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Member, American Society of Consulting Arborists

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February 8, 2010

### **ASSIGNMENT:**

I received a call from Andrew Davidson, City of Sausalito, Staff Engineer, and Manager of a project for an ADA access path to Vina Del Mar Park in the business district of Sausalito. The proposed pathway in the park would pass within the root zone of trees in the park and questions on the impact to the trees are considered as a component of the project. A comprehensive December 1996 Arboriculture Report commissioned by The City of Sausalito when the park opened to the public, included all trees within the park. As the years have passed, an update for specific trees affected by the ADA pathway is necessary.

I agreed to provide arboricultural information based on Andrew Davidson's proposal for the project. They are stated in his request and are as follows:

- Review of applicable sections of the 1996 Kenneth Allen Arboriculture Report.
- Provide recommendations for construction to reduce impact on the affected trees within the area of the pathway.
- Prepare a report summarizing findings and recommendations for the proposed project.

The report format will include the required topics as sections and identify specific trees impacted by the proposed pathway. This report will describe two pathway proposals and provide arboricultural information for a decision that will proceed with the project.

### **ASSUMPTIONS and LIMITATIONS:**

All observations were made from the ground for each tree. The report focused on the impact to roots of affected trees. Aerial equipment was not available to inspect the Palm crowns. It is recommended that upper crown inspection be performed during scheduled pruning when aerial equipment is available for pruning the trees. Testing of tree trunks did not include invasive drilling or outer bark removal. Trunk decay was limited to visual inspection. Root decay was not suspected when probing root areas of the pathway. Soil probing was used to determine the location of primary tree roots

### **OBSERVATIONS and DISCUSSIONS:**

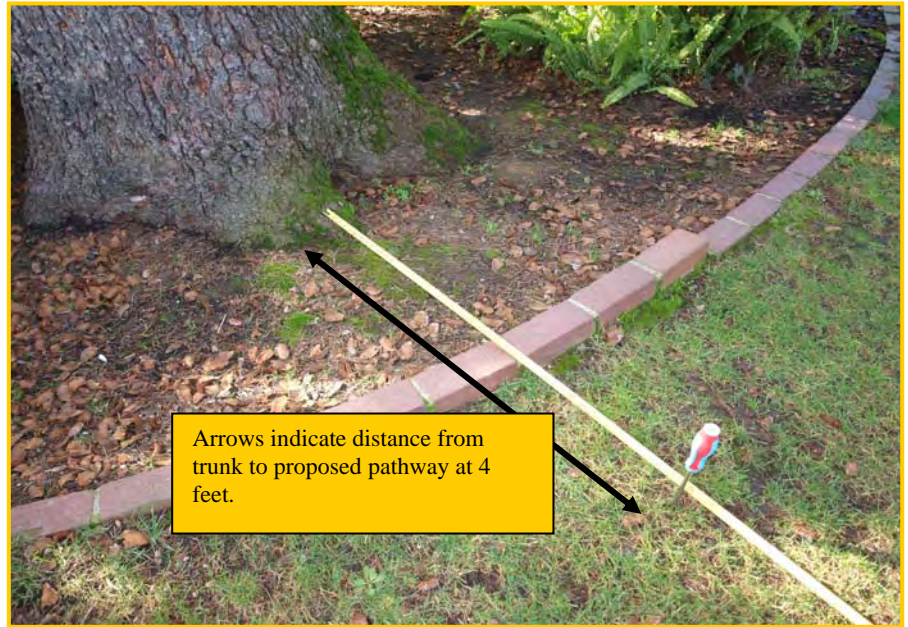
A meeting with Andrew Davidson took place on January 25, 2010, at 10:00AM. At this meeting, he presented an information packet to assist with preparation of the arborist report. The meeting specifics of the project were discussed and clarified. I then made a site visit to the location, Vina Del Mar Park, to collect information for the report. Based on the meeting with Mr. Davidson, and the subsequent site visit, three trees are within very close proximity to both of the proposed pathway locations. Two additional site visits were necessary to collect information before preparing this report. The trees within close proximity to the proposed pathway locations are as follows:

#### ***Cedrus deodara*, Deodar Cedar**

The tree is located just inside the park where Bridgeway and El Portal streets meet. This is the southeast corner of the park. The Circumference at Breast Height (CBH) measured with a circumference /diameter tape measured and equaled 10.4 feet.

The tree is approximately 65 feet in height. The Sausalito Tree Ordinance defines this tree as a “Heritage Tree” because of the trunk circumference, and in addition is a “Protected Tree” because it has heritage status, and is located on City property.

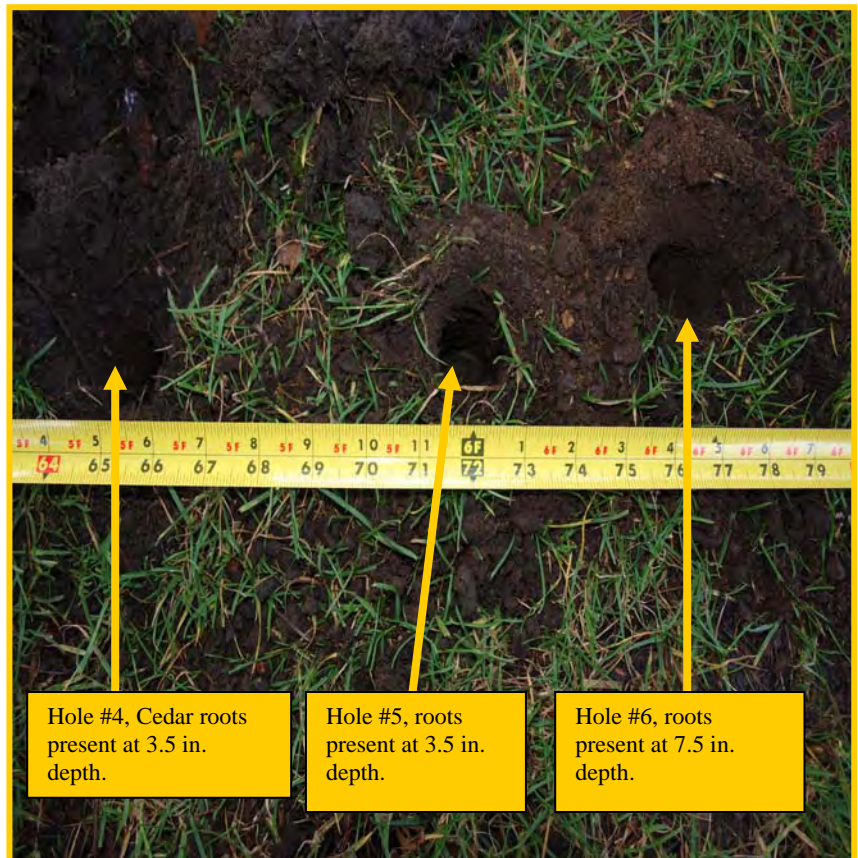
One proposal is for the pathway to pass within ten feet to the south of the Cedar trunk. This is in the same location as an ADA accessible ramp for access to the Vina Del Mar Park Plaza. In the second proposal, the pathway for access to the park and fountain would pass within four feet to the north of the Cedar trunk. These two proposed pathways for access to the park and fountain will pass within ten feet of the trunk on either side of the tree. A choice for the pathway location is required for the project to proceed. The root zone, within ten feet of the trunk, is considered a critical area because it is where buttress roots are closest to the soil surface. The impact is considered an alteration by the Sausalito Tree Ordinance and requires identifying what the best methods are to accomplish the project and reduce a negative impact to the health of the tree.



In one of the proposed ADA pathways, the pathway would pass to the north of the Cedar tree beginning at an existing opening and gap in the privet hedge on the El Portal side of the park. To determine the impact to the Cedar’s root system in this area a series of 14-2 inch boreholes were drilled to locate buttress roots beneath the soil surface closest to the trunk. The boreholes extended from the end of an existing brick threshold to a length of 70 inches in a straight-line direction towards the fountain.

The first group of three boreholes was made to a depth of 7, 8, and 10 inches spaced at one-foot intervals. The test holes did not produce any cedar roots.

The next group of three boreholes was made and produced the following results. Hole #4 drilled to a depth of 3.5 inches revealed cedar tree roots. At hole #5 roots were found at 3.5 inches and at hole #6, roots were found at 7.5 inches, (see photograph to the right.)



In each of the proposals, the ADA ramp access to the Plaza is located in the same place. The ramp would be just outside of the drip line of the Cedar tree further reducing impact on the Cedar tree's roots.

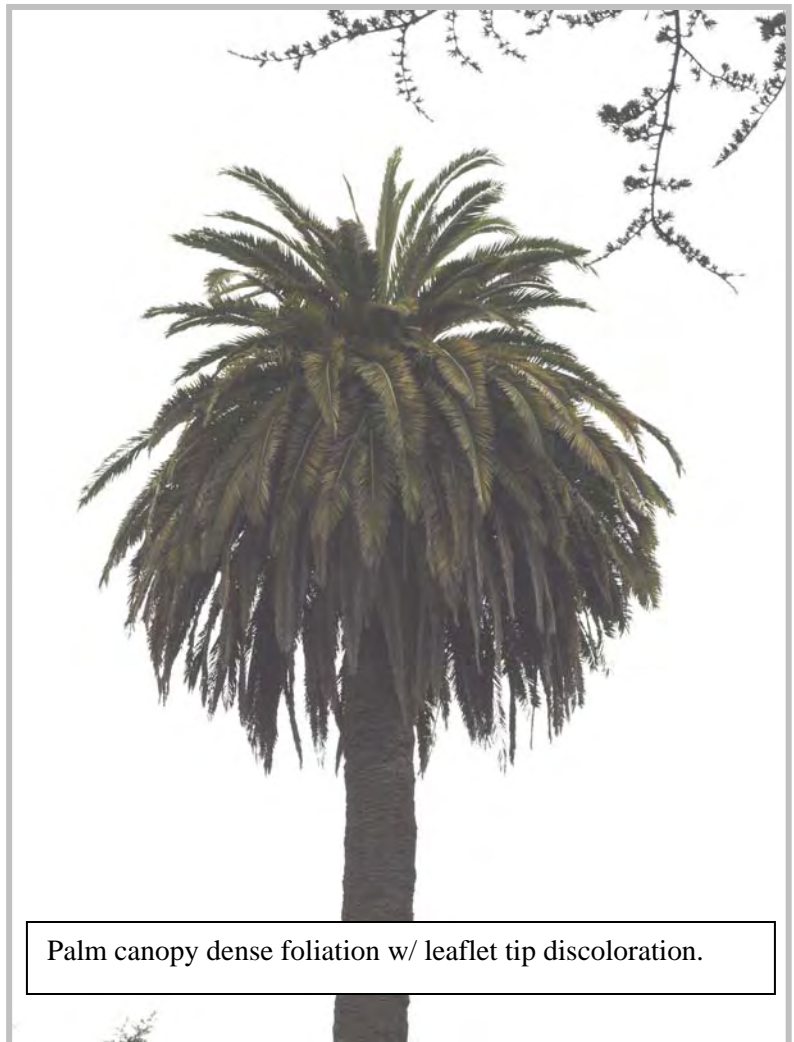
In the second proposal, illustrated by a plan drawing prepared by Architerra MaCrae Architects, pathway access to the fountain would follow along side the ramp to Vina Del Mar Plaza. It is here that the pathway would be on the south side of the Cedar tree between Bridgeway and the tree. The pathway would follow the plaza ramp at its beginning and turn toward the fountain just beyond a brick landscape border that separates the park lawn from the Cedar tree. At the closest point where the pathway would pass by the Cedar trunk, eleven boreholes were drilled to determine if buttress roots were growing within the area of the pathway. The boreholes were spaced at one-foot intervals and in a straight line. They were drilled to a depth of 8 inches where the proposed pathway would be placed. At this depth one of the Cedar's buttress roots were encountered in the eleven borehole locations. Though the boreholes cannot be a definite indicator of buttress roots being present throughout the test path it is a good indicator for-root location. Buttress roots at the trunk attachment point on this side of the tree were fewer in number than on the north side of the trunk. This indicates fewer buttress roots will be encountered on the south side of the Cedar tree.

***Phoenix canariensis*, Canary Island Date Palm #1**

This Palm is located at the south side of the park between the fountain and Vina Del Mar Plaza immediately to the right of the plaza entrance to the park. The Circumference at Breast Height (CBH) measured 9.3 feet. The Palm has a CBH of nine times the size of a Heritage Tree description. Height measurement was made with a Brunton Clino Master and measured 65.6 feet. The Phoenix Palm is defined as a "Heritage Tree" and "Protected Tree" when applying CBH to the Sausalito Tree Ordinance description of these terms. **Ordinance NO. 1114, paragraph 11.12.020 DEFINITIONS.** In addition, the Palm trees in this park are symbolic of Vina Del Mar Park and its features. They have historic value in addition to their appraised value and every effort to protect them must be made.

***Phoenix canariensis*, Canary Island Date Palm #2**

The tree is located to the north behind the park fountain and Tracy Way. The tree is 5 feet from the lowest pool of the fountain rim and directly against the concrete pathway. CBH measured at 9.3 feet and height is 65.6 feet. Based on the trunk's CBH, and height, this is a mature Canary Island Date Palm tree and similar to the other Canary Island Date Palm. The trunk base and root mass appeared in good condition. Old puncture wounds along the vertical length of the



Palm canopy dense foliage w/ leaflet tip discoloration.

trunk appeared to be from unauthorized climbing equipment used to ascend the tree. The canopy has a normal amount of foliage. Palm literature indicates Phoenix canariensis canopy cover on average have fifty fronds and visual inspection indicated a full canopy. Canopy cover is an indicator of a plant's vigor.

A slight discoloration on leaflet tips was noticed that could be related to a nutrient deficiency or salt spray damage. The Palm tree is near the bay and salt-water wind spray from the bay can accumulate on leaflet tips to cause this discoloration. Nutrient deficiency can be corrected with specifically formulated Palm fertilizers. Salt spray from the bay's waters generated by winds is uncontrolled because it is a climatic condition. Shredded frond tips is very likely wind damage and not critical to the tree health. Soil testing for nutrient deficiency specifically, magnesium and potassium would determine if a nutrient deficiency exists and how to correct the deficiency, see photograph on page 3.

### **TESTING AND ANALYSIS:**

Testing and analysis of Palm tree diseases are referred to in the recommendations section of this report. The work can be performed by a certified arborist during scheduled pruning work.

### **RECOMMENDATIONS:**

#### **Root Protection Zone and General Requirements:**

This report has established the high value of Vina Del Mar Park trees described in the Appraisal section of this report. They are all Heritage Trees defined in the Sausalito Tree Ordinance. Any damage resulting from construction work is the responsibility of the contractor. Any damage to Phoenix palm trees is irreversible. Trunk wounding does not heal and the wound would be a permanent exposure to pathogens and pests that could affect the trees' health. General protection measures cited in the Sausalito Tree Ordinance and arboriculture literature are necessary for tree protection during construction work.

A protection fencing to prevent damage to trees during construction is necessary. Protection fencing shall surround each tree described in this report by a minimum distance of four feet from the trunk. Where protection fencing is not possible as with Palm #1 modification procedures described under Construction Protection Requirements of this report are recommended. The fencing and modified trunk protection for protected trees must be in place before the beginning of the construction project and not removed until project completion. No work or construction materials shall be within this critical protection area. There shall not be any open flames or dumping of construction spoils within the park. **Excavation for the pathway within the root zone of trees, the outer canopy of the trees as projected on the ground beneath the canopy, shall be performed by hand digging or with the use of pneumatic air tools that remove soil with compressed air.** If roots are encountered from protected trees, roots that are greater than one inch shall not be removed unless determined by the on site certified arborist to be acceptable. Any root pruning to protected trees shall be performed by a certified arborist, and documentation of the work shall be presented to City of Sausalito staff engineer when completed. Roots smaller than one inch that require removal shall be performed by a certified arborist using sharp sterilized pruning tools. During pathway excavation, any exposed roots shall be covered with mulch and kept moist until installation of permanent pathway materials. Any excavated soil beyond the pathway area shall be backfilled with clean top soil to the existing surrounding grade. In the event that roots cannot be removed because of their size, the pathway shall be bridged over the root system and allowance for root expansion included in the pathway design. The sides of the elevated can be sloped in a gradual transition to the existing grade provided soil is kept clear of the trunk and root flare of protected trees. The area of soil slope shall not be within 12 inches of any tree trunk or root flare where roots are attached to the trunk.

It is very important to monitor irrigation in the park. When testing for root location, the top layer of soil is not more than 12 inches. Just below the top soil layer, a hardpan surface is very difficult to penetrate. All tree roots are located within this top layer of soil. Since water will not percolate below the hardpan layer, it is where excess water will accumulate and this accumulation creates anaerobic conditions that promote diseases. Irrigation programming can be controlled with programming of irrigation controllers and sprinkler systems that provide matched precipitation rates for even distribution of moisture. The controlled use of water conservation for irrigation is a benefit for the community and plant health.

A designated area for storage of material away from park plants shall be made by the project certified arborist. No mixing, dumping, or storage of construction material shall take place within the park.

Placement of park utility electrical and irrigation panels must be considered before project approval. Utility panels should not be placed in root protection zones of the park trees.

Consideration for plant material that is displaced can be relocated to other areas within the park.

### **Phoenix Canariensis Construction Protection Requirements:**

Root zones of each of the two Palm trees must be protected and a buffer area established to separate the pathway from the Palms. Any wounding to the Palm trunks or root flair cannot be corrected. Trunk wounding from construction accidents will be permanent and is a source for disease pathogens that will lead to irreversible decline. This report recognizes the different settings of the two affected Palm trees in the construction zone for this pathway. Therefore, each Palm tree protection requirement is discussed separately when the differences apply.

The tree construction plan for Palm tree #1 shall have a thick layer of straw and jute to contain the padding wrap on the lower trunk. This shall be in place before any work begins and not removed until all construction work is completed to prevent construction injury. The padding shall be designed to withstand accidental impact of any construction work necessary for the project. Since the least amount of root mass disturbance for the palm tree is necessary, special care for the removal of the existing asphalt surface that traverses from the plaza stairs to the fountain is necessary. Once the asphalt is removed, the certified arborist assigned to the project can determine the limits of the new pathway excavation depth. It shall be no greater than 4 inches below existing preconstruction grade. The outermost portion of the pathway border shall not be within twenty-four (24) inches of the trunk. This report estimates that root mass encroachment using the limits described would impact the root mass by approximately eight (8%) percent.

A perimeter fence shall be setup at a radial distance of four (4) feet from the trunk of Palm tree #2. The fencing shall not be removed during the construction and must remain in place until the completion of the project. Excavation work for the pathway located behind the fountain, between the fountain and Tracy Way, shall end on both sides of the Palm tree at a six-foot distance measured away from the Palm trunk. This buffer area between the pathway and the Palm trunk is required to protect the root mass, and to prevent destabilization of the tree.

Absolutely no work or material storage within the protection area of either tree is allowed during construction.

The modification of the pathway to accommodate ADA access will require additional maintenance especially to trees within the pathway. The pathway and trees will require a maintenance program. Keeping pathway material separate from turf, plants, adjusting, and reconfiguring irrigation to separate the pathway from plant

material is necessary. Palm tree pruning will be necessary to reduce the occasional shedding of palm leaf blades. Specific methods for palm pruning are recommended in the Winter 2009 issue of Western Arborist an International Society of Arboriculture publication and available to ISA Certified Arborists.

### **SUMMARY:**

Communities recognize the importance of trees. They contribute to the enjoyment and well-being of their communities. The trees in Vina Del Mar Park contribute to the park's environment and character. Protecting their health and condition is important to preserving the beauty and enjoyment this park. The report describes the two proposals and the impact each would have on the trees. The pathway and ramp placement on the south side of the Cedar tree as proposed in the MaCrae Architects drawing would appear to have the least impact from my testing for root locations. Since plant material would have to be cleared for ramp access to the plaza, placement of the pathway surface beside the ramp would limit the construction to the same location of the park.

Separating the pathway from the ramp and placing each on either side of the Cedar tree would require bridging the pathway over tree roots. The impact on the tree would be greater because the root system would be affected in two separate locations instead of just one. A plan to bridge the roots would be necessary because there are more buttress roots on this side of the tree. Multiple entry points would divide the park into sections created by the pathway and ramp. This would require sprinkler system modifications and increase maintenance practices. The requirement for a site arborist to implement the tree protection plan described in this report and the Sausalito Tree Ordinance must be part of the project to complete the project successfully.

### **REFERENCES:**

- Sausalito Tree Ordinance 1114, 11.12.020, Definitions, 11.12.030 Protected Trees, C, Conditions of Approval for Protected Trees During Construction.
- Trees and Development, A technical Guide to Preservation of Trees During Land Development, Nelda Matheny, and James Clark.
- Guide for Plant Appraisal, International Society of Arboriculture.
- Western Arborist, International Society of Arboriculture,
  - Palms in the Landscape-part 2, Donald Hodel,
  - Palms in the Landscape-part 3, Donald Hodel
  - Palm Diseases and their Management,-part 2, Donald Hodel
  - Palm Diseases and their Management-Part 3, Donald Hodel
  - Pruning Palms, Donald Hodel

## **TREE APPRAISALS**

Cedrus deodara

**Tree Appraisal Trunk formula Method 9 edition**

- 1 Species: Cedrus deodara, Deodar Cedar
- 2 Condition: 80%
- 3 Trunk Circumference: 124.8in. Diameter: 40 in.
- 4 Location: %= [ Site: 95% % + Contribution 90% % + Placement 90%  
 sub total: 275% % div.by 3 92% % total
- Regional Plant Appraisal Committee and/or Appraiser-Developed or Modified Information.
- 5 Species Rating 70%
- 6 Replacement Tree Size (diameter) 3.50 2.75 inch dia of tree  
 (Trunk Area) 12.56 in.sq./cm.sq.TAr
- 7 Replacement Tree Cost: \$900.00  
 (see regional information to use cost selected)
- 8 Installation Cost: \$ \$1,800.00
- 9 Installation Tree Cost line (12+14) \$2,700.00
- 10 Unit Tree Cost: \$ \$56.50 per in. sq./cm.sq.  
 (see regional information to use cost selected)  
 Calculations by Apprasier using Field and Regional Information
- 11 Appraised Trunk Area:  
 (TAa or ATa; use tables 4.4-4.7)  
 or Cir. sq.(line 5 trunk circumference) \_\_\_\_\_ x 0.08 \_\_\_\_\_ in. sq.  
 or dia. sq. (line 5 trunk diameter) 1600 x 0.785 1256 in. sq.
- 12 Appraised Tree Trunk Increase (TA incr) =  
 TAa or ATa 1256 in.sq.cir.Tar (minus) 2.75 (F10) = 1253 in.sq.
- 13 Basic Tree Cost=Taincr (J24) 1238 in.sq. X Unit Tree Cost (D16) \$56.50 per in.sq.  
 (plus) Installed Tree Cost (E15) \$2,700.00 (equals) \$72,647
- 14a Appraised Value = Basic Tree Cost (E16) \$72,647  
 X Location (F7) 92% \$37,428  
 X species rating 70% X condition ( 80%
- If the Appraised Value is \$5000 or more, round it to the nearest \$100; if it is less, round to the nearest \$10.
- 14b Appraised Value = \$37,428



**Palm Tree #1**

**Tree Appraisal Trunk formula Method 9 edition**

- 1 **Species:** *Pheonix Canariensis*, Canary Island Date Palm
- 2 **Condition:** 80%
- 3 **Trunk Circumference:** 115 Diameter: 37 in.
- 4 **Location:** %= [ **Site:** 95% % + **Contribution:** 90% % + **Placement:** 75%  
 sub total: 260% % div.by 3 87% total
- Regional Plant Apprasial Committee and/or Appraiser-Developed or Modified Information.
- 5 **Species Rating** 70%
- 6 **Replacement Tree Size (diameter)** 3.50 inch dia of tree  
 (Trunk Area) 13.00 in.sq<sup>2</sup> TAr
- 7 **Replacement Tree Cost:** \$900.00  
 (see regional information to use cost selected)
- 8 **Installation Cost:** \$ \$1,800.00
- 9 **Installation Tree Cost line (12+14)** \$2,700.00
- 10 **Unit Tree Cost:** \$ \$56.50 per in. sq./cm.sq.  
 (see regional information to use cost selected)  
 Calculations by Apprasier using Field and Regional Information
- 11 **Appraised Trunk Area:**  
 (TAa or ATa; use tables 4.4-4.7)  
 or Cir. sq.(line 5 trunk circumference) \_\_\_\_\_ x 0.08 \_\_\_\_\_ in. sq.  
 or dia. sq. (line 5 trunk diameter) 1369 x 0.785 1075 in. sq.
- 12 **Appraised Tree Trunk Increase (TA incr) =**  
 TAa or ATAA 1075 in.sq.cir.Tar (minus) F-10 3.50 = 1071 in.sq.
- 13 **Basic Tree Cost=Taincr (J24)** 1071 in.sq. x Unit Tree Cost (D16) \$56.50 per in.sq.  
 (plus) Installed Tree Cost (E15) \$2,700.00 (equals) \$63,212
- 14a **Appraised Value = Basic Tree Cost (E16)** \$63,212  
 X Location (F7) 92% \$32,567  
 X species rating 70% X condition ( 80%
- If the Appraised Value is \$5000 or more, round it to the nearest \$100; if it is less, round to the nearest \$10.
- 14b **Appraised Value =** \$32,567

**Palm Tree #2**

**Tree Appraisal Trunk formula Method 9 edition**

1	Species:	<u><i>Pheonix Canariensis</i></u> , Canary Island Date Palm			
2	Condition:	<u>80%</u>			
3	Trunk Circumference:	<u>112.8in.</u>	Diameter:	<u>36</u>	in.
4	Location: %= [ Site:	<u>95%</u>	+ Contribution:	<u>90%</u>	+ Placement: <u>90%</u>
	sub total:	<u>275%</u>	div.by	<u>3</u>	<u>92%</u> total
	Regional Plant Apprasial Committee and/or Appraiser-Developed or Modified Information.				
5	Species Rating	<u>70%</u>			
6	Replacement Tree Size (diameter)	<u>3.50</u>	<u>2.75</u>	inch dia of tree	
	(Trunk Area)	<u>12.56</u>	in.sq./cm.sq.TAr		
7	Replacement Tree Cost:	<u>\$900.00</u>			
	(see regional information to use cost selected)				
8	Installation Cost:	<u>\$ 1,800.00</u>			
9	Installation Tree Cost line (12+14)	<u>\$2,700.00</u>			
10	Unit Tree Cost:	<u>\$ 56.50</u> per in. sq./cm.sq.			
	(see regional information to use cost selected)				
	Calculations by Apprasier using Field and Regional Information				
11	Appraised Trunk Area:				
	(TAa or ATa; use tables 4.4-4.7)				
	or Cir. sq.(line 5 trunk circumference)		x	<u>0.08</u>	in. sq.
	or dia. sq. (line 5 trunk diameter)	<u>1296</u>	x	<u>0.785</u>	<u>1017</u> in. sq.
12	Appraised Tree Trunk Increase (TA incr) =				
	TAa or ATAA	<u>1017</u>	in.sq.cir.Tar (minus)	<u>3.50</u>	(E10) = <u>1014</u> in.sq.
13	Basic Tree Cost=Taincr (J24)	<u>1014</u>	in.sq. X Unit Tree Cost (D16)	<u>\$56.50</u>	per in.sq.
	(plus) Installed Tree Cost (E15)	<u>\$2,700.00</u>	(equals)	<u>\$59,991</u>	
				X species rating	<u>70%</u>
14	Appraised Value = Basic Tree Cost (E16)	<u>\$59,991</u>		X condition (	<u>80%</u>
	X Location (F7)	<u>92%</u>	<u>\$30,907</u>		
	If the Appraised Value is \$5000 or more, round it to the nearest \$100; if it is less, round to the nearest \$10.				
	Appraised Value =	<u>\$30,907</u>			