California Tree and Landscape Consulting, Inc.

CalTLC
TENDER LOVING CARE FOR YOUR TREES

June 4, 2021

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PRELIMINARY ARBORIST REPORT & TREE INVENTORY

RE: Sierra Vista, 6400 Baseline Road, APN 499-010-014, City of Roseville Jurisdiction

Executive Summary

Towne Development of Sacramento contacted California Tree and Landscape Consulting, Inc. to inventory and evaluate the trees on the site for purposes of providing preliminary tree information for planning for development of the parcel. The property is located at 6400 Baseline Road, in the City of Roseville, California, and is subject to the jurisdiction of Roseville. See Supporting Information Appendix 1 – Tree Inventory Map.

Edwin E. Stirtz, ISA Certified Arborist #WE-0510A, and Thomas M. Stein, ISA Certified Arborist WE-12854A, were on the site on May 5, 2021, to provide species identification, measurements of diameter and canopy, field condition notes, and arborist ratings. A total of 41 trees were included in the inventory, 9 of which are protected by the City of Roseville Tree Preservation Municipal Code 19.66.

Tree Species	Trees Inventoried	Trees on the Site[1]	Protected Trees	Trees Proposed for Removal	Trees impacted by the proposed development and requiring special protection measures	Predicted Impact	Diameter Inches Proposed for Removal or Impact
Interior Live Oak	2	2	2	1	n/a	n/a	n/a
Non-Protected: Aleppo Pine, Almond, American Elm, Arizona Cypress, Black Locust, Black Walnut, Casuarina, Eucalyptus, European Olive, Honey Locust, Interior Live Oak, Mulberry, Oregon Ash, Unknown	39	39	0	13	n/a	n/a	n/a
Totals	**41**	**41**	**2**	**14**	**n/a**	**n/a**	**n/a**

See Appendices for specific information on each tree and preservation requirements and/or restrictions.

[1] CalTLC is not a licensed land surveyor. Tree locations are approximate and we do not determine tree ownership. Trees which appear to be on another parcel are listed as off-site and treated as the property of that parcel.

Methods

Appendix 2 in this report is the detailed inventory of the trees. The following terms will further explain our methods and findings.

The protected trees evaluated as part of this report have a numbered tag that was placed on each one that is 1-1/8" x 1-3/8", green anodized aluminum, "acorn" shaped, and labeled: CalTLC, Auburn, CA with 1/4" pre-stamped tree number and Tree Tag. They are attached with a natural-colored aluminum 10d nail, installed at approximately 6 feet above ground level on the approximate north side of the tree. The tag should last ~10-20+ years depending on the species, before it is enveloped by the trees' normal growth cycle.

A Level 2 – Basic Visual Assessment was performed in accordance with the International Society of Arboriculture's best management practices. This assessment level is limited to the observation of conditions and defects which are readily visible. Additional limiting factors, such as blackberries, poison oak, and/or debris piled at the base of a tree can inhibit the visual assessment.

Tree Location: The GPS location of each tree was collected using the ESRI's ArcGIS collector application on an Apple iPhone or Samsung. The data was then processed in ESRI's ArcMap by Julie McNamara, M.S. GISci, to produce the Tree Location Map.

Tree Measurements: DBH (diameter breast high) is normally measured at 4'6" (above the average ground height for "Urban Forestry"), but if that varies then the location where it is measured is noted. A steel diameter tape was used to measure the diameter. A Stanley laser distance meter was used to measure distances. Canopy radius measurements may also have been estimated due to obstructions, such as steep slopes, fences, or other trees.

Terms

Field Tag #	The pre-stamped tree number on the tag which is installed at approximately 6 feet above ground level on the north side of the tree.
Old Tag #	If additional field tags are found on the trees and are legible, they are listed here.
Species	The species of a tree is listed by our local and correct common name and botanical name by genus (capitalized) and species (lower case). Oaks frequently cross-pollinate and hybridize, but the identification is towards the strongest characteristics.
DBH	Diameter breast high' is normally measured at 4'6" (above the average ground height for "Urban Forestry"), but if that varies then the location where it is measured is noted in the next column "measured at"
Measured at	Height above average ground level where the measurement of DBH was taken.
Canopy Radius	The farthest extent of the crown composed of leaves and small twigs. Most trees are not evenly balanced. This measurement represents the longest extension from the trunk to the outer canopy. The dripline measurement is from the center point of the tree and is shown on the Tree Location Map as a circle. This measurement further defines the protection zone if specified in the local ordinance as such or can indicate if pruning may be required for development
Protected Root Zone	The radius of the protected root zone is a circle equal to the trunk diameter inches converted to feet and factored by tree age, condition and health pursuant to the industry standard. Best Management Practices: Managing Trees During Construction, the companion publication to the Approved American National Standard, provides guidance regarding minimum tree root protection zones for long term survival. In instances where a tree is multi-stemmed, the protected root zone is equal to the extrapolated diameter (sum of the area of each stem converted to a single stem) factored by tree age, condition and health.

Arborist Rating

Subjective to condition and is based on both the health and structure of the tree. All of the trees were rated for condition, per the recognized national standard as set up by the Council of Tree and Landscape Appraisers and the International Society of Arboriculture (ISA) on a numeric scale of 5 (being the highest) to 0 (the worst condition, dead) as in Chart A. The rating was done in the field at the time of the measuring and inspection.

No problem(s)	Excellent	**5**	No problems found from a visual ground inspection. Structurally, these trees have properly spaced branches and near perfect
No apparent problem(s)	Good or Fair to Good	**4**	The tree is in good condition and there are no apparent problems that a Certified Arborist can see from a visual ground inspection. If potential structural or health problems are tended to at this stage future hazard can be reduced and more serious health problems can be averted.
Minor problem(s)	Fair	**3**	The tree is in fair condition. There are some minor structural or health problems that pose no immediate danger. When the recommended actions in an arborist report are completed correctly the defect(s) can be minimized or eliminated and/or health can be improved.
Major or uncorrectable problems (2)	Fair to Poor	**2**	The tree has major problems. If the option is taken to preserve the tree, additional evaluation to identify if health or structure can be improved with correct arboricultural work including, but not limited to: pruning, cabling, bracing, bolting, guying, spraying, mistletoe removal, vertical mulching, fertilization, etc. Additionally, risk should be evaluated as a tree rated 2 may have structural conditions which indicate there is a high likelihood of some type of failure. Tree rated 2 should be removed if these additional evaluations will not be performed.
Extreme problem(s)	Poor	**1**	The problems are extreme. This rating is assigned to a tree that has structural and/or health problems that no amount of work or effort can change. The issues may or may not be considered a dangerous situation.
Dead	Dead	**0**	This indicates the tree has no significant sign of life.

Notes: Provide notable details about each tree which are factors considered in the determination of the tree rating including: (a) condition of root crown and/or roots; (b) condition of trunk; (c) condition of limbs and structure; (d) growth history and twig condition; (e) leaf appearance; and (f) dripline environment. Notes also indicate if the standard tree evaluation procedure was not followed (for example - why DBH may have been measured at a location other than the standard 54”). Additionally, notes will list any evaluation limiting factors such as debris at the base of a tree.

Actions Recommended actions to increase health and longevity.

Development Impacts Projected development impacts are based solely on distance relationships between tree location and grading. Field inspections and findings during the project at the time of grading and trenching can change relative impacts. Closely followed guidelines and requirements can result in a higher chance of survival, while requirements that are overlooked can result in a dramatically lower chance of survival. Impacts are measured as follows:

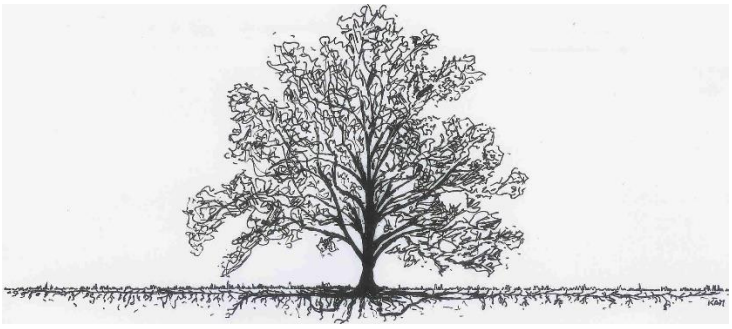
Impact Term:	Long Term Result of Impact:
Negligible	Tree is unlikely to show any symptoms. Chance of survival post development is excellent. Impacts to the Protected Root Zone are less than 5%.
Minor	Tree is likely to show minor symptoms. Chance of survival post development is good. Impacts to the Protected Root Zone are less than 15% and species tolerance is good.
Moderate	Tree is likely to show moderate symptoms. Chance of survival post development is fair. Impacts to the Protected Root Zone are less than 35% and species tolerance is good or moderate.
Severe	Tree is likely to show moderate symptoms annually and a pattern of decline. Chance of long-term survival post development is low. Impacts to the Protected Root Zone are up to 50% and species tolerance is moderate to poor.
Critical	Tree is likely to show moderate to severe symptoms annually and a pattern of decline. Chance of long-term survival post development is negligible. Impacts to the Protected Root Zone are up to 80%.

Discussion

Trees need to be protected from normal construction practices if they are to remain on the site and are expected to survive long term. While construction damage in the root zone is often the death of a tree, the time from when the damage occurs to when the symptoms begin and/or the tree dies can be years. Our recommendations are based on experience and the local ordinance requirements to enhance tree longevity. It requires the calculated root zone must remain intact as an underground ecosystem despite the use of heavy equipment to install foundations, driveways, underground utilities, and landscape irrigation systems. Simply walking and driving on soil can have serious consequences to tree health. The Tree Preservation Requirements and General Development Guidelines should be incorporated into the site plans and enforced onsite. The project arborist should be included in the development team during construction to provide expertise and make additional recommendations if additional impacts occur or tree response is poor.

Root Structure

The majority of a tree's roots are contained in a radius from the main trunk outward approximately two to three times the canopy of the tree. These roots are located in the top 6" to 3' of soil. It is a common misconception that a tree underground resembles the canopy. The correct root structure of a tree is in the drawing below. All plants' roots need both water and air for survival. Poor canopy development or canopy decline in mature trees after development is often the result of inadequate root space and/or soil compaction.



The reality of where roots are generally located

Pruning Mature Trees for Risk Reduction and/or Development Clearance

There are few good reasons to prune mature trees. Removal of deadwood, directional pruning, removal of decayed or damaged wood, and end-weight reduction as a method of mitigation for structural faults are the only reasons a mature tree should be pruned. Live wood over 3" should not be pruned unless absolutely necessary. Pruning cuts should be clean and correctly placed. Pruning should be done in accordance with the American National Standards Institute (ANSI) A300 standards.

Pruning causes an open wound in the tree. Trees do not "heal" they compartmentalize. It is far better to use more small cuts than a few large cuts as small pruning wounds reduce risk while large wounds increase risk. Any wound made today will always remain, but a healthy tree, in the absence of decay in the wound, will 'cover it' with callus tissue. Large, old pruning wounds which did not close with callous tissue often have advanced decay. These wounds are a likely failure point. Mature trees with large wounds have a high risk of failure.

Overweight limbs are a common structural fault in suppressed trees. There are two remedial actions for over- weight limbs (1) prune the limb to reduce the extension of the canopy, or (2) cable the limb to reduce movement. Cables do not hold weight they only stabilize the limb and additionally require annual inspection.

Arborist Classifications

There are different types of Arborists:

Tree Removal and/or Pruning Companies: These companies may be licensed by the State of California to do business as a tree removal company, but they do not necessarily know anything about trees biology.

Arborists: Arborist is a broad term intended to mean someone with specialized knowledge of trees, but it is often used to imply knowledge that is not there.

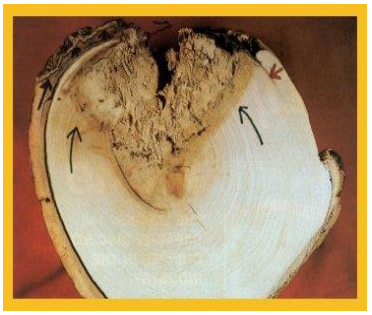
ISA Certified Arborist: An International Society of Arboriculture Certified Arborist is someone who has trained, met the qualifications for application, and been tested to have specialized knowledge of trees. You can look up certified arborists at the International Society of Arboriculture website: isa-arbor.org.

Consulting Arborist: An American Society of Consulting Arborists Registered Consulting Arborist is someone who has been trained and then tested to have specialized knowledge of trees; and trained and tested to provide high quality reports and documentation. You can look up registered consulting arborists at the American Society of Consulting Arborists website: ASCA-consultants.org.

Decay in Trees

Decay (in General): Fungi cause all decay of living trees. Decay is considered a disease because cell walls are altered, wood strength is affected, and living sapwood cells may be killed. Fungi decay wood by secreting enzymes. Different types of fungi cause different types of decay through the secretion of different chemical enzymes. Some decays, such as white rot, cause less wood strength loss than others because they first attack the lignin (causes cell walls to thicken and reduces susceptibility to decay and pest damage) secondarily the cellulose (another structural component in a cell walls). Others, such as soft rot, attack the cellulose chain and cause substantial losses in wood strength even in the initial stages of decay. Brown rot causes wood to become brittle and fractures easily with tension. Identification of internal decay in a tree is difficult because visible evidence may not be present.

According to Evaluation of Hazard Trees in Urban Areas (Matheny, 1994) decay is a critical factor in the stability of the tree. As decay progresses in the trunk, the stem becomes a hollow tube or cylinder rather than a solid rod. This change is not readily apparent to the casual observer. Trees require only a small amount of bark and wood to transport water, minerals and sugars. Interior heartwood can be eliminated (or degraded) to a great degree without compromising the transport process. Therefore, trees can contain significant amounts of decay without showing decline symptoms in the crown. Compartmentalization of decay in trees is a biological process in which the cellular tissue around wounds is changed to inhibit fungal growth and provide a barrier against the spread of decay agents into additional cells. The weakest of the barrier zones is the formation of the vertical wall. Accordingly, while a tree may be able to limit decay progression inward at large pruning cuts, in the event that there are more than one pruning cut located vertically along the main trunk of the tree, the likelihood of decay progression and the associated structural loss of integrity of the internal wood is high.



Oak Tree Impacts

Our native oak trees are easily damaged or killed by having the soil within the Protected Root Zone (PRZ) disturbed or compacted. All of the work initially performed around protected trees that will be saved should be done by people rather than by wheeled or track type tractors. Oaks are fragile giants that can take little change in soil grade, compaction, or warm season watering. Don't be fooled into believing that warm season watering has no adverse effects on native oaks. Decline and eventual death can take as long as 5-20 years with poor care and inappropriate watering. Oaks can live hundreds of years if treated properly during construction, as well as later with proper pruning, and the appropriate landscape/irrigation design.

RECOMMENDATIONS: Summary of Tree Protection Measures

The Owner and/or Developer should ensure the project arborist's protection measures are incorporated into the site plans and followed. Tree specific protection measures can be found in Appendix 2 – Tree Data.

- The project arborist should inspect the fencing prior to grading and/or grubbing for compliance with the recommended protection zones.
- All stumps within the root zone of trees to be preserved shall be ground out using a stump router or left in place. **No trunk within the root zone of other trees shall be removed using a backhoe or other piece of grading equipment.**
- Prior to any grading, or other work on the site that will come within 50' of any tree to be preserved, irrigation will be required from April through September and placement of a 4-6" layer of chip mulch over the protected root zone of all trees that will be impacted. Chips should be obtained from onsite materials and trees to be removed.
- Clearance pruning should include removal of all the lower foliage that may interfere with equipment PRIOR to having grading or other equipment on site. The Project Arborist should approve the extent of foliage elevation and oversee the pruning to be performed by a contractor who is an ISA Certified Arborist.

- Clearly designate an area on the site outside the drip line of all trees where construction materials may be stored, and parking can take place. No materials or parking shall take place within the root zones of protected trees.
- Any and all work to be performed inside the protected root zone fencing shall be supervised by the project arborist.
- Trenching inside the protected root zone shall be by a hydraulic or air spade, placing pipes underneath the roots, or boring deeper trenches underneath the roots.
- Follow all of the General Development Guidelines, Appendix 3, for all trees.

Report Prepared by:

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International Society of Arboriculture
Certified Arborist WE-0510A
ISA Tree Risk Assessment Qualified
Member, American Society of Consulting Arborists

Enc.: Appendix 1 – Tree Inventory Map
Appendix 2 – Tree Data
Appendix 3 – General Development Guidelines

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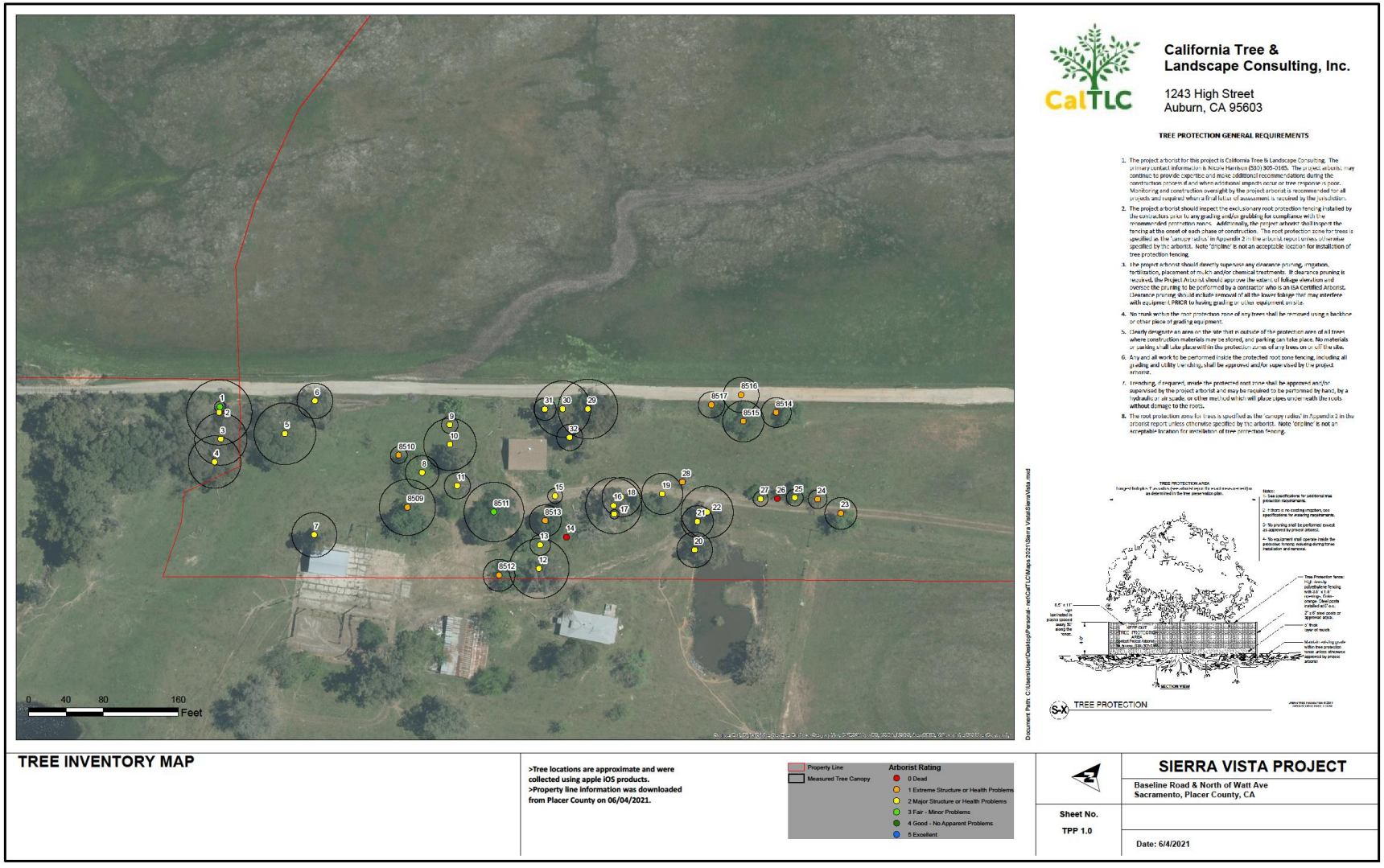
APPENDIX 1 – TREE INVENTORY MAP



APPENDIX 2 – TREE DATA

Tag #	Old Tag #	Protected By Code	Offsite	Common Name	Botanical Name	Multi-Stems	DBH	Measured At	Measured Canopy Radius	Arborist Rating	Notes	Recommendations
Non-Protected Trees*												
1		No	No	Interior Live Oak	*Quercus wislizeni*		5	54	6	3 Fair - Minor Problems	Substandard size tree adjacent to the gravel road. 3" Live Oak 3' south.	None at this time.
2		No	No	Eucalyptus	*Eucalyptus globulus*		45	54	35	2 Major Structure or Health Problems	Large Eucalyptus forks 4.5' above grade with weak attachments.	None at this time.
3		No	No	Eucalyptus	*Eucalyptus globulus*	14,17	31	54	28	2 Major Structure or Health Problems	Forks 1' above grade with weak attachments. Above average amount of dead branches.	None at this time.
4		No	No	Eucalyptus	*Eucalyptus globulus*		16	54	28	2 Major Structure or Health Problems		None at this time.
5		No	No	Eucalyptus	*Eucalyptus globulus*	29,33	62	54	33	2 Major Structure or Health Problems	Two smaller Eucalyptus trees directly north of this tree.	None at this time.
6		No	No	Eucalyptus	*Eucalyptus globulus*	12,12	24	54	19	2 Major Structure or Health Problems	Forks at grade. One 12" Eucalyptus to the north. Two trees to the south (one 13" and one 10,11,12").	None at this time.
7		No	No	Eucalyptus	*Eucalyptus globulus*		24	54	24	2 Major Structure or Health Problems	Growing adjacent to old barn. Reaction growth over concrete slab.	None at this time.
8		No	No	Black Locust	*Robinia pseudoacacia*		15	54	18	2 Major Structure or Health Problems	Single stem. Poor condition. Excessive deadwood and sparse foliage.	None at this time.
9		No	No	Unknown	*Unknown*		10	54	9	2 Major Structure or Health Problems		None at this time.
10		No	No	Eucalyptus	*Eucalyptus globulus*	12,13,28	53	54	28	2 Major Structure or Health Problems	One-sided south. Smaller Eucalyptus directly north with stems 12,14".	None at this time.
11		No	No	Honey Locust	*Gleditsia triacanthos*		8	54	14	2 Major Structure or Health Problems	One stem surrounded by 4 volunteers, 4-5" each. Poor condition.	None at this time.
12		No	No	Eucalyptus	*Eucalyptus globulus*		47	54	32	2 Major Structure or Health Problems	Forks 4.5' above grade into 2 large stems, both leaning northwest.	**Recommend removal due to nature and extent of defects.**

Tag #	Old Tag #	Protected By Code	Offsite	Common Name	Botanical Name	Multi-Stems	DBH	Measured At	Measured Canopy Radius	Arborist Rating	Notes	Recommendations
13		No	No	Almond	*Prunus dulcis*		12	54	11	2 Major Structure or Health Problems	Tree is 95% dead.	None at this time.
14		No	No	Eucalyptus	*Eucalyptus globulus*		25	54		0 Dead	Tree is dead	**Recommend removal due to nature and extent of defects.**
15		No	No	Arizona Cypress	*Cupressus arizonica*		12	54	8	2 Major Structure or Health Problems		None at this time.
16		No	No	Eucalyptus	*Eucalyptus globulus*		25	54	30	2 Major Structure or Health Problems	Dead branches, leans.	None at this time.
17		No	No	Arizona Cypress	*Cupressus arizonica*		7	54	5	2 Major Structure or Health Problems		None at this time.
18		No	No	Aleppo Pine	*Pinus halepensis*		23	54	21	2 Major Structure or Health Problems	Trunk leans south and bends east.	None at this time.
19		No	No	Casuarina	*Casuarina equisetifolia*		17	54	22	2 Major Structure or Health Problems		None at this time.
20		No	No	Eucalyptus	*Eucalyptus globulus*		25	36	19	2 Major Structure or Health Problems		None at this time.
21		No	No	Eucalyptus	*Eucalyptus globulus*		15	54	17	2 Major Structure or Health Problems		None at this time.
22		No	No	Eucalyptus	*Eucalyptus globulus*		17	54	28	2 Major Structure or Health Problems		None at this time.
23		No	No	American Elm	*Ulmus americana*		26	54	17	1 Extreme Structure or Health Problems	Poor condition. Forks into codominant stems 5' above grade. Northerly stem broken 9' above grade. Tree is 90% dead.	**Recommend removal due to nature and extent of defects.**
24		No	No	Almond	*Prunus dulcis*	5,6,8,12	31	54	10	1 Extreme Structure or Health Problems	Above average dead branches.	**Recommend removal due to nature and extent of defects.**
25		No	No	Almond	*Prunus dulcis*	8,8	16	54	9	2 Major Structure or Health Problems		None at this time.

Tag #	Old Tag #	Protected By Code	Offsite	Common Name	Botanical Name	Multi-Stems	DBH	Measured At	Measured Canopy Radius	Arborist Rating	Notes	Recommendations
26		No	No	Almond	*Prunus dulcis*	5,6	11	54	3	0 Dead	Tree is dead.	**Recommend removal due to nature and extent of defects.**
27		No	No	Almond	*Prunus dulcis*	4,4,5,5,5	23	54	8	2 Major Structure or Health Problems	Poor condition.	None at this time.
28		No	No	Mulberry	*Morus*		16	36	2	1 Extreme Structure or Health Problems	Tree is 90% dead.	**Recommend removal due to nature and extent of defects.**
29		No	No	Eucalyptus	*Eucalyptus globulus*		30	54	32	2 Major Structure or Health Problems		None at this time.
30		No	No	Eucalyptus	*Eucalyptus globulus*		34	54	30	2 Major Structure or Health Problems	5 small Eucalyptus 3-4" beneath this tree and the previous tree.	None at this time.
31		No	No	European Olive	*Olea europaea*	3,4,5,7	19	54	12	2 Major Structure or Health Problems	Poor structure.	None at this time.
32		No	No	Eucalyptus	*Eucalyptus globulus*		13	54	14	2 Major Structure or Health Problems		None at this time.
8509	1509	Yes	No	Black Walnut	*Juglans nigra*	10,11,13,19	53	54	30	1 Extreme Structure or Health Problems	Branches 1' above grade. Large basal cavity. Moderate decay. Canopy ~50% dead.	**Recommend removal due to nature and extent of defects.**
8510		Yes	No	Oregon Ash	*Fraxinus latifolia*		8	54	9	1 Extreme Structure or Health Problems	Trunk split from grade to 12' above grade. Half missing with extreme decay.	**Recommend removal due to nature and extent of defects.**
8512	1589	Yes	No	Black Walnut	*Juglans nigra*		17	54	17	1 Extreme Structure or Health Problems	Trunk leans slightly south. Codominant branching at 5' above grade with included bark. Canopy is 70% dead.	**Recommend removal due to nature and extent of defects.**
8514		Yes	No	Black Walnut	*Juglans nigra*		18	12	16	1 Extreme Structure or Health Problems	Branches 2-3' above grade. Canopy ~50% dead.	**Recommend removal due to nature and extent of defects.**
8515	1579	Yes	No	Black Walnut	*Juglans nigra*		18	54	22	1 Extreme Structure or Health Problems	Codominant branching 6' above grade with included bark. Canopy ~30% dead. Moderate lean north.	**Recommend removal due to nature and extent of defects.**

Tag #	Old Tag #	Protected By Code	Offsite	Common Name	Botanical Name	Multi-Stems	DBH	Measured At	Measured Canopy Radius	Arborist Rating	Notes	Recommendations
8516	1581	Yes	No	Black Walnut	*Juglans nigra*	4,5,6	15	54	19	1 Extreme Structure or Health Problems	Branches at grade. Canopy ~50% dead. Broken branches throughout.	**Recommend removal due to nature and extent of defects.**
8517	1582	Yes	No	Black Walnut	*Juglans nigra*	6,6	12	54	14	1 Extreme Structure or Health Problems	Branches 1' above grade. Canopy ~45% dead.	**Recommend removal due to nature and extent of defects.**
Protected Trees**												
8511	1587	Yes	No	Interior Live Oak	*Quercus wislizeni*		31	54	32	3 Fair - Minor Problems	Moderate lean west from grade to 8' above grade. One-sided east.	Canopy raise on east side.
8513	1586	Yes	No	Interior Live Oak	*Quercus wislizeni*		23	54	17	1 Extreme Structure or Health Problems	Mechanical wound south side from grade to 7' above grade. Partially callused. Extreme decay. Fruiting bodies. Extremely sparse canopy.	**Recommend removal due to nature and extent of defects.**

TOTAL INVENTORIED TREES = 41 trees (932 aggregate diameter inches)
TOTAL RECOMMENDED REMOVALS = 14 trees (320 aggregate diameter inches)
Rating (0-5, where 0 is Dead) = 0=2 trees; 1=11 trees; 2=26 trees; 3=2 trees
Total Non-Protected Trees = 39 trees (878 aggregate diameter inches)
Total Protected Trees = 2 trees (54 aggregate diameter inches)

**Non-Protected Trees for identification purposes, not numbered in the field.*

***Protected Trees tagged in the field.*

APPENDIX 3 – GENERAL PRACTICES FOR TREE PROTECTION

Definitions

Root zone: The roots of trees grow fairly close to the surface of the soil, and spread out in a radial direction from the trunk of tree. A general rule of thumb is that they spread 2 to 3 times the radius of the canopy, or 1 to 1 ½ times the height of the tree. It is generally accepted that disturbance to root zones should be kept as far as possible from the trunk of a tree.

Inner Bark: The bark on large valley oaks and coast live oaks is quite thick, usually 1" to 2". If the bark is knocked off a tree, the inner bark, or cambial region, is exposed or removed. The cambial zone is the area of tissue responsible for adding new layers to the tree each year, so by removing it, the tree can only grow new tissue from the edges of the wound. In addition, the wood of the tree is exposed to decay fungi, so the trunk present at the time of the injury becomes susceptible to decay. Tree protection measures require that no activities occur which can knock the bark off the trees.

Methods Used in Tree Protection:

No matter how detailed Tree Protection Measures are in the initial Arborist Report, they will not accomplish their stated purpose unless they are applied to individual trees and a Project Arborist is hired to oversee the construction. The Project Arborist should have the ability to enforce the Protection Measures. The Project Arborist should be hired as soon as possible to assist in design and to become familiar with the project. He must be able to read and understand the project drawings and interpret the specifications. He should also have the ability to cooperate with the contractor, incorporating the contractor's ideas on how to accomplish the protection measures, wherever possible. It is advisable for the Project Arborist to be present at the Pre-Bid tour of the site, to answer questions the contractors may have about Tree Protection Measures. This also lets the contractors know how important tree preservation is to the developer.

Root Protection Zone (RPZ): Since in most construction projects it is not possible to protect the entire root zone of a tree, a Root Protection Zone is established for each tree to be preserved. The minimum Root Protection Zone is the area underneath the tree's canopy (out to the dripline, or edge of the canopy), plus 10'. The Project Arborist must approve work within the RPZ.

Irrigate, Fertilize, Mulch: Prior to grading on the site near any tree, the area within the Tree Protection fence should be fertilized with 4 pounds of nitrogen per 1000 square feet, and the fertilizer irrigated in. The irrigation should percolate at least 24 inches into the soil. This should be done no less than 2 weeks prior to grading or other root disturbing activities. After irrigating, cover the RPZ with at least 12" of leaf and twig mulch. Such mulch can be obtained from chipping or grinding the limbs of any trees removed on the site. Acceptable mulches can be obtained from nurseries or other commercial sources. Fibrous or shredded redwood or cedar bark mulch shall not be used anywhere on site.

Fence: Fence around the Root Protection Zone and restrict activity therein to prevent soil compaction by vehicles, foot traffic or material storage. The fenced area shall be off limits to all construction equipment, unless there is express written notification provided by the Project Arborist, and impacts are discussed and mitigated prior to work commencing.

No storage or cleaning of equipment or materials, or parking of any equipment can take place within the fenced off area, known as the RPZ.

The fence should be highly visible, and stout enough to keep vehicles and other equipment out. I recommend the fence be made of orange plastic protective fencing, kept in place by t-posts set no farther apart than 6'.

In areas of intense impact, a 6' chain link fence is preferred.

In areas with many trees, the RPZ can be fenced as one unit, rather than separately for each tree.

Where tree trunks are within 3' of the construction area, place 2" by 4" boards vertically against the tree trunks, even if fenced off. Hold the boards in place with wire. Do not nail them directly to the tree. The purpose of the boards is to protect the trunk, should any equipment stray into the RPZ.

Elevate Foliage: Where indicated, remove lower foliage from a tree to prevent limb breakage by equipment. Low foliage can usually be removed without harming the tree, unless more than 25% of the foliage is removed. Branches need to be removed at the anatomically correct location in order to prevent decay organisms from entering the trunk. For this reason, a contractor who is an ISA Certified Arborist should perform all pruning on protected trees.[2]

Expose and Cut Roots: Breaking roots with a backhoe, or crushing them with a grader, causes significant injury, which may subject the roots to decay. Ripping roots may cause them to splinter toward the base of the tree, creating much more injury than a clean cut would make. At any location where the root zone of a tree will be impacted by a trench or a cut (including a cut required for a fill and compaction), the roots shall be exposed with either a backhoe digging radially to the trunk, by hand digging, or by a hydraulic air spade, and then cut cleanly with a sharp instrument, such as chainsaw with a carbide chain. Once the roots are severed, the area behind the cut should be moistened and mulched. A root protection fence should also be erected to protect the remaining roots, if it is not already in place. Further grading or backhoe work required outside the established RPZ can then continue without further protection measures.

Protect Roots in Deeper Trenches: The location of utilities on the site can be very detrimental to trees. Design the project to use as few trenches as possible, and to keep them away from the major trees to be protected. Wherever possible, in areas where trenches will be very deep, consider boring under the roots of the trees, rather than digging the trench through the roots. This technique can be quite useful for utility trenches and pipelines.

Protect Roots in Small Trenches: After all construction is complete on a site, it is not unusual for the landscape contractor to come in and sever a large number of "preserved" roots during the installation of irrigation systems. The Project Arborist must therefore approve the landscape and irrigation plans. The irrigation system needs to be designed so the main lines are located outside the root zone of major trees, and the secondary lines are either laid on the surface (drip systems), or carefully dug with a hydraulic or air spade, and the flexible pipe fed underneath the major roots.

Design the irrigation system so it can slowly apply water (no more than ¼" to ½" of water per hour) over a longer period of time. This allows deep soaking of root zones. The system also needs to accommodate infrequent irrigation settings of once or twice a month, rather than several times a week.

Monitoring Tree Health During and After Construction: The Project Arborist should visit the site at least twice a month during construction to be certain the tree protection measures are being followed, to monitor the health of impacted trees, and make recommendations as to irrigation or other needs. After construction is complete, the arborist should monitor the site monthly for one year and make recommendations for care where needed.

Chemical Treatments: The owner or developer shall be responsible to contact an arborist with a pesticide applicators license to arrange for an application of a root enhancing hormone, such as Paclobutrazol, to mitigate the stress produced by the development **prior to grading**. Additionally, at the discretion of the project arborist, an insect infestation preventative for both boring insects and leaf feeding insects and/or fungal preventative for leaf surfaces may be required. Roots pruned during the course of performing a cut may be required to be treated with a biofungicide such as Bio-Tam.

[2] International Society of Arboriculture (ISA), maintains a program of Certifying individuals. Each Certified Arborist has a number and must maintain continuing education credits to remain Certified.