (1104 trees 85.7% of the population). Seventeen (17) trees (1.3% of population) are dead or critical and thirty four (34) trees (2.6% of population) are recommended for removal.

Condition	Count	Percentage (%)
Very Good	1104	85.71
Good	117	9.08
Fair	40	3.11
Poor	10	0.78
Critical	4	0.31
Dead	13	1.01

**Table - Condition**

Health Observations	Count	Percentage (%)
Structure	467	36.26
Codominant	299	23.21
None	194	15.06
Disease / Insect	164	12.73
Clearance	96	7.45
Damage	52	4.04
Deadwood	5	0.39
Staked	4	0.31
Disease	4	0.31
Root Problem	2	0.16
Topped	1	0.08

**Table 2 - Health and Condition Observations**

## Condition

Tree condition was assessed based on the following rating system:

**Excellent** *The tree is nearly perfect in condition, vigor, and form. This uncommon category is generally applicable to small-diameter trees that have been recently transplanted and are well established.*

No trees were rated as excellent in this population.

**Very Good** *Overall, the tree is healthy and satisfactory in condition, vigor, and form. The tree has no major structural problems, no mechanical damage, and may only have insignificant aesthetic, insect, disease, or structure problems.*

One thousand one hundred and four (1,104) trees, 86% of the population, were rated as very good. They are distributed throughout the inventory area and include some trees with codominant stems that do not have substantial included bark and those with aphid infestations that are less severe.

**Good** *The tree has minor structural problems, or minor mechanical damage, may have only minor aesthetic insect, disease, or structure problems, and is in good health.*

One hundred seventeen (117) trees, 9% of the population, were rated as good. Over half of these trees have structural defects or codominant stems. Other common issues included aphids, mechanical damage and clearance.

**Fair** *The tree may exhibit the following characteristics: minor structural problems and/or mechanical damage, significant damage from non-fatal or disfiguring diseases, minor crown imbalance or thin crown, and/or stunted growth compared to adjacent trees*

Forty (40) trees were rated as fair. Thirteen (13) trees had non-fatal, yet substantial, damage and ten (10) had structural defects. Eight (8) trees are identified for removal, primarily due to spacing concerns.

**Poor** *The tree appears unhealthy and may have structural defects such as co-dominant stems, severe included bark, severed trunk, and/or decay. A tree in this category may also have severe mechanical damage, crown dieback, or poor vigor threatening its ability to thrive. Poor condition trees may respond to appropriate maintenance procedures, although these procedures may be cost-prohibitive to undertake.*

Ten trees (10) were rated as poor and three (3) of these are recommended for removal. These trees are not likely to recover and may all be considered for removal in the next three years.

**Critical** *The tree has already failed, is failing, or highly likely to fail. There is no reasonable maintenance activity that would prevent failure. Removal is recommended.*

Four (4) trees are in critical condition. Removal is recommended as soon as possible.

**Dead** *This category refers to dead trees only.*

There are thirteen (13) dead trees and ten (10) stumps to grind. These locations may be considered as planting opportunities except where there is a conflict or over-crowding. It is not recommended to replant trees within 6' of street lights, or within 20' of an adjacent large-stature tree due to conflicts.

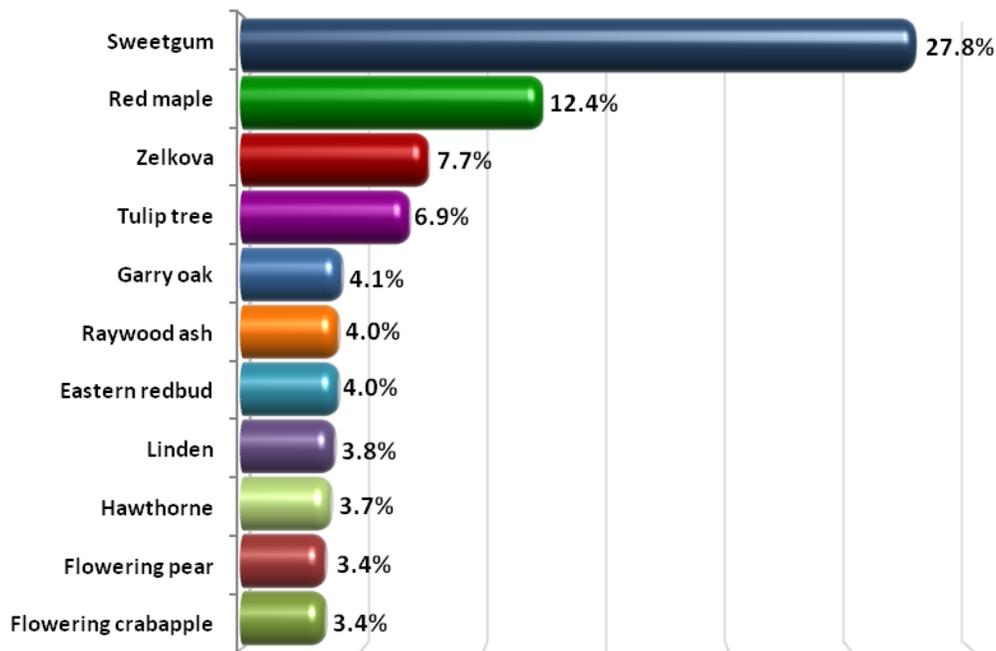
**Pavement conflicts**

Large stature trees, such as sweetgum (*Liquidambar styraciflua*), red maple (*Acer rubrum*) and zelkova (*Zelkova serrata*), planted in 5' planting strips have begun to conflict with adjacent pavement. Strategies to mitigate these conflicts include pavement grinding and bridging over roots.

Hardscape Damage	Count	Percentage (%)
None	976	75.78
Minor to 1/2:"	197	15.3
1/2" to 3/4"	12	0.93
3/4 - 1"	6	0.47
Above 1"	97	7.53

**Species diversity**

The inventoried population includes over 27 distinct species in 20 genera. The four most common species are sweetgum (*Liquidambar styraciflua*, 358 trees, 27.8% of the population), red maple (*Acer rubrum*, 106 trees, 12.4% of the population), zelkova (*Zelkova serrata*, 99 trees, 7.7% of the population), and tulip tree (*Liriodendron tulipifera*, 89 trees, 6.9% of the population). All other species represent less than 5% of the population.



**Figure 2 - Prevalence of Species**

There is a widely accepted rule that no single species should represent greater than 10% of the total population and no single genus represent more than 20% (Clark, et al., 1997). The overall population suggests fairly adequate diversification within the inventoried area with the exception of sweetgum and red maple, which exceed 10%. As future plantings are installed, choosing species other than sweetgum and red maple will increase the overall diversity of the tree population and decrease the risk of substantial loss should a new pest or disease emerge that targets these species.

## Recommendations

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The majority of the trees in the inventoried area have condition ratings of very good and do not require immediate attention. The most common problems identified were codominant stems and structural issues, both of which can be prevented and mitigated with a proactive management program. Development of a pruning program based on a 3-7 year cycle to correct defects can substantially increase the structural integrity of many trees in DuPont. As large stature trees mature in small planting strips, sidewalk conflicts will need to be addressed as they arise.

Seven hundred sixty six (766) trees (59.5% of the population) have codominant stems or structural issues. Several past failures of codominant stems were observed. When codominant stems develop, included bark can occur, which can result in decay and failure at this crucial union. In medium sized trees, this condition can sometimes be corrected with pruning and can easily be addressed with structural pruning when the tree is 1-5" DBH.

Hardscape damage is an issue concerning residents and public works staff. There are opportunities to address this in the inventoried area. Where sweetgums are closer than 20' on center, selective removal may benefit the remaining trees by reducing crowding. Sweetgum is a large-stature tree that will reach 40' canopy width at maturity. These trees can be planted 50' apart and still provide a verdant canopy. If removal is pursued, consider selecting poorer performing trees as removal priorities rather than alternating every other tree.

### *Immediate Priorities*

- Remove dead and critical trees. Replant where no conflict exists.
- Remove all tree stakes.
- Prune 1-3" DBH trees to develop a single central leader and evenly spaced branches.
- Monitor co-dominant stems with condition ratings of fair or poor. Consider pruning to reduce weight



Previous failure of codominant stems

### *Secondary Priorities*

- Develop a five-year plan to remove one third to one half of the sweetgums along Palisade Blvd. This will decrease pavement disruption and provide adequate space for remaining trees to mature.
- Grind stumps and replant where appropriate. Consider replanting with alternative species to increase diversity along streets.
- Develop a specification recommending 2'-3' of mulch at the base of young trees to reduce mechanical damage from string trimmers.
- Conduct an inventory of remaining City trees to complete the assessment.



Mechanical damage

### *Long-term Strategies*

- Specify planting spacing guidelines for developers based on mature size of tree trunk and canopy. Require larger planting strips for larger stature trees.
- Develop a plan to address sidewalk-root conflicts. These may become a major cost in 5 - 20 years as large stature trees mature in 5' planter strips.
- Develop a recommended species list for new plantings.
- Consider alternating species along streets to increase diversity and interest.
- Replant in vacant sites where no conflict exists.



Sidewalk root conflict

## **Conclusion**

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There are substantial opportunities to proactively manage the inventoried area's trees. The primary issue identified was structural problems within tree canopies including codominant stems, crowded branches, crossing and conflicting branches, and unbalanced crowns. These issues can be remedied with pruning, and should be addressed in the next 5 years to avoid substantial maintenance costs in the future. The sidewalk and pest issues identified are secondary to these structural issues and should be addressed as time and resources allow.

This inventory and the listed recommendations are based on the condition of the trees in August, 2011. Due to the dynamic nature of landscapes, continued monitoring and inspections are recommended as needed.

## Glossary

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**Codominant stems** – Stems equal in size and relative importance that may have narrow branching angles causing a structural weakness.

**Decay** – Process of degradation of woody tissues.

**Diameter at breast height (DBH)** – The diameter of the tree measured at 4.5' above the ground.

**Hazard** – A hazard exists when the sum of the risk factors assessed equals or exceeds a predetermined threshold of risk. Below that threshold, no hazard exists.

**Mulch** – Any material that is spread on the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing and evaporation

**Risk assessment** – A systematic process that reviews risk factors and ranks them in to risk categories

## References

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Dunster, J. (2009) Tree risk assessment in urban areas and the urban/rural interface: Course manual. Silverton, OR: Pacific Northwest Chapter, International Society of Arboriculture.

Harris, R. W., Clark, J. R., Matheny, N. P., (2004) *Arboriculture: Integrated management of landscape trees, shrubs, and vines*, fourth edition, Upper Saddle River, NJ: Prentice Hall.

Richards, N.A. 1982/83. Diversity and stability in a street tree population. *Urban Ecology*. 7:159–171.

## Appendix

Category	Field	Type	Selections	Description
<b>Location</b>	Tree ID	Auto Fill		Unique ID value for tree generate by data collection system
	Mapping Coordinate	Auto Fill		X and Y (latitude/longitude) coordinate locations captured using GIS maps and/or GPS equipment
	Area/Zone	Drop Down Menu	list from shape file	Tree locations will be identified by subdivision or code number. Map layer provided by the City
	Address Number	Text Box		Street Number of tree location. Vacant lots with no address will use closest available address and assigned shall equal 'Yes'. Medians and Arterials shall use block side addressing. Medians should be addressed and sequenced to even side of street. Addresses will be collected with the follow of traffic.
	Address Street	Drop Down Menu	Pre-load Street Names	Street name for address of location of tree - From GIS layer provided by the City.
	Sequence	Auto Fill	Auto Fill	Will be used to identify tree location on property. Trees on property will be auto numbered based on the direction of traffic flow. Note: New plantings or removals will require number to be updated in future management system to maintain sequence. Park sequence number will be recorded as Side = n/a except when Side is obvious. Always low to high.
	Location	Drop Down Menu	Front Rear Left Right Median N/A	The tree's physical location in relation to Right of Way and/or public space. Location of tree in relation to front of property (facing property). Are there any you would like to add?

Category	Field	Type	Selections	Description
	Grow Space	Drop Down Menu	Tree Lawn	Describes the type of area where the tree is growing.
			Tree Well	
			Median	
			Raised Planter	
			Open/Unrestricted	
			Planter Strip	
			Unmaintained Area	
	<b>Space Size</b>	Drop Down Menu	1	The narrowest dimension of the Grow Space, to the nearest foot. Single numbers 1-9 and then 10+
			2	
			3	
4...				
10 +				
Land Use	Drop Down Menu	Single Family Residential	Describes the type of area where the tree is growing.	
		Multi Family Residential		
		Industrial/Large Commercial		
		Small Commercial		
		City Facility		
		Traffic Median		
		Park		
		Vacant		
		School		
		Other		

Category	Field	Type	Selections	Description
<b>Attributes</b>	Diameter	Drop Down Menu	1,2,3,4...50	Tree trunk diameter will be recorded to the nearest inch. Average of multi-stem
	Species	Drop Down Menu	West Coast Species List	Trees will be identified by genus and species, cultivar if evident, and by common name. Species found but not in list will be assigned a "Z-Species" number and added to system in update. "Vacant" will be selection for empty planting sites. "Stump" will be used for locations that require stump grinding.
	Height	Drop Down Menu	1-10	Tree height will be estimated in increments of 10 feet.
			11-20	
			21-30	
			31-40	
			41-50	
			51-60...	
	50+			
	Canopy Width	Drop Down Menu	0	Canopy width will be estimated in increments of 5 feet or less.
1				
2				
3				
4-35				
35+				
Condition	Drop Down Menu	Excellent - 100	In general, the condition of each tree will be recorded in one of the listed categories adapted from the rating system established by the International Society of Arboriculture:	
		Very Good - 90		
		Good - 80		
		Fair - 60		
		Poor - 40		
		Critical - 20		
Dead - 0				

Category	Field	Type	Selections	Description
<b>Observations</b>	Maintenance (Priority) Need	Drop Down Menu	Priority 1 Removal	Most trees will fall in this category if 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 risk of failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities 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	Tree is not yet a hazard, but is unlikely to recover from damage.
			Priority 3 Removal	Consider removal due to spacing considerations.
			Priority 1 Prune	Trees that 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 4" 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.
			Large Tree Routine Prune	These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. Trees in this category are large enough to require bucket truck access or manual climbing.
			Small Tree Routine Prune	These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can be evaluated and pruned from the ground.

Category	Field	Type	Selections	Description
	Maintenance (Priority) Need	Drop Down Menu	Training Prune	Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or objectionable branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole-pruner by a person standing on the ground.
			Visibility Clearance	Prune for safety purposes related to traffic safety, sign visibility or signals
			Stump Removal	Indicates a stump that should be removed.
			Plant	During the inventory, vacant planting sites will be identified by street and address. The size of the site is designated as small, medium, or large (indicating the ultimate size that the tree will attain), depending on the growing space available and the presence of overhead wires.
	Hardscape Damage. Damage to sidewalks and curbs by tree roots are noted within Canopy.	Drop Down Menu	0	No apparent damage to any part of the paved sidewalk or paved trail.
			1	Damage to any part of the sidewalk or paved trail is less than 1/2" and not apparently hazardous.
			2	Damage to any part of the sidewalk or paved trail is greater than 1/2" and potentially hazardous
			3	Damage to any part of the sidewalk or paved trail is greater than or equal 3/4" and potentially hazardous to the public
			4	Cracks, gaps, or lift greater than 1" and potentially hazardous to the public
	Observations/ Health	Pick List	None	
Buried			Base of tree has been buried in soil or mineral substance. Root flare not visible.	
Clearance			Tree needs to be trimmed because it is impeding street, sidewalk, or street sign.	

Category	Field	Type	Selections	Description
	Observations/ Health	Pick List	Co-dominant	Tree has a codominant growth form that will likely effect the tree's structure.
			Damage	Tree has sustained damage to it's trunk, scaffold branches, or major roots
			Deadwood	Deadwood greater than 2" in diameter present canopy of tree
			Decay	Decay present in the tree's trunk, scaffold branches or major roots
			Disease	Disease present that is effecting the health of the tree
			Insect	Damaging insect or potential disease vector present on tree-notes on type of insect please
			Drainage	Tree needs better drainage
			Root Problem	Damage/decay/disease present in the tree's roots
			Staked	Tree is staked
			Structure	Tree has poor structure, Young, large-growing trees that are still small must be pruned to correct or eliminate weak, interfering, or poorly structured branches in order to minimize future maintenance requirements. These trees, up to 20 feet in height, can be worked with a pole-pruner by a person standing on the ground.
			Stump Removal	Stump left behind
			Topped	Tree has been topped
	Wires	Highvoltage lines present in the vicinity of the tree's canopy		
	Notes	Text		Additional information regarding disease, insect type, mechanical damage, etc. can be included in this field