Arborist's Report
June 18, 2022

Tree Preservation Plan

For Edison Park, City of Huntington Beach

Prepared for: **Ms. Tamara McGlory**
RJM Design Group
31591 Camino Capistrano
San Juan Capistrano, CA 92691

Prepared by: **Greg Applegate, ASCA, ASLA**
Arborgate Consulting, Inc
1131 Lucinda Way
Tustin, CA 92780
714/ 731-6240

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Introduction

Background and Assignment

Edison Park is a forty-acre municipal facility in Huntington Beach, California, across the street from Edison High School. Edison Park contains a wide variety of trees, large areas of fairly level turf, and a few buildings, including a fire station and community building. Designed and installed in about 1960, it is arranged in a common southern California format – turf with randomly placed trees and groups of trees, flat hardscape for paths, sports use and picnics, restrooms, and playgrounds. The park is primarily used by nearby residents and Edison High School students. This park is in a generally attractive and clean middle-class neighborhood and has paved paths winding through the grassy open fields, which are used for biking, dog walking and jogging. Many active recreational elements are existing, and more are planned. Edison Park has a children's play area, tennis and handball courts and fields for various sports activities.

This report is to update a previous inventory and report prepared in 2009 for NUVIS Landscape Architecture & Planning. Since that time a large number of trees have died or been removed. Comparison of the two reports will

provide useful information on the success and durability of various tree species. It will also provide suggestions for changes in maintenance that should add to the success and durability to new trees.

The City of Huntington Beach transformed the site of a former landfill into what is now Edison Park. In January 2001, a passive gas control system was installed at Edison Park by GeoScience Analytical Inc. to control the methane gas being produced by the old Cannery Street Disposal Station. The system consists of five wells located at two sites in the park, three wells along the west, southwest border and two wells along the north border of the park at Stillwell Drive. According to the City's web site, very little gas remains.

The City of Huntington Beach has hired the landscape architectural firm, RJM Design Group, to study and design overall improvements to the park. RJM contracted with this consultant to provide arboricultural consulting services as a part of their design development work. In the 2009 study several hundred (320) mature trees were growing throughout the park, many of which were in decline. In this study 228 trees remain, and many of them are in decline. The primary focus is the trees in and around planned improvements.

Ms. Tamara McGlory has asked that I inspect these trees, individually, list their botanic name, common name, analyze their health and structure as it affects their suitability for use in the new plan, recommend which trees are suitable and of sufficient value to justify transplanting and reuse, and describe general protection measures to preserve the other suitable trees during future construction.

It was agreed that each tree 4" caliper or larger will be tagged, measured, and evaluated. Arboricultural evaluation of the trees' health and condition relative to transplanting or preservation related to planned park improvements and professional opinions would be provided, and reported as appropriate. Arborgate will determine which trees are suitable for transplanting and the minimum clearance radius needed to protect each in place. Recommendations and specifications for replacements, transplanting and protection in place will be included. If requested, I may be on-call for arboricultural consulting questions during design development.

Findings

Background Documents

As background for this report, this consultant was supplied seven pdf's of the planting plans for Edison Park, a "Planting Details, Notes and List", a Tree Exhibit" plan, and an inventory of the park trees performed about 7 years ago or more. The current plans have not been finalized, certified or approved by the City as of the date of this report.

Observations

Many mature specimens of several Eucalyptus species, Liquidambars, sycamores, London planes, pines, evergreen pears, and Shamel ash provide shade and beauty in this large park. Several new species have been planted since the last inventory, some successful, some not. A previous inventory done about 2004 included 386 trees. Including the fire station and its surrounding trees and palms, there were about 319 trees in 2009, distributed among 53 species, that were observed during my inspection. The current inventory includes 234 trees over 4" caliper, in 46 species. Their health has been weakened by soil compaction, soil quality, drought, infrequent or poor pruning practices, pest outbreaks, and lawn mower injuries. Now

that the park is over 60 years old, a number of trees have structural defects, as older public trees often exhibit, such as overly long limbs, decay, included bark, damaged surface roots, and crowded scaffold limbs.

No risk assessment was performed, but the main factors affecting the risk level of these trees are the poor structural conditions, plus their relative age lack of initial training, turf related root problems, the genetic characteristics of the species, and proximity to areas of human use and traffic.

Being written by a consultant usually hired to detect weaknesses and solve tree problems, this report will have a somewhat critical tone. Most of the trees in Edison Park are in moderate health and in adequate condition for the climate, use, and ordinary municipal budgeted maintenance level they have received over the years. A few of the trees are large and stately, but contain flaws which raise concern. I recommend that 59 trees be removed due to their safety, poor health or condition.

The **myoporums** were in decline in the last report and now there are few left. They were in serious decline due to the recent thrip infestation, *Klambothrips myopori*, plus poor soil conditions and poor structure with included bark had caused several to split apart. The **sweetgums** frequently had codominant trunks or scaffold limbs, with narrow crotches and included bark which will make them prone to splitting. Pierce's disease, *Xylella fastidiosa*, appears to be causing further decline, but no testing has been done to confirm this. Their scaffold limbs were also too long and end heavy. **Cajeput trees** are normally considered a bullet-proof species for areas like this. Most are healthy here, but it is surprising that a few are not healthy. **Carrotwood** trees are normally a reliable and vigorous species, almost weed-like in normal healthy soil. However, the soil here has affected most of them adversely. Chlorosis, dieback and stunting is common. **Alders** are short-lived, and there are none left worth saving.

Some **London planes** were in weak health due to inadequate root space, and others due to poor tolerance of the coastal environment. **California sycamores** have grown much better than the London plane trees. All other things being equal, California sycamores grow much faster. However, they are also more prone to invasive shot hole borers. The recent planting of **Chitalpas** was not very successful. This is a useful tree in desert areas, but not so much in this coastal zone. **Aleppo pines** are also a tree that favors hot dry climates. They grow well in coastal areas, but the climate negatively affects their structure, making them more erratic in form. Desert grown Aleppo pines are more excurrent and straight. Coastal ones are more decurrent, sometimes even growing horizontally. **Italian stone pines** can also grow well in this area, but they need to be subordinated in pruning to keep a single central leader. Several species of **eucalypts** are grown here, and most appear to have grown better than average. The only one worth calling out, is the red ironbark. The red ironbarks are generally healthy, but the structure is weak. They commonly have dogleg limbs or trunks, included bark, old breaks and overly long

limbs. **Evergreen pears** are prone to fire-blight which caused some dieback and cankers. They also had poor structure, often with included bark or overly long limbs. A number of **Shamel ash** appear to be in decline and have dead limbs. Testing will need to be performed to identify to cause. Shamel ash also had narrow crotches with included bark and crowded scaffold limbs, which is common for the species. **Southern magnolias** are fussier about soil and need more water than most of the successful species here. They are less fussy than other magnolia species. Half the magnolias are in poor health. **Tipu trees** have grown well. The one that is not under high tension lines looks great, but all the others are severely topped for line clearance. Their structure, health and beauty has been permanently destroyed.

Later in this report there will be more discussion of species found only in a few representatives. Some of these less-common trees have grown well. They were few in number in the last inventory, so it does not show that they failed, but rather they could be tested on a wider basis.

It is likely that soils used to fill in the old land fill are a significant part of the difficulty here for growing healthy trees. True topsoil, suited for growing common trees and shrubs is hard to find. Such soils would lack organic matter and beneficial biotic life, and have toxic levels of metals or salts. Considering that areas where the turf is thin show many exposed sea shells, it would not be surprising that soil from dredging Huntington Harbor was used. Consider that even Bermuda grass is having a hard time growing in some areas. Geosyntec Consultants is studying the soils with a structural focus. Another study may be useful for the benefit of the trees, namely an agronomic analysis. The combination of salts, turf focused irrigation and soil compaction has caused the death of many trees, and caused many trees to be shallow rooted, which then leads to damage by lawn maintenance equipment. Very little mulching was observed.

I considered the health, structure and species tolerances in my recommendations for transplanting. Transplanting, storage and replanting is an expensive process and adds a level of risk for toppling or dying in the years following transplanting. Older trees and unhealthy trees are less likely to transplant successfully.

The first chart below (Overall Matrix of Findings) shows the subject trees arranged first by tag number with all criteria shown in a A to F rating system – A being best. Empty cells are for trees removed after the last inventory.

Overall Matrix of Findings

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
1	Tipuana tipu	Tipu tree	32	33	A	B		Lt 2long
2	Callistemon citrinus	Lemon bottlebrush	4,6,7,5,4,4	12	B	C-	- -	Cod inc Xing
3	Liquidambar styraciflua	American sweetgum	18	18	B	C	- -	Cod inc 2long Sh MB
4	Liquidambar styraciflua	American sweetgum	11	15	C-	C-	- -	CrS cod 2long Sh MB
5	Platanus x acerifolia	London plane	14	18	D	C-	- -	Db cod Sh MB
6	Removed							
7	Alnus rhombifolia	White alder	18	13	D-	D	- -	Db Sh MB
8	Removed							
9	Morus alba	White mulberry	21	25	A	C-	- -	Cod 2long Xing S-seam, Sh MB
10	Alnus rhombifolia	White alder	17	16	D	D-	- -	1s Dk Brk NEST
11	Platanus x acerifolia	London plane	14	16	D	D	- -	Db cod Sh MB
12	Removed							
13	Morus alba	White mulberry	16	18	B	C-	- -	mDk cod DL Xing Sh MB
14	Platanus racemosa	California sycamore	23	24	A	C-	- -	60° lean cod-kiss Sh MB
15	Removed							
16	Platanus racemosa	California sycamore	24	22	A	C	- -	DLT DLS Xing cod Sh MB
17	Spathodea campanulata	African tulip tree	6+4.5	9	B	C	- -	1s Binj Sh MB
18	Pyrus kawakamii	Evergreen pear	15	14	C	C-	- -	Db FB Dk Brk DL Sh MB
19	Platanus x acerifolia	London plane	6.2	5	D	D-	- -	TO Dk Db cod
20	Platanus x acerifolia	London plane	8	4	D	D-	- -	TDk SDk epi Binj
21	Platanus x acerifolia	London plane	6	7 - 1s	D	D-	- -	1s 45° lean TDk BDk
22	Spathodea campanulata	African tulip tree	5 @ 3'	5	C	C	- -	Cod LB Sh MB
23	Spathodea campanulata	African tulip tree	7	6	C	C	- -	Cod mDb Sh half-gird
24	Platanus x acerifolia	London plane	8	18	D	C-	- -	WWinj CrS Db 2long
25	Platanus x acerifolia	London plane	10	13	C-	D	- -	WW BDk Db 2long
26	Pyrus kawakamii	Evergreen pear	8+8	14	C	C	- -	Cod inc Db FB Sh MB

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
27	Magnolia grandiflora	Southern magnolia	17	20	B	A	- -	mCod Sh MB
28	Removed						- -	
29	Liquidambar styraciflua	American sweetgum	15 @ 1'	18	C-	C-	- -	LB 2long mDb Sh MB
30	Alnus rhombifolia	White alder	27"b	16	D	D	- -	Cod inc Db
31	Alnus rhombifolia	White alder	21 @ 3'	16	D	D	- -	Cod T-seam Db Sh MB
32	Lagerstroemia X cv	Hybrid crape myrtle	12	11	B	C	- -	CrS Sh MB
33	Juniperus chin. 'Torulosa'	Hollywood juniper	16	10	B	C	- -	Cod inc OL
34	Juniperus chin. 'Torulosa'	Hollywood juniper	9+10	11	B	C	- -	Cod inc OL
35	x Chitalpa	Chilopsis x Catalpa	5	7	C-	C-	end island	Sp
36	x Chitalpa	Chilopsis x Catalpa	5	6	C-	C-	end island	Sp lean
37	x Chitalpa	Chilopsis x Catalpa	5	6	C-	C-	end island	Sp
38	Removed						- -	
39	Afrocarpus falcatus	Fern pine	18	18	B	C	- -	Cod Xing Sh
40	Corymbia citriodora	Lemon-scented gum	22	25	C	C	- -	Cod Sp
41	Cupaniopsis anacardioides	Carrotwood	5+8	10	D	D	- -	Cod Sp chlor Sh MB
42	Afrocarpus falcatus	Fern pine	20	25	B	B	- -	Sh 2long
43	Cupaniopsis anacardioides	Carrotwood	4	6	C-	D	- -	Cod inc Xing TO Sh MB
44	Cupaniopsis anacardioides	Carrotwood	8+9	12	B	C	- -	Cod inc Xing Sh MB
45	Cupaniopsis anacardioides	Carrotwood	4+5	6	C-	D	- -	Cod Xing-kiss Sp Sh MB
46	x Chitalpa	Chilopsis x Catalpa	5	6	C-	C	- -	Cod Xing leans 60° NoRF
47	x Chitalpa	Chilopsis x Catalpa	5	8	C-	C-	- -	Cod TO Xing Sp
48	x Chitalpa	Chilopsis x Catalpa	6.5	6	C-	C-	- -	60° lean Tinj cod Sp FC
49	x Chitalpa	Chilopsis x Catalpa	7	9	B	B	- -	mLean mSp
50	Liquidambar styraciflua	American sweetgum	20	25	D	D	- -	Cod inc SDk Sh MB
51	Platanus x acerifolia	London plane	12	17	C	B	- -	Sh

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
52	Removed						- -	
53	Removed						- -	
54	Removed						- -	
55	Removed						- -	
56	Removed						- -	
57	Removed						- -	
58	Removed						- -	
59	Removed						- -	
60	Melaleuca quinquenervia	Cajeput tree	40	20	B	C-	- -	Cod inc Hd SW-lift Sh MB
61	Pyrus kawakamii	Evergreen pear	16	18	C	C-	- -	Db FB Lt TO Sh MB
62	Quercus ilex	Holly oak	18	16	C	C	- -	Cod TD mSp Sh MB
63	Liquidambar styraciflua	American sweetgum	14	15	B	C-	- -	LB cod CrS Sh MB
64	Quercus ilex	Holly oak	12	16	C	B	- -	mSp MB
65	Magnolia grandiflora	Southern magnolia	5.5	7	D	C-	- -	Sp Brk Db
66	Pittosporum phillyraeoides	Willow pittosporum	7	7	F	F	- -	Dead NoRF
67	Pittosporum phillyraeoides	Willow pittosporum	13	18	B	C-	- -	Cod Xing-kiss
68	Pittosporum phillyraeoides	Willow pittosporum	15	16	C	C	- -	Cod inc Sh MB
69	Pittosporum phillyraeoides	Willow pittosporum	12	16	C	C-	- -	Cod incTO gaffed Sh MB
70	Pittosporum phillyraeoides	Willow pittosporum	14	14	C	D	- -	1sRF cod inc gaffed CrS
71	Eucalyptus camaldulensis	Red gum	23	22	C	C	- -	Hd Sp cod mDb Sh MB
72	Removed						- -	
73	Schinus terebinthifolius	Brazil pepper	26	18	C-	C-	- -	1sRF mSp cod MB
74	Removed							
75	Pinus thunbergiana	Japanese black pine	8	6	C	C	- -	Cod Binj Sp
76	Schinus terebinthifolius	Brazil pepper	20	17	C-	C-	- -	Cod inc Lt Sp Db FC Sh

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
77	Fraxinus uhdei	Shamel ash	21	30	C	C	- -	Cod inc CrS Xing Sh MB
78	Pinus canariensis	Canary Island pine	14	16 - 1s	B	D	- -	1s WWinj Sh MB
79	Lagunaria patersonii	Primrose tree	11	9	A	C	- -	Cod inc CrS epi, burrow
80	Myoporum laetum	Ngaio	26	20 - 1s	D	D	- -	1s cod inc T-horiz Sp Db R-exposed
81	Schinus molle	California pepper	8+9	12	B	C	- -	Cod inc FC 1T-cut
82	Tipuana tipu	Tipu tree	23	18	C	D	- -	Topd Hd epi OH-wires, Sh MB
83	Tipuana tipu	Tipu tree	22	22	C	D	- -	Topd Hd epi OH-wires, Sh MB
84	Tipuana tipu	Tipu tree	21	15	C	D	- -	Topd Hd epi OH-wires, Sh MB
85	Removed						- -	
86	Removed						- -	
87	Removed						- -	
88	Removed						- -	
89	Schinus terebinthifolius	Brazil pepper	30	28	B	C	- -	1s cod FC mGird Sh
90	Removed						- -	
91	Removed						- -	
92	Removed						- -	
93	Metrosideros excelsus	New Zealand Christmas tree	8,8,8,8,8	13	B	C	- -	Cod Xing TO Sh MB
94	Eucalyptus camaldulensis	Red gum	39	36	C	C	- -	2long cod mSp S-crk
95	Pinus canariensis	Canary Island pine	7	10 - 1s	B	C-	- -	60° lean Binj
96	Pinus canariensis	Canary Island pine	14	16	C	C-	- -	DLT Brk 2long
97	Eucalyptus camaldulensis	Red gum	26	28	C	C	- -	Cod 2long mSp Sh MB
98	Pinus canariensis	Canary Island pine	13	12	C-	B	- -	Cr#97 1s Db
99	Pinus canariensis	Canary Island pine	17	13	B	C	- -	Cod 2long R-galls
100	Eucalyptus camaldulensis	Red gum	26	25	C-	C	- -	Cod 2long Db Sp Sh MB
101	Removed						- -	
102	Myoporum laetum	Ngaio	3+4	3	C	D	- -	3"T broke

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
103	Myoporum laetum	Ngaio	8+10+7+4	15	C	D	- -	Root sprung
104	Myoporum laetum	Ngaio	3+4+6	7	C	D	- -	2Ts-Dk, Sp
105	Myoporum laetum	Ngaio	3,3,3,3,3	8	C	C	- -	Clump
106	Removed						- -	
107	Removed						- -	
108	Myoporum laetum	Ngaio	3,2,2,2,2,2	6	C	C-	- -	Clump, old Hd
109	Myoporum laetum	Ngaio	7+3+2	8	C	C-	- -	1s, old Hd
110	Myoporum laetum	Ngaio	6,6,7,7,7	9	C	C-	- -	Db Tinjs mGird
111	Myoporum laetum	Ngaio	3+3+2+2	6	C	C-	- -	Hd DL, a bush, fill on-RC, burrow
112	Removed						- -	
113	Removed						- -	
114	Myoporum laetum	Ngaio	10,7,7,5,5, 5	15	C	C-	- -	Lt cod mDb Sp Sh
115	Myoporum laetum	Ngaio	6	12 - 1s	C	C-	- -	45° lean, 1s mDb S-crk
116	Myoporum laetum	Ngaio	5+2	12 - 1s	D	D	- -	1s dead, other Sp
117	Removed						- -	
118	Removed						- -	
119	Removed						- -	
120	Removed						- -	
121	Removed						- -	
122	Removed						- -	
123	Removed						- -	
124	Feijoa sellowiana	Pineapple guava	5, 5, 5, 7,4	8	C	C-	- -	Cod Xing Lt Sh MB
125	Feijoa sellowiana	Pineapple guava	10"b	4	D	D	- -	Cod Lt Sh MB
126	Metrosideros excelsus	New Zealand Christmas tree	9,7,6,6,5,5	15	B	C	- -	Cod Xing Lt Sh MB
127	Pinus canariensis	Canary Island pine	14	12	B	C	- -	Cod Sh, R-galls, HANAGER
128	Eucalyptus camaldulensis	Red gum	42	36	B	C	- -	Cod FC 2long Sh MB
129	Removed						- -	

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
130	Removed						- -	
131	Pinus pinea	Italian stone pine	20	18 - 1s	B	C-	- -	Root sprung, 30° lean
132	Pinus pinea	Italian stone pine	22 @ 2'	13	B	C	- -	Cod inc Sh MB
133	Eucalyptus polyanthemos	Silver dollar gum	14	20	C	C	- -	Cod 2long leans, Sh MB
134	Pinus halepensis	Aleppo pine	20	22 - 1s	F	F	- -	DEAD
135	Removed						- -	
136	Removed						- -	
137	Pinus halepensis	Aleppo pine	44	36	A	B	- -	Cod 2long
138	Pinus halepensis	Aleppo pine	34 @ 2'	30	A	C	- -	1sRF cod 2long Rinj
139	Eucalyptus polyanthemos	Silver dollar gum	14	14	C	D	- -	Brks DLT cod
140	Removed						- -	
141	Removed						- -	
142	Removed						- -	
143	Removed						- -	
144	Eucalyptus camaldulensis	Red gum	23	16	C	C	- -	Cod Sp Db 2long
145	Liquidambar styraciflua	American sweetgum	20	30	C-	C-	- -	Cod inc 2long lrg S-cut Db Sh MB
146	Celtis laevigata	Sugar hackberry	12	16	B	C	- -	Chlor cod DL 2long
147	Removed						- -	
148	Removed						- -	
149	Eucalyptus polyanthemos	Silver dollar gum	15	16	B	B	- -	Sh MB
150	Eucalyptus sideroxylon	Red ironbark	23	20	C	C	- -	Cod DLS 2long Sh MB
151	Eucalyptus sp.	Eucalypt	19	18	C	C	- -	Cod CrS Xing
152	Removed						- -	
153	Removed						- -	
154	Removed						- -	
155	Agonis flexuosa	Peppermint tree	29, 16, 17	20	B	C	- -	Cod T-crk Xing Sh MB
156	Eucalyptus sideroxylon	Red ironbark	25	20	B	C	- -	Cod DLS 2long Sh MB, NEST

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
157	Eucalyptus sideroxylon	Red ironbark	23	20	B	C	- -	Cod DLS 2long Sh MB
158	Eucalyptus sideroxylon	Red ironbark	18	18	C	C	- -	Cod DLT FC brk Sh MB
159	Eucalyptus sideroxylon	Red ironbark	22	20	C	C-	- -	Cod DLS Xing Sh MB
160	Eucalyptus sideroxylon	Red ironbark	20	18	C	C	- -	Cod DLS Xing Sh MB
161	Eucalyptus sideroxylon	Red ironbark	20	16 - 1s	C	C	- -	1s DLS L:t Cod Sh MB
162	Eucalyptus sideroxylon	Red ironbark	19	16	C	C	- -	Cod Hd DL brk Xing Sh MB
163	Eucalyptus polyanthemos	Silver dollar gum	24	25	C	C	- -	1sRF Cod OL Lt Sh MB
164	Fraxinus uhdei	Shamel ash	34	28	B	C	- -	Cod CrS mDb 2long Sh MB
165	Fraxinus uhdei	Shamel ash	24	20	C-	C-	- -	1sSp Db CrS Sh MB
166	Fraxinus uhdei	Shamel ash	17	14	C-	C	- -	CrS Db Sp Sh MB
167	Fraxinus uhdei	Shamel ash	24	25	D	C	- -	CrS cod Sp Db Sh MB
168	Cupaniopsis anacardioides	Carrotwood	14	16	B	C	- -	CrS cod Xing Sh MB
169	Pyrus kawakamii	Evergreen pear	10	9	B	C	- -	Cod Tinj Sh MB
170	Pinus halepensis	Aleppo pine	14	15	B	C	- -	45º lean, half gird
171	Removed						- -	
172	Removed						- -	
173	Removed						- -	
174	Removed						- -	
175	Removed						- -	
176	Removed						- -	
177	Sophora japonica	Chinese scholar tree	5.5	8	C	C-	- -	Cod Xing Sh MB
178	Sophora japonica	Chinese scholar tree	5	7	C	C-	- -	Cod CrS Xing Binj
179	Sophora japonica	Chinese scholar tree	7	9	C	C-	- -	Cod CrS Xing mDb Sh MB
180	Pinus pinea	Italian stone pine	27	22	B	C	- -	Cod CrS Sh MB
181	Pinus pinea	Italian stone pine	29	30	B	C-	- -	Cod inc Xing, R-galls Sh MB
182	Sophora japonica	Chinese scholar tree	5	5	C	C-	- -	Cod CrS Xing NoRF
183	Brachychiton populneus	Bottle tree	19	12	C	C	- -	Cod 2long 1sSp Sh MB
184	Brachychiton discolor	Pink flame tree	14	7	D	D	- -	Dead top and tips, Sh MB

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
185	Brachychiton discolor	Pink flame tree	8	6	C-	C-	- -	Weak top
186	Brachychiton discolor	Pink flame tree	19	10	C	C-	- -	Cod CrS Sh MB
187	Brachychiton populneus	Bottle tree	8+10	12	C-	C-	- -	Cod inc Sp Sh MB
188	Brachychiton populneus	Bottle tree	20	15	C	C		NoRF cod inc Sp
189	Brachychiton discolor	Pink flame tree	18	8	C-	C-	- -	CrS Sp Sh MB
190	Brachychiton populneus	Bottle tree	16	12	B	C-	- -	Cod Sh MB
191	Pinus thunbergiana	Japanese black pine	14	18	B	C	- -	Cod Sh MB Cr#190 & 192
192	Brachychiton populneus	Bottle tree	13	12	C	C	- -	Cod Sh MB Cr#191
193	Brachychiton populneus	Bottle tree	9	6	B	C	- -	Cod CrS
194	Brachychiton populneus	Bottle tree	4.3	3	C	C-	- -	Cod Xing
195	Melaleuca quinquenervia	Cajeput tree	22	18	B	C-	- -	Cod inc Lt Sh MB
196	Eucalyptus rudis	Desert gum	16	16	B	C	- -	Cod leans, root sprung, Sh MB
197	Eucalyptus polyanthemos	Silver dollar gum	32	27	C	C	- -	SW lift cod Xing-kiss
198	Eucalyptus cladocalyx	Sugar gum	24	25	C	C	- -	Hd DL cod Sh MB
199	Eucalyptus polyanthemos	Silver dollar gum	18	18-1s	B	C-	- -	45º lean, root-sprung, Xing-kiss Sh MB
200	Removed						- -	
201	Eucalyptus cladocalyx	Sugar gum	40	27	C	C	- -	Sp-top cod Sh MB, HANGER
202	Removed							
203	Pinus eldarica	Afghan pine	16	12	C	C		Sp 2long, no mulch
204	Eucalyptus cladocalyx	Sugar gum	35	25	B	C		Cod Hd TD
205	Eucalyptus cladocalyx	Sugar gum	32	25	B	B		Hd TD Sp-top Sh MB
206	Eucalyptus cladocalyx	Sugar gum	46	30	C	C		R-inj cod Xing-kiss DLS Sp-top
207	Pinus pinea	Italian stone pine	20	25	B	C		R-inj cod galls 2long Sh MB
208	Pinus pinea	Italian stone pine	20	25	B	C		FC inc cod galls DLS Sh MB
209	Pinus pinea	Italian stone pine	26"b	25	C-	C-		Cod inc R-galls Lt OP Sp Sh MB
210	Melaleuca quinquenervia	Cajeput tree	26 @ 2'	15	B	C-		Cod inc CrR TO OL

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
211	Olmediella betschlerana	Guatemalan holly	9	10	B	C-		60° lean CrS FC Sh MB
212	Pyrus kawakamii	Evergreen pear	10	10	B	C		Cod mSp Sh MB
213	Pyrus kawakamii	Evergreen pear	12	15	B	C		Cod DLS mDb mSp Sh MB
214	Platanus racemosa	California sycamore	21	22	A	B		mBow 2long Sh MB
215	Liquidambar styraciflua	American sweetgum	15	15	C-	C-		DL cid Db Sh MB
216	Liquidambar styraciflua	American sweetgum	17	18	C	C		Cod 2long Sh MB
217	Schinus molle	California pepper	7.3	7	B	B		Cod Sh MB
218	Cupaniopsis anacardioides	Carrotwood	18	14	C	C-		FC 1-cod cut, TD R-galls Sh MB
219	Cupaniopsis anacardioides	Carrotwood	18	20	B	C-		Cod CrS Xing R-galls, Sh MB
220	Pyrus kawakamii	Evergreen pear	13	11	B	D		Cod Xing, tangle of limbs, Sh MB
221	Pyrus kawakamii	Evergreen pear	18	10	B	C-		FC 60° lean Tinj DLT DLS Sh MB
222	Removed							
223	Removed							
224	Platanus x acerifolia	London plane	10	16	C-	C-	sml cutout	Cod Db Sp bleeding trunk
225	Platanus x acerifolia	London plane	8	12	D	D	sml cutout	Leans Db Sp T-Db
226	Platanus x acerifolia	London plane	7.5	12	D	D	sml cutout	Cod Db Sp
227	Platanus x acerifolia	London plane	7.5	14 -1s	D	D	sml cutout	Cod brk leans Db Sp
228	Platanus x acerifolia	London plane	7.7	9	C-	C-	sml cutout	Cod DLS Db Sp
229	Platanus x acerifolia	London plane	11	16	C-	C-	sml cutout	Cod DLS Db Sp
230	Platanus x acerifolia	London plane	8.5	10	C-	D	sml cutout	Cid CrS DLS Db Sp
231	Platanus x acerifolia	London plane	8	12	C-	C-	sml cutout	Cod brks DLS Db Sp
232	Platanus x acerifolia	London plane	4	2	F	F	sml cutout	Dk Db Sp, near dead
233	Removed							
234	Removed							
235	Removed							
236	Removed							
237	Removed							

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
238	Ficus rubiginosa	Rusty leaf fig	5	4	B	C	sml plantr	FC, stump sprout
239	Removed							
240	x Chitalpa	Chilopsis x Catalpa	6	8	C	C-	turn round	Tinj 1sRF Sp cod, aphids
241	x Chitalpa	Chilopsis x Catalpa	5.5	7	C-	D	turn round	Leans 60°, Tinj 1sRF Sp cod, aphids
242	x Chitalpa	Chilopsis x Catalpa	7	8	C	C-	Fire station	Vines in canopy, rests on wall, cod Sp
243	x Chitalpa	Chilopsis x Catalpa	6	7	C	C-	Fire station	Vines in canopy, CrR cod Sp
244	x Chitalpa	Chilopsis x Catalpa	7	10	C	C-	Fire station	Vines in canopy, CrR cod Sp
245	x Chitalpa	Chilopsis x Catalpa	7	8	C	C-	Fire station	Vines in canopy, CrR leans cod Sp
246	Magnolia grandiflora	Southern magnolia	6.3	10	B	C	Fire station	Cod CrS Tinj
247	Melaleuca quinquenervia	Cajeput tree	10+11+12	12	C-	C	Fire station	Cod Xing OL Sh MB
248	Melaleuca quinquenervia	Cajeput tree	12+10+10	16	C	C	Fire station	Cod OL Sh MB
249	Melaleuca nesophylla	Pink melaleuca	13	20 - 1s	C	C-	Fire station	OP T-horiz
250	Melaleuca nesophylla	Pink melaleuca	12+12	20 - 1s	C	C-	Fire station	OP T-horiz DkT
251	Magnolia grandiflora	Southern magnolia	6	9	C-	C	mid	Sp Db S-brk
252	Eucalyptus ficifolia	Red flowering gum	20	16	C	C		mLean cod mBleeding
253	Melaleuca quinquenervia	Cajeput tree	15	14	B	D		60° lean cod inc Xing, tangled Sh MB
254	Melaleuca quinquenervia	Cajeput tree	15	12	B	D		1sRF cod inc CrS Sh MB
255	Melaleuca quinquenervia	Cajeput tree	16	12	B	C-		CrS cod inc Db Sh MB
256	Melaleuca quinquenervia	Cajeput tree	14	12	C	D		Xing tangledSp Db Sh MB
257	Melaleuca quinquenervia	Cajeput tree	22	15	B	C-		Cod inc half-gird CrS
258	Removed							

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
259	Removed							
260	Corymbia citriodora	Lemon-scented gum	14	16 - 1s	C-	C-		1s cod Sp Lt Sh MB
261	Removed							
262	Removed							
263	Removed							
264	Removed							
265	Removed							
266	Eucalyptus camaldulensis	Red gum	20	16 - 1s	C	C-		1s Xing OL Sh MB
267	Removed							
268	Removed							
269	Fraxinus uhdei	Shamel ash	8+9	15 - 1s	C-	D		1s cod DkTs epis
270	Fraxinus uhdei	Shamel ash	11	10	D-	C-		Cod NC Db Sh MB
271	Fraxinus uhdei	Shamel ash	20	25	B	C-		Cod Xing-kiss Sh MB
272	Liquidambar styraciflua	American sweetgum	18"b	18	C-	C-		Cod inc 2long Db Sh MB
273	Removed							
274	Liquidambar styraciflua	American sweetgum	16	20	C-	D		FC Dk Hd DL Sh MB
275	Removed							
276	Olea europaea	Olive	22	15	D	D		Epis FC brk Db Xylella? Sh MB
277	Removed							
278	Metrosideros excelsus	New Zealand Christmas tree	21 @ 2'	18	B	C		Root sprung, Lt Sh
279	Platanus racemosa	California sycamore	18	20	C-	C		OP Sp mDb Sh MB
280	Platanus racemosa	California sycamore	20	20	B	B		Lt 2long Sh MB
281	Platanus x acerifolia	London plane	23	26	C	C-		Cod Xing-kiss Db, gravel mulch
282	Fraxinus uhdei	Shamel ash	18	18	C	C		Cod mDb Sh MB
283	Removed							
284	Fraxinus uhdei	Shamel ash	16	18	C	D		1s TO topd Sh MB
285	Removed							

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
286	Fraxinus uhdei	Shamel ash	21	20	C	C		Cod mTop-Db Sh MB
287	Removed							
288	Liquidambar styraciflua	American sweetgum	11	12	C-	C-		Cod Db brk Sh MB
289	Removed							
290	Platanus racemosa	California sycamore	20	16	C-	C		ShMB Db DLs Sp
291	Lophostemon confertus	Brisbane box	8	8	C-	D		Sp Db galls stunted
292	Liquidambar styraciflua	American sweetgum	17	20	B	C		Cod brks mDb Sh MB
293	Removed							
294	Removed							
295	Platanus x acerifolia	London plane	17	16	C-	C		Db Sp Sh MB
296	Pinus halepensis	Aleppo pine	40	30	C	C-		Cod inc CrS Sp
297	Pinus halepensis	Aleppo pine	32	30	B	C-		Cod inc EH Lt
298	Pinus halepensis	Aleppo pine	18	20	A	D		DkB
299	Eucalyptus citriodora	Lemon-scented gum	25	25	B	C		Cid brk 2long Sh MB
300	Eucalyptus citriodora	Lemon-scented gum	17	16	D-	D		Binj cod brk Sh MB
301	Platanus racemosa	California sycamore	34	25	B	B		DLs 2long Sh MB
302	Removed							
303	Liquidambar styraciflua	American sweetgum	12	14	D	D		Cod Hd Db 2long Sh MB
304	Removed							
305	Cupaniopsis anacardioides	Carrotwood	5+6+6	12	C	C-		FC cod chlor mDb Sh MB
306	Cupaniopsis anacardioides	Carrotwood	4.2	5	D	D		WWinj chlor Db lean
307	Cupaniopsis anacardioides	Carrotwood	5	6	D	D		WWinj chlor Db Sh MB
308	Ficus rubignosa	Rusty leaf fig	11	14	B	C		Lt CrR
309	Removed							
310	Syagrus romanzoffianum	Queen palm	20'th	12	C	C	Fire station	Penciled
311	Syagrus romanzoffianum	Queen palm	17'th	10	C	C	Fire station	Penciled

Tag #	Botanic Name	Common Name	Caliper – DBH*	Dripline radius	Health	Condition	Location	Comments
312	Syagrus romanzoffianum	Queen palm	16'th	10	C	C	Fire station	Penciled
313	Liquidambar styraciflua	American sweetgum	12	16	C-	D	Fire station	Topd TD Db 2long Sh MB
314	Howea forsteriana	Kentia palm	4+6'	9	B	B	Fire station	4'T stunted
315	Corymbia citriodora	Lemon-scented gum	18	20	C	C-	Fire station	|OP Lt Sp
316	Platanus x acerifolia	London plane	8.5	12	B	C	Fire station	FC OL Sh MB
317	Platanus x acerifolia	London plane	9	12	B	C	Fire station	FC OL cod
318	Syagrus romanzoffianum	Queen palm	16+18	10	B	C	Fire station	8'T is thin and sparse
319	Schinus terebinthifolius	Brazil pepper	9+10	10	B	C-	Fire station	Cod inc stubs DLT DLS

* Calipers with "b" indicated basal measurements below first scaffold limbs.

** All tree tags from the 2009 inspection are gone. They probably were removed, because not even small stunted trees had tags.

Abbreviations in the Matrix

Arboricultural terms are defined in the glossary. Common abbreviations used in the following matrix include:

1s = one sided,
1sRF = 1 sided root flare
2long = too long
B = base e.g.
Binj = basal injury
Brk = break
Chlor = chlorotic
CO = cut out
Cod = codominant branching
Crk = crack
Cr = crowded
CrR = crowded roots
CrS = crowded scaffold limbs
CrT = crowded trunks
Db = dieback
Dk = decay
DL = dog-leg, DLS = dog-leg scaffold
DLT = dog-leg trunk
EH = end heavy
epi = epicormic shoots
FC = flush cut
Gird = girdled
Hd = headed back
Inc = included bark
Inj = injured
Lt = lion tailed
MB = mower blight
OL = over-lifted (canopy)
OP = over-pruned
R = root e.g. Rinj = root injury
RC=root crown
RDk = root decay
Sh = shallow roots
Sp = sparse
S = scaffold limb
Sml=small
S-brk = scaffold broke
SW = sidewalk
T = trunk
T-bow = bowed trunk
TDk = trunk decay
th = trunk height
Tinj = trunk injury
TO = tear out
Topd = topped
WWinj = weed whip injury
Xing = crossing, rubbing limbs

Discussion

Turf grass impacts and effects on tree health

The custom of planting trees within the lawns creates a maintenance conflict and an irrigation conflict between turf care and tree care. As a result, most of Edison Park's trees are shallow rooted and make poor candidates for transplanting. Trees in turf suffer from several common problems. Generally, their wood is weaker, due to heavier use of nitrogen fertilizer. Also, excurrent trees in turf tend to lose their primary or central leaders, and they have shallow root systems that are frequently injured by lawn mowers. Trunks and root crowns are also injured by turf maintenance equipment. In addition, soil compaction is higher in turf areas due to frequent foot and lawn mower traffic over wet or moist soil. The high number of leaning trees is also related to being shallow rooted due to turf grass culture and not able to resist strong winds.

During this inspection and the last, pickup trunks and heavier vehicles were being driven over the turf, over tree root zones. Most of these trees are either directly planted in turf or have root systems that have grown into adjoining turf. In recent history the lawn areas have been kept fairly dry, it appears that at least during the period when their primary root structure was developing turf conditions were moister.

Life expectancy and longevity

Trees in parks often have shorter life spans than in nature, because of "people pressures", soil compaction, competition with turf, damage from turf equipment, and in this case, perhaps vandalism from high school students. The trees in Edison Park have a few signs of vandalism, such as trunk carving, but many more lawn mower injuries. They also show the other impacts of soil compaction to various degrees. A number of leaning trees are probably due to having shallow roots.

Most trees in older parks needs to be replaced or upgraded periodically to reflect the success or failure of species, pest or disease outbreaks, and challenging locations. Due to Edison Park's history as a land fill, this is a challenging location. Life spans for some species of trees in Edison Park have already been reached in several cases. Though in nature some superior specimens may live for hundreds of years, genetically inferior trees and trees less ideally situated live much shorter lives. In most cases trees with the longest life span are in nature, untouched by man. Some trees in Edison Park appear to be about 60 years old. With the "people pressures" found here, few of these trees will last another 50 years. Based on the analysis to follow, the less successful species should be avoided in future planting and in some cases removed.

Pest and diseases observed

Some trees in this park are declining prematurely due to pest or disease problems, such as the red gum eucalyptus. Since 2009 about a third of the redgums and flooded gums at Edison Park have been removed for one reason or another. Redgum lerp psyllid, *Glycaspis brimblecombei*, (RLP) is the primary pest affecting the red gums and flooded gums on site. The 2009 inventory found only half as many of these two species as when the previous inventory was done. The state release of a predatory wasp has brought this pest under control. Only minor infestations of psyllids were observed at this time, but even in Australia, with full natural controls, flare ups do occur.

Redgum lerp psyllids are small insects that suck sap from leaves. Adults are about the size of a gnat. Even with natural biological controls in place, psyllid densities can become so high that partial or total defoliation of trees occasionally results, tree appearance becomes unsightly, and tree vigor is reduced. Psyllids also produce a sticky substance called honeydew, which drops to the ground on cars and sidewalks. The honeydew will often be fed on by black sooty mold and ants.

< Immature lerp psyllid

<"Lerps" are caps made of crystallized sap, under which immature psyllids feed. RLP forms a lerp, which is a structure produced by the nymphs as a protective cover resembling a scale.

Over the past twenty years or so, eight to ten eucalyptus pests have arrived in California. The redgum lerp psyllid, one of the more deadly pests on California's eucalyptus trees, was discovered in 1998 in Los Angeles County. Fortunately, the biological control program run by the state has finally become effective as the wasps spread and parasitized the psyllid eggs.

Another relatively new eucalyptus pest is the fern leaf psyllid, *Eucalyptolyma maidenii*. This psyllid feeds on lemon gum and spotted gum. This pest will definitely stress these trees and trees already stressed by other causes may be eventually killed. Almost no damage was found on the six lemon gum specimens in Edison Park. There were seven lemon gums in the last inventory, so one has died or been removed.

There is also some minor damage from the Australian tortoise beetle, *Trachymela sloanei.* The red gums, flooded gums, and sugar gums are also fed upon by this beetle. While being attacked by psyllids, additional foliage loss from tortoise beetles can be serious. There is no control and I know of no biological control programs underway.

The white alders have either been removed for structural problems, or over half have died from borers or other issues. This is a fairly short-lived species, and all of the remaining ones on site are in poor health and have structural weaknesses.

Myoporums are currently in serious decline due to a recent outbreak of thrips, *Klambothrips myopori*. I have yet to see a successful spray program for this pest and many of the myoporums on site are too far declined to recover.

It may be only a seasonal problem, but the Chitalpas are sparse and heavily infested by aphids. Aphids can infest many different species when they have soft new leaves in spring. However, this is the only species noted with a significant aphid infestation.

Evergreen pears have always had spells of fire blight damage. When properly treated and not spread by pruning tools, it is only serious in wetter years. In 2009 there were eight fewer pears than at the previous inventory. There are still eight remaining.

Several other species have disappeared totally from the park for unknown reasons. The silver maple, Indian laurels, white birch, coral trees, Wilson holly, yew pine, and Xylosma have been removed since the first inventory for one reason or another.

Visible Decay or Structural Defects

The most common defects are related to turf maintenance around trees. Many of the large, exposed primary roots have been shaved down by lawn mowers. Basal injuries and decay are also common, either due to lawn mower impacts or string trimmer damage, Lawn mowers or string trimmers have damaged the root flares of many trees to the extent that decay has resulted to various degrees. Some of the trees are so damaged that they are leaning, some from lack of root support. Others may have leaned due to strong winds before they were adequately rooted in.

Over the years the trees in Edison Park have formed their current structures without the benefit of skillful training and pruning. The budget to bring in expert crews to perform the type of pruning that yields stronger, longer lived trees was not available. Most of the older specimens now have overly long, end-heavy branches, dogleg limbs, and crowded scaffold limbs, with narrow crotches, included bark and other defects that can ultimately be hazardous. Poorly formed trees eventually shed branches or may topple unexpectedly. The requirements of turf maintenance in the root zones of trees introduces many small injuries over time to the trunks, root crowns, and surface roots.

This inspection was not intended to be exhaustive, no internal decay testing was done, nor were loss of strength calculations done to determine if decay was critical. With the high incidence of lawn mower injuries to roots and trunks, more decay might be found with Resistograph or sonic tomography testing, but the degree of root decay would be nearly impossible to quantify.

The alders and liquidambars, though typically excurrent, have poor codominant structure due to lack of training, poor maintenance pruning, and loss of a central leader due to wind damage, topping and/or excessive nitrogen fertilizer. Xylella is a likely cause of some of the liquidambars dieback. Their overall health and growth rate has declined and these specimens are not especially large

yet. When secondary leaders are growing too large they may be reduced proportionately by drop-crotch style pruning or subordination. This will stunt the growth of the competing leaders while allowing the main leader to increase proportionately.

Aleppo pines are another species that is typically excurrent in its native desert climate. In coastal climates they tend to lose their natural form, and even more so when they have excess water and nitrogen fertilizer, i.e. lawn conditions. The resulting codominant structure is also due to lack of training.

Italian stone pines may also be affected by this climate. Anyone who has been to Italy is probably familiar with their tall mushroom-like form in maturity. It is very common on the Italian skyline. The low bushy form found here is prone to splitting in their later years.

Single-trunk carrotwoods are commonly topped at an early age by the growers, which causes a brush of dense and closely spaced scaffold limbs. These crowded limbs tend to pinch each other out over time. Good early training can reduce or eliminate this problem. Carrotwood multi-trunked trees tend to have included bark between trunks and later in life one or more trunks split out. Many of the carrotwoods here are in weak health and may never grow large. Comparing photographs from 2009 with this year's trees, many seem to be virtually the same size. As common as this is, soil chemistry is the likely cause.

As red gums, sugar gums and other trees get older their chance of dropping limbs increases significantly and the size of those limbs also increase. I observed several large breaks in old eucalypts. These may be caused by storm damage or just excessive end weight. Defects and decay are not as much the cause, as age and overly long and end-heavy limbs. Keeping foot traffic and activities out from under these trees is the best remedy, short of good pruning or removal. The reader will note in the Appendix charts that document the hazard profile of red gums, ironbarks and 2 other eucalyptus species.

Current Maintenance

Current maintenance practice is impacting the health of the trees in the areas of pruning, turf maintenance and soils/water management.

Substandard pruning practices include poor or lack of early training, such as allowing codominant leaders to form or crowded scaffolds with included bark; making flush cuts, leaving stubs, and lion-tailing. Codominant or equal size leaders often split out; they are inherently weak since they do not form good branch collars. When scaffold limbs are not properly spaced at an early age they often grow together, and sometimes fuse together where they cross. Codominant limbs are inherently weak. The branch collar cannot form uniformly around the base of the limb and they often fail. Flush cuts cut through the branch

collar into trunk or limb tissue and lead to decay. Flush cuts are also larger cuts. Lion-tailing leaves all the foliage and weight at the branch ends. This concentrates the weight at the end rather than evenly distributing it along the limb and it also eliminates the ability to drop-crotch limbs when they get old, long, and end-heavy.

Shallow roots are common for trees in turf, since the compaction of the soil and the frequent irrigation of the turf keeps the roots near the surface. However, as these roots expand to the point where the lawn mower nick them on every pass, it is time to move the turf back and install a larger mulch basin below the tree. When roots are exposed near the base it is not acceptable to just mow off the tops. Each such injury to the trunk or root crown is one more wound that the tree must expend stored carbohydrates to compartmentalize. Each such injury is a possible point of infection and decay.

Few trees in Edison Park have had the turf pulled back from around the trunk. For larger trees on this site, this leads to more mower damage to the exposed roots. Keeping the turf back from trees allows for mulching, and also reduces the competition for water and nutrients. Mulching helps young trees to have a deeper distribution of roots. Mulch can be made from the chips the tree service makes from the pruning debris. This improves the soil, improves root health and reduces organic debris going to the landfill. One study of young trees found that keeping the turf back eighteen inches allowed 50 % faster growth than allowing the turf to grow up to the trunk. This was even without the damage to roots and trunks.

Turf aeration can reduce compaction to surface layers and will be helpful to trees as well, but it must be kept away from the larger exposed primary roots. Mulching and application of gypsum will improve water penetration, reduce soil compaction near trees, improve biotic life in the soil and reduce injury to exposed roots.

The early history of this site may be an important factor in the chemistry and condition of the soil on site. Good soil management should start with good sampling, mapping the soils, and testing of soils on site. Soil that can't support turf grass, probably can't support tree growth.

Periodic leaching of salts is probably necessary, being so close to the ocean. If reclaimed irrigation water is used, it will require even more frequent leaching.

To reduce soil compaction, lawn mowing should be scheduled for periods when the soil is at its driest, just before irrigation. The irrigation cycles should also be governed by the times the sports fields are in use and activities scheduled for periods when the soil is drier.

Soil Compaction

One of the major effects of heavy foot traffic and vehicle traffic is soil compaction. To the experienced eye, the effect of compacted soil on trees is obvious. Other plants that happen to be rooted in compacted soil, shrubs, annuals, perennials, even turf, will suffer from compaction as well. Bare soils in heavily used parks where grass cannot grow back are common. The places at Edison Park where City vehicles leave the paved roads and walkways are also devoid of turf and tree roots suffer as well. During the time I was on site I noticed several vehicles parking under trees. In a coastal climate like this, the shade of trees is simply not that important compared to the damage it does to the soil and roots. Root systems are very demanding and simply will not grow in compacted soil.

Here are several signs of soil compaction:

- Roots of plants, especially trees, close to or exposed on the surface.
- Yellowing of foliage, especially in early spring during leaf-out and prior to leaf maturity, coupled with diminished development of leaves throughout the growing season. Do not confuse this with several nutrient deficiency symptoms. Cross-checking with foliar and soil analyses may be required.
- Incidence of various plant diseases that are related to poor drainage and lack of oxygen.
- Resistance to penetration of the soil by shovel, pick, or penetrometer.

Several of these symptoms may be present on a heavily used site. It is unlikely that one symptom alone - except resistance to penetration - indicates compaction, and that varies with soil moisture. Moreover, individual features may occur on uncompacted soils; shallow-rooted tree species such as ficus, fruitless mulberry and Shamel ash, for example, exhibit roots near the surface even on uncompacted soils.

Significant effects of soil compaction as they affect management of this site include:

- Crusting. Crusting occurs when the soil aggregates are pulverized and the fines fill the smaller pores. Foot and vehicle traffic compacts the surface more than lower soil depths. The crust can then repel even light rainfall and irrigation.
- Decreased infiltration. The crust formation coupled with the reduced pore space and its smaller average-pore size reduces the infiltration capacity of the compacted soil under heavy rainfall, creating runoff and soil erosion.
- Increased density. As soil fragments fill voids in compressed soil, the total pore space is reduced and the larger air-filled pores are destroyed or at least reduced in size.
- Decreased water-holding capacity. Since water is held in the pore space, any pore space decrease will generally decrease water-holding capacity.

- Decreased soil aeration. Diffusion of gases, such as oxygen and carbon dioxide, into and out of the soil can be greatly reduced. Macro-pores become discontinuous and the smaller pores that are water-filled act as a barrier to diffusion of gases. Even if the surface soil is the only portion compacted, infiltration and diffusion are determined by the least permeable layer of the soil profile; so the entire profile may suffer from reduced diffusion.
- Root impedance. Roots penetrate only pores as large or larger in diameter than their root tip; the root will penetrate a smaller pore only if the soil is loose. If the soil is firm, the root simply cannot penetrate the smaller pore.
- Poor leaching of salts. The compaction and crusting reduce water penetration, but leaves behind a thin layer of salts near the surface. The salts prevent good soil structure and reduce tree health in less tolerant species.

Photographic Documentation

Note the golden carpet below tipu tree # 1

#19 London plane – note limb torn out

Decay probably started with a basal injury by a lawn mower.

Alders in decline

The Liquidambar behind make the alder look fuller.

Gophers or ground squirrels abound.

Note a recently fallen branch.

Most of the larger eucalypts need corrective pruning to reduce risk.

Locals know these trees have dropped limbs, but everyone wanted to make sure they were not removed.

#206 Sugar gum is one-sided and has crossing limbs that fused.

See above ↑


Cajeput or paperbark trees should be a good species for this soil and climate. Some are declining though.


Cajeput or paperbark trees should be a good species for this soil and climate. The most common deterrent to good health are root injuries.

Note the planed down surface roots common around their basess.

Note the planed down surface roots common around their bases. This one is also girdled

Many myoporums are root sprung.

The south edge used to have many more myoporums.


Magnolias are usually a good lawn tree, but need better soil. Note the unhealthy turf surrounding these trees.

Note the unhealthy turf surrounding these trees.

This healthy magnolia has more green grass around it; is it water or soil?

A root sprung pink melaleuca.

#67 Willow pittosporum with a braided trunk.

A root-sprung, decayed and headed pink melaleuca, but not dead.

A root-sprung, decayed and headed pink melaleuca, but interesting.

Chitalpa are a recently planted desert loving hybrid. They are sparse, have poor structure and lots of aphids.

Tag #145, Liquidambar styraciflua with crowded codominant limbs

#71 Eucalyptus camaldulensis – note headed lower limb wraps around

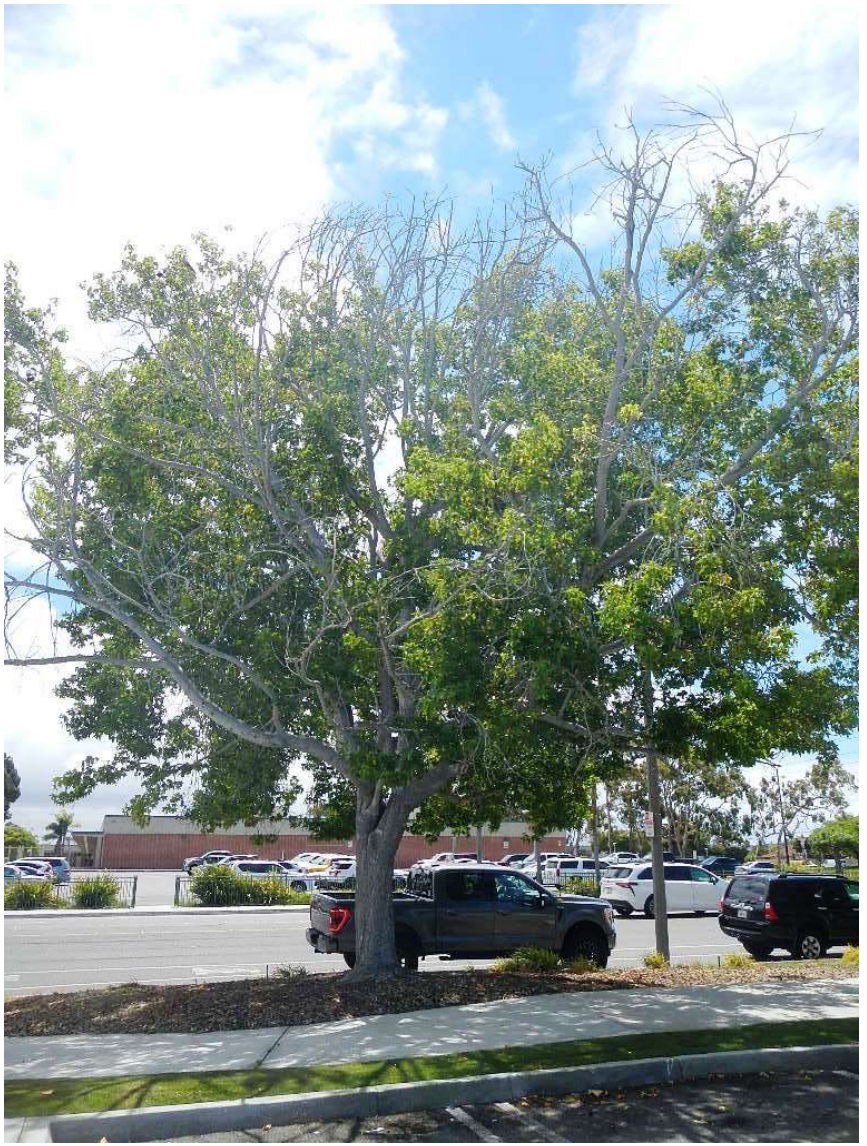
The whole group of London planes in the plaza are in tiny cut-outs and in poor health.>

Healthy London planes in front of the fire station.

London planes just to the north are in poor health. Soil or water?

Flush cuts on trunk resulted in velvet stem (Flammulina velutipes) decay. #145, Liquidambar with included bark, codominant, broken limbs

Tag #145, Liquidambar with codominant limbs and included bark.



#50 Liquidambar with much dieback; Xylella?

Tag #218, Cupaniopsis anacardioides with crowded scaffold limbs and included bark. Also note minor chlorosis.

This carrotwood has barely grown at all since 2009. Note the root crown. This carrotwood is also stunted. Note the root crown.

Tag #266, Fraxinus uhdei –This damages roots and compacts soil. This picture is from 2009, conditions have deteriorated since then.

#269 Fraxinus uhdei – wind swept?

Fraxinus uhdei – note roots shaved by mowers.

181, Pinus pinea with very crowded codominant trunks that are likely to split out. This pine has declined significantly since 2009.

More stunted carrotwoods surround the community building.

#42 Afrocarpus falcatus below the community building is very healthy.

New Tristaniopsis laurina, a coastal species, are doing well.

Analysis

The main purpose of this report is to identify trees that are of sufficient health, condition and value to justify the cost of boxing, storing and replanting on site, as well as to identify trees that should be removed just due to very poor health or instability. Any other use of this report should consider the lack of detailed testing and reporting of internal decay and underground root defects.

Trees that were clearly close to death and unrecoverable and those that were clearly unstable are recommended for removal. All the trees that are in the path of new improvements cannot remain in their present location, but nearby trees can be preserved if their roots and canopies are protected at a sufficient distance from their trunk.

In the recommendations matrix to follow I list those trees that should be removed solely due to their health or structural condition; those that would be reasonable to transplant considering their species, health, structure and value; I list the average radius of their driplines; a recommended clearance and protective fencing radius. Generally conifers and deciduous trees move best in winter, broadleaf evergreens move best in spring just before new growth, and sub-tropicals move best in late spring or early summer.

Eucalyptus, eucalyptus relatives and certain other related trees do not transplant well in any season. Some species like Magnolia grandiflora transplant adequately when they are young but become increasingly difficult to move successfully as they age. Overall, successful transplanting requires healthy trees, the proper season, suitable species, the right size box for the tree, and an experienced and knowledgeable transplant contractor.

Since long term guarantees are rare or expensive from tree movers, and since construction schedules do not often consider tree needs, I advise to err on the side of removal and replacement. Since tree moving contractors usually only offer one year or no guarantee and when they do replace a tree, it is from their stock, they tend to err on the side of transplanting almost anything. In my opinion an independent expert with no financial interest provides the most reliable guidance.

Transplanting specifications are found in the appendix of this report.

Recommendations

Since the construction plans are not finalized, but hopefully are flexible to some degree, the recommendations below are general and intended most to aid the landscape architects' design development work. The clearance radii in the matrix below are approximate, and should be adjusted to accommodate leaning trees or trees with damaged or one-sided root systems. The clearance radii on the side opposite the lean should be increased proportionately to the degree of lean.

Trees in good health, that can be preserved, will need to be protected during roto-tilling, soil treatments, grading, and irrigation trenching, as well as other construction. Fencing and clear marking of those to be preserved will be needed. When grading near trees to remain, preliminary trenching at the limits of the protection zone will prevent backhoes and graders from tearing roots back into the protection zone.

At the time Edison Park was designed and installed, it was more common to place "shade trees" in turf. The redesign of the park can be improved by placing a significant percentage of new trees in areas adjacent to, but separate from the broad lawns. In this way irrigation needs of trees and turf, which are so different, can each be optimized. Soil preparation for and maintenance of a mulch bed below a tree grove can made more efficient and effective.

New and replacement tree species must be carefully selected to be tolerant of soil and environmental conditions, and need little maintenance. And of course, we would not want to repeat planting more of the tree species that have previously failed at

Edison Park. If reclaimed water is used, a narrower list of potential trees for replacement should be researched. The current need for water restrictions may also limit the amount of turf and the species of turf that can be maintained. Less turf and more trees would improve water efficiency.

The use of a well-diversified pallet of trees is the safest approach to selection when there is a combination of various difficult soil conditions and turf. Planting amendments and soil preparation should be determined by a soil laboratory report. However, the lab report should also contain recommendations that deal with mitigation of compaction outside the root zones of trees. General planting strategies are needed to protect new trees and enhance their growing environments. New trees should stay clear of existing trees and have over-sized planting pits to deal with compaction and other soil conditions. The planting pits should be over-size in width, not depth. Maintenance recommendations will deal with protection of soil and root zones as well as proper training and pruning.

For preservation in place suitable surrounding trees should be surveyed, since in my experience GPS can occasionally be inaccurate even when done with expensive surveying equipment.

Only trees that should clearly be removed were marked as such below. Other trees that have low condition ratings, below C, should be considered for removal or intensive care. Older trees that are in poor condition do not improve quickly. It may take years for noticeable recovery. This determination is a matter for more consideration and discussion.

Construction is hard on trees, even landscape construction. Following good tree preservation procedures will lessen the impact, but not eliminate it. Dust alone can have serious impacts on trees. Even with fencing there will still be some root loss and damage. Many trees on site have serious stress levels already, due to compaction and physical injuries. The additional stresses related to construction must be kept to a minimum to end up with worthwhile trees at the end.

Matrix of Recommendations

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
1	Tipuana tipu	32	33	A	B	No	No	33	Lt 2long
2	Callistemon citrinus	4,6,7,5,4,4	12	B	C-	No	No	12	Cod inc Xing
3	Liquidambar styraciflua	18	18	B	C	No	No	18	Cod inc 2long Sh MB
4	Liquidambar styraciflua	11	15	C-	C-	No	?	15	CrS cod 2long Sh MB
5	Platanus x acerifolia	14	18	D	C-	No	Yes	N/A	Db cod Sh MB
6	Removed								
7	Alnus rhombifolia	18	13	D-	D	No	Yes	N/A	Db Sh MB
8	Removed								
9	Morus alba	21	25	A	C-	No	?	25	Cod 2long Xing S-seam, Sh MB
10	Alnus rhombifolia	17	16	D	D-	No	Yes	N/A	1s Dk Brk NEST
11	Platanus x acerifolia	14	16	D	D	No	Yes	N/A	Db cod Sh MB
12	Removed								
13	Morus alba	16	18	B	C-	No	No	18	mDk cod DL Xing Sh MB
14	Platanus racemosa	23	24	A	C-	No	Yes	N/A	60° lean cod-kiss Sh MB
15	Removed								
16	Platanus racemosa	24	22	A	C	No	No	22	DLT DLS Xing cod Sh MB
17	Spathodea campanulata	6+4.5	9	B	C	No	No	9	1s Binj Sh MB
18	Pyrus kawakamii	15	14	C	C-	No	Yes	N/A	Db FB Dk Brk DL Sh MB
19	Platanus x acerifolia	6.2	5	D	D-	No	Yes	N/A	TO Dk Db cod
20	Platanus x acerifolia	8	4	D	D-	No	Yes	N/A	TDk SDk epi Binj
21	Platanus x acerifolia	6	7 - 1s	D	D-	No	Yes	N/A	1s 45° lean TDk BDk
22	Spathodea campanulata	5 @ 3'	5	C	C	No	No	5	Cod LB Sh MB
23	Spathodea campanulata	7	6	C	C	No	No	7	Cod mDb Sh half-gird
24	Platanus x acerifolia	8	18	D	C-	No	No	20	WWinj CrS Db 2long
25	Platanus x acerifolia	10	13	C-	D	No	Yes	N/A	WW BDk Db 2long
26	Pyrus kawakamii	8+8	14	C	C	No	No	14	Cod inc Db FB Sh MB

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
27	Magnolia grandiflora	17	20	B	A	No	No	20	mCod Sh MB
28	Removed								
29	Liquidambar styraciflua	15 @ 1'	18	C-	C-	No	Yes	N/A	LB 2long mDb Sh MB
30	Alnus rhombifolia	27"b	16	D	D	No	Yes	N/A	Cod inc Db
31	Alnus rhombifolia	21 @ 3'	16	D	D	No	Yes	N/A	Cod T-seam Db Sh MB
32	Lagerstroemia X cv	12	11	B	C	No	No	11	CrS Sh MB
33	Juniperus chin. 'Torulosa'	16	10	B	C	No	No	10	Cod inc OL
34	Juniperus chin. 'Torulosa'	9+10	11	B	C	No	No	11	Cod inc OL
35	x Chitalpa	5	7	C-	C-	No	Yes	N/A	Sp
36	x Chitalpa	5	6	C-	C-	No	Yes	N/A	Sp lean
37	x Chitalpa	5	6	C-	C-	No	Yes	N/A	Sp
38	Removed								
39	Afrocarpus falcatus	18	18	B	C	No	No	18	Cod Xing Sh
40	Corymbia citriodora	22	25	C	C	No	No	25	Cod Sp
41	Cupaniopsis anacardioides	5+8	10	D	D	No	Yes	N/A	Cod Sp chlor Sh MB
42	Afrocarpus falcatus	20	25	B	B	No	No	25	Sh 2long
43	Cupaniopsis anacardioides	4	6	C-	D	No	Yes	N/A	Cod inc Xing TO Sh MB
44	Cupaniopsis anacardioides	8+9	12	B	C	No	No	12	Cod inc Xing Sh MB
45	Cupaniopsis anacardioides	4+5	6	C-	D	No	Yes	N/A	Cod Xing-kiss Sp Sh MB
46	x Chitalpa	5	6	C-	C	No	Yes	N/A	Cod Xing leans 60° NoRF
47	x Chitalpa	5	8	C-	C-	No	No	8	Cod TO Xing Sp
48	x Chitalpa	6.5	6	C-	C-	No	Yes	N/A	60° lean Tinj cod Sp FC
49	x Chitalpa	7	9	B	B	No	No	9	mLean mSp
50	Liquidambar styraciflua	20	25	D	D	No	Yes	N/A	Cod inc SDk Sh MB
51	Platanus x acerifolia	12	17	C	B	No	No	17	Sh

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
52	Removed								
53	Removed								
54	Removed								
55	Removed								
56	Removed								
57	Removed								
58	Removed								
59	Removed								
60	Melaleuca quinquenervia	40	20	B	C-	No	No	20	Cod inc Hd SW-lift Sh MB
61	Pyrus kawakamii	16	18	C	C-	No	No	18	Db FB Lt TO Sh MB
62	Quercus ilex	18	16	C	C	Yes	No	18	Cod TD mSp Sh MB
63	Liquidambar styraciflua	14	15	B	C-	No	No	15	LB cod CrS Sh MB
64	Quercus ilex	12	16	C	B	Yes	No	16	mSp MB
65	Magnolia grandiflora	5.5	7	D	C-	No	Yes	N/A	Sp Brk Db
66	Pittosporum phillyraeoides	7	7	F	F	No	Yes	n/A	Dead NoRF
67	Pittosporum phillyraeoides	13	18	B	C-	No	No	18	Cod Xing-kiss
68	Pittosporum phillyraeoides	15	16	C	C	No	No	16	Cod inc Sh MB
69	Pittosporum phillyraeoides	12	16	C	C-	No	No	16	Cod incTO gaffed Sh MB
70	Pittosporum phillyraeoides	14	14	C	D	No	No	14	1sRF cod inc gaffed CrS
71	Eucalyptus camaldulensis	23	22	C	C	No	No	23	Hd Sp cod mDb Sh MB
72	Removed								
73	Schinus terebinthifolius	26	18	C-	C-	No	No	30	1sRF mSp cod MB
74	Removed								
75	Pinus thunbergiana	8	6	C	C	No	No	8	Cod Binj Sp
76	Schinus terebinthifolius	20	17	C-	C-	No	No	24	Cod inc Lt Sp Db FC Sh

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
77	Fraxinus uhdei	21	30	C	C	No	No	21	Cod inc CrS Xing Sh MB
78	Pinus canariensis	14	16 - 1s	B	D	No	Yes	16 - 1s	1s WWinj Sh MB
79	Lagunaria patersonii	11	9	A	C	No	No	9	Cod inc CrS epi, burrow
80	Myoporum laetum	26	20 - 1s	D	D	No	Yes	N/A	1s cod inc T-horiz Sp Db R-exposed
81	Schinus molle	8+9	12	B	C	No	No	12	Cod inc FC 1T-cut
82	Tipuana tipu	23	18	C	D	No	Yes	N/A	Topd Hd epi OH-wires, Sh MB
83	Tipuana tipu	22	22	C	D	No	Yes	N/A	Topd Hd epi OH-wires, Sh MB
84	Tipuana tipu	21	15	C	D	No	Yes	N/A	Topd Hd epi OH-wires, Sh MB
85	Removed								
86	Removed								
87	Removed								
88	Removed								
89	Schinus terebinthifolius	30	28	B	C	No	No	28	1s cod FC mGird Sh
90	Removed								
91	Removed								
92	Removed								
93	Metrosideros excelsus	8,8,8,8,8	13	B	C	No	No	13	Cod Xing TO Sh MB
94	Eucalyptus camaldulensis	39	36	C	C	No	No	39	2long cod mSp S-crk
95	Pinus canariensis	7	10 - 1s	B	C-	No	No	10 - 1s	60° lean Binj
96	Pinus canariensis	14	16	C	C-	No	No	16	DLT Brk 2long
97	Eucalyptus camaldulensis	26	28	C	C	No	No	26	Cod 2long mSp Sh MB
98	Pinus canariensis	13	12	C-	B	No	No	15	Cr#97 1s Db
99	Pinus canariensis	17	13	B	C	No	No	13	Cod 2long R-galls
100	Eucalyptus camaldulensis	26	25	C-	C	No	No	30	Cod 2long Db Sp Sh MB
101	Removed								
102	Myoporum laetum	3+4	3	C	D	No	Yes	N/A	3"T broke
103	Myoporum laetum	8+10+7+4	15	C	D	No	Yes	N/A	Root sprung

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
104	Myoporum laetum	3+4+6	7	C	D	No	Yes	N/A	2Ts-Dk, Sp
105	Myoporum laetum	3,3,3,3,3	8	C	C	No	No	8	Clump
106	Removed								
107	Removed								
108	Myoporum laetum	3,2,2,2,2,2	6	C	C-	No	Yes	N/A	Clump, old Hd
109	Myoporum laetum	7+3+2	8	C	C-	No	No	8	1s, old Hd
110	Myoporum laetum	6,6,7,7,7	9	C	C-	No	No	9	Db Tinjs mGird
111	Myoporum laetum	3+3+2+2	6	C	C-	No	No	6	Hd DL, a bush, fill on-RC, burrow
112	Removed								
113	Removed								
114	Myoporum laetum	10,7,7,5,5,5	15	C	C-	No	No	15	Lt cod mDb Sp Sh
115	Myoporum laetum	6	12 - 1s	C	C-	No	No	12	45º lean, 1s mDb S-crk
116	Myoporum laetum	5+2	12 - 1s	D	D	No	Yes	N/A	1s dead, other Sp
117	Removed								
118	Removed								
119	Removed								
120	Removed								
121	Removed								
122	Removed								
123	Removed								
124	Feijoa sellowiana	5, 5, 5, 7,4	8	C	C-	No	No	8	Cod Xing Lt Sh MB
125	Feijoa sellowiana	10"b	4	D	D	No	No	12	Cod Lt Sh MB
126	Metrosideros excelsus	9,7,6,6,5,5	15	B	C	No	No	15	Cod Xing Lt Sh MB
127	Pinus canariensis	14	12	B	C	No	No	12	Cod Sh, R-galls, HANAGER
128	Eucalyptus camaldulensis	42	36	B	C	No	No	36	Cod FC 2long Sh MB
129	Removed								
130	Removed								
131	Pinus pinea	20	18 - 1s	B	C-	No	No	18 - 1s	Root sprung, 30º lean

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
132	Pinus pinea	22 @ 2'	13	B	C	No	No	13	Cod inc Sh MB
133	Eucalyptus polyanthemos	14	20	C	C	No	No	20	Cod 2long leans, Sh MB
134	Pinus halepensis	20	22 - 1s	F	F	No	Yes	n/A	DEAD
135	Removed								
136	Removed								
137	Pinus halepensis	44	36	A	B	No	No	36	Cod 2long
138	Pinus halepensis	34 @ 2'	30	A	C	No	No	30	1sRF cod 2long Rinj
139	Eucalyptus polyanthemos	14	14	C	D	No	Yes	N/A	Brks DLT cod
140	Removed								
141	Removed								
142	Removed								
143	Removed								
144	Eucalyptus camaldulensis	23	16	C	C	No	No	23	Cod Sp Db 2long
145	Liquidambar styraciflua	20	30	C-	C-	No	No	30	Cod inc 2long lrg S-cut Db Sh MB
146	Celtis laevigata	12	16	B	C	No	No	16	Chlor cod DL 2long
147	Removed								
148	Removed								
149	Eucalyptus polyanthemos	15	16	B	B	No	No	16	Sh MB
150	Eucalyptus sideroxylon	23	20	C	C	No	No	23	Cod DLS 2long Sh MB
151	Eucalyptus sp.	19	18	C	C	No	No	19	Cod CrS Xing
152	Removed								
153	Removed								
154	Removed								
155	Agonis flexuosa	29, 16, 17	20	B	C	No	No	20	Cod T-crk Xing Sh MB
156	Eucalyptus sideroxylon	25	20	B	C	No	No	20	Cod DLS 2long Sh MB, NEST
157	Eucalyptus sideroxylon	23	20	B	C	No	No	20	Cod DLS 2long Sh MB
158	Eucalyptus sideroxylon	18	18	C	C	No	No	18	Cod DLT FC brk Sh MB

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
159	Eucalyptus sideroxylon	22	20	C	C-	No	No	22	Cod DLS Xing Sh MB
160	Eucalyptus sideroxylon	20	18	C	C	No	No	20	Cod DLS Xing Sh MB
161	Eucalyptus sideroxylon	20	16 - 1s	C	C	No	No	20	1s DLS L:t Cod Sh MB
162	Eucalyptus sideroxylon	19	16	C	C	No	No	19	Cod Hd DL brk Xing Sh MB
163	Eucalyptus polyanthemos	24	25	C	C	No	No	25	1sRF Cod OL Lt Sh MB
164	Fraxinus uhdei	34	28	B	C	No	No	28	Cod CrS mDb 2long Sh MB
165	Fraxinus uhdei	24	20	C-	C-	No	No	24	1sSp Db CrS Sh MB
166	Fraxinus uhdei	17	14	C-	C	No	No	17	CrS Db Sp Sh MB
167	Fraxinus uhdei	24	25	D	C	No	No	27	CrS cod Sp Db Sh MB
168	Cupaniopsis anacardioides	14	16	B	C	No	No	16	CrS cod Xing Sh MB
169	Pyrus kawakamii	10	9	B	C	No	No	9	Cod Tinj Sh MB
170	Pinus halepensis	14	15	B	C	No	No	15	45º lean, half gird
171	Removed								
172	Removed								
173	Removed								
174	Removed								
175	Removed								
176	Removed								
177	Sophora japonica	5.5	8	C	C-	No	No	8	Cod Xing Sh MB
178	Sophora japonica	5	7	C	C-	No	No	7	Cod CrS Xing Binj
179	Sophora japonica	7	9	C	C-	No	No	9	Cod CrS Xing mDb Sh MB
180	Pinus pinea	27	22	B	C	No	No	22	Cod CrS Sh MB
181	Pinus pinea	29	30	B	C-	No	No	30	Cod inc Xing, R-galls Sh MB
182	Sophora japonica	5	5	C	C-	No	No	5	Cod CrS Xing NoRF
183	Brachychiton populneus	19	12	C	C	No	No	19	Cod 2long 1sSp Sh MB
184	Brachychiton discolor	14	7	D	D	No	Yes	N/A	Dead top and tips, Sh MB
185	Brachychiton discolor	8	6	C-	C-	No	No	8	Weak top
186	Brachychiton discolor	19	10	C	C-	No	No	19	Cod CrS Sh MB

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
187	Brachychiton populneus	8+10	12	C-	C-	No	No	12	Cod inc Sp Sh MB
188	Brachychiton populneus	20	15	C	C	No	No	20	NoRF cod inc Sp
189	Brachychiton discolor	18	8	C-	C-	No	No	18	CrS Sp Sh MB
190	Brachychiton populneus	16	12	B	C-	No	No	12	Cod Sh MB
191	Pinus thunbergiana	14	18	B	C	No	No	18	Cod Sh MB Cr#190 & 192
192	Brachychiton populneus	13	12	C	C	No	No	13	Cod Sh MB Cr#191
193	Brachychiton populneus	9	6	B	C	No	No	7	Cod CrS
194	Brachychiton populneus	4.3	3	C	C-	No	No	4.5	Cod Xing
195	Melaleuca quinquenervia	22	18	B	C-	No	?	18	Cod inc Lt Sh MB
196	Eucalyptus rudis	16	16	B	C	No	No	16	Cod leans, root sprung, Sh MB
197	Eucalyptus polyanthemos	32	27	C	C	No	No	32	SW lift cod Xing-kiss
198	Eucalyptus cladocalyx	24	25	C	C	No	No	25	Hd DL cod Sh MB
199	Eucalyptus polyanthemos	18	18-1s	B	C-	No	No	18	45° lean, root-sprung, Xing-kiss Sh MB
200	Removed								
201	Eucalyptus cladocalyx	40	27	C	C	No	No	40	Sp-top cod Sh MB, HANGER
202	Removed								
203	Pinus eldarica	16	12	C	C	No	No	16	Sp 2long, no mulch
204	Eucalyptus cladocalyx	35	25	B	C	No	No	27	Cod Hd TD
205	Eucalyptus cladocalyx	32	25	B	B	No	No	25	Hd TD Sp-top Sh MB
206	Eucalyptus cladocalyx	46	30	C	C	No	No	46	R-inj cod Xing-kiss DLS Sp-top
207	Pinus pinea	20	25	B	C	No	No	25	R-inj cod galls 2long Sh MB
208	Pinus pinea	20	25	B	C	No	No	25	FC inc cod galls DLS Sh MB
209	Pinus pinea	26"b	25	C-	C-	No	No	30	Cod inc R-galls Lt OP Sp Sh MB
210	Melaleuca quinquenervia	26 @ 2'	15	B	C-	No	No	15	Cod inc CrR TO OL
211	Olmediella betschlerana	9	10	B	C-	No	No	10	60° lean CrS FC Sh MB
212	Pyrus kawakamii	10	10	B	C	No	No	10	Cod mSp Sh MB
213	Pyrus kawakamii	12	15	B	C	No	No	15	Cod DLS mDb mSp Sh MB
214	Platanus racemosa	21	22	A	B	No	No	22	mBow 2long Sh MB

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
215	Liquidambar styraciflua	15	15	C-	C-	No	No	15	DL cid Db Sh MB
216	Liquidambar styraciflua	17	18	C	C	No	No	18	Cod 2long Sh MB
217	Schinus molle	7.3	7	B	B	No	No	7	Cod Sh MB
218	Cupaniopsis anacardioides	18	14	C	C-	No	No	18	FC 1-cod cut, TD R-galls Sh MB
219	Cupaniopsis anacardioides	18	20	B	C-	No	No	20	Cod CrS Xing R-galls, Sh MB
220	Pyrus kawakamii	13	11	B	D	No	No	11	Cod Xing, tangle of limbs, Sh MB
221	Pyrus kawakamii	18	10	B	C-	No	No	10	FC 60º lean Tinj DLT DLS Sh MB
222	Removed								
223	Removed								
224	Platanus x acerifolia	10	16	C-	C-	No	**Yes**	N/A	Cod Db Sp bleeding trunk
225	Platanus x acerifolia	8	12	D	D	No	**Yes**	n/A	Leans Db Sp T-Db
226	Platanus x acerifolia	7.5	12	D	D	No	**Yes**	n/A	Cod Db Sp
227	Platanus x acerifolia	7.5	14 -1s	D	D	No	**Yes**	n/A	Cod brk leans Db Sp
228	Platanus x acerifolia	7.7	9	C-	C-	No	**Yes**	N/A	Cod DLS Db Sp
229	Platanus x acerifolia	11	16	C-	C-	No	**Yes**	N/A	Cod DLS Db Sp
230	Platanus x acerifolia	8.5	10	C-	D	No	**Yes**	N/A	Cid CrS DLS Db Sp
231	Platanus x acerifolia	8	12	C-	C-	No	**Yes**	N/A	Cod brks DLS Db Sp
232	Platanus x acerifolia	4	2	F	F	No	**Yes**	n/A	Dk Db Sp, near dead
233	Removed								
234	Removed								
235	Removed								
236	Removed								
237	Removed								
238	Ficus rubignosa	5	4	B	C	No	Yes	N/A	FC, stump sprout
239	Removed								
240	x Chitalpa	6	8	C	C-	No	No	8	Tinj 1sRF Sp cod, aphids
241	x Chitalpa	5.5	7	C-	D	No	Yes	N/A	Leans 60º, Tinj 1sRF Sp cod, aphids

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
242	x Chitalpa	7	8	C	C-	No	No	8	Vines in canopy, rests on wall, cod Sp
243	x Chitalpa	6	7	C	C-	No	No	7	Vines in canopy, CrR cod Sp
244	x Chitalpa	7	10	C	C-	No	No	10	Vines in canopy, CrR cod Sp
245	x Chitalpa	7	8	C	C-	No	No	8	Vines in canopy, CrR leans cod Sp
246	Magnolia grandiflora	6.3	10	B	C	No	No	10	Cod CrS Tinj
247	Melaleuca quinquenervia	10+11+12	12	C-	C	No	No	15	Cod Xing OL Sh MB
248	Melaleuca quinquenervia	12+10+10	16	C	C	No	No	16	Cod OL Sh MB
249	Melaleuca nesophylla	13	20 - 1s	C	C-	No	No	15	OP T-horiz
250	Melaleuca nesophylla	12+12	20 - 1s	C	C-	No	No	20	OP T-horiz DkT
251	Magnolia grandiflora	6	9	C-	C	No	No	10	Sp Db S-brk
252	Eucalyptus ficifolia	20	16	C	C	No	No	20	mLean cod mBleeding
253	Melaleuca quinquenervia	15	14	B	D	No	?	14	60º lean cod inc Xing, tangled Sh MB
254	Melaleuca quinquenervia	15	12	B	D	No	?	12	1sRF cod inc CrS Sh MB
255	Melaleuca quinquenervia	16	12	B	C-	No	No	12	CrS cod inc Db Sh MB
256	Melaleuca quinquenervia	14	12	C	D	No	?	14	Xing tangledSp Db Sh MB
257	Melaleuca quinquenervia	22	15	B	C-	No	No	15	Cod inc half-gird CrS
258	Removed								
259	Removed								
260	Corymbia citriodora	14	16 - 1s	C-	C-	No	No	2	1s cod Sp Lt Sh MB
261	Removed								
262	Removed								
263	Removed								
264	Removed								
265	Removed								
266	Eucalyptus camaldulensis	20	16 - 1s	C	C-	No	No	20	1s Xing OL Sh MB
267	Removed								
268	Removed								

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
269	Fraxinus uhdei	8+9	15 - 1s	C-	D	No	Yes	N/A	1s cod DkTs epis
270	Fraxinus uhdei	11	10	D-	C-	No	Yes	n/A	Cod NC Db Sh MB
271	Fraxinus uhdei	20	25	B	C-	No	No	25	Cod Xing-kiss Sh MB
272	Liquidambar styraciflua	18"b	18	C-	C-	No	No	20	Cod inc 2long Db Sh MB
273	Removed								
274	Liquidambar styraciflua	16	20	C-	D	No	Yes	N/A	FC Dk Hd DL Sh MB
275	Removed								
276	Olea europaea	22	15	D	D	No	Yes	N/A	Epis FC brk Db Xylella? Sh MB
277	Removed								
278	Metrosideros excelsus	21 @ 2'	18	B	C	No	No	18	Root sprung, Lt Sh
279	Platanus racemosa	18	20	C-	C	No	No	24	OP Sp mDb Sh MB
280	Platanus racemosa	20	20	B	B	Yes	No	20	Lt 2long Sh MB
281	Platanus x acerifolia	23	26	C	C-	No	No	26	Cod Xing-kiss Db, gravel mulch
282	Fraxinus uhdei	18	18	C	C	No	No	18	Cod mDb Sh MB
283	Removed								
284	Fraxinus uhdei	16	18	C	D	No	Yes	N/A	1s TO topd Sh MB
285	Removed								
286	Fraxinus uhdei	21	20	C	C	No	No	21	Cod mTop-Db Sh MB
287	Removed								
288	Liquidambar styraciflua	11	12	C-	C-	No	?	12	Cod Db brk Sh MB
289	Removed								
290	Platanus racemosa	20	16	C-	C	No	No	24	ShMB Db DLs Sp
291	Lophostemon confertus	8	8	C-	D	No	Yes	N/A	Sp Db galls stunted
292	Liquidambar styraciflua	17	20	B	C	No	No	20	Cod brks mDb Sh MB
293	Removed								
294	Removed								
295	Platanus x acerifolia	17	16	C-	C	No	No	20	Db Sp Sh MB
296	Pinus halepensis	40	30	C	C-	No	No	40	Cod inc CrS Sp
297	Pinus halepensis	32	30	B	C-	No	No	30	Cod inc EH Lt

Tag #	Botanic Name	Caliper DBH*	Dripline radius	Health	Condition	Transplant	Remove	Clearance	Comments
298	Pinus halepensis	18	20	A	D	No	Yes	N/A	DkB
299	Eucalyptus citriodora	25	25	B	C	No	No	25	Cid brk 2long Sh MB
300	Eucalyptus citriodora	17	16	D-	D	No	Yes	n/A	Binj cod brk Sh MB
301	Platanus racemosa	34	25	B	B	No	No	25	DLs 2long Sh MB
302	Removed								
303	Liquidambar styraciflua	12	14	D	D	No	Yes	N/A	Cod Hd Db 2long Sh MB
304	Removed								
305	Cupaniopsis anacardioides	5+6+6	12	C	C-	No	No	12	FC cod chlor mDb Sh MB
306	Cupaniopsis anacardioides	4.2	5	D	D	No	Yes	N/A	WWinj chlor Db lean
307	Cupaniopsis anacardioides	5	6	D	D	No	Yes	N/A	WWinj chlor Db Sh MB
308	Ficus rubignosa	11	14	B	C	No	No	14	Lt CrR
309	Removed								
310	Syagrus romanzoffianum	20'th	12	C	C	Okay	No	5	Penciled
311	Syagrus romanzoffianum	17'th	10	C	C	Okay	No	5	Penciled
312	Syagrus romanzoffianum	16'th	10	C	C	Okay	No	5	Penciled
313	Liquidambar styraciflua	12	16	C-	D	No	Yes	N/A	Topd TD Db 2long Sh MB
314	Howea forsteriana	4+6'	9	B	B	Okay	No	9	4'T stunted
315	Corymbia citriodora	18	20	C	C-	No	No	20	|OP Lt Sp
316	Platanus x acerifolia	8.5	12	B	C	No	No	12	FC OL Sh MB
317	Platanus x acerifolia	9	12	B	C	No	No	12	FC OL cod
318	Syagrus romanzoffianum	16+18	10	B	C	Okay	No	10	8'T is thin and sparse
319	Schinus terebinthifolius	9+10	10	B	C-	No	No	10	Cod inc stubs DLT DLS

*Trunk diameters with “b” indicated basal measurements below first scaffold limbs.

Clearances for Trees during Construction

Recommended clearance radii for trenching, paving or other activities that may weaken or kill trees are listed in the Matrix of Recommendations above. There are several methods of determining the space needed for tree protection. Drip line is most often used but you must be aware of the tree's lean or any other physical factors that force roots into a certain direction. The most important roots are opposite the lean of a tree. Following dripline alone would be just the wrong thing to do for leaning trees. Dripline based recommendations also do not consider larger trees with narrow or upright habits. There are also significant species tolerance differences that should be considered. Drip line is not effective in these cases.

The authors of *Trees & Development*, use a diameter method that allows six inches of radius for every inch of trunk diameter for trees up to 20 inches DBH. For trees that are over 20 inches allow nine inches for every inch of trunk diameter. Over mature trees will need a full foot for every diameter - inch. If the tree is known to be only moderately tolerant to damage, add 3 inches per diameter inch to these distances. If the tree has a poor tolerance, add 6 inches. If you take this to the maximum, you would allow 1.5 feet of radius for every inch of trunk diameter to be on the safe side. Using such a formula is my preferred method of forming a protection zone. See *Trees and Development*, ISA, by Matheny and Clark, page 74 and appendix.

I recommend 6-foot-high chain link protective fencing around the protection zone. Before the fence goes up any weeds should be removed and any bare soil mulched to four inches deep with coarse tree chips. Existing turf in the protection zone can be sprayed with herbicide before mulching.

Preservation of Trees to Remain

During tree removal operations it will be evident that some trees may have less than attractive, formerly shaded, sides exposed. If properly chosen and placed, new plantings should soon help fill in and improve this appearance. Temporary irrigation will probably be necessary during construction to maintain the health of existing trees (due to the shallow roots). A drip or mini-spray type system and domestic water would be best, considering the root spread and dictates of a construction site. Water trucks rarely provide sufficiently deep watering. Other species added to existing groupings should have similar watering requirements as the existing trees. However, for the first few years they will require more frequent irrigation within the watering basin, while they root in. Trees planted from smaller containers need shorter establishment periods.

Deep cross-ripping (subsoiling) and amending of large areas where trees will be planted is essential. Recommendations for soil amendments and fertilization should come from an independent laboratory, after thorough testing.

- Install 6' high secure fencing around trees to be preserved. Equipment and even foot traffic must be kept out from under all trees being preserved.
- To avoid tearing roots back into the protection zones, during deep ripping or grading in the vicinity of trees to remain, a trencher should cut around the perimeter outside the clearance radius. Roots over 1 inch in diameter should then be cut cleanly using loppers or a fine bladed saw. Do not apply a sealant. Considering the shallow rooting of trees at Edison Park, keep in mind that almost any amount of root loss may increase the risk of toppling in the wind.
- When other excavations are dug, first use a trencher and re-cut the roots over one inch with loppers or a fine bladed saw. Equipment such as backhoes may tear roots excessively between the trench and trunk. Roots that are not cut cleanly will be more open to infection and will not resprout as well.
- No vehicles, equipment, materials, fuels, soil, excess concrete or other debris, liquid or solid, may be dumped or stored under or near the trees.
- Do not change the soil level or grade within the drip-line of any tree. If necessary, some accommodations can be made if approached on a tree-by-tree basis. Specific recommendations should be obtained from a registered consulting arborist.
- To reduce soil compaction below trees to remain, four radial trenches should be placed between the main lateral roots, as much as their position can be determined. Trenches should begin at four feet or more from the trunk and radiate out to the edge of the root zone. The soil in each trench should be amended as recommended by a soil lab.
- When larger roots are exposed in excavations, cover the ends with baggies and a rubber band or plastic sheeting and keep moist. Remember to remove the baggies when the roots are recovered.
- Strong dust control measures should be observed and dusty foliage rinsed every Friday or as often as necessary.
- The soil surface under each tree to remain should be maintained in a moist condition to a minimum depth of 18 inches.
- After turf and ground cover are removed under trees, a layer of wood chips or coarse mulch should be maintained to a depth of four inches. The existing leaf and organic layer should be left in place as much as possible.
- If equipment access is necessary within the protection zone, steel plates on a layer of wood chips 8 inches deep should be installed on the surface under trees to reduce compaction.

Pest Management

Monitor trees to remain during construction and consult a licensed pest control advisor for recommendations to control pests encountered.

Tree Health Management

Tree health management should consider both the part you see and the equally important part underground. The below ground portions will involve soil chemical, biological and physical properties. Minimum levels of fertility are recommended to discourage excessive new growth, which is preferred by many pests. Recommendations dealing with the physical properties are as follows:

1. Trees that cannot be made safe by pruning or moving the "target" should be removed.
2. Trees protection zones should be mulched. Adding surface mulching to tree planting areas will reduce water evaporation from the soil surface, improve soil biotic life, improve water penetration, protect surface roots, and reduce the accumulation of salts in the soil surface. Try to use good quality, fully composted organic material from a reputable source (e.g. Aguinaga "Forest Floor ½ - 2") However, if constrained by budgets, even fresh tree chips from a tree service are better than no mulch.
3. Aerate lawn areas, vertical mulch or use radial trenching as described above.

The larger eucalypts, red gums and sugar gums surrounding improvements should receive the following care:

1. Do no pruning (root pruning or top pruning) except as needed for public safety.
2. Pruning needs to focus on correcting or minimizing the defects listed in the comments column of the matrix.
3. Do not climb any tree, other than those being removed, using climbing gaffs.
4. Do not cultivate the soil under construction affected trees, except lightly as needed to apply gypsum or other recommended amendments. Under no circumstances should a roto-tiller be used under affected trees.
5. Do not trench, dig, or install new plantings under or near trees to remain. Radial trenching between primary roots to reduce compaction may be used under the guidance of a registered consulting arborist.
6. Irrigation in the area of affected trees should be adjusted to less frequent, but longer cycles, according to the reduced needs of the trees once the turf is removed.
7. The new irrigation system should have separate valves for tree masses. New irrigation lines among tree masses should be run outside the clearance radii, but when necessary can be run radial to trunks or surface mounted flex tubing below mulch.
8. Do not plant any new eucalypts from containers larger than 5-gallon size, and minimize staking.

Long Term Maintenance Recommendations

1. To the degree possible, trees to remain should have turf removed within the dripline and replaced with mulch beds and occasional sparse plantings of drought tolerant shrubs or ground covers. New trees should have no turf within three feet of their trunks. The irrigation for the trees should be separated from the turf and scheduled according to their specific needs.
2. All future pruning should be guided by ANSI A-300 standards – there must be no topping, no lion-tailing, no flush cuts, no over-lifting and no over thinning. All pruning should be supervised by an ISA certified arborist. Pruning specifications should guide outside contract tree service work.
3. Staking of new trees should be carefully monitored to avoid stake rub and tree tie girdling. Trees shall be tied only as high as necessary to keep the tree vertical. All excess stake length above the highest tie shall be cut and removed. Stakes should be removed as soon as trees can stand without them.
4. Trees that are over picnic areas, walkways, and other public use areas must be kept to high standards of soundness and safety. Large codominant specimens, trees with large end-heavy scaffolds, trees with extensive decay, trees that have large limbs with included bark, and other trees that have uncorrectable defects should be removed or the uses below them should be removed.
5. Establish and enforce policies to keep all vehicles in the park, including city maintenance vehicles, on paved surfaces and away from trees.
6. After construction the trees should be inspected again for hazardous conditions that may have come about during this time or perhaps caused by construction.

Tree Preservation Suggestions

1. Protection Barrier: A protection barrier is recommended to be installed around the trees to be preserved. The barrier shall be constructed of chain-link fencing at least six feet high. The barrier shall be placed as far from the base of the tree(s) as possible, preferably at the drip-line to protect lower limbs. The fencing shall be maintained in good repair throughout the duration of the project, and shall not be removed, relocated, or encroached upon.
2. Storage of Materials: There shall be NO storage of materials or supplies of any kind within the area of the protection barriers. Concrete and cement materials, block, stone, sand and soil shall not be placed within the drip-line of the tree.
3. Fuel Storage: Fuel storage is not recommended within 150 feet of any tree to be preserved. Refueling, servicing and maintenance of equipment and machinery shall NOT be permitted within 150 feet of protected trees.
4. Debris and Waste Materials: Debris and waste from construction or other activities is NOT be permitted within protected areas. Wash down of concrete or cement handling equipment, in particular, is not recommended within 150 feet of protected trees.
5. Grade Changes: Grade changes can be particularly damaging to trees. Even as little as two inches of fill can cause the death of a tree. Lowering the grade can destroy major portions of a root system. Any grade changes proposed should be approved by a Registered Consulting Arborist prior to construction, and precautions taken to mitigate potential injuries.
6. Damages: Severed roots shall be pruned cleanly to healthy tissue, using proper pruning tools. Broken branches or limbs shall be pruned according to International Society of Arboriculture Pruning Guidelines and ANSI A-300 Pruning Standards.
7. Preventive Measures: Before construction begins, fertilization of the affected trees intended to remain is recommended to improve tree vigor and health. Follow a soil laboratory's recommendations for fertilization with the appropriate fertilizer products. Pruning of the tree canopies and branches should be done at the direction of the project arborist to remove any dead or broken branches, and to provide the necessary clearances for the construction equipment when necessary.

Contingent and Limited Conditions

In comparison, the 2009 inventory shows continuing tree loss in two main areas, short-lived species and large trees planted in small spaces.

Proper planting and maintenance will be essential to good growth and performance of any future planting and the maintenance of the existing trees.

Transplanting is unlikely to be of use in this park due to shallow roots, poor tree health and long recovery periods.

Transplanting of larger mature trees always involves increased risk of tree death and/or toppling.

The soil conditions of this site do not appear to be uniform, and conditions may be encountered that are still unknown.

A detailed hazard analysis was not requested. No testing was done for internal decay or below ground conditions.

No guarantee of tree safety or stability is made by this report. Existing stability may be compromised by the future work of others.

Small numbers of trees do not yield reliable conclusions as to their site suitability.

Tree dripline radii were estimated for an approximate average radius around each tree.

Measurements were taken according to ANSI Z-60, using a Biltmore stick, or calipers for smaller trees.

Conclusion

Preservation

I recommend that 59 trees be removed due to their safety, poor health or condition. In the 2009 report most of these removals were myoporums dying due to the thrip infestation. Now, over a decade later, only six myoporums are recommended for removal, but that is half the remaining twelve myoporums. The species with the largest number of recommended removals is the London plane tree, and that due mostly to the group planted in the skateboard area declining from lack of root space. The London plane cultivar planted in front of the fire station have grown well. Trees of other species were recommended for removal for a variety of reasons, e.g. decay at the base started by lawn mower injuries, trunk defects such as seriously included bark between codominant leaders, poor health, and other untreatable defects or conditions. This is the best time to clean out weak and unstable trees.

For the trees that will remain, some serious protection measures are needed and justified. Large trees, like the eucalypts near the office, are a great asset to a park. However, they have dropped limbs and need professional corrective pruning.

If this study is followed by new construction, consider that many unplanned things can happen on construction sites. Good fencing is the best insurance that desirable trees will remain so. Monitoring of work around trees is essential.

Planting

What makes choosing good species difficult at Edison Park is the variety of soil conditions. What may be a good choice for one part of the park, may not be good elsewhere. There are some species that tolerate tough soil conditions, but do not do well under lawn conditions. Then there are other considerations than soil and lawn tolerance. Some will need to be smaller trees for small areas. But the bottom line is, if the tree won't grow well in these conditions, it doesn't matter if it's a good tree for lawn areas or small areas.

This consultant occasionally deals with soils that will not support woody plants of any species. There are grass species that can tolerate some such difficult soils that woody plants will not. Testing, mapping, and knowing the soil conditions around the park will help avoid more plant failures.

If the park is watered with reclaimed water, having that water tested, or getting the suppliers test results can also help avoid future plant failures. West Basin Water District still does not meet State standards for their reclaimed water, and there are other districts that have high salinity or high boron. Excess elements in the water can build up in the soil to the point where very few plants will grow.

Diversity is good insurance against serious future pest outbreaks. Edison Park has fairly good diversity, but has too many of certain species that have not grown well. Do not plant more than ten percent of even the most successful species. The introduction of new pests that can kill trees is nothing new. Consider the Dutch elm disease.

The root environment is just as important as the above ground environment. Many of the trees recommended for removal became injured or unstable because the root environment was not protected and shallow roots resulted, the shallow roots were then injured by lawn mowers and in some decay resulted. This is an opportunity to improve that environment. Less turf, thoughtful selection, more mulch, and good soil testing and monitoring can help new trees last longer.

Transplanting

Transplanting is not necessarily a valid means of preserving trees. There are few truly qualified contractors, it is expensive and risky, it can take decades for transplanted trees to fully recover, landscape maintenance people do not typically know how to care for transplanted trees, and there are almost no trees at Edison Park that should be transplanted.

Disclaimer

Good, current information on tree preservation has been applied. However, even when every tree is inspected, inspection involves sampling, therefore some areas of decay or weakness may be missed. A complete tree hazard evaluation was not requested or performed. Weather, winds and the magnitude and direction of storms are not predictable and some failures may still occur despite the best application of high professional standards. Future tree maintenance will also affect the trees health and stability and is not under the supervision or scrutiny of this consultant. Continuing construction activity such as trenching will also affect the health and safety, but are unknown and unsupervised by this consultant. Trees are living, dynamic organisms and their future status cannot be predicted with complete certainty by any expert. This consultant does not assume liability for any tree failures involved with this property.

Certification

I, Gregory W. Applegate, certify to the best of my knowledge and belief:

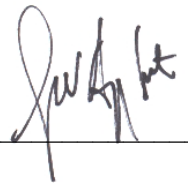
That the statements of fact contained in this report are true and correct. That the report analysis, opinions, and conclusions are limited only the reported assumptions and limiting conditions, and are my personal unbiased professional analysis, opinions and conclusions.

That I have no present or prospective interest in the vegetation that is the subject of this report, and I have no personal interest or bias with respect to the parties involved.

That my compensation is not contingent upon a reporting the attainment of stipulated result, or the occurrence of a subsequent event.

That my analysis, opinions, and conclusions were developed, and this report has been prepared, in conformity with the standards of arboricultural practice.

That I have made a personal inspection of the plants that are the subject of this report. No one provided significant professional assistance to the person signing this report.

Arborgate Consulting, Inc
Gregory W. Applegate, ASCA, ASLA emeritus  Date 6/18/2022
Registered Consulting Arborist #365

Appendix

A. Resume

B. Botanical Name / Common Name Cross-reference

C. Glossary

D. Area map

E. Eucalyptus Hazard Charts

F. Transplanting Specifications

RESUME: GREGORY W. APPLEGATE, ASCA, ASLA emeritus

PROFESSIONAL REGISTRATIONS:

American Society of Consulting Arborists RCA #365
American Society of Consulting Arborists, Tree & Plant Appraisal Qualified
International Society of Arboriculture, Certified Arborist Number WE-180a
International Society of Arboriculture, Tree Risk Assessment Qualified

EXPERIENCE:

Mr. Applegate is an independent consulting arborist, CEO of Arborgate Consulting, Inc. He has been in the horticulture industry since 1963, providing professional arboricultural consulting since 1984 within both private and public sectors. His expertise includes appraisal, tree preservation, diagnosis of tree and palm problems, construction impact mitigation, environmental assessment, forensic consulting and testimony, hazard evaluation, pruning programs, species selection and tree health monitoring.

Mr. Applegate has consulted for insurance companies, major developers, theme parks, homeowners, homeowners' associations, landscape architects, landscape contractors, property managers, attorneys and governmental bodies.

Notable projects on which he has consulted are: Disneyland, Disneyland Hotel, DisneySeas-Tokyo, Disney's Wild Animal Kingdom, the New Tomorrowland, Disney's California Adventure, Disney Hong Kong project, Universal Studios, Knott's Berry Farm, J. Paul Getty Museum, Dreamworks, Newport Coast, Crystal Court, Newport Fashion Island Palms, Bixby Ranch Country Club, Playa Vista, MTA Purple and Expo Lines, MWD-California Lakes, Loyola-Marymount campus, Cal Tech, Cal State Long Beach, Arcadia High School, Pierce College, The Irvine Concourse, UCI, USC, UCLA, LA City College, LA Trade Tech, Riverside City College, Crafton Hills College, and the State of California review of the Landscape Architecture License exam (re: plant materials).

EDUCATION:

Bachelor of Science in Landscape Architecture, California State Polytechnic University, Pomona 1973
Arboricultural Consulting Academy (by ASCA), Arbor-Day Farm, Kansas City 1995
Continuing Education Courses in Arboriculture, required to maintain Certified Arborist status and for ASCA membership

PROFESSIONAL AFFILIATIONS:

American Society of Landscape Architects (ASLA), Emeritus Member
American Society of Consulting Arborists (ASCA), Registered Member
International Society of Arboriculture (ISA), Certified Member
California Tree Failure Report Program, UC Davis, Participant
Street Tree Seminar (STS), Member

COMMUNITY AFFILIATIONS:

Landscape Architecture License Exam, Reviewer, Cal Poly Pomona (1986-90)
American Institute of Landscape Architects (L.A.) Board of Directors (1980-82)
ASCA 2011 Nominations Committee and A3G appraisal update committee
ASCA, Industry definitions committee 2009-2010
ASCA web site, west coast tree question responder (2007 -2018)
California Landscape Architect Student Scholarship Fund - Chairman (1985)
International Society of Arboriculture - Examiner-tree worker certification (1990)
Guest lecturer at UCLA, Cal Poly, Saddleback College, & Palomar Junior College

B. Botanical Name / Common Name Cross-reference

Botanic name	Common name
Afrocarpus falcatus	Fern pine
Agonis flexuosa	Peppermint tree
Alnus rhombifolia	White alder
Brachychiton discolor	Pink flame tree
Brachychiton populneus	Bottle tree
Callistemon citrinus	Bottle brush tree
Celtis laevigata	Sugar hackberry
Corymbia citriodora	Lemon gum
Cupaniopsis anacardioides	Carrotwood tree
Eucalyptus camaldulensis	Red gum
Eucalyptus cladocalyx	Sugar gum
Eucalyptus ficifolia	Red flowering gum
Eucalyptus polyanthemos	Silver dollar gum
Eucalyptus rudis	Flooded gum
Eucalyptus sideroxylon	Red ironbark
Feijoa sellowiana	Pineapple guava
Ficus rubignosa	Rusty leaf fig
Fraxinus uhdei	Shamel ash
Howea forsteriana	Kentia palm
Juniperus chinensis 'Torulosa'	Hollywood juniper
Lagerstroemia X cv	Hybrid crape myrtle cultivar
Lagunaria patersonii	Primrose tree
Liquidambar styraciflua	American sweet gum
Lophostemon confertus	Brisbane box
Magnolia grandiflora	Southern magnolia
Melaleuca quinquenervia	Cajeput tree
Metrosideros excelsus	New Zealand Christmas tree
Morus alba	White mulberry
Myoporum laetum	Ngaio

Botanic name	Common name
Olea europaea	Olive
Olmediella betschlerana	Guatemalan holly
Pinus canariensis	Canary Island pine
Pinus eldarica	Afghan pine
Pinus halepensis	Aleppo pine
Pinus pinea	Italian stone pine
Pinus thunbergiana	Japanese black pine
Platanus racemosa	California sycamore
Platanus x acerifolia	London plane
Pyrus kawakamii	Evergreen pear
Quercus ilex	Holly oak
Schinus molle	California pepper
Schinus terebinthifolius	Brazil pepper
Sophora japonica	Chinese scholar tree
Spathodea campanulata	African tulip tree
Syagrus romanzoffianum	Queen palm
Tipuana tipu	Tipu tree

Glossary

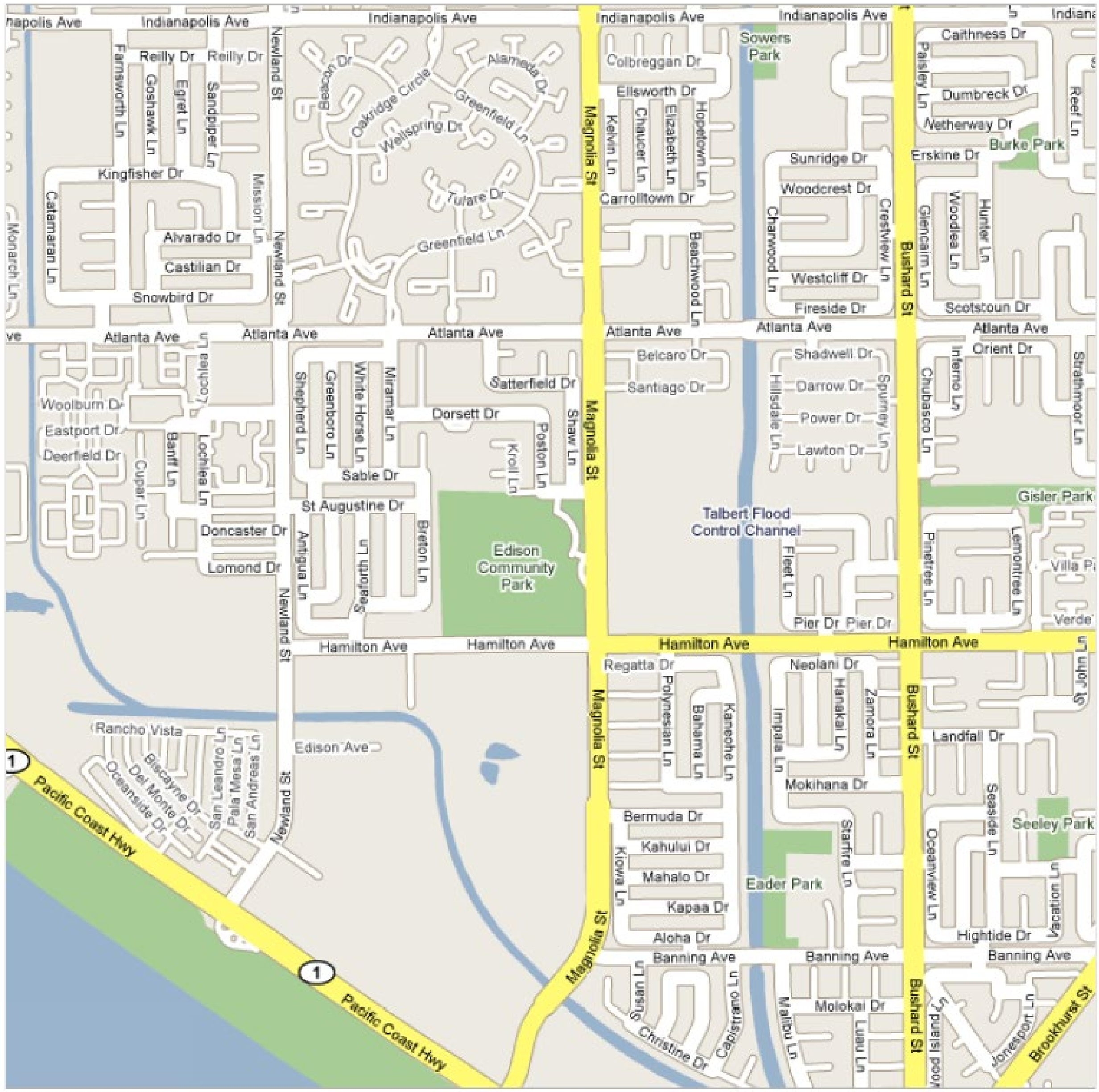
Apical dominance	Relative strength of the central leader compared to lateral branches.
Arboricultural	Pertaining to the awareness, care, evaluation, identification, growing, maintenance, management, planting, selection, treatment, understanding, valuation and so forth of trees and other woody plants and their growing environments, particularly in shade and ornamental (non-crop/commodity) settings.
Arborist	A person possessing the technical competence through experience and related training to provide for or supervise the management of trees or other woody plants in a landscape setting.
Bark	Tissue on the outside of the vascular cambium. Bark is usually divided into inner bark - active phloem and aging and dead crushed phloem - and outer bark.
Biltmore stick	The Biltmore stick or cruiser stick can determine tree diameter and height along with volumes of wood on standing trees and logs.
Biotic	Pertaining to living organisms.
Branch collar	Trunk tissue that forms around the base of a branch between the main stem and the branch, or between a main branch and a lateral branch. As a branch decreases in vigor or begins to die, the collar usually becomes more pronounced an more completely encircles the branch.
Calcareous soil	A soil containing calcium carbonate (lime), or a soil alkaline in reaction because of the presence of calcium carbonate.
Caliper	A measurement of the trunk diameter for nursery-grown or small size trees; taken at 6 inches above ground level for trees less than 6 inches diameter, and at 12 inches above ground level for trees 6 inches to 12 inches diameter. Trees larger than 12 inches diameter are measured at 54 inches (4.5 feet) above the ground level.
Canopy	The live, foliage-bearing part of a tree.
Cavity	An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.
Central leader	The main stem of the tree.
Chlorotic	Also Chlorosis. A condition of the plant marked by yellowing of normally green foliage, often indicating nutrient deficiency or plant dysfunction.

Codominant	Leaders equal in size and relative importance, developed from 2 apical buds at the top of a stem. Each codominant stem is an extension of the stem below it. There are no branch collars or trunk collars at the bases of codominant stems.
Compaction	(Soil Compaction) The compression of soil, causing a reduction of pore space and an increase in the bulk density of the soil. Tree roots cannot grow in compacted soil.
Compartmentalize	To seal off decay. The ability of the tree to restrict the spread of invasive organisms, such as decay fungi, by means of internal changes in cell structure and chemistry.
Crotch	The union of two or more branches; the axillary zone between branches.
Crown	The upper portions of a tree or shrub, including the main limbs, branches, and twigs.
Cultivar	A cultivated variety. Maybe a field selection or a horticultural variety that has originated and persisted under cultivation. Usually enclosed in single quotes after the genus and species names.
Decay	Progressive deterioration of organic tissues, usually caused by fungal or bacterial organisms, resulting in loss of cell structure, strength, and function. In wood, the loss of structural strength.
Decline	Progressive reduction of health or vigor of a plant.
Decurrent	Referring to crowns which are made up of a system of codominant scaffold branches. Lacking a central leader.
Dieback	Progressive death of buds, twigs and branch tissues, on individual limbs, or throughout the canopy.
Dripline	A projected line on the ground that corresponds to the spread of branches in the canopy; the farthest spread of branches.
Evergreen	retains its leaves throughout the year.
Excurrent	Referring to crowns having a strong central leader
Fertilization	The process of adding nutrients to a tree or plant; usually done by incorporating the nutrients into the soil, but sometimes by foliar application or injection directly into living tissues.
Flush cut	Pruning technique in which both branch and stem tissue are removed, generally considered poor practice
Foliage	The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.
Gall	An abnormal or disorganized growth of plant tissues, caused by parasitic or infectious organisms such as insects, fungi, bacteria, or viruses.
Grading	Also Regrading. Intentional altering of topography and soil levels, using machinery.

Ground cover	Plants, usually herbaceous, used to spread, stay low and cover ground. They are usually not suited for foot traffic and do not usually need to be mowed and as such are distinguished from lawns
Included bark	Bark or cortex tissue that is included or trapped between close-growing branches. Usually found in narrow or tight crotches.
Leader	A main stem or branch of a tree that is (usually) codominant with other main stems.
Lifted	A shrub or a tree that has had lower branches and foliage removed, often to reveal the lower trunks or branch-work or for improved visibility as in many street trees.
Limb	A large lateral branch growing from the main trunk.
Lion-tailing	Pruning technique where internal foliage and branches are removed, leaving the latter concentrated at branch ends.
Penciled	abrupt tapering of the upper trunk of a palm, indicating diminishing health over time.
Resistograph	An instrument used to detect and measure the extent of decay in trees and wood. The Resistograph drills a 3 mm hole into the trunk and produces a graph of the resistance encountered.
Root crown	Area at the base of a tree where the roots and stem merge (synonym - root collar)
Root system	The portion of the tree containing the root organs, including buttress roots, transport roots, and fine absorbing roots; all underground parts of the tree.
Root zone	The area and volume of soil around the tree in which roots are normally found. May extend to three or more times the branch spread of the tree, or several times the height of the tree.
Scaffold limb	Primary structural branch of the crown.
Shrub	A relatively low woody plant with several stems arising near the ground.
Soil profile	The characteristics of a soil as regards to relative depth; the changes in soil texture and composition that occur with depth.
Sprout	Also water sprout or epicormic shoot. A shoot or stem that grows from the bark of a tree; adventitious or secondary growth.
Systemic	Affecting the whole plant or organism. A systemic compound is carried throughout the entire plant to all parts.
Taper	Relative change I diameter with length - reflects ability of stem or branch to evenly distribute stress.
Target	Any person or object within reach of a falling tree or part of a tree that may be injured or damaged.

Topping	The practice of cutting large limbs back severely, without regard to form or habit of the tree. Cuts are usually made between lateral branch nodes. This practice is extremely injurious to trees, and promotes decay in the canopy.
Trees	An arborescent woody plant, with a single or few trunks near the base.
Vertical mulching	Ventilation of soil by auguring holes in a regular pattern. Usually the holes are backfilled with amended soil, but small holes may be left open.
Vigor	Active, healthy growth of plants: ability to respond to stress factors.

D. Area Map



Indianapolis Ave
Reilly Dr
Farnsworth Ln
Goshawk Ln
Egret Ln
Sandpiper Ln
Newland St
Beacon Dr
Oakridge Circle
Wellspring Dr
Alameda Dr
Greenfield Ln
Tulare Dr
Kingfisher Dr
Mission Ln
Catamaran Ln
Monarch Ln
Alvarado Dr
Castilian Dr
Snowbird Dr
Atlanta Ave
Lochlea Ln
Woolburn Dr
Eastport Dr
Deerfield Dr
Banff Ln
Cupar Ln
Doncaster Dr
Lomond Dr
Shepherd Ln
Greenboro Ln
White Horse Ln
Miramar Ln
Sable Dr
St Augustine Dr
Antigua Ln
Seaforth Ln
Breton Ln
Satterfield Dr
Dorsett Dr
Kroll Ln
Poston Ln
Shaw Ln
Edison Community Park
Hamilton Ave
Rancho Vista
Edison Ave
Biscayne Dr
Del Monte Dr
Oceanside Dr
San Leandro Ln
Pala Mesa Ln
San Andreas Ln
Pacific Coast Hwy
1
Magnolia St
Colbreggan Dr
Ellsworth Dr
Kelvin Ln
Chaucer Ln
Elizabeth Ln
Hopetown Ln
Carrolltown Dr
Beachwood Ln
Sowers Park
Sunridge Dr
Woodcrest Dr
Charwood Ln
Crestview Ln
Westcliff Dr
Fireside Dr
Belcaro Dr
Santiago Dr
Shadwell Dr
Darrow Dr
Power Dr
Lawton Dr
Hillsdale Ln
Spurney Ln
Talbert Flood Control Channel
Fleet Ln
Pier Dr
Regatta Dr
Polynesian Ln
Bahama Ln
Kaneohe Ln
Neolani Dr
Hanakai Ln
Zamora Ln
Impala Ln
Mokihana Dr
Bermuda Dr
Kahului Dr
Mahalo Dr
Kapaa Dr
Aloha Dr
Kiowa Ln
Eader Park
Starfire Ln
Banning Ave
Christine Dr
Capistrano Ln
Malibu Ln
Molokai Dr
Luau Ln
Bushard St
Caithness Dr
Paisley Ln
Dumbreck Dr
Netherway Dr
Erskine Dr
Burke Park
Reef Ln
Glencairn Ln
Woodlea Ln
Hunter Ln
Scotstoun Dr
Orient Dr
Inferno Ln
Chubasco Ln
Strathmoor Ln
Gisler Park
Pinetree Ln
Lemontree Ln
Villa Pi
Verde
St John Ln
Landfall Dr
Seaside Ln
Seeley Park
Oceanview Ln
Vacation Ln
Hightide Dr
Jonesport Ln
Brookhurst St

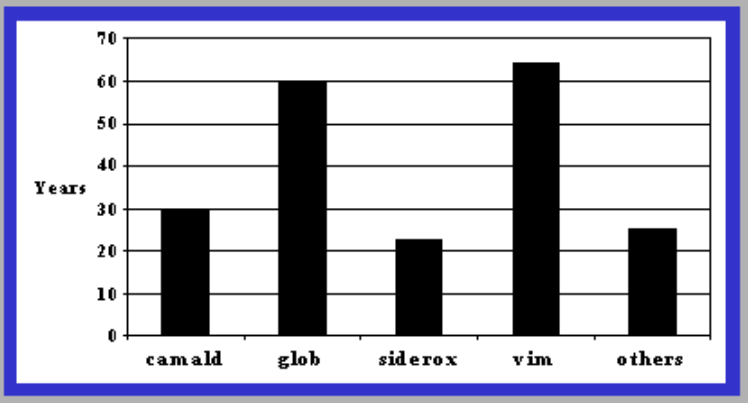
E .Eucalyptus Hazard Charts

The following charts are taken from a recent presentation of information of the California Tree Failure Database. Information is submitted by arborist participants throughout California.

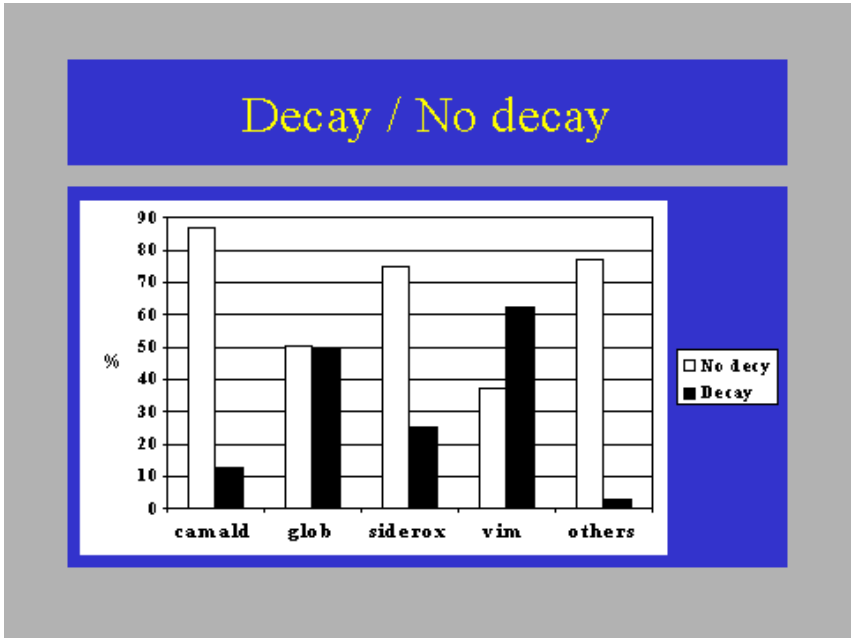
E. camaldulensis - Summary

- High branch failure rate
  - Multiple trunks / codominant stems
  - Heavy lateral limbs
- Young population in database
- Lower incidence of decay
- Strong association with high wind

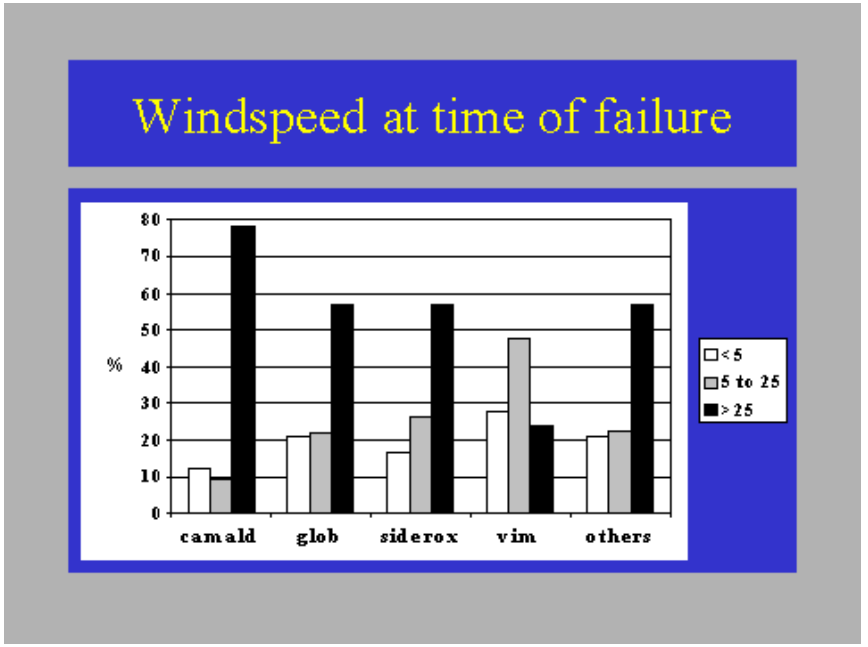
Estimated Eucalyptus age



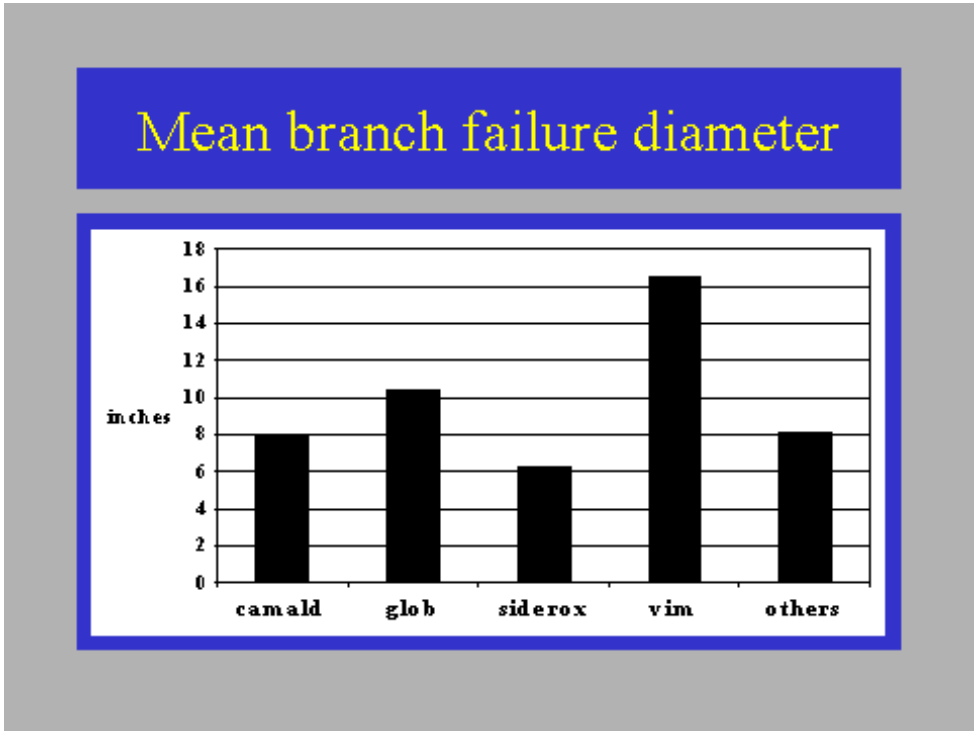
camald = Eucalyptus camaldulensis	Red gum
golb = Eucalyptus globulus	Blue gum
siderox = Eucalyptus sideroxylon	Ironbark
vim = Eucalyptus viminalis	Manna gum



Decay is involved in limb drop to a species-specific degree.



While high winds are often a cause of limb failure, ten percent or more failures are on near still days.



Even 4 inch diameter limbs can be deadly, but these figures represent means not the range of size.

F. Transplanting Specifications

1.00 Introduction - The specifications are presented as working guidelines, recognizing that trees are individually unique and that their transplanting may not always fit strict rules. Successful transplanting of trees is a skill obtained by practice in the field. Only contractors who can present evidence of successful similar projects are invited to bid.

1.01 Overview of Specifications - Any tree transplanting performed on a tree under this contract must be done according these specifications.

1.10 General Requirements - The following requirements are for use only during any contracted transplanting of trees at Edison Park, and may not be used for other projects by the City or others.

a. Transplanting trees, including boxing and cleating, to maximize tree health and survival. Transplant trees, as indicated by the City, as specified herein, and provide all materials and labor necessary for a complete and proper installation. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor, subject to approval by the designated City representative.

a. Transport boxed trees to designated holding area on site.

c. Build watering basins within the box using clean washed sand free from noxious weeds and/or seeds, stones or other foreign matter.

d. Watering, using water that is suitable for irrigation and free from ingredients harmful to plant life. Water may be available via quick-coupler near some transplanted trees. Contractor is responsible to supply water as needed.

Prior to starting, the Contractor must schedule and attend a pre-contract meeting at Edison Park, 22301 Magnolia Blvd., Huntington Beach, California. At this meeting, schedules, procedures, and any other questions pertaining to the project, as specified in the tree work, shall be discussed and any clarifications addressed by City's representative. Contractor will be responsible to contact Underground Service Alert (800-422-4133) prior to commencing work.

1.11 Consulting Arborist - Shall be notified one week prior to the start of work to set up site meeting. Greg Applegate may be reached at 714-731-6240.

1.12 Transplanting Specifications - Box sizes recommended by the Consulting Arborist shall be listed on the bid sheet and/or plans. Trees shall be transplanted from various locations on site and transported to a designated location for stabilizing before planting:

a. 36 inch box trees - minimum two and one half inch (2 ½") caliper to three and one half inch (3 ½") measured at six inches (6") above ground level. Tree height shall be comparable with what is commonly available in the nursery trade, as solely determined by the Consulting Arborist.

b. 48 inch box trees - minimum three and one half inch (3 ½") caliper to four and one half inch (4 ½") measured at six inches (6") above ground level. Tree height shall be comparable with what is commonly available in the nursery trade, as solely determined by the Consulting Arborist.

c. 60 inch box trees – minimum four and one half inch (4. ½") caliper to six and one half inch (6 ½") measured at six inches (6") above ground level. Tree height shall be comparable with what is commonly available in the nursery trade, as solely determined by the Consulting Arborist

d. Trees larger than 6 ½" caliper will be individually sized by the Consulting Arborist and labeled in the field.

1.13 Procedure - All trees to be transplanted shall be located and watered to moisten the soil to a depth of three and a half feet two days before boxing. The root ball of each tree must be kept moist and held intact during transplanting. The initial trenching of the rootball may be performed using a trencher. However the final fitting of the rootball to the box shall be performed using sharpened spades. All root ends must be cut cleanly. After rough cutting the rootball shape, two opposite sides of the box should be staked in place and used as a template to form the remaining rootball. After obtaining a tight fit, nail and band the box sides in place. Padded 2

x 4's, 2 x 6's or 2 x 8's (depending on box size) shall be nailed in place as cleats around the trunk before installing bottom. If the soil has sufficient clay content to hold together, the bottom may be installed by pulling over the box, by the box and shaving the bottom flush, then nailing on the bottom. If the soil at the bottom is concave, nail one or two boards on at a time and pack the soil behind them as the bottom is formed. The bottom shall be nailed in place and banded over the cleats before moving. Trees shall not be moved or pulled over by their trunks. Cables, straps or chains may only contact or be attached to the tree box. The trees shall be moved to a holding area where a sand watering basin will be formed at the box edge. Water the tree immediately after forming the basin. A final inspection of all boxed trees will be performed at the designated holding area.

1.14 Transplanting Materials - Boxing materials shall be approved by the Consulting Arborist prior to transplanting the trees. Materials to be approved are:

a. Sand - Clean washed sand, suitable for horticultural use, free from noxious weeds and/or seeds, stones or other foreign matter.

b. Tree Boxes - The tree boxes shall be delivered as new disassembled sides, complete with bottoms, and cleats in the sizes specified.

c. Bands - Bands shall be new steel, one inch bands and clamps, with appropriate crimping device.

d. Topsoil, where necessary to backfill holes created by transplanting trees, composed of pulverized top soil free from subsoil, noxious weeds and/or seeds, stones or other foreign matter.

Transplanting materials shall be inspected by the Consulting Arborist prior to boxing. Payment for boxes, bands, sand, and other supplies needed for complete and proper transplanting shall be included in the bid. Contractor shall pay for any returns necessary.

1.15 Tree Location - The location of all trees to be transplanted will be marked in the field by the City representative and/or Consulting Arborist. Marking is usually done with a ribbon and Sharpie. No work shall be done if there is a discrepancy, until approval has been given by City.

1.20 Specific Transplanting Specifications

All trees to be transplanted shall be located and watered to moisten the soil to a depth of three to three and a half feet, two days before boxing.

a. The root ball of each tree must be kept moist and held intact during transplanting.

b. The initial trenching of the rootball may be performed using a trencher. However the final fitting of the rootball to the box shall be performed using sharpened spades.

c. All root ends must be cut cleanly.

d. After rough cutting the rootball shape, two opposite sides of the box should be staked in place and used as a template to form the rootball.

e. After obtaining a tight fit, nail and band the box sides in place.

f. Soil at natural grade must fill box to within two to three inches of the top. Soil may not be placed on top to achieve level.

g. Padded 2 x 4's, 2 x 6's or 2 x 8's shall be nailed in place as cleats around the trunk, and the side bands before installing bottom.

h. Bottom shall be nailed in place and banded over the cleats before moving.

i. The trees shall be transplanted to a holding area on site where a sand watering basin will be formed at the box edge. Avoid windy areas and exposed asphalt areas. Water should be readily available. Trees may need guying to prevent toppling in the wind.

j. Water immediately and thoroughly after forming the basin. The basin should hold at least two inches of water and should be filled twice at this time.

k. A final inspection by a City representative of all boxed trees will be performed at the designated holding area.

l. Trees shall not be transplanted if the soil is dry or in a muddy condition.

m. All trees shall be kept in a moist condition until final acceptance. Several light irrigations per day may be needed during hot, dry or Santa Ana conditions.

1.21 Tree Pruning - Only broken or dead limbs , and approved as such, shall be pruned. All pruning cuts should be made per ANSI A-300. Lower limbs in the way of cleats may be removed. All other limbs in the way of boxing shall be tied up rather than removed. Any trees improperly pruned will be subject to removal by the Contractor and replaced by the Contractor at no additional cost to the City.

1.22 Tree guarantee and replacement - All transplanted trees shall be guaranteed to be properly transplanted for at least one (1) month after transplanting or until one month after the final acceptance, whichever occurs later. Trees that die or are damaged as a result of vandalism or lack of care by the City are exempt from this condition. All replacement trees shall likewise be guaranteed to be in excellent health and condition until at least one (1) month after receipt.

1.23 Tree Watering - Trees shall be watered by Contractor during boxing operations and thereafter, until acceptance of the work. Immediately after boxing and building a water basin, apply water to each tree by means of a hose or drip/trickle system. Apply water in a moderate stream in the basin until the soil is completely and evenly saturated to the bottom of the box.

The watering shall be in sufficient quantities and as often as seasonal conditions require to keep the soil moist, but not waterlogged, at all times.

1.24 Tree Establishment and Acceptance - The establishment period is hereby defined as starting with completion of transplanting operations and acceptance by City, and continuing for 30 calendar days thereafter. Acceptance by City must be in writing in order for the establishment period to begin. At completion of the establishment period, trees shall not show evidence of tip die-back, wilt, or bark cracking. Where landscape dies or shows evidence of decline, weakness or damage due to neglect or transplanting using an unapproved method, the Contractor shall promptly replace with new, vigorous and healthy pines at no additional cost to the City.

When the Contractor believes he has completed the tree establishment period and all the trees are ready for acceptance, he shall request inspection. A City representative will inspect the trees for acceptance in a timely manner. Acceptance shall occur only upon written acceptance of the project by the City.

During the contract period the Contractor will maintain water basins in good condition and provide all watering and weeding necessary to keep the trees in a healthy growing condition. The Contractor shall conduct all operations in such a manner as to minimize inconvenience to the City and the general public. The Contractor shall provide a level of maintenance which presents a pleasing and desirable appearance at all times. Final payment to the Contractor will not be made until the end of the establishment period by the City, and upon final acceptance by City and completion of the Notice of Completion process. All pest control chemicals or other materials used by the Contractor in carrying out work related to this project must be approved by the City prior to its use.

Where trees die or show evidence of decline, weakness or damage due to neglect or transplanting in an unapproved method, the Contractor shall promptly replace with new, vigorous and healthy selections at no additional cost to the City. At the end of the establishment period all pines shall be in a healthy condition as determined by the City. The Contractor shall obtain written approval and release from the City before ending maintenance obligations.