TO:	Craig Sears, Taylor Development
JOB SITE:	13640 NE 100th St, Redmond, WA 98052
SUBJECT:	Tree Inventory & Arborist Report
DATE:	May 2, 2013; Revised November 12, 2013
PREPARED BY:	Sean Dugan, Registered Consulting Arborist #457, ISA Board Certified Master Arborist PN-5459B & Qualified Tree Risk Assessor
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Contents

Summary

Eighty-five (85) trees were assessed at the above addressed job site. Seventy-three (73) of the trees assessed meet the City's definition of a Significant or Landmark tree; seventeen (17) of these are Landmark trees, fifty-six (56) meet the definition of a healthy Significant tree. Twelve (12) of the trees assessed were found to be in poor health condition, therefore, mitigation is not required following their removal. None of the trees on site present a high risk potential to surrounding targets.

Fifty-three (53) trees will require removal based on proposed site development plans; 13 of these are Landmark trees. Provide the City with an exception request for the removal or impact of any Landmark tree, as well as the removal of greater than the minimum percentage of significant trees that need to be retained. Five significant trees will be removed beyond the 35-percent retention limit. The City requires all removed trees exceeding 35-percent be replaced at a 3:1 ratio, if exception is approved. Eighty-nine (89) new trees will be required to replace the removed Landmark and healthy Significant trees.

Twelve (12) trees will be impacted and eight (8) will be retained. Both impacted and retained trees should have protection measures applied to them before the commencement of site work. Many of these trees will require crown cleaning to remove dead parts in the canopy. Trees on adjacent properties are likely to be preserved with minimal disturbance, if careful construction techniques are implemented. Trees in the right-of-way can be removed for improvements but will need to be replaced as indicated in the Redmond Zoning Code.

Obtain the necessary tree removal permission from the City before beginning site development.

Assignment & Scope of Report

This report outlines the site inspection by Sean Dugan and Haley Galbraith, of Tree Solutions Inc., made on April 22, 2013. We were asked to visit the site and assess all significant trees for the Benjamin Subdivision project. We were asked to review the Redmond Zoning Code (RZC) requirements as they pertain to the project. We were asked to provide a formal report, including the species, size, health, risk assessment, and designation of each tree as it relates to City code. Craig Sears, of Taylor Development, requested these services to acquire information for project planning purposes.

Limits of Assignment

Unless stated otherwise: 1) information contained in this report covers only those trees that were examined and reflects the condition of those trees at the time of inspection; and 2) the inspection is limited to visual examination of the subject trees without dissection, excavation, probing, climbing, or coring unless explicitly specified. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

A hazard tree, or a hazardous component, exists when the sum of the risk factors equals or exceeds a predetermined threshold of risk." The predetermined threshold for risk and the actions required to reduce the risk below that threshold is established by the risk manager.

As a Qualified Tree Risk Assessor, my job is to provide the risk manager, in this case the project manager, with technical information required to make informed decisions. The risk manager must make the decision about how to implement the actions required to reduce risk levels to acceptable levels.

Additional assumptions and limiting conditions can be found in Appendix A.

Methods

We evaluated tree health and structure utilizing visual tree assessment (VTA) methods. The basis behind VTA is the identification of symptoms, which the tree produces in reaction to a weak spot or area of mechanical stress. A tree reacts to mechanical and physiological stresses by growing more vigorously to re-enforce weak areas, while depriving less stressed parts. (Mattheck & Breloer 1994) An understanding of the uniform stress allows us to make informed judgments about the condition of a tree.

All trees on site were tagged with a numbered aluminum tree tag for easy identification.

The diameter of each tree was measured at 54-inches above grade, the diameter at standard height (DSH). We calculated the average of the trunk diameter sizes for multiple trunk trees to obtain a single trunk equivalent diameter. The drip line radius was obtained by measuring the furthest extent of canopy spread in any one direction from the tree. The species, size, health condition, risk potential rating, notes, and recommendations for each tree can be found in the attached Table of Trees.

We used the ISA Tree Risk Assessment method to assign a risk potential rating to the trees. This method provides assessors a structured process, based on good science and arboriculture, to assign recommended thresholds for action for the purpose of informing risk managers. Additional information regarding this method can be found in Appendix B.

Tree protection measures can be found in Appendix C. A site survey showing the proposed development and the tree retention can be found attached to this report.

Observations

The Site

This 115,968-square-foot property is located in a residential zone and is currently under consideration for development. The site currently consists of a shed and a single family structure located centrally on site. The property fronts NE 100th Street in Redmond. There are no critical areas on the site. The topography is flat. Invasive Himalayan blackberries cover the majority of the eastern portion of the site. The extent of the site can be seen on the attached site survey with tree locations. The site is proposed to be developed.

The Trees

Eighty-five (85) trees were tagged and assessed for health and structural conditions. Twelve (12) trees were found to be in poor condition. None of the trees on site present a high level of risk to the surrounding targets.

Seventy-three (73) trees were found to be in fair to good health condition. Seventeen (17) of these meet the City's definition of Landmark, having a DSH of greater than 30-inches. Fifty-six (56) trees meet the City's definition of a healthy Significant tree.

Significant and Landmark tree species included Western red cedar (*Thuja plicata*), Douglas-fir (*Pseudotsuga menziesii*), Bigleaf maple (*Acer macrophyllum)*, Bitter cherry (*Prunus emarginata*), Western hemlock (*Tsuga heterophylla*), Silver birch (*Betula pendula*), Apple (*Malus domestica*), Deodar cedar (*Cedrus deodara*), Black walnut (*Juglans nigra*), Monkey puzzle (*Araucaria araucana*), Giant magnolia (*Magnolia grandiflora*), and Weeping Alaska cedar (*Chamaecyparis nootkatensis 'pendula'*).

The understory vegetation is dominated by invasive Himalayan blackberry and turf. No endangered or threatened species were observed.

Discussion

Retained, Impacted & Removed Trees

The Redmond Zoning Code (RZC) states that the tree protection area shall be a minimum of the drip line plus five additional radial feet added to the furthest extent of the drip line. Trees that are proposed to be retained, removed, or may be impacted, should be shown on a Tree Preservation Plan.

The trees on the adjacent properties are in fair to good health and structure. These trees are unlikely to be compromised during site development, if careful construction practices are implemented that do not over-excavate or encroach into the critical root zone of these trees. Trees located in the ROW that are removed for improvements will need to be replaced at a 1:1 ratio for significant trees and Landmark trees at a 3:1 ratio.

The RZC states that a minimum of 35-percent of all significant trees on site shall be retained on any new development site, along with all Landmark trees, unless an exception has been applied for and granted. If the 35-percent retention level for significant trees is not achieved, each significant tree removed beyond 35-percent must be replaced at a 3:1 ratio.

Table 1 provides a description of the number and percentages of each tree scheduled to be removed, impacted, or retained, based on tree classification and site development schematics.

Tree Inventory - Proposed Action & Brief Definition				
Type of Tree (DSH)	Removal	Impacted	Retained	Total
Landmark (>30”)	13 = 17.8%	3 = 4.1%	1 = 1.4%	17 = 23.3%
Significant (6”- 30”)	40 = 54.8%	9 = 12.3%	7 = 12.5%	56 = 76.7%
Totals	53 = 72.6%	12 = 16.4%	8 = 11.0%	73 = 100%
Replacement Trees	89	0	0	89

Table 1. Numbers are generated based on site conditions, proposed development, and City requirements. Significant trees are to be replaced at a 1:1 ratio; Landmark trees at a 3:1 ratio. Each significant tree removed beyond 35-percent retention must be replaced at a 3:1 ratio.

Replacement Tree Calculations

Landmark trees to be replaced at 3:1 = 13 x 3 = **39 replacement trees**.
Significant trees removed beyond the 35% minimum threshold to be replaced 3:1 = 5 x 3 = **15 replacement trees.**
Significant trees removed to be replaced at 1:1 minus trees to replaced at 3:1 = 53 – 18 = 35 x 1 = **35 replacement trees.**

Replacement Trees

The RZC states the following:

- Replacement trees are to be a minimum of:
  - → Two-and-one-half-inch caliper at breast height for deciduous trees
  - → Six feet in height for evergreen trees
- The Administrator may consider smaller-sized replacement trees if the applicant can demonstrate that smaller trees are more suited to the species, the site conditions, and the purposes of this section, and that such trees will be planted in sufficient quantities to meet the intent of this section.
- Replacement trees shall be primarily native species in order to restore and enhance the site as nearly as practicable to its pre-development character.
- The condition of replacement trees shall meet or exceed current American Nursery and Landscape Association or equivalent organization's standards for nursery stock.
- Installation of required replacement trees shall be in accordance with best management practices for landscaping which ensure the tree's long-term health and survival.
- All required tree replacement and other required mitigation shall be bonded or completed prior to issuance of a building permit.

Recommendations

- Provide the City with a written exception request for the removal of 13, and impacts to three Landmark trees on site.
- Provide the City with a written exception request for the removal of five trees greater than 35-percent minimum threshold for significant trees.
- Obtain the necessary tree removal permission from the City before developing the site development.

Glossary

crown: the aboveground portions of a tree (Lilly 2001)
DSH: diameter at standard height; the diameter of the trunk measured 54-inches (4.5-feet) above grade (Matheny *et al.* 1998)
ISA: International Society of Arboriculture
Landmark tree: A healthy tree with a DSH greater than 30-inches. (RZC)
significant size: a tree measuring 6" DSH or greater (RZC)
target: person, object, or structure that could be injured or damaged in the event of tree or branch failure (Lilly 2001)

References

Lilly, Sharon. Arborists' Certification Study Guide. Champaign, IL: The International Society of Arboriculture, 2001.

Matheny, Nelda and James R. Clark. Trees and Development: A Technical Guide to Preservation of Trees During Land Development. Champaign, IL: International Society of Arboriculture, 1998.

Mattheck, Claus and Helge Breloer, The Body Language of Trees.: A Handbook for Failure Analysis. London: HMSO, 1994.

Redmond Zoning Code. http://www.codepublishing.com/WA/redmond.html (Accessed April 23, 2013)

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. 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.

9. 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.

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

Appendix B - Tree Risk Assessor Method

The International Society of Arboriculture (ISA) Tree Risk Assessment method is adapted from the United States Forest Service risk assessment approach. This method provides assessors a structured process, based on good science and arboriculture, to assign recommended thresholds for action for the purpose of informing risk managers.

The method uses a 12 point system, divided into three categories, to rate the potential risk from a tree and its parts.

P **Probability of Failure** is rated at 1-5 points based on the judgment of the assessor.

1 point = Low risk – The defect is not likely to lead to imminent failure and no further action is required. In many cases these defects might not even be recorded.

2 points = Moderate risk – One or more defects that are well established but would typically not lead to failure for several years. Corrective action might be useful to prevent future problems but only if time and money are available. Not the highest priority for action, these are the "retain and monitor" situations that can be used to inform budget and work schedules for subsequent years.

3 points = Moderately High risk – One or more defects areas well established but not yet deemed to be a high priority issue. Additional testing may be required or, the assessor may feel the problems are not serious enough to warrant immediate action, but do warrant placing the tree on a list of trees to be inspected more regularly. These are Retain and Monitor trees.

4 points = High risk – The defect is serious and imminent failure is likely and corrective action is required immediately. These cases require treatment within the next few days or weeks.

5 points = Extreme - The tree or component part is already failing. An emergency situation where treatment is required today.

S **Size of the Defective Part(s)** is rated 1-3 with 1 point for branches or stems up to 10cm (4 inches) in diameter, 2 points for branches or stems between 10-50cm (4-20 inches) in diameter and, 3 points for branches or stems over 50cm (20 inches) in diameter.

T **Target Area** is rated 1-4 based on the following target descriptions.

1= Low – Sites rated at one point are very rarely used for any long period of time, and people passing through the area (regardless of how they travel) do not spend a lot of time within the striking range of the tree within any one day. There are no valuable buildings or other facilities within striking range.

2= Moderate – Valuable buildings are at the edge of striking distance, so they would not be seriously damaged even if the tree did fall down. The site has people within striking range occasionally, meaning less than 50% of the time span in any one day, week , or month, and do not stay within striking range for very long.

3= Moderately High – The site has valuable buildings within striking range. People are within striking range more than 50% of the time span in any one day, week, or month, and their exposure time can be more than just passing by.

4= High – The highest rated targets have a building within striking range frequently used by people, often for longer periods of time, or high volumes of people coming and going within striking range

The Overall Risk Rating and Action Thresholds

Risk Rating	Risk Category	Interpretation & Implications
3	Low 1	*Insignificant- no concern at all.*
4	Low 2	*Insignificant – very minor issues*
5	Low 3	*Insignificant – minor issues not of concern for many years yet*
6	Moderate 1	*Some issues but nothing that is likely to cause any problems for another 10 years or more*
7	Moderate 2	*Well defined issues – retain and monitor. Not expected to be a problem for at least another 5 – 10 years*
8	Moderate 3	*Well-defined issues – retain and monitor. Not expected to be a problem for at least another 1 – 5 years.*
9	High 1	*The assessed issues have now become very clear. The tree can still reasonable be retained as it is not likely to fall apart right away, but it must now be monitored annually.*
10	High 2	*The assessed issues have now become very clear. The probability of failure is now getting serious, or the target rating and/or site context have changed such that mitigation measures should now be on a schedule with a clearly defined timeline for action.*
11	High 3	*The tree, or a part of it has reached a stage where it could fail at any time. Action to mitigate the risk is required within weeks rather than months.*
12	Extreme	*This tree, or part of it, is in the process of failing. Immediate action is required. All other less significant tree work should be suspended, and roads or work areas should be closed off until the risk issues have been mitigated.*

Options for Mitigation of Risk Trees include:

Remove the risk altogether if possible by cutting off one or more branches, removing dead wood, or possibly removing the entire tree. Extreme risk situations should be closed off until the risk is abated.

Modify the risk of failure probability. In some cases it may be possible to reduce the probability of failure by adding mechanical support in the form of cables braces or props.

Modify the risk rating by moving the target. Risk ratings can sometimes be lowered by moving the target so that there is a much lower probability of the defective part striking anything. Moving the target should generally be seen as an interim measure.

Retain and monitor. This approach is used where some defects have been noted but they are not yet serious and the present risk level is only moderate.

Reference:

Dunster & Associates Environmental Consultants Ltd. Assessing Trees in Urban Areas and the Urban-Rural Interface, US Release 1.0. Silverton: Pacific Northwest Chapter ISA, 2006

Appendix C - Tree Protection Measures

1. This specification should be followed for all trees that are in close proximity to any clearing and grading limits.
2. Tree Protection Area (TPA) chain link fencing or approved equal should be installed five feet out from drip line to protect Critical Root Zones (CRZ) of trees that are to be preserved. Optimal CRZ areas should be calculated at 1 foot radius for every 1 inch of tree diameter. Work required for removal of unwanted vegetation within the CRZ areas will be hand work only, NO HEAVY EQUIPMENT. TPA fencing shall be securely anchored. All fencing is subject to approval by the City administrator. TPA fencing shall not be moved without authorization from the site supervisor. All fencing is to be left in place until the completion of the project.
3. Within the TPA areas no parking, materials storage, dumping, or burning is allowed.
4. When removing trees outside of the TPA determined to be unacceptable for retention, use methods such as directional felling to avoid damage to trees and other valuable vegetation that is being retained. Small trees and other native vegetation in these areas should be carefully preserved.
5. Tree stumps that are within a TPA or immediately adjacent to the CRZ of a preserved tree or other vegetation shall be left intact or removed by grinding.
6. Any root greater than 1.5" diameter that is encountered shall be carefully cut with a sharp tool. A Certified Arborist should be on site to supervise pruning. Roots cut shall be immediately covered with soil or mulch and kept moist. Scarps in the slope should be covered with burlap to reduce evaporation from the soil.
7. Where access for machinery or any vehicle is required within the CRZ or TPA of any preserved tree, the soil should be protected from compaction. Acceptable methods include 18" of wood chips or hog fuel, plywood, or steel sheets.
8. Landscaping specified within the TPA areas shall be designed to limit disturbance of surface soils and preserved vegetation. No root pruning should be permitted. New plants added in these areas should be of the smallest size possible to minimize disturbance.
9. Where backfill is required within a CRZ or TPA area, a consulting arborist should determine the amount and type of fill material to be used.
10. Any trees adjacent to high traffic areas or building envelopes shall be pruned by the owner. The consulting arborist will provide a recommendation using ANSI A30 American Standards for Pruning to remove dead wood, provide clearance, and cabling or bracing. Use of an International Society of Arboriculture Certified Arborist to perform the recommended work is strongly recommended.
11. Supplemental irrigation for all protected trees is required during the summer months or prolonged periods of dry weather. **THIS IS MOST IMPORTANT FOR SUCESSFUL TREE RETENTION.**
12. The appropriate use of soil aeration and soil amendments in tree protection and planting area shall be determined by a certified arborist as requested.
13. Monitoring of all trees, especially those exposed to new environmental conditions such as exposure to wind, sun, or deep shade, should be monitored annually to check for adverse changes to the tree health or stability.
14. Application of a slow release 3-1-1 or 10-6-4 fertilizer to enhance vigor of stressed trees.

Protection measures are adapted from 20D.80.20-100 of the Redmond Municipal Code

Attachments:

Table of Trees
Site Survey