

# Fort Mason Tree Inventory and Management Plan 2010



**Inventoried & Prepared by:**

**Patrick Anderson, ISA Board-Certified Master Arborist & Municipal Specialist, RCA #475**

**Brandon Hogan, GIS Specialist**

**Juan Carrasco ISA Board-Certified Master Arborist, Pest Control Advisor**

**Peter Andreucci ISA Board-Certified Master Arborist**

**Michael Sherwood, ISA Board-Certified Master Arborist & Municipal Specialist**

## **Bartlett Inventory Solutions**

by



# Fort Mason Tree Inventory and Management Plan

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Technical Reports

- MoniTor IPM Program*
- Maintenance Pruning Program*
- Root Collar Disorders*
- Mulch Application Guidelines*
- Tree Structure Evaluation*
- ANSI A300 (Part 1)-2001 Pruning*

Glossary of Terms

## I. Executive Summary

Trees within the Fort Mason Golden Gate National Recreation Area were inventoried to assist in managing tree health and safety. The trees in the park provide not only an aesthetic benefit to the citizens and visitors in the area, but also benefit the environment as well. Fort Mason provides a unique Green Space in an otherwise urban area. The desire to preserve as many trees as possible and the need to reduce hazards posed to those who live, work and recreate in the park were carefully weighted when considering recommendations. 427 trees were identified of 54 different species. The attributes that were collected include tree Latitude and Longitude, and a visual assessment of tree structure, health, and vigor. The documentation of these attributes will help in future management decisions relative to tree health, preservation and safety.

Attribute collection for the tree inventory was conducted using a sub-meter accuracy GPSr device having an error in location not greater than 3 meters.

Specific recommendations for the subject trees over the next 3-year period include:

- Removing 60 trees (14%) to eliminate potential hazards to eliminate trees in advanced stages of decline, or to improve habitat for desirable trees close by.
- Pruning 285 trees (67%) for safety, health, structure, and appearance. Pruning recommendations will comply with American National Standards Institute (ANSI) A300Z pruning standards for arboriculture.
- Support system installation in 46 trees (11%) to reduce branch and crown failure potential.
- Providing tree risk assessments for 15 trees (4%) to evaluate the impact of wood decay in stems and buttress roots that show potential for failure.
- Implementing an integrated pest management program to monitor pests and diseases on the subject trees. Treatments are therapeutic and preventive. Treatment timing is based on pest life cycle.
- Taking soil samples throughout the campus. Soil analysis provides information on the presence of soil nutrients, pH, organic matter, and cation exchange capacity.
- Taking bulk density samples throughout the grounds to determine the amount of soil compaction.

## II. Introduction

In the summer of 2010 Bartlett Tree Experts was retained to perform a tree inventory for Fort Mason in San Francisco, CA. The inventory included:

- Identifying the trees' condition, health, and vigor
- Identifying historic trees throughout the property (Greater than 50 years in age)
- Recommending hazard evaluations and removals of appropriate trees
- Recommending tree pruning, removal, soil management, and pest management treatments to promote tree safety, health, and longevity
- Mapping the trees using Global Positioning Satellite Receiver (GPSr) hardware and Geographic Information System (GIS) software

The following report contains the findings and recommendations of the tree inventory.

The *Matheny Clark Method* of Visual Tree Structure Analysis System ranks the relative degree of risk for prioritizing remedial treatments when managing large tree populations. The system uses three criteria: Failure Potential, Size of Defective Part, and Target Rating;

**Failure Potential** identifies the most likely failure and rates the likelihood that the structural defect(s) will result in failure within the inspection period.

Sever Risk – Defects are very sever_____	4
High Risk - Numerous and/or significant defects present_____	3
Medium Risk– Defects are present and obvious_____	2
Low Risk – Defects are minor_____	1

**Size of Defective Part** rates the size of the part most likely to fail. The larger the part that fails, the greater the potential for damage. Therefore, the size of the failure affects the hazard potential.

Most likely to fail greater than 30 inches _____	4
Most likely failure 18-30 inches _____	3
Most likely failure 6 – 18 inches _____	2
Most likely failure less than 6 inches _____	1

**Target Rating** rates the use and occupancy of the area that would be struck by the defective part

Constant use, structures _____	4
Frequent use, secondary structure _____	3
Intermittent use _____	2
Occasional use _____	1

$$\text{Hazard Rating} = \text{Failure Potential} + \text{Size of Defective Part} + \text{Target Rating}$$

Pruning and structural support system procedures will reduce the risk of branch and leader failure to an acceptable level. It must be emphasized however, that all large trees pose a certain degree of inherent risk and this evaluation does not preclude all possibility of failure especially during severe storms.

For those trees that the client considers hazardous and representing an immediate safety concern, we recommend placing a sign, tape, or other warning device near those trees until such time as the hazard can be remedied.

The material is presented in both printed and digital formats, and instructions for digital viewing follow:

To view digital maps, install “Arc Reader 9.3” from:

<http://www.esri.com/software/arcgis/arcreader/index.html>

When the web page opens, click on *Download Now*, and follow the prompts.

After Arc Reader is installed, you can open the “Fort Mason.pmf” file (included on the disk) to see the information.

On the disk, unzip the “Fort Mason. zip” file to your C-drive (C:\). It is important that you unzip the “Fort Mason.zip” file directly to your C-drive, or you will be unable to view the maps with ArcReader. After, the file has been unzipped, navigate to C:\FortMason, and open the folder. Within the folder will be the “Click here to open.pmf” file.

To view the entire spreadsheet of tree information for the site, open the “Ft Mason.accb” file.

To view a digital copy of the Inventory/ Management Plan, open the “Fort Mason Tree Inventory and Management Plan 2010.pdf” file.

### **III. Inventory Objectives**

Management objectives for the subject trees are as follow:

- Maximize immediate and long-term tree health and aesthetics through
  - integrated pest management
  - soil management
  - maintenance pruning
- Manage immediate and long-term risk associated with trees in high-use areas including use of
  - hazard pruning
  - required removals
  - tree structure evaluations

### **IV. Inventory Procedures and Definitions**

The Bartlett BIS team completed the tree inventory using Trimble GeoXH GPSr hardware with Trimble TerraSync and ArcGIS 9.3 GIS software. The following tree attribute data were collected on site:

- Genus and Species
- Tree location based on GPS coordinate system
- Tag Number
- Diameter at Breast Height (DBH)
- Canopy Radius (Estimated from ground)
- Historic tree (Estimate greater than 50 years old)
- Height Class (Measured from ground using TruPulse 360B laser)
- Condition Class
  - Dead
  - Poor - Most of the canopy is affected with die-back, undesirable leaf color, undesirable leaf size and undesirable new growth. Tree or parts of the tree are in the process of failure.
  - Fair - Parts of the canopy affected by undesirable leaf color, undesirable leaf size and undesirable new growth. Parts of the tree are likely to fail.
  - Good - Tree health and condition are acceptable.
- Root Zone Infringement (Based on dripline, estimate grayscape (man-made structures, such as sidewalks) impact on root zone)
- Infrastructure Interaction (Interaction between trees and grayscape that may cause an undesirable condition)
- Priority of General Tree Work (Based upon a 3-year management plan). Priority class recommendations take into consideration tree species, location value, age, and hazard rating.
  - Priority 1
  - Priority 2
  - Priority 3

- Pruning
  - Clean - Selective pruning to remove one or more of the following parts:  
dead, diseased, and/or broken branches
  - Raise - Selective pruning to provide vertical clearance
  - Thin - Selective pruning to reduce density of live branches
  - Reduce - Selective pruning to reduce height or spread
  - Structure – Selective pruning of live branches and stems to influence orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems.
- Need for and inspection of existing cables and braces
- Need for tree risk evaluations
- Tree removals
- Soil management recommendations
- Pest management recommendations



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## **V. Inventory Results and Recommendations**

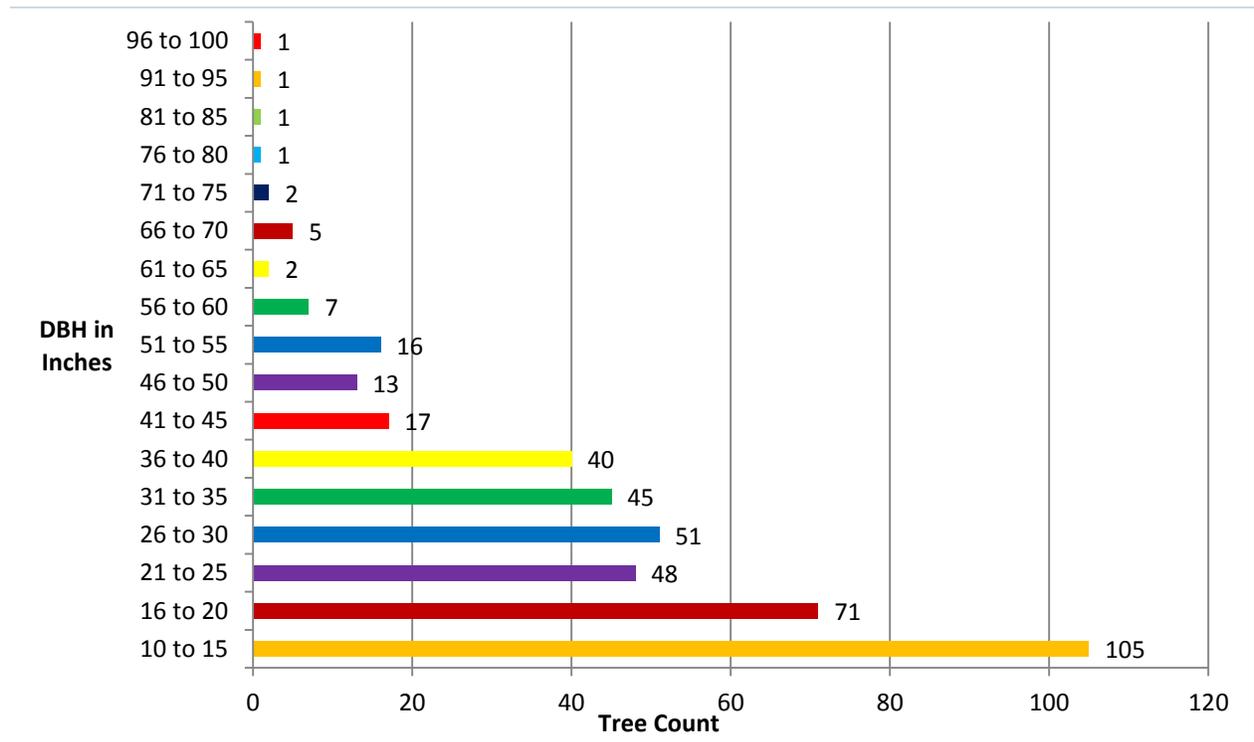
i. Fort Mason Stand Dynamics

The breakdown of tree condition follows (See Section IV, Inventory Procedures and Definitions, “Condition Class” for definitions):

	Quantity	% of Total
Good	244	57%
Fair	150	35%
Poor	30	7%
Dead	3	1%

	Quantity	% of Total
Mature	373	87%
Semi-Mature	41	10%
Young	13	3%

**Tree Diameter Distribution at Breast Height (DBH) in Inches**



# Fort Mason Trees In Good Condition



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# Fort Mason Trees In Fair Condition



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# Fort Mason Trees In Poor Condition



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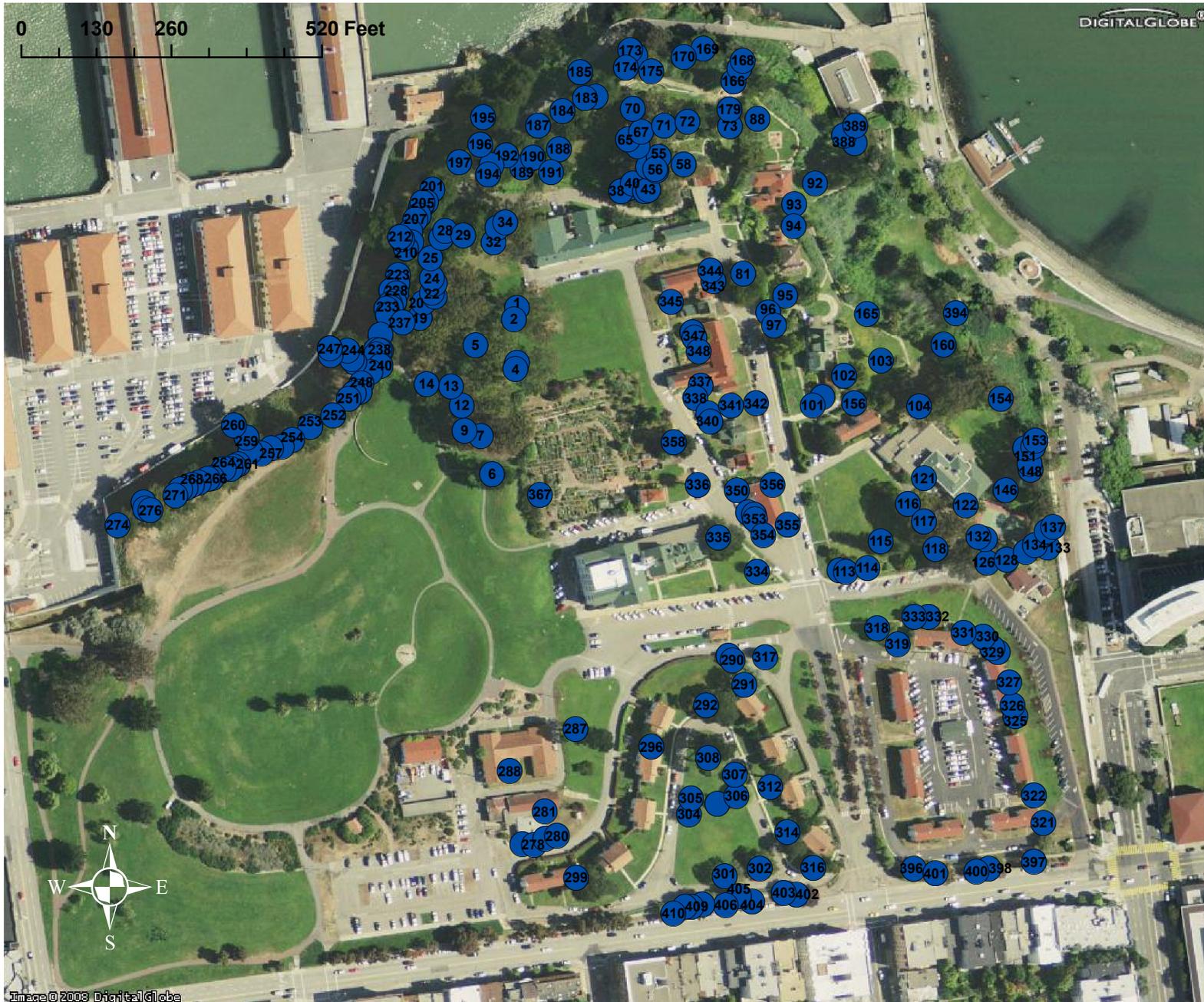
# Fort Mason Trees Dead



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# Fort Mason Trees Greater Than 50 Years In Age



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i. Fort Mason Stand Dynamics

Genus Species	Tree Count	Percent
Acacia melanoxylon	19	4.45%
Acacia spp	1	0.23%
Aesculus glabra	1	0.23%
Aracucaria heterophy	2	0.47%
Cedrus atlantica	2	0.47%
Cedrus deodara	1	0.23%
Chamaecyparis lawson	2	0.47%
Chamaecyparis spp	3	0.70%
Corymbia ficifolia	39	9.13%
Corymbia maculata	16	3.75%
Corynocarpus laevigata	2	0.47%
Cryptomeria japonica	1	0.23%
Cypress macrocarpa	138	32.32%
Eucalyptus globulus	42	9.84%
Eucalyptus spp	2	0.47%
Ficus spp	2	0.47%
Griselina litoralis	3	0.70%
Griselina spp	1	0.23%
Heteromeles arbutifo	11	2.58%
Leptospermum scoparium	1	0.23%
Magnolia grandiflora	8	1.87%
Maytenus boaria	1	0.23%
Metrosideros excelsa	2	0.47%
Metrosoderos polymor	1	0.23%
Pittosporum tobiria	3	0.70%
Myoporum laetum	1	0.23%
Myrtus cominus	3	0.70%

Genus Species	Tree Count	Percent
Persea americana	3	0.70%
Phoenix canariensis	9	2.11%
Pinus canariensis	7	1.64%
Pinus pinea	6	1.41%
Pinus radiata	5	1.17%
Pinus sylvestris	1	0.23%
Pinus thunbergii	2	0.47%
Pittosporum spp	15	3.51%
Platanus occidentali	7	1.64%
Podocarpus macrophyl	6	1.41%
Pruns spp	3	0.70%
Prunus cerasifeva	3	0.70%
Prunus laurocerasus	3	0.70%
Prunus spp (plum)	2	0.47%
Rhododendron spp	1	0.23%
Schinus terebinthifo	1	0.23%
Sequoia Sempervirens	9	2.11%
Sequoiadendron gigan	1	0.23%
Syzygium aromatica	1	0.23%
Syzygium paniculatum	2	0.47%
Taxus stricta	11	2.58%
Thuja occidentalis	1	0.23%
Thuja plicata	1	0.23%
Umbellularia califor	1	0.23%
unknown	2	0.47%
Yucca brevifolia	16	3.75%

The following is a list of tree groupings:

Tree Number	DBH	Tree Type	Group
101	11	Yucca brevifolia	group of 5
130	13	Pittosporum spp	group of 3
371	10	Heteromeles arbutifo	group of 3

ii. Fort Mason Trees Recommended for Structural Evaluation and Removal by Priority

As part of this inventory, the Bartlett BIS team conducted visual inspection of each tree from the ground. For the trees listed below, some aspect of tree structure or health indicated that further analysis is necessary to more completely evaluate tree condition and risk, and to make a more informed decision about managing each tree.

Tree structure evaluations are recommended to evaluate the impact of wood decay in stems and buttress roots that show potential for failure. Detailed tree structure evaluation may require climbing the tree, and using diagnostic tools to thoroughly determine the nature and extent of defects and decay. Evaluation may also require detailed examination of the root system using air excavation. An experienced ISA Certified Arborist using a “tree structure drill bit” or IML resistograph (preferred method) can evaluate degree of strength loss due to wood decay. Recommendations for tree maintenance are made after evaluation is complete. (Refer to *Tree Structure Evaluation* Technical Report)

Tree Number	DBH	Tree Type	Drill Stem	Drill Root	Climbing Inspections
7	100	Eucalyptus globulus	Yes	No	No
34	68	Eucalyptus globulus	Yes	No	No
43	29	Corymbia maculate	No	No	Yes
93	59	Magnolia grandiflora	Yes	No	No
206	21	Cypress macrocarpa	Yes	No	No
225	23	Cypress macrocarpa	Yes	No	No
226	12	Cypress macrocarpa	Yes	No	No
227	20	Cypress macrocarpa	Yes	No	No
256	22	Cypress macrocarpa	Yes	No	No
257	30	Cypress macrocarpa	Yes	No	No
258	23	Cypress macrocarpa	Yes	Yes	No
308	64	Pinus radiata	Yes	No	No
312	54	Pinus pinea	Yes	No	No
402	46	Corymbia ficifolia	Yes	No	No
403	22	Corymbia ficifolia	Yes	No	No

The following trees are recommended for removal:

Tree Number	DBH	Tree Type	Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Removal
4	37	Eucalyptus globulus	None	3	4	3	1	Yes
6	69	Pinus radiata	Sidewalk	4	4	4	1	Yes
10	20	Eucalyptus globulus	None	2	2	3	1	Yes
14	28	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes
15	15	Cypress macrocarpa	Sidewalk	1	1	2	1	Yes
16	21	Corymbia maculata	None	1	1	1	3	Yes

ii. Fort Mason Trees Recommended for Structural Evaluation and Removal by Priority

Tree Number	DBH	Tree Type	Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Removal
17	16	Corymbia maculata	Pedestrian Area	3	2	2	2	Yes
28	29	Cypress macrocarpa	Pedestrian Area	3	4	4	1	Yes
30	20	Cypress macrocarpa	Pedestrian Area	2	2	4	1	Yes
36	32	Cypress macrocarpa	Pedestrian Area	3	3	2	1	Yes
37	14	Cypress macrocarpa	Pedestrian Area	2	3	2	2	Yes
41	29	Cypress macrocarpa	Pedestrian Area	3	3	3	1	Yes
44	15	Corymbia maculata	Building	1	2	3	2	Yes
46	12	Corymbia maculata	Building	2	1	3	2	Yes
48	12	Corymbia maculata	Pedestrian Area	1	1	3	2	Yes
50	24	Corymbia maculata	Pedestrian Area	1	2	2	3	Yes
57	19	Cypress macrocarpa	Building	1	1	2	3	Yes
58	36	Eucalyptus globulus	Road	3	2	2	1	Yes
61	16	Heteromeles arbutifo	Pedestrian Area	1	1	2	3	Yes
64	13	Corymbia maculata	Pedestrian Area	2	1	2	3	Yes
66	18	Corymbia maculata	Pedestrian Area	2	2	2	3	Yes
69	12	Eucalyptus spp	Pedestrian Area	2	1	2	3	Yes
89	37	Pittosporum spp	Pedestrian Area	1	1	2	3	Yes
110	11	Leptospermum scoparium	Pedestrian Area	1	1	3	2	Yes
125	25	Corynocarpus laevigt	Pedestrian Area	1	1	3	1	Yes
132	16	Yucca brevifolia	Pedestrian Area	2	2	3	1	Yes
140	32	Acacia melanoxylon	Pedestrian Area	1	1	2	1	Yes
141	12	Acacia spp	Pedestrian Area	1	2	3	1	Yes
167	34	Cypress macrocarpa	Pedestrian Area	4	3	3	1	Yes
168	52	Cypress macrocarpa	Pedestrian Area	2	2	3	1	Yes
171	20	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes
172	32	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes
200	19	Cypress macrocarpa	Pedestrian Area	2	2	3	1	Yes
202	16	Cypress macrocarpa	Pedestrian Area	2	1	3	1	Yes
210	14	Cypress macrocarpa	Pedestrian Area	2	3	3	1	Yes
213	11	Cypress macrocarpa	Pedestrian Area	2	1	3	2	Yes
224	14	Cypress macrocarpa	Pedestrian Area	2	1	3	1	Yes
235	24	Cypress macrocarpa	Pedestrian Area	2	1	3	2	Yes
246	48	Cypress macrocarpa	Parking	3	1	3	1	Yes
249	22	Cypress macrocarpa	Pedestrian Area	2	1	3	1	Yes
251	29	Cypress macrocarpa	Pedestrian Area	2	1	3	1	Yes
260	33	Cypress macrocarpa	Road	3	4	3	1	Yes
261	33	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes
262	30	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes
271	41	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes

ii. Fort Mason Trees Recommended for Structural Evaluation and Removal by Priority

Tree Number	DBH	Tree Type	Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Removal
282	17	Prunus cerasifeva	Pedestrian Area	1	1	3	2	Yes
283	14	Prunus cerasifeva	Pedestrian Area	1	1	3	2	Yes
301	30	Acacia melanoxylon	Road	3	3	3	1	Yes
302	25	Acacia melanoxylon	Road	3	2	3	1	Yes
307	13	Magnolia grandiflora	Road	2	1	3	1	Yes
315	28	Pinus pinea	Pedestrian Area	4	3	3	1	Yes
316	40	Acacia melanoxylon	Pedestrian Area	3	2	3	1	Yes
330	30	Corymbia ficifolia	Pedestrian Area	3	2	3	1	Yes
346	35	Persea americana	Building	1	1	3	1	Yes
348	12	Podocarpus macrophyl	Building	0	1	3	3	Yes
362	17	Prunus spp (plum)	Pedestrian Area	2	1	3	1	Yes
366	37	Metrosoderos polymor	Pedestrian Area	1	1	3	1	Yes
417	29	Corymbia ficifolia	Pedestrian Area	3	3	4	1	Yes
419	55	Corymbia ficifolia	Pedestrian Area	3	2	4	1	Yes
421	14	Corymbia ficifolia	Pedestrian Area	2	1	4	1	Yes



Italian Stone Pine (Tree Numbe 315) recommended for removal. Notice split between two trunks and close proximity to nearby home.



# Fort Mason Trees Requiring Further Inspection



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# Fort Mason Trees Recommended For Removal



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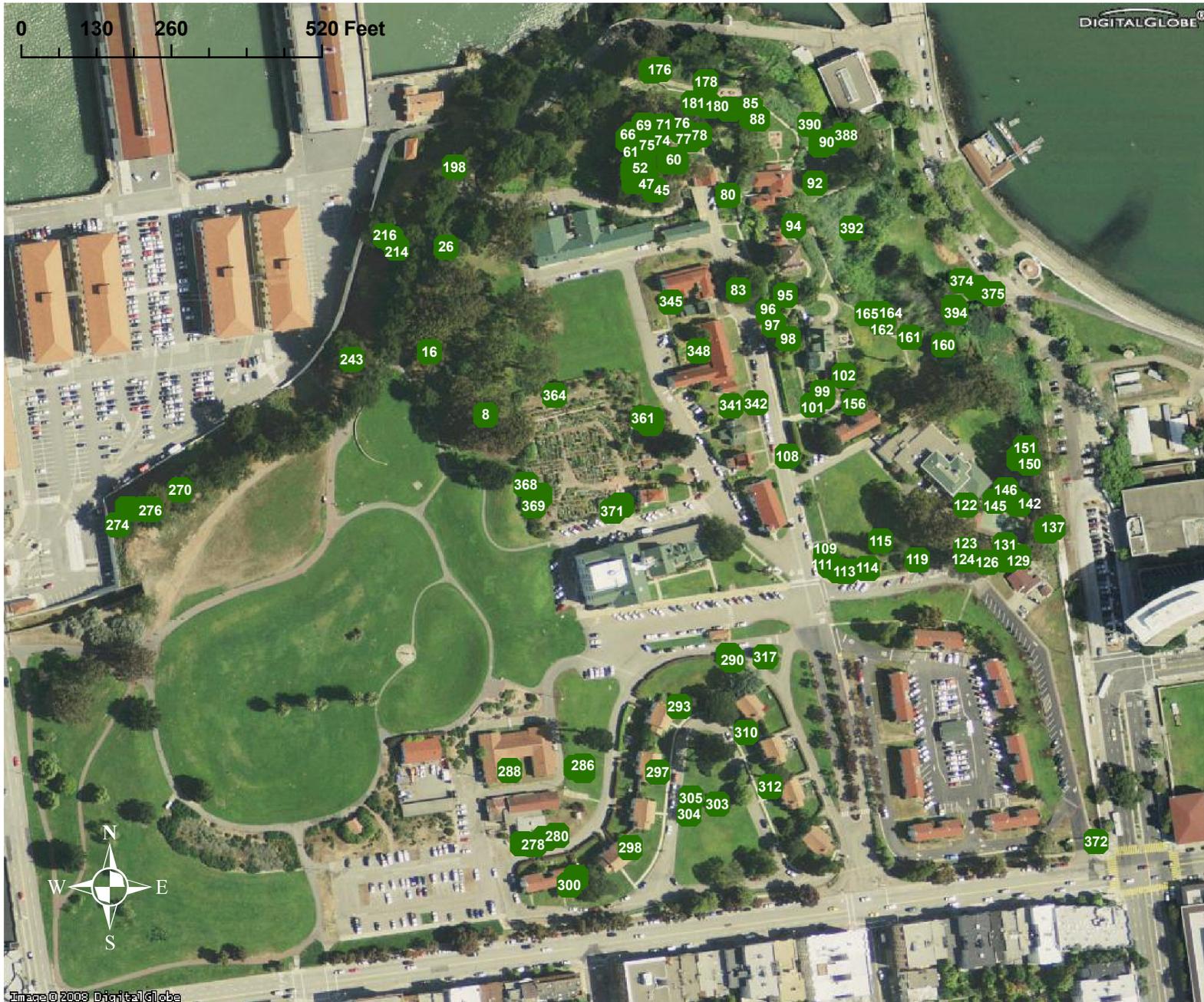
# Fort Mason Trees Classified As Priority 2



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# Fort Mason Trees Classified As Priority 3

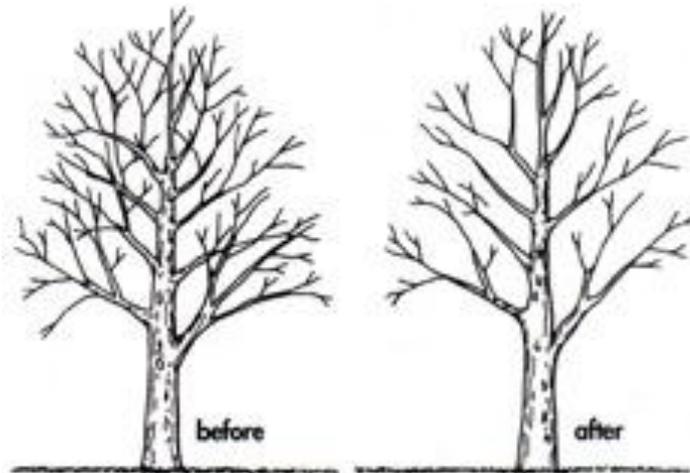


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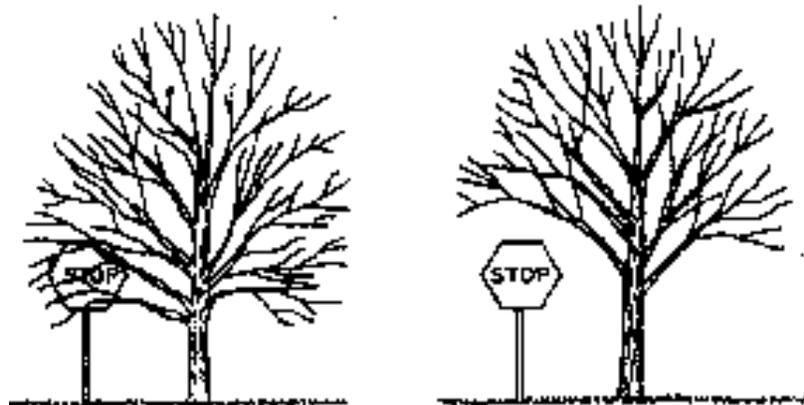
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Acceptable Pruning Practices (Refer to *ANSI A300 (Part 1)-2001 Pruning* and Section IV *Procedures* of this document for definitions of pruning and priority):

- Clean - Selective pruning to remove one or more of the following parts: dead diseased and/or broken branches

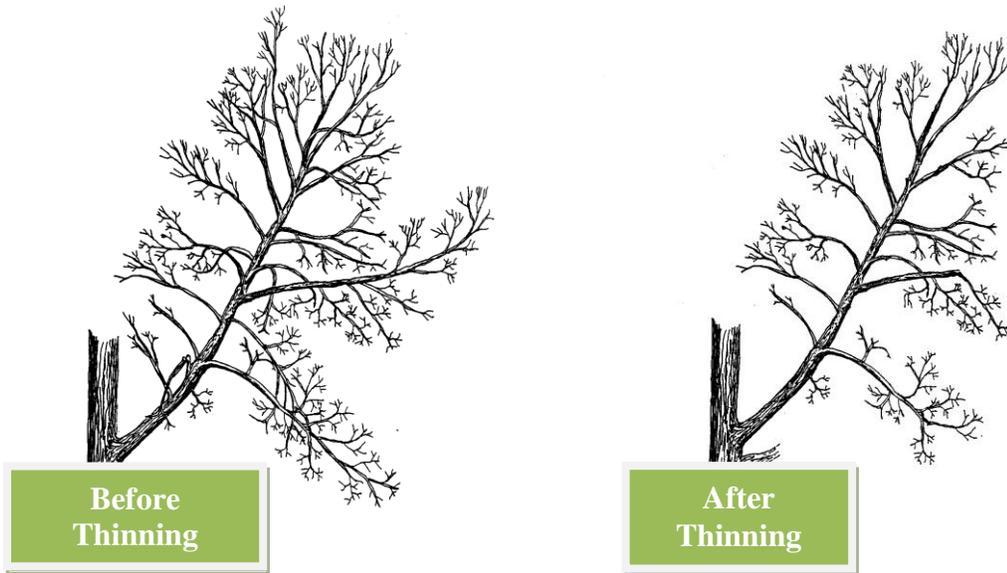


- Raise - Selectively pruning to provide vertical clearance



iii. Fort Mason Trees Recommended for Pruning and Structural Support Systems by Priority

- Thin - Selective pruning to reduce density of live branches

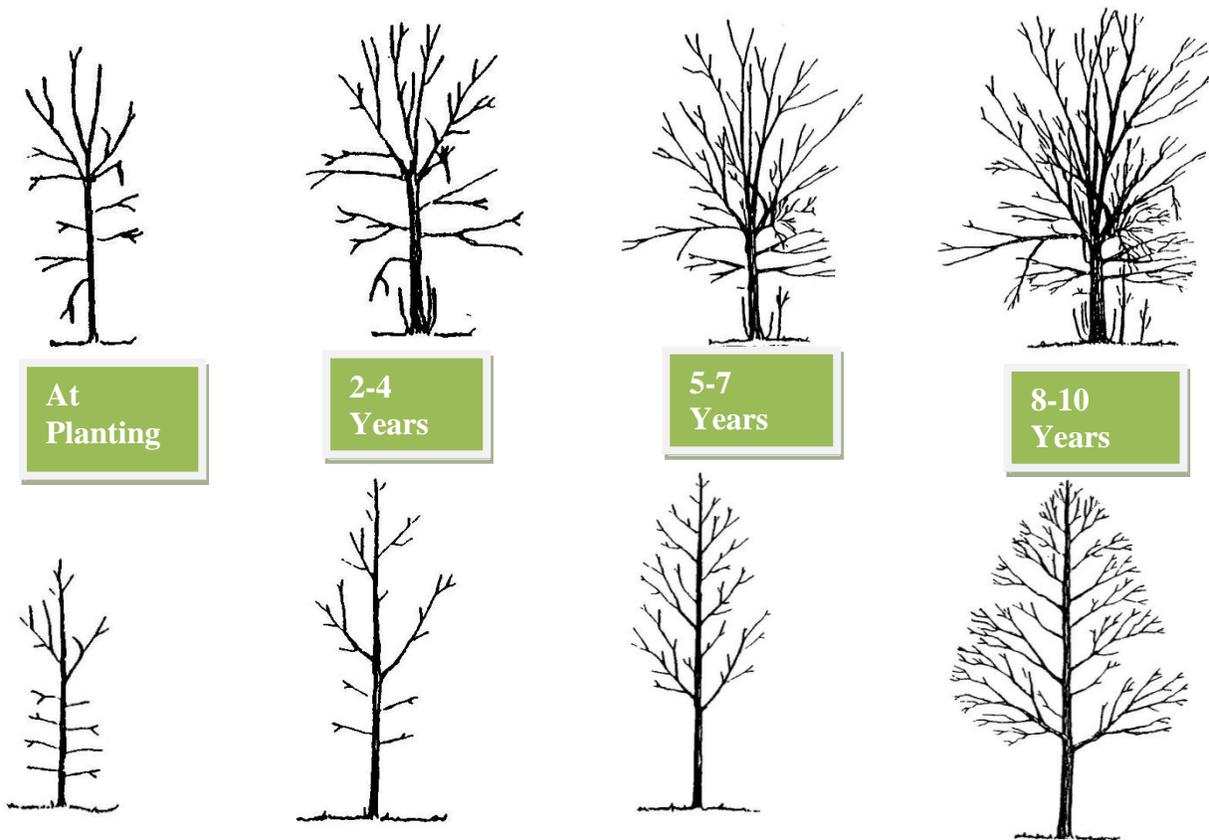


- Reduce - Selective pruning to reduce height or spread



iii. Fort Mason Trees Recommended for Pruning and Structural Support Systems by Priority

- Structure – Selective pruning of live branches and stems to influence orientation, spacing, growth rate, strength of attachment, and ultimate size of branches and stems. The trees pictured below on the top row have not been pruned. The trees below them have been structurally pruned ever 2 to 3 years.



- Palm pruning- is the removal of fronds, flowers, fruit, stems or loose petioles that may create a hazardous condition. Live healthy fronds should not be removed. If healthy fronds need to be removed, avoid removing those that initiate at an angle of 45% or greater above horizontal. Fronds should be cut close to the petiole base. Care needs to be taken not to damage live trunk tissue.



Before Pruning



After Pruning

Pruning practices that are not accepted and can yield to hazardous conditions include:

- Lion tailing – Pruning that removes interior branches along the stem and scaffold branches
- Topping – Reduction of tree's size by using heading cuts that shorten branches to a predetermined size.



- Using climbing spikes to ascend a healthy tree is not an acceptable pruning practice. Doing this wounds healthy stem tissue, this may lead to infection by fungal pathogen.







iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
87	36	Cypress macrocarpa	Sidewalk	2	1	2	2	No	No	No	No	No	No	No	No
88	25	Yucca brevifolia	Sidewalk	1	1	2	3	Yes	No	No	No	No	No	No	No
89	37	Pittosporum spp	Pedestrian Area	1	1	2	3	No	No	No	No	No	No	No	No
90	10	Pittosporum spp	Pedestrian Area	1	1	1	3	Yes	Yes	No	No	No	No	No	No
91	69	Cypress macrocarpa	Sidewalk	3	2	2	2	Yes	Yes	No	No	No	Yes	No	No
92	40	Sequoiadendron gigan	Pedestrian Area	1	1	2	3	Yes	Yes	No	No	No	No	No	No
93	59	Magnolia grandiflora	Sidewalk	3	2	3	1	No	No	No	No	No	No	No	No
94	26	Cryptomeria japonica	Sidewalk	1	1	2	3	Yes	Yes	No	No	No	No	No	No
95	55	Cedrus deodara	Road	0	0	0	3	Yes	Yes	No	No	No	Yes	No	No
96	35	Chamaecyparis spp	Road	1	1	2	3	Yes	Yes	No	No	No	No	No	No
97	20	Thuja plicata	Road	1	1	2	3	Yes	No	No	No	No	No	No	No
98	50	Taxus stricta	Sidewalk	1	1	2	3	No	No	No	Yes	No	No	No	No
99	16	Syzygium paniculatum	Pedestrian Area	1	1	2	3	Yes	Yes	Yes	No	No	No	No	No
100	18	Syzygium paniculatum	Road	1	1	2	3	Yes	Yes	No	Yes	No	No	No	No
101	11	Yucca brevifolia	Pedestrian Area	1	1	2	3	Yes	No	No	No	No	No	No	No
102	24	Acacia melanoxylon	Sidewalk	1	1	2	3	Yes	Yes	No	No	No	No	No	No
104	86	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No		No	No
105	20	Pinus pinea	Sidewalk	1	1	3	2	Yes	No	No	Yes	No	No	No	No
106	14	Pinus pinea	Sidewalk	1	1	3	2	Yes	No	No	Yes	No	No	No	No
107	12	Prunus laurocerasus	Sidewalk	1	1	3	2	Yes	No	No	No	No	No	No	No
108	11	Acacia melanoxylon	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
109	35	Prunus laurocerasus	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
110	11	Leptospermum laevis	Sidewalk	1	1	3	2	No	No	No	No	No	No	No	No
111	20	Griselinia littoralis	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
112	11	Griselinia littoralis	Sidewalk	1	2	3	3	Yes	Yes	No	No	No	No	No	No
113	12	Griselinia littoralis	Sidewalk	1	2	3	3	Yes	Yes	No	No	No	No	No	No
114	12	Chamaecyparis spp	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
115	34	Aracucaria heterophylla	Pedestrian Area	1	1	3	3	Yes	Yes	No	No	No	No	No	No
116	42	Eucalyptus globulus	Building	2	2	3	1	Yes	Yes	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
117	83	Eucalyptus globulus	Road	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
118	95	Eucalyptus globulus	Road	3	2	3	1	Yes	Yes	No	Yes	No	Yes	No	No
119	18	Heteromeles arbutifo	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
120	11	Pittosporum tobiria	Sidewalk	1	1	3	1	No	No	No	Yes	No	No	No	No
121	10	Yucca brevifolia	Building	1	1	3	2	Yes	No	No	Yes	No	No	No	No
123	13	Corynocarpus laeviga	Sidewalk	1	1	3	3	Yes	No	No	No	No	No	No	No
124	11	Acacia melanoxylon	Road	1	1	3	3	No	No	Yes	No	No	No	No	No
125	25	Corynocarpus laevigt	Sidewalk	1	1	3	1	No	No	No	No	No	No	No	No
126	15	Pittosporum spp	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
127	10	Yucca brevifolia	Sidewalk	1	1	3	2	No	No	No	No	No	No	No	No
128	10	Umbellularia califor	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
129	14	Pittosporum spp	Sidewalk	1	1	3	3	No	No	No	No	No	No	No	No
130	13	Pittosporum spp	Sidewalk	1	1	3	1	Yes	Yes	No	Yes	No	No	No	No
131	18	Yucca brevifolia	Sidewalk	1	1	3	3	Yes	No	No	No	No	No	No	No
132	16	Yucca brevifolia	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
133	44	Eucalyptus globulus	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
134	16	Platanus occidentali	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
135	13	Acacia melanoxylon	Pedestrian Area	1	1	2	1	Yes	Yes	No	No	Yes	No	No	No
136	25	Eucalyptus globulus	Pedestrian Area	2	1	3	3	Yes	No	No	Yes	No	No	No	No
137	55	Eucalyptus globulus	Pedestrian Area	2	2	2	3	Yes	Yes	No	No	No	No	No	No
138	11	Acacia melanoxylon	Pedestrian Area	1	1	1		No	No	No	No	No	No	No	No
139	12	Acacia melanoxylon	Pedestrian Area	1	1	1		No	No	No	No	No	No	No	No
140	32	Acacia melanoxylon	Pedestrian Area	1	1	2	1	No	No	No	No	No	No	No	No
141	12	Acacia spp	Pedestrian Area	1	2	3	1	No	No	No	No	No	No	No	No
142	17	Acacia melanoxylon	Pedestrian Area	1	2	1	3	No	No	No	No	No	Yes	No	No
143	24	Acacia melanoxylon	Pedestrian Area	1	1	1	3	Yes	No	No	No	No	No	No	No
144	11	Acacia melanoxylon	Pedestrian Area	1	1	2	3	Yes	No	No	No	No	No	No	No
145	19	Acacia melanoxylon	Pedestrian Area	1	1	1	3	Yes	No	No	No	No	No	No	No
146	25	Pittosporum spp	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
147	38	Cedrus atlantica	Pedestrian Area	3	1	2	1	Yes	No	No	No	No	No	No	No
148	43	Eucalyptus globulus	Pedestrian Area	2	2	2	2	Yes	No	No	No	No	No	No	No
149	15	Corymbia ficifolia	Pedestrian Area	1	1	2	3	Yes	No	No	No	No	No	No	No
150	48	Eucalyptus globulus	Pedestrian Area	2	2	3	3	Yes	No	No	No	No	No	No	No
151	43	Eucalyptus globulus	Pedestrian Area	2	2	3	3	Yes	No	No	No	No	No	No	No
152	32	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	No	No	No
153	38	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	No	No	No
154	28	Eucalyptus globulus	Pedestrian Area	2	2	3	2	Yes	Yes	No	No	No	No	No	No
155	75	Eucalyptus globulus	Pedestrian Area	2	2	2	2	Yes	No	No	No	No	No	No	No
156	18	Yucca brevifolia	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
157	14	Acacia melanoxylon	Building	1	1	3	2	No	No	Yes	Yes	No	No	No	No
158	15	Acacia melanoxylon	Building	1	1	3	2	Yes	Yes	No	Yes	No	No	No	No
159	40	Pruns spp	Building	1	1	3	2	Yes	Yes	No	Yes	No	No	No	No
160	36	Acacia melanoxylon	Pedestrian Area	1	1	2	3	Yes	Yes	No	No	No	No	No	No
165	12	Pruns spp	Sidewalk	1	1	2	3	Yes	Yes	No	No	Yes	No	No	No
166	27	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	No	No	No	No	Yes	No	No
167	34	Cypress macrocarpa	Pedestrian Area	4	3	3	1	No	No	No	No	No	No	No	No
168	52	Cypress macrocarpa	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
169	77	Cypress macrocarpa	Pedestrian Area	4	2	3	1	Yes	Yes	No	No	No	No	No	No
170	53	Cypress macrocarpa	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
171	20	Eucalyptus globulus	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
172	32	Eucalyptus globulus	Pedestrian Area	2	2	3	1	No	No	No	No	No	No	No	No
173	45	Eucalyptus globulus	Pedestrian Area	2	2	3	1	Yes	No	No	No	No	No	No	No
174	38	Cypress macrocarpa	Pedestrian Area	3	2	3	1	Yes	Yes	No	No	No	No	No	No
175	14	Pittosporum spp	Pedestrian Area	1	1	3	3	Yes	Yes	No	No	No	No	No	No
176	24	Heteromeles arbutifo	Pedestrian Area	1	1	2	3	No	No	No	Yes	No	No	No	No
177	11	Pittosporum spp	Pedestrian Area	1	1	2	3	No	No	No	Yes	No	No	No	No
178	20	Pittosporum spp	Pedestrian Area	1	1	2	3	No	No	No	Yes	No	No	No	No
179	15	Yucca brevifolia	Sidewalk	1	1	2	3	Yes	No	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
180	19	Yucca brevifolia	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
181	10	Pittosporum spp	Pedestrian Area	1	1	2	3	Yes	Yes	No	No	No	No	No	No
182	36	Cypress macrocarpa	Pedestrian Area	3	2	3	2	Yes	Yes	No	No	No	No	No	No
183	34	Cypress macrocarpa	Pedestrian Area	3	2	3	1	Yes	Yes	No	No	No	No	No	No
184	48	Cypress macrocarpa	Pedestrian Area	3	2	3	1	Yes	Yes	No	No	No	No	No	No
185	18	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	No	No	No
186	15	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	No	No	No
187	36	Cypress macrocarpa	Pedestrian Area	3	2	3	1	Yes	Yes	No	No	No	No	No	No
188	33	Cypress macrocarpa	Pedestrian Area	3	2	3	1	Yes	Yes	No	No	No	No	No	No
189	28	Cypress macrocarpa	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	No	No	No
190	66	Cypress macrocarpa	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	No	No	No
191	31	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	No	No	No
192	70	Cypress macrocarpa	Sidewalk	3	2	3	1	Yes	Yes	No	No	No	Yes	No	No
193	55	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
194	38	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
195	56	Cypress macrocarpa	Sidewalk	2	2	3	2	Yes	Yes	No	No	No	No	No	No
196	56	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
197	35	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	No	No	No
198	12	Cypress macrocarpa	Sidewalk	1	1	3	3	Yes	Yes	No	No	No	No	No	No
199	38	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	No	No	No
200	19	Cypress macrocarpa	Sidewalk	2	2	3	1	No	No	No	No	No	No	No	No
201	53	Cypress macrocarpa	Sidewalk	2	2	3	1	Yes	Yes	No	No	No	Yes	No	No
202	16	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	Yes	No	No
203	18	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
204	18	Cypress macrocarpa	Sidewalk	3	2	3	1	Yes	Yes	No	No	No	Yes	No	No
205	16	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
206	21	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	No	No	No
207	21	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
208	27	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
209	15	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
210	14	Cypress macrocarpa	Sidewalk	2	3	3	1	No	No	No	No	No	No	No	No
211	18	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
212	26	Cypress macrocarpa	Pedestrian Area	2	1	3	2	Yes	Yes	No	No	No	No	No	No
213	11	Cypress macrocarpa	Pedestrian Area	2	1	3	2	No	No	No	No	No	No	No	No
214	19	Cypress macrocarpa	Pedestrian Area	2	1	2	3	Yes	No	No	No	No	No	No	No
215	10	Cypress macrocarpa	Pedestrian Area	2	1	2	3	Yes	No	No	No	No	No	No	No
216	28	Cypress macrocarpa	Pedestrian Area	2	1	2	3	Yes	No	No	No	No	No	No	No
217	25	Cypress macrocarpa	Pedestrian Area	2	1	2	2	Yes	Yes	No	No	No	No	No	No
218	22	Cypress macrocarpa	Parking	2	1	3	2	Yes	Yes	No	No	No	No	No	No
219	51	Cypress macrocarpa	Parking	2	1	3	2	Yes	Yes	No	No	No	No	No	No
220	11	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
221	19	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
222	26	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
223	40	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
224	14	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	Yes	No	No
225	23	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	Yes	No	No
226	12	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
227	20	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
228	20	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
229	14	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
230	30	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
231	21	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
232	14	Cypress macrocarpa	Sidewalk	2	1	3	2	Yes	Yes	No	No	No	No	No	No
233	35	Cypress macrocarpa	Sidewalk	2	1	3	2	Yes	Yes	No	No	No	Yes	No	No
234	28	Cypress macrocarpa	Sidewalk	2	1	3	2	Yes	Yes	No	No	No	Yes	No	No
235	24	Cypress macrocarpa	Sidewalk	2	1	3	2	No	No	No	No	No	No	No	No
236	18	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
237	28	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
238	26	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
239	40	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
240	17	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
241	22	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
242	44	Cypress macrocarpa	Pedestrian Area	2	1	2	1	Yes	Yes	No	No	No	Yes	No	No
243	31	Cypress macrocarpa	Pedestrian Area	2	1	2	3	Yes	Yes	No	No	No	No	No	No
244	36	Cypress macrocarpa	Pedestrian Area	2	1	2	2	Yes	Yes	No	No	No	Yes	No	No
245	50	Cypress macrocarpa	Parking	2	1	2	2	Yes	Yes	No	No	No	Yes	No	No
246	48	Cypress macrocarpa	Parking	3	1	3	1	No	No	No	No	No	Yes	No	No
247	34	Cypress macrocarpa	Parking	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
248	16	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
249	22	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	No	No	No
250	49	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
251	29	Cypress macrocarpa	Sidewalk	2	1	3	1	No	No	No	No	No	No	No	No
252	34	Cypress macrocarpa	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
253	55	Cypress macrocarpa	Dirt Path	2	1	3	1	Yes	Yes	No	No	No	Yes	No	Yes
254	47	Cypress macrocarpa	Dirt Path	2	1	2	2	Yes	Yes	No	No	No	Yes	No	No
255	33	Cypress macrocarpa	Dirt Path	2	1	2	2	Yes	Yes	No	No	No	No	No	No
256	22	Cypress macrocarpa	Dirt Path	2	2	2	2	No	No	No	No	No	No	No	No
257	30	Cypress macrocarpa	Dirt Path	2	1	2	2	No	No	No	No	No	No	No	No
258	23	Cypress macrocarpa	Dirt Path	2	1	2	2	No	No	No	No	No	No	No	No
259	28	Cypress macrocarpa	Pedestrian Area	2	1	2	2	Yes	Yes	No	No	No	No	No	No
260	33	Cypress macrocarpa	Road	3	4	3	1	No	No	No	No	No	No	No	No
261	33	Cypress macrocarpa	Dirt Path	2	3	2	2	No	No	No	No	No	No	No	No
262	30	Cypress macrocarpa	Dirt Path	2	3	2	2	No	No	No	No	No	No	No	No
263	37	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	Yes	No	No	No	No
264	16	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	Yes	No	No	No	No
265	30	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No
266	35	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
267	32	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No
268	26	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No
269	23	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No
270	32	Cypress macrocarpa	Dirt Path	2	2	1	3	Yes	Yes	No	No	No	No	No	No
271	41	Cypress macrocarpa	Dirt Path	2	3	2	2	No	No	No	No	No	No	No	No
272	45	Cypress macrocarpa	Dirt Path	2	3	2	2	Yes	Yes	No	No	No	No	No	No
273	17	Cypress macrocarpa	Dirt Path	1	1	2	3	Yes	Yes	No	No	No	No	No	No
274	38	Cypress macrocarpa	Dirt Path	1	1	2	3	Yes	Yes	No	No	No	No	No	No
275	22	Cypress macrocarpa	Dirt Path	1	1	2	3	Yes	Yes	No	No	No	No	No	No
276	19	Cypress macrocarpa	Dirt Path	1	1	2	3	Yes	Yes	No	No	No	No	No	No
277	30	Myrtus comminus	Road	1	1	3	3	Yes	No	No	Yes	No	No	No	No
278	25	Taxus stricta	Road	1	1	3	3	Yes	No	No	Yes	No	No	No	No
279	38	Myrtus comminus	Sidewalk	1	1	3	3	Yes	No	No	Yes	No	No	No	No
280	12	Chamaecyparis lawson	Road	1	1	3	3	No	No	No	Yes	No	No	No	No
281	10	Myrtus comminus	Building	1	1	3	2	Yes	No	No	Yes	No	No	No	No
282	17	Prunus cerasifeva	Pedestrian Area	1	1	3	2	No	No	No	No	No	No	No	No
283	14	Prunus cerasifeva	Pedestrian Area	1	1	3	2	No	No	No	No	No	No	No	No
284	17	Sequoia Sempervirens	Pedestrian Area	1	1	3	3	No	No	Yes	No	No	No	No	No
285	12	Sequoia Sempervirens	Pedestrian Area	1	1	3	3	No	No	Yes	No	No	No	No	No
286	22	Sequoia Sempervirens	Pedestrian Area	1	1	3	3	No	No	Yes	No	No	No	No	No
287	46	Pinus radiata	Pedestrian Area	2	2	3	1	Yes	Yes	No	No	No	No	No	No
288	14	Magnolia grandiflora	Building	1	1	3	3	Yes	No	No	Yes	No	No	No	No
289	10	Metrosideros excelsa	Sidewalk	1	1	3	3	Yes	Yes	No	No	Yes	No	No	No
290	12	Metrosideros excelsa	Sidewalk	1	1	3	3	Yes	Yes	No	No	Yes	No	No	No
291	28	Cedrus atlantica	Building	2	1	3	1	Yes	No	No	Yes	No	Yes	No	No
292	55	Pinus pinea	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	Yes	No	No
293	16	Pinus thunbergii	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
294	11	Pittosporum tobiria	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
295	11	Pittosporum tobiria	Building	1	1	3	1	No	No	No	Yes	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
296	13	Pittosporum spp	Building	1	1	3	1	Yes	Yes	No	Yes	No	No	No	No
297	15	Unknown	Building	1	1	3	3	No	No	No	Yes	No	No	No	No
298	11	Thuja occidentalis	Building	1	1	3	3	Yes	No	No	Yes	No	No	No	No
299	14	Pinus thunbergii	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
300	11	Rhododendron spp	Building	1	1	3	3	Yes	No	No	Yes	No	No	No	No
301	30	Acacia melanoxylon	Road	3	3	3	1	No	No	No	No	No	No	No	No
302	25	Acacia melanoxylon	Road	3	2	3	1	No	No	No	No	No	No	No	No
303	58	Taxus stricta	Pedestrian Area	1	1	3	3	No	No	No	Yes	No	No	No	No
304	14	Magnolia grandiflora	Road	1	1	3	3	Yes	No	No	No	No	No	No	No
305	16	Magnolia grandiflora	Road	1	1	3	3	Yes	No	No	No	No	No	No	No
306	16	Magnolia grandiflora	Road	1	1	3	2	Yes	No	No	No	Yes	No	No	No
307	13	Magnolia grandiflora	Road	2	1	3	1	No	No	No	No	Yes	No	No	No
308	64	Pinus radiata	Road	2	2	3	1	No	No	No	No	No	No	No	No
309	12	Pittosporum spp	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
310	12	Pinus canariensis	Pedestrian Area	1	1	3	3	No	No	No	No	No	No	No	No
311	16	Griselinia spp	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
312	54	Pinus pinea	Road	2	3	3	3	No	No	No	No	No	No	No	No
313	15	Pinus pinea	Pedestrian Area	1	1	3	2	No	No	Yes	No	No	No	No	No
314	18	Pinus sylvestris	Pedestrian Area	1	1	3	2	Yes	No	No	Yes	No	No	No	No
315	28	Pinus pinea	Sidewalk	4	3	3	1	No	No	No	No	No	No	No	No
316	40	Acacia melanoxylon	Sidewalk	3	2	3	1	No	No	No	No	No	No	No	No
318	28	Acacia melanoxylon	Road	2	1	3	1	Yes	Yes	No	No	No	Yes	No	No
319	25	Syzygium aromatica	Sidewalk	1	1	3	1	Yes	Yes	No	No	No	No	No	No
320	42	Corymbia ficifolia	Road	2	1	3	1	Yes	Yes	No	No	Yes	No	No	No
321	22	Corymbia ficifolia	Road	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
322	24	Corymbia ficifolia	Road	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
323	24	unknown	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
324	18	Magnolia grandiflora	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
325	35	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
326	22	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
327	13	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
328	33	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
329	22	Corymbia ficifolia	Sidewalk	3	1	3	1	Yes	Yes	No	Yes	No	No	No	No
330	30	Corymbia ficifolia	Sidewalk	3	2	3	1	No	No	No	No	No	No	No	No
331	24	Magnolia grandiflora	Sidewalk	1	1	3	1	No	No	No	Yes	No	No	No	No
332	33	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
333	41	Corymbia ficifolia	Sidewalk	2	1	3	1	Yes	Yes	No	Yes	No	No	No	No
335	55	Pinus radiata	Building	2	2	3	2	Yes	No	No	No	No	No	No	No
337	11	Podocarpus macrophyl	Building	1	1	3	1	No	Yes	No	Yes	No	No	No	No
338	19	Podocarpus macrophyl	Road	1	1	3	2	No	Yes	No	No	Yes	No	No	No
339	14	Podocarpus macrophyl	Road	1	1	3	2	No	Yes	No	No	Yes	No	No	No
340	14	Podocarpus macrophyl	Road	1	1	3	2	No	Yes	No	No	Yes	No	No	No
341	11	Yucca brevifolia	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
342	23	Yucca brevifolia	Sidewalk	1	1	3	3	Yes	No	No	No	No	No	No	No
343	30	Taxus stricta	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
344	30	Taxus stricta	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
345	16	Persea americana	Sidewalk	1	1	3	3	No	Yes	No	Yes	No	No	No	No
346	35	Persea americana	Building	1	1	3	1	No	No	No	No	No	No	No	No
347	18	Podocarpus macrophyl	Building	1	1	3	1	No	No	No	Yes	No	No	No	No
348	12	Podocarpus macrophyl	Building	0	1	3	3	No	No	No	No	No	No	No	No
349	10	Yucca brevifolia	Sidewalk	1	1	3	2	Yes	No	No	No	No	No	No	No
350	12	Yucca brevifolia	Road	1	1	3	2	Yes	No	No	No	No	No	No	No
351	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No
352	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No
353	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No
354	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No
355	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No
356	30	Taxus stricta	Building	1	1	3	2	No	No	No	Yes	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
357	38	Myoporum laetum	Road	1	1	3	1	No	Yes	No	Yes	No	No	No	No
358	42	Pinus radiata	Road	2	1	3	2	Yes	Yes	No	No	No	No	No	No
359	10	Sequoia Sempervirens	Pedestrian Area	1	1	3	3	No	No	Yes	No	No	No	No	No
360	13	Yucca brevifolia	Pedestrian Area	1	1	3	3	Yes	No	No	No	No	No	No	No
361	15	Sequoia Sempervirens	Pedestrian Area	1	1	3	3	No	No	Yes	No	No	No	No	No
362	17	Prunus spp (plum)	Pedestrian Area	2	1	3	1	No	No	No	No	No	No	No	No
363	22	Prunus spp (plum)	Pedestrian Area	1	1	3	2	No	No	No	No	No	No	No	No
364	14	Persea americana	Pedestrian Area	1	1	3	3	No	No	No	No	No	No	No	No
365	10	Prunus cerasifera	Pedestrian Area	1	1	3	2	No	No	No	No	No	No	No	No
366	37	Metrosideros polymor	Pedestrian Area	1	1	3	1	No	No	No	No	No	No	No	No
367	18	Schinus terebinthifo	Pedestrian Area	1	1	3	3	Yes	Yes	No	No	No	No	No	No
368	18	Aesculus glabra	Pedestrian Area	1	1	3	3	Yes	No	Yes	No	No	No	No	No
369	10	Aracucaria heterophy	Pedestrian Area	1	1	3	3	No	No	No	No	No	No	No	No
370	10	Maytenus boaria	Road	1	1	3	3	No	Yes	No	No	Yes	No	No	No
371	10	Heteromeles arbutifo	Road	1	1	3	3	No	No	No	Yes	No	No	No	No
372	12	Chamaecyparis spp	Sidewalk	1	1	3	3	No	No	No	No	Yes	No	No	No
373	30	Pinus canariensis	Sidewalk	2	1	3	3	Yes	Yes	No	No	No	Yes	No	No
374	24	Pinus canariensis	Pedestrian Area	2	1	3	3	Yes	Yes	No	No	No	No	No	No
375	23	Pinus canariensis	Pedestrian Area	2	1	3	3	Yes	Yes	No	No	No	Yes	No	No
376	12	Platanus occidentali	Sidewalk	3	1	3	1	Yes	No	No	No	No	No	No	No
377	15	Platanus occidentali	Sidewalk	3	1	3	1	Yes	No	No	No	No	No	No	No
378	15	Ficus spp	Sidewalk	1	1	3	1	Yes	Yes	No	No	No	No	No	No
379	20	Platanus occidentali	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
380	11	Platanus occidentali	Sidewalk	2	1	3	1	Yes	No	No	No	No	No	No	No
381	16	Ficus spp	Sidewalk	1	1	3	1	Yes	Yes	No	No	No	No	No	No
382	16	Platanus occidentali	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
383	22	Pinus canariensis	Sidewalk	1	1	3	1	Yes	Yes	No	No	No	No	No	No
384	17	Platanus occidentali	Sidewalk	2	1	3	1	Yes	Yes	No	No	No	No	No	No
385	23	Pinus canariensis	Sidewalk	1	1	3	1	Yes	Yes	No	No	No	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
386	21	Pinus canariensis	Pedestrian Area	1	1	2	2	Yes	Yes	No	No	No	No	No	No
387	43	Cypress macrocarpa	Building	2	2	3	2	Yes	Yes	No	No	No	No	No	No
388	29	Cypress macrocarpa	Pedestrian Area	2	2	2	3	Yes	Yes	No	No	No	No	No	No
389	37	Cypress macrocarpa	Building	3	2	2	1	Yes	No	No	No	No	No	No	No
390	23	Cypress macrocarpa	Sidewalk	1	1	2	3	Yes	Yes	No	No	No	No	No	No
391	12	Cypress macrocarpa	Sidewalk	3	1	2	1	Yes	No	No	No	No	No	No	No
392	40	Prunus laurocerasus	Pedestrian Area	1	1	3	3	No	No	No	No	No	No	No	No
393	42	Eucalyptus globulus	Sidewalk	2	2	2	3	Yes	Yes	No	No	No	No	No	No
394	12	Chamaecyparis lawson	Sidewalk	1	1	3	3	No	No	No	No	No	No	No	No
395	50	Cypress macrocarpa	Pedestrian Area	2	2	2	2	Yes	Yes	No	No	No	No	No	No
396	22	Acacia melanoxylon	Sidewalk	1	1	3	2	Yes	Yes	No	No	No	No	No	No
397	29	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	No	No	No	No
398	18	Corymbia ficifolia	Sidewalk	2	2	4	1	Yes	Yes	No	No	No	No	No	No
399	35	Sequoia Sempervirens	Sidewalk	1	1	4	1	Yes	Yes	No	No	No	No	No	No
400	20	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
401	30	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
402	46	Corymbia ficifolia	Sidewalk	3	3	4	1	No	No	No	No	No	No	No	No
403	22	Corymbia ficifolia	Sidewalk	2	1	4	1	No	No	No	No	No	No	No	No
404	26	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	No	No	No	No
405	36	Sequoia Sempervirens	Sidewalk	1	1	4	1	Yes	No	No	No	Yes	No	No	No
406	30	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
407	38	Sequoia Sempervirens	Sidewalk	2	1	4	2	Yes	No	No	No	Yes	No	No	No
408	26	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
409	30	Sequoia Sempervirens	Sidewalk	1	1	4	2	Yes	No	No	No	Yes	No	No	No
410	38	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
411	16	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
412	32	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
413	18	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
414	24	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No

iii. Fort Mason Trees Recommended for Pruning and Structural Support System by Priority

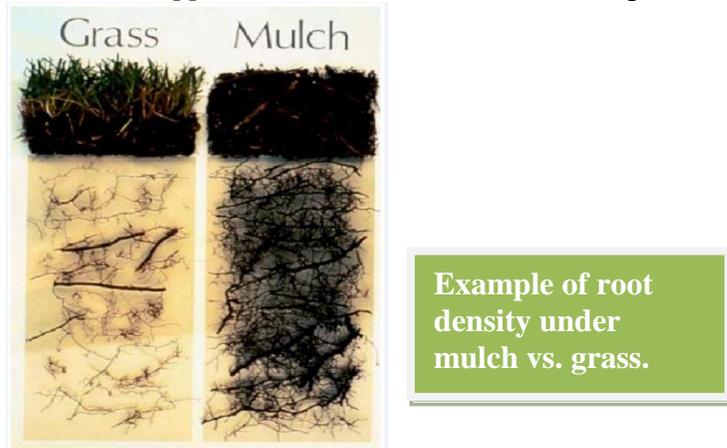
Tree Number	DBH	Tree Type	Infrastructure Interaction	Failure Potential	Size of Defect	Target Rating	GTW Priority	Clean	Thin	Structural	Reduce	Raise	Cable New	Cable Inspect	Brace Rod
415	34	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
416	30	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
417	29	Corymbia ficifolia	Sidewalk	3	3	4	1	No	No	No	No	No	No	No	No
418	25	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	No	No	No	No
419	55	Corymbia ficifolia	Sidewalk	3	2	4	1	No	No	No	No	No	No	No	No
420	18	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	No	No	No	Yes	No	No	No
421	14	Corymbia ficifolia	Sidewalk	2	1	4	1	No	No	No	No	No	No	No	No
422	18	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
423	16	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
424	14	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
425	18	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
426	17	Corymbia ficifolia	Sidewalk	2	1	4	1	Yes	Yes	No	No	Yes	No	No	No
427	13	Pruns spp	Building	1	1	4	1	Yes	Yes	No	Yes	No	No	No	No

\*All Canary Island date palms should be on a yearly maintenance pruning schedule to remove lower fronds that are dead or more than half chlorotic. This will maintain the safety and aesthetics of the plants.

Tree Number	DBH	Tree Type
103	35	Phoenix canariensis
122	34	Phoenix canariensis
161	38	Phoenix canariensis
162	30	Phoenix canariensis
163	32	Phoenix canariensis
164	32	Phoenix canariensis
317	30	Phoenix canariensis
334	34	Phoenix canariensis
336	47	Phoenix canariensis

Soil samples are recommended to determine what nutrients may be lacking in the soil, unfavorable soil pH values, and adequacy of soil organic matter. Following laboratory test results, we can implement a prescription fertilization program to balance soil chemistry and optimize conditions for plant growth.

Proper mulching of all trees is recommended. Mulches provide many benefits for trees and shrubs. Benefits include; moderating soil, temperatures, reducing soil moisture loss, reducing soil compaction, providing nutrients, and improving soil structure. This results in more root growth and healthier plants. (Refer to *Mulch Application Guidelines* Technical Report)



Bulk density is a measure of the level of soil compaction. This information can be used to diagnose problems, or to determine what size holes to dig for planting. Density analysis requires an undisturbed core sample. If soil density exceeds a measured threshold for a given soil type and tree species, Bartlett’s Root Invigoration Program is recommended.

Root collar excavations are recommended for those trees whose buttress roots are covered by excess soil or mulch. Buried root collars can contribute to tree health problems, including girdling roots, basal cankers, and masking root and lower stem decay. (Refer to *Root Collar Disorder* Technical Report)



Bartlett’s patented Root Invigoration Program aims to improve soil conditions by addressing soil compaction, and promoting new root growth, especially for high value trees in disturbed areas. The process includes taking soil samples to determine what nutrients are deficient, performing a root collar excavation, “air-tilling” a portion of the root zone to find fine roots, incorporating organic matter, prescription fertilization (based on soil sample), and proper mulching. The area of the root system treated can vary by tree. For the Root Invigoration Program to be successful, proper watering techniques must be employed after the process is complete.

iv. Fort Mason Soil Management Recommendations

The following trees show signs of poor health/ vigor. Soil samples/ Root Invigoration are recommended under the area of the following trees:

Tree Number	DBH	Tree Type	Root RX	Soil RX
304	14	Magnolia grandiflora	Yes	Yes
305	16	Magnolia grandiflora	Yes	Yes
307	13	Magnolia grandiflora	Yes	Yes
324	18	Magnolia grandiflora	Yes	Yes
331	24	Magnolia grandiflora	Yes	Yes
319	25	Syzygium aromatica	No	Yes

Southern Magnolia (Tree Number 331) exhibiting signs of poor health/vigor.



An Integrated Pest Management Program is recommended for trees within the Fort Mason Golden Gate Historic Park to monitor for potentially damaging insects, diseases and cultural problems that were not evident during the course of the inventory. These pests include but are not limited to:

- Powdery Mildew – on a variety of species, especially *Heteromeles arbutifolia*, observed on Tree Number 59.
- Psyllid – on *Corymbia* species, observed on Tree Number 43.
- Phytophthora Root Rot and Canker – on a variety of tree species.
- Pitch Canker – on Monterey pine, observed on Tree Numbers 6, 335, 338.
- Boring Insects – on a variety of species, especially Monterey pine
- Seiridium Canker – on a variety of species, especially Monterey cypress. Observed on Tree Number 15.
- Botryoshaeria Canker – on a variety of species, especially coast redwood
- Fusarium Wilt – on Canary Island date palm
- Pink Rot – on Canary Island date palm

Pitch Canker – is a fungal disease of many pine species including Monterey pine. Infection occurs in wounds, and form resin soaked perennial cankers. Over time the perennial cankers girdle and kill affected parts of the tree. Common symptoms of pitch canker include shoot die back and limb/ trunk cankers. There is no chemical treatment for pitch canker. The best way to prevent the disease is keeping potential host trees healthy through soil management, integrated pest management, and proper pruning practices.

Seiridium Canker – is a fungal disease of many tree species including Monterey cypress. Branch or top death occurs from girdling by lesions that start in wounds on the bases of twigs/ branches. The lesions begin as brown areas where resin begins to exude. The lesions soon become sunken cankers. There is no chemical treatment for seiridium canker. The best way to prevent the disease is keeping potential host trees healthy through soil management, integrated pest management, and proper pruning practices.

Fusarium Wilt – is a vascular wilt disease of many palms including Canary Island date palm. Symptoms develop on lower fronds and progress upward. Pinnae and spines begin to desiccate and die from the petiole base outward to the frond tip in a one-sided manner. Mature trees die in a few months. There is no chemical treatment for fusarium wilt. The best way to prevent the disease is keeping potential host trees healthy through soil management, integrated pest management, and proper pruning practices.

Pink Rot – is a fungal disease that causes leaf spots, sheath decay, bud rot, and stem rot on several palms including Canary Island date palm. The fungus enters the plant through wounds or damaged tissue. The most characteristic sign of the disease is the pinkish or orange mass of spores which are common on dead sections of the plant.

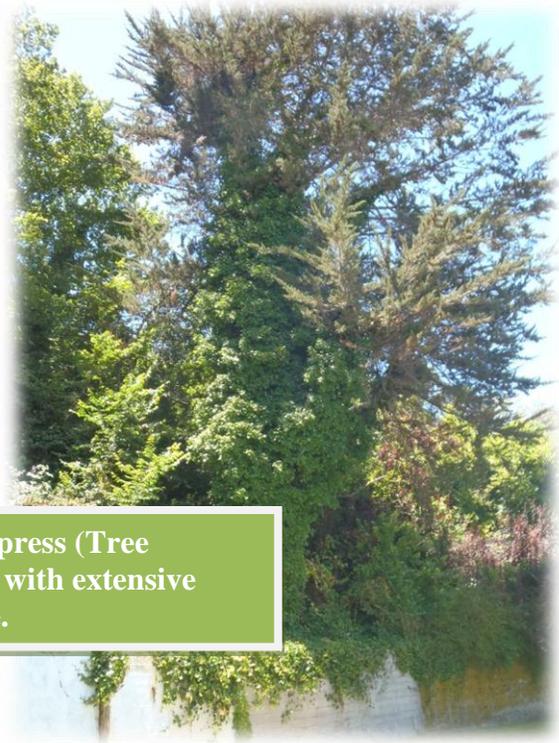
The following trees are recommended for vine removal. In some cases the vines are so dense that a complete visual inspection of the tree trunk or crown is impossible.

Tree Number	DBH	Tree Type	Vines
20	40	Eucalyptus globulus	vines
21	55	Eucalyptus globulus	vines
22	34	Eucalyptus globulus	vines
23	42	Eucalyptus globulus	vines
34	68	Eucalyptus globulus	vines
35	13	Heteromeles arbutifo	vines
47	18	Corymbia maculata	vines
61	16	Heteromeles arbutifo	vine
65	25	Corymbia maculata	vines
68	22	Cypress macrocarpa	vines
69	12	Eucalyptus spp	vines
70	45	Eucalyptus spp	vines
71	40	Cypress macrocarpa	vines
72	37	Cypress macrocarpa	vines
74	12	Heteromeles arbutifo	vines
77	16	Yucca brevifolia	vines
78	11	Heteromeles arbutifo	vines
79	14	Pittosporum spp	vines
86	18	Heteromeles arbutifo	vines
87	36	Cypress macrocarpa	vines
89	37	Pittosporum spp	vines
90	10	Pittosporum spp	vines
91	69	Cypress macrocarpa	vines
97	20	Thuja plicata	vines
113	12	Griselina litoralis	vines
118	95	Eucalyptus globulus	vines
119	18	Heteromeles arbutifo	vines
124	11	Acacia melanoxylon	vines
126	15	Pittosporum spp	vines
133	44	Eucalyptus globulus	vines
134	16	Platanus occidentali	vines
135	13	Acacia melanoxylon	vines
136	25	Eucalyptus globulus	vines
138	11	Acacia melanoxylon	vines
139	12	Acacia melanoxylon	vines
142	17	Acacia melanoxylon	vines
143	24	Acacia melanoxylon	vines
144	11	Acacia melanoxylon	vines
145	19	Acacia melanoxylon	vines
146	25	Pittosporum spp	vines
147	38	Cedrus atlantica	vines

Tree Number	DBH	Tree Type	Vines
148	43	Eucalyptus globulus	vines
149	15	Corymbia ficifolia	vines
150	48	Eucalyptus globulus	vines
151	43	Eucalyptus globulus	vines
152	32	Eucalyptus globulus	vines
153	38	Eucalyptus globulus	vines
154	28	Eucalyptus globulus	vines
155	75	Eucalyptus globulus	vines
156	18	Yucca brevifolia	vines
158	15	Acacia melanoxylon	vines
159	40	Pruns spp	vines
162	30	Phoenix canariensis	vines
163	32	Phoenix canariensis	vines
166	27	Cypress macrocarpa	vines
168	52	Cypress macrocarpa	vines
169	77	Cypress macrocarpa	vines
170	53	Cypress macrocarpa	vines
173	45	Eucalyptus globulus	vines
183	34	Cypress macrocarpa	vines
184	48	Cypress macrocarpa	vines
185	18	Cypress macrocarpa	vines
186	15	Cypress macrocarpa	vines
187	36	Cypress macrocarpa	vines
188	33	Cypress macrocarpa	vines
189	28	Cypress macrocarpa	vines
190	66	Cypress macrocarpa	vines
191	31	Cypress macrocarpa	vines
192	70	Cypress macrocarpa	vines
193	55	Cypress macrocarpa	vines
195	56	Cypress macrocarpa	vines
303	58	Taxus stricta	vines
335	55	Pinus radiata	vines
388	29	Cypress macrocarpa	vines
389	37	Cypress macrocarpa	vines
390	23	Cypress macrocarpa	vines
391	12	Cypress macrocarpa	vines
394	12	Chamaecyparis lawson	vines
395	50	Cypress macrocarpa	vines



Monterey Cypress (Tree Number 87) with extensive vine coverage.



Monterey Cypress (Tree Number 395) with extensive vine coverage.



vii. Fort Mason Conditions Observed

Tree Number	DBH	Tree Type	Co-dominant	Cavity Stem	Cavity Root Flare	Cavity Crown	Sweep	Lean	Crack Stem	Crack Limb	Conk	Poor Structure	Girdling root	Wound Stem	Wound Root Flare	Wound Crown	Hanger	Storm	Topping
43	29	Corymbia maculata	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
44	15	Corymbia maculata	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
49	10	Corymbia maculata	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
50	24	Corymbia maculata	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
51	13	Corymbia maculata	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
53	31	Cypress macrocarpa	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
54	36	Cypress macrocarpa	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
55	37	Cypress macrocarpa	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
56	36	Cypress macrocarpa	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
58	36	Eucalyptus globulus	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No
62	22	Eucalyptus globulus	No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
63	34	Corymbia maculata	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
72	37	Cypress macrocarpa	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
73	40	Cypress macrocarpa	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
75	12	Yucca brevifolia	No	No	No	Yes	No	No	No	No	No	No	No	No	No	Yes	No	No	No
80	18	Pittosporum spp	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
91	69	Cypress macrocarpa	Yes	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No
93	59	Magnolia grandiflora	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
96	35	Chamaecyparis spp	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
101	11	Yucca brevifolia	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No
103	35	Phoenix canariensis	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
104	86	Eucalyptus globulus	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No
105	20	Pinus pinea	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
112	11	Griselinia littoralis	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
113	12	Griselinia littoralis	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
114	12	Chamaecyparis spp	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
116	42	Eucalyptus globulus	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
117	83	Eucalyptus globulus	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No
118	95	Eucalyptus globulus	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
121	10	Yucca brevifolia	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No	No	No









vii. Fort Mason Conditions Observed

Tree Number	DBH	Tree Type	Co-dominate	Cavity Stem	Cavity Root Flare	Cavity Crown	Sweep	Lean	Crack Stem	Crack Limb	Conk	Poor Structure	Girdling root	Wound Stem	Wound Root Flare	Wound Crown	Hanger	Storm	Topping
419	55	Corymbia ficifolia	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
420	18	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
421	14	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
422	18	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
423	16	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
424	14	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
425	18	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
426	17	Corymbia ficifolia	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
427	13	Pruns spp	Yes	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

The following trees are cause sidewalk lifting/ damage:

Tree Number	DBH	Tree Type
73	40	Cypress macrocarpa
250	49	Cypress macrocarpa
325	35	Corymbia ficifolia
326	22	Corymbia ficifolia
328	33	Corymbia ficifolia



**Red Gum (Tree Number 325) causing sidewalk lifting and damage.**

vii. Fort Mason Conditions Observed

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
1	51	N/A	Eucalyptus globulus	35	Mature	Yes	110	YES	1	Good	0%	1
2	54	N/A	Eucalyptus globulus	20	Mature	Yes	110	No	1	Good	0%	1
3	36	N/A	Eucalyptus globulus	30	Mature	Yes	100	No	1	Good	0%	1
4	37	N/A	Eucalyptus globulus	30	Mature	Yes	100	No	3	Fair	0%	1
5	65	N/A	Eucalyptus globulus	35	Mature	Yes	100	No	1	Good	0%	1
6	69	N/A	Pinus radiata	25	Mature	Yes	55	No	1	Poor	1 to 25%	1
7	100	N/A	Eucalyptus globulus	35	Mature	Yes	75	No	1	Good	0%	1
8	12	N/A	Eucalyptus globulus	5	Semi-Mature	No	30	No	1	Good	0%	3
9	53	N/A	Eucalyptus globulus	25	Mature	Yes	75	No	1	Fair	0%	1
10	20	N/A	Eucalyptus globulus	10	Semi-Mature	No	20	No	2	Poor	0%	1
11	39	N/A	Eucalyptus globulus	30	Mature	No	70	No	1	Fair	0%	2
12	42	N/A	Eucalyptus globulus	20	Mature	Yes	70	No	1	Fair	0%	1
13	59	N/A	Eucalyptus globulus	30	Mature	Yes	70	No	1	Fair	0%	1
14	28	N/A	Cypress macrocarpa	40	Mature	Yes	60	No	1	Fair	26 to 50%	1
15	15	N/A	Cypress macrocarpa	10	Young	No	15	No	1	Poor	1 to 25%	1
16	21	N/A	Corymbia maculata	15	Semi-Mature	No	20	No	1	Good	0%	3
17	16	N/A	Corymbia maculata	15	Semi-Mature	No	30	No	1	Fair	0%	2
18	23	N/A	Corymbia ficifolia	20	Semi-Mature	No	40	No	1	Good	0%	2
19	72	N/A	Eucalyptus globulus	30	Mature	Yes	65	No	1	Fair	0%	1
20	40	N/A	Eucalyptus globulus	35	Mature	Yes	60	No	1	Good	0%	1
21	55	N/A	Eucalyptus globulus	35	Mature	Yes	65	No	1	Good	0%	1
22	34	N/A	Eucalyptus globulus	25	Mature	Yes	65	No	1	Fair	0%	1
23	42	N/A	Eucalyptus globulus	30	Mature	Yes	70	No	1	Good	0%	1
24	29	N/A	Cypress macrocarpa	25	Mature	Yes	60	No	1	Good	1 to 25%	1
25	36	N/A	Cypress macrocarpa	20	Mature	Yes	70	No	1	Good	0%	1
26	17	N/A	Eucalyptus globulus	10	Semi-Mature	No	65	No	1	Good	0%	3
27	47	N/A	Cypress macrocarpa	25	Mature	Yes	65	No	1	Good	1 to 25%	1
28	29	N/A	Cypress macrocarpa	10	Over-mature	Yes	45	No	1	Poor	0%	1

viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
29	57	N/A	Cypress macrocarpa	25	Over-mature	Yes	50	No	1	Fair	0%	1
30	20	N/A	Cypress macrocarpa	15	Semi-Mature	No	40	No	1	Poor	0%	1
31	50	N/A	Cypress macrocarpa	20	Mature	No	50	No	1	Good	0%	1
32	41	N/A	Eucalyptus globulus	25	Mature	Yes	80	No	1	Good	0%	2
33	40	N/A	Eucalyptus globulus	30	Mature	Yes	65	No	3	Good	1 to 25%	1
34	68	N/A	Eucalyptus globulus	40	Mature	Yes	65	No	3	Good	26 to 50%	1
35	13	N/A	Heteromeles arbutifo	15	Mature	No	30	No	1	Good	26 to 50%	1
36	32	N/A	Cypress macrocarpa	20	Mature	Yes	55	No	1	Fair	0%	1
37	14	N/A	Cypress macrocarpa	5	Semi-Mature	No	15	No	1	Poor	0%	2
38	33	N/A	Cypress macrocarpa	20	Mature	Yes	60	No	1	Fair	0%	2
39	20	N/A	Cypress macrocarpa	10	Semi-Mature	No	50	No	1	Good	0%	3
40	31	N/A	Eucalyptus globulus	30	Mature	Yes	55	No	1	Good	0%	2
41	29	N/A	Cypress macrocarpa	15	Semi-Mature	No	50	No	1	Fair	0%	1
42	35	N/A	Cypress macrocarpa	20	Mature	Yes	60	No	1	Good	0%	1
43	29	N/A	Corymbia maculata	25	Mature	Yes	60	No	1	Good	26 to 50%	1
44	15	N/A	Corymbia maculata	10	Semi-Mature	No	15	No	1	Fair	26 to 50%	2
45	12	N/A	Corymbia maculata	10	Semi-Mature	No	30	No	1	Fair	0%	3
46	12	N/A	Corymbia maculata	5	Semi-Mature	No	30	No	1	Poor	1 to 25%	2
47	18	N/A	Corymbia maculata	10	Semi-Mature	No	40	No	1	Fair	26 to 50%	3
48	12	N/A	Corymbia maculata	15	Semi-Mature	No	20	No	1	Fair	0%	2
49	10	N/A	Corymbia maculata	15	Young	No	15	No	1	Fair	0%	3
50	24	N/A	Corymbia maculata	10	Semi-Mature	No	10	No	1	Fair	0%	3
51	13	N/A	Corymbia maculata	5	Semi-Mature	No	30	No	1	Fair	0%	3
52	35	N/A	Cypress macrocarpa	15	Mature	No	55	No	1	Good	0%	3
53	31	N/A	Cypress macrocarpa	20	Mature	Yes	55	No	1	Good	1 to 25%	2
54	36	N/A	Cypress macrocarpa	20	Over-mature	Yes	70	No	1	Good	26 to 50%	2
55	37	N/A	Cypress macrocarpa	20	Mature	Yes	60	No	1	Fair	26 to 50%	2
56	36	N/A	Cypress macrocarpa	25	Mature	Yes	65	No	1	Good	26 to 50%	2

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
57	19	N/A	Cypress macrocarpa	10	Young	No	35	No	1	Poor	26 to 50%	3
58	36	N/A	Eucalyptus globulus	30	Mature	Yes	70	No	1	Fair	26 to 50%	1
59	14	N/A	Heteromeles arbutifo	10	Mature	No	15	No	3	Good	1 to 25%	3
60	31	N/A	Heteromeles arbutifo	10	Mature	No	15	No	7	Good	1 to 25%	3
61	16	N/A	Heteromeles arbutifo	5	Young	No	50	No	1	Fair	0%	3
62	22	N/A	Eucalyptus globulus	10	Semi-Mature	No	90	No	1	Fair	1 to 25%	2
63	34	N/A	Corymbia maculata	30	Mature	Yes	90	No	1	Fair	1 to 25%	2
64	13	N/A	Corymbia maculata	10	Semi-Mature	No	60	No	1	Fair	1 to 25%	3
65	25	N/A	Corymbia maculata	15	Mature	Yes	70	No	1	Fair	0%	3
66	18	N/A	Corymbia maculata	15	Mature	No	70	No	1	Fair	0%	3
67	26	N/A	Corymbia maculata	30	Mature	Yes	80	No	1	Good	0%	3
68	22	N/A	Cypress macrocarpa	15	Semi-Mature	No	40	No	1	Fair	1 to 25%	3
69	12	N/A	Eucalyptus spp	15	Semi-Mature	No	30	No	3	Fair	0%	3
70	45	N/A	Eucalyptus spp	40	Mature	Yes	80	No	1	Good	0%	1
71	40	N/A	Cypress macrocarpa	25	Mature	Yes	80	No	1	Good	26 to 50%	3
72	37	N/A	Cypress macrocarpa	20	Mature	Yes	70	No	1	Fair	0%	2
73	40	N/A	Cypress macrocarpa	25	Mature	Yes	55	No	1	Good	26 to 50%	1
74	12	N/A	Heteromeles arbutifo	10	Young	No	15	No	1	Fair	0%	3
75	12	N/A	Yucca brevifolia	5	Semi-Mature	No	15	No	1	Poor	1 to 25%	3
76	15	N/A	Heteromeles arbutifo	15	Mature	No	20	No	3	Good	1 to 25%	3
77	16	N/A	Yucca brevifolia	5	Mature	No	15	No	3	Poor	26 to 50%	3
78	11	N/A	Heteromeles arbutifo	5	Mature	No	15	No	3	Good	0%	3
79	14	N/A	Pittosporum spp	10	Mature	No	20	No	1	Fair	1 to 25%	2
80	18	N/A	Pittosporum spp	10	Mature	No	20	No	2	Good	1 to 25%	3
81	31	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Good	1 to 25%	2
82	32	N/A	Cypress macrocarpa	20	Mature	No	40	No	1	Good	26 to 50%	2
83	32	N/A	Cypress macrocarpa	20	Mature	No	45	No	1	Good	1 to 25%	3
84	30	N/A	Cypress macrocarpa	20	Mature	No	50	No	1	Good	1 to 25%	2

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
85	56	N/A	Pittosporum spp	20	Mature	No	25	No	10	Good	0%	3
86	18	N/A	Heteromeles arbutifo	20	Mature	No	35	No	1	Good	0%	3
87	36	N/A	Cypress macrocarpa	30	Mature	No	60	No	1	Good	26 to 50%	2
88	25	N/A	Yucca brevifolia	10	Mature	Yes	20	No	3	Good	1 to 25%	3
89	37	N/A	Pittosporum spp	10	Mature	No	30	No	5	Poor	0%	3
90	10	N/A	Pittosporum spp	5	Mature	No	15	No	1	Fair	0%	3
91	69	15	Cypress macrocarpa	25	Mature	No	60	No	1	Good	1 to 25%	2
92	40	14	Sequoiadendron gigan	10	Mature	Yes	50	No	1	Good	0%	3
93	59	13	Magnolia grandiflora	25	Mature	Yes	40	No	1	Poor	1 to 25%	1
94	26	12	Cryptomeria japonica	20	Mature	Yes	60	No	1	Good	1 to 25%	3
95	55	8	Cedrus deodara	25	Mature	Yes	60	No	1	Good	26 to 50%	3
96	35	N/A	Chamaecyparis spp	15	Mature	Yes	40	No	7	Good	51 to 75	3
97	20	N/A	Thuja plicata	10	Mature	Yes	20	No	7	Fair	1 to 25%	3
98	50	N/A	Taxus stricta	10	Mature	No	15	No	10	Good	26 to 50%	3
99	16	N/A	Syzygium paniculatum	10	Mature	No	30	No	1	Good	0%	3
100	18	N/A	Syzygium paniculatum	10	Mature	Yes	25	No	1	Fair	26 to 50%	3
101	11	N/A	Yucca brevifolia	5	Mature	Yes	10	No	1	Fair	0%	3
102	24	19	Acacia melanoxylon	20	Mature	Yes	55	No	1	Good	51 to 75	3
103	35	18	Phoenix canariensis	10	Mature	Yes	55	No	1	Good	0%	2
104	86	21	Eucalyptus globulus	35	Mature	Yes	80	No	1	Good	0%	1
105	20	N/A	Pinus pinea	10	Mature	No	35	No	1	Fair	26 to 50%	2
106	14	N/A	Pinus pinea	15	Mature	No	10	No	1	Fair	51 to 75	2
107	12	N/A	Prunus laurocerasus	10	Mature	No	15	No	5	Fair	1 to 25%	2
108	11	N/A	Acacia melanoxylon	15	Mature	No	20	No	1	Good	1 to 25%	3
109	35	N/A	Prunus laurocerasus	10	Mature	No	15	No	10	Good	1 to 25%	3
110	11	N/A	Leptospermum scoparium	5	Mature	No	10	No	9	Poor	1 to 25%	2
111	20	N/A	Griselinia littoralis	10	Mature	No	15	No	10	Good	1 to 25%	3

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
112	11	N/A	Griselina litoralis	10	Mature	Yes	15	No	5	Good	1 to 25%	3
113	12	N/A	Griselina litoralis	10	Mature	Yes	20	No	4	Good	1 to 25%	3
114	12	N/A	Chamaecyparis spp	15	Mature	Yes	40	No	2	Good	1 to 25%	3
115	34	<b>28</b>	Aracucaria heterophy	20	Mature	Yes	80	No	1	Good	0%	3
116	42	<b>27</b>	Eucalyptus globulus	30	Mature	Yes	70	No	1	Good	1 to 25%	1
117	83	<b>26</b>	Eucalyptus globulus	35	Mature	Yes	70	No	1	Good	1 to 25%	1
118	95	<b>25</b>	Eucalyptus globulus	30	Mature	Yes	70	No	1	Good	51 to 75	1
119	18	N/A	Heteromeles arbutifo	10	Mature	No	10	No	8	Fair	1 to 25%	3
120	11	N/A	Pittosporum tobiria	5	Mature	No	10	No	2	Good	1 to 25%	1
121	10	N/A	Yucca brevifolia	5	Mature	Yes	10	No	3	Fair	26 to 50%	2
122	34	<b>24</b>	Phoenix canariensis	10	Mature	Yes	50	No	1	Fair	0%	3
123	13	N/A	Corynocarpus laeviga	10	Mature	No	10	No	2	Good	1 to 25%	3
124	11	N/A	Acacia melanoxylon	10	Semi-Mature	No	20	No	1	Good	1 to 25%	3
125	25	N/A	Corynocarpus laevigt	5	Mature	No	15	No	3	Poor	1 to 25%	1
126	15	N/A	Pittosporum spp	10	Mature	Yes	10	No	2	Fair	1 to 25%	3
127	10	N/A	Yucca brevifolia	5	Mature	Yes	15	No	3	Good	1 to 25%	2
128	10	N/A	Umbellularia califor	5	Mature	Yes	10	No	4	Good	1 to 25%	3
129	14	N/A	Pittosporum spp	10	Mature	No	10	No	1	Good	1 to 25%	3
130	13	N/A	Pittosporum spp	10	Mature	Yes	15	No	3	Good	1 to 25%	1
131	18	N/A	Yucca brevifolia	10	Mature	No	20	No	1	Good	1 to 25%	3
132	16	N/A	Yucca brevifolia	5	Mature	Yes	10	No	1	Poor	1 to 25%	1
133	44	N/A	Eucalyptus globulus	35	Mature	Yes	90	No	1	Good	0%	1
134	16	N/A	Platanus occidentali	25	Mature	Yes	60	No	1	Fair	0%	1
135	13	N/A	Acacia melanoxylon	15	Mature	No	75	No	3	Good	1 to 25%	1
136	25	N/A	Eucalyptus globulus	20	Mature	Yes	70	No	1	Good	1 to 25%	3
137	55	N/A	Eucalyptus globulus	30	Mature	Yes	70	No	1	Good	0%	3
138	11	N/A	Acacia melanoxylon	10	Young	No	60	No	2	Fair	0%	
139	12	N/A	Acacia melanoxylon	10	Young	No	60	No	1	Good	0%	

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
140	32	N/A	Acacia melanoxylon	10	Mature	No	60	No	5	Good	1 to 25%	1
141	12	N/A	Acacia spp	10	Semi-Mature	No	10	No	1	Poor	1 to 25%	1
142	17	N/A	Acacia melanoxylon	10	Young	No	60	No	1	Fair	0%	3
143	24	N/A	Acacia melanoxylon	10	Young	No	60	No	5	Fair	0%	3
144	11	N/A	Acacia melanoxylon	10	Semi-Mature	No	60	No	2	Good	0%	3
145	19	N/A	Acacia melanoxylon	10	Semi-Mature	No	60	No	2	Fair	0%	3
146	25	N/A	Pittosporum spp	15	Mature	Yes	15	No	3	Fair	1 to 25%	3
147	38	<b>30</b>	Cedrus atlantica	25	Mature	No	70	No	1	Good	0%	1
148	43	<b>31</b>	Eucalyptus globulus	20	Mature	Yes	95	No	1	Good	0%	2
149	15	<b>33</b>	Corymbia ficifolia	10	Young	No	50	No	1	Fair	0%	3
150	48	N/A	Eucalyptus globulus	30	Mature	Yes	90	No	1	Good	0%	3
151	43	<b>35</b>	Eucalyptus globulus	30	Mature	Yes	80	No	1	Good	0%	3
152	32	N/A	Eucalyptus globulus	15	Mature	Yes	70	No	3	Fair	0%	1
153	38	N/A	Eucalyptus globulus	15	Mature	Yes	70	No	1	Fair	0%	1
154	28	<b>46</b>	Eucalyptus globulus	35	Mature	Yes	110	No	1	Good	0%	2
155	75	<b>23</b>	Eucalyptus globulus	35	Mature	No	120	No	1	Good	0%	2
156	18	N/A	Yucca brevifolia	10	Mature	Yes	15	No	1	Fair	0%	3
157	14	N/A	Acacia melanoxylon	5	Young	No	30	No	3	Good	1 to 25%	2
158	15	<b>20</b>	Acacia melanoxylon	15	Semi-Mature	No	45	No	1	Good	1 to 25%	2
159	40	N/A	Pruns spp	15	Mature	No	10	No	10	Good	1 to 25%	2
160	36	N/A	Acacia melanoxylon	20	Mature	Yes	60	No	2	Good	0%	3
161	38	N/A	Phoenix canariensis	15	Semi-Mature	No	10	No	1	Good	26 to 50%	3
162	30	<b>40</b>	Phoenix canariensis	10	Mature	No	25	No	1	Good	1 to 25%	3
163	32	N/A	Phoenix canariensis	10	Mature	No	25	No	1	Good	0%	3
164	32	N/A	Phoenix canariensis	10	Mature	No	15	No	1	Fair	0%	3
165	12	N/A	Pruns spp	10	Mature	Yes	10	No	3	Good	1 to 25%	3
166	27	<b>67</b>	Cypress macrocarpa	25	Mature	Yes	106	No	1	Fair	1 to 25%	1
167	34	N/A	Cypress macrocarpa	34	Mature	Yes	100	No	1	Poor	0%	1

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
168	52	69	Cypress macrocarpa	30	Mature	Yes	100	No	3	Fair	0%	1
169	77	702	Cypress macrocarpa	30	Mature	Yes	80	No	3	Poor	0%	1
170	53	N/A	Cypress macrocarpa	35	Mature	Yes	90	No	1	Good	0%	1
171	20	N/A	Eucalyptus globulus	20	Mature	No	10	No	1	Good	0%	1
172	32	N/A	Eucalyptus globulus	25	Mature	Yes	20	No	1	Fair	0%	1
173	45	N/A	Eucalyptus globulus	25	Mature	Yes	30	No	3	Fair	0%	1
174	38	73	Cypress macrocarpa	25	Mature	Yes	50	No	1	Good	0%	1
175	14	N/A	Pittosporum spp	15	Mature	Yes	20	No	1	Good	0%	3
176	24	N/A	Heteromeles arbutifo	10	Mature	No	20	No	4	Good	0%	3
177	11	N/A	Pittosporum spp	10	Mature	No	20	No	1	Fair	0%	3
178	20	N/A	Pittosporum spp	10	Mature	No	20	No	1	Good	0%	3
179	15	N/A	Yucca brevifolia	10	Mature	Yes	15	No	1	Good	1 to 25%	3
180	19	N/A	Yucca brevifolia	10	Mature	No	10	No	6	Good	0%	3
181	10	N/A	Pittosporum spp	10	Mature	No	15	No	1	Good	0%	3
182	36	76	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	0%	2
183	34	77	Cypress macrocarpa	25	Mature	Yes	60	No	1	Fair	0%	1
184	48	N/A	Cypress macrocarpa	30	Mature	Yes	60	No	1	Good	0%	1
185	18	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	1	Fair	1 to 25%	1
186	15	N/A	Cypress macrocarpa	15	Mature	No	40	No	1	Fair	1 to 25%	1
187	36	N/A	Cypress macrocarpa	25	Mature	Yes	70	No	1	Fair	0%	1
188	33	N/A	Cypress macrocarpa	25	Mature	Yes	70	No	1	Fair	0%	1
189	28	N/A	Cypress macrocarpa	20	Mature	Yes	70	No	1	Fair	0%	1
190	66	N/A	Cypress macrocarpa	30	Mature	Yes	80	No	1	Good	0%	1
191	31	N/A	Cypress macrocarpa	20	Mature	Yes	80	No	1	Good	1 to 25%	1
192	70	N/A	Cypress macrocarpa	40	Mature	Yes	90	No	1	Good	1 to 25%	1
193	55	N/A	Cypress macrocarpa	30	Mature	Yes	90	No	1	Good	1 to 25%	1
194	38	N/A	Cypress macrocarpa	30	Mature	Yes	90	No	1	Good	1 to 25%	1
195	56	N/A	Cypress macrocarpa	30	Mature	Yes	60	No	1	Good	1 to 25%	2

viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
196	56	N/A	Cypress macrocarpa	30	Mature	Yes	60	No	2	Good	1 to 25%	1
197	35	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	2	Good	1 to 25%	1
198	12	N/A	Cypress macrocarpa	15	Semi-Mature	No	30	No	1	Good	1 to 25%	3
199	38	N/A	Cypress macrocarpa	20	Mature	No	30	No	1	Good	1 to 25%	1
200	19	N/A	Cypress macrocarpa	10	Mature	No	20	No	1	Dead	1 to 25%	1
201	53	N/A	Cypress macrocarpa	25	Mature	Yes	70	No	1	Good	1 to 25%	1
202	16	N/A	Cypress macrocarpa	5	Mature	Yes	20	No	1	Good	1 to 25%	1
203	18	N/A	Cypress macrocarpa	50	Mature	Yes	20	No	1	Good	1 to 25%	1
204	18	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	1
205	16	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Good	1 to 25%	1
206	21	N/A	Cypress macrocarpa	20	Mature	Yes	55	No	1	Good	1 to 25%	1
207	21	N/A	Cypress macrocarpa	15	Mature	Yes	55	No	1	Good	1 to 25%	1
208	27	N/A	Cypress macrocarpa	20	Mature	Yes	55	No	1	Good	1 to 25%	1
209	15	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Good	1 to 25%	1
210	14	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Good	1 to 25%	1
211	18	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Good	1 to 25%	1
212	26	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Good	0%	2
213	11	N/A	Cypress macrocarpa	10	Mature	No	20	No	1	Fair	0%	2
214	19	N/A	Cypress macrocarpa	10	Mature	No	40	No	1	Fair	0%	3
215	10	N/A	Cypress macrocarpa	5	Mature	No	30	No	1	Fair	0%	3
216	28	N/A	Cypress macrocarpa	15	Mature	No	35	No	1	Fair	0%	3
217	25	N/A	Cypress macrocarpa	20	Mature	No	40	No	1	Good	0%	2
218	22	N/A	Cypress macrocarpa	10	Mature	No	30	No	1	Good	1 to 25%	2
219	51	N/A	Cypress macrocarpa	20	Mature	No	40	No	1	Good	1 to 25%	2
220	11	N/A	Cypress macrocarpa	10	Mature	No	40	No	1	Good	1 to 25%	1
221	19	N/A	Cypress macrocarpa	15	Mature	No	40	No	1	Good	1 to 25%	1
222	26	N/A	Cypress macrocarpa	15	Mature	No	25	No	2	Good	1 to 25%	1
223	40	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	2	Good	1 to 25%	1

viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
224	14	N/A	Cypress macrocarpa	15	Mature	No	45	No	2	Fair	1 to 25%	1
225	23	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	2	Fair	1 to 25%	1
226	12	N/A	Cypress macrocarpa	10	Mature	No	45	No	1	Fair	1 to 25%	1
227	20	N/A	Cypress macrocarpa	15	Mature	Yes	30	No	1	Fair	1 to 25%	1
228	20	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
229	14	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Fair	1 to 25%	1
230	30	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	1
231	21	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	2	Fair	1 to 25%	1
232	14	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Fair	1 to 25%	2
233	35	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	2
234	28	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	2
235	24	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	2	Fair	1 to 25%	2
236	18	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Fair	1 to 25%	1
237	28	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
238	26	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
239	40	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
240	17	N/A	Cypress macrocarpa	15	Mature	Yes	50	No	1	Fair	1 to 25%	1
241	22	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
242	44	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
243	31	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	3
244	36	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	2
245	50	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	2	Fair	1 to 25%	2
246	48	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	2	Fair	1 to 25%	1
247	34	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
248	16	N/A	Cypress macrocarpa	20	Mature	Yes	40	No	1	Fair	1 to 25%	1
249	22	N/A	Cypress macrocarpa	15	Mature	Yes	40	No	1	Dead	1 to 25%	1
250	49	N/A	Cypress macrocarpa	30	Mature	Yes	60	No	1	Fair	1 to 25%	1
251	29	N/A	Cypress macrocarpa	20	Mature	Yes	30	No	1	Fair	1 to 25%	1

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
252	34	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	1	Fair	1 to 25%	1
253	55	N/A	Cypress macrocarpa	25	Mature	Yes	60	No	1	Fair	1 to 25%	1
254	47	N/A	Cypress macrocarpa	25	Mature	Yes	60	No	1	Fair	1 to 25%	2
255	33	N/A	Cypress macrocarpa	25	Mature	Yes	55	No	1	Fair	1 to 25%	2
256	22	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	2
257	30	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	2
258	23	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	2
259	28	N/A	Cypress macrocarpa	20	Mature	Yes	40	No	1	Fair	1 to 25%	2
260	33	N/A	Cypress macrocarpa	25	Mature	Yes	40	No	2	Fair	1 to 25%	1
261	33	N/A	Cypress macrocarpa	10	Mature	Yes	25	No	1	Fair	1 to 25%	2
262	30	N/A	Cypress macrocarpa	20	Mature	Yes	30	No	1	Fair	1 to 25%	2
263	37	N/A	Cypress macrocarpa	15	Mature	Yes	30	No	1	Fair	1 to 25%	2
264	16	N/A	Cypress macrocarpa	15	Mature	Yes	30	No	1	Fair	1 to 25%	2
265	30	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	2
266	35	N/A	Cypress macrocarpa	25	Mature	Yes	50	No	1	Fair	1 to 25%	2
267	32	N/A	Cypress macrocarpa	20	Mature	Yes	50	No	1	Fair	1 to 25%	2
268	26	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	1	Fair	1 to 25%	2
269	23	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	1	Fair	1 to 25%	2
270	32	N/A	Cypress macrocarpa	20	Mature	Yes	45	No	1	Fair	1 to 25%	3
271	41	N/A	Cypress macrocarpa	30	Mature	Yes	45	No	1	Fair	1 to 25%	2
272	45	N/A	Cypress macrocarpa	30	Mature	Yes	60	No	1	Fair	1 to 25%	2
273	17	N/A	Cypress macrocarpa	15	Semi-Mature	No	30	No	1	Good	1 to 25%	3
274	38	N/A	Cypress macrocarpa	20	Mature	Yes	40	No	1	Good	1 to 25%	3
275	22	N/A	Cypress macrocarpa	20	Mature	Yes	40	No	1	Good	1 to 25%	3
276	19	N/A	Cypress macrocarpa	20	Mature	Yes	40	No	1	Good	1 to 25%	3
277	30	N/A	Myrtus comminus	10	Mature	Yes	10	No	3	Good	1 to 25%	3
278	25	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	3
279	38	N/A	Myrtus comminus	10	Mature	Yes	10	No	5	Good	1 to 25%	3

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
280	12	N/A	Chamaecyparis lawson	10	Mature	Yes	15	No	1	Good	1 to 25%	3
281	10	N/A	Myrtus comminus	10	Mature	Yes	10	No	4	Good	1 to 25%	2
282	17	N/A	Prunus cerasifeva	5	Mature	No	10	No	3	Poor	0%	2
283	14	N/A	Prunus cerasifeva	5	Mature	No	10	No	4	Poor	0%	2
284	17	N/A	Sequoia Sempervirens	5	Semi-Mature	No	10	No	1	Fair	0%	3
285	12	N/A	Sequoia Sempervirens	5	Semi-Mature	No	10	No	1	Fair	0%	3
286	22	N/A	Sequoia Sempervirens	5	Semi-Mature	No	10	No	1	Fair	0%	3
287	46	N/A	Pinus radiata	20	Mature	Yes	80	No	1	Good	0%	1
288	14	N/A	Magnolia grandiflora	10	Mature	Yes	20	No	1	Good	1 to 25%	3
289	10	N/A	Metrosideros excelsa	10	Mature	Yes	35	No	1	Good	26 to 50%	3
290	12	N/A	Metrosideros excelsa	10	Mature	Yes	35	No	1	Good	26 to 50%	3
291	28	N/A	Cedrus atlantica	25	Mature	Yes	45	No	1	Good	1 to 25%	1
292	55	N/A	Pinus pinea	30	Mature	Yes	50	No	1	Good	1 to 25%	1
293	16	N/A	Pinus thunbergii	15	Mature	No	30	No	1	Good	0%	3
294	11	N/A	Pittosporum tobiria	5	Mature	No	10	No	2	Good	1 to 25%	1
295	11	N/A	Pittosporum tobiria	5	Mature	No	10	No	2	Good	1 to 25%	1
296	13	N/A	Pittosporum spp	10	Mature	Yes	15	No	1	Good	1 to 25%	1
297	15	N/A	unknown	10	Mature	No	35	No	2	Good	1 to 25%	3
298	11	N/A	Thuja occidentalis	5	Mature	No	30	No	1	Good	1 to 25%	3
299	14	N/A	Pinus thunbergii	10	Mature	Yes	45	No	1	Good	0%	3
300	11	N/A	Rhododendron spp	5	Mature	No	15	No	2	Fair	1 to 25%	3
301	30	N/A	Acacia melanoxylon	30	Mature	Yes	50	No	1	Poor	1 to 25%	1
302	25	N/A	Acacia melanoxylon	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
303	58	N/A	Taxus stricta	10	Mature	Yes	30	No	10	Good	0%	3
304	14	N/A	Magnolia grandiflora	15	Mature	Yes	25	No	1	Fair	1 to 25%	3
305	16	N/A	Magnolia grandiflora	15	Mature	Yes	25	No	1	Fair	1 to 25%	3
306	16	N/A	Magnolia grandiflora	20	Mature	Yes	25	No	1	Good	1 to 25%	2
307	13	N/A	Magnolia grandiflora	10	Mature	Yes	25	No	1	Poor	1 to 25%	1

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
308	64	N/A	Pinus radiata	40	Mature	Yes	80	No	1	Good	1 to 25%	1
309	12	N/A	Pittosporum spp	10	Mature	No	25	No	1	Good	1 to 25%	1
310	12	N/A	Pinus canariensis	10	Mature	No	30	No	1	Good	0%	3
311	16	N/A	Griselina spp	10	Mature	No	25	No	3	Good	1 to 25%	1
312	54	N/A	Pinus pinea	30	Mature	Yes	65	No	1	Good	1 to 25%	3
313	15	N/A	Pinus pinea	10	Young	No	15	No	1	Good	0%	2
314	18	N/A	Pinus sylvestris	15	Mature	Yes	10	No	1	Fair	0%	2
315	28	N/A	Pinus pinea	25	Mature	No	35	No	1	Fair	1 to 25%	1
316	40	N/A	Acacia melanoxylon	30	Mature	Yes	55	No	2	Fair	1 to 25%	1
317	30	N/A	Phoenix canariensis	10	Mature	Yes	40	No	1	Good	1 to 25%	3
318	28	N/A	Acacia melanoxylon	20	Mature	Yes	55	No	2	Good	1 to 25%	1
319	25	N/A	Syzygium aromatica	15	Mature	Yes	30	No	2	Fair	1 to 25%	1
320	42	N/A	Corymbia ficifolia	15	Mature	No	30	No	3	Good	1 to 25%	1
321	22	N/A	Corymbia ficifolia	15	Mature	Yes	30	No	1	Good	1 to 25%	1
322	24	N/A	Corymbia ficifolia	15	Mature	Yes	35	No	1	Good	1 to 25%	1
323	24	N/A	unknown	15	Mature	No	25	No	3	Good	1 to 25%	1
324	18	N/A	Magnolia grandiflora	20	Mature	No	25	No	1	Fair	1 to 25%	1
325	35	N/A	Corymbia ficifolia	20	Mature	Yes	30	No	1	Good	1 to 25%	1
326	22	N/A	Corymbia ficifolia	20	Mature	Yes	30	No	1	Good	1 to 25%	1
327	13	N/A	Corymbia ficifolia	10	Mature	Yes	25	No	1	Good	1 to 25%	1
328	33	N/A	Corymbia ficifolia	15	Mature	Yes	40	No	1	Good	1 to 25%	1
329	22	N/A	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	1 to 25%	1
330	30	N/A	Corymbia ficifolia	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
331	24	N/A	Magnolia grandiflora	20	Mature	Yes	50	No	1	Fair	1 to 25%	1
332	33	N/A	Corymbia ficifolia	20	Mature	Yes	35	No	1	Good	1 to 25%	1
333	41	N/A	Corymbia ficifolia	20	Mature	Yes	35	No	1	Good	1 to 25%	1
334	34	N/A	Phoenix canariensis	10	Mature	Yes	40	No	1	Good	0%	1
335	55	N/A	Pinus radiata	30	Mature	Yes	45	No	1	Fair	1 to 25%	2

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
336	47	N/A	Phoenix canariensis	15	Mature	Yes	55	No	1	Good	51 to 75	1
337	11	N/A	Podocarpus macrophyl	15	Mature	Yes	20	No	1	Good	1 to 25%	1
338	19	N/A	Podocarpus macrophyl	15	Mature	Yes	20	No	1	Good	1 to 25%	2
339	14	N/A	Podocarpus macrophyl	15	Mature	Yes	20	No	2	Good	1 to 25%	2
340	14	N/A	Podocarpus macrophyl	15	Mature	Yes	20	No	2	Good	1 to 25%	2
341	11	N/A	Yucca brevifolia	5	Mature	Yes	20	No	3	Fair	0%	3
342	23	N/A	Yucca brevifolia	5	Mature	Yes	10	No	3	Poor	26 to 50%	3
343	30	N/A	Taxus stricta	10	Mature	Yes	20	No	10	Good	26 to 50%	1
344	30	N/A	Taxus stricta	10	Mature	Yes	20	No	10	Good	26 to 50%	1
345	16	N/A	Persea americana	15	Mature	Yes	20	No	2	Good	26 to 50%	3
346	35	N/A	Persea americana	15	Mature	Yes	20	No	6	Good	26 to 50%	1
347	18	N/A	Podocarpus macrophyl	15	Mature	Yes	45	No	1	Good	1 to 25%	1
348	12	N/A	Podocarpus macrophyl	5	Mature	Yes	10	No	1	Poor	1 to 25%	3
349	10	N/A	Yucca brevifolia	5	Mature	No	15	No	1	Poor	1 to 25%	2
350	12	N/A	Yucca brevifolia	5	Mature	Yes	10	No	3	Fair	1 to 25%	2
351	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
352	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
353	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
354	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
355	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
356	30	N/A	Taxus stricta	5	Mature	Yes	15	No	10	Good	1 to 25%	2
357	38	N/A	Myoporum laetum	10	Mature	No	30	No	3	Good	1 to 25%	1
358	42	N/A	Pinus radiata	20	Mature	Yes	50	No	1	Good	1 to 25%	2
359	10	N/A	Sequoia Sempervirens	5	Young	No	20	No	1	Good	0%	3
360	13	N/A	Yucca brevifolia	10	Mature	No	15	No	8	Good	0%	3
361	15	N/A	Sequoia Sempervirens	15	Semi-Mature	No	30	No	1	Fair	0%	3
362	17	N/A	Prunus spp (plum)	10	Mature	No	10	No	1	Dead	0%	1
363	22	N/A	Prunus spp (plum)	10	Mature	No	10	No	1	Fair	0%	2

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
364	14	N/A	Persea americana	15	Mature	No	20	No	1	Good	0%	3
365	10	N/A	Prunus cerasifera	5	Mature	No	15	No	1	Fair	0%	2
366	37	N/A	Metrosideros polymor	10	Mature	No	15	No	10	Poor	0%	1
367	18	N/A	Schinus terebinthifo	25	Mature	Yes	25	No	1	Good	0%	3
368	18	N/A	Aesculus glabra	15	Mature	No	15	No	3	Good	0%	3
369	10	N/A	Aracucaria heterophy	50	Semi-Mature	No	20	No	1	Good	0%	3
370	10	N/A	Maytenus boaria	10	Semi-Mature	No	10	No	3	Good	1 to 25%	3
371	10	N/A	Heteromeles arbutifo	10	Mature	No	10	No	3	Good	1 to 25%	3
372	12	N/A	Chamaecyparis spp	20	Mature	No	15	No	1	Good	26 to 50%	3
373	30	N/A	Pinus canariensis	15	Mature	No	50	No	1	Good	1 to 25%	3
374	24	N/A	Pinus canariensis	15	Mature	No	50	No	1	Good	0%	3
375	23	N/A	Pinus canariensis	15	Mature	No	50	No	1	Good	0%	3
376	12	N/A	Platanus occidentali	20	Semi-Mature	No	50	No	1	Good	26 to 50%	1
377	15	N/A	Platanus occidentali	20	Semi-Mature	No	50	No	1	Good	26 to 50%	1
378	15	N/A	Ficus spp	20	Mature	No	50	No	1	Good	1 to 25%	1
379	20	N/A	Platanus occidentali	20	Mature	No	50	No	1	Poor	1 to 25%	1
380	11	N/A	Platanus occidentali	15	Mature	No	50	No	1	Poor	1 to 25%	1
381	16	N/A	Ficus spp	20	Mature	No	50	No	1	Good	1 to 25%	1
382	16	N/A	Platanus occidentali	20	Mature	No	50	No	1	Fair	1 to 25%	1
383	22	N/A	Pinus canariensis	15	Mature	No	50	No	1	Fair	1 to 25%	1
384	17	N/A	Platanus occidentali	25	Mature	No	55	No	1	Fair	26 to 50%	1
385	23	N/A	Pinus canariensis	10	Mature	No	55	No	1	Good	1 to 25%	1
386	21	N/A	Pinus canariensis	15	Mature	No	50	No	1	Good	0%	2
387	43	<b>43</b>	Cypress macrocarpa	25	Mature	Yes	90	No	1	Good	1 to 25%	2
388	29	N/A	Cypress macrocarpa	25	Mature	Yes	85	No	1	Good	0%	3
389	37	N/A	Cypress macrocarpa	25	Mature	Yes	90	No	1	Fair	1 to 25%	1
390	23	<b>46</b>	Cypress macrocarpa	15	Semi-Mature	No	30	No	1	Good	1 to 25%	3
391	12	N/A	Cypress macrocarpa	15	Semi-Mature	No	30	No	1	Fair	1 to 25%	1

## viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
392	40	N/A	Prunus laurocerasus	20	Mature	No	25	No	3	Good	0%	3
393	42	N/A	Eucalyptus globulus	30	Mature	No	80	No	1	Good	1 to 25%	3
394	12	N/A	Chamaecyparis lawson	10	Mature	Yes	70	No	1	Good	1 to 25%	3
395	50	N/A	Cypress macrocarpa	20	Mature	No	80	No	1	Good	1 to 25%	2
396	22	N/A	Acacia melanoxylon	20	Mature	Yes	45	No	1	Good	26 to 50%	2
397	29	<b>83</b>	Corymbia ficifolia	20	Mature	Yes	50	No	1	Good	51 to 75%	1
398	18	<b>84</b>	Corymbia ficifolia	15	Mature	Yes	30	No	1	Fair	51 to 75%	1
399	35	N/A	Sequoia Sempervirens	10	Semi-Mature	No	45	No	1	Good	51 to 75%	1
400	20	<b>85</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	51 to 75%	1
401	30	<b>86</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	51 to 75%	1
402	46	<b>87</b>	Corymbia ficifolia	20	Mature	Yes	55	No	1	Good	51 to 75%	1
403	22	<b>88</b>	Corymbia ficifolia	20	Mature	Yes	30	No	1	Poor	51 to 75%	1
404	26	<b>89</b>	Corymbia ficifolia	20	Mature	Yes	30	No	1	Good	51 to 75%	1
405	36	<b>89</b>	Sequoia Sempervirens	15	Mature	Yes	40	No	1	Good	51 to 75%	1
406	30	<b>90</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	51 to 75%	1
407	38	N/A	Sequoia Sempervirens	20	Mature	Yes	40	No	1	Good	51 to 75%	2
408	26	N/A	Corymbia ficifolia	15	Mature	Yes	35	No	1	Good	51 to 75%	1
409	30	N/A	Sequoia Sempervirens	15	Mature	Yes	45	No	1	Good	51 to 75%	2
410	38	N/A	Corymbia ficifolia	15	Mature	Yes	40	No	1	Good	51 to 75%	1
411	16	<b>93</b>	Corymbia ficifolia	15	Mature	No	30	No	1	Good	51 to 75%	1
412	32	<b>94</b>	Corymbia ficifolia	20	Mature	Yes	45	No	1	Good	51 to 75%	1
413	18	<b>95</b>	Corymbia ficifolia	20	Mature	No	40	No	1	Good	51 to 75%	1
414	24	<b>96</b>	Corymbia ficifolia	20	Mature	No	40	No	1	Good	51 to 75%	1
415	34	<b>97</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	51 to 75%	1
416	30	<b>98</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Good	51 to 75%	1
417	29	<b>99</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Fair	51 to 75%	1
418	25	<b>42</b>	Corymbia ficifolia	15	Mature	Yes	40	No	1	Fair	51 to 75%	1
419	55	<b>43</b>	Corymbia ficifolia	20	Mature	Yes	40	No	1	Fair	51 to 75%	1

viii. Fort Mason Entire Inventory

Tree Number	DBH	Previous Tag	Tree Type	Canopy Radius	Age Class	Historic	Height	Bird Nest	Multi-Stem	Condition	Root Zone	GTW Priority
420	18	44	Corymbia ficifolia	15	Mature	No	30	No	1	Fair	51 to 75%	1
421	14	45	Corymbia ficifolia	15	Mature	No	30	No	1	Poor	51 to 75	1
422	18	46	Corymbia ficifolia	15	Mature	No	30	No	1	Good	51 to 75	1
423	16	47	Corymbia ficifolia	15	Mature	No	30	No	1	Good	51 to 75	1
424	14	48	Corymbia ficifolia	15	Mature	No	25	No	1	Good	51 to 75	1
425	18	49	Corymbia ficifolia	15	Mature	No	25	No	1	Good	51 to 75	1
426	17	N/A	Corymbia ficifolia	15	Mature	No	25	No	1	Good	51 to 75	1
427	13	N/A	Pruns spp	15	Mature	No	25	No	1	Good	1 to 25%	1



## MoniTor IPM program

Bartlett offers a progressive, effective alternative to conventional landscape pest control that I recommend for your property. This would be the most efficient way to manage the insect and disease pest of the plants throughout the property. Bartlett's Integrated Pest Management (IPM) program is called MoniTor, this program requires a greater investment of time, but dramatically reduces the amount of pesticides used by as much as 90 percent. With MoniTor we optimize suppression while minimizing the use of pesticides through preventive maintenance and early detection of problems.

The MoniTor program consists of scheduled visits to inspect the plants around the property for insects, mites, diseases or cultural problems. Nonchemical interference is given first priority. For example, mulching and the release of beneficial insects can be very effective in some instances. When stronger control is needed, we use horticultural oil, insecticidal soap and several of the synthetic pyrethrums. Chemical control is always the last alternative.

Most MoniTor program are designed as follows:

- Schedule a series of inspections for all the woody plants by a trained IPM monitor.
- During each inspection, the monitor will identify and treat insect and disease problems. Low level, non-harmful insect populations will not be treated unless damage to the plant exceeds a tolerable level. Health and aesthetic appearance will determine this level.
- Identification of beneficial insects also would be performed. When present in sufficient numbers, these predatory insects may help control harmful insects, avoiding the use of chemicals.
- If a spray application is warranted, the most benign product available will be used. These products will usually be naturally occurring materials such as oil, soap, pyrethrums or a synthetic material of similar properties. Such products minimally impact both beneficial insects and the environment.
- Cultural treatments such as soil pH adjustment, root collar inspections and mulch adjustments will be included.
- This program will be limited to trees less than 40 feet in height.
- You will receive a written report from the monitor following each inspection. This report will include: description of problems, treatments applied, observations of plant conditions and recommendations.
- As needed, we will perform soil tests in problem areas to identify pH, nutrient or other soil concerns as well as conduct insect and disease analysis from Bartlett's Research Laboratories when problems cannot be identified on site.

An investment in the MoniTor IPM program is an environmentally sound means to maintain your plants in top condition.



BARTLETT TREE

RESEARCH LABORATORIES

CHARLOTTE, NC



# Technical Report



## *Maintenance Pruning Standard: A Simplified View*

*E. Thomas Smiley, Ph. D., Plant Pathologist  
Bruce R. Fraedrich, Ph. D., Plant Pathologist*

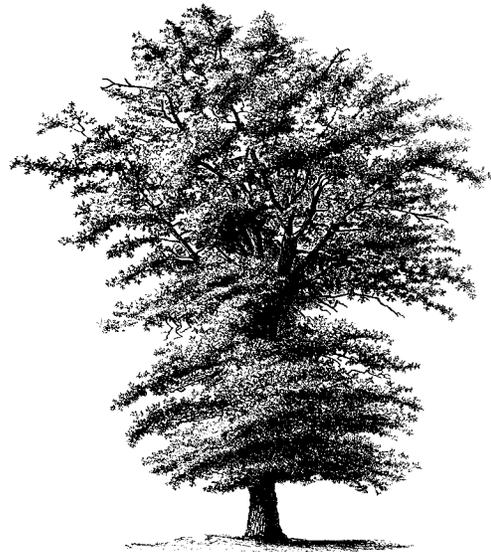
“Correct pruning cuts should be made close to the branch collar. Do not leave stubs and do not injure the collar”. For many years, correct removal of branches has been synonymous with proper tree pruning. The new American National Standards Institute (ANSI) A-300 Pruning Standard brings the *tree* back into focus. It places emphasis on developing pruning goals based on specific needs of the plant. The Standard also provides clear, concise and descriptive terminology that arborists, tree workers and consumers can readily understand.

When pruning, arborists must decide which branches to remove. Will only defective limbs be removed or is there a benefit to thinning out live branches? Should the tree remain the same height and spread or are reductions necessary? Are low limbs interfering with traffic and require raising? What is the size limit on branches to be removed?

Before removing any branches, several factors must be considered. What is the condition of the tree? What are the landscape functions provided by the tree? Will pruning maintain or enhance those functions? Are structural defects or storm damage present that should be removed? Are branches interfering with powerlines,

houses, and walkways? Is the tree too dense or does it need shaping? Will the tree tolerate removal of live branches? What are the customer's expectations and budget? The answers to these questions will govern how and to what extent the tree is pruned.

Four basic pruning techniques are used to maintain trees. Depending on tree requirements, client expectations and budget, one or more of the techniques will be used to maintain the plant.



*Before pruning*

**Crown thinning** is the removal of live, healthy branches on trees with dense crowns. This improves light penetration and air movement, and decreases wind resistance, thus reducing pest infestations and decreasing the risk of storm damage.



*Crown thinning*

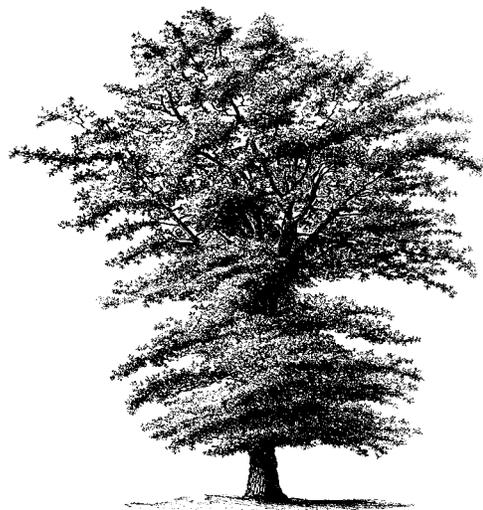
Thinning can also be used to reduce weight of individual limbs and to slow the growth rate on overly vigorous limbs. This pruning technique is most commonly needed on young, rapidly growing trees.

On slower growing mature trees, thinning is mainly used when weight reduction is needed on individual limbs to compensate for structural defects. Usually, thinning is performed in conjunction with crown cleaning.

Virtually all-urban trees benefit from periodic **crown cleaning**. This is the removal of defective limbs including those that are dead, dying, diseased, rubbing, and structurally unsound. Cleaning reduces the risk of branch failures, improves plant health and enhances tree appearance by removing limbs that are unsightly, unhealthy and unsound.

Although removal of healthy branches is technically “thinning”, selective removal of watersprouts is included in the cleaning specification. Before selecting this option, arborists must judge whether sprout

removal will benefit the tree. Stripping sprouts is rarely beneficial and may eventually create many more problems for the tree. The Standard also states that **one-half of the foliage should be evenly distributed in the lower two-thirds of the**



**crown and individual limbs.**

*Crown cleaning*

Unnecessary sprout removal and removal of all lower branches would certainly violate this rule. The concept of not removing sprouts must be clearly conveyed to consumers since many homeowners equate proper pruning with removal of interior limbs. There are a few exceptions where removal of watersprouts is beneficial. Removing sprouts on dogwoods in areas where *Discula* anthracnose is present is recommended to reduce risk of cankers in larger branches, for example.

Leaving interior and lower branches on a tree is equally important when thinning the crown. In order not to violate the *one-half the foliage on the lower two-thirds* rule, the majority of thinning cuts are on the outer portion of the crown, not the inside. This means working with pole tools or from an aerial lift. After large deadwood and structural problems have been corrected using a chainsaw, hand or pneumatic tools are used for thinning.

**Crown reduction** is needed on trees or individual limbs that are growing close to

buildings, other trees, or utility wires. Reduction may also be necessary to prevent or correct storm damage and to shorten errant branches to provide a more desirable shape. This type of pruning involves reducing the height or spread of the crown or individual limbs. Certain species such as beech and sugar maple respond poorly to reductions so consideration must be given to the ability of the species to tolerate this procedure.

When reducing a leader or branch cut back to a lateral branch that is large enough to assume dominance. The size of the remaining lateral is not specified in the Standard since it varies with tree species and tree condition. Typically, a lateral one-third the diameter of the parent limb is selected. If the lateral is smaller, the limb will either dieback or sprout profusely. If the lateral is considerably larger than the one-third guideline, then thinning the remaining lateral should be considered due to the risk of storm damage. The remaining lateral should be growing in a direction that will maintain a desirable shape and not interfere with objects within the pruning cycle.

When lower limbs interfere with mowing, traffic, people or utilities, pruning is needed to provide clearance. While removal of lower limbs goes under many names, the one that has been selected is **crown raising**. Limbs can either be removed at



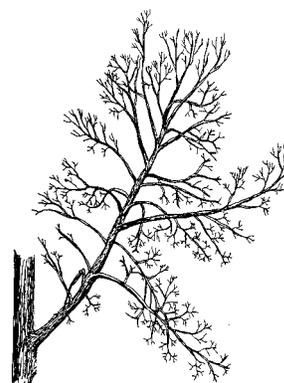
*Crown raising*

the trunk or downward growing branches can be removed at the parent limb. Thinning the ends of a heavy parent limb may accomplish the same goal if the limb raises when weight is removed. When raising is performed, limb levels generally are left at a uniform height around the tree to provide symmetry.

These are the four primary types of maintenance pruning - **thinning, cleaning, reduction and raising**. Other pruning techniques and systems are discussed in the Standard, including **crown restoration, vista pruning, young tree pruning, espalier, pollarding and palm pruning**. These techniques are generally performed to achieve specific goals that are separate from maintenance considerations or are oriented to a specific type of tree. Consult the Standard for descriptions of these pruning types.

The majority of established trees can benefit from **one or more** maintenance pruning types. How can you prune a tree in more than one way? Easy! If a tree is

*Before pruning*



growing next to a house and has deadwood and limbs rubbing against the roof, it needs crown cleaning throughout and reduction or raising of the limbs over the residence. You may use any of the techniques, or combination of techniques, to provide exactly what the tree needs and the customer wants. Choosing the correct pruning technique(s) is relatively easy, even for an inexperienced arborist,

because the tree guides the decision making process. If the tree has deadwood - clean it; if overly thick - thin it; if too tall - reduce it; if too low - raise it. Once the technique(s) have been decided, and then the **size of the smallest limb** to prune is the next consideration. Typically, the sizes that have been used are 1/2", 1", 2" or 4". However, no numbers are specified in the Standard so you can select any size that meets the needs of the specific tree and customer objectives. If 1" minimum is selected, then limbs 1" in diameter at the point of attachment and larger would be removed when the branches meet the requirements of the technique.

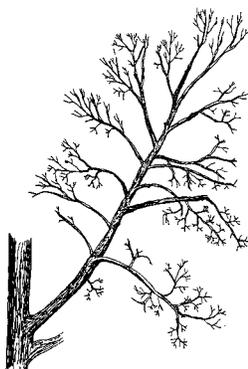
The size of the smallest limb to be pruned should be adjusted for the tree and the client's budget. When crown cleaning a small tree such as a Japanese maple, the smallest branch to remove might be specified at 1/2 inch in diameter. This means that dead, dying, diseased or weak branches greater than 1/2 inch are removed. If 1/4" diameter is chosen instead, the time required to complete the task is easily doubled or tripled.

Arborists and consumers must realize that more is **not** always better when it comes to pruning. The amount of foliage that should be pruned from mature trees is now less than before. The Standard specifies that **not more than one quarter of the leaf**

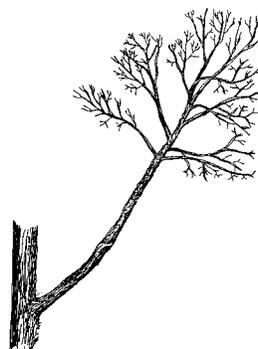
**surface** be removed during a single pruning operation. This will benefit the tree by maintaining a greater leaf surface area for producing photosynthates (energy).

When work is sold, whether to a municipality, commercial account or residential client, the pruning technique and minimum branch size must be specified, explained and discussed. This will foster fair competition and help ensure that both client and arborist understand what is to be accomplished by pruning. There should be no surprises for the client when purchasing tree work. To ensure this, tree workers as well as the arborist must understand the Standard. If a client selects crown cleaning but budget constraints require pruning 2" and larger limbs, then the crew cannot take the time to remove 1/2-inch limbs.

In summary, the new Standard encourages arborists to prune trees based on the tree's need. This is a significant improvement from the days when we tried to "fit" the tree to a predetermined, artificial classification. Basing pruning on the tree's needs make the principles described hold true for hardwoods and conifers, small ornamentals and large shade trees, young trees and mature trees. The terminology in the Standard is a change for most arborists, but it is user friendly and descriptive. Industry professionals as well as consumers should readily adopt the terminology and techniques.



*Correct pruning*



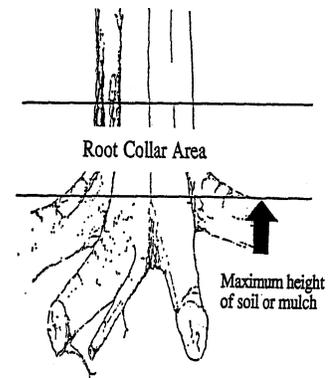
*Improper pruning*



## ROOT COLLAR DISORDERS

A tree's root collar is the area where the roots join the trunk. Root collars flare out from the trunk before leading down to the major roots.

Although root collars may look like roots, this area of a tree is actually part of the trunk. The trunk, unlike roots, is not specialized to resist constant soil moisture. Root collars are meant to be exposed to air, not covered with soil--as we see when trees are excessively mulched or buried too deeply.



When soil covers the root collar, movement of oxygen and carbon dioxide in and out of the inner bark is inhibited. Over a period of years, lack of gas exchange will kill cells and interfere with the downward movement of food to the roots. Eventually you will see root dieback and reduced water uptake, leaving the tree more susceptible to infection and disease.

Problems with buried root collars occur in a number of different situations. Most commonly you will see root collars buried during landscaping projects when fill soil is distributed around the tree. In addition, transplanted trees may settle or be set too deeply in the planting hole. Some trees may even arrive from the nursery with excess soil against the root collar.

Excessive mulch also can lead to death of the root collar. A good rule is that mulch layers should not exceed four inches in thickness and should not be placed against the root collar.

Early symptoms of root collar disorders are yellowing foliage, early leaf coloration and drop, and dieback in the upper crown. Some trees, though, will show no symptoms at all prior to their death during a hot dry period of the summer.

Secondary invaders such as canker disease fungi and insect borers often invade trees stressed by root collar problems. These cankers may cause sunken areas near the soil line. Winter injury is common as well, though usually not apparent until spring. Disruption of the transportation of food and other necessary materials in the tree inhibits growth regulators responsible for hardening off in preparation for winter. The tree is then prone to cold weather damage.

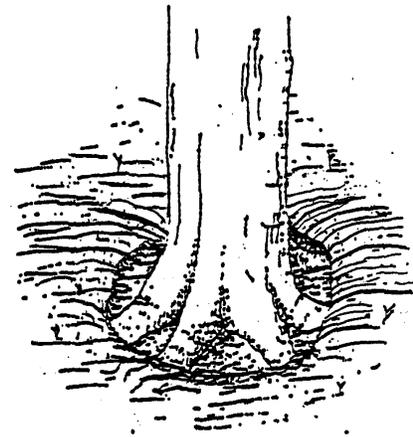
# ROOT COLLAR DISORDERS

Most tree and shrub species are susceptible to problems from buried root collars. Very sensitive plants include sugar maple, California live oak, dogwood, Japanese black pine and Eastern white pine.

The easiest way to check a tree for a root collar disorder is to look for natural root flare. If no flare is present, an excavation should be made to locate the buttress roots. From this, we can determine whether or not the soil or mulch against the collar has started to cause problems.

If a tree is severely declining from a root collar disorder, removal is recommended before the tree becomes hazardous. If symptoms are detected early, remedial actions can be taken that may save the tree. All soil or mulch in contact with the root collar should be removed.

Root collar excavations can be done by carefully using small digging tools and a brush or with a new tool called an air spade. The Air Spade will excavate the soil around the tree by directing a high pressure, high velocity stream of air at the soil. This separates the soil particles and lifts them up and away with the air stream. This method of performing root collar excavations is the least intrusive to the tree's root system.



**Excavated root collar**

The second priority to save a tree from root collar injury is fertilization. The third action is to provide appropriate irrigation during dry periods. Most tree species require one inch of water per week during the growing season. Care should be taken not to overwater. Irrigation water should never be applied directly to the trunk or root collar area.

In summary, trees and shrubs with buried root collars may decline and are more susceptible to attack by secondary pests. It is best to treat the situation as soon as it is discovered by means of a root collar excavation. Other corrective treatments such as fertilizing and mulching will promote tree health and improve chances for recovery.



BARTLETT TREE

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CHARLOTTE, NC



# Technical Report

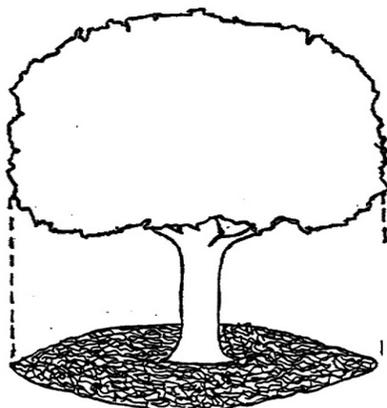


## *Mulch Application Guidelines*

E. Thomas Smiley, Ph. D., Plant Pathologist

Mulches provide many benefits for trees and shrubs. They moderate soil temperatures, reduce soil moisture loss, reduce soil compaction, provide nutrients, improve soil structure, keep mowers and string trimmers away from the trunk. These benefits result in more root growth and healthier plants. When applying mulch the following guidelines should be observed:

1. The best mulch materials are wood chips, bark nuggets, composted leaves or pine needles. Plastic, stone, sawdust, finely shredded bark, and grass clippings should be avoided. Do not use redwood or walnut mulch due to allelopathic effects.



*Figure 1. Mulch should be applied from the trunk to the dripline.*

2. Mulch should be applied from the dripline to the trunk (Figure 1). If this

is not practical, minimum mulch circle radii should be 3 feet for small trees, 8 feet for medium trees and 12 feet for large trees.

3. When applying mulch it is not necessary to kill or remove existing ground cover. However, turf should be mowed very short and clippings removed prior to application. Mulch should be applied directly to the soil surface, do not use landscape fabric to separate the mulch from the soil.



*Figure 2. Mulch layer should be 2-4 inches thick and not be against the trunk.*

4. Mulch layer should be 2-4 inches thick depending on tree species and mulch (Figure 2).
5. Additional mulch should be added to maintain a 2-4 inch depth.
6. Mulch should not be placed against the trunk (Figure 2). Mulch will retain too much moisture against the trunk, potentially resulting in disease problems.



BARTLETT TREE

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# Technical Report



## *Tree Structure Evaluation*

*Bruce R. Fraedrich, Ph. D., Plant Pathologist*

The urban forest is aging and declining at an increasing rate. At the same time, society is becoming more litigious. As a result, detection, evaluation and management of defective trees now are a major concern for arborists, urban foresters and park managers.

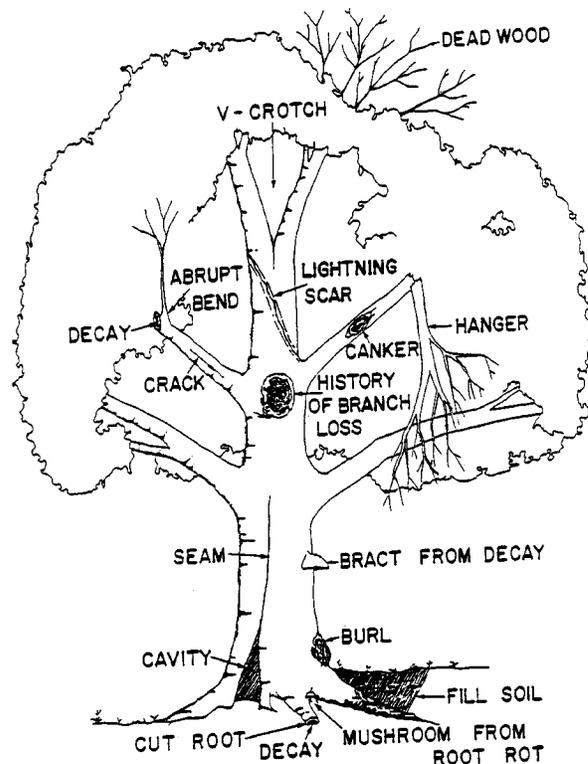
### **HAZARDOUS TREES DEFINED**

A tree is considered hazardous when it has a structural defect that predisposes it to failure and the tree is located near a target (an area where property damage or personal injury could occur if the tree failed). Targets include areas around structures, walkways, roadways, campsites and other areas where there are property and people.

Structurally sound trees also may be hazardous if plant parts interfere with routine activities of people such as obstructing motorists' vision, raising sidewalk, interfering with utilities, roadways or walkways.

### **LIABILITIES**

Property owners/managers have a legal obligation to (1) periodically inspect trees for defects and unsafe conditions and (2) correct defects and unsafe conditions immediately upon detection. If a property owner/manager employs an arborist to perform work on site, the arborist may assume at least some of the responsibility for detecting defective tree conditions and recommending remedial treatments. Arborists are considered "experts" and may



be held accountable for uncorrected or unreported tree defects, which are not obvious to the average property owner.

### **HAZARD TREES DUE TO STRUCTURAL DEFECTS**

A thorough inspection of the branches, stem, root crown and area around the root system is essential in detecting hazardous conditions. Binoculars are helpful in detecting defects in the upper crown. In some instances an aerial lift or climber may be needed to provide a detailed evaluation.

Common structural defects include dead trees, dead branches, stubs from topping cuts, broken branches (hangers), abrupt bends in branches, "V" crotches and multiple stems from the root collar (coppice growth). Failure also is more common in trees with an unbalanced crown or leaning stem if there is a defect.

### **WOOD DECAY DETECTION AND EVALUATION**

Many failures in branches and stems result from loss in structural integrity due to wood decay. When evaluating decayed stems and branches, arborists have generally relied on qualitative parameters for formulating recommendations. These parameters include the location and relative size of the defect, tree species characteristics, site exposure, crown size, leaning stems, owner's "attitude" toward the tree and target considerations.

A method is now available that allows the arborist to quantitatively estimate a strength loss value from wood decay which then can be used with the qualitative parameters listed above to determine more precisely if a tree is prone to failure due to wood decay.

#### **Evaluating decay is a four-step process involving:**

1. Decay Detection - Symptoms and signs
2. Measuring the size of the decay column
3. Calculating strength loss value due to decay.
4. Selecting a strength loss value "threshold" for wood decay (taking into consideration the strength loss from decay and qualitative factors previously listed).

### **DETECTION**

Symptoms of wood decay can be quite obvious such as open cavities, loose bark/exposed punky wood and fungal fruiting structures growing from the bark or exposed wood. Other symptoms of wood

decay can be subtler such as seams, cracks, abnormal flare, burls, stubs and cankers. Decay is often associated with multiple stems from the root collar (coppice growth) and in limbs with abrupt bends. When inspecting trees for decay, make sure the crown and stem is thoroughly examined. Binoculars are helpful for inspecting the crown. In some instances, a climber or aerial lift may be necessary for a satisfactory inspection of the upper crown.

### **MEASURING THE DECAY COLUMN**

The diameter of the decay column is determined by measuring the thickness of sound wood at the weakest point on the stem or branch. The average sound wood thickness is multiplied by 2 and subtracted from the total wood diameter to arrive at the diameter of the decay column. Note wood diameter equals the stem/branch diameter minus twice the bark thickness.

The thickness of the "shell" of sound wood can be rapidly determined with minimum damage using a drill with a 1/8" drill bit. The drill bit is inserted until resistance decreases when decayed tissues are encountered. The inserted portion of the drill is then extracted and measured to determine the thickness of sound wood.

An increment borer also can be used to extract a core of sound wood, which can be measured. This is useful on trees with soft wood where it may be difficult to detect the resistance change between healthy and decayed wood. The increment core is more damaging and slower than the drilling technique.

A Shigometer also can be used to assess healthy, decayed and discolored wood.

A minimum of three sampling sites is used and the values are averaged to calculate the decay column diameter. More sampling is necessary in trees over 30 inches in diameter or when measurements vary greatly.

## DETERMINING STRENGTH LOSS VALUES FROM WOOD DECAY IN STANDING TREES

Principally the outer rings of wood provide strength in woody stems and branches. Trees can withstand considerable loss of the inner cylinder without a significant loss in structural integrity. Strength loss resulting from decay in wood tissues can be estimated by comparing the diameter of the decay column to the total diameter of the stem.

This technique is based on engineering formulas used in estimating strength loss in pipes due to corrosion. In pipes, strength loss estimates are as follows:

$$\% \text{ Strength Loss} = \frac{\text{Inside Diameter (hollow)}^4}{\text{Total Diameter}^4} \times 100$$

Wagener (1) modified this formula for trees as follows:

$$\text{Strength Loss (SL)} = \frac{(\text{Diameter of Decay Column})^3}{(\text{Diameter of Stem})^3} \times 100$$

$$\text{or } \text{SL} + \frac{d^3}{D^3} \times 100$$

Due to the modification, values derived from use of this formula should be viewed as a relative measure of strength loss rather than an actual measure. Values measured against a scale where 0 (zero) equals no strength loss and 100 equals total loss in strength.

When trees have open cavities, the reduction in strength from loss of the outer rings of wood must be entered into the strength loss formula. Loss in strength from open cavities is significant because the outer rings of wood provide most of the structural strength.

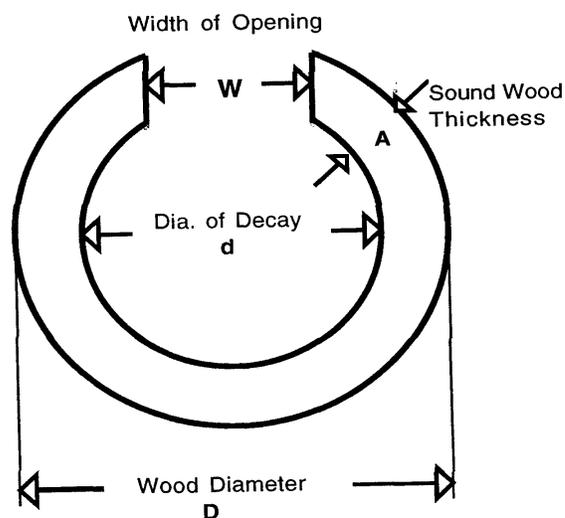
The F.A. Bartlett Tree Expert Co. uses a variation of the formula proposed by Wagener to determine strength loss in stems from open cavities. This formula is as follows:

$$\text{Strength Loss (SL)} = \frac{(\text{Diameter of Decay Column})^3 + \text{Area of Cavity}}{(\text{Diameter of Stem})^3}$$

$$\text{or } \text{SL} = \frac{d^3 + R(D^3 - d^3)}{D^3} \times 100$$

SL = Strength Loss  
 d = Diameter of Decay Column  
 D = Stem Diameter (inside bark)  
 R = Ratio of Cavity Opening to Stem Circumference  
 (R = width of cavity opening)

Values derived from this formula should also be viewed as a relative measure of strength loss as described above.



## STRENGTH LOSS VALUE THRESHOLDS

Wagener (1) stated that West Coast conifers could tolerate up to a one-third loss in strength without predisposing the stem to unreasonable risk of failure if the weakening effect is heart rot uncomplicated by other defects. Wagener emphasizes that the one-third-strength loss value is not absolute and is only a general guideline.

Smiley and Fraedrich (2) surveyed hardwood trees that were broken during 1989's Hurricane Hugo in Charlotte, NC. Sustained winds were 69 miles per hour (mph) with gusts to 90 mph during the storm. They found that 52 of the 54 broken trees had internal decay. Using formulas proposed by Wagener and modified by the Bartlett Tree Lab, strength loss values of broken trees with decay varied from one to

90 with an average of 33. This evidence supports the establishment of a threshold value between 30 and 40 depending on local conditions.

The F. A. Bartlett Tree Expert Co. uses a value of 33 as the maximum strength loss to be tolerated. The threshold is reduced in:

- Leaning Trees
- Trees with inherently weak or brittle wood
- Trees in exposed locations
- Trees with large/full crowns
- Declining trees
- Trees with multiple defects
- Trees in high use areas (sensitive target areas)

### STRENGTH LOSS VALUE SIMPLIFIED

The minimum thickness of sound wood surrounding heart rot must be at least 15% of the total wood diameter or the tree is considered an unreasonable risk.

The thickness of sound wood must be greater in trees with cavity openings, species with weak wood, trees with multiple defects, relatively large crowns, leaning stems and trees on exposed sites.

**Minimum thickness sound wood =  
Wood diameter x .015**

Wood Diameter (inches)	Minimum Thickness of Sound Wood (inches)
10"	1.5"
15"	2.3"
20"	3.0"
25"	3.8"
30"	4.5"
35"	5.3"
40"	6.0"
50"	7.5"

### ROOT DEFECT EVALUATION

Up to seventy-five percent of all tree failures are due to root problems. The majority of tree failures occur when winds exceed 50 mph (e.g. hurricane, tornado), however,

failures may occur under any wind conditions if the roots are sufficiently weakened. Two types of failure have been classified for this occurrence: Root failure and Ground failure.

**Ground failure** is extremely difficult to predict. Failure occurs when the soil does not have enough strength to keep the roots intact. Soil and roots are exposed when the tree falls over. This type of failure can occur in any soil texture if the soil is wet. Failure is more common on sandy textured and very shallow (<2' deep) soils. Soil failure also occurs when trees are surrounded by pavement, which does not allow the root system to develop sufficiently to support the tree.

**Root failure** occurs when roots break, thus do not provide the necessary support. Root failure occurs more readily on trees, which have root decay or other root problems.

Trees growing in stands, recently thinned stands and recently created edge trees are more susceptible to windthrow due to lack of root spread and increased susceptibility to root disease. Root disease can be detected, however, this is a relatively difficult procedure.

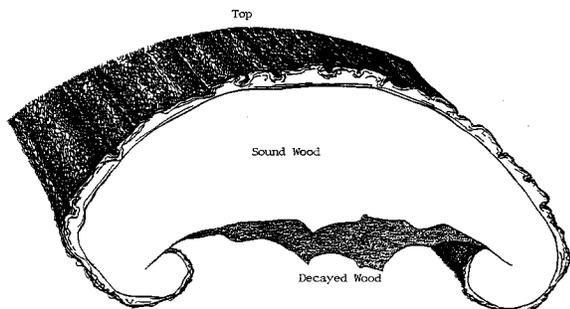
### SYMPTOMS OF ROOT FAILURE

Trees with extensive root decay often show little or no symptoms of decline. External indicators of root decay include:

- Dead (loose bark) on the roots, root flare or lower trunk.
- Fungus fruiting structures around the root flare. These include mushrooms, conks and bracts on or immediately adjacent to the tree.
- Oozing from the root flare, lower trunk or wounds on the lower trunk.
- Cuts or fill soil moved beneath the tree.
- Cracks in the soil above or beside major roots.

### ASSESSING ROOT DECAY

Root decay is difficult to assess since it starts on the lower section of the root and works its way upward. The most visible section of the root shows the least amount of symptoms. When root decay is present in the buttress or flare roots it is usually



*Typical pattern of root decay, starting from the lower side working upward*

much more extensive than anticipated. Where root decay is suspected, the first step is to excavate soil from the root collar. Using a penknife, nick the bark on major root flares and valleys between flares to determine whether the bark is healthy.

**High-risk trees may tolerate a lower percentage of root decay.**

**High-risk trees include the following:**

1. Leaning trees
2. Trees with limited root space
3. Trees at the edge of recently cleared areas where severe windstorms frequently occur
4. Trees with large and/or dense crowns
5. Trees, which have, soil fractures associated with one or more major roots where trees are high risk and any root decay is encountered, always notify the property owner of the increased risk window. Removal may be appropriate.

The next step is to determine if decay is present in the roots or base of the trunk.

Using a drill with 1/8" x 8" bit or increment borer, drill downward into each major root issuing from the root collar. Consider the entire root decayed if any defect is encountered. Repeat the same procedures drilling toward the center of the tree in the valleys of the root collar to determine if basal decay is present. Often lower trunk heart rot is associated with root decay. Record the number of healthy and decayed roots.

### **ROOT DECAY THRESHOLD**

Assessing root decay is complicated by the fact that root and basal decay is frequently more severe than detection procedures will indicate. Subsequently, whenever any root/basal decay is encountered the property owner should be advised that root disease might be more severe than anticipated. There is always a risk of failure (windthrow) when root decay is encountered.

The F. A. Bartlett Tree Expert Co. considers that whenever 33% or more of the major roots contain decay, the bark/cambium is dead on more than 33% of the root flare, or when 33% or more of the support root system has been severed, there is high risk of failure. Removal is recommended in the following instances.

### **INSPECTION AND DOCUMENTATION**

Landscape trees should be periodically inspected for defects and other potentially hazardous conditions. Inspections should be performed at least annually and after major storms. Trees growing in high use sites and those with known defects should be inspected more often.

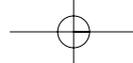
Inspections should be documented in writing whether the trees are considered defective or not. Documentation of inspections (including date), the presence of defects and recommended treatments should be sent to the property owner in writing.

When assessing wood decay and root defects, arborists should not base treatments or removal recommendations

solely on strength loss value or percentage of roots with decay. Document all qualitative parameters that may contribute to the hazard as well as the quantitative measurements. Qualitative parameters include species characteristics, crown size, defect location, multiple defects, tree vitality, site exposure, and intensity of site use (target considerations).

### **Literature Cited**

1. Wagener, W.W. 1963. *Judging Hazards From Native Trees in California Recreation Areas: A Guide for Professional Foresters*. US Forest Service Research Paper PSW-P1. 29 pages.
2. Smiley, E.T. and B.R. Fraedrich. 1992. Determining Strength Loss From Wood Decay. Journal of Arboriculture 18:201-204.

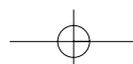


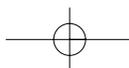
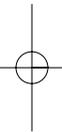
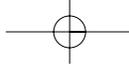
*ANSI A300 (Part 1)-2008 Pruning  
Revision of ANSI A300 (Part 1)-2001*

**American National Standard**

*for Tree Care Operations —  
Tree, Shrub, and Other Woody Plant  
Management —  
Standard Practices (Pruning)*

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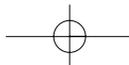
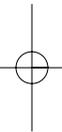
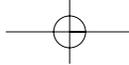
ANSI®  
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for Tree Care Operations —  
Tree, Shrub, and Other Woody Plant Management —  
Standard Practices (*Pruning*)

Secretariat  
Tree Care Industry Association, Inc.

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**Tree Care Industry Association, Inc.**  
136 Harvey Road - Suite B101-B110  
Londonderry, NH 03053  
1-800-733-2622  
(603) 314-5380  
Fax: (603) 314-5386  
E-mail: [Rouse@tcia.org](mailto:Rouse@tcia.org)  
Web: [www.tcia.org](http://www.tcia.org)



## American National Standard

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**Tree Care Industry Association, Inc.,**  
**136 Harvey Road - Suite B101-B110, Londonderry, NH 03053**  
**Phone: 1-800-733-2622 or (603) 314-5380 Fax: (603) 314-5386**  
**E-mail: [tcia@tcia.org](mailto:tcia@tcia.org)**  
**Web: [www.tcia.org](http://www.tcia.org)**

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\* The term pruning type is replaced with the term pruning method. The purpose of this is to label the processes detailed in section 6 with greater accuracy.

## **Foreword** This foreword is not part of American National Standard A300 (Part 1)-2008 *Pruning*

ANSI A300 Standards are divided into multiple parts, each focusing on a specific aspect of woody plant management (e.g. Pruning, Fertilization, etc).

These standards are used to develop written specifications for work assignments. They are not intended to be used as specifications in and of themselves. Management objectives may differ considerably and therefore must be specifically defined by the user. Specifications are then written to meet the established objectives and must include measurable criteria.

ANSI A300 standards apply to professionals who provide for or supervise the management of trees, shrubs, and other woody landscape plants. Intended users include businesses, government agencies, property owners, property managers, and utilities. The standard does not apply to agriculture, horticultural production, or silviculture, except where explicitly noted otherwise.

This standard has been developed by the Tree Care Industry Association (TCIA), an ANSI-accredited Standards Developing Organization (SDO). TCIA is secretariat of the ANSI A300 standards, and develops standards using procedures accredited by the American National Standards Institute (ANSI).

Consensus for standards writing was developed by the Accredited Standards Committee on Tree, Shrub, and Other Woody Plant Management Operations – Standard Practices, A300 (ASC A300).

Prior to 1991, various industry associations and practitioners developed their own standards and recommendations for tree care practices. Recognizing the need for a standardized, scientific approach, green industry associations, government agencies and tree care companies agreed to develop consensus for an official American National Standard.

The result – ANSI A300 standards – unify and take authoritative precedence over all previously existing tree care industry standards. ANSI requires that approved standards be developed according to accepted principles, and that they be reviewed and, if necessary, revised every five years.

TCIA was accredited as a standards developing organization with ASC A300 as the consensus body on June 28, 1991. ASC A300 meets regularly to write new, and review and revise existing ANSI A300 standards. The committee includes industry representatives with broad knowledge and technical expertise from residential and commercial tree care, utility, municipal and federal sectors, landscape and nursery industries, and other interested organizations.

Suggestions for improvement of this standard should be forwarded to: A300 Secretary, c/o Tree Care Industry Association, Inc., 136 Harvey Road - Suite B101-B110, Londonderry, NH, 03053.

ANSI A300 (Part 1)-2008 Pruning was approved as an American National Standard by ANSI on May 1, 2008. ANSI approval does not require unanimous approval by ASC A300. The ASC A300 committee contained the following members at the time of ANSI approval:

Tim Johnson, Chair  
(Artistic Arborist, Inc.)

Bob Rouse, Secretary  
(Tree Care Industry Association, Inc.)

*(Continued)*

**Organizations Represented****Name of Representative**

American Nursery and Landscape Association .....	Warren Quinn Craig J. Regelbrugge (Alt.)
American Society of Consulting Arborists .....	Donald Zimar
American Society of Landscape Architects .....	Ron Leighton
Asplundh Tree Expert Company .....	Geoff Kempter Peter Fengler (Alt.)
Bartlett Tree Expert Company .....	Peter Becker Dr. Thomas Smiley (Alt.)
Davey Tree Expert Company.....	Joseph Tommasi R.J. Laverne (Alt.)
International Society of Arboriculture .....	Bruce Hagen Sharon Lilly (Alt.)
National Park Service .....	Robert DeFeo Dr. James Sherald (Alt.)
Professional Grounds Management Society .....	Thomas Shaner
Professional Land Care Network .....	Preston Leyshon
Society of Municipal Arborists .....	Gordon Mann Andy Hillman (Alt.)
Tree Care Industry Association .....	Dane Buell James McGuire (Alt.)
USDA Forest Service .....	Ed Macie Keith Cline (Alt.)
Utility Arborist Association.....	Matthew Simons Jeffrey Smith (Alt.)

**Additional organizations and individuals:**

American Forests (Observer)  
Mike Galvin (Observer)  
Peter Gerstenberger (Observer)  
Dick Jones (Observer)  
Myron Laible (Observer)  
Beth Palys (Observer)  
Richard Rathjens (Observer)  
Richard Roux (NFPA-780 Liaison)

**ASC A300 mission statement:**

*Mission: To develop consensus performance standards based on current research and sound practice for writing specifications to manage trees, shrubs, and other woody plants.*

## American National Standard for Tree Care Operations –

# Tree, Shrub, and Other Woody Plant Management – Standard Practices (Pruning)

## 1 ANSI A300 standards

### 1.1 Scope

ANSI A300 standards present performance standards for the care and management of trees, shrubs, and other woody plants.

### 1.2 Purpose

ANSI A300 performance standards are intended for use by federal, state, municipal and private entities including arborists, property owners, property managers, and utilities for developing written specifications.

### 1.3 Application

ANSI A300 performance standards shall apply to any person or entity engaged in the management of trees, shrubs, or other woody plants.

## 2 Part 1 – Pruning standards

### 2.1 Purpose

The purpose of Part 1 – *Pruning* is to provide performance standards for developing written specifications for pruning.

### 2.2 Reasons for pruning

The reasons for tree pruning may include, but are not limited to, reducing risk, managing tree health and structure, improving aesthetics, or achieving other specific objectives. Pruning practices for agricultural, horticultural production, or silvicultural purposes are exempt from this standard unless this standard, or a portion thereof, is expressly referenced in standards for these other related areas.

## 2.3 Implementation

**2.3.1** Specifications for pruning should be written and administered by an arborist.

**2.3.1.1** Specifications should include location of tree(s), objectives, methods (types), and extent of pruning (location, percentage, part size, etc).

**2.3.2** Pruning specifications shall be adhered to.

## 2.4 Safety

**2.4.1** Pruning shall be implemented by an arborist, familiar with the practices and hazards of pruning and the equipment used in such operations.

**2.4.2** This performance standard shall not take precedence over applicable industry safe work practices.

**2.4.3** Performance shall comply with applicable Federal and State Occupational Safety and Health standards, ANSI Z133.1, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and other Federal Environmental Protection Agency (EPA) regulations, as well as state and local regulations.

## 3 Normative references

The following standards contain provisions, which, through reference in the text, constitute provisions of this American National Standard. All standards are subject to revision, and parties to agreements based on this American National Standard shall apply the most recent edition of the standards indicated below.

ANSI Z60.1, Nursery stock  
ANSI Z133.1, Arboriculture – Safety requirements  
29 CFR 1910, General industry <sup>1)</sup>  
29 CFR 1910.268, Telecommunications <sup>1)</sup>  
29 CFR 1910.269, Electric power generation, transmission, and distribution <sup>1)</sup>  
29 CFR 1910.331 - 335, Electrical safety-related work practices <sup>1)</sup>

## 4 Definitions

**4.1 arboriculture:** The art, science, technology, and business of commercial, public, and utility tree care.

<sup>1)</sup> Available from U.S. Department of Labor, 200 Constitution Avenue, NW, Washington, DC 20210

**4.2 arborist:** An individual engaged in the profession of arboriculture who, through experience, education, and related training, possesses the competence to provide for or supervise the management of trees and other woody plants.

**4.3 arborist trainee:** An individual undergoing on-the-job training to obtain the experience and the competence required to provide for or supervise the management of trees and other woody plants. Such trainees shall be under the direct supervision of an arborist.

**4.4 branch:** A shoot or stem growing from a parent branch or stem (See Fig. 4.4).

**4.4.1 codominant branches/codominant leaders:** Branches or stems arising from a common junction, having nearly the same size diameter (See Fig. 4.4).

**4.4.2 lateral branch:** A shoot or stem growing from another branch (See Fig. 4.4).

**4.4.3 parent branch or stem:** A tree trunk or branch from which other branches or shoots grow (See Fig. 4.4).

**4.4.4 scaffold branch:** A primary branch that forms part of the main structure of the crown (See Fig. 4.4).

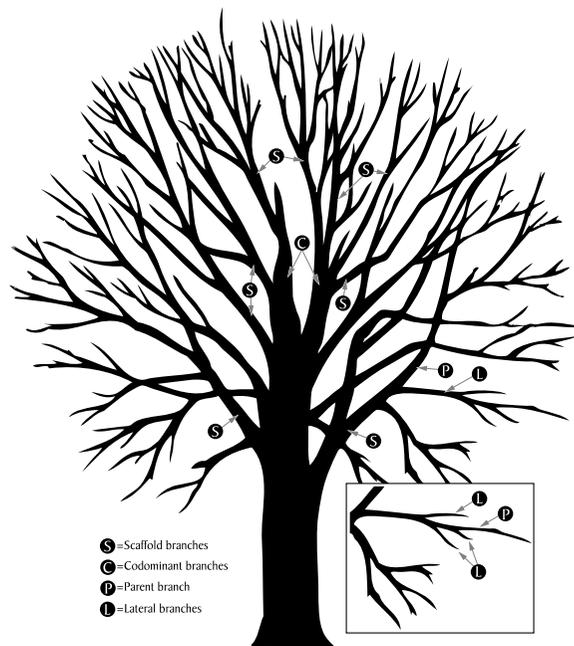


Figure 4.4 Standard branch definitions.

**4.5 branch bark ridge:** The raised area of bark in the branch crotch that marks where the branch and parent stem meet. (See Figs. 5.3.2 and 5.3.3).

**4.6 branch collar:** The swollen area at the base of a branch.

**4.7 callus:** Undifferentiated tissue formed by the cambium around a wound.

**4.8 cambium:** The dividing layer of cells that forms sapwood (xylem) to the inside and inner bark (phloem) to the outside.

**4.9 clean:** Selective pruning to remove one or more of the following non-beneficial parts: dead, diseased, and/or broken branches (7.2).

**4.10 climbing spurs:** Sharp, pointed devices strapped to a climber's lower legs used to assist in climbing trees. (syn.: gaffs, hooks, spurs, spikes, climbers)

**4.11 closure:** The process in a woody plant by which woundwood grows over a pruning cut or injury.

**4.12 crown:** Upper part of a tree, measured from the lowest branch, including all the branches and foliage.

**4.13 decay:** The degradation of woody tissue caused by microorganisms.

**4.14 espalier:** The combination of pruning, supporting, and training branches to orient a plant in one plane (6.5).

**4.15 establishment:** The point after planting when a tree's root system has grown sufficiently into the surrounding soil to support growth and anchor the tree.

**4.16 facility:** A structure or equipment used to deliver or provide protection for the delivery of an essential service, such as electricity or communications.

**4.17 frond:** A leaf structure of a palm.

**4.18 heading:** The reduction of a shoot, stem, or branch back to a bud or to a lateral branch not large enough to assume the terminal role.

- 4.19 interfering branches:** Crossing, rubbing, or upright branches that have the potential to damage tree structure and/or health.
- 4.20 internode:** The area between lateral branches or buds.
- 4.21 job briefing:** The communication of at least the following subjects for arboricultural operations: work specifications, hazards associated with the job, work procedures involved, special precautions, electrical hazards, job assignments, and personal protective equipment.
- 4.22 leader:** A dominant, typically upright, stem – usually the main trunk. There can be several leaders in one tree.
- 4.23 lion's tailing:** The removal of an excessive number of inner and/or lower lateral branches from parent branches. Lion's tailing is not an acceptable pruning practice (6.1.7).
- 4.24 live crown ratio:** Crown height relative to overall plant height.
- 4.25 mechanical pruning:** A pruning technique where large-scale power equipment is used to cut back branches (9.3.2).
- 4.26 method:** A procedure or process for achieving an objective.
- 4.27 peeling:** The removal of dead frond bases without damaging living trunk tissue at the point they make contact with the trunk. (syn.: shaving)
- 4.28 petiole:** A stalk of a leaf or frond.
- 4.29 pollarding:** Pruning method in which tree branches are initially headed and then reduced on a regular basis without disturbing the callus knob (6.6).
- 4.30 pruning:** The selective removal of plant parts to meet specific goals and objectives.
- 4.31 qualified line-clearance arborist:** An individual who, through related training and on-the-job experience, is familiar with the equipment and hazards in line clearance and has demonstrated the ability to perform the special techniques involved. This individual may or may not be currently employed by a line-clearance contractor.
- 4.32 qualified line-clearance arborist trainee:** An individual undergoing line-clearance training under the direct supervision of a qualified line-clearance arborist. In the course of such training, the trainee becomes familiar with the equipment and hazards in line clearance and demonstrates ability in the performance of the special techniques involved.
- 4.33 raise:** Pruning to provide vertical clearance (7.3).
- 4.34 reduce:** Pruning to decrease height and/or spread (7.4).
- 4.35 remote area:** As used in the utility pruning section of this standard, an unpopulated area.
- 4.36 restoration:** Pruning to redevelop structure, form, and appearance of topped or damaged trees (6.3).
- 4.37 rural area:** As used in the utility pruning section of this standard, a sparsely populated place away from large cities, suburbs, or towns but distinct from remote areas.
- 4.38 shall:** As used in this standard, denotes a mandatory requirement.
- 4.39 shoot:** Stem or branch and its leaves, especially when young.
- 4.40 should:** As used in this standard, denotes an advisory recommendation.
- 4.41 specifications:** A document stating a detailed, measurable plan or proposal for provision of a product or service.
- 4.42 sprouts:** New shoots originating from epicormic or adventitious buds, not to be confused with suckers. (syn.: watersprouts, epicormic shoots)
- 4.43 standard, ANSI A300:** The performance parameters established by industry consensus as a rule for the measure of extent, quality, quantity, value or weight used to write specifications.
- 4.44 stem:** A woody structure bearing buds, foliage, and giving rise to other stems.
- 4.45 structural pruning:** Pruning to improve branch architecture (6.2).

**4.46 stub:** Portion of a branch or stem remaining after an internodal cut or branch breakage.

**4.47 subordination:** Pruning to reduce the size and ensuing growth rate of a branch or leader in relation to other branches or leaders.

**4.48 sucker:** Shoot arising from the roots.

**4.49 thin:** pruning to reduce density of live branches (7.5).

**4.50 throw line:** A small, lightweight line with a weighted end used to position a climber's rope in a tree.

**4.51 topping:** Reduction of tree size using internodal cuts without regard to tree health or structural integrity. Topping is not an acceptable pruning practice (6.1.7).

**4.52 tracing:** The removal of loose, damaged tissue from in and around the wound.

**4.53 trunk:** The main woody part of a tree beginning at and including the trunk flare and extending up into the crown from which scaffold branches grow.

**4.54 trunk flare:** 1. The area at the base of the plant's trunk where it broadens to form roots. 2. The area of transition between the root system and trunk (syn.: root flare).

**4.55 urban/residential areas:** Populated areas including public and private property that are normally associated with human activity.

**4.56 utility:** A public or private entity that delivers a public service, such as electricity or communications.

**4.57 utility space:** The physical area occupied by a utility's facilities and the additional space required to ensure its operation.

**4.58 vista/view prune:** Pruning to enhance a specific view without jeopardizing the health of the tree (6.4).

**4.59 wound:** An opening that is created when the bark of a live branch or stem is cut, penetrated, damaged, or removed.

**4.60 woundwood:** Partially differentiated tissue responsible for closing wounds. Woundwood develops from callus associated with wounds.

## 5 Pruning practices

### 5.1 Tree inspection

**5.1.1** An arborist or arborist trainee shall visually inspect each tree before beginning work.

**5.1.2** If a condition is observed requiring attention beyond the original scope of the work, the condition should be reported to an immediate supervisor, the owner, or the person responsible for authorizing the work.

**5.1.3** Job briefings shall be performed as outlined in ANSI Z133.1, subclause 3.1.4.

### 5.2 Tools and equipment

**5.2.1** Equipment, tools, and work practices that damage living tissue and bark beyond the scope of normal work practices shall be avoided.

**5.2.2** Climbing spurs shall not be used when entering and climbing trees for the purpose of pruning.

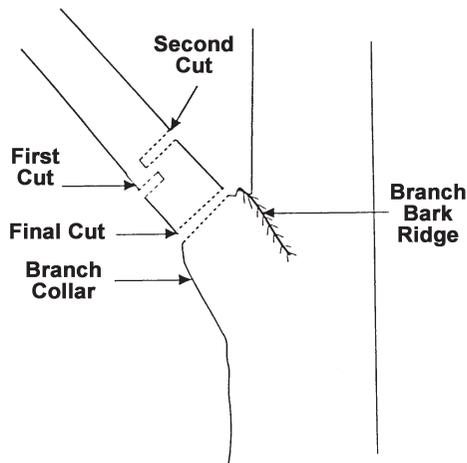
Exceptions:

- when branches are more than throw-line distance apart and there is no other means of climbing the tree;
- when the outer bark is thick enough to prevent damage to the inner bark and cambium;
- in remote or rural utility rights-of-way.

### 5.3 Pruning cuts

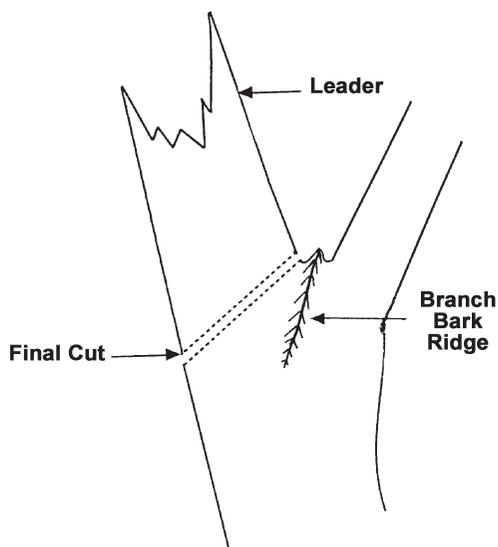
**5.3.1** Pruning tools used in making pruning cuts shall be sharp.

**5.3.2** A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent branch without cutting into the branch bark ridge or branch collar or leaving a stub (see Figure 5.3.2).



**Figure 5.3.2.** A cut that removes a branch at its point of origin. (See Annex A – Pruning cut guideline).

**5.3.3** A pruning cut that reduces the length of a branch or parent stem shall be made at a slight downward angle relative to the remaining stem and not damage the remaining stem. Smaller cuts shall be preferred (see Fig. 5.3.3).



**Figure 5.3.3.** A cut that reduces the length of a branch or parent stem.

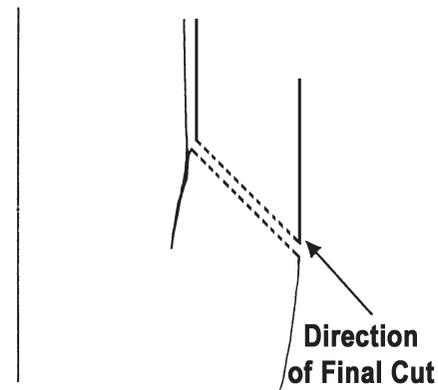
**5.3.4** When pruning to a lateral, the remaining lateral branch should be large enough to assume the terminal role.

**5.3.5** The final cut should result in a flat surface with adjacent bark firmly attached.

**5.3.6** When removing a dead branch, the final cut shall be made just outside the collar of living tissue.

**5.3.7** Tree branches shall be removed in such a manner so as to avoid damage to other parts of the tree or to other plants or property. Branches too large to support with one hand shall be precut to avoid splitting of the wood or tearing of the bark (see Figure 5.3.2). Where necessary, ropes or other equipment shall be used to lower large branches or portions of branches to the ground.

**5.3.8** A cut that removes a branch with a narrow angle of attachment should be made from the outside of the branch to prevent damage to the parent branch (see Figure 5.3.8).



**Figure 5.3.8.** A cut that removes a branch with a narrow angle of attachment.

**5.3.9** Severed branches shall be removed from the crown upon completion of the pruning, at times when the tree would be left unattended, or at the end of the workday.

## 5.4 Wound treatment

**5.4.1** Wound treatments shall not be used to cover wounds or pruning cuts, except when necessary for disease, insect, mistletoe, or sprout control, or for cosmetic reasons.

**5.4.2** Wound treatments that are damaging to tree tissues shall not be used.

**5.4.3** When tracing wounds, only loose, damaged tissue shall be removed.

## 6 Pruning objectives

**6.1** Pruning objectives shall be established prior to beginning any pruning operation.

**6.1.1** Objectives should include, but are not limited to, one or more of the following:

- Risk reduction
- Manage health
- Clearance
- Structural improvement/correction
- View improvement/creation
- Aesthetic improvement
- Restoration

**6.1.2** Established objectives should be specified in writing (See Annex B – *Specification writing guideline*).

**6.1.3** To obtain the defined objective, the growth cycles, structure, species, and the extent of pruning to be performed shall be considered.

**6.1.4** Not more than 25 percent of the foliage should be removed within an annual growing season. The percentage and distribution of foliage to be removed shall be adjusted according to the plant's species, age, health, and site.

**6.1.5** When frequent excessive pruning is necessary for a tree to avoid conflicts with elements such as infrastructure, view, traffic, or utilities, removal or relocation of the tree shall be considered.

**6.1.6** Pruning cuts should be made in accordance with section 5.3 *Pruning cuts*.

**6.1.7** Topping and lion's tailing shall be considered unacceptable pruning practices for trees.

**6.2 Structural:** Structural pruning shall consist of selective pruning to improve tree and branch architecture primarily on young- and medium-aged trees.

**6.2.1** Size and location of leaders or branches to be subordinated or removed should be specified.

**6.2.2** Dominant leader(s) should be selected for development as appropriate.

**6.2.3** Strong, properly spaced scaffold branch structure should be selected and maintained by reducing or removing others.

**6.2.4** Temporary branches should be retained or reduced as appropriate.

**6.2.5** Interfering, overextended, defective, weak, and poorly attached branches should be removed or reduced.

**6.2.6** At planting, pruning should be limited to cleaning (7.2).

**6.3 Restoration:** Restoration shall consist of selective pruning to redevelop structure, form, and appearance of severely pruned, vandalized, or damaged trees.

**6.3.1** Location in tree, size range of parts, and percentage of sprouts to be removed should be specified.

**6.4 Vista/view:** Vista/view pruning shall consist of the use of one or more pruning methods (types) to enhance a specific line of sight.

**6.4.1** Pruning methods (types) shall be specified.

**6.4.2** Size range of parts, location in tree, and percentage of foliage to be removed should be specified.

## 6.5 Espalier

**6.5.1** Branches that extend outside the desired plane of growth shall be pruned or tied back.

**6.5.2** Ties should be replaced as needed to prevent girdling the branches at the attachment site.

## 6.6 Pollarding

**6.6.1** Consideration shall be given to the ability of the individual tree to respond to pollarding.

**6.6.2** Management plans shall be made prior to the start of the pollarding process for routine removal of sprouts.

**6.6.3** Heading cuts shall be made at specific locations to start the pollarding process. After the initial cuts are made, no additional heading cuts shall be made.

**6.6.4** Sprouts growing from the cut ends of branches (knuckles) should be removed annually during the dormant season.

## 7 Pruning methods (types)

**7.1** One or more of the following methods (types) shall be specified to achieve the objective.

**7.2 Clean:** Cleaning shall consist of pruning to remove one or more of the following non-beneficial parts: dead, diseased, and/or broken branches.

**7.2.1** Location of parts to be removed shall be specified.

**7.2.2** Size range of parts to be removed shall be specified.

**7.3 Raise:** Raising shall consist of pruning to provide vertical clearance.

**7.3.1** Clearance distance shall be specified.

**7.3.2** Location and size range of parts to be removed should be specified.

**7.3.3** Live crown ratio should not be reduced to less than 50 percent.

**7.4 Reduce:** Reducing shall consist of pruning to decrease height and/or spread.

**7.4.1** Consideration shall be given to the ability of a species to tolerate this type of pruning.

**7.4.2** Location of parts to be removed or clearance requirements shall be specified.

**7.4.3** Size of parts should be specified.

**7.5 Thin:** Thinning shall consist of selective pruning to reduce density of live branches.

**7.5.1** Thinning should result in an even distribution of branches on individual branches and throughout the crown.

**7.5.2** Not more than 25 percent of the crown should be removed within an annual growing season.

**7.5.3** Location of parts to be removed shall be specified.

**7.5.4** Percentage of foliage and size range of parts to be removed shall be specified.

## 8 Palm pruning

**8.1** Palm pruning should be performed when fronds, fruit, or loose petioles may create a dangerous condition.

**8.2** Live healthy fronds should not be removed.

**8.3** Live, healthy fronds above horizontal shall not be removed. Exception: Palms encroaching on electric supply lines (see Fig. 8.3a and 8.3b).

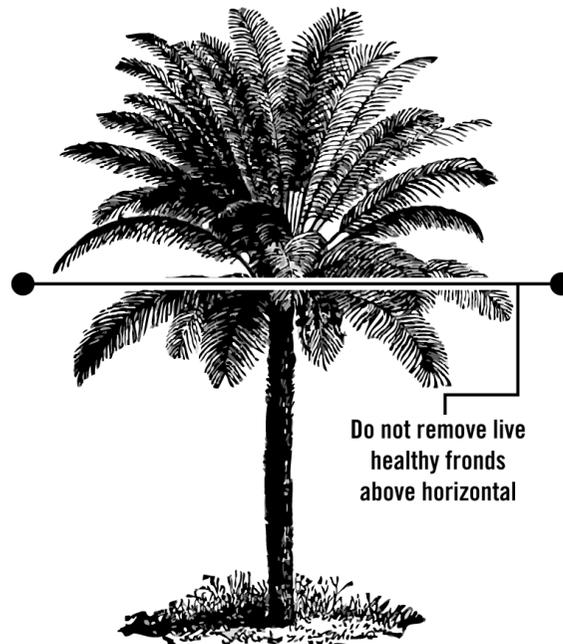
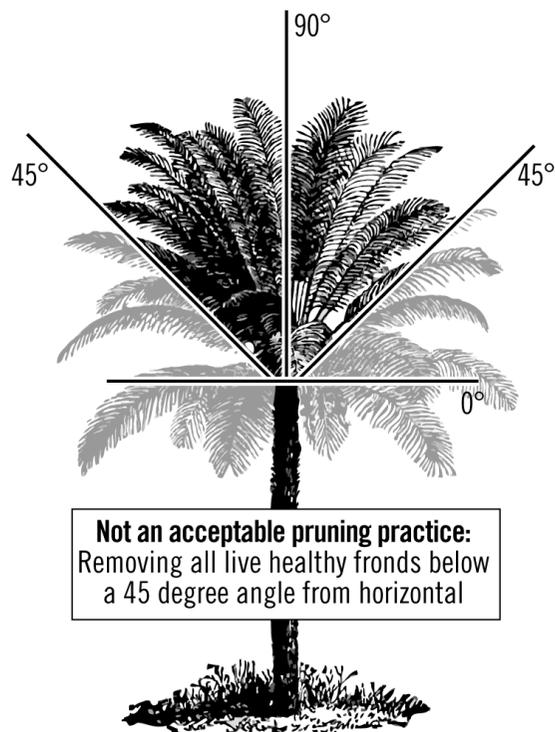


Figure 8.3a Frond removal location.



**Figure 8.3b An overpruned palm (not an acceptable pruning practice).**

**8.4** Fronds removed should be severed close to the petiole base without damaging living trunk tissue.

**8.5** Palm peeling (shaving) should consist of the removal of only the dead frond bases at the point they make contact with the trunk without damaging living trunk tissue.

## 9 Utility pruning

### 9.1 Purpose

The purpose of utility pruning is to prevent the loss of service, comply with mandated clearance laws, prevent damage to equipment, maintain access, and uphold the intended usage of the facility/utility space while adhering to accepted tree care performance standards.

### 9.2 General

**9.2.1** Only a qualified line-clearance arborist or line-clearance arborist trainee shall be assigned to

line clearance work in accordance with ANSI Z133.1, 29 CFR 1910.331 – 335, 29 CFR 1910.268 or 29 CFR 1910.269.

**9.2.2** Utility pruning operations are exempt from requirements in subclause 5.1, *Tree Inspection*, for conditions outside the utility pruning scope of work.

**9.2.3** Job briefings shall be performed as outlined in ANSI Z133.1, subclause 3.1.4.

## 9.3 Utility crown reduction pruning

### 9.3.1 Urban/residential areas

**9.3.1.1** Pruning cuts should be made in accordance with subclause 5.3, *Pruning cuts*. The following requirements and recommendations of 9.3.1.1 are repeated from subclause 5.3 *Pruning cuts*.

**9.3.1.1.1** A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent branch, without cutting into the branch bark ridge or collar, or leaving a stub (see Figure 5.3.2).

**9.3.1.1.2** A pruning cut that reduces the length of a branch or parent stem shall be made at a slight downward angle relative to the remaining stem and not damage the remaining stem. Smaller cuts shall be preferred (see Fig. 5.3.3).

**9.3.1.1.3** The final cut shall result in a flat surface with adjacent bark firmly attached.

**9.3.1.1.4** When removing a dead branch, the final cut shall be made just outside the collar of living tissue.

**9.3.1.1.5** Tree branches shall be removed in such a manner so as not to cause damage to other parts of the tree or to other plants or property. Branches too large to support with one hand shall be precut to avoid splitting of the wood or tearing of the bark (see Figure 5.3.2). Where necessary, ropes or other equipment shall be used to lower large branches or portions of branches to the ground.

**9.3.1.1.6** A cut that removes a branch with a narrow angle of attachment should be made from the outside of the branch to prevent damage to the parent branch (see Figure 5.3.8).

**9.3.1.2** A minimum number of pruning cuts should be made to accomplish the purpose of facility/utility pruning. The structure and growth habit of the tree should be considered.

**9.3.1.3** Trees directly under and growing into facility/utility spaces should be removed or pruned. Such pruning should be done by removing entire branches or leaders or by removing branches that have laterals growing into (or once pruned, will grow into) the facility/utility space.

**9.3.1.4** Trees growing next to, and into or toward, facility/utility spaces should be pruned by reducing branches to laterals (5.3.3) to direct growth away from the utility space or by removing entire branches. Branches that, when cut, will produce sprouts that would grow into facilities and/or utility space should be removed.

**9.3.1.5** Branches should be cut to laterals or the parent branch and not at a pre-established clearing limit. If clearance limits are established, pruning cuts should be made at laterals or parent branches outside the specified clearance zone.

### **9.3.2 Rural/remote locations – mechanical pruning**

Cuts should be made close to the main stem, outside of the branch bark ridge and branch collar. Precautions should be taken to avoid stripping or tearing of bark or excessive wounding.

### **9.4 Emergency service restoration**

During a utility-declared emergency, service must be restored as quickly as possible in accordance with ANSI Z133.1, 29 CFR 1910.331 – 335, 29 CFR 1910.268, or 29 CFR 1910.269. At such times, it may be necessary, because of safety and the urgency of service restoration, to deviate from the use of proper pruning techniques as defined in this standard. Following the emergency, corrective pruning should be done as necessary.

## Annex A

### Pruning cut guideline

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#### A-1 Three-cut method

Multiple cutting techniques exist for application of a three-cut method. A number of them may be used to implement an acceptable three-cut method.

A-1.1 The technique depicted in *Figure 5.3.2* demonstrates one example of a three-cut method that is common to hand-saw usage. It is not intended to depict all acceptable three-cut method techniques.

## Annex B

### Specification writing guideline

A300 (Part 1)-2008 *Pruning* standards are performance standards, and shall not be used as job specifications. Job specifications should be clearly detailed and contain measurable criteria.

The words “should” and “shall” are both used when writing standards. The word “shall” is used when writing specifications.

Writing specifications can be simple or complex and can be written in a format that suits your company/the job. The specifications consist of two sections.

#### I. General:

This section contains all aspects of the work to be performed that needs to be documented, yet does not need to be detailed.

Saying under the General section that “all work shall be completed in compliance with A300 Standards” means the clauses covering safety, inspections, cuts, etc. will be adhered to. There is no need to write each and every clause into every job specification.

Other items that may be covered in the General section could be: work hours and dates, traffic issues, disposal criteria, etc.

The second section under Job Specifications would be:

#### II. Details:

This section provides the clear and measurable criteria; the deliverables to the client.

This section, to be written in compliance with A300 standards, shall contain the following information:

##### 1. Objective – Clause 6

These objectives originate from/with the tree owner or manager. The arborist shall clearly state what is going to be done to achieve the objective(s).

Objectives can be written for the entire job or individual trees. Rarely can one or two words clearly convey an objective so that all parties involved (client, sales, crew, etc.) can visualize the outcome.

##### 2. Method – Clause 7

Here the method(s) to be used to achieve the objective are stated. Again, depending on the type of job, this can be stated for the individual tree or a group of trees.

##### 3. Location – Clause 7.2.1, 7.3.2, 7.4.2, 7.5.3

This is the location in the tree(s) that the work methods are to take place.

##### 4. Density – Clause 7.3.1, 7.3.3, 7.5.1, 7.5.2, 7.5.4

This is the amount or volume of parts that are to be removed and can be stated exactly or in ranges.

##### 5. Size – Clause 7.2.2, 7.3.2, 7.4.3, 7.5.4

This is the size or range of sizes of cut(s) utilized to remove the volume specified.

**NOTE:** Items # 4 & 5 are directly related to resource allocation, staffing and dollars.

### SAMPLE PRUNING SPECIFICATIONS

#1. **Scope:** Large live oak on west side of pool

**Objectives:** Increase light penetration through east side of tree. Reduce risk potential of 1-inch-diameter branches falling.

**Specifications:** All broken branches and 1-inch-plus diameter dead branches shall be removed from the crown.

The three lowest 8-inch-plus diameter branches on the east side shall be thinned 25 percent with 1-inch- to 3-inch-diameter cuts.

**NOTE:** All work shall be completed in compliance with ANSI A300 and Z133.1 Standards.

## Annex B Specification writing guideline

**#2. Scope:** 1 Arizona ash

**Objective:** Enhance structure/structural development.

**Specifications:** General:

All pruning shall be completed in compliance with A300 Standards.

Detail:

Thin crown 20-25 percent with 1-inch- to 4-inch-diameter cuts. Reduce west codominant leader by approximately 12 feet.

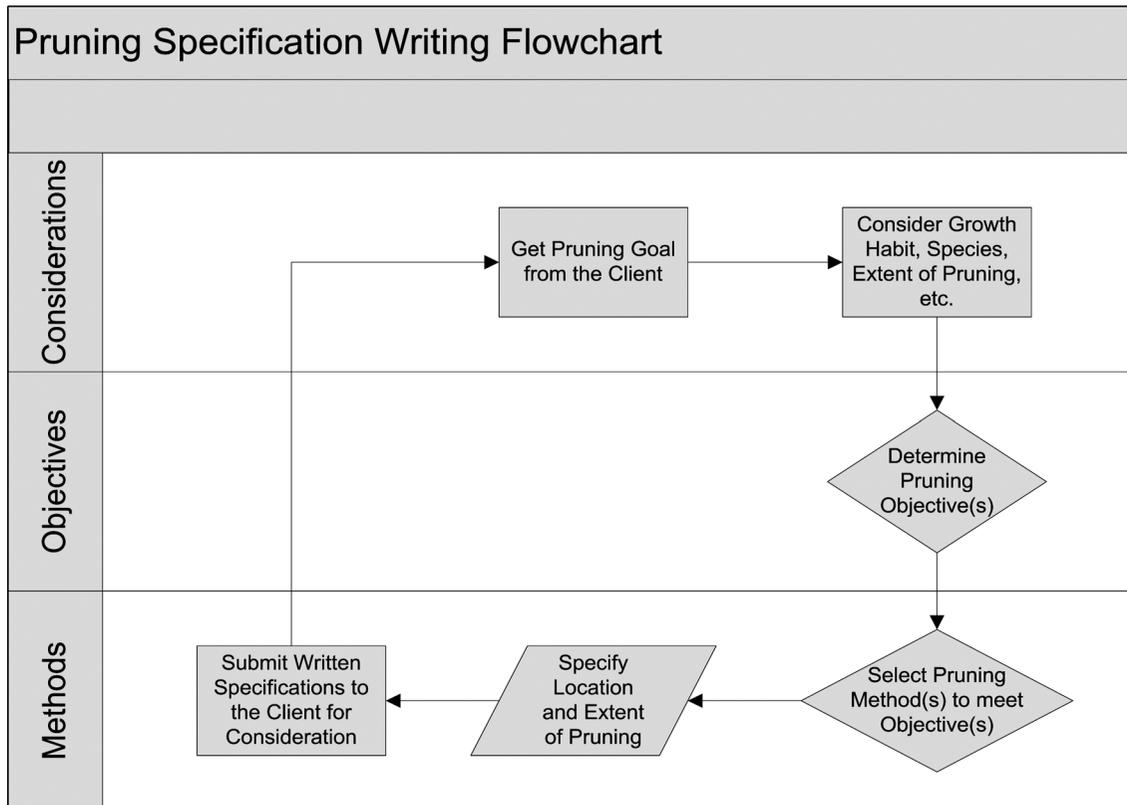
**#3. Scope:** Twenty-three newly installed evergreen elms

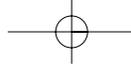
**Objective:** Maximize establishment – reduce nuisance while enhancing natural growth habit.

All work shall be completed in compliance with A300 Standards and the following specifications.

**Specifications:**

- Retain as much size as possible and 80-90 percent density of foliage.
- Lowest permanent branch will be 6 feet above grade in four to five years.
- Retain all sprout growth originating 18 inches above grade on trunk and 4 inches out from branch attachments throughout crown.
- Remove weakest rubbing branches.
- Remove dead branches.
- Reduce broken branches or branches with dead ends back to live laterals or buds. Heading cuts can be used.
- Maintain 6 inches behind adjacent edge of walks all growth that originates between 1.5 feet (18 inches) and 6 feet (72 inches) above grade. Heading cuts are acceptable.





## **Annex C**

### **Applicable ANSI A300 interpretations**

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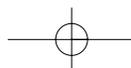
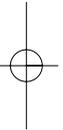
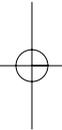
The following interpretations apply to Part 1 – *Pruning*:

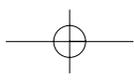
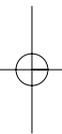
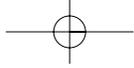
#### **C-1 Interpretation of “should” in ANSI A300 standards**

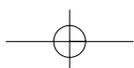
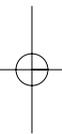
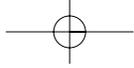
“An advisory recommendation” is the common definition of “should” used in the standards development community and the common definition of “should” used in ANSI standards. An advisory notice is not a mandatory requirement. Advisory recommendations may not be followed when defensible reasons for non-compliance exist.

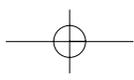
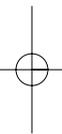
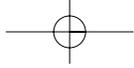
#### **C-2 Interpretation of “shall” in ANSI A300 standards**

“A mandatory requirement” is the common definition of “shall” used in the standards development community and the common definition of “shall” used in ANSI standards. A mandatory requirement is not optional and must be followed for ANSI A300 compliance.









# Glossary of Terms

**arborist:** 1. An individual engaged in the profession of arboriculture who, through experience, education and related training, possesses the competence to provide for, or supervise the management of, trees and other woody ornamentals. [ANSI A300 (Part 1, 2, 4, 5, 6)] 2. An individual engaged in the profession of arboriculture. [ANSI Z133.1-2000 Safety Requirements for Arboricultural Operations]

**bracing:** The installation of lag-thread screw or threaded-steel rods in limbs, leaders, or trunks to provide supplemental support. [ANSI A300 (Part 3)-2000 Support Systems]

**branch:** An outgrowing shoot, stem or twig that grows from the main stem or trunk. [ANSI Z60.1-2004 Nursery Stock]

**buttress roots:** Lateral surface roots that aid in stabilizing the tree.

**cable:** 1) Zinc coated strand per ASTM A-475 for dead-end grip applications. 2) Wire rope or strand for general applications. 3) Synthetic-fiber rope or synthetic-fiber webbing for general applications. [ANSI A300 (Part 3)-2000 Support Systems]

**cabling:** The installation of a steel wire rope, steel strand, or synthetic-fiber system within a tree between limbs or leaders to limit movement and provide supplemental support. [ANSI A300 (Part 3)-2000 Support Systems]

**canopy:** collective branches and foliage of a tree or group of trees' crowns

**cation exchange capacity(CEC):** The ability of soil to absorb nutrients.

**cavity:** An open wound characterized by the presence of decay and resulting in a hollow.

**cleaning:** Selective pruning to remove one or more of the following parts: dead, diseased, and/or broken branches (5.6.1). [ANSI A300 (Part 1)-2001 Pruning]

**co-dominate branches:** Equal in size and importance, usually associated with either the trunks, stems, or scaffold limbs.

**conk:** fruiting body or nonfruiting body of a fungus. Often associated with decay.

**crown:** 1. The leaves and branches of a tree measured from the lowest branch on the trunk to the top of the tree. [ANSI A300 (Part 1)-2001 Pruning] [ANSI A300 (Part 6)-2005 Transplanting] 2. The portion of a tree comprising the branches. [ANSI Z60.1-2004 Nursery Stock]

**D.B.H. [diameter at breast height]:** Measurement of trunk diameter taken at 4.5 feet (1.4 m) off the ground. [ANSI A300 (Part 6)-2005 Transplanting]

**decay:** The degradation of woody tissue caused by microorganisms. [ANSI A300 (Part 1)-2001 Pruning]

**geographic information system(GIS):** is any system for capturing, storing, analyzing and managing data and associated attributes which are spatially referenced to earth.

**girdling root:** A root that may impede proper development of other roots, trunk flare, and/or trunk. [ANSI A300 (Part 6)-2005 Transplanting]

**Global Positioning System(GPS):** A constellation of at least 24 Medium Earth Orbit satellites that transmit precise microwave signals, the system enables a GPS receiver to determine its location, speed, direction, and time.

**Global Positioning System receiver(GPSr):** A receiver that receives its input from GPS satellites to determine location, speed, direction, and time.

**heading:** cutting a shoot back to a bud or cutting branches back to buds, stubs, or lateral branches not large enough to assume apical dominance. Cutting an older branch or stem back to meet a structural objective

**integrated pest management(IPM):** A pest control strategy that uses an array of complementary methods: mechanical devices, physical devices, genetic, biological, legal, cultural management, and chemical management. These methods are done in three stages of prevention, Observation, and finally Intervention. It is an ecological approach that has its main goal is to significantly reduce or eliminate the use of pesticides.

**lateral branch:** A shoot or stem growing from a parent branch or stem. [ANSI A300 (Part 1)-2001 Pruning]

# Glossary of Terms

**leader:** A dominant or co-dominant, upright stem. [ANSI A300 (Part 1)-2001 Pruning]

**lean:** Departure from vertical of the stem, beginning at or near the base of the trunk.

**limb:** A large, prominent branch. [ANSI A300 (Part 1)-2001 Pruning]

**lion's tailing:** The removal of an excessive number of inner, lateral branches from parent branches. Lion's tailing is not an acceptable pruning practice (5.5.7). [ANSI A300 (Part 1)-2001 Pruning]

**macronutrient:** Nutrient required in relatively large amounts by plants, such as nitrogen (N), phosphorus (P), potassium (K), and sulfur (S). [ANSI A300 (Part 2)-2004 Fertilization]

**micronutrient:** Nutrient required in relatively small amounts by plants, such as iron (Fe), manganese (Mn), zinc (Zn), copper (Cu), and boron (B). [ANSI A300 (Part 2)-2004 Fertilization]

**nutrient:** Element or compound required for growth, reproduction or development of a plant. [ANSI A300 (Part 2)-2004 Fertilization]

**organic matter:** material derived from the growth (and death) of living organisms. The organic components of soil.

**parent branch or stem:** A tree trunk, limb, or prominent branch from which shoots or stems grow. [ANSI A300 (Part 1)-2001 Pruning]

**pH:** unit of measurement that describes the alkalinity or acidity of a solution. Measured on a scale of 0 to 14. Greater than 7 is alkaline, less than 7 is acid, and 7 is neutral (pure water).

**pruning:** The selective removal of plant parts to meet specific goals and objectives. [ANSI A300 (Part 1)-2001 Pruning]

**qualified arborist:** An individual who, by possession of a recognized degree, certification, or professional standing, or through related training and on-the-job experience, is familiar with the equipment and hazards involved in arboricultural operations and who has demonstrated ability in the performance of the special techniques involved. [ANSI Z133.1-2000]

Safety Requirements for Arboricultural Operations]

**raising:** Selective pruning to provide vertical clearance (5.6.3). [ANSI A300 (Part 1)-2001 Pruning]

**reduction:** Selective pruning to decrease height and/or spread (5.6.4). [ANSI A300 (Part 1)-2001 Pruning]

**risk assessment:** process of evaluating what unexpected things could happen, how likely it is, and what the likely outcomes are. In tree management, the systematic process to determine the level of risk posed by a tree, tree part, or group of trees.

**root collar:** 1. The transition zone between the trunk and the root system. [ANSI A300 (Part 6)-2005 Transplanting] 2. See COLLAR. [ANSI Z60.1-2004 Nursery Stock]

**root flare or trunk flare:** The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk. [ANSI Z60.1-2004 Nursery Stock] [ANSI A300 (Part 6)-2005 Transplanting]

**root zone:** The volume of soil containing the roots of a plant. [ANSI A300 (Part 5)-2005]

**secondary nutrient:** Nutrient required in moderate amounts by plants, such as calcium (Ca) and magnesium (Mg). [ANSI A300 (Part 2)-2004 Fertilization]

**seam:** Vertical line that appears where two edges of wound wood or callus ridge meet.

**soil amendment:** Any material added to soil to alter its composition and structure, such as sand, fertilizer, or organic matter. [ANSI A300 (Part 6)-2005 Transplanting]

**soil pH:** A measure of the acidity or alkalinity of the soil.

**structural support system:** hardware installed in tree, may be; cables, braces, or guys, to provide supplemental support.

**sweep:** Departure from vertical of the stem, beginning above the base of the trunk.

# Glossary of Terms

**thinning:** Selective pruning to reduce density of live branches (5.6.2). [ANSI A300 (Part 1)-2001 Pruning]

**tree risk assessment:** Closer inspection of visibly damaged, dead, defected diseased, leaning or dying tree to determine management needs.

**topping:** The reduction of a tree's size using heading cuts that shorten limbs or branches back to a predetermined crown limit. Topping is not an acceptable pruning practice (5.5.7). [ANSI A300 (Part 1)-2001 Pruning]

**tree inventory:** A comprehensive list of individual trees providing descriptive information on all or a portion of the project area. [ANSI A300 (Part 5)-2005 Management during site planning, site development, and construction]

**tree protection zone:** A space above and belowground within which trees are to be retained and protected. [ANSI A300 (Part 5)-2005 Management during site planning, site development, and construction]

**structural support system:** A support system used to provide supplemental support to leaders, individual limbs, and/or the whole plant. [ANSI A300 (Part 4)-2002 Lightning Protection Systems]

**trunk:** That portion of a stem or stems of a tree before branching occurs. [ANSI Z60.1-2004 Nursery Stock]

**wound:** An opening that is created when the bark of a live branch or stem is penetrated, cut, or removed. [ANSI A300 (Part 1)-2001 Pruning]