

Arborist Report

**Costco Wholesale
Sunnyvale, CA**

Prepared for:
**Barghausen Consulting Engineers
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REV # 2
w/ updated tree map



Arborist Report

**Costco
Sunnyvale, CA**

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Arborist Report Costco Wholesale Sunnyvale, CA

Introduction and Overview

Costco Wholesale is planning to expand the existing fueling facility at the Costco retail facility in Sunnyvale, CA. Current site use consists of the warehouse retail facility, a fueling facility, parking lot and associated landscaping. HortScience, Inc. was asked to prepare an **Arborist Report** for the site to meet the development requirements for the City of Sunnyvale.

This report provides the following information:

1. An evaluation of the health and structural condition of the trees within the proposed project area based on a visual inspection from the ground.
2. An assessment of the development impacts to the trees based on the plans provided by Barghausen Consulting Engineers.
3. An appraisal value of the trees according to the procedures described in the *Guide for Plant Appraisal* (Council of Tree and Landscape Appraisers).
4. Guidelines for tree preservation during the design, construction, and maintenance phases of development.

Assessment Methods

Trees were originally tagged and assessed in 2012, and conditions and trunk diameters were updated on January 6, 2017. The assessment included all trees within the proposed construction area measuring 4" and greater in diameter. The assessment procedure consisted of the following steps:

1. Confirming the tree species;
2. Measuring the trunk diameter at a point 54" above grade;
3. Evaluating the health and structural condition using a scale of 1 – 5:
 - 5 - A healthy, vigorous tree, reasonably free of signs and symptoms of disease, with good structure and form typical of the species.
 - 4 - Tree with slight decline in vigor, small amount of twig dieback, minor structural defects that could be corrected.
 - 3 - Tree with moderate vigor, moderate twig and small branch dieback, thinning of crown, poor leaf color, moderate structural defects that might be mitigated with regular care.
 - 2 - Tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated.
 - 1 - Tree in severe decline, dieback of scaffold branches and/or trunk; most of foliage from epicormics; extensive structural defects that cannot be abated.
4. Rating the suitability for preservation as "high", "moderate" or "low". Suitability for preservation considers the health, age and structural condition of the tree species, and its potential to remain an asset to the site.

High: Trees with good health and structural stability that have the potential for longevity at the site.

Moderate: Trees with somewhat declining health and/or structural defects than can be abated with treatment. The tree will require more intense management and monitoring, and may have shorter life span than those in 'high' category.

Low: Trees in poor health or with significant structural defects that cannot be mitigated. Tree is expected to continue to decline, regardless of treatment. The species or individual tree may have characteristics that are undesirable for landscapes, and generally are unsuited for use areas.

Description of Trees

Sixty-six (66) trees were evaluated, representing 10 species (**Table 1**). Trees were tagged with numbers 1-16, 18-43, and 99-122. Trees with tags numbered 44-98 are not within the improvement area, and tree #17 was removed due to poor health. All trees were planted on the site; none of the species were considered native. Most were semi-mature in development and were planted when the site was originally developed. Descriptions of each tree are found in the **Tree Assessment Form** and approximate locations are plotted on the **Tree Assessment Map** (see exhibits).

The most commonly encountered species was London plane, with 22 trees or 33% of the population. London planes were young to semi-mature, with diameters ranging from 5-15". Condition of the London planes was predominantly good (11 trees), with three (3) in poor condition and eight (8) in fair condition. Most trees were growing in small 3'x3' planters surrounded by asphalt. In general, London planes appeared water stressed; many trees had thin crowns and twig or branch dieback (photo 1).

Photo 1: London planes in the parking lot had restricted rooting space and were in fair condition with twig dieback and slightly thin crowns, an indication of water stress.



Ten (10) Brazilian pepper trees, representing 15% of the population, were evaluated. Eight (8) were in fair condition and two (2) were in poor condition (#31 & 112). Many trees were characterized by having dense crowns but poor structure (photo 2), with codominant trunks or multiple trunks emerging from one point, crossing branches and other defects. Others had thin crowns and exhibited twig and branch dieback.



Photo 2: Brazilian pepper trees on site often had full, dense crowns and structural defects. Tree #39 had a healthy crown and poor structure with a trunk cavity extending from the base to 6' (arrows).

A total of eight (8) Chinese pistache were assessed, representing 12% of the population, with conditions ranging from fair to good. Trees were young to semi-mature in development and had

trunk diameters from 5-11". Smaller trees (<7") had good vigor while larger trees (>7") had thinning crowns, an indication of water stress.

The following trees were also assessed at the Costco site:

- Seven (7) Lombardy poplars located on the southwest property line were in poor to fair condition. All seven trees had been topped for overhead utility line clearance.
- Along the west edge of the parking lot near the existing fueling facility, five (5) Chinese elms were in poor to fair condition. All had thin or thinning crowns and twig dieback.
- Five (5) olive trees were growing among the Chinese elms. Four (4) were in fair condition and one (1) was in good condition. All had multiple attachments, which is typical of the species.
- Four (4) coast redwoods adjacent to the poplars had also been topped for overhead utilities. All were in fair condition with good vigor.
- In the southwest corner of the site, three (3) purpleleaf plums were in fair and poor condition with multiple attachments. Trunk decay was present in two trees (#15 and 16).
- One (1) xylosma in fair condition with poor form and structure.

The City of Sunnyvale defines any single-trunk tree with a trunk diameter of 12" or greater as *Protected*. By this definition, 29 trees evaluated qualified as *Protected*. *Protected* status of individual trees is provided in the **Tree Assessment**.

**Table 1. Condition ratings and frequency of occurrence of trees.
Costco Wholesale, Sunnyvale CA.**

Common name	Scientific name	Condition			No. of trees
		Poor (2)	Fair (3)	Good (4-5)	
Brazilian pepper	<i>Schinus terebinthifolius</i>	2	8	-	10
Chinese elm	<i>Ulmus parvifolia</i>	2	3	-	5
Chinese pistache	<i>Pistacia chinensis</i>	-	2	6	8
Coast redwood	<i>Sequoia sempervirens</i>	-	4	-	4
Lombardy poplar	<i>Populus nigra</i>	2	5	-	7
London plane	<i>Platanus x hispanica</i>	3	8	11	22
Olive	<i>Olea europaea</i>	-	4	1	5
Purpleleaf plum	<i>Prunus cerasifera</i>	2	1	-	3
White alder	<i>Alnus rhombifolia</i>	-	-	1	1
Xylosma	<i>Xylosma congestum</i>	-	1	-	1
Grand Total		11	36	18	66
		17%	55%	27%	100%

Suitability for Preservation

Before evaluating the impacts that will occur during development, it is important to consider the quality of the tree resource itself, and the potential for individual trees to function well over an extended length of time. Trees that are preserved on development sites must be carefully selected to provide greater assurance they survive development impacts, adapt to a new environment, and perform well in the landscape.

Our goal is to identify trees that have the potential for long-term health, structural stability and longevity. Evaluation of suitability for preservation considers several factors:

- **Tree health**
 Healthy, vigorous trees are better able to tolerate impacts such as root injury, demolition of existing structures, changes in soil grade and moisture, and soil compaction than are non-vigorous trees.
- **Structural integrity**
 Trees with significant amounts of wood decay and other structural defects that cannot be corrected are likely to fail. Such trees should not be preserved in areas where damage to people or property is likely. Trees with decay or poor branch attachments are not good candidates for preservation.
- **Species response**
 There is a wide variation in the response of individual species to construction impacts and changes in the environment. In general, London planes are relatively tolerant of construction impacts and site changes while purple leaf plum is less tolerant.
- **Tree age and longevity**
 Old trees, while having significant emotional and aesthetic appeal, have limited physiological capacity to adjust to an altered environment. Young trees are better able to generate new tissue and respond to change.
- **Invasiveness**
 Trees with the potential to invade an established forest, reproduce rapidly, and grow in sub-optimal environments are considered invasive. Species with these qualities may alter the function and aesthetics of the forest. Brazilian pepper, olive and purpleleaf plum are listed as being a "limited" invasive species

Each tree was rated for suitability for preservation based upon its age, health, structural condition and ability to safely coexist within a development environment. Table 2 provides a summary of suitability ratings. Suitability ratings for individual trees are provided in the **Tree Assessment Form** (see exhibits).

We consider trees with good suitability for preservation to be the best candidates for preservation. We do not recommend retention of trees with low suitability for preservation in areas where people or property will be present. Retention of trees with moderate suitability for preservation depends upon the intensity of proposed site changes.

**Table 2: Tree suitability for preservation.
 Costco Wholesale, Sunnyvale CA.**

High	These are trees with good health and structural stability that have the potential for longevity at the site. Twelve (12) trees were in this category.
Moderate	Trees in this category have fair health and/or structural defects that may be abated with treatment. These trees require more intense management and monitoring, and may have shorter life-spans than those in the "high" category. Thirty (30) trees were of moderate suitability for preservation.
Low	Trees in this category are in poor health or have significant defects in structure that cannot be abated with treatment. These trees can be expected to decline regardless of management. The species or individual tree may possess either characteristics that are undesirable in landscape settings or be unsuited for use areas. Twenty-four (24) trees were of low suitability for preservation.

Evaluation of Impacts and Recommendations

Appropriate tree retention develops a practical match between the location and intensity of construction activities and the quality and health of trees. The **Tree Assessment** was the reference point for tree health and condition. I referred to the Detailed Site Plan prepared by Barghausen Consulting Engineers, Inc. (dated 1/15/15) to estimate the impacts to trees from the proposed changes.

The plan proposes to expand the existing fueling facility. No grading, drainage, or utility information was shown on the plan. Surveyed trunk locations were not included.

Potential impacts from construction were estimated for each tree. Precise impacts will have to be determined once trees have been located and plotted, and the plans are finalized. The most significant impacts to trees would be associated with reconfiguration of planters and the new controller enclosure.

Removal would be required for seven (7) trees. Of the trees to be removed, one (1), London plane #7, was *Protected* trees. Five (5) trees recommended for removal had high suitability for preservation and two (2) had moderate suitability. Table 3 shows trees recommended for removal with reasons for removal and their *Protected* status.

**Table 3. Trees recommended for removal.
 Costco Wholesale, Sunnyvale CA.**

Tree No.	Species	DBH	Protected?	Reason for removal
1	Chinese pistache	10	No	Bioretention area
2	London plane	14	Yes	Bioretention area
5	Chinese pistache	6	No	Reduce ex. planter size
42	Chinese pistache	5	No	Reduce ex. planter size
43	Chinese pistache	5	No	Reduce ex. planter size
111	London plane	9	No	New controller enclosure
113	London plane	8	No	Reconfigured planter

Appraisal of Value

The City of Sunnyvale requires that the value of all of the surveyed trees be established. To accomplish this, I used the standard methods found in *Guide for Plant Appraisal*, 9th edition (published in 2000 by the International Society of Arboriculture, Champaign IL). In addition, I referred to *Species Classification and Group Assignment* (2004), a publication of the Western Chapter of the International Society of Arboriculture. These two documents outline the methods employed in tree appraisal.

The value of landscape trees is based upon four factors: size, species, condition and location. Size is measured as trunk diameter, normally 54" above grade. The species factor considers the adaptability and appropriateness of the plant in the South Bay area. The *Species Classification and Group Assignment* lists recommended species ratings and evaluations. Condition reflects the health and structural integrity of the individual, as noted in the **Tree Assessment Form**. Location factor considers the site, placement, and contribution of the tree in its surrounding landscape.

Using the methods described above, the appraised value of the 66 evaluated trees is **\$81,300** (see **Tree Assessment**). The appraised value of trees to be removed is **\$7,350**.

Tree Preservation Guidelines

The goal of tree preservation is not merely tree survival during development but maintenance of tree health and beauty for many years. Impacts can be minimized by coordinating any construction activities inside the **TREE PROTECTION ZONE**.

The following recommendations will help reduce impacts to trees from development and maintain and improve their health and vitality through the clearing, grading and construction phases.

Design recommendations

- 1 Any plan affecting trees should be reviewed by the Consulting Arborist with regard to tree impacts. These include, but are not limited to, improvement plans, utility and drainage plans, grading plans, landscape and irrigation plans and demolition plans.
- 2 A **TREE PROTECTION ZONE** shall be established around trees #40, 41 and 112. For design purposes, the **TREE PROTECTION ZONE** shall be the dripline of the trees. No grading, excavation, construction or storage of materials shall occur within that zone. These trees should receive trunk protection (photo 3).
- 3 **Tree Preservation Guidelines**, prepared by the Consulting Arborist, should be included on all plans.
- 4 Underground services including utilities, sub-drains, water or sewer shall be routed around the **TREE PROTECTION ZONE**. Where encroachment cannot be avoided, special construction techniques such as hand digging or tunneling under roots shall be employed where necessary to minimize root injury.
- 5 Irrigation systems must be designed so that no trenching will occur within the **TREE PROTECTION ZONE**.



Photo 3: Protect trunks of trees by winding silt sock wattle and orange snow fencing around trunks.

Pre-construction treatments and recommendations

1. The demolition contractor shall meet with the Consulting Arborist before beginning work to discuss work procedures and tree protection.
2. Structures and underground features to be removed within the **TREE PROTECTION ZONE** shall use the smallest equipment, and operate from outside the **TREE PROTECTION ZONE**. The Consulting Arborist shall be on-site during all operations within the **TREE PROTECTION ZONE** to monitor demolition activity.
3. Protect trees #40, 41 and 112 prior to demolition. Wrap the trunks to a height of 8' with straw wattle and orange snow fencing to provide a visual cue and protection from incidental contact (photo 3). Trunk protection is to remain until all construction is completed.
4. Trees to be preserved may require pruning to provide construction clearance. All pruning shall be completed by a Certified Arborist or Tree Worker. Pruning shall adhere to the latest edition of the ANSI Z133 and A300 standards as well as the *Best Management Practices -- Tree Pruning* published by the International Society of Arboriculture.

Recommendations for tree protection during construction

1. Prior to beginning work, the contractors working in the vicinity of trees to be preserved are required to meet with the Consulting Arborist at the site to review all work procedures, access routes, storage areas and tree protection measures.
2. Trunk protection is to remain until all site work has been completed.
3. Any excavation within the dripline or other work that is expected to encounter tree roots should be monitored by the Consulting Arborist. Roots shall be cut by manually digging a trench and cutting exposed roots with a hand saw. The Consulting Arborist will identify where root pruning is required
4. If injury should occur to any tree during construction, it should be evaluated as soon as possible by the Consulting Arborist so that appropriate treatments can be applied.
5. Any additional tree pruning needed for clearance during construction must be performed by a Certified Arborist and not by construction personnel.

Maintenance of impacted trees

Trees preserved at the Costco Wholesale site may experience a physical environment different from that pre-development. As a result, tree health and structural stability should be monitored. Occasional pruning, fertilization, mulch, pest management, replanting and irrigation may be required. In addition, provisions for monitoring both tree health and structural stability following construction must be made a priority. As trees age, the likelihood of branches or entire trees failing will increase. Therefore, annual inspection for hazard potential is recommended.

If you have any questions regarding my observations or recommendations, please contact me.

HortScience, Inc.



Deanne Ecklund
ISA Certified Arborist WE9067-A

Attached: **Tree Assessment**
 Tree Inventory Map

Exhibits

Tree Assessment Tree Inventory Map



Tree Assessment

Costco Wholesale
150 Lawrence Station Rd.
Sunnyvale, California
September & December 2012; updated January 2017



TREE SPECIES No.	SIZE DIAMETER (in inches)	CONDITION 1=POOR 5=EXCELLENT	SUITABILITY FOR PRESERVATION	PROTECTED TREE?	APPRAISED VALUE	COMMENTS
1 Chinese pistache	10	4	High	No	\$1,300	Good form and structure; slightly thin crown.
2 London plane	14	4	High	Yes	\$1,900	Thin crown; in small planter; displacing asphalt; slight lean west.
3 London plane	10	3	Moderate	No	\$800	Codominant trunks at 6'; leans west; in small planter; slightly thin crown; history of branch failure.
4 London plane	14	4	High	Yes	\$1,750	Good form and structure; slightly thin crown.
5 Chinese pistache	7	4	High	No	\$750	Good form and structure; slight lean west; full crown.
6 Olive	11,8,6	3	Moderate	No	\$1,950	Multiple attachments at 3'; thin crown; crossing stems.
7 Chinese elm	11	2	Low	No	\$950	Multiple attachments at 7'; thin crown; dieback.
8 Olive	12,8,7,6	3	Moderate	Yes	\$2,450	Multiple attachments at 4'; pruned for light standard; heading cuts; slightly thin crown; trunk wounds.
9 Olive	10,8,8	4	Moderate	No	\$2,650	Codominant trunks at 2'; full crown.
10 Chinese elm	8	2	Low	No	\$500	Multiple attachments at 7'; thin crown; dieback; canker.
11 Chinese elm	9	3	Moderate	No	\$1,100	Slightly thin crown; twig dieback; surface roots.
12 Chinese elm	9	3	Moderate	No	\$850	Twisted form; minor twig dieback.
13 Chinese elm	12	3	Low	Yes	\$1,450	Leans east; thin crown; dieback; canker.
14 Purpleleaf plum	8,6,4	3	Moderate	No	\$450	Upright stems from topping cuts; full crown.
15 Purpleleaf plum	12,8	2	Low	Yes	\$600	Upright stems from topping cuts; sunscald; trunk decay.
16 Purpleleaf plum	6,5	2	Low	No	\$150	Sunscald; trunk decay from base to 4'.
18 Coast redwood	18	3	Low	Yes	\$2,000	Topped for overhead utilities; full crown.
19 Coast redwood	18	3	Low	Yes	\$2,000	Topped for overhead utilities; full crown.
20 Coast redwood	16	3	Low	Yes	\$1,600	Topped for overhead utilities; full crown.
21 Coast redwood	32	3	Low	Yes	\$6,200	Topped for overhead utilities; full crown.

Tree Assessment

Costco Wholesale
150 Lawrence Station Rd.
Sunnyvale, California
September & December 2012; updated January 2017



TREE SPECIES No.	SIZE	CONDITION	SUITABILITY	PROTECTED	APPRAISED	COMMENTS	
	DIAMETER (in inches)	1=POOR 5=EXCELLENT	FOR PRESERVATION	TREE?	VALUE		
22	Xylosma	5,4	3	Moderate	No	\$300	Codominant trunks at 4'; upright stems from topping cuts; poor form and structure; 3' from utility pole.
23	Lombardy poplar	19	3	Low	Yes	\$1,000	Topped for overhead utilities.
24	Lombardy poplar	17	3	Low	Yes	\$800	Topped for overhead utilities.
25	Lombardy poplar	13	3	Low	Yes	\$500	Topped for overhead utilities.
26	Chinese pistache	11	3	Moderate	No	\$1,350	Codominant trunks at 6'; poor structure.
27	Lombardy poplar	19	2	Low	Yes	\$650	Topped for overhead utilities; 3' long trunk wound; circling root.
28	Lombardy poplar	10	3	Low	No	\$300	Topped for overhead utilities; small crown.
29	Lombardy poplar	13	3	Low	Yes	\$500	Topped for overhead utilities; small crown.
30	London plane	11	4	High	No	\$1,600	Codominant trunks at 8'; slight lean southeast; full crown.
31	Brazilian pepper	9	2	Low	No	\$450	Codominant trunks at 8'; significant crown dieback.
32	Brazilian pepper	14	3	Moderate	Yes	\$1,700	Codominant trunks at 7'; pruning wound at attachment; crossing branches; full crown.
33	London plane	9	3	Moderate	No	\$650	Multiple attachments at 5'; twig dieback; slightly thin crown.
34	Brazilian pepper	15	3	Low	Yes	\$1,750	Multiple attachments at 7'; chlorotic; slightly thin crown.
35	Brazilian pepper	13	3	Moderate	Yes	\$1,500	Codominant trunks at 6' with wide attachment; full crown.
36	London plane	7	2	Low	No	\$200	Codominant trunks at 6'; twig and branch dieback; thin crown.
37	London plane	9	4	High	No	\$850	Multiple attachments at 6'; twig dieback; slightly thin crown.
38	Brazilian pepper	11	3	Low	No	\$950	Codominant trunks at 6'; chlorotic; thin crown;

Tree Assessment

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150 Lawrence Station Rd.
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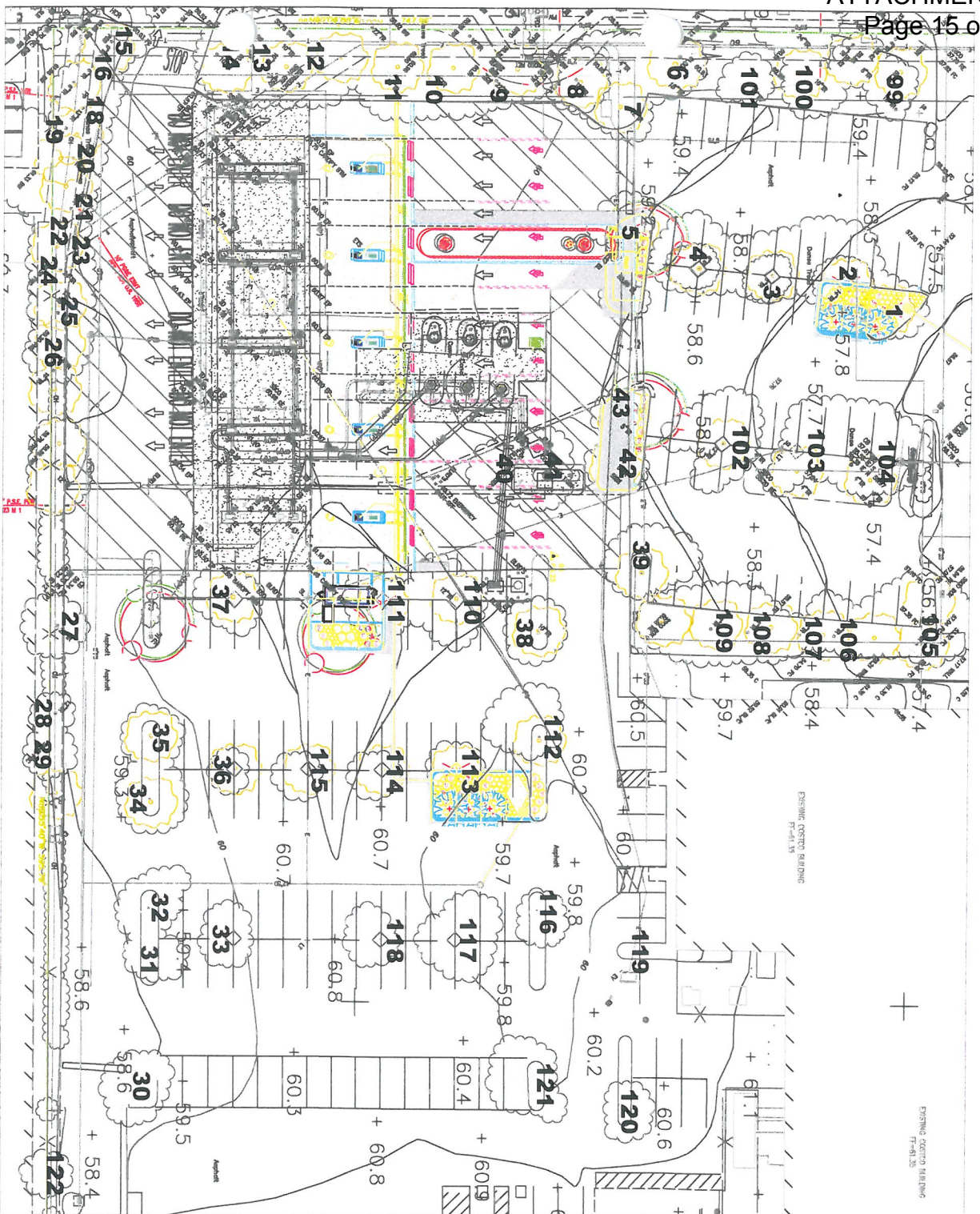
TREE SPECIES No.	SIZE DIAMETER (in inches)	CONDITION 1=POOR 5=EXCELLENT	SUITABILITY FOR PRESERVATION	PROTECTED TREE?	APPRAISED VALUE	COMMENTS	
39	Brazilian pepper	18	3	Low	Yes	\$2,550	Poor form and structure; trunk wound from base
40	Chinese pistache	6	4	High	No	\$750	Good young tree.
41	Chinese pistache	8	4	High	No	\$1,100	Multiple attachments at 5'; slightly thin crown.
42	Chinese pistache	5	4	High	No	\$500	Multiple attachments at 6'; slightly thin crown.
43	Chinese pistache	5	4	High	No	\$550	Codominant trunks at 5'; slight lean west; good young tree.
99	Olive	15	3	Moderate	Yes	\$2,250	Codominant trunks at 7'; poor form and structure; history of branch failure; stub cuts; trunk wound at base with decay.
100	Chinese pistache	8	3	Moderate	No	\$850	Codominant trunks at 9'; one sided form over parking lot.
101	Olive	7.7	3	Moderate	No	\$750	Codominant trunks at 4'; poor form.
102	London plane	12	4	Moderate	Yes	\$1,750	Multiple attachments at 9'; nice form; roots pruned for 3x3 planter; twig dieback.
103	White alder	4	5	High	No	\$2,650	Good form and structure; staked; good young tree.
104	London plane	14	4	High	Yes	\$2,750	Good form and structure; nice tree.
105	London plane	15	4	Moderate	Yes	\$2,750	Multiple attachments at 7'; corrected lean south; nice form.
106	London plane	12	4	Moderate	Yes	\$1,500	Multiple attachments at 8'; nice form; slightly thin crown.
107	London plane	5	2	Low	No	\$250	Codominant trunks at 6'; suppressed form; history of branch failure.
108	London plane	9	3	Moderate	No	\$750	Multiple attachments at 7'; seam on interior of south stem; surface roots.
109	London plane	13	4	Moderate	Yes	\$1,750	Codominant trunks at 9'; heavy lateral limb; good form; surface roots.

Tree Assessment

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TREE SPECIES No.	SIZE DIAMETER (in inches)	CONDITION 1=POOR 5=EXCELLENT	SUITABILITY FOR PRESERVATION	PROTECTED TREE?	APPRAISED VALUE	COMMENTS
110 London plane	12	4	Moderate	Yes	\$1,750	Codominant trunks at 10'; nice form; twig dieback; significant root lifting asphalt 2-3" on north.
111 London plane	9	3	Moderate	No	\$750	Multiple attachments at 7'; history of branch failure; trunk wounds; twig dieback.
112 Brazilian pepper	18	2	Low	Yes	\$1,950	Codominant trunks at 6'; trunk tearout on north side; history of branch failure; asymmetrical form.
113 London plane	10	3	Moderate	No	\$600	Codominant trunks at 9'; twig dieback; history of branch failure.
114 London plane	6	2	Low	No	\$150	Small crown; trunk wounds; history of branch failure; trunk bows south.
115 London plane	8	3	Moderate	No	\$400	Codominant trunks at 7'; history of branch failure; trunk wounds; poor structure.
116 Brazilian pepper	11	3	Moderate	No	\$1,050	Codominant trunks at 6' and 8'; slight lean east; broken limb.
117 London plane	10	4	Moderate	No	\$950	Multiple attachments at 8'; nice form; history of branch failure.
118 London plane	11	3	Moderate	No	\$650	Codominant trunks at 9'; corrected lean south; history of branch failure; twig dieback.
119 Brazilian pepper	7	3	Moderate	No	\$400	Nice form; poor structure; chlorotic.
120 Brazilian pepper	13	3	Moderate	Yes	\$1,350	Codominant trunks at 9'; trunk tearout seam from 1'-6'; nice form.
121 London plane	12	3	Moderate	Yes	\$1,050	Multiple attachments at 10'; history of branch failure; slight lean south.
122 Lombardy poplar	14	2	Low	Yes	\$350	Topped at 20'; girdling root.



Tree Inventory Map

Costco Wholesale
Sunnyvale, CA

Prepared for:
Barghausen Consulting Engineers
Kent, WA

January 2017

No Scale

Notes:
Base map provided by:
Kier & Wright / Livermore, CA

Numbered tree locations
are approximate.



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