OFFICE OF THE CITY MANAGER

February 6, 2009

TO: CITY COUNCIL

FROM: CITY MANAGER

RE: SUPPORTING INFORMATION TO ITEM 4A ON MONDAY, FEBRUARY 9, 2009 CITY COUNCIL AGENDA

The City Council memorandum from me for Item 4A on Monday's City Council Agenda refers to a STRATUM analysis as a way to assess the value of the existing ficus trees and the proposed ginkgo trees. Attached is a copy of a draft STRATUM report as an example as to how such a report analyzes the value of trees. In the memorandum I recommend that we use a STRATUM report to determine when the new trees are at a sufficient maturity level that the older ficus trees could be considered for removal.

The attached study focused on Phases 1D and 2 of the Playhouse District Streetscape Plan. Phase 1D relates to the tree removal and replacement on Colorado Blvd., and Phase 2 relates to the replanting of all the north and south streets within the District between Los Robles, Green, Lake and Union. The one correction that will need to be made to this report is it made an assumption that we would replant using 15 gallon trees and we are planning to replant with 36" box ginkgo trees. Therefore, the estimated timeline in the report for the new trees to reach a value consistent with the existing trees is likely to be much longer then what will happen when we start with more mature trees. We have asked Davey Resource Group to update the study utilizing a 36" box tree as the basis for all replanting and are hoping to have that study by Monday.

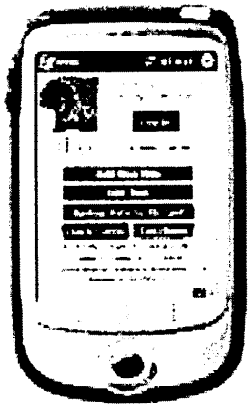
I hope this additional information is helpful to you. If you have any questions, please feel free to contact me.

Sincerely,

Michael J. Beck
City Manager

100 N. Garfield Avenue, Room S228 • P.O. Box 7115 • Pasadena CA 91109-7215

02/09/2009
4.A.



STRATUM Analysis
for the
City of Pasadena

Based on the Proposed Tree Inventory for Phase 1D and Phase 2 Construction of the Pasadena Playhouse District Streetscapes, Walk Ways, & Alleys

Conducted by

Vince Mikulanis
Dana Karcher
Davey Resource Group

November 2007

SECTION 1 - INTRODUCTION

- **Scope**

Davey Resource Group (DRG) was contracted by the City of Pasadena (the city) to conduct a short term STRATUM analysis for proposed street tree inventory changes related to construction in the Pasadena Playhouse District. Existing tree inventory data was furnished by the city to DRG for use in analyzing current tree statistics. Proposed changes to the inventory were also furnished by the city. Diameter Breast Height (DBH) projections for growth of the proposed inventory were conducted using methods for UFORE analysis of urban forest populations. Growth projections for 5 years and 15 years of the new inventory were analyzed through STRATUM to give projected annual benefits to the city based on the new population.

- **STRATUM and UFORE**

STRATUM and UFORE are part of the i-Tree urban forest analysis tools. STRATUM (Street Tree Resource Analysis Tool for Urban Forest Managers) was the principle tools used in this analysis. STRATUM uses peer-reviewed modeling techniques to quantify the value of annual environmental and aesthetic benefits provided by the urban forest. When used in conjunction with more complete street data and municipal budget data, STRATUM can also analyze management needs, and costs of the trees.

UFORE (Urban Forest Effects Model) utilizes data from randomly selected plots throughout a community to quantify urban forest structure and environmental effects. The sole application of UFORE for this analysis was to use its methods for annual DBH (diameter at breast height) growth increases of the studied street trees.

SECTION 2 - METHODOLOGY

- **Inventory Data**

Existing street tree inventory data was furnished by the city to DRG for the STRATUM analysis. However when compared to the proposed changes to the inventory it was determined that the street tree inventory was inaccurate in regards to tree locations. Maps of the proposed construction and changes were requested and furnished by the city which gave more accurate tree location and DBH information which was used for the STRATUM analysis. Since inventory DBH and location information were inaccurate it was determined that relying on the inventory for tree health and sidewalk damage would not be accurate as well. It was assumed for this analysis that the trees were in relatively good health and there was little to no sidewalk damage. Since sidewalks would be expected to be repaired/replaced during construction and it is assumed only healthy trees would be retained, this should not affect the projected benefits provided by the proposed inventory. However it is recommended that an updated inventory be conducted in the city before performing larger scale tree cost/benefit analysis.

For the newly planted trees DBH was assumed to be consistent with a #15 (formerly 15 gallon) tree for the species, which comprise 70% of all new street tree plantings within the State of California. (Lesser 1996) Heights of the proposed Mexican fan palm plantings were furnished and the DBH was extrapolated from that information.

- **STRATUM Analyses**

Three separate STRATUM analyses were conducted for each phase of construction.

1. Current inventory before removal and planting
2. Proposed inventory 5 years after removal/replacement/planting
3. Proposed inventory 15 years after removal/replacement/planting

The data analysis will look at each phase separately.

Five annual benefits are assessed in STRATUM. Each benefit is quantified in terms or resource units and a dollar value is assigned to the resource unit. The benefits categories are as follows:

1. Energy - the sum of energy savings due to reduced natural gas in winter in reduced air-conditioning in the summer. These savings come from the shading provided by trees, transpiration resulting in cooling the air, and wind-speed reduction which also reduces conductive heat loss. (Maco *et al* 2005)
2. Carbon Dioxide - the sum of the decreased atmospheric carbon dioxide due to sequestering by trees and the reduced carbon emissions from power plants due to energy savings. This model accounts for carbon released by trees due to decomposition when they die and from pruning activities.
3. Air Quality - The sum of air pollutants deposited on trees and taken out of the atmosphere and reduced emissions from power plants. This model accounts for potential negative effects from BVOC (Biogenic Volatile Organic Compounds) released by trees into the environment. In some cases these BVOC's cause an overall negative impact on air quality by trees.
4. Storm Water - measures reduced annual stormwater runoff due to trees through interception or absorption through roots.
5. Aesthetic - a measure of the tangible and intangible benefits of trees reflected in increases in property values due to trees. (i-Tree)

- **DBH Projections**

STRATUM uses DBH as one of the main factors when analyzing annual benefits. For species where data was available to predict dbh, growth by species was used (Maco *et al* 2003). Where it was not available annual DBH growth was projected using data from UFORE giving an annual projected DBH growth ranging from 0.1 to 0.5in per year, with the exception of the Mexican fan palms. Once established at the height the city is planning, this species has very little DBH growth in relation to height. (UFORE)

Although many studies relating to DBH growth have been conducted, models are very specific to tree, site, and region given the variety of factors that can affect the growth of DBH. Planting site (tree box, park, etc), pruning activities, climate, and irrigation are only a few examples of the factors that affect DBH growth rates. The projected rates of growth of DBH should be considered as a predicted average of how the trees will perform. Although the projected DBH values are consistent with what is expected of trees of the individual species, many factors could influence how they actually grow. Accuracy could be improved if the DBH of trees of the same species with known ages and similar site characteristics in the city of Pasadena could be inventoried, and that data extrapolated into the projected DBH growth for the new inventory.

SECTION 3 - ANALYSIS

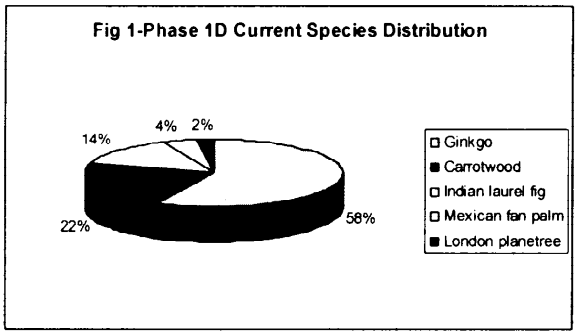
Phase 1D

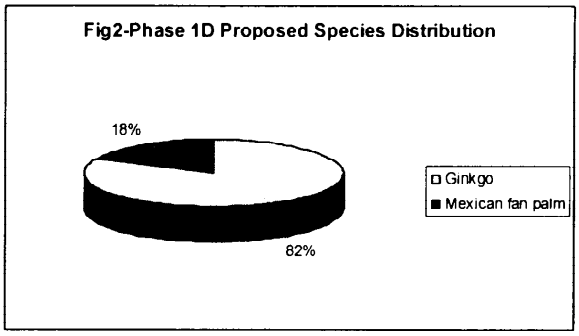
- **Species Composition**

Phase 1D had a large shift in species composition from the current to the proposed inventory.

Figure 1 shows the current species distribution. The inventory is comprised primarily of Gingko with the next most common species being carrotwood. There are a total of five different species in the current inventory.

Figure 2 shows the changes in species distribution by the proposed inventory. With the proposed inventory the number of species is reduced from 5 to two. Gingko is still the primary species; however its relative importance increases by over 20%





- **Annual Benefits**

Tables 1-3 show the summary of net annual benefits provided by trees in the five categories analyzed by STRATUM. The different tables show the current inventory, 5 year projected inventory, and 15 year projected inventory respectively.

With the reduction in species diversity and relative size of the trees it takes nearly 15 years for the proposed inventory to catch up with the current inventory in terms of net annual benefits. With many of the more beneficial species being removed and the increase of Mexican fan palms, the Gingko trees increase in importance in terms of benefits as time goes on.

Figures 3-5 show the relative importance of each species in terms of environmental benefits. These figures correlate with the data showing the gingko trees providing an increased percentage of benefits

Table 1

Average Annual Benefits of Public Trees by Species - Current Inventory

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Ginkgo	468.00	24.27	69.37	71.14	2,250.33	2,883.11
Carrotwood	360.87	27.91	166.24	134.13	1,456.30	2,145.45
Indian laurel fig	339.96	34.96	156.91	148.01	1,088.99	1,768.82
Mexican fan palm	20.25	1.29	3.79	4.30	79.32	108.95
London planetree	50.00	4.24	- 0.15	13.63	194.21	261.93
Citywide total	**1,239.08**	**92.67**	**396.15**	**371.22**	**5,069.15**	**7,168.26**

Table 2

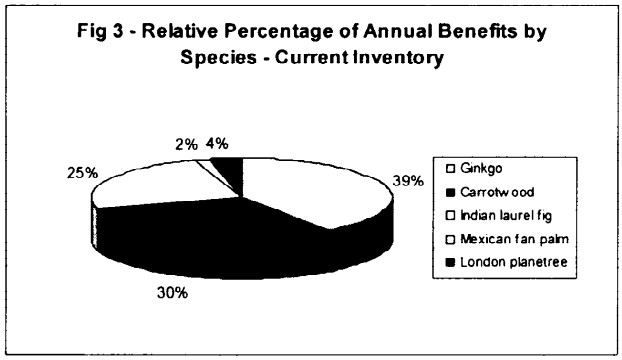
Average Annual Benefits of Public Trees by Species - 5yr Projected

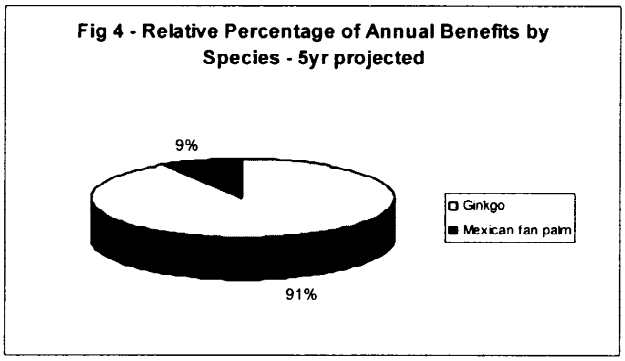
Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Ginkgo	509.37	26.06	67.95	76.26	3,997.42	4,677.06
Mexican fan palm	59.46	5.83	6.38	11.75	371.75	455.17
Citywide total	**568.83**	**31.89**	**74.33**	**88.01**	**4,369.17**	**5,132.23**

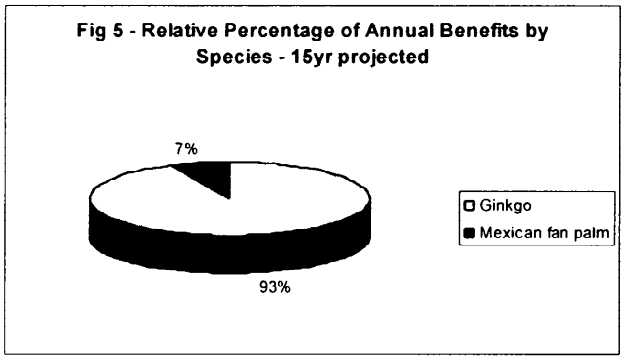
Table 3

Average Annual Benefits of Public Trees by Species - 15yr Projected

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Ginkgo	1,523.96	85.61	240.77	246.66	4,803.72	6,900.72
Mexican fan palm	76.46	6.03	11.57	17.03	414.65	525.74
Citywide total	1,600.42	91.64	252.34	263.69	5,218.37	7,426.46



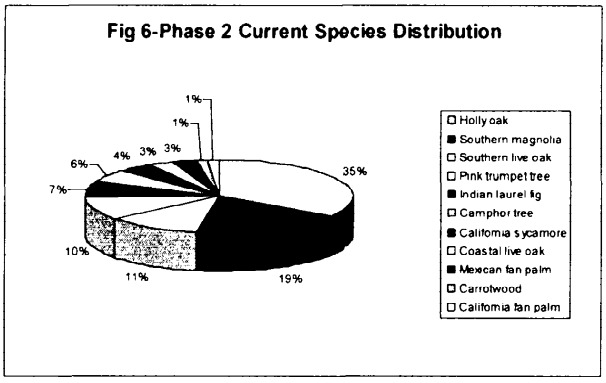


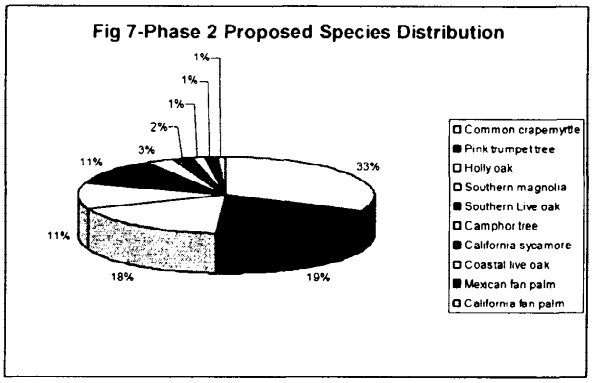


Phase 2

- **Species Composition**

Phase two has a relatively complex distribution of species. Holly oak, Southern Magnolia, Southern live oak, and Pink trumpet tree are all among the top five most prevalent species both before and after the proposed inventory changes. Crapemyrtle replaces the Indian laurel fig in its distribution with the proposed changes, which eliminates Indian laurel fig from the inventory. The changes in species distribution by the proposed inventory are represented by figures 6-7.





- **Annual Benefits**

Tables 4-6 show the current and projected summary of net annual benefits provided by trees in the five STRATUM categories for phase 2.

The proposed plan for Phase 2 shows immediate increases in benefits across all but the air quality categories. Due to the BVOC emissions from Holly oak, Southern magnolia, and coast and southern live oak, there is a continued net reduction in air quality from the current inventory through the 15 year projected inventory. However in all other categories, energy, carbon dioxide, storm water and aesthetics the proposed changes to the inventory are positive and continue to provide additional benefits as time goes on. The BVOC emissions by the four species are outweighed by their increased contributions to savings in the other categories especially in energy savings, most likely due to their large stature and shade canopy.

Figures 8-10 demonstrate the relative importance of the total trees in each species in terms of environmental benefits. Despite the BVOC emissions, the holly oak is relatively the most valuable species in the proposed projected inventory. Although they contribute to species diversity, the Mexican and Californian fan palms, and coast live oak are relatively the least important species. This is due to the combined factors of not being represented as well in the overall inventory and their lower net environmental benefits on average.

Table 4

Average Annual Benefits of Public Trees by Species - Current inventory

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Holly oak	605.72	73.67	- 537.54	218.10	2,630.74	2,990.70
Southern magnolia	198.04	16.85	- 14.52	74.45	818.67	1,093.48
Southern live oak	213.87	25.11	- 184.61	70.28	898.77	1,023.41
Pink trumpet tree	29.49	1.69	2.78	7.32	396.90	438.19
Indian laurel fig	147.25	15.08	79.82	66.14	440.68	748.96
Camphor tree	111.30	11.57	52.47	48.94	355.07	579.34
California sycamore	111.65	14.29	42.81	32.15	649.01	849.91
Coastal live oak	30.14	3.53	- 25.66	8.94	211.35	228.31
Mexican fan palm	10.12	0.65	1.89	2.15	39.66	54.47
Carrotwood	18.50	1.42	8.55	6.87	72.93	108.27
California fan palm	6.64	0.32	2.12	1.47	13.27	23.82
Citywide total	1,482.72	164.17	- 571.89	536.82	6,527.04	8,138.86

Table 5

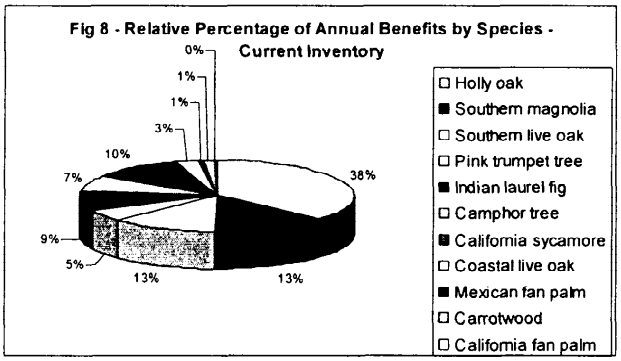
Average Annual Benefits of Public Trees by Species 5yr projected

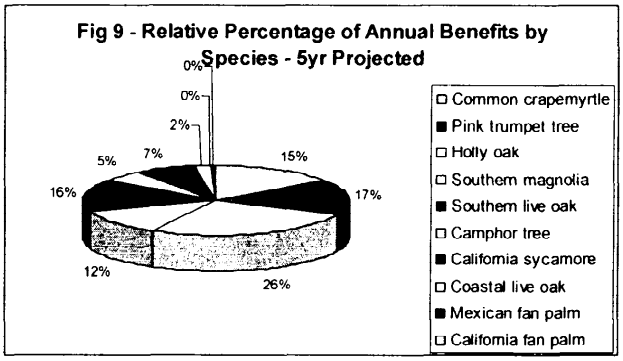
Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Common crapemyrtle	168.53	18.35	23.74	30.55	1,520.12	1,761.29
Pink trumpet tree	275.34	18.70	62.04	89.18	1,566.04	2,011.30
Holly oak	635.79	76.98	- 561.74	226.92	2,661.76	3,039.72
Southern magnolia	248.44	20.54	- 20.96	91.38	1,030.74	1,370.14
Southern live oak	316.91	36.87	- 267.05	96.12	1,693.39	1,876.24
Camphor tree	111.30	11.57	52.47	48.94	355.07	579.34
California sycamore	111.65	14.29	42.81	32.15	649.01	849.91
Coastal live oak	30.14	3.53	- 25.66	8.94	211.35	228.31
Mexican fan palm	10.12	0.65	1.89	2.15	39.66	54.47
California fan palm	6.64	0.32	2.12	1.47	13.27	23.82
Citywide total	**1,914.87**	**201.79**	**- 690.34**	**627.80**	**9,740.41**	**11,794.54**

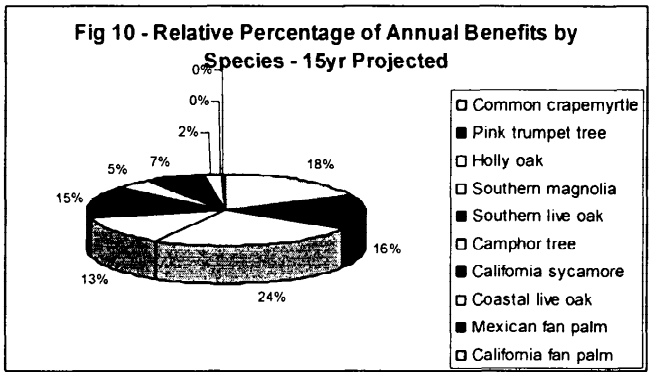
Table 6

Average Annual Benefits of Public Trees by Species - 15yr projected

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total ($)
Common crapemyrtle	384.19	50.73	82.41	69.31	1,669.66	2,256.31
Pink trumpet tree	291.53	19.94	68.09	95.65	1,576.89	2,052.09
Holly oak	646.29	78.19	- 571.21	230.90	2,661.65	3,045.82
Southern magnolia	313.34	26.81	- 20.42	118.85	1,199.74	1,638.31
Southern live oak	316.91	36.87	- 267.05	96.12	1,693.39	1,876.24
Camphor tree	111.30	11.57	52.47	48.94	355.07	579.34
California sycamore	111.65	14.29	42.81	32.15	649.01	849.91
Coastal live oak	39.93	4.57	- 33.02	11.36	226.92	249.77
Mexican fan palm	10.12	0.65	1.89	2.15	39.66	54.47
California fan palm	6.64	0.32	2.12	1.47	13.27	23.82
Citywide total	**2,231.89**	**243.94**	**- 641.92**	**706.90**	**10,085.26**	**12,626.07**







Section 4 - Summary

The tables and figures in the above analysis demonstrate the benefits provided by each tree species as a whole, as they are represented in the overall proposed inventory. Table 7 and figure 11 below represent the performance of an individual tree as averaged through a combination of both inventories. They also include the three trees that were eliminated (all representative trees removed and replaced) by the proposed inventory. This helps to demonstrate the relative performance of each tree species in terms of net benefits. Where the analysis gives the benefits provided by all trees of the species, this summary provides information for how each trees of each species performs on average as in individual. This can be used to help determine if the current proposed inventory utilizes trees that provide the most return on investment in terms of environmental benefits.

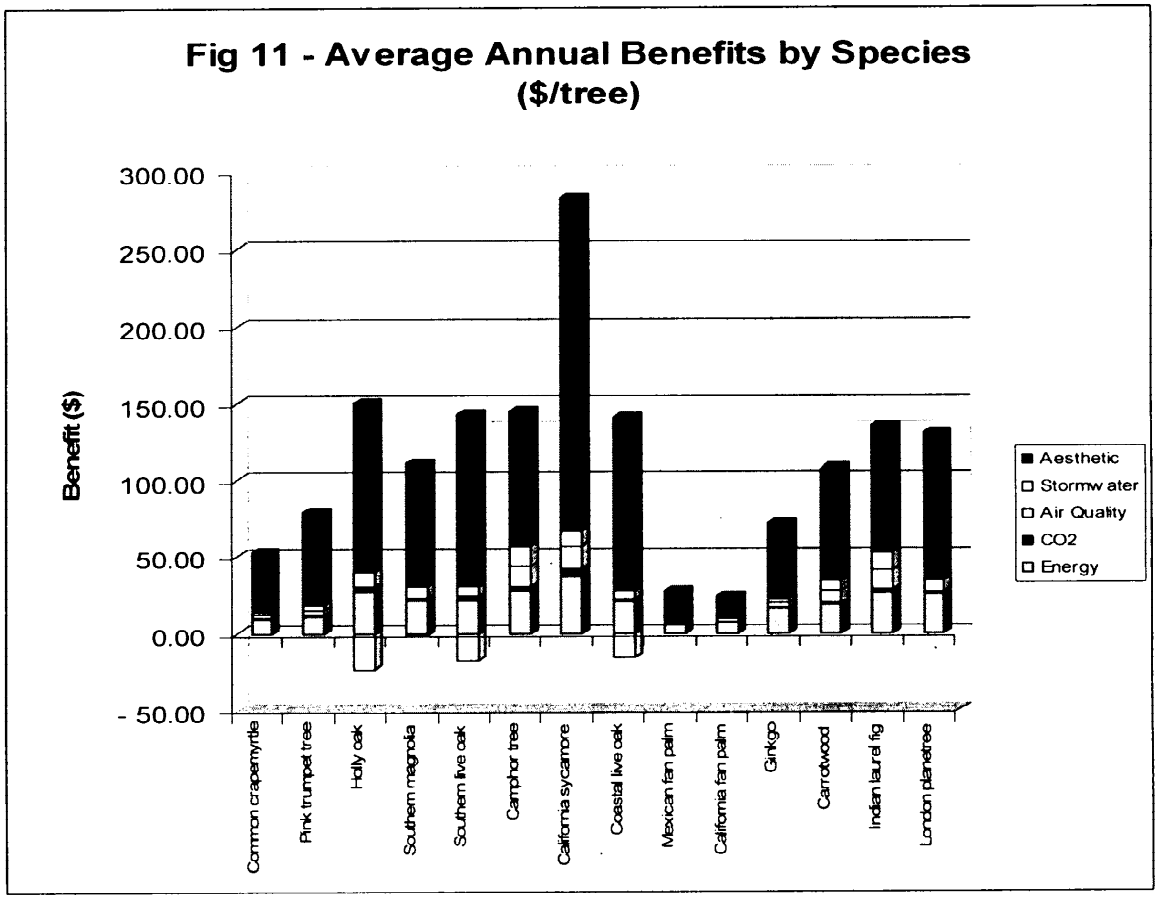
By far the most important contribution in terms of dollars of all tree species is their aesthetic value. However the importance of a trees environmental benefit must be recognized. Figure 12 graphically represents the same data as figure 11, however in order to better recognize the values of the trees on the environment, aesthetic value has been eliminated.

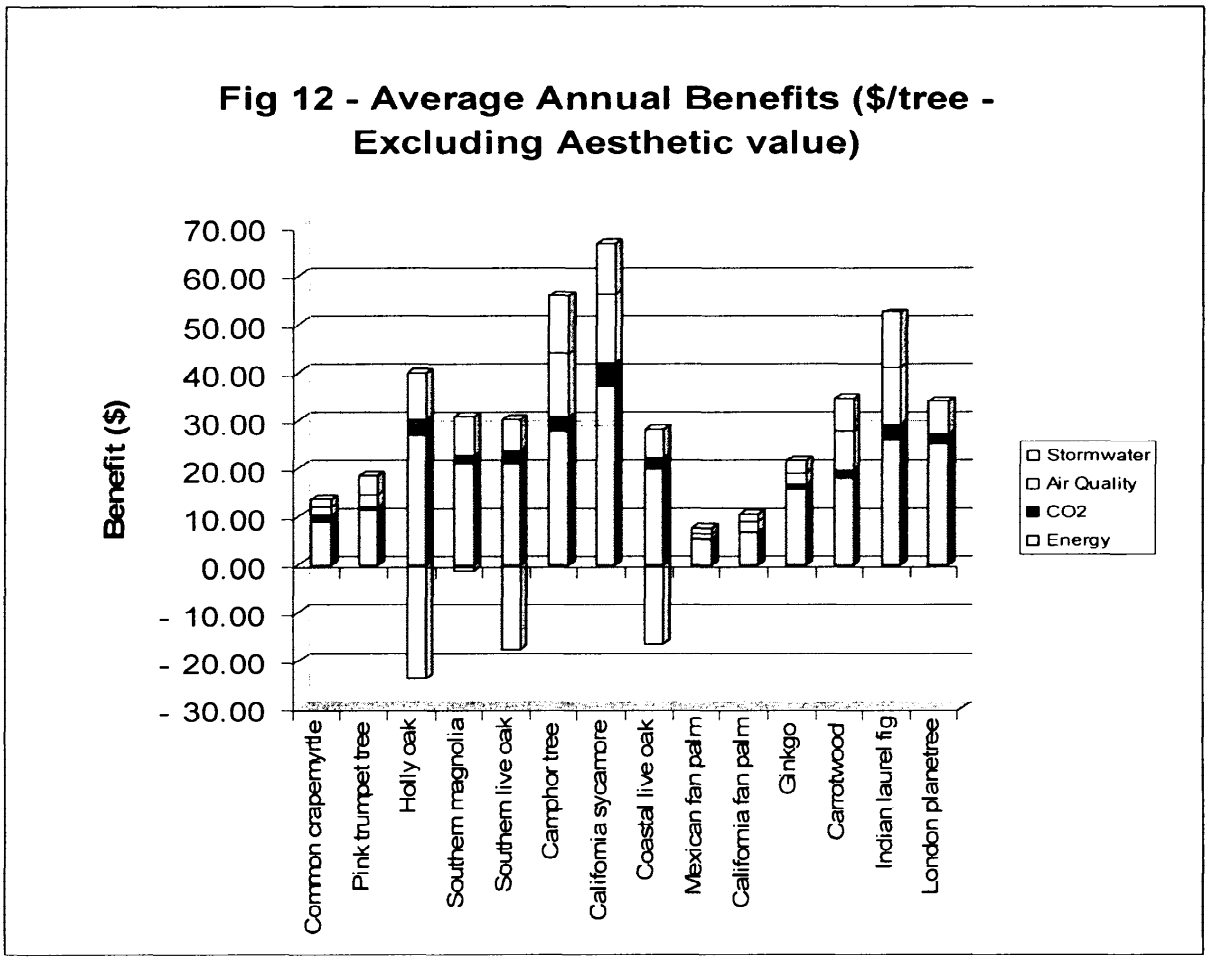
This STRATUM analysis quantifies the environmental benefits provided by the trees in the current and proposed inventories for the Pasadena Playhouse district. By summarizing these values by species, this analysis will help the urban forest managers and planners determine if the proposed inventories utilize the correct trees to gain the most return in environmental benefits.

Table 7

Average Annual Benefits of Public Trees by Species ($/tree)

Species	Energy	CO2	Air Quality	Stormwater	Aesthetic	Total
Common crapemyrtle	8.93	1.18	1.92	1.61	38.83	52.47
Pink trumpet tree	11.21	0.77	2.62	3.68	60.65	78.93
Holly oak	26.93	3.26	- 23.80	9.62	110.90	126.91
Southern magnolia	20.89	1.79	- 1.36	7.92	79.98	109.22
Southern live oak	21.13	2.46	- 17.80	6.41	112.89	125.08
Camphor tree	27.83	2.89	13.12	12.23	88.77	144.84
California sycamore	37.22	4.76	14.27	10.72	216.34	283.30
Coastal live oak	19.97	2.29	- 16.51	5.68	113.46	124.88
Mexican fan palm	5.06	0.32	0.95	1.08	19.83	27.24
California fan palm	6.64	0.32	2.12	1.47	13.27	23.82
Ginkgo	15.71	0.88	2.48	2.54	49.52	71.14
Carrotwood	18.04	1.40	8.31	6.71	72.82	107.27
Indian laurel fig	26.15	2.69	12.07	11.39	83.77	136.06
London planetree	25.00	2.12	- 0.08	6.82	97.11	130.97





Literature Cited

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Lesser, Lawrence M. "Street Tree Diversity and DBH in Southern California." Journal of Arboriculture 22(4), July 1996.

Maco Scott E, McPherson E. Gregory. "A Practical approach to assessing structure, function, and value of street tree populations in small communities." Journal of Arboriculture 29(2) March 2003.

Maco Scott E, McPherson E. Gregory, "City of Berkeley Municipal Tree Resource Analysis" March 2005 UFORE methods. http://www.itreetools.org/resource_learning_center/reports/ufore_methods.pdf

Jomsky, Mark

From: Zinn, Linda [Linda.Zinn@Sothebyshomes.com]
Sent: Monday, February 09, 2009 10:52 AM
To: Jomsky, Mark
Cc: Polly Wheaton
Subject: Pasadena Street Trees

Dear Council Members,

Please do not vote to destroy the beautiful mature trees on Colorado Blvd and Green Street. They create much needed shade and encourage foot traffic and walkers. The plan for alternating Palms with Ginkgo trees looks quite confused and does not help the City's aim of becoming more Green. Surely, the money could be better spent in these tough economic times.

I do not have each council person's e-mail address, and I am, therefore asking you to circulate this letter.

Thank you fro you thoughtful reconsideration of this issue.

Linda Zinn

02/09/2009
4.A.

Jomsky, Mark

From: Seager, Gretchen B [Gretchen.Seager@Sothebyshomes.com]
Sent: Monday, February 09, 2009 12:12 PM
To: Jomsky, Mark
Subject: Ficus Tree removal

I wanted to voice my opinion AGAINST about a plan that the City of Pasadena has to remove 38 trees in Pasadena. These are shade providing trees that not only help keep our city "green", but make our city beautiful. Green Street, in particular, is one of the most beautiful streets we have right now with its large Ficus trees creating a wonderful and scenic canopy over the road. I would imagine that the businesses along that route don't have to turn on their A/C as much in the summer months. Palm trees are not only ugly, but they provide no green relief at all.

Please don not remove these beautiful trees. It would be a HUGE mistake for Pasadena. Old Town is now planted with Ginko and palms, providing ZERO relief from the sun and summer heat. It has also made the hardscape and buildings appear even more harsh and barren.

I hope you will distribute this email to your entire membership and so NO to removing more of Pasadena's shade providing trees.

Sincerely,

Gretchen B. Seager

02/09/2009
4.A.

Jomsky, Mark

From: Danz, Nadine [Nadine.Danz@Sothebyshomes.com]
Sent: Monday, February 09, 2009 4:10 PM
To: Jomsky, Mark
Cc: Wheaton, Polly
Subject: Tree Removal

Please note that the proposal to remove live healthy trees is untimely, to say the least, with the current economic condition. The replacement choice of Ginkgo and Palms is neither practical nor remedial. Several years ago a Ginkgo in front of our office on Colorado died and was removed. It required more water to survive and the city was not maintaining these trees. The city also has not replaced that tree to this day. Trees provide shade and softening of the hard urban landscape as well as filter carbon dioxide. Part of Pasadena's desirability and appeal is the vast number of trees that fill our neighborhoods. This discussion to remove perfectly fine trees and replacing them (there is the concern that this will not be done in a timely manner) is an untimely and ill thought out proposal. Please distribute this letter to all parties involved. Thank you. Nadine Danz

02/09/2009
4.A.

Jomsky, Mark

From: Beck, Michael
Sent: Monday, February 09, 2009 5:30 PM
To: Jomsky, Mark
Subject: Fw: Additional RE: Ficus Tree Issue - Removal support

Importance: High

Mark,

Please see below.

...Michael

Michael J. Beck
City Manager
City of Pasadena
(626) 744-7927

----- Original Message -----
From: dale trader <dtrader_91104@yahoo.com>
To: Beck, Michael
Sent: Mon Feb 09 16:44:47 2009
Subject: Additional RE: Ficus Tree Issue - Removal support

Michael,

Just checking on Ficus Microcarpa Nitida, the tree species in question, it seems it is listed as an invasive species almost everywhere, including on the U.S. Department of Agriculture Website http://plants.usda.gov/java/profile?symbol=FIMI2 and on the list of prohibited street tree species in Newport Beach http://www.city.newport-beach.ca.us/Councilpolicies/G-1.PDF

I think the case is fairly clear.

Please submit this information to City Council and the Mayor.

Thanks and regards,
Dale

--- On Mon, 2/9/09, Beck, Michael <mbeck@cityofpasadena.net> wrote:

> From: Beck, Michael <mbeck@cityofpasadena.net>
> Subject: RE: Ficus Tree Issue - Removal support
> To: dtrader_91104@yahoo.com
> Date: Monday, February 9, 2009, 3:36 PM
>
> Dale,
>
> Thanks for your comments. Would you like me to forward your comments to the City Council so they can be included as part of the record?
>
> ...Michael

02/09/2009
4.A.

Michael J. Beck

City Manager

City of Pasadena

(626) 744-7927

From: dale trader [mailto:dtrader_91104@yahoo.com]
Sent: Monday, February 09, 2009 2:42 PM
To: Beck, Michael
Subject: Ficus Tree Issue - Removal support

Hi Michael,

Good to see you on Colorado recently. You were right outside my office which is on the 5th floor of the building on the NW corner of Lake and Colorado , 2 North Lake .

I just wanted to express the concern some of us, from the historic preservation and the business community, have about not removing the damaging, invasive Ficus trees from all of Pasadena 's streetscapes. The Ficus trees have been in Pasadena for only a short period of Pasadena 's history and are very damaging to Pasadena 's infrastructure. As many know, the Ficus root system is three times larger than what is seen above ground, which is an impressive consideration when we see what exists of the Ficus above ground.

Camphor trees, the trees of many of our historic neighborhoods, have similar issues with Pasadena's infrastructure, but most consider the Camphor a favored Pasadena street tree for almost 100 years, is aesthetically pleasing with its graceful branches, provides a beautiful all year green canopy and its leaves and wood contain the chemical Camphor which repels insects and its berries our beloved Parrots love. Camphor trees are one of the oldest living tree species on earth and are considered sacred in Taiwan and Japan , just to give two examples.

Ficus trees, on the other hand, are bushy and not considered by some as aesthetically pleasing and are a relative recent immigrant to the city of Pasadena . The removal of Ficus trees in the Playhouse District should be coordinated with the removal of the Ficus trees on Green Street and South Lake Avenue in order to minimize the amount of citizen complaints and solid arguments should be given to the public to explain why the Ficus trees are being removed and replaced with better choices for Pasadena's street scape.

Regards,

Dale Trader