April 13, 2009

Aditya Advani
Royston Hanamoto Alley & Abey
225 Miller Ave.
Mill Valley, CA 94941

Subject: Arborist Report
Middlefield Road NW side at Oregon Expressway

Mr. Advani:

Royston Hanamoto Alley & Abey is assisting in the design of streetscape improvements on the northwest side of Middlefield Road at Oregon Expressway, in Palo Alto. There are existing City street trees on the northwest side of Middlefield Rd. within the project limits.

You asked that I examine the trees, evaluate their health and structural condition and assess the impact of the proposed project. You also requested that I review replacement tree species and provide comments on the use of structural soil. This report summarizes my assessment and recommendations.

Survey Methods

Trees were surveyed on March 25, 2009. The survey included five (5) street trees on the northwest side of Middlefield Rd. identified by the County of Santa Clara Roads & Airports Department. Only those trees identified by the County were included in the survey. The survey procedure consisted of the following steps:

1. Tagging each tree with an identifying number (#51-55) and recording its location on a map (tree #55 was assigned a number but was to small too tag);

2. Identifying the tree as to species;

3. Measuring the trunk diameter at a point 54" above grade;

4. Evaluating the health and structural condition using a scale of 1 – 5:
   - ***5*** – *Excellent condition*: a healthy, vigorous tree, reasonably free of signs and symptoms of disease, with good structure and form typical of the species.
   - ***4*** - *Good condition*: tree with slight decline in vigor, small amount of twig dieback, minor structural defects that could be corrected.
   - ***3*** – *Fair condition*: 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*** – *Poor condition*: tree in decline, epicormic growth, extensive dieback of medium to large branches, significant structural defects that cannot be abated.
   - ***1*** – *Very poor condition*: tree in severe decline, dieback of scaffold branches and/or trunk; most of foliage from epicormics; extensive structural defects that cannot be abated.

5. Rating the suitability for preservation as ”good”, “moderate” or “poor”. Suitability for preservation considers the health, age and structural condition of the tree, and its potential to remain an asset to the site for years to come.

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

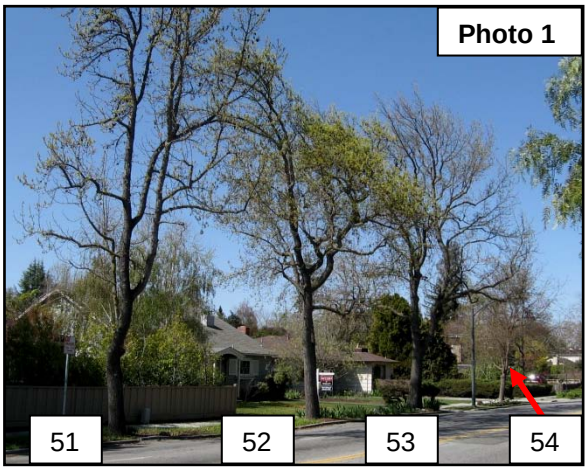
   Moderate: Trees with somewhat declining health and/or structural defects than can be abated with treatment. The tree will require more intense management and monitoring, and may have shorter life span than those in ‘good’ category.

   Poor: 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 may have characteristics that are undesirable for landscapes, and generally are unsuited for use areas.

Observations at the Site

The five (5) street trees were located in a landscape strip between the sidewalk and curb. The planting area was approximately 5.5’ wide. The trees were numbered starting at Oregon Expressway north towards Garland Drive. The sidewalk near trees #51-54 had been raised and the curb was displaced. At tree #55 the sidewalk and curb appeared to be in good condition. Descriptions of individual trees are included in the attached ***Tree Survey Form*** and locations are shown on the ***Tree Survey Map***.

Trees #51-53 were sweetgum (*Liquidambar styraciflua*) (photo 1). Tree #51 was located on the side of 699 Oregon Ave., and #52-53 were at 2370 Middlefield Rd. The sweetgums were mature in form and development. Trunk size varied from 15” to 22” in diameter. Trees #52-53 were in good condition. They had good form and structure and a full crown. On tree #53 a 15'' west facing stem over the street has been repeatedly hit by trucks creating a large wound. Tree #51 was in fair condition and characterized by a narrow form.



Chinese tallow (*Sapium sebiferum*) #54 was located at 2360 Middlefield Rd. The tree was semi-mature in development with an 11” diameter trunk. It was in good condition, had good form and a full crown (photo 1).

Red oak (*Quercus rubra*) #55 was located at 2342 Middlefield Rd. and was in excellent health. The young oak had excellent form and structure, and a 4” diameter trunk (photo 2). Foliage from the prior year’s growth was still attached to the tree, a common characteristic of the species.

Suitability for Preservation

In selecting trees to preserve on project sites, our goal is to select individuals that have the potential for long-term health, structural stability and longevity. To that end, we evaluate the suitability for preservation of each tree, considering the following 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.

- **Species response**
  There is a wide variation in the response of individual species to construction impacts and changes in the environment. In this case, sweetgum, Chinese tallow and red oak all have moderate tolerances to site disturbance.

- **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.

- **Species invasiveness**
  Species which spread across a site and displace desired vegetation are not always appropriate for retention. This is particularly true when indigenous species are displaced. The species surveyed are considered non-invasive, and they rarely reproduce in a landscape setting.

Tree Suitability for Preservation

Good	These are trees with good health and structural stability that have the potential for longevity at the site. Two (2) trees were rated as having good suitability for preservation, Chinese tallow #54 and red oak #55.
Moderate	Trees in this category have fair health and/or structural defects that may be abated with treatment. Trees in this category require more intense management and monitoring, and may have shorter life-spans than those in the “good” category. All three sweetgums #51-53 were rated as having moderate suitability for preservation.
Poor	Trees in this category are in poor health or have significant defects in structure that cannot be abated with treatment. No trees were rated as having poor 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. Potential impacts from construction were evaluated using the Oregon Expressway and Middlefield Road Alternative 3 Modified Plan, provided by the County of Santa Clara Roads & Airports Department (revised April 6, 2009).

The plan depicted the proposed widening of Middlefield Rd. on the west side, in the direction of trees #51-55. The street would be widened and a new curb, sidewalk and landscape strip would be constructed. The Plan showed the location of the trees.

Using the plan, potential impacts from construction were estimated for each tree. The proposed plans showed trees #51-54 in the new south bound lane on Middlefield Rd. The widening of Middlefield Rd. would start approximately 5' south of tree #55.

Based upon my assessment of the plans, I recommend the preservation of red oak #55. Preservation of this tree is predicated on the impacts being within the tolerances of the tree and on the implementation of specific recommendations in the ***Tree Preservation Guidelines*** (next page).

I recommend the removal of the remaining four (4) trees (#51-54) due to impacts from construction.

Proposed Street Tree Planting

The proposed widening of Middlefield Rd. on the west would create a 1.5' wide landscape strip between the new sidewalk and curb. A tree grate (1' wide x 4' long) would be installed in the sidewalk at each tree location to provide more space for street trees. The 1' wide tree grate would increase the size of the planting area to 2.5' wide at tree locations.

The existing tree palette on Middlefield Rd. consists mostly of mature London plane and sweetgum, and young red oak and red maple, in the 5.5' wide landscape strip. These are all deciduous and large growing species. The new 2.5' wide planting area, at tree locations, cannot accommodate the future growth of the trunk and root system of these large trees. As an example, the size of their trunk/root collar at ground level will exceed the size of the new planting area as they mature. The growth and development of the trunk/root collar, buttress roots (ie. large structural roots) and surface roots (eg. sweetgum and red maple) would damage the new street, curb and sidewalk.

Based on the 2.5' wide planting area I recommend the use of smaller size trees. I recommend the following three options for deciduous species.

Crape myrtle hybrids (*Lagerstroemia* x *fauriei)*
A small flowering tree distinguished by their flower color. Mature height to 25' by 15' wide. Excellent flower display in the range of white, coral pink, red and lavender. Fall colors include yellow, orange and red. Growth rate is fast, approximately 18-24" or more per year.

Callery pear (*Pyrus calleryana* 'Chanticleer' or 'Redspire'*)*
A medium-sized tree that may reach 30-40' in height with a 15-20' spread. Chanticleer has a narrowly pyramidal form, and fall color is orange to reddish purple. Redspire is oval to pyramidal in form, and fall color is yellow and red. White flowers in spring. Growth rate is relatively fast once established, about 18-24" per year.

European hornbeam (*Carpinus betulus* 'Fastigiata'*)*
A medium-sized tree to 30-40' in height with a 25' spread. A symmetrical tree that is formal in appearance, with a narrow to oval form. Fall color is yellow to orange. Growth rate is moderate at 12-18" per year.

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. Trees retained on sites that are either subject to extensive injury during construction or are inadequately maintained become a liability rather than an asset. The response of individual trees will depend on the amount of excavation and grading, the care with which demolition is undertaken, and the construction methods. These impacts can be minimized by coordinating any construction activity inside the **TREE PROTECTION ZONE**.

The following recommendations will help reduce impacts to tree #55 from development and maintain its health and vitality through the construction phases.

Design recommendations

1. **Tree Preservation Guidelines**, prepared by the Consulting Arborist, should be included on all plans.

2. Any changes to the plans affecting the tree 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.

3. Keep edge of construction a minimum of 5' from the tree in all directions.

4. **TREE PROTECTION ZONE** shall be established around the tree. No grading, excavation, construction, or storage of materials shall occur within the **TREE PROTECTION ZONE**. No underground services including utilities, sub-drains, water or sewer shall be placed in the **TREE PROTECTION ZONE**. Spoils from excavation, construction and trenching, shall not be placed within the **TREE PROTECTION ZONE**, either temporarily or permanently. The limits of the **TREE PROTECTION ZONE** may be adjusted following design changes. The **TREE PROTECTION ZONE** shall be one continuous zone, and is defined as follows: back edge of existing curb on east; 1' back of existing sidewalk on west; dripline on north; minimum of 5' south of trunk.

5. Do not apply lime to the soil for compaction purposes. Lime is toxic to roots.

6. Any herbicides placed under paving materials must be safe for use around trees and labeled for that use.

Pre-construction treatments and recommendations

1. Fence the tree to be retained to enclose the **TREE PROTECTION ZONE** prior to demolition, grubbing or grading. Fence shall be 4ft. orange construction fence with steel posts embedded in the ground. Fencing shall remain until all grading and construction is completed. We suggest placing two (2) weather proof signs on the fencing that read **"TREE PROTECTION ZONE KEEP OUT"**.

2. Encourage the property owner to maintain their normal irrigation schedule for the tree during construction.

Recommendations for tree protection during construction

1. No grading, excavation, construction or storage of materials shall occur within the **TREE PROTECTION ZONE** unless approved and monitored by the Consulting Arborist. No underground services including utilities, sub-drains, water, sewer or irrigation shall be placed in the **TREE PROTECTION ZONE** unless approved and monitored by the Consulting Arborist. Spoil from trench, footing, utility or other excavation shall not be placed within the **TREE PROTECTION ZONE**, either temporarily or permanently. Any modifications must be approved and monitored by the Consulting Arborist.

2. All demolition, grading and construction within the dripline of the tree shall be done using the smallest equipment possible. The equipment shall operate perpendicular to the tree and operate from outside the **TREE PROTECTION ZONE**.

3. If roots 1" in diameter and greater are encountered the tree will require root pruning at the edge of the **TREE PROTECTION ZONE** by cutting all roots cleanly to the depth of construction. Roots will be exposed by either: pulling soil away from the tree with a small back hoe or digging by hand. Roots shall be pruned at undamaged tissue and perpendicular to the root, with pruners, loppers or hand saw as required.

4. If injury should occur to the tree during construction, it should be evaluated as soon as possible by the Consulting Arborist so that appropriate treatments can be applied.

5. No excess soil, chemicals, debris, equipment or other materials shall be dumped or stored within the **TREE PROTECTION ZONE**.

If you have any questions about my observations, evaluation or recommendations, please feel free to contact me.

Sincerely,

Michael D. Santos
Certified Arborist WE-3877
Registered Consulting Arborist #430

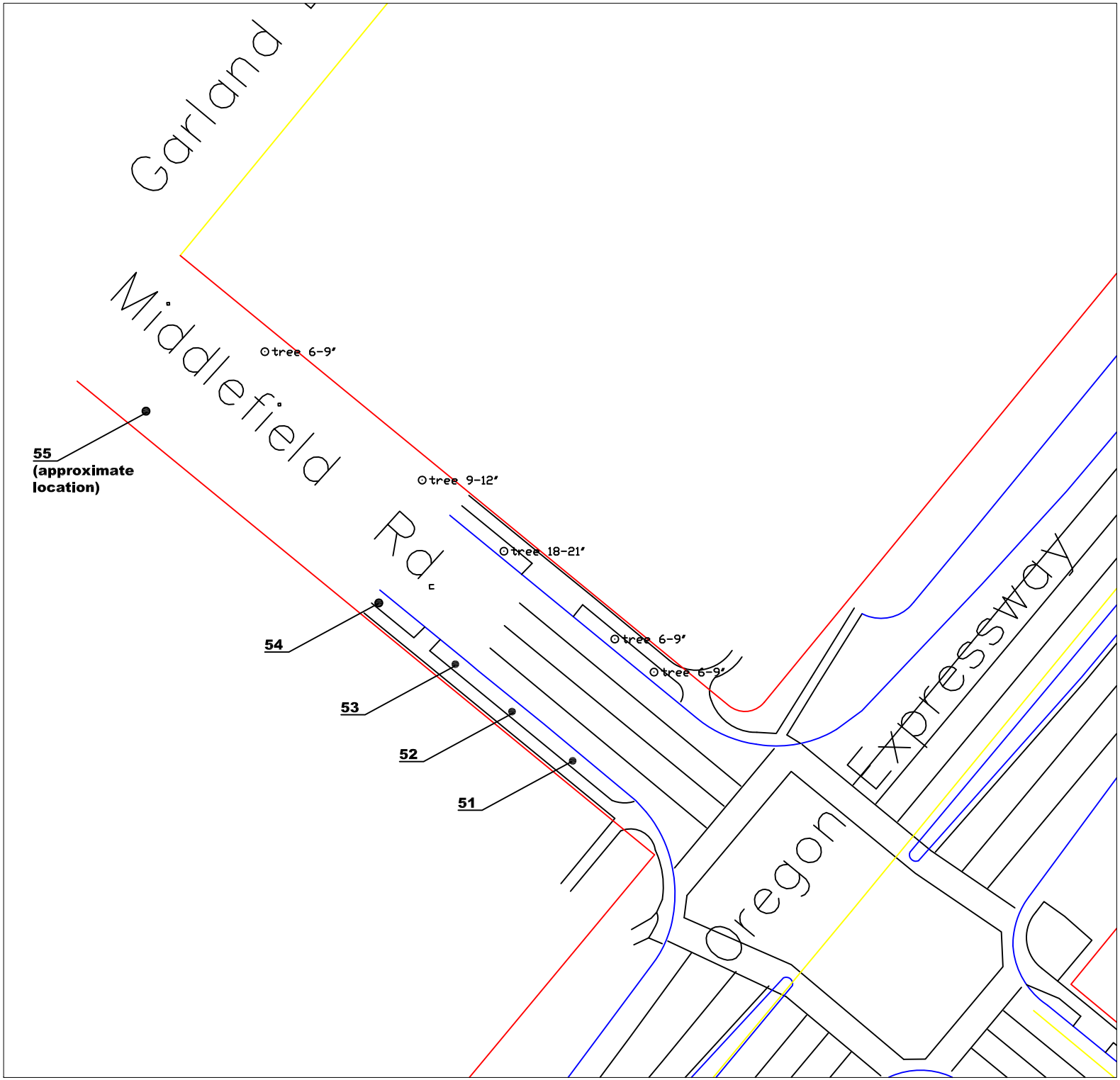
Att. ***Tree Survey Form***
Tree Survey Map

HortScience Tree Survey

Royston Hanamoto Alley & Abey

Middlefield Rd. NW side at Oregon Exp.
Palo Alto, CA
March 24, 2009

TREE No.	ADDRESS	SPECIES	SIZE DIAMETER (in inches)	CONDITION 1=POOR 5=EXCELLENT	SUITABILITY FOR PRESERVATION	COMMENTS
51	699 Oregon Ave.	Sweetgum	15	3	Moderate	Narrow upright form; sidewalk raised; curb, gutter and street displaced; 5.5' wide planting strip.
52	2370 Middlefield Rd.	Sweetgum	19	4	Moderate	Codominant at 10'; full crown; 5'' west facing branch over sidewalk with decay; sidewalk raised; curb, gutter and street displaced; 5.5' wide planting strip.
53	2370 Middlefield Rd.	Sweetgum	22	4	Moderate	Codominant at 11'; full crown; 15'' west facing stem over street hit by vehicles resulting in large wound; root collar next to sidewalk; sidewalk raised; curb, gutter and street displaced; 5.5' wide planting strip.
54	2360 Middlefield Rd.	Chinese tallow	11	4	Good	Good form; full crown; trunk divides at 7' into two stems; sidewalk raised; curb, gutter and street displaced, likely by previous tree; 5.5' wide planting strip.
55	2342 Middlefield Rd.	Red oak	4	5	Good	Untagged; good young tree; excellent form and structure.



Tree Survey Map

Middlefield Road
Northwest Side
@ Oregon Expressway

Prepared for:

Royston, Hanamoto,
Alley & Abey
Mill Valley, CA

March 2008

No Scale

Notes:
Base map provided by:
County of Santa Clara Roads
and Airport Department
Santa Clara, CA
Numbered tree locations are approximate.

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