SBCA TREE CONSULTING
Steve Batchelder, Consulting Arborist
1534 Rose Street, Crockett, CA 94525
WC ISA Certified Arborist #228
CUFC Certified Urban Forester #134
Calif. Contractor Lic. (C-27) 533675
Phone (510) 787-3075, Fax (510) 787-3065
E-mail: steve@sbcatree.com

Date: October 29, 2014

To: Todd Williams, Public Works Supervisor
City of Alameda

Subject: Advanced Tree Safety Inspection for Three *Liquidambar* Trees

Location: 1710, 1720 & 1728 Chapin

Species: American Sweet Gum *(Liquidambar styraciflua)*

Assignment: Arborists were asked to conduct an advanced decay investigation on three *Liquidambar* trees on Chapin Street and provide assessment of tree safety and recommendations for the mitigation of safety concerns.

Introduction

This report should be read in conjunction with past reports submitted by SBCA Tree Consulting pertaining to the liquidambar trees on Chapin. Addressed in this report is the advanced decay assessments of three trees as recommended in the prior report dated August 25, 2014. Arborists worked with Eric Carlson of West Coast Arborists Inc. in performing the assessment. Company regulations preclude anyone other than company personnel from using a company lift device and Eric conducted the investigation above 12 feet. Arborists Steve Batchelder and Molly Batchelder investigated tree decay in the area below 12 feet. Both Eric and Molly are certified arborists and are "Tree Risk Assessment Qualified" (TRAQ), having passed a specialized course and examination administered by the International Society of Arboriculture. Resistograph recordings are provided in *Appendix 1.*

- Tools: Arborists used a mallet, a metal probe and a Resistograph to make the assessment.
- Procedure:
  - ✓ *Visual Inspection* – The three arborists first conducted a visual inspection to determine the locations where further investigation was to be conducted. The areas of investigation were identified where large pruning cuts or breakouts had occurred in the past and where decay was most likely to be found.
  - ✓ *Sounding* – The first 12 feet of the tree was sounded for signs of hollowness. Eric Carlson then proceeded into the tree in the lift device to sound suspected locations.
  - ✓ *Probe* – A metal probe was used to probe open wounds to determine the depth of decay.
  - ✓ *Resistograph* – Areas determined by sounding to have decay were investigated further using a Resistograph.

- Limitations of Investigation: The lift device did not allow access to the residential side of the trees limiting investigation to the street side of the trees. However, open wounds did allow for better estimates finding decay in excess of 50% in most areas

Summary

Decay was identified in all areas where it was suspected, as determined by visual inspection by the three arborists present. Decay was detected in locations where improper pruning cuts[1] had been made. The tree at 1710 Chapin is considered to be the highest priority for removal.

The other two trees investigated at 1720 and 1728 Chapin are both extremely large trees with significant decay. The decay is a result of prior topping and heading cuts. Both have experienced stem failures in the past. The stems that are attached at the decay locations are quite large in size. These trees are also recommended for removal as the combination of the decay and the relatively weak wood of the *Liquidambar* species makes stem failure a serious concern. If there is a desire to retain the trees for a few more years, severe crown reduction pruning would be required to reduce the potential for stem failure.

Comments by Eric Carlson – Due to the locations of all subject trees, if a tree should experience a failure, the impact to a target is 'likely' to 'very likely' due to occupancy rates of the various targets. Consequences of impact vary from 'minor' to 'severe'.[1]

I feel that part sizes, failure characteristics, and fall distances vary. The defects are throughout the subject trees, at all heights, and on all sides. Considering the facts that the street is frequented with pedestrians and vehicular traffic, the near constant occupancy rate of parked cars, and constant residential home occupancy rate, there is almost no 'safe' side of the subject trees.

Tree and Site Description

All trees are City Street Trees and growing in parkway planting strips between the sidewalk and the curb. All trees are considered to be mature with heights up to 85 feet.

Table 1 – Tree descriptions and arborist notes for the three trees in question.

Address	DBH	Health	Structure	Notes	Recommendations
1710	25”	Fair-Good	Poor	Topped; large pruning wound; rotten stem over path; internal decay.	Remove tree.
1720	43.5	Good	Poor	Topped; major included-bark breakout; curb/gutter/sidewalk displacement; 2008 pavement improvements; recent large limb failure (over-weight); internal decay, dead cambium found in large areas on the main trunk.	Remove tree or administer “crown reduction” pruning.

[1] “In deriving an estimate of risk, the targets, the likelihood of a tree failure impacting a target, and the consequences of failure must be considered” (Dunster, Julian A. Tree Risk Assessment Manual. USA: ISA, 2013. Print.”

Address	DBH	Health	Structure	Notes	Recommendations
1728	37”	Good	Poor	Topped; roots in street; major decay in upper scaffold; curb/gutter/sidewalk displacement; internal decay.	Remove tree or administer “crown reduction” pruning.

Discussion

The following items of discussion were considerations in determining the overall safety of the three *Liquidambar* trees.

- Evidence of Inappropriate Pruning in the Past – The scaffold structures of the three trees exhibit signs of large pruning wounds in the past. Such pruning (topping and heading) significantly reduces the safe life expectancy of large stature trees. Large pruning wounds always result in internal decay which compromise tree safety later on. Furthermore, many branches were sun scalded when the past heavy pruning occurred. These sun scalded areas are now riddled with extensive decay. Because of the large number of compromised stems, it is difficult to determine which may fail first.
- *Liquidambar* Noted for Brash Wood – The relatively weak or brash wood of the *Liquidambar* is a significant factor. When combined with decay, the failure potential is greater. Codominance and included bark can further increase the potential for stem failure.
- History of Failures – It is clear from viewing the trees that there is a history of large stem failures. The included bark stem failure on the tree at 1720 was significant as was the recent branch failure on the same tree. Residents state that the limb was decayed.
- Level of Decay – Signs of significant decay were found in all locations where the Resistograph was utilized. Decay was estimated to be in excess of 50% in most all locations. Resistograph readings are provided in the *Appendix* material.
- Tree Size and Potential to Cause Harm – The size of the part of the tree most likely to fail influences the level of risk that must be tolerated. The size of the stems that could potentially fail is significant with the potential for serious damage.
- Target – The potential target in a stem failure is another important concern. The primary targets are cars, residences, and pedestrians.
- Overall Tree Safety – It is quite difficult to predict when and where a stem failure might occur. The combination of the decay, weight of the stems, stem attachments and brash wood coupled with high wind forces are the most significant factors in potential failures. The combination of the large size of the stems and the “target” (car, pedestrian, residence) indicates that action is needed. Safety can be improved somewhat through severe crown reduction pruning to reduce the size of the tree.
- Future Prospects if Trees are Retained – The improper pruning treatments administered at earlier times have sealed the fate of these trees. Such pruning treatments result in failures or more frequent pruning treatments required to prevent stem failures.

- Crown Reduction Pruning – The purpose of this pruning treatment is to reduce the overall size of a tree to reduce the likelihood of structural failure. This type of pruning treatment is generally prescribed for large old trees, when retention is desired but associated risk is high. Crown reduction pruning is often coupled with an increased frequency of future maintenance. Furthermore, such pruning is also a double-edged sword as the regular loss of foliage reduces carbohydrate production and thus new wood production to counter the advancing decay.

Recommendations

Remove *Liquidambar* Tree at 1710 Chapin – The level of decay in the trunk and scaffold is excessive. The pruning necessary to maintain the tree will ruin the tree's aesthetic contribution to the streetscape.

Remove or Perform Crown Reduction Pruning on the Trees at 1720 & 1728 Chapin – The large size of these trees makes them valuable to the streetscape but also a safety liability. If there is a strong desire to retain these trees, severe crown reduction pruning would be required. Both trees are close to the end of their safe and useful life expectancies, entailing a higher level of maintenance. The suggestion for short term retention of these trees is primarily to provide for a slower transition to new trees. This was suggested in our earlier 2007 reports. The thinning and heading cuts used in the crown reduction pruning should not exceed 4 inches in diameter.

Replacement Planting – Tree replacement species' mature size must be agreeable with the size limitations of the planting sites. Also, it is strongly recommended that under-pavement treatments to discourage future root related hardscape displacement be implemented when damaged sidewalks are replaced. Treatments would include the use of 4-6 inches of clean crushed rock in place of base material.

Signs of Improper Pruning Treatment on Other Trees – Whenever signs of large pruning cuts or significant branch failures are observed, particularly in *Liquidambar* trees, there is a potential for decay activity. Avoid creating pruning wounds over 4 inches in diameter.

End Report

Report Submitted By:

Steve Batchelder, Consulting Arborist
ISA Certified Arborist WE 228A
CaUFC Certified Urban Forester #138
Calif. Contractor Lic. (C-27) 533675

Photo Supplement

Photo 1. *Photo to the left shows the tree in front of 1710 Chapin. The tree had been topped at an earlier time and decay is moving down the center of the tree. Resistograph readings taken at 7 feet above grade confirmed that incipient decay is throughout the tree.*

Photo 2. *Photo to the left shows a rotten limb on the tree shown in Photo 1. It has been recommended that this tree be removed.*

Photo 3. *Photo to the right shows a limb on the tree in front of #1720. This type of hollowness and decay was found in multiple limbs throughout the three trees.*

Photo 4. *Photo to the left shows a significant included bark branch breakout location in the tree at #1720. This limb is weakened and would require reduction in size to mitigate the safety concerns. This tree exhibits signs of two significant stem breakages, one of which was recent.*

Photo 5. *Photo to the left shows another decayed area on the tree at 1728, which was likely a result of poor pruning practices.*

The stem is growing new wood (red arrow) in an attempt to compensate for the decay-related wood loss. Such a wound on top of a branch will rot much faster due to the collection of water. The weight reduction required to reduce the potential for failure will also reduce new support wood production while the decay continues to spread. *The weight reduction required to reduce the potential for failure will also reduce new support wood production while the decay continues to spread.*

Photo 6. *Photo to the left shows Eric Carlson using the Resistograph on tree #1720. The area was first sounded with a mallet, which detected internal decay. Resistograph records can be found in* Appendix 1. *The thickness of the sound wood was less than 2 inches with what appears to be intermittent decay.*

Photo 7. *Above shows the tree in front of #1728. The red arrow points to the area where decay was detected on the limb extending over the adjacent residence. Decay was present at all locations where large heading cuts were made in years past. Such a limb would have a failure potential as "likely" within the next year. Improper pruning of this tree in the past is the cause of the current decay related safety issues. Luckily, not all of the* Liquidambar *trees in the City were subjected to this type of pruning. Large pruning wounds almost always lead to decay. There are many factors that can lead to a catastrophic failure. The most common ingredients are decay and/or weak stem attachments coupled with windy weather conditions.*

The other ingredients to a catastrophic tree failure are large trees or limbs that could fail and a significant target; all of which exist in this situation. The recommended treatment is tree removal. Severe crown reduction pruning could allow the tree to be retained for a few more years.

End Photo Supplement