COMMUNITY FORESTRY PROGRAM
CITY OF FAIRWAY, KANSAS

INVENTORY RESULTS AND MANAGEMENT RECOMMENDATIONS
October 2007

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CITY OF FAIRWAY, KANSAS

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INTRODUCTION

A 100% inventory of street, park and greenspace trees within the city limits of Fairway was conducted during October 2007. This is the first public tree inventory for the city. In this inventory, all publicly-owned trees were recorded as to their species, size and condition class, defined as:

GOOD: Healthy vigorous tree with no apparent signs of disease or mechanical injury. The tree is representative of its species and requires little or no corrective work.

FAIR: Tree of average condition and vigor for the area, with minor insect injury, disease or physiological problems. May lack desirable form characteristics of the species, and may require some corrective pruning or repair.

POOR: Tree is in general state of decline, and may show severe mechanical, insect or disease damage, but death is not imminent. May require major repair, renovation or replacement.

DEAD AND DYING: Dead or death imminent from Dutch elm disease or other causes.

Grateful acknowledgment is given to the City of Fairway Public Works, Fairway Tree Board, and numerous Fairway citizens for their assistance and support in the completion of this project.

The purpose of this report is to provide information to the City of Fairway and the Fairway Tree Board to aid in the continued development of a community forestry planting and management program. Ideally, a program should include a mission statement, goals, objectives based upon the goals, strategic planning (3 - 5 years) and annual plans of work that identify the activities that will be carried out. The appendices of this report contain information relevant to the selection, planting and care of trees. This information is included in support of this report as well as with future technical needs. The report binder is broken down into the following subject areas: Inventory Results, Tree Value, Specie Composition, Condition Classes and General Recommendations.

A community forestry program should address management of the public tree resource.

Healthy trees may be the first opportunity to provide a favorable impression to Fairway citizens and visitors.

Well- trained city staff and tree board members should monitor and address trees in poor or declining health.

INVENTORY RESULTS

At the time of the inventory, there were 3,079 greenspace, park and street trees located within the city limits of Fairway, representing approximately 72 different species. Street trees included all trees in the right of way or those substantially influencing the right of way. Park trees included those in Fairway City Park. Greenspace trees are those in traffic islands, medians and open spaces owned by the city. Pin oak comprises 22% of the total population with sugar maple at 12% of the total. Sweetgum follows at 9% and green ash at 8% of the population.

In the Fairway area, where a large variety of tree species will grow well, no single species should comprise more than 10% of the total number of trees. Over population by a single species can make a community vulnerable to losing a large number of trees to a single insect or disease. Dutch elm disease in American elms is an example. Pin oak and sugar maple are over the recommended stocking rate of 10% and should be discouraged for future planting on a large scale. Green ash and sweetgum are approaching the 10% level and careful consideration is advised in the further planting or encouragement of these species as well.

The condition and health of the species is an important consideration. At the time of the inventory, the summarized field data shows that 49% of all trees are reported to be in good condition, followed by 33% in fair, and 17% in poor condition. Approximately 35(1%) dead and dying trees were identified. This is somewhat of a similar breakdown of what we would find in many Kansas communities with a managing tree program. Such categories help to easily identify future management needs. For example, based on the breakdown of condition classes 49% (1507 trees) have no specific management needs, 33% (1019 trees) require minor pruning, maintenance or insect and disease controls, and 17% (518 trees) require more intensive management intervention. All dead and dying trees should be removed.

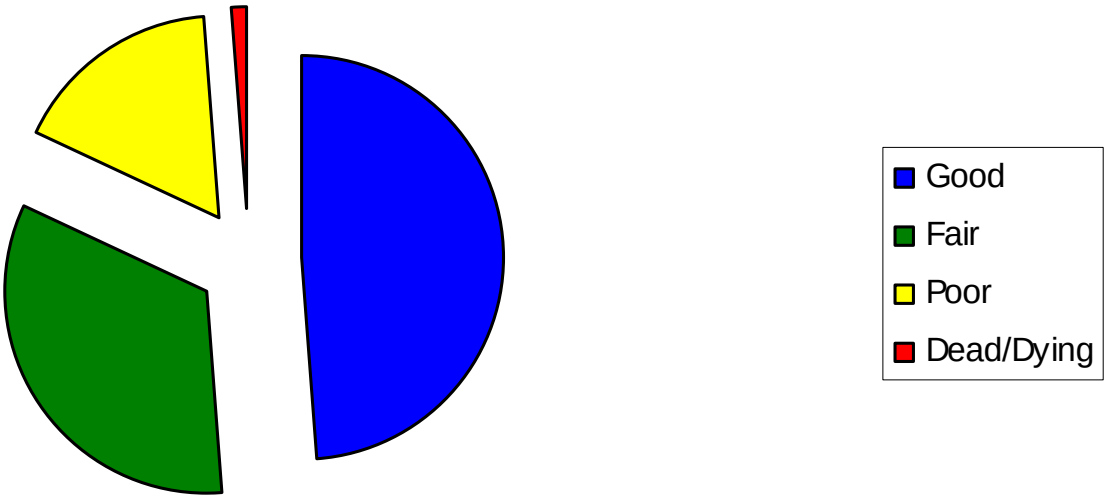
Note: In the time since the inventory, it is reported that all but a very few of the dead and dying trees have been removed. This action is to be commended.

Healthy trees provide many benefits for the entire community, such as improved water and air quality, carbon dioxide storage, energy savings and aesthetic value.

Pin oak and northern red oak comprise 24% of the total population. Sugar, silver and red maple comprise 22% of the total population - more than the recommended level of 20% for any Genus. It is recommended that no one family exceed 30% of the total population. Some tree insects and pests don't attack an entire Genus or family, but as emerald ash borer has shown, all *Fraxinus* in this country are vulnerable.

Mature tree care often requires the work of professional arborists

2007 Condition Classes by Percent



GOOD: Healthy vigorous tree with no apparent signs of disease or mechanical injury. The tree is representative of its species and requires little or no corrective work.

FAIR: Tree of average condition and vigor for the area, with minor insect, injury, disease or physiological problems. May lack desirable form characteristics of the species, and may require some corrective pruning or repair.

POOR: Tree is in general state of decline, and may show severe mechanical, insect or disease damage, but death is no imminent. May require major repair, renovation or replacement.

DEAD AND DYING: Dead or death imminent from Dutch elm disease or other causes.

TREE VALUE

Trees provide many services to the community and environment. Trees add beauty and create an environment beneficial to our well being by:

- Adding and defining natural character to our cities and towns.
- Providing us with colors, flowers, forms and textures.
- Screening undesirable views and softening the harsh lines of masonry, metal and glass.
- Reduce and cut noise pollution by acting as sound barriers.
- Defining space and providing landscape interest and continuity.

Direct and measurable benefits of trees are also very significant. Properly selected and planted trees can:

- Reduce air pollution by trapping and holding particulate pollutants and absorbing carbon dioxide and other dangerous gasses.
- Conserve water and reduce soil erosion.
- Save energy by reducing glare and providing cooling shade in the sunny hotter months and windbreaks during the cold winter months.
- Increase property values from 7% to 15%.

The value figures in the following tables were computed using an equation developed by the International Shade Tree Conference which takes into consideration intrinsic values such as shade and beauty. The estimated value of all inventoried trees within the Fairway city limits is in excess of $10 million dollars.

The above figure is used only as an estimate based on currently accepted calculations. Inventory values and data are pertinent to the determination of adequate yearly budget levels needed to maintain and enhance the public tree resource.

Trees add measurable values to our communities

The 2007 value of inventoried street, park and greenspace trees in Fairway is $10,052,548.

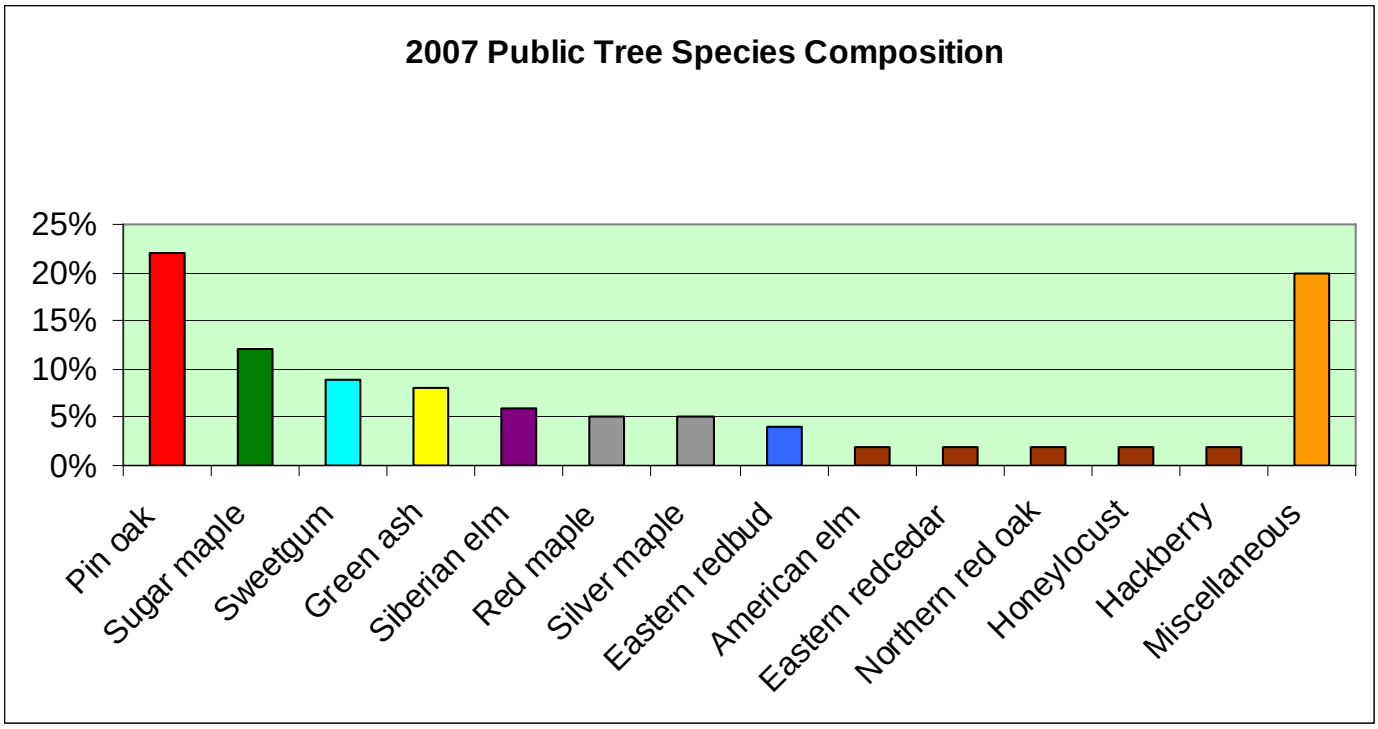
Trees provide many environmental services that can now be quantified through STRATUM – *Street Tree Resource Analysis Tool for Urban Forest Managers.* See Appendix A for specific benefits provided by Fairway's public trees.

PUBLIC TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Pin oak	666	27”	49%	40%	11%	0%	22%	$4,896,317
Sugar maple	363	14”	74%	20%	6%	0%	12%	$1,051,961
Sweetgum	273	19”	71%	25%	4%	0%	9%	$1,263,130
Green ash	256	17”	21%	40%	37%	2%	8%	$631,575
Siberian elm	187	25”	6%	33%	60%	1%	6%	$179,373
Red maple	147	9”	69%	22%	9%	0%	5%	$61,379
Silver maple	140	21”	25%	53%	22%	0%	5%	$217,847
Eastern redbud	110	5”	67%	15%	18%	0%	4%	$33,599
American elm	70	19”	13%	54%	33%	0%	2%	$154,688
Eastern redcedar	69	8”	52%	38%	3%	7%	2%	$70,938
Northern red oak	56	13”	66%	29%	4%	2%	2%	$202,653
Honeylocust	52	14”	52%	33%	13%	1%	2%	$108,040
Hackberry	48	18”	19%	56%	25%	0%	2%	$138,458
Miscellaneous*	638	11”	51%	32%	15%	2%	20%	$1,042,590
TOTAL	**3079**	**17”**	**49%**	**33%**	**17%**	**1%**	**100%**	**$10,052,548**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried public tree population):

Arborvitae, white ash, baldcypress; river and eastern white birch; black gum, boxelder, northern catalpa; black and ornamental cherry; Kentucky coffeetree, crabapple, flowering dogwood, elm spp., fruit spp., ginkgo, goldenraintree, Washington hawthorn, eastern hemlock; bitternut, pignut and shagbark hickory; holly spp., European hornbeam, juniper, littleleaf linden, black locust, magnolia, Bracken’s Beauty magnolia; amur, Freeman, Japanese and Norway maple; mimosa, mulberry spp.; red and white mulberry; bur, chinkapin, shingle and swamp white oak; Osage-orange, Japanese pagodatree, ornamental pear, pecan; Austrian, eastern white, limber and Scotch pine; purpleleaf plum, silver and other poplar, serviceberry, common smoketree; Black Hills, Colorado blue and Norway spruce; American sycamore, tuliptree, an unknown and black walnut



***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried public tree population):

Arborvitae, white ash, baldcypress; river and eastern white birch; black gum, boxelder, northern catalpa; black and ornamental cherry; Kentucky coffeetree, crabapple, flowering dogwood, elm spp., fruit spp., ginkgo, goldenraintree, Washington hawthorn, eastern hemlock; bitternut, pignut and shagbark hickory; holly spp., European hornbeam, juniper, littleleaf linden, black locust, magnolia, Bracken's Beauty magnolia; amur, Freeman, Japanese and Norway maple; mimosa, mulberry spp.; red and white mulberry; bur, chinkapin, shingle and swamp white oak; Osage-orange, Japanese pagodatree, ornamental pear, pecan; Austrian, eastern white, limber and Scotch pine; purpleleaf plum, silver and other poplar, serviceberry, common smoketree; Black Hills, Colorado blue and Norway spruce; American sycamore, tuliptree, an unknown and black walnut

WARD 1 TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Sugar maple	179	13”	76%	20%	3%	1%	24%	$438,838
Sweetgum	131	18”	76%	24%	0%	0%	18%	$596,286
Green ash	94	15”	22%	45%	30%	3%	13%	$189,013
Pin oak	86	25”	21%	71%	8%	0%	12%	$485,678
Red maple	49	9”	70%	18%	12%	0%	7%	$20,934
Siberian elm	31	23”	10%	48%	42%	0%	4%	$29,640
American elm	23	20”	9%	61%	30%	0%	3%	$46,497
Norway maple	22	11”	41%	50%	9%	0%	3%	$25,781
Northern red oak	17	14”	71%	23%	6%	0%	2%	$70,875
Miscellaneous*	104	13”	67%	23%	8%	2%	14%	$231,917
TOTAL	**736**	**16”**	**55%**	**34%**	**10%**	**1%**	**100%**	**$2,135,459**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried Ward 1 tree population):

White ash, black gum, northern catalpa, crabapple, flowering dogwood, goldenraintree, hackberry, honeylocust, littleleaf linden, black locust, magnolia, Freeman and silver maple, red mulberry; bur, chinkapin and swamp white oak; ornamental pear; Austrian, eastern white, and Scotch pine; purpleleaf plum, eastern redbud, eastern redcedar, serviceberry; Colorado blue and Norway spruce, sycamore, tuliptree, and black walnut.

Ward 1 Overview:

Sugar maple, sweetgum, green ash and pin oak exceed the recommended level of 10% for specie diversity. As trees within these species decline and require removal, other species should be replanted in their place to increase the overall diversity of the city and especially of Ward 1. Red maple is approaching a level of overstocking and should be discouraged from any large planting – this should include the Freeman maple. The pin oak’s average diameter indicates that it is approaching an over-mature size and issues related to age, storm damage and other environmental stresses should be expected. Siberian elm, with an average diameter of 23”, is very prone to storm damage and accelerated decline with age. American elm is approaching a state of maturity and may be affected yet by Dutch elm disease. With emerald ash borer (EAB) a potential threat to Kansas, the 14% of green and white ash is at risk.

WARD 2 TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Pin oak	211	26”	39%	40%	20%	1%	28%	$1,318,297
Sweetgum	87	18”	62%	29%	9%	0%	11%	$344,403
Sugar maple	75	15”	71%	20%	9%	0%	10%	$263,400
Eastern redbud	37	5”	70%	8%	22%	0%	5%	$9,450
Green ash	31	16”	16%	29%	52%	3%	4%	$72,333
Siberian elm	28	22”	3%	29%	64%	4%	4%	$19,031
Honeylocust	28	13”	60%	29%	11%	0%	4%	$40,623
Red maple	23	9”	61%	22%	17%	0%	3%	$8,255
Hackberry	19	16”	10%	58%	32%	0%	3%	$39,905
Eastern redcedar	19	6”	0%	89%	11%	0%	3%	$5,476
Black walnut	17	20”	18%	70%	12%	0%	2%	$64,101
American elm	15	19”	13%	60%	27%	0%	2%	$31,466
Austrian pine	13	8”	15%	69%	8%	8%	2%	$6,431
Eastern white pine	12	11”	75%	8%	17%	0%	2%	$24,753
Miscellaneous*	142	11”	59%	26%	14%	1%	19%	$245,594
TOTAL	**757**	**17”**	**47%**	**33%**	**19%**	**1%**	**100%**	**$2,493,518**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried Ward 2 tree population):

Arborvitae, white ash, baldcypress, river and eastern white birch, boxelder, black and ornamental cherry, crabapple, flowering dogwood, ginkgo, goldenraintree, bitternut and shagbark hickory, juniper, littleleaf linden, magnolia; Japanese, Norway and silver maple, mimosa, mulberry; bur, chinkapin, northern red, shingle, and swamp white oak; ornamental pear, Scotch pine, purpleleaf plum, Colorado and Norway spruce, and tuliptree.

Ward 2 Overview:

Pin oak, sweetgum and sugar maple comprise 10% or more of Ward 2 species. As trees within these species decline and require removal, other species should be replanted in their place to increase the overall diversity. This ward also is comprised of mature and over-mature pin oak and Siberian elm and black walnut are nearing mature to over-mature sizes. Large trees in the ward should be expected to have issues related to age, storm damage, accelerated decline and environmental stresses. Some or all of the 2% American elm could be affected yet by Dutch elm disease and the pines by pine wilt - K-State’s Plant Diagnostic Lab sees an increasing number of Austrian pines affected by pine wilt. The 4% of ash is at risk of loss to EAB.

WARD 3 TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Pin oak	308	29”	60%	34%	6%	0%	42%	$2,705,979
Silver maple	74	24”	18%	69%	13%	0%	10%	$140,129
Green ash	53	20”	13%	30%	57%	0%	7%	$146,853
Sugar maple	52	14”	75%	19%	6%	0%	7%	$157,519
Sweetgum	34	22”	82%	9%	9%	0%	5%	$219,696
Eastern redcedar	33	7”	76%	9%	0%	15%	5%	$20,341
Red maple	30	8”	100%	0%	0%	0%	4%	$11,255
Siberian elm	19	29“	11%	47%	42%	0%	3%	$26,864
American sycamore	13	27”	92%	8%	0%	0%	2%	$87,497
Miscellaneous*	113	14”	56%	34%	10%	0%	16%	$309,802
TOTAL	**729**	**22”**	**56%**	**32%**	**11%**	**1%**	**100%**	**$3,825,935**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried Ward 3 tree population):

White ash, crabapple, flowering dogwood, American elm, hackberry, Honeylocust, European hornbeam, juniper, black locust, magnolia; amur, Freeman and Norway maple; northern red, shingle, and swamp white oak; Osage-orange, ornamental pear; eastern white and Scotch pine; eastern redbud, serviceberry, Colorado blue and Norway spruce, and black walnut.

Ward 3 Overview:

Pin oak utterly dominates the diversity in Ward 3 and is one of the largest species, to boot. The pin oak should be a specific management consideration for the ward. Silver maple, Siberian elm and green ash are prone to storm damage and accelerated decline and all have average diameters over 20”, with the silver maple and Siberian elm approaching a more mature state. There is a real need to identify the poorest condition trees, especially those also with large diameters, and target diverse plantings in anticipation of future loss. Maple comprises 22% of the ward population and should be discouraged for large scale planting. It should be recognized that 57% of the green ash population is in poor condition and with the white ash, at risk for loss from EAB.

WARD 4 TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Siberian elm	98	26”	6%	29%	64%	1%	18%	$97,739
Green ash	66	16”	30%	47%	23%	0%	12%	$178,885
Sugar maple	56	15”	64%	25%	11%	0%	10%	$190,696
Pin oak	51	24”	67%	23%	10%	0%	9%	$318,228
Silver maple	47	21”	28%	34%	38%	0%	9%	$60,423
Red maple	27	11”	52%	44%	4%	0%	5%	$15,899
Eastern redbud	26	6”	50%	23%	27%	0%	5%	$8,522
American elm	20	19“	5%	45%	50%	0%	4%	$41,127
Sweetgum	19	19”	63%	32%	5%	0%	4%	$89,192
Ornamental pear	11	6”	55%	36%	9%	0%	2%	$4,036
Northern red oak	10	12”	80%	10%	10%	0%	2%	$29,175
Colorado blue spruce	10	12”	50%	30%	20%	0%	2%	$17,191
Miscellaneous*	97	12”	41%	25%	25%	11%	18%	$157,502
TOTAL	**538**	**17”**	**39%**	**31%**	**28%**	**2%**	**100%**	**$1,208,615**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried Ward 4 tree population):

White ash, river and eastern white birch, boxelder, black and ornamental cherry, Kentucky coffeetree, crabapple, flowering dogwood, elm, fruit species, ginkgo, goldenraintree, hackberry, holly, honeylocust, littleleaf linden, magnolia, Norway maple, mulberry, swamp white and shingle oak, Japanese pagodatree, pecan; Austrian, eastern white and Scotch pine; London planetree, poplar, eastern redcedar, common smoketree, Norway spruce, sycamore, tuliptree, black walnut, and an unknown.

Ward 4 Overview:

Two species of trees prone to storm damage and decay development comprise 30% of the ward’s tree population. Twenty-four percent of maples exist in the ward. Sugar maple comprises 10% of the population and pin oak 9%. Both should be discouraged from planting in larger numbers. A focus should be given to increase specie diversity in the ward. From a condition standpoint, it should be noted that 64% of the Siberian elm are in poor condition, with the expectation that a larger number of these trees are likely to decline. The 12% ash is at risk of loss to EAB.

PARK TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Juniper	16	2”	25%	63%	12%	3%	22%	$512
European hornbeam	11	6”	0%	100%	0%	0%	15%	$3,190
Red maple	8	7”	63%	25%	12%	0%	11%	$2,919
Green ash	5	26”	20%	60%	20%	0%	7%	$31,704
Honeylocust	3	6”	33%	67%	0%	0%	4%	$886
Pin oak	3	28”	100%	0%	0%	0%	4%	$29,049
Scotch pine	3	23”	67%	33%	0%	0%	4%	$4,247
Eastern redbud	3	3“	33%	67%	0%	0%	4%	$370
Black Hills spruce	3	2”	100%	0%	0%	0%	4%	$162
Northern catalpa	2	14”	0%	0%	100%	0%	3%	$1,182
Freeman maple	2	10”	100%	0%	0%	0%	3%	$1,050
Silver maple	2	23”	0%	50%	50%	0%	3%	$2,135
Mulberry	2	8”	50%	50%	0%	0%	3%	$748
Eastern redcedar	2	22”	50%	50%	0%	0%	3%	$9,732
Colorado blue spruce	2	6”	50%	50%	0%	0%	3%	$905
Miscellaneous*	5	19”	40%	0%	60%	0%	7%	$20,040
TOTAL	**72**	**10”**	**37%**	**49%**	**11%**	**3%**	**100%**	**$108,831**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried park tree population):

Ginkgo, hackberry, black locust, Austrian and eastern white pine

Parks Overview:

It should be realized that with a small number of park trees, anything planted in mass will comprise a large percentage of the total. Plant an even wider variety of species to diversify the parks. All of the catalpa are in poor condition and should be monitored. Large percentages of juniper, European hornbeam, green ash, honeylocust and redbud are in fair condition and should be managed to prevent a slide in condition. Mechanical damage was noted on nearly all of the European hornbeam. This damage can be greatly minimized on all ward, park and greenspace trees with the use of wood chips or herbicide treatments of grass and weeds. The 7% ash is at risk of loss to EAB.

GREENSPACE TREE RESOURCE - City of Fairway, Kansas
October 2007
Percent of Inventory Total

SPECIES	No. of Trees	Avg. Dia.	% Good	% Fair	% Poor	% Dead & Dying	% of Total Trees	Value
Eastern redbud	29	6”	79%	14%	7%	0%	12%	$10,788
Austrian pine	15	8”	13%	87%	0%	0%	6%	$7,205
Crabapple	14	6”	36%	14%	29%	21%	6%	$8,504
Honeylocust	13	14”	46%	23%	23%	8%	5%	$19,636
Flowering dogwood	12	3”	83%	17%	0%	0%	5%	$1,490
Siberian elm	11	22”	0%	9%	91%	0%	4%	$6,099
Fruit spp.	11	2”	9%	18%	73%	0%	4%	$210
Hackberry	11	15“	27%	64%	9%	0%	4%	$29,983
Colorado blue spruce	11	5”	82%	18%	0%	0%	4%	$4,001
Red maple	10	6”	40%	50%	10%	0%	4%	$2,117
Scotch pine	9	7“	0%	44%	56%	0%	4%	$790
Green ash	7	17”	14%	29%	57%	0%	3%	$12,787
Magnolia	7	8”	14%	43%	43%	0%	3%	$3,281
Pin oak	7	26”	29%	42%	29%	0%	3%	$39,086
Eastern white pine	7	5”	72%	14%	14%	0%	3%	$2,935
River birch	6	9“	83%	0%	17%	0%	2%	$5,274
Eastern redcedar	6	6”	50%	50%	0%	0%	2%	$3,330
Black walnut	6	23”	0%	100%	0%	0%	2%	$26,960
American elm	5	4”	40%	40%	20%	0%	2%	$512
American sycamore	5	28”	60%	20%	20%	0%	2%	$26,455
Boxelder	4	21”	0%	50%	50%	0%	2%	$6,224
Miscellaneous*	41	9”	54%	29%	15%	2%	18%	$62,523
TOTAL	**247**	**10”**	**43%**	**33%**	**22%**	**2%**	**100%**	**$280,190**

***Miscellaneous:** (Tree species that represent 1% or less of the total inventoried greenspace tree population):

Baldcypress, black cherry, Kentucky coffeetree, elm, ginkgo, Washington hawthorn, eastern hemlock; pignut and shagbark hickory; littleleaf linden, Bracken’s Beauty magnolia; Japanese, silver and sugar maple; red mulberry; bur, chinkapin and northern red oak; ornamental pear, common smoketree, and sweetgum.

Greenspace Overview:
Several species of trees are found in Fairway’s greenspaces but plantings of eastern redbud should be limited. It should be noted that 91% of Siberian elm is poor, and a future management concern, along with the poor boxelder, fruit trees, green ash, Scotch pine and hackberry. With pine wilt commonly found in Kansas communities, the Scotch and Austrian pine could be at risk, along with the 3% green ash for infestation of EAB. Pin oak and sycamore average diameters exceed 25 inches with black walnut, Siberian elm and boxelder also found to have larger diameters over 20 inches. The city should be mindful of age and condition related issues with these species in the years to come.

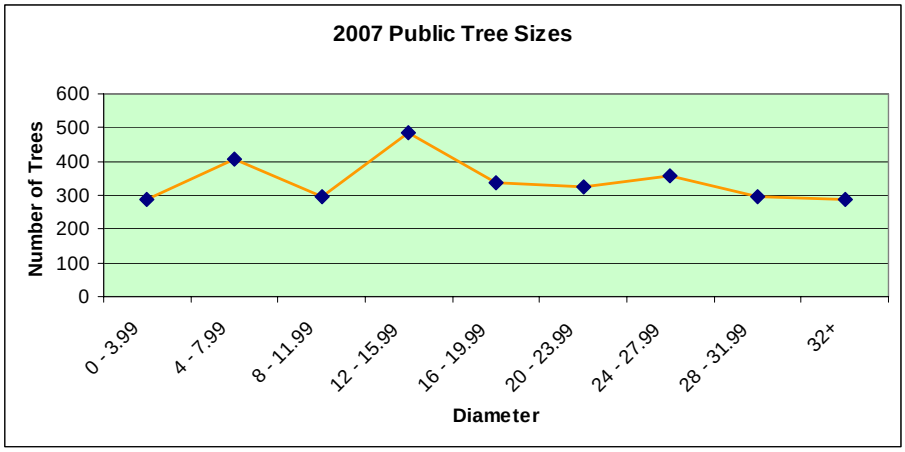
TREE SIZE

The following graph shows the size class of all public trees inventoried. Seventy percent (70%) of the inventoried trees in Fairway are in the diameter categories less than 24 inches. This is a positive trend as it demonstrates that the community has been active in planting trees. I would encourage the city and tree board to maintain this positive trend of a higher population of smaller sized trees than large trees. A population of smaller trees is more likely to overcome severe weather events as opposed to large mature and over-mature trees. A high population of large diameter trees can indicate an over-mature population with potentially very high maintenance and removal needs. At the time of the inventory, there were 938 trees in the larger diameter classes (24+ inches). This population of trees is dominated by pin oak with 516 trees. Species with 20+ trees over 24 inches in diameter include Siberian elm (120), silver maple (61), sweetgum (48), green ash (42), American elm (30) and American sycamore (24).

There are 286 public trees over 32 inches in diameter. Species in this size category include: pin oak (202); Siberian elm (25); silver maple (21), American elm (9), sycamore (8), green ash and shingle oak (4 each), hackberry (3), Honeylocust and sugar maple (2 each) and bur oak, northern red oak, Osage-orange, eastern white pine, sweetgum and black walnut (1 each).

Two factors to consider when managing tree species that are larger in diameter are the number of poor condition trees and specie type. Looking at species 24 *inches or more in diameter and in poor condition* found 68 Siberian elm, 55 pin oak, 16 green ash, 13 silver maple, 8 American elm, 5 hackberry, 2 (each) sugar maple and sweetgum and 1 tree (each) river birch, boxelder, Norway maple, shingle oak, Osage-orange and sycamore meeting this criteria.

The city should familiarize themselves with these species and locations as these trees will have potentially high maintenance needs and increasing risks for failure as they continue to mature. See the enclosed inventory reports for specific specie information regarding size and condition.



Cottonwood, hackberry, Siberian elm, Tree of Heaven *(Ailanthus*), boxelder, silver maple, Bradford pear, poplar and willow are species with very high specie hazard indices. Refer to the enclosed draft publication *Guidelines for Assessing Failure Potential Associated with Tree Defects* for specific specie information.

PLANTING TRENDS

The City of Fairway tree planting trends were developed by examining all trees less than four inches in diameter. Two hundred eighty-nine (289) young trees were found in public areas in Fairway. These newly planted trees represent 9% of the total tree population and have a total value of $10,962. The majority of these young trees are in good to fair condition. There is a fair diversity of species being planted in Fairway public areas overall.

PLANTING TRENDS

Species	# of Trees under 4"	% of Total Trees	Value
Eastern redbud	41	4%	$1,840
Red maple	34	5%	$540
Juniper	31	1%	$1,232
Flowering dogwood	20	1%	$770
Crabapple	16	1%	$800
Northern red oak	14	2%	$740
Fruit spp.	12	0%	$238
Sugar maple	12	12%	$720
Miscellaneous*	109	4%	$4,082
YOUNG TREE TOTAL**	**289**	**9%**	**$10,962**

***Miscellaneous:** (Tree species with less than 10 trees under 4 inches in diameter):

Arborvitae, green and white ash, baldcypress, river and eastern white birch, black and ornamental cherry, American elm, hackberry, Washington hawthorn, holly, European hornbeam, littleleaf linden, Bracken's Beauty and other magnolia; amur, Freeman, Japanese, Norway and silver maple; mimosa, red and other mulberry; bur, chinkapin, pin and swamp white oak, ornamental pear; Austrian, eastern white, limber and Scotch pine, purpleleaf plum, eastern redcedar, serviceberry, Black Hills and Colorado blue spruce and sweetgum.

Planting

Planting is the most important aspect of most programs. This facet generally has the most appeal for, and most support by, the public and governing administration. Consideration should be given not only to the planting of trees, but also for the "establishment" of trees. In other words all losses should be replanted until a 100 percent survival is achieved. I would also recommend that the City of Fairway consider the following specific recommendations in regards to planting:

The city should budget money for the planting and establishment of a certain number of recommended species of trees each year. Fairway could lose 14% *or more* of its canopy in the next 10 to 15 years. Approximately 35 trees (1%) are dead or dying and any remaining should be removed promptly. Seventeen percent (17%) of the total tree population is in poor condition, with many trees in that category at higher potential for accelerated decline in health due to cavity development and other structural decline. Some of the fair condition trees, especially those more prone to storm damage, poor compartmentalizers and susceptible to other sources of decline, may need to be replaced, especially those populations comprised of hackberry, silver maple, Siberian elm, green ash, black walnut, honeylocust, and redbud. Emerald ash borer is a potential threat to ash, and pine wilt, oak wilt, and Dutch elm disease are present in many communities.

Species to monitor for additional loss include:

a) *Siberian elm, silver maple, black walnut, hackberry, green and white ash, ornamental pear, honeylocust, and Colorado blue spruce.* These species are more susceptible to environmental damage and/or defect formation with high and very high hazard indices. Trees rated as fair within these species could worsen in condition if damaged by severe weather events or experience increased defect formation. Fifty-three percent (53%) of silver maple, 56% of hackberry, 40% green ash, 18% white ash, 33% Siberian elm, 64% black walnut, 43% ornamental pear and 25% of Colorado blue spruce are fair condition trees.

Large diameter trees are susceptible to age-related and environmental stresses. Inspect these and all trees in high traffic areas once or more per year.

b) A tree's diameter can be used as an indicator of age. Species with larger average diameters should be monitored closely. Their condition will help determine the necessary level of management. Larger trees should also be monitored for decline from natural causes or stress-induced decline. Species with larger average diameters include: Osage-orange at 28", pin oak and sycamore at 27", Siberian elm and shingle oak at 25", boxelder, London planetree and tuliptree at 22", silver maple and black walnut at 21", and black gum at 20".

Some poor condition trees may be managed back to improved condition with some fair condition, large diameter trees continuing to mature and possibly decline in health.

The draft publication *Guidelines for Assessing Failure Potential Associated with Tree Defects* is included as a reference to provide detailed information concerning severe and critical defects, failure profiles of common Kansas trees and Kansas species hazard indices.

2. Based on the current findings of this inventory, coupled with known insect and disease problems of certain species, I would discourage any future planting/promotion of the following species:

Species	Reason	Alternative
Pin oak and sugar maple	Overstocked	Ginkgo (Male) American linden
Green and white ash	Borers – ash/lilac and potential for emerald ash borer; ash yellows disease	Goldenraintree American yellowwood Western soapberry
Sweetgum Green ash	Overstocking potential	Lacebark elm Bloodgood London planetree
Green ash Siberian elm Hackberry Silver maple Boxelder	Hazard tree potential	Shantung maple and hybrids English oak Osage-orange (Male) Goldenraintree Black tupelo (Black gum)
Scotch and Austrian pine	Pine Wilt disease Needle diseases	Limber or pinyon pine Black Hills spruce Upright Chinese juniper Wide variety of evergreens
Red Oak species	Oak Wilt disease	Wide variety of oak species Baldcypress
Honeylocust	Thyronectria canker Honeylocust complex	Hophornbeam Littleleaf linden

3. Coupled with the knowledge of what "not" to plant is the identified need of what can be successfully established in Fairway. I would offer the following recommendations to meet the general planting needs of the city. *I would, however, emphasize that these are general recommendations and planting projects should not be limited by this list.*

Small Trees (under 30 feet at maturity)

- Crabapple (refer to K-State Research and Extension Crabapple publication).
- Amur maple
- Oklahoma redbud
- Japanese tree lilac
- Autumn Brilliance serviceberry

Redbud in spring color

Medium Trees (30 - 70 feet at maturity)

- Lacebark elm
- Kentucky coffeetree
- Ginkgo (male)
- Shantung maple
- American yellowwood
- Osage-orange (thornless/fruitless)
- Western soapberry
- Chinkapin oak
- Sawtooth oak
- Swamp white oak
- English oak
- American and littleleaf linden
- Persimmon

Ginkgo in fall color

Large Trees (more than 70 feet at maturity)

- White oak
- Bur oak
- Baldcypress

Sawtooth oak during winter dormancy

Evergreen Trees

- Upright Chinese junipers
- Eastern redcedar and cultivars
- Black Hills spruce
- Pinyon pine
- Limber pine
- Eastern white pine

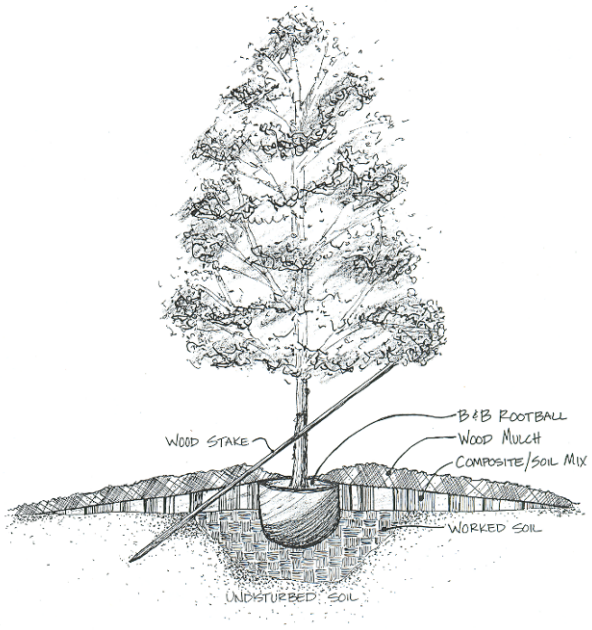
White pine foliage and cones

Please refer to the enclosed *Preferred Tree List for Northeast Kansas* for further details and expanded species recommendations.

4. The proper planting of trees is critical for successful establishment. One of the biggest hurdles that a city can face with tree planting is getting trees successfully established in unprotected areas with poor soils and inadequate moisture. To mitigate this situation I would offer the following strategy, located below, to assist in the successful establishment for the more difficult planting sites.

Using the following diagram as a guide:

- Dig planting hole 2 - 3 times larger than the root ball of the tree.
- Place root ball in hole such that 50% or greater is above the soil surface.
- Back fill the remaining portion of the hole with native soil so it is level with the adjacent undisturbed soil.
- Using a 50/50 mix of compost and soil fill in the area level to just above the root ball and tapered to a minimum of 4' off the center of the tree.
- Mulch with wood chips to a distance of 4' - 6' off the center of the tree. Mulch should be 6" - 8" thick and tapered as shown in the diagram.



A successfully established tree on a very poor, heavy clay site

PLANTING DEPTH

Many instances of young tree mortality are being contributed to tree roots that are too deep in the ground. Stem girdling roots are a common result of roots that are too deep. Remove any soil that covers the root flare (where the trunk and first roots meet), dig the hole depth according to the remaining root mass and place the root flare at or slightly above the soil level.

For further information on stem girdling roots see: http://www.extension.umn.edu/distribution/naturalresources/DD7501.html

Maintenance

Maintenance is the portion of a tree program that is most often overlooked by most communities. Nothing can be more detrimental to citizen and board support than to waste money on tree plantings which die from neglect due to lack of water, mower injury, poor pruning or insect and disease. A maintenance program/schedule should be set up for every planting, and periodic surveys should be made to determine which trees to remove and prune. Pesticide treatments are costly and should be used only on select trees of excellent condition and form. Proper species selection and a good sanitation program (dead tree removal) are much more effective at preventing insect and disease outbreak than pesticide application. In fact, most pesticide applications do not prevent insect and disease problems; rather they focus on control after the problem exists. Appropriate tree selection, planting and maintenance allows trees to grow at their optimum growth rate which is the best way to prevent insect and disease problems. Proper pruning, especially when trees are young, can eliminate unnecessary work and labor costs later on and help minimize storm damage. Maintaining mulch zones around the base of younger trees, eliminating grass and weeds in these mulched areas and the timely delivery of water are critical to the healthy establishment of trees.

Proper pruning is critical for a strong maintenance program

Please refer to the enclosed appendices for further information on tree maintenance recommendations.

Poor staking practices can lead to tree decline and death

I would suggest that citizens, tree board members and city employees learn to identify and implement controls for some of the common problems associated with the following species:

Austrian and Scotch Pine:	Tip blight (*Diplodia*), needle blight (*Dothistroma*), pine wilt
Cedar:	Kabatina blight, Cercospora blight, bagworms, spider mites
Ash species:	Anthracnose, ash borers, ash yellows, emerald ash borer
Maple species:	Anthracnose, verticillium wilt, root rot, flatheaded borer
Oak Species:	Oak wilt
American Elm:	Dutch elm disease

This list represents potential, common and potentially controllable insect and disease problems associated with several tree species within Fairway. It is not intended to be a comprehensive list. Please refer to the enclosed insect and disease publications for further details. Further recommendations on species selections, removals and planting innovations are included in the recommendation section of this report.

The health and vigor of most pine species continues to decline in most Kansas communities

Dead and Dying Tree Removal

In order to remove hazards to life and property, reduce the spread of disease, and provide for beautification and reduce maintenance costs, it is highly recommended that any remaining dead and dying trees be removed as quickly as possible from the Fairway public properties. The inventory shows that approximately 35 trees were determined to be dead or dying and in need of removal. Depending on specific situations, management needs and capabilities, the 518 trees in the poor condition class may also be in need of removal in the near future. *Silver maple, Siberian elm, hackberry, green ash, eastern redbud, American elm, crabapple, Washington hawthorn, littleleaf linden, black locust and magnolia have 15% or more of their specie in the poor condition category, totaling about 325 trees from the population of those specific species.* Silver maple, hackberry, green ash, and Siberian elm are highly prone to storm damage and structural decline, especially as they age. Other large diameter species are susceptible, as well, to damage and decline as those species mature, so the potential for removals certainly could increase due to several trees reaching a mature or over-mature state.

Dead wood can fail unexpectedly and should be removed promptly.

TREE RISK MANAGEMENT

A community tree inventory plays an important role in tree risk management. An inventory provides detailed information about the diversity, health and age of the community forest. This information, in turn, gives forest managers and city leadership necessary information to make informed decisions in developing tree risk management strategies.

The two guiding principles of tree risk management programs are:

1. Increase public safety
2. Promote tree health and sustainability

As detailed in *Community Tree Risk Management: Program Planning and Design*, a community forestry program would integrate tree risk management, tree planting, emergency response and tree pruning and maintenance programs. When a community adopts a proactive approach to public tree management, the result will be a healthier and safer tree resource. This extensive publication may be found online at: http://www.na.fs.fed.us/spfo/pubs/uf/utrmm. It is ***strongly recommended*** that city staff and tree board members review and integrate pertinent components from this resource into your community tree program.

Decay weakens branch and stem strength and can increase the risk of failure.

The presence of fruiting bodies is an indicator of advanced decay.

CONCLUSION

Trees are an asset to any community. They modify the urban environment, beautify a community, add property value, and are usually responsible for the first and last impression of a town. The Fairway Tree Board, city departments and officials have already made a very positive and lasting improvement upon the resource for all to benefit from and enjoy. Based upon the recent inventory results and recommendations I would offer the following highlights and priorities:

- At the time of the inventory, 3,079 public trees were located within the city limits of Fairway, of which 49% were in good condition, 33% in fair condition and 17% poor condition. Approximately 35 trees were considered dead and dying – 1% of the population.
- Any remaining dead and dying trees should be removed as soon as possible.
- The 17% of poor trees, 518 trees in total, are in need of intensive management assistance or will need to be removed in the near future.
- The 33% of fair trees, 1019 trees in total, have minor maintenance requirements such as pruning or insect and disease control needs.
- Pin oak comprises the largest percentage of species, followed by sugar maple, sweetgum and green ash, which combine for a total of 51% of the total population.
- There are several species with average diameters at or over 24 inches – totaling 938 trees. These species comprise 30% of the total tree population.
- Approximately 72 species are represented in the inventoried areas of Fairway.
- To charter a future course for the city it is recommended that a mission statement with desired goals and objectives be identified for the community including elements of results, criteria, time frames and specific targets to be reached.
- Establish an annual budget and plan of work which targets the needs of planning, planting, maintenance and tree removals.
- Due to overstocking, high failure potential, and insect and disease problems it is recommended that the following species not be planted or encouraged in the future: pin oak, sugar maple, sweetgum, hackberry, silver maple, green ash, Siberian elm, Scotch and Austrian pine, honeylocust, Bradford pear, cottonwood and poplars.
- Planting and establishment of quality rather than quantity is recommended with a new planting strategy on harsher sites.

49% of Fairway's public trees are in good condition

30% of all trees have average diameters 24" or larger

Tree planting is an investment for our environment and future.

APPENDIX A
Environmental Services of Fairway's Public Trees

In addition to the many benefits listed on page 4 of this report, trees provide specific environmental services to the community that can now be quantified through use of STRATUM - *Street Tree Resource Analysis Tool for Urban Forest Managers* - a software program that provides community forestry analysis and benefits assessment tools. STRATUM quantifies benefits such as energy savings, air quality improvement, carbon dioxide reduction, stormwater runoff reduction and property value increases.

To be able to calculate these benefits, Fairway's basic inventory data was imported into the STRATUM program. It should be pointed out that the two software programs used to prepare this management recommendation are very different. STRATUM requires the data to be inputted into specific categories and specie information must be manipulated for STRATUM to be able to utilize the data. It should also be recognized that the enclosed STRATUM reports reveal ***only the total benefits*** of the trees, not net benefits.

Highlights of the enclosed STRATUM reports revealed the following ***total annual benefits:***

Energy	$139,770
Carbon dioxide	$18,722
Air quality	$ 21,428
Stormwater	$185,821
Aesthetic/Other	$140,385
Total Yearly Benefits	**$506,126**

While not an annual benefit, the public tree resource also stores a considerable amount of carbon dioxide – 28,050,178 pounds - with a calculated benefit of **$210,376.**

Please refer to the enclosed STRATUM reports for specific information and values. The *Midwest Community Tree Guide*, the basis for the Midwest data and values utilized in STRATUM, provides yet more detailed and pertinent information. It may be found online at http://www.fs.fed.us/psw/publications/documents/psw_gtr199.

NOTES: