Appendix B

Tree Solutions Inc
Consulting Arborists
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Project No. TS - 4993

Memorandum

TO:	Patty Jenkins, City of Bainbridge Island, c/o Nathan Polanski, MIG|SvR
SITE:	Olympic Drive (SR 305) between Harborview Drive SE & Winslow Way E Bainbridge Island, WA 98110
RE:	Olympic Drive Tree Retention Analysis – Ferry Terminal Access Road Improvements
DATE:	May 18, 2017
PROJECT ARBORIST:	Scott Baker, ASCA Registered Consulting Arborist # 414 ISA Board Certified Master Arborist PN-0670B ISA Qualified Tree Risk Assessor
REVIEWED BY:	Katherine Taylor ISA Certified Arborist PN-8022A ISA Qualified Tree Risk Assessor

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This memo documents my site visit on May 3rd, 2017. Patty Jenkins from the City of Bainbridge Island requested the site visit to assess existing trees on site; provide comments on the potential survivability of tree numbers 525, 523, and 513 based on current design plans; and suggest design modifications to improve tree survivability during and after construction. We were asked to provide options that could allow the trees to be safely retained.

Observations

I met on the site with the Project Manager Patty Jenkins and also reviewed plans and details for the project which will widen the ferry terminal access road and add sidewalks.

I assessed three trees, numbered 525, 523, 513 (Photo 1). These were originally proposed for removal with one tree (523) to be left as a snag in a report generated by our office. Due to concerns raised by the public we were asked to assess if there might be a way to retain the trees.

The trees are growing in an area that is currently forested and managed by the parks department. Several trails exist onsite, including one with a sign noting that it connects to town. The area has heavy invasive plant cover, including invasive ivy (*Hedera* spp.) and some Himalayan blackberry (*Rubus bifrons*), which is currently being managed in an attempt to restore the native vegetative cover.

We performed root crown examinations to determine the location of large roots and used a soil probe to estimate potential root depth.

Tree 525 is a Douglas-fir (*Pseudotsuga menziesii*) tree that is 95 feet tall and has a Diameter at Standard Height (DSH) of 31.5 inches. This tree has a live crown ratio (LCR) of approximately 70 percent and an

average drip line of approximately 20 feet. The tree has large structural roots extending to the northeast, northwest, southwest. The leader of this tree is not intact and has a flat crown.

Tree 523 is a Douglas-fir that is 110 feet tall and has a DSH of 36.2 inches. This tree has an LCR of approximately 64 percent and an average drip line of approximately 22 feet. The tree has large structural roots extending to the northwest, southwest, and southeast.

Tree 513 is a Douglas-fir that is 125 feet tall and has a DSH of 34.6 inches. This tree has a LCR of approximately 68 percent and an average drip line of approximately 25 feet. The tree has large structural roots extending to the northeast and southeast.

A retaining wall is proposed to fall within the drip lines of these trees to accommodate the widened ferry terminal access and sidewalk. The proposed retaining wall would be a standard block wall approximately 2 to 8 feet tall. It is proposed to be installed within approximately 1 to 10 feet of the trees. The wall would require a crushed rock base of 24 inches.

We used a soil probe to determine that the soil depth which could support trees roots is approximately 40 inches or greater, to the north side of the subject trees (Photo 2).

The retaining wall, near tree 525, would be approximately 2 feet tall. This which would require minimal amount of cut and fill. The wall would be installed approximately 1 foot from the base of the tree. A nearby utility structure would also be relocated and require that a 2 inch conduit be trenched in within the drip line of the tree.

The retaining wall, near tree 523, would be approximately 5 to 6 feet tall and 10 feet away from the base of the tree. Near tree 513, the retaining wall would be approximately 8 feet tall and 6 feet away from the base of the tree.

The existing utility poles which support three phase power are also planned for relocation near to or within the canopies of the subject trees. Plans show unconfirmed locations of the overhead utility lines south of the proposed retaining wall.

Discussion

There is apparently considerable interest in trying to retain the three large Douglas-fir trees. Trees 525, 523, and 513 may be possible to retain if the wall can be built over the existing roots, and the utility line conflict can be resolved. The type of wall being used is ideal for attempting to save the trees.

Given the soil volume as well as the type, height, and location of the wall, I believe the root systems of these trees would have sufficient room for growth without impacting the wall. Additionally, the material specified to raise the grade is quite porous and would be placed in lifts which may allow the root system to survive, however, some impact is likely.

Retaining the trees would require that the root systems of the trees be minimally impacted. Based on our inspection, I believe there will be a few large roots that extend under the wall to the north. No large structural roots should be severed along the area where the base material for the wall is placed. Any

removal of adjacent trees and vegetation should be done with care to reduce impact to the retained trees. Excavation and root pruning should be monitored and assessed by a qualified arborist.

I recommend working with the Puget Sound Energy (PSE), to locate utility poles in a manner that minimizes impact to the subject trees to the greatest extent possible. As currently shown on the proposed plans, the utility lines will be in conflict with the trees. Consider altering the path of the overhead lines to the north or cross over to the north side of the street.

If the current pole locations cannot be moved then the only option would be to leave all three trees as wildlife snags.

Prior to construction I recommend digging an exploratory trench along the south edge of the proposed retaining wall to the depth of the crushed rock base. This will provide more information on the location of structural roots and potential impacts to the trees. The project engineer may need to assess potential impacts to the retaining wall of leaving roots in place.

Throughout construction the retained trees should be monitored for symptoms of decline. If trees begin to show significant symptoms of decline, including dieback in the canopy and/or formation of fungal fruiting bodies, they should be assessed again by a qualified arborist. If decline occurs, the trees may require shortening, using live wildlife snag style pruning, to push them into a shorter flat topped form. This treatment should allow the trees to remain stable for a long time. If the roots left beneath the new wall decline and rot, the trees may eventually have an elevated risk of failure away from the road.

If necessary, the structural stability of the retained trees can be assessed using the Statics Integrated Assessment (SIA) method or “pulling test”. This system applies a load to the tree and uses sensors to assesses the breaking safety and root stability of the tree. If the assessment finds that the trees have become unstable, they could be shortened again to leave dead wildlife snags along the edge of the forest. This would provide some protection the other retained trees on site. On the proposed plans one tree is currently shown to be left as a snag in order to protect an adjacent tree.

In addition, we looked at a group of red alder trees (*Alnus rubra*) along the west edge of the site. I recommend pruning the lower branches on trees number 501 and 502 to provide clearance for the garden area to the north and reduce risk to the landscape and sculptures that are present. It is not absolutely necessary to remove these trees.

I recommend communication with the general public inform them of the tree preservation plan if you can determine that it would be feasible. Be sure clearly communicate that the trees may be altered to accommodate utility lines, and/or be shortened to live or dead habitat snags depending on the outcome of construction.

This tree preservation work will not conform to current best practices for tree retention which would require a substantial undisturbed area of 1 foot per inch trunk diameter, in the area where the project will cover. Based on my experience, I believe the trees have fair chance of surviving for many years if the project team is willing to try. I do believe they will be impacted and the likelihood that they would need to be altered with pruning is high.

To retain trees 525, 523, and 513, I recommend updating the construction documents to require the contractor use the following construction methods and specifications:

- Update plans to show tree numbers and retained trees.
- Prior to construction, dig an exploratory trench along the south portion of the proposed retaining wall to locate structural roots. The trench should be dug by hand. A qualified arborist should be on site to assess the uncovered roots.
- Prior to construction, remove invasive plants and apply a 6 inch layer of wood chip mulch over soil within the tree protection area.
- In areas where silt or tree protection fencing is installed, do not trench to bury fencing materials, use straw wattles.
- Remove vegetation in the demolition area with care to avoid damaging the root systems of retained trees. Stumps should be ground and not grubbed.
- Excavation for the project demolition phase should be done with a flat front bucket to strip vegetation where fill will be placed.
- Excavation for the wall footing should be done to reduce or eliminate over excavation. Excavation should be conducted slowly with one person spotting for roots. When roots are encountered excavation should cease and if necessary roots should be pruned with a sharp saw making clean cuts. If there are a significant amount of roots are encountered, pneumatic air excavation should be considered to dig the trench.
- The base material for the wall should be placed over any large structural roots that are encountered, and compacted to the required level. Do not sever large structural roots to accommodate the base material.
- Root pruning should be limited to the extent possible. All roots shall be pruned with a sharp saw making clean cuts. Do not fracture and break roots with excavation equipment. Root cuts should be immediately covered with burlap, soil, or mulch and kept moist.
- Have a qualified arborist monitor all excavation and root pruning for the wall installation; and if necessary, the utility pole installation.
- Depending on where the new power poles are installed, the trees may have to be pruned to raise the lowest limbs on the north side to allow clearance. Conduct reduction pruning of branches, toward the improvements, in advance of the construction to prevent damage to the canopies and reduce the likelihood of a branches shedding onto the lines or sidewalk and road. Other than pruning for utility lines, trees should be left intact and protected throughout construction.

- Any pruning should be done according to ANSI-A300 standards by a well-qualified arborist. This is vital if any reduction in height is needed as it will be important to leave the trees with a natural appearance.

- Closely monitor trees for any decline or dieback and prune to remove dead or dying parts. Have a qualified arborist reassess trees that are showing symptoms of decline.

Recommendations

- Determine the position of the utility poles and consult with the utility to discuss retaining trees 525, 523, and 513.
- Dig an exploratory trench to further assess structural roots that may be in the area of the retaining wall. Have the project engineer assess potential impacts of retaining roots on the wall.
- Adjust the plans and specifications to show that the trees will be retained.
- Adjust the construction documents to include the provided tree retention specifications.
- Alert the general public of the tree preservation plan and of all potential outcomes depending on construction impacts.
- Hire a well-qualified arborist to conduct any necessary pruning.

Photographs

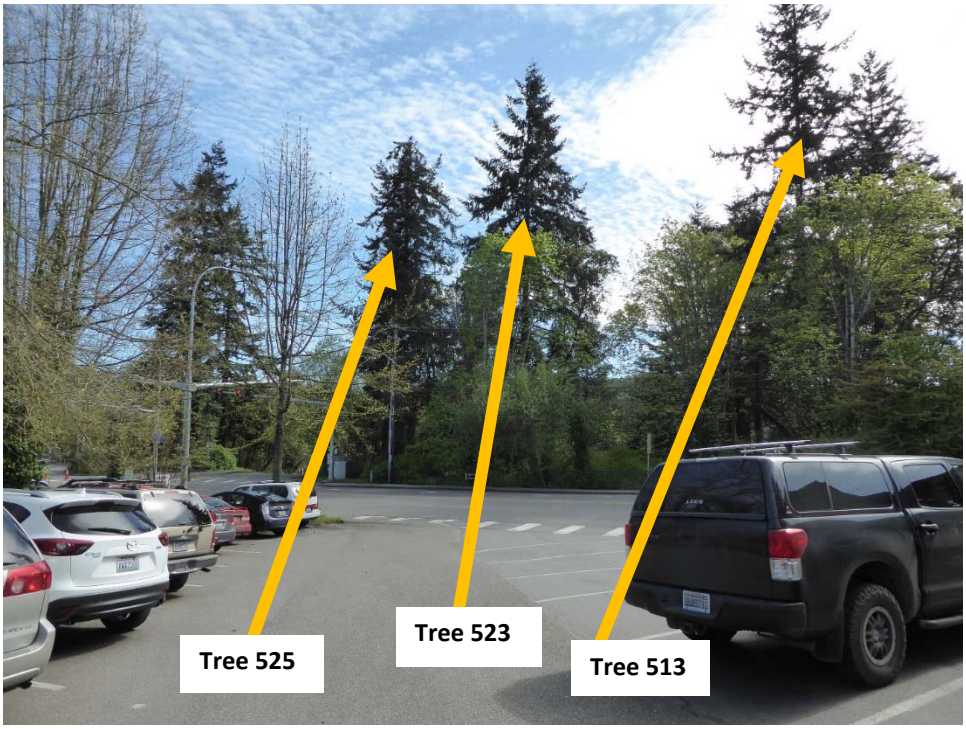

Photo 1. The subject trees looking south.

Photo 2. Base of tree 523 with soil probe fully inserted on wall side of the tree, an indication that there is likely good rooting depth.

Appendix A - Assumptions & Limiting Conditions

1. Consultant assumes that any legal description provided to Consultant is correct and that title to property is good and marketable. Consultant assumes no responsibility for legal matters. Consultant assumes all property appraised or evaluated is free and clear, and is under responsible ownership and competent management.

2. Consultant assumes that the property and its use do not violate applicable codes, ordinances, statutes or regulations.

3. Although Consultant has taken care to obtain all information from reliable sources and to verify the data insofar as possible, Consultant does not guarantee and is not responsible for the accuracy of information provided by others.

4. Client may not require Consultant to testify or attend court by reason of any report unless mutually satisfactory contractual arrangements are made, including payment of an additional fee for such Services as described in the Consulting Arborist Agreement.

5. Unless otherwise required by law, possession of this report does not imply right of publication or use for any purpose by any person other than the person to whom it is addressed, without the prior express written consent of the Consultant.

6. Unless otherwise required by law, no part of this report shall be conveyed by any person, including the Client, the public through advertising, public relations, news, sales or other media without the Consultant‘s prior express written consent.

7. This report and any values expressed herein represent the opinion of the Consultant, and the Consultant’s fee is in no way contingent upon the reporting of a specific value, a stipulated result, the occurrence of a subsequent event or upon any finding to be reported.

8. All photographs included in this report were taken by Tree Solutions Inc. during the documented site visit, unless otherwise noted.

9. Sketches, drawings and photographs in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering or architectural reports or surveys. The reproduction of any information generated by architects, engineers or other consultants and any sketches, drawings or photographs is for the express purpose of coordination and ease of reference only. Inclusion of such information on any drawings or other documents does not constitute a representation by Consultant as to the sufficiency or accuracy of the information.

10. Unless otherwise agreed, (1) information contained in this report covers only the items examined and reflects the condition of the those items at the time of inspection; and (2) the inspection is limited to visual examination of accessible items without dissection, excavation, probing, climbing, or coring. Consultant makes no warranty or guarantee, express or implied, that the problems or deficiencies of the plans or property in question may not arise in the future.

11. Loss or alteration of any part of this Agreement invalidates the entire report.