ENGINEERING
ENVIRONMENTAL
ECOLOGICAL

November 20, 2013

Mr. Bert L. Bender, Architect
Bender & Associates Architects, P.A.
410 Angela Street
Key West, FL 33040

**Subject: Arborist Assessment of Trees**
**Former Glynn Archer Elementary School Site**
**1302 White Street, Key West, FL 33040**
**E Sciences Proposal Number 1-1702-01**

Dear Mr. Bender,

E Sciences, Incorporated (E Sciences) is pleased to provide the following assessment of trees and palms located at 1302 White St, Key West, FL 33040, the site of the former Glynn R. Archer Elementary School and future City Hall operations. The City and its architect, Bender and Associates Architects, P.A. (Bender & Associates), engaged E Sciences to design a new landscape for the site. The new design will incorporate a portion of the existing landscape material and require removal of some existing trees, including trees that are protected under Section 110 of the City's municipal code.

The purpose of this report is to document E Sciences' observations of the health and condition of the trees at the site, and to provide recommendations for preservation, transplantation and/or removal and replacement associated with the new design and in accordance with the City's municipal code. The use of this report for other purposes is prohibited.

**METHODOLOGY**

On October 10 and 11, 2013, an E Sciences International Society of Arboriculture (ISA) Certified Arborist conducted a ground-based visual assessment of the tree crown, trunk, above-ground roots, and site conditions around the trees to evaluate the structure and health of the trees. The assessment did not include the use of tools.

The assessment included the identification of conditions indicating the presence of health and/or structural deficiencies including, but not limited to: chlorosis; dead, diseased, broken branches, stems, and/or roots; weakly attached branches and co-dominant stems; crossing limbs; mechanical damage and cracks; abnormal growth such as swelling, ribs, flat areas, or seams; indications of decay and cankers; root plate lifting; abnormal trunk flare; lack of trunk flare; soil cracks; grade change; restricted or undermined roots; unusual tree architecture including lean, low live crown ratio, poor taper, and/or crown asymmetry.

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## RESULTS AND RECOMMENDATIONS

Following are the observations made at the site, and our recommendations. The tree numbers used below correspond to the tree numbers from the tree survey and disposition table dated July 19, 2013. When trees were identified at the site that were not included in the tree survey, a new tree identification number was generated by adding a letter to the number of a nearby tree.

### Tree 1: Royal Poinciana (*Delonix regia*)

***Observations:*** This tree is located in a highly trafficked location at the corner of White Street and Seminary Street. The tree crown structure is typical of the species, as are the surface roots present throughout the root zone. E Sciences observed some decay within old pruning cuts at some of the branch connections. These cuts range from four to eight inches long. Roots show signs of mechanical damage, likely due to mowing. The tree abuts the Seminary Street curb and is impacting the integrity of the curb and street. The curb is likely to be limiting the growth of roots on the south side of the tree. Grass does not grow well under royal poinciana trees and thus erosion has occurred at the base of the tree. This erosion and the lack of root structure to the south create a situation where the tree's stability is compromised. There is concrete in the base of the tree, which likely was used in an attempt to stabilize the area under the tree. The tree is cracking the road and growing over the curb (see photo right).

***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** While this species is visually appealing and iconic to Key West, this particular specimen is located too close to the sidewalk and street. This placement has resulted in potential destabilization of the tree due to lack of root structure to the south and the likelihood of continued damage to the street and curb. E Sciences recommends removing and replacing this tree in association with Sec. 110-327(a) of the City's municipal code.

### Trees 2 and 3: Queen Palm (*Syagrus romanzoffiana*)

***Observations:*** These two palm trees are located adjacent to the east side of the building. E Sciences observed slight pencil-necking (narrowing of the trunk) towards the base of the palms. Due to the proximity of the building, the crown of the palms are limited (see photo right). The palms also appear to lack overall vigor, potentially due to poor, alkaline soils typical of the area, lack of nutrients, or premature removal of older fronds.

***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** While this palm is not included in Section 110-254 of the City of Key West or Section 114-102 of the Monroe County Code, it is listed on the Florida Exotic Pest Plant Council (FLEPPC) List of Invasive Plant Species. These specimens are too close to the building to reach their full canopy potential. E Sciences recommends removing these palms and replacing with new, suitable trees.

### Tree 4: Alexander Palm (*Ptychosperma elegans*)

***Observations:*** This palm has a slight dogleg and pencil-necking in its trunk but appears generally healthy. No photo is included for this tree.

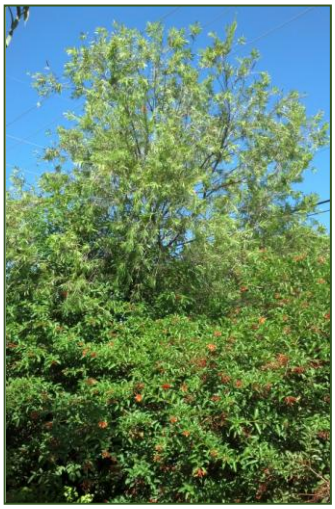
***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** E Sciences recommends removal and replacement.

### Tree 5: Weeping Bottlebrush Tree (*Callistemon viminalis*)

***Observations:*** This tree is almost completely engulfed by shrubs and thus is not growing to its canopy potential (see photo right). Very little of the canopy is exposed. The root structure of this tree is poor. The tree leans heavily and is being supported by one rope, which is girdling the tree (see photo left).



***Rating:*** Poor

***Disposition:*** Removal and replacement

***Recommendation:*** This tree is listed on the FLEPPC List of Invasive Plant Species and is in poor condition. E Sciences recommends removal and replacement.

### Tree 6: Weeping Bottlebrush Tree

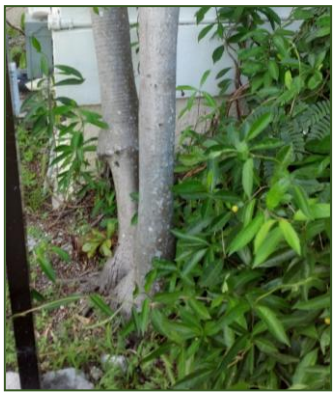
***Observations:*** Like Tree 5, this tree is engulfed by shrubs and thus most of the canopy is missing. This tree also has poor root structure due to large rocks in the soil and erosion caused by roosters living within the shrubs. This tree has a significant lean, has been over pruned, and has stub cuts. No photo is included for this tree.

***Rating:*** Poor

***Disposition:*** Removal and replacement

***Recommendation:*** This tree is listed on the FLEPPC List of Invasive Plant Species and is in poor condition. E Sciences recommends removal and replacement.

### Tree 7: Alexander Palm



***Observations:*** This double palm has slight pencil-necking at the base (see photo right), but is otherwise healthy.

***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** If this tree does not fit within the context of the new landscape design, E Sciences recommends removal and replacement.

### Tree 8: Queen Palm

***Observations:*** Similar to Trees 2 and 3 this palm is too close to the building and is pencil-necked low in the trunk. No photo is included for this tree.

***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** This palm is listed on the FLEPPC List of Invasive Plant Species. This palm is too close to the building to reach its full canopy potential. E Sciences recommends removal and replacement.

### Tree 9, 9a: Queen Palm

***Observations:*** Next to Tree 9 is another queen palm, which will be identified as Tree 9a. Both of these palms are stunted and chlorotic. They are too close to the building and have had too many fronds removed (see photo left).

***Rating:*** Poor

***Disposition:*** Removal and replacement

***Recommendation:*** This palm is listed on the FLEPPC List of Invasive Plant Species. These two palms are too close to the building and in poor condition. E Sciences recommends removal and replacement.

### Tree 10: Alexander Palm

***Observations:*** This tree has pencil-necking and some damage at the base of the trunk, as well as a dog-leg (see photo left).

***Rating:*** Fair

***Disposition:*** Removal and replacement

***Recommendation:*** E Sciences recommends removal and replacement.

### Tree 11: West Indian Mahogany (*Swietenia mahagoni*)

***Observations:*** This mature tree has two, upright co-dominant leaders low in the tree, and E Sciences observed included bark between the two leaders (see photo right), which reduces the tree's wind tolerance and increases the likelihood of failure. Within the canopy, E Sciences observed a number of dead leaders; some were attached and some were hanging. There are a number of stub cuts within the canopy. The tree has plenty of root space and good root structure. There has been some mechanical root damage.

***Rating:*** Fair

***Disposition:*** Preservation

***Recommendation:*** This mature tree appears to be in good health, but has some structural flaws. See photo left. E Sciences recommends pruning the tree to remove dead wood and hangers from the canopy, correct stub cuts, and to take some weight off of the tree to remove some pressure from the connection between the tree's co-dominant leaders. The root zone should be protected with mulch or another cover to prevent erosion and discourage use of mechanical equipment within the root zone. E Sciences also recommends monitoring the tree annually for structure.

### Trees 12 and 13: Cabbage Palm (*Sabal palmetto*)

***Observations:*** Only one tree is located at the corner of White Street and United Street as opposed to the two shown on the tree survey. The remaining tree is a cabbage palm in good condition. Palm fronds are close to the overhead utility line that runs along the south side of United Street but should not interfere with the lines (see photo right).

***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends preservation.

### Tree 14: Seagrape (*Coccoloba uvifera*)

***Observations:*** This tree is placed very close to the building and a concrete pad, both of which will limit the tree's growth (see photo right). E Sciences observed that the tree is leaning away from the school. Only one third of the canopy remains; it appears that major leaders were removed or damaged. There are old wounds and stub cuts present.

***Rating:*** Poor

***Disposition:*** Removal and replacement

***Recommendation:*** E Sciences recommends removal in accordance with Sec. 110-327(a) of the City's municipal code. The tree is in poor condition and close to the building.

### Tree 14a: Florida Thatch Palm (*Thrinax radiata*)

***Observations:*** This tree is very close to the building but appears healthy and structurally sound (see photo left).

***Rating:*** Good

***Disposition:*** Not included in tree survey

***Recommendation:*** E Sciences recommends preservation or relocation.

### Tree 15, 16, 16a-d: Alexander Palm

***Observations:*** Two of these palms are listed on the tree survey; however, there are six total within this courtyard. E Sciences did not observe any obvious signs of health or structural deficiency with the exception of one double-stemmed palm that is growing through the fence (see photo right). Only palms that are eight feet tall are protected per Sec. 110-321(a)( 2).

***Rating:*** Good, poor

***Disposition:*** Two proposed for removal; four not included in survey.

***Recommendation:*** E Sciences recommends removal of palms in good condition only if needed due to conflict with new landscape elements.

### Tree 17: Gumbo Limbo (*Bursera simaruba*)

***Observations:*** This tree appears to be in good health and has good structure for a tree of this species (see photo right). E Sciences observed some dead branches, attached and hanging, and some crossing limbs. There is also a small structure attached to the tree with a rope that will soon be girdling the tree.

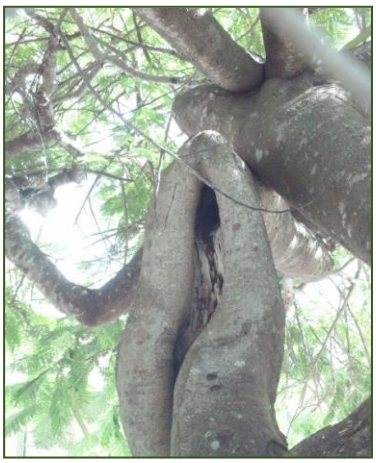
***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** While this tree is in relatively good condition, E Sciences recommends removing and replacing this tree due to conflict with new landscape elements

### Tree 18 Royal Poinciana

***Observations:*** This tree has major structural flaws, including crossing leaders and bark and major decay throughout the center of the trunk (see photos to the right and left).



***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal of this tree in accordance with Sec. 110-327(a) of the City's municipal code. If the City desires to keep this tree due to the canopy it provides, E Sciences recommends structural pruning for correctable defects and frequent monitoring. E Sciences also recommends consultation with an arborist experienced with bracing and propping.

### Tree 19: Gumbo Limbo

***Observations:*** This tree is growing too close to the fence and sidewalk and is damaging both. There is an approximate three-inch lift in sidewalk that would be difficult to correct without significant damage to the tree. The tree is growing into the fence. The canopy is small relative to the size of the tree. E Sciences observed crossing limbs within the crown.

***Rating:*** Poor

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal of this tree.

### Trees 20 through 26: Cabbage Palm

***Observations:*** These seven cabbage palms appear to be in good health and condition. However, they are all growing close to the utility line along United Street.

***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends preserving palms that do not conflict with the proposed design: 25 and 26. E Sciences recommends monitoring the remaining palms for utility conflict and removing parasitic trees such as strangler fig (*Ficus aurea*).

### Tree 27: Queensland Umbrella (*Schefflera actinophylla*)

***Observations:*** This tree is in poor condition and is conflicting with the building (see photo right). There have been major cuts or breaks in this tree, resulting in large wounds and reduced canopy.

***Rating:*** Poor

***Disposition:*** Removal

***Recommendation:*** E Sciences recommends removing this tree, which is not a protected species per Sec. 110-254 of the City's code and is listed on the FLEPPC list of invasive species.

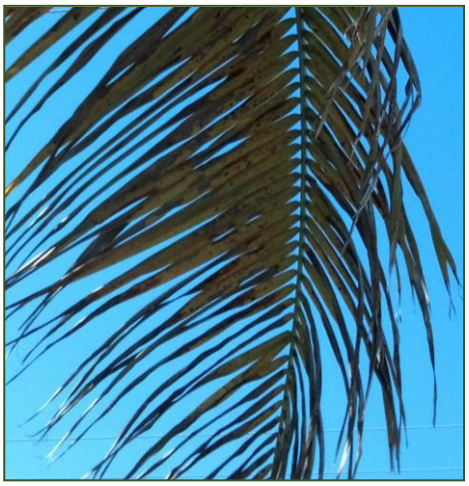
### Trees 28 through 36: Cabbage Palm

***Observations:*** These nine cabbage palms appear to be in good health and condition. However, they are all growing close to the utility line along United Street. No photo is included for these trees.

***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends preserving these palm with the exception of Tree 31, which conflicts with the proposed design. E Sciences recommends monitoring the palms for utility conflict and removing parasitic trees such as strangler fig.



### Trees 37 through 39: Coconut Palm (*Cocos nucifera*)

***Observations:*** E Sciences observed fronds that were yellowing, with browning tips and brown spots (see photos left and below). E Sciences also observed cracks in the trunks of these palms.

***Rating:*** Fair

***Disposition:*** Relocation

***Recommendation:***

E Sciences recommends removal of these palms and replacement.

### Trees 40 through 44 (including 42a): Cabbage Palm

***Observations*:** There are six cabbage palms along the north side of the property (south side of United Street) west of the coconut palms. Like the other palms along United Street, these palms are close to the utility lines running along the south side of United Street. The line is currently one or two feet above the palms, with the center of the palms being located two to three feet from the line. These palms are all in good condition. One of the palms has a slight lean (see photo above).

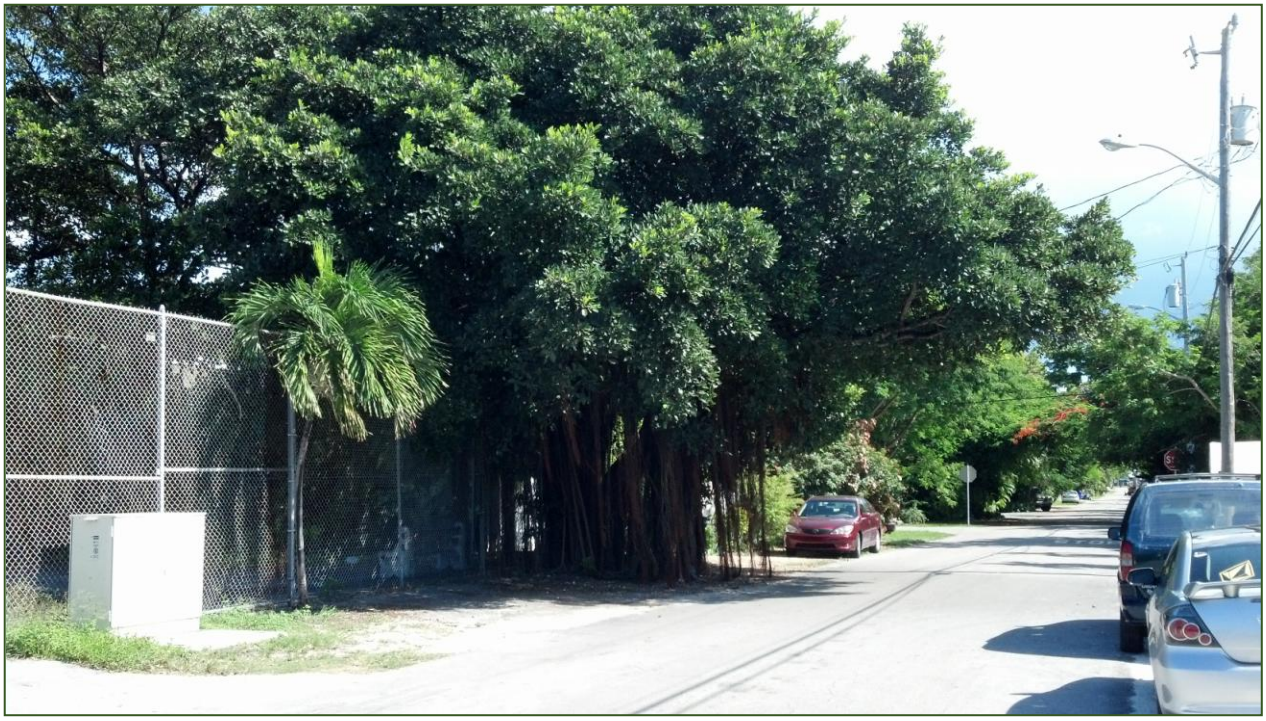
***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends preserving Trees 40 through 42, which do not conflict with the proposed landscape design. The rest should be removed and replaced.

### Tree 45: Strangler Fig

**Observations:** This tree provides shade for Grinnell Street and visual interest from a number of angles (see photo below). The tree's structure is typical for this species. The tree is growing into the fence on the west side of the property. This is likely to result in damage to the fence.



**Rating:** Fair

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends monitoring the health and conditions of this tree every few years. The tree should be maintained for clearance along Grinnell Street.

### Tree 46: Royal Poinciana

***Observations:*** This tree conflicts with a utility pole, overhead utilities, and the Seminary Street curb and sidewalk (see photo right). Overall, the tree appears healthy and its structure is typical of a mature specimen of this species. E Sciences observed numerous crossing limbs and some dead leaders within the crown. Branch connections in some locations are compromised due to decay observed associated with previous pruning cuts. Some larger limbs appear to be sprouts from prior damage; these large sprouts are likely to be more

weakly attached than other limbs and are located over a target (sidewalk). Cement has been inserted into gaps in the base of the tree. Root structure was observed to be poor.

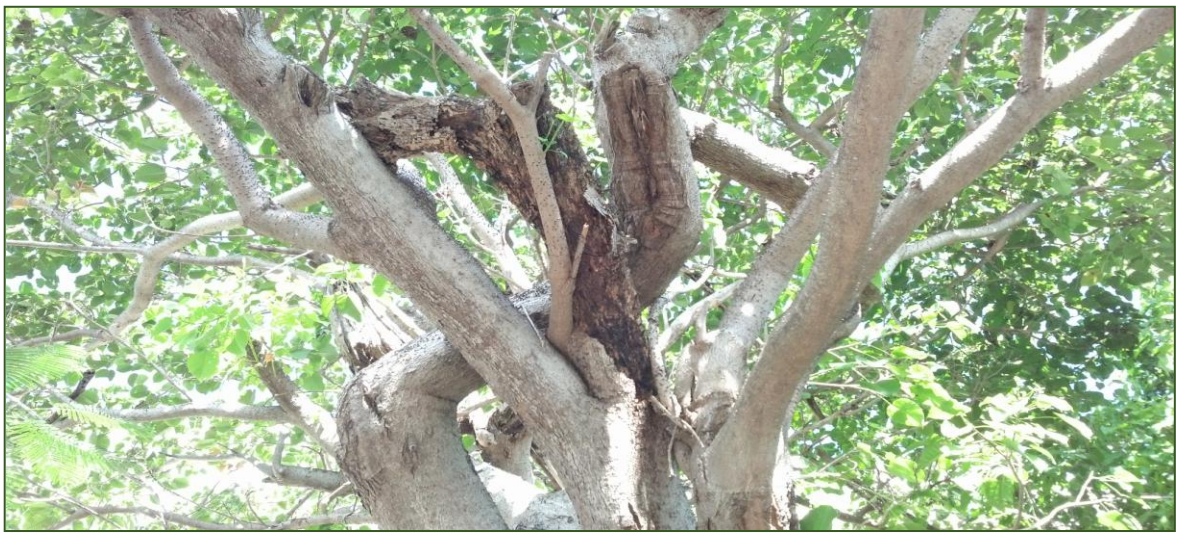
***Rating:*** Fair

***Disposition:*** Removal

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's municipal code.

### Tree 47: Sandbox Tree (*Hura crepitans*)

***Observations:*** This tree conflicts with the utility lines along Seminary Street and has structural flaws and signs of diminished health and condition. The tree is being impacted at the base by concrete. E Sciences observed numerous hanging and fallen limbs, with a number of dead or decaying limbs likely to fall in the near future. The tree has a substantial lean and decay within old wounds (see photo below).



***Rating:*** Poor

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's municipal code and replacement. If the City desires preservation, E Sciences recommends structural pruning and crown cleaning. E Sciences also recommends monitoring the condition of this tree annually or biannually.

### Tree 48: Sandbox Tree

***Observations:*** This tree conflicts with the utility lines along Seminary Street and has structural flaws and signs of diminished health and condition. E Sciences observed numerous hanging and fallen limbs, with a number of dead or decaying limbs likely to fall in the near future. There are also stub cuts and crossing

leaders with included bark in the crown (see photo below). A fungus was observed growing on one of the larger limbs; this is often a sign if decay within the wood.

***Rating:*** Poor

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's code and replacement. If the City desires preservation, E Sciences recommends structural pruning and crown cleaning. E Sciences also recommends monitoring the condition of this tree annually or biannually.

### Tree 49: Sandbox Tree

***Observations:*** This tree conflicts with the utility lines along Seminary Street and has structural flaws and signs of diminished health and condition. The tree has co-dominant leaders, with included bark and excessive growth at the attachment. E Sciences observed stress cracks along some of the larger limbs and die-back towards the tips of some of the leaders hanging over the street. There is an old wound on the trunk, which is cracked to the base of the tree (see photo right).

***Rating:*** Poor

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal

of this tree per Sec. 110-327(a) of the City's municipal code and replacement. If the City desires preservation, E Sciences recommends structural pruning and crown cleaning. E Sciences also recommends monitoring the condition of this tree annually or biannually.

### Tree 50: Sandbox Tree

***Observations:*** This tree is abutting the sidewalk along Seminary Street and is growing over the cement and interfering with the fence behind it (see photo left) which is damaging the sidewalk and the tree. Overall, the crown structure of this tree is poor, with included bark at attachments, crossing and/or pressing leaders (see photo below) and decay visible at the locations of old pruning cuts or breaks. Fungus was observed, which is an indication of decay.

***Rating:*** Poor

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's municipal code and replacement. If the City desires preservation, E Sciences recommends structural pruning and crown cleaning. E Sciences also recommends monitoring the condition of this tree annually or biannually.

### Tree 51: Number not used in tree survey

### Tree 52: Jamaican Dogwood (*Piscidia piscipula*)

***Observations:*** This tree has co-dominant leaders (photo left). There are crossing limbs, dead limbs and decay is present in old wounds. E Sciences observed included bark at one of the branch connections.

***Rating:*** Poor

***Disposition:*** Removal

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's municipal code and replacement.

### Tree 53: Jamaican Dogwood

***Observations:*** This tree is leaning and has poor root structure. There are crossing leaders, dead limbs and decay is present in old wounds (see photo right).

***Rating:*** Poor

***Disposition:*** Removal

***Recommendation:*** E Sciences recommends removal of this tree per Sec. 110-327(a) of the City's municipal code and replacement.

### Tree 54: Alexander Palm

***Observations:*** This four-stemmed palm was observed to be chlorotic (see photo left).

***Rating:*** Fair

***Disposition:*** Removal

***Recommendation:*** If this palm does not fit within the context of the new landscape design, E Sciences recommends removal and replacement.

### Tree 55: Alexander Palm

***Observations:*** This two-stemmed palm is in good health and condition. No photo is included for this tree.

***Rating:*** Good

***Disposition:*** Removal

***Recommendation:*** If this palm does not fit within the context of the new landscape design, E Sciences recommends removal and replacement.

### Tree 56: Silver Buttonwood (*Conocarpus erectus var. sericeus*)

***Observations:*** This tree is planted in poor soil, but appears to be in good health. The form is typical of this species (see photo right).

***Rating:*** Good

***Disposition:*** Removal

***Recommendation:*** If this tree does not fit within the context of the new landscape design, E Sciences recommends removal and replacement.

### Tree 57: Tree of Life (*Guaiacum officinale*)

***Observations:*** This tree is planted in poor soil, but appears to be in good health. The form is typical of this species (see photo left).

***Rating:*** Good

***Disposition:*** Preservation

***Recommendation:*** E Sciences recommends preservation.

### Tree 58: Tree of Life

***Observations:*** This tree is planted in poor soil and leans heavily. E Sciences observed some decay and sprouts at the site of previous pruning cuts, which include stub cuts. Because the tree is small, defects are unlikely to pose a risk (see photo right).

***Rating:*** Fair

***Disposition:*** *Preservation*

***Recommendation:*** E Sciences recommends preservation.

### Tree 59: No tree in this location

### Courtyard Trees

There are trees located within a courtyard surrounded on four sides by buildings (see photo right). These trees include fourteen Alexander palms, one coconut palm, and one umbrella tree. Because the courtyard is surrounded by buildings on all four sides (with one small opening), these trees should be exempt from permitting per Sec. 110-322(b).

**SUMMARY OF RECOMMENDATIONS**

Following is a summary table that includes the tree number, species, disposition, and E Sciences' recommendations.

| Tree Number | Species | Disposition | Recommendation |
|---|---|---|---|
| 1 | Delonix regia | Remove | Remove |
| 2 | Syagrus romanzoffiana | Remove | Remove |
| 3 | Syagrus romanzoffiana | Remove | Remove |
| 4 | Ptychosperma elegans | Remove | Remove |
| 5 | Callistemon viminalis | Remove | Remove |
| 6 | Callistemon viminalis | Remove | Remove |
| 7 | Ptychosperma elegans | Remove | Remove |
| 8 | Syagrus romanzoffiana | Remove | Remove |
| 9 | Syagrus romanzoffiana | Remove | Remove |
| 10 | Ptychosperma elegans | Remove | Remove |
| 11 | Swietenia mahagoni | Remain | Preserve |
| 12 | Sabal palmetto | Remain | Preserve |
| 13 | no tree | NA | NA |
| 14 | Coccoloba uvifera | Remove | Remove |
| 14a* | Thrinax radiata | NA | Preserve or relocate |
| 15 | Ptychosperma elegans | Remove | Remove |
| 16 | Ptychosperma elegans | Remove | Remove |
| 16a* | Ptychosperma elegans | NA | Remove |
| 16b* | Ptychosperma elegans | NA | Remove |
| 16c* | Ptychosperma elegans | NA | Remove |
| 16d* | Ptychosperma elegans | NA | Remove |
| 17 | Bursera simaruba | Remain | Remove |
| 18 | Delonix regia | Remain | Remove |
| 19 | Bursera simaruba | Remain | Remove |
| 20 | Sabal palmetto | Remain | Remove |
| 21 | Sabal palmetto | Remain | Remove |
| 22 | Sabal palmetto | Remain | Remove |
| 23 | Sabal palmetto | Remain | Remove |
| 24 | Sabal palmetto | Remain | Remove |
| 25 | Sabal palmetto | Remain | Preserve |
| 26 | Sabal palmetto | Remain | Preserve |
| 27 | Schefflera actinophylla | Remove | Remove |
| 28 | Sabal palmetto | Remain | Preserve |
| 29 | Sabal palmetto | Remain | Preserve |

| Tree Number | Species | Disposition | Recommendation |
|---|---|---|---|
| 30 | Sabal palmetto | Remain | Preserve |
| 31 | Sabal palmetto | Remain | Remove |
| 32 | Sabal palmetto | Remain | Preserve |
| 33 | Sabal palmetto | Remain | Preserve |
| 34 | Sabal palmetto | Remain | Preserve |
| 35 | Sabal palmetto | Remain | Preserve |
| 36 | Sabal palmetto | Remain | Preserve |
| 37 | Cocos nucifera | Relocate | Remove |
| 38 | Cocos nucifera | Relocate | Remove |
| 39 | Cocos nucifera | Relocate | Remove |
| 40 | Sabal palmetto | Remain | Preserve |
| 41 | Sabal palmetto | Remain | Preserve |
| 42 | Sabal palmetto | Remain | Remove |
| 42a* | Sabal palmetto | Remain | Remove |
| 43 | Sabal palmetto | Remain | Remove |
| 44 | Sabal palmetto | Remain | Remove |
| 45 | Ficus aurea | Remain | Preserve |
| 46 | Delonix regia | Remove | Remove |
| 47 | Hura crepitans | Remain | Remove |
| 48 | Hura crepitans | Remain | Remove |
| 49 | Hura crepitans | Remain | Remove |
| 50 | Hura crepitans | Remain | Remove |
| 51 | number not used | NA | NA |
| 52 | Piscidia piscipula | Remove | Remove |
| 53 | Piscidia piscipula | Remove | Remove |
| 54 | Ptychosperma elegans | Remove | Remove |
| 55 | Ptychosperma elegans | Remove | Remove |
| 56 | Conocarpus erectus var. sericeus | Remove | Remove |
| 57 | Guaiacum officinale | Remain | Preserve |
| 58 | Guaiacum officinale | Remain | Preserve |
| 59 | no tree | NA | NA |

*was not included in original tree survey