



**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.

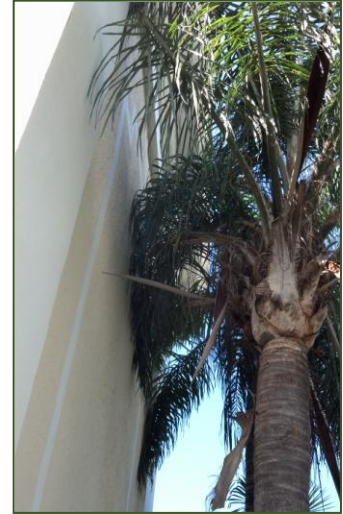
Trees 2 and 3: Queen Palm (*Syagrus romanzoffiana*)

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*)

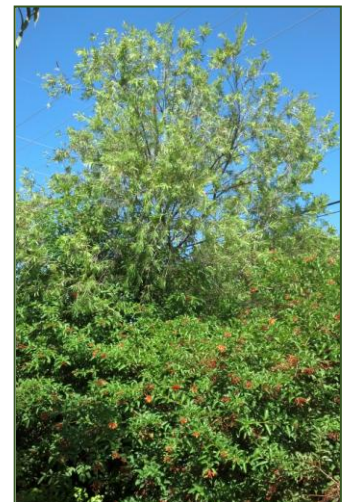


Observations: This tree is almost completely engulfed by shrubs and thus is not growing to its canopy potential (see photo right). Very little of the canopy is exposed. The root structure of this tree is poor. The tree leans heavily and is being supported by one rope, which is girdling the tree (see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

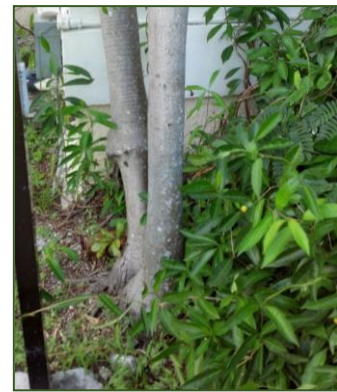
Tree 7: Alexander Palm

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*)

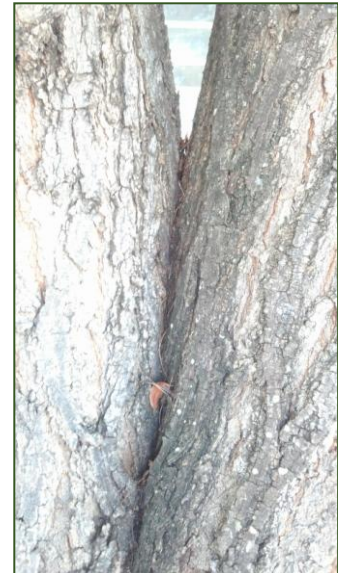
Observations: This mature tree has two, upright co-dominant leaders low in the tree, and E Sciences observed included bark between the two leaders (see photo right), which reduces the tree's wind tolerance and increases the likelihood of failure. Within the canopy, E Sciences observed a number of dead 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.



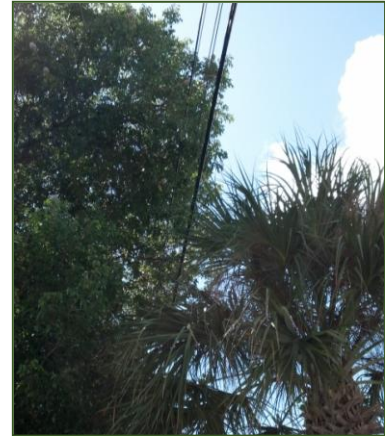
Trees 12 and 13: Cabbage Palm (*Sabal palmetto*)

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).



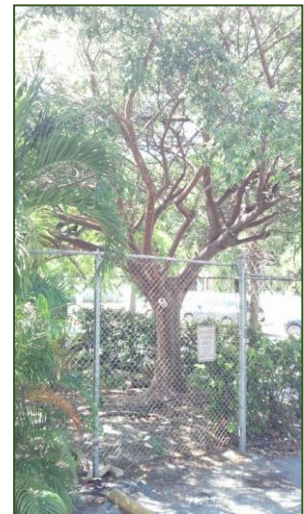
Rating: Good, poor

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

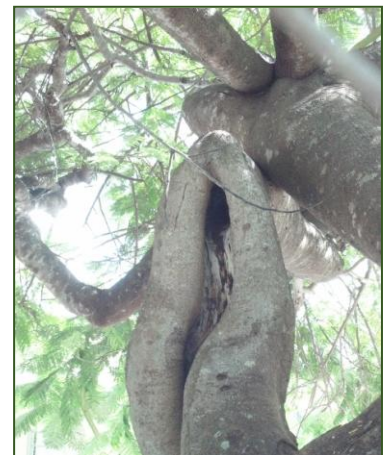


Tree 18 Royal Poinciana

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 of 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

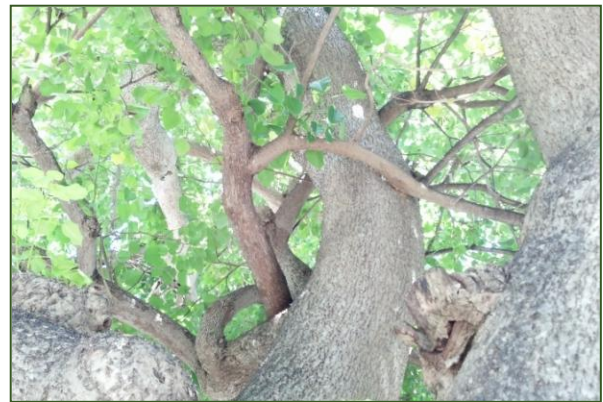
Observations: This tree is abutting the sidewalk along Seminary Street and is growing over the cement and interfering with the fence behind it (see photo left) which is damaging the sidewalk and the tree. Overall, the crown structure of this tree is poor, with included bark at attachments, crossing and/or 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