

City of Grand Terrace

Tree Inventory Summary Report

March 29, 2016

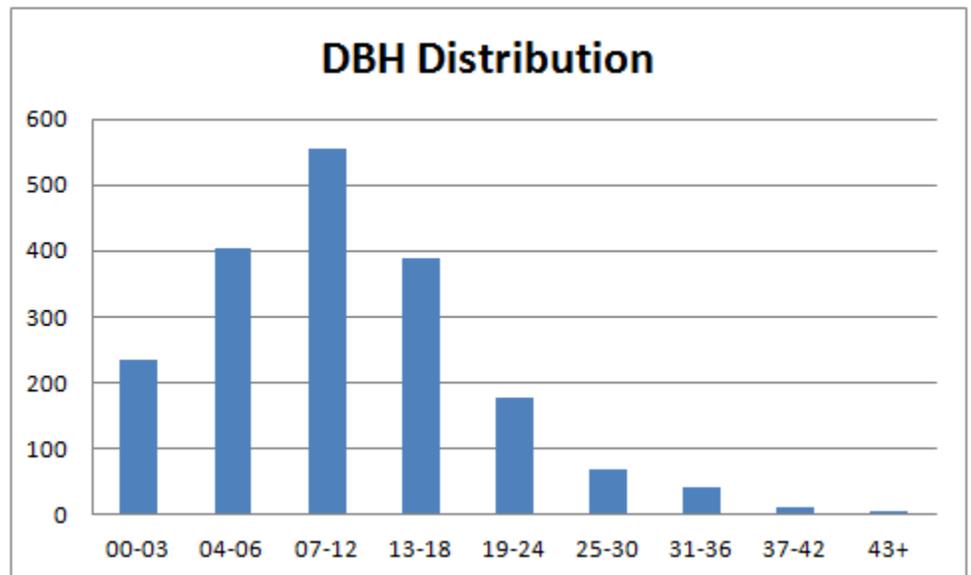
Report Summary

On February 8, 2016 ArborPro, Inc. began working on a comprehensive GPS tree inventory for City of Grand Terrace. ArborPro assigned an ISA Certified Arborist (Jeff Davidson ó WE 3457) to perform this survey. Jeff identified a total of 1,888 tree sites throughout the City. The purpose of this report is to review the project totals and to summarize the findings of our survey.

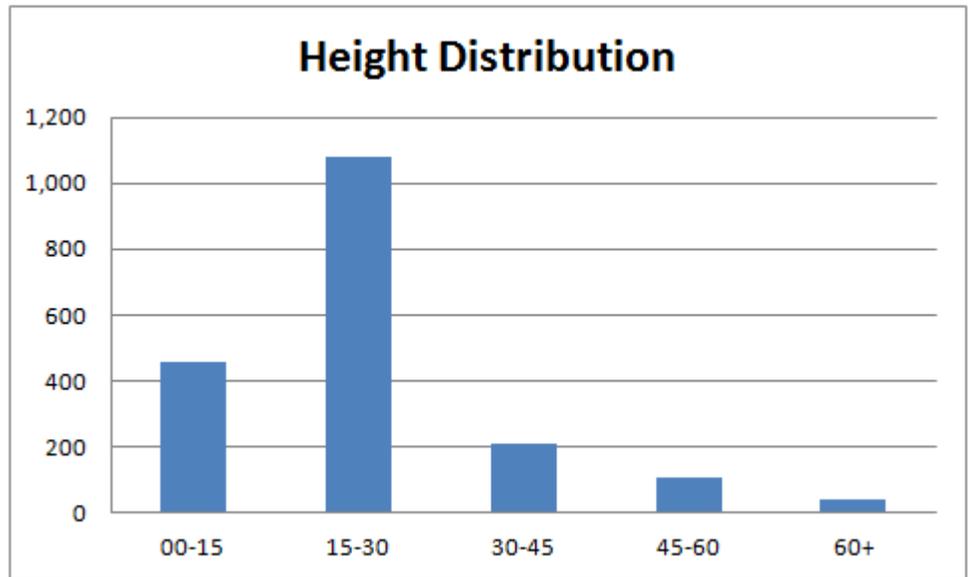
Size Characteristics

The general size of a tree provides insight into the age and value of the tree. There are two industry-wide recognized size characteristics, height and diameter at breast height. While height is self explanatory, diameter at breast height (DBH) is determined by the diameter of the tree at 4.5 feet above grade. Both the height and the DBH are collected in ranges due to the dynamic growth rate of trees.

DBH (in inches)	Tree Count
00-03	236
04-06	404
07-12	555
13-18	390
19-24	178
25-30	67
31-36	41
37-42	11
43+	6
Total	1,888



Tree Height	Tree Count
00-15	456
15-30	1,079
30-45	207
45-60	105
60+	41
Total	1,888



Tree Condition

Excellent ó The tree is near perfect condition, this determination is generally used for trees with no defects and young trees that have been properly maintained.

Very Good ó The tree is in very good condition with very minor defects that could be corrected by pruning. These trees generally stand out with respect to the aesthetic value they add to the Urban Forest.

Good ó The tree has no major structural problems; no significant damage from diseases or pests; no significant mechanical damage; a full, balanced crown, and normal twig condition and vigor for its species.

Fair ó 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; minor structural imbalance; or stunted growth compared to adjacent trees.

Poor ó The tree appears healthy, but may have structural defects. This classification also includes healthy trees that have unbalanced structures or have been topped. Trees in this category may also have severe mechanical damage, decay, severe crown dieback or poor vigor/failure to thrive.

Dead ó Trees in advanced states of decline are not included. This category refers only to dead trees.

Critical ó The tree is in a physical state that requires immediate attention. Generally these trees are recommended for a Priority One Removal.

Tree Condition	Tree Count
Good	195
Fair	1,199
Poor	429
Dead	20
Critical	0
Stump Removal	45
Total	1,888

Species Diversity – Poor and Dead Trees

We have found based on our experience that the most valuable assessment from our survey is the species composition of the trees that are dead or in poor condition. Below is a listing of these tree species found within the city. We have also identified what percentage of the tree species surveyed have been identified as poor or dead trees. For example, we have identified that there are seven Arizona Ash trees and of these seven trees, there are six that are in poor condition or dead representing an 85.71% poor rating.

Botanical Name	Common Name	Poor or Dead	Total	%
Acer saccharinum	Silver Maple	5	5	100.00%
Alnus rhombifolia	White Alder	1	1	100.00%
Bauhinia x blakeana	Hong Kong Orchid Tree	1	1	100.00%
Cycas revoluta	Sago Palm	1	1	100.00%
Ficus carica	Edible Fig	1	1	100.00%
Juglans nigra	Black Walnut	2	2	100.00%
Koelreuteria paniculata	Goldenrain Tree	4	4	100.00%
Liriodendron tulipifera	Tulip Tree	3	3	100.00%
Malus domestica	Edible Apple Species	1	1	100.00%
Pinus radiata	Monterey Pine	1	1	100.00%
Prunus armeniaca	Apricot	1	1	100.00%
Pyrus calleryana 'Bradford'	Bradford Pear	1	1	100.00%
Robinia x ambigua 'Purple Robe'	Purple Robe Locust	1	1	100.00%
Schinus molle	California Pepper	1	1	100.00%
Triadica sebifera	Chinese Tallow Tree	1	1	100.00%
Ulmus pumila	Siberian Elm	1	1	100.00%
Fraxinus velutina	Arizona Ash	6	7	85.71%
Pinus thunbergiana	Japanese Black Pine	6	7	85.71%
Morus alba	White Mulberry	20	24	83.33%
Fraxinus velutina 'Modesto'	Modesto Ash	33	42	78.57%
Albizia julibrissin	Mimosa; Silk Tree	2	3	66.67%
Ceiba speciosa	Floss Silk Tree	2	3	66.67%
Prunus persica	Peach	4	6	66.67%
Fraxinus uhdei	Shamel Ash	9	14	64.29%
Lophostemon confertus	Brisbane Box	3	5	60.00%
Pinus brutia var. eldarica	Afghan Pine	7	13	53.85%
Liquidambar styraciflua	American Sweet Gum	51	101	50.50%
Archontophoenix cunninghamiana	King Palm	1	2	50.00%
Brachychiton populneus	Bottle Tree	1	2	50.00%
Melia azedarach	Chinaberry	1	2	50.00%

Parkinsonia aculeata	Jerusalem Thorn	1	2	50.00%
Robinia pseudoacacia	Black Locust	1	2	50.00%
Yucca gloriosa	Spanish Dagger	1	2	50.00%
Jacaranda mimosifolia	Jacaranda	6	14	42.86%
Cercis canadensis	Eastern Redbud	67	183	36.61%
Gleditsia triacanthos	Honey Locust	2	6	33.33%
Prunus cerasifera	Purple-Leafed Plum	8	24	33.33%
Koelreuteria bipinnata	Chinese Flame Tree	15	46	32.61%
Schinus terebinthifolius	Brazilian Pepper	8	26	30.77%
Platanus x acerifolia	London Plane Tree	32	110	29.09%
Cedrus atlantica	Atlas Cedar	2	7	28.57%
Pinus pinea	Italian Stone Pine	5	19	26.32%
Melaleuca quinquenervia	Cajeput Tree	1	4	25.00%
Ulmus parvifolia	Chinese Elm	2	8	25.00%
Cupaniopsis anacardioides	Carrotwood	32	139	23.02%
Callistemon citrinus	Lemon Bottlebrush	1	5	20.00%
Citrus sinensis	Orange	1	5	20.00%
Eucalyptus polyanthemus	Silver Dollar Gum	2	10	20.00%
Pyrus kawakamii	Evergreen Pear	2	10	20.00%
Pinus canariensis	Canary Island Pine	9	46	19.57%
Cinnamomum camphora	Camphor	6	31	19.35%
Pinus halepensis	Aleppo Pine	3	16	18.75%
Magnolia grandiflora	Southern Magnolia	16	89	17.98%
Chitalpa tashkentensis	Chitalpa	4	26	15.38%
Washingtonia filifera X robusta	Filibusta Palm	2	14	14.29%
Zelkova serrata	Sawleaf Zelkova	1	8	12.50%
Lagerstroemia indica	Crape Myrtle	35	311	11.25%
Pistacia chinensis	Chinese Pistache	2	22	9.09%
Afrocarpus gracilior	Fern Pine	1	13	7.69%
Bauhinia variegata	Purple Orchid Tree	3	42	7.14%
Cupressus sempervirens	Italian Cypress	1	14	7.14%
Washingtonia filifera	California Fan Palm	1	23	4.35%
Syagrus romanzoffianum	Queen Palm	3	131	2.29%
Washingtonia robusta	Mexican Fan Palm	1	72	1.39%

Species Frequency

Below is a Species Frequency report for all trees located in the city right of way.

Botanical Name	Common Name	Tree Count
<i>Acer palmatum</i>	Japanese Maple	3
<i>Acer rubrum</i>	Red Maple	1
<i>Acer saccharinum</i>	Silver Maple	5
<i>Afrocarpus gracilior</i>	Fern Pine	13
<i>Albizia julibrissin</i>	Mimosa; Silk Tree	3
<i>Alnus rhombifolia</i>	White Alder	1
<i>Araucaria columnaris</i>	Star Pine	1
<i>Archontophoenix cunninghamiana</i>	King Palm	2
<i>Bauhinia variegata</i>	Purple Orchid Tree	42
<i>Bauhinia x blakeana</i>	Hong Kong Orchid Tree	1
<i>Brachychiton populneus</i>	Bottle Tree	2
<i>Brahea edulis</i>	Guadalupe Palm	1
<i>Butia capitata</i>	Pindo Palm	2
<i>Callistemon citrinus</i>	Lemon Bottlebrush	5
<i>Calocedrus decurrens</i>	Incense Cedar	1
<i>Cedrus atlantica</i>	Atlas Cedar	7
<i>Ceiba speciosa</i>	Floss Silk Tree	3
<i>Ceratonia siliqua</i>	Carob	1
<i>Cercis canadensis</i>	Eastern Redbud	183
<i>Cercis canadensis</i> 'Forest Pansy'	Forest Pansy Redbud	2
<i>Chamaerops humilis</i>	Mediterranean Fan Palm	3
<i>Chitalpa tashkentensis</i>	Chitalpa	26
<i>Cinnamomum camphora</i>	Camphor	31
<i>Citrus limon</i>	Lemon	1
<i>Citrus sinensis</i>	Orange	5
<i>Cupaniopsis anacardioides</i>	Carrotwood	139
<i>Cupressus sempervirens</i>	Italian Cypress	14
<i>Cycas revoluta</i>	Sago Palm	1
<i>Eucalyptus camaldulensis</i>	Red Gum	2
<i>Eucalyptus polyanthemos</i>	Silver Dollar Gum	10
<i>Ficus carica</i>	Edible Fig	1
<i>Fraxinus uhdei</i>	Shamel Ash	14
<i>Fraxinus velutina</i>	Arizona Ash	7
<i>Fraxinus velutina</i> 'Modesto'	Modesto Ash	42
<i>Ginkgo biloba</i>	Maidenhair Tree	4
<i>Gleditsia triacanthos</i>	Honey Locust	6

Handroanthus impetiginosus	Pink Trumpet Tree	2
Jacaranda mimosifolia	Jacaranda	14
Juglans nigra	Black Walnut	2
Juniperus chinensis	Chinese Juniper	1
Juniperus chinensis 'Torulosa'	Hollywood Juniper	6
Koelreuteria bipinnata	Chinese Flame Tree	46
Koelreuteria paniculata	Goldenrain Tree	4
Lagerstroemia indica	Crape Myrtle (including hybrids)	311
Ligustrum lucidum	Glossy Privet	3
Liquidambar styraciflua	American Sweet Gum	101
Liriodendron tulipifera	Tulip Tree	3
Lophostemon confertus	Brisbane Box	5
Magnolia grandiflora	Southern Magnolia	89
Malus domestica	Edible Apple Species	1
Melaleuca quinquenervia	Cajeput Tree	4
Melia azedarach	Chinaberry	2
Morus alba	White Mulberry	24
Olea europaea	Olive	6
Other Tree	Other Tree	1
Palm species	Palm Species	2
Parkinsonia aculeata	Jerusalem Thorn	2
Parkinsonia florida	Blue Palo Verde	1
Parkinsonia x 'Desert Museum'	Desert Museum Palo Verde	2
Persea americana	Avocado	2
Phoenix canariensis	Canary Island Date Palm	6
Phoenix dactylifera	Date Palm	1
Phoenix roebelenii	Pigmy Date Palm	20
Pinus brutia var. eldarica	Afghan Pine	13
Pinus canariensis	Canary Island Pine	46
Pinus halepensis	Aleppo Pine	16
Pinus pinea	Italian Stone Pine	19
Pinus radiata	Monterey Pine	1
Pinus thunbergiana	Japanese Black Pine	7
Pistacia chinensis	Chinese Pistache	22
Platanus racemosa	California Sycamore	1
Platanus x acerifolia	London Plane Tree	110
Podocarpus macrophyllus	Yew Pine	1
Populus deltoides	Cottonwood	1
Prosopis alba	Argentine Mesquite	1
Prunus armeniaca	Apricot	1
Prunus cerasifera	Purple-Leafed Plum	24

Prunus persica	Peach	6
Psidium cattleianum	Strawberry Guava	1
Pyrus calleryana	Ornamental Pear	1
Pyrus calleryana 'Bradford'	Bradford Pear	1
Pyrus kawakamii	Evergreen Pear	10
Robinia pseudoacacia	Black Locust	2
Robinia x ambigua 'Purple Robe'	Purple Robe Locust	1
Salix babylonica	Weeping Willow	1
Schinus molle	California Pepper	1
Schinus terebinthifolius	Brazilian Pepper	26
Stump	Stump	45
Syagrus romanzoffianum	Queen Palm	131
Syzygium australe	Brush Cherry	2
Tipuana tipu	Tipu	13
Trachycarpus fortunei	Windmill Palm	8
Triadica sebifera	Chinese Tallow Tree	1
Ulmus parvifolia	Chinese Elm	8
Ulmus pumila	Siberian Elm	1
Umbellularia californica	California Bay	1
Washingtonia filifera	California Fan Palm	23
Washingtonia filifera X robusta	Filibusta Palm	14
Washingtonia robusta	Mexican Fan Palm	72
Yucca gloriosa	Spanish Dagger	2
Zelkova serrata	Sawleaf Zelkova	8

Maintenance Recommendations

In conjunction with the comprehensive tree inventory our Arborist has provided a maintenance recommendation for each tree in the city right of way. Below is a definition for each maintenance category and a chart summarizing the findings.

Priority 1 Removal ó 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 a dead crown, and pose an elevated level of risk or failure. Any hazards that could be seen as potential dangers to persons or property and seen as potential liabilities would be in this category.

Priority 2 Removal ó Trees that should be removed but do not pose liability as great as the first priority will be identified. This category would need attention as soon as óPriority Oneö trees are removed.

Priority 3 Removal ó Trees that should be removed, but pose minimal liability to person or property, will be identified in this category.

Priority 1 Prune ó Trees that require the removal of 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 four (4) inches in diameter.

Priority 2 Prune - These trees have dead, diseased or weakened branches between two (2) and four (4) inches in diameter and are potential safety hazards.

Large Tree Routine Prune ó 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.

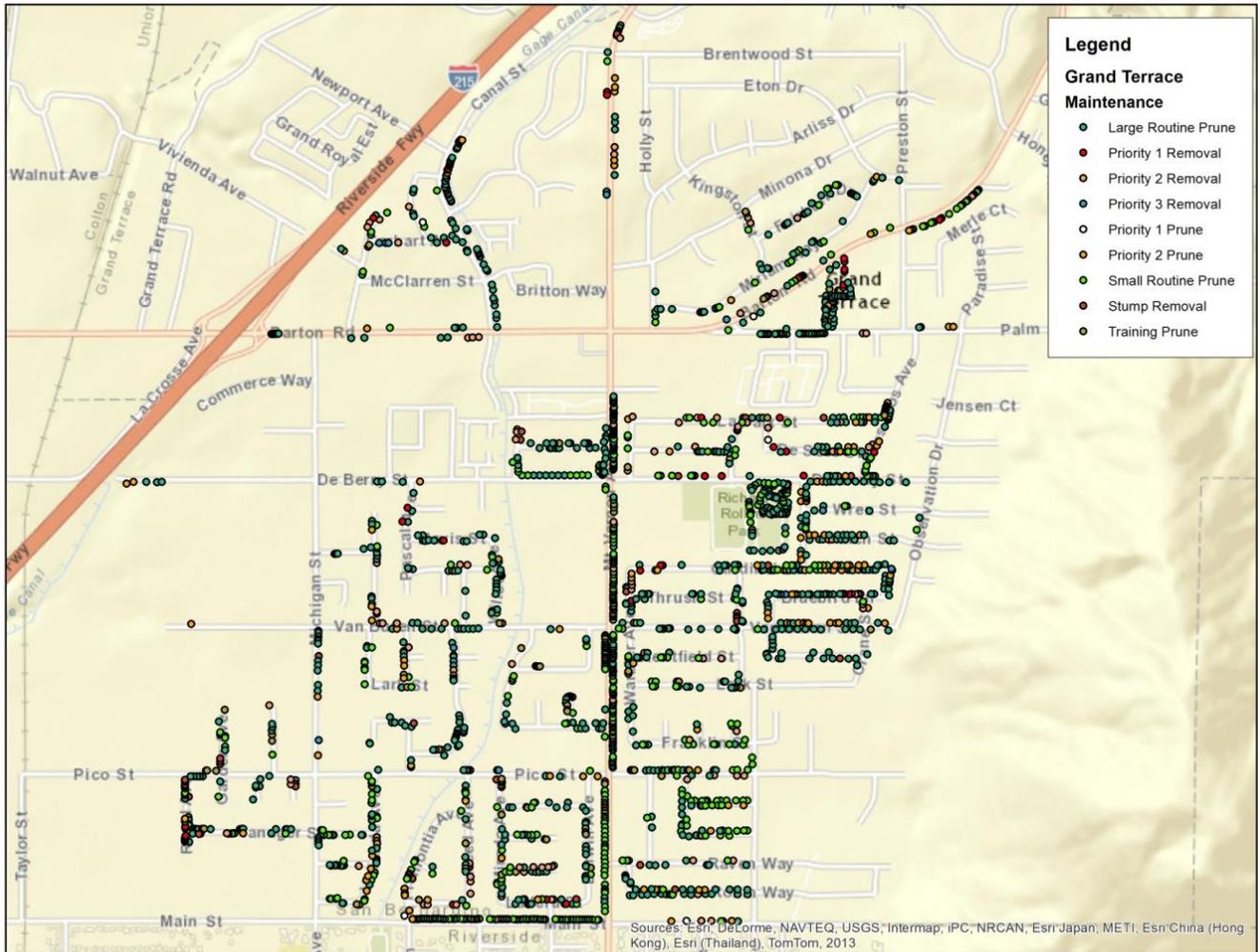
Small Tree Routine Prune ó These trees require routine horticultural pruning to correct structural problems or growth patterns, which would eventually obstruct traffic or interfere with utility wires or buildings. These trees are small growing, mature trees that can be evaluated and pruned from the grown.

Training Prune ó 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 or by a person standing on the ground.

Maintenance Recommendation	Tree Count
Priority 1 Removal	47
Priority 2 Removal	132
Priority 3 Removal	20
Priority 1 Prune	5
Priority 2 Prune	135
Large Routine Prune	851
Small Routine Prune	528
Stump Removal	45
Training Prune	125
Total	1,888

Stump Grind/Removal This category indicates a stump that should be stump grown below grade level and/or removed.

Below is a map categorized by the maintenance recommendation provided for each tree.

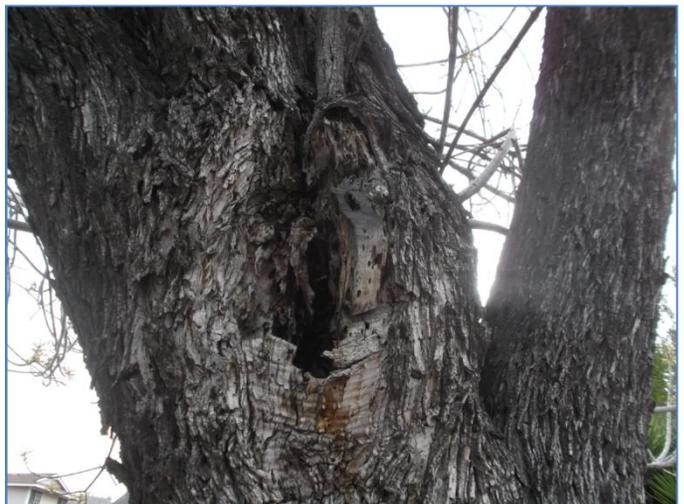
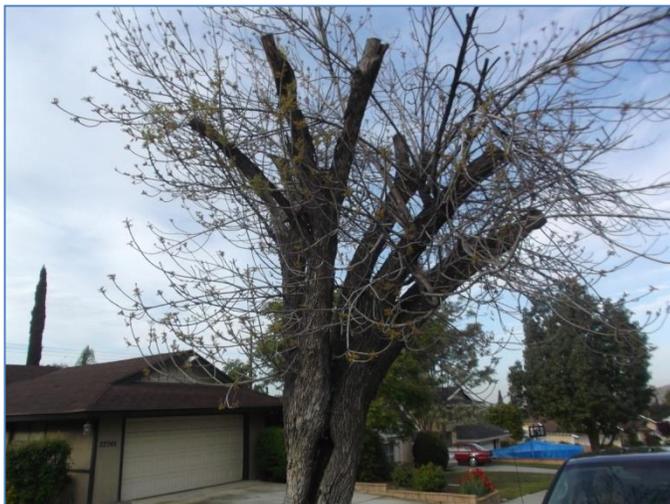


In an effort to further clarify the maintenance recommendation categories we have provided photos of trees that fall into the Priority 1 Removal, Priority 2 Removal and Priority 2 Pruning classes. The first example below is the tree located at 22656 De Berry Street. This tree is a *Morus alba* tree commonly referred to as a White Mulberry. The recommendation for this tree is a Priority 1 Removal.



The tree at 22656 De Berry Street has been severely topped during past prunings. Topping is the practice of removing whole tops of trees or large branches and/or trunks from the tops of trees. This leaves stubs or lateral branches that are too small to assume the role of a terminal leader. This practice should never be allowed. There is very little that can be done to mitigate the damage done, therefore this practice results in the need to remove city trees.

Another example of a Priority 1 Removal is the Arizona Ash tree located at 22745 De Soto Street. As you can see, this tree has also been topped in the past and includes large hollow cavities in the trunk of the tree. Below are photos of the Arizona Ash.



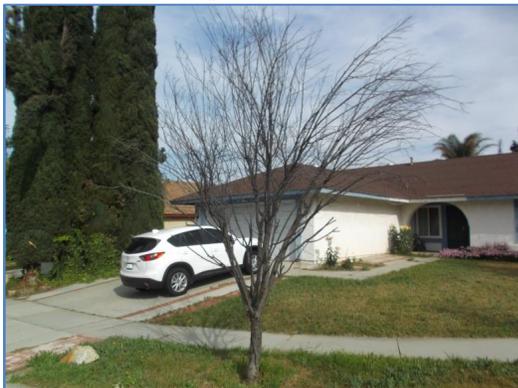
The majority of trees that have been classified as Priority 1 Removals are due to past poor pruning practices or trees planted in a poor location. Usually a location that does not provide an adequate amount of space for root growth or the crown development of the tree. Also Priority 1 Removals generally are larger trees that also include a compromised root system where the chance of failure is moderate to high. We have classified a total of 47 trees as Priority 1 Removals, we recommend that these trees are removed within the next six months to a year. Below is a listing of the Priority 1 Removal trees by address. We estimate the cost to remove the Priority 1 Trees at approximately \$18,500.

Tree ID	Address	Side	Site	Common Name	DBH	Height
1688	22702 BARTON RD	Front	10	Eastern Redbud	5	17
1669	22901 BARTON RD	Front	8	Eastern Redbud	5	16
1668	22901 BARTON RD	Front	9	Eastern Redbud	6	16
1219	22800 BLUEBIRD LN	Front	2	London Plane Tree	9	14
1218	22810 BLUEBIRD LN	Front	1	London Plane Tree	9	14
1217	22820 BLUEBIRD LN	Front	2	London Plane Tree	9	15
1213	22830 BLUEBIRD LN	Front	1	London Plane Tree	10	9
1850	11901 CANAL ST	Front	15	American Sweet Gum	6	34
1196	22537 CARDINAL ST	Front	1	White Mulberry	16	16
1184	22568 CARDINAL ST	Front	1	Silver Maple	28	36
1176	22670 CARDINAL ST	Front	3	Mimosa; Silk Tree	17	24
1522	22271 CARHART AVE	Front	1	Arizona Ash	28	25
1450	22630 DE BERRY AVE	Front	1	White Mulberry	20	20
1449	22656 DE BERRY AVE	Front	1	White Mulberry	28	12
1373	RICHARD COLLINS PARK	Park	21	Sawleaf Zelkova	5	23
1447	22760 DE BERRY AVE	Front	1	American Sweet Gum	18	23
1716	22724 DESOTO ST	Front	1	Bottle Tree	18	23
1714	22745 DESOTO ST	Front	1	Arizona Ash	18	20
1760	12271 DOS RIOS AVE	Front	1	Chinese Flame Tree	18	35
1468	22628 LA PAIX ST	Front	1	White Mulberry	18	10
1476	22730 LA PAIX ST	Front	1	White Mulberry	23	30
1780	22853 LA PAIX ST	Front	1	Carrotwood	15	21
201	22285 LADERA ST	Front	1	Goldenrain Tree	14	7
351	22410 LADERA ST	Front	2	Honey Locust	6	20
316	22441 LADERA ST	Front	2	American Sweet Gum	9	7
952	22265 MAVIS ST	Front	2	Monterey Pine	10	24
102	12702 MOUNT VERNON AVE	Front	9	Purple Orchid Tree	3	10
1880	11750 MT VERNON AVE	Front	3	American Sweet Gum	8	19
1881	11750 MT VERNON AVE	Front	4	American Sweet Gum	9	19
666	12301 MT VERNON AVE	Front	38	Eastern Redbud	1	5

942	12334 PASCAL AVE	Front	1	Filibusta Palm	28	55
943	12334 PASCAL AVE	Front	1	Modesto Ash	23	19
207	12827 REED AVE	Front	1	Camphor	12	22
81	12778 ROYAL AVE	Front	1	Modesto Ash	18	17
80	12778 ROYAL AVE	Front	2	Modesto Ash	15	16
79	12786 ROYAL AVE	Front	1	Modesto Ash	21	25
78	12786 ROYAL AVE	Front	2	Modesto Ash	16	24
77	12786 ROYAL AVE	Front	3	Modesto Ash	18	24
76	12796 ROYAL AVE	Front	1	Modesto Ash	17	24
75	12796 ROYAL AVE	Front	2	Modesto Ash	19	26
1508	11948 VIVIENDA CT	Front	1	Arizona Ash	30	24
1099	22537 THRUSH ST	Side	1	Siberian Elm	24	23
1273	GRAND TERRACE LIBRARY	Front	1	Canary Island Pine	25	55
1272	GRAND TERRACE LIBRARY	Front	2	Canary Island Pine	26	55
1271	GRAND TERRACE LIBRARY	Front	5	Canary Island Pine	20	45
1270	GRAND TERRACE LIBRARY	Front	6	Aleppo Pine	27	48
1269	GRAND TERRACE LIBRARY	Front	12	Canary Island Pine	26	50

ArborPro, Inc. has also identified 132 Priority 2 Removals throughout the City of Grand Terrace. The primary cause of this determination is also due to past poor pruning practices, limited growth space, cracked trunks, etc. The primary difference between the designation of the Priority 1 Removal vs Priority 2 Removal, is the more imminent failure potential of a Priority 1 Tree. Another determining factor are the potential targets of such a failure, such as, the risk to vehicles and pedestrians, that may be impacted by the failure of a Priority 1 Tree. Many of the trees designated as a Priority 2 Removal are smaller than Priority 1 Trees and in locations that would cause less damage if the tree was to fail.

For review we have also provided some photos of trees that have been categorized as Priority 2 Removals. The first example below is the Purple Leaf Plum tree located at 22422 Raven Way. This tree is dead with noticeable cracks in the trunk of the tree. While this tree should be removed we would prioritize this removal to occur following the Priority 1 Trees, because if this tree were to fail there would be limited exposure with regards to damage of persons or property.



Our Arborist, Jeff Davidson, has also identified numerous priority pruning locations. He only identified 5 Priority 1 Prunes but we did identify 135 Priority 2 Prunes. The primary reason for the priority 2 prune designation is due to vehicular and pedestrian clearance, the majority being vehicular clearance issues. To the right is a photo of Van Buren Street. On this street alone we identified 11 trees in the 22000 block that require a clearance prune.



Long Term Maintenance Plan

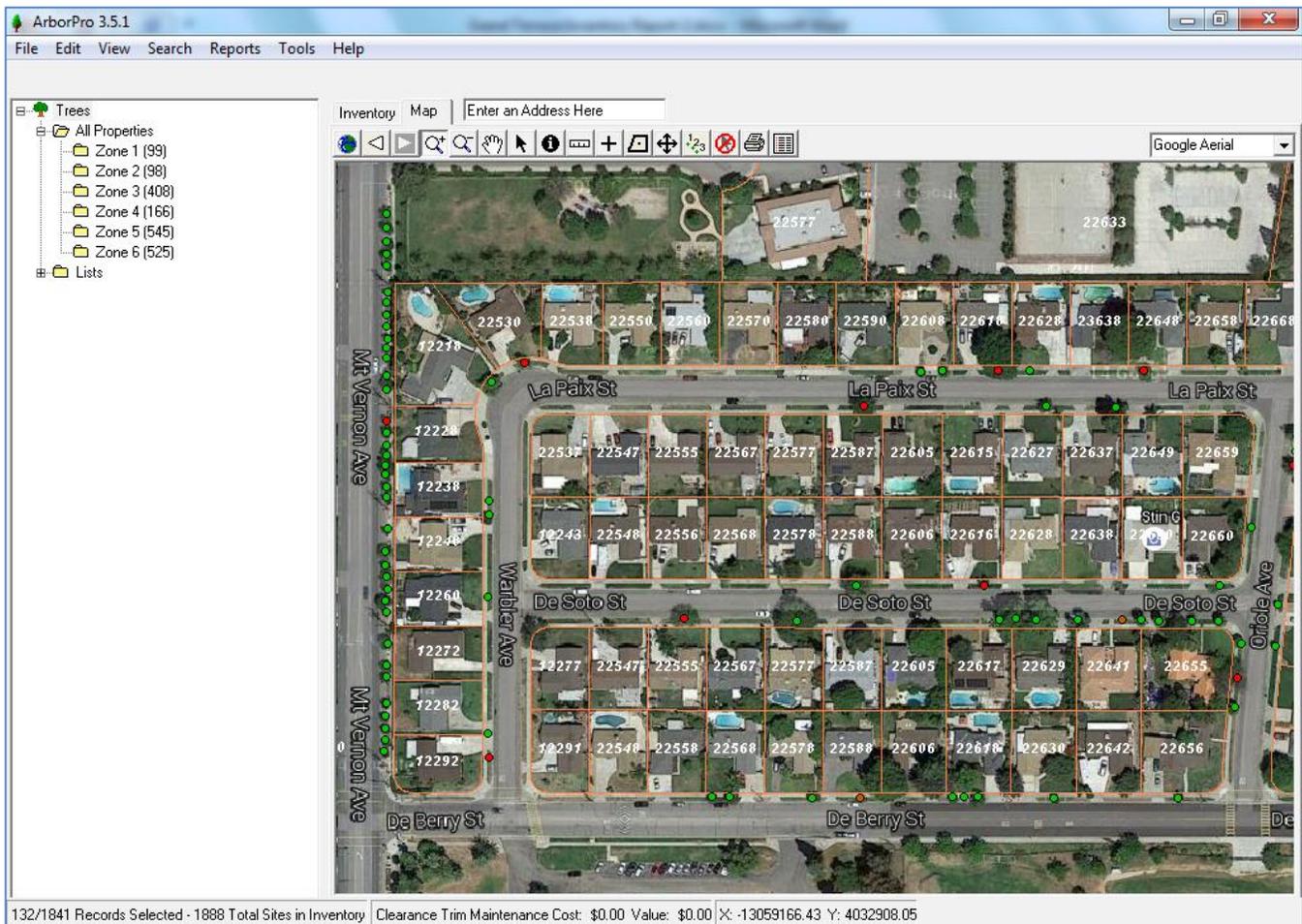
It is our recommendation that the City of Grand Terrace enter into a long term grid maintenance plan to properly and most cost effectively maintain the Urban Forest. Prior to initiating a long term grid pruning plan we highly recommend that the Priority 1 Removal trees are removed, and also that the Priority 1 and Priority 2 Prune trees are pruned. Below is our estimated budget to address the priorities followed by the annual budget required to maintain the Urban Forest. We recommend that the Priority 2 Removal trees are addressed as the trees are pruned in the maintenance grids.

Year 1 - Priority Maintenance		
Maintenance Activity	Tree Count	Estimated Cost
Priority 1 Removals	47	\$18,500.00
Priority 1 and 2 Prunes	140	\$9,000.00
Total Cost for Year 1 Priority Maintenance		\$27,500.00
Five Year Grid Pruning Schedule		
Maintenance Activity	Tree Count	Estimated Cost
Grid Pruning	370	\$17,760.00
Tree Removals (P2 Removals)	25	\$10,000.00
Tree Planting (Replacement Trees)	25	\$6,250.00
Emergency Response		\$5,000.00
Annual Tree Maintenance Cost		\$39,010.00

The cost estimates above are based on current industry standards. We have estimated the prices on the higher side of the industry standard, the actual cost to perform the maintenance may be substantially lower.

ArborPro Software

ArborPro has at no cost provided the City with five licenses of our tree inventory software program ArborPro. To maintain the integrity of the tree inventory, it is important that data be properly maintained and updated. When a tree is pruned, removed or planted, the information should be updated in the ArborPro tree management program. Also, when preparing a contract for a tree management services, the City should include a provision requiring the company to update the ArborPro database. Below is a screen shot of the software program.



Tree Planting Palette

The City of Grand Terrace should pursue a tree replacement program for all trees that are removed city wide. The key aspect of a tree removal/replacement program is the proper selection of the replacement species. Trees should be selected based on success in the local environment, the environmental benefits they provide and the specific location attributes, parkway size, utilities, etc. In association with city staff and utilizing guidelines suggested from the Recommended Street Tree Book, ArborPro, Inc. has created a tree planting palette for the City of Grand Terrace.

Botanical Name	Common Name	Parkway Size
Acacia smallii	Small's Acacia	3-5
Afrocarpus gracilior	Fern Pine	5-7
Brachychiton populneus	Bottle Tree	3-5
Callistemon citrinus	Lemon Bottlebrush	3-5
Cinnamomum camphora	Camphor	5-7
Elaeocarpus decipiens	Japanese Blueberry Tree	3-5
Ginkgo biloba	Maidenhair Tree	5-7
Gleditsia triacanthos	Honey Locust	3-5
Hymenosporum flavum	Sweetshade	3-5
Koelreuteria elegans subsp. formosana	Formosa Flamegold	5-7
Lagerstroemia indica	Crape Myrtle	3-5
Ligustrum lucidum	Glossy Privet	3-5
Melaleuca quinquenervia	Cajeput Tree	5-7
Parkinsonia florida	Blue Palo Verde	3-5
Parkinsonia microphyllum	Foothill Palo Verde	5-7
Pinus brutia var. eldarica	Afghan Pine	5-7
Pinus halepensis	Aleppo Pine	5-7
Pistacia chinensis	Chinese Pistache	3-5
Prunus caroliniana	Carolina Laurel Cherry	3-5
Pyrus calleryana 'Bradford'	Bradford Pear	3-5
Pyrus calleryana 'Redspire'	Redspire Pear	5-7
Pyrus kawakamii	Evergreen Pear	3-5
Quercus fusiformis	Escarpment Live Oak	5-7
Quercus virginiana 'Heritage'	Heritage Southern Live Oak	5-7
Rhus lancea	African Sumac	3-5
Robinia x ambigua 'Purple Robe'	Purple Robe Locust	3-5
Tipuana tipu	Tipu	5-7
Triadica sebifera	Chinese Tallow Tree	3-5
Ulmus parvifolia	Chinese Elm	5-7
Zelkova serrata	Sawleaf Zelkova	5-7

Economic Benefits Analysis

Often, municipalities only consider the cost of maintaining the urban forest, and ignore the benefits that trees provide. Trees provide significant community benefits. It is important to quantify those benefits to highlight the fact that trees are a good investment for the community.

ArborPro, Inc. performed an economic benefits analysis of the tree inventory data utilizing the i-Tree software suite distributed by the USDA Forest Service. The i-Tree suite is comprised of urban and community forestry analysis and benefits assessment tools. The i-Tree tools are intended to help communities to strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and the structure of the urban forest. All of the attributes collected during the tree inventory were entered into the i-Tree software to quantify their value.

Stormwater Runoff and Improved Water Quality

Trees reduce peak stormwater runoff and associated pollutants entering local water bodies. Trees reduce stormwater volumes by intercepting a portion of rainfall, which evaporates and never reaches the ground. Tree roots also increase rainfall infiltration and storage in the soil. And tree canopies reduce soil erosion by diminishing the impact of raindrops on barren surfaces.

Public trees in Grand Terrace intercept 1,459,030 gallons of water annually for a savings of \$8,029.

Reduction of Atmospheric Carbon Dioxide

Trees reduce atmospheric carbon by capturing and storing CO₂ as they grow. By reducing demand for heating and cooling, trees indirectly reduce CO₂ by avoiding emissions associated with energy production.

Public trees in Grand Terrace store approximately 2,059,533 pounds of atmospheric CO₂ for a total savings of \$6,796.

Air Quality Improvements

Trees improve air quality by trapping particulates, absorbing gaseous pollutants, and releasing oxygen. By cooling urban heat islands and shading parked cars, trees indirectly reduce ozone levels. The Environmental Protection Agency recognizes tree planting as an ozone reduction measure in state implementation plans.

Public trees in Grand Terrace remove particulate matter, ozone, sulfur dioxide and nitrogen oxides. The annual savings from air quality improvements including indirect cost is \$4,420.

Energy Savings

Trees reduce the demand for energy to heat and cool buildings by providing shade, lowering summertime temperatures, and reducing windspeeds. Secondary benefits are reduced water consumption and pollutants emissions.

Public trees in Grand Terrace save the city approximately \$4,422 in energy savings.