



October 20, 2021

Project: Pre-construction assessment for lot re-development at 7208 N Mercer Way, Mercer Island, WA. Parcel number 5315100025.

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Objectives: Evaluate health of existing trees and establish criteria for the preservation of those to be retained.

Description: The existing house on the subject property was built in 1951 on a two lot parcel in the Roanoke neighborhood at the north end of Mercer Island (Figure 1). It was heavily renovated in 1978 and few changes have occurred on the property since that time. The current owners purchased the property in March of 2021 from a family who had owned the home since 1993.

Only one of the nearby properties showed significant changes over the last twenty years. The 7214 parcel which runs along the SE border line of the subject was sold to a new owner in the fall of 2011. They demolished the old house in 2012 and built a new one in nearly the same location (Figures 2 and 3). During this process several large evergreens were removed to allow for major conformational changes to the driveway (Figure 4). Several other large trees standing between the new driveway and the subject property had to have had their root systems significantly disturbed based on their sizes and location.

The owners of the 7208 property began working with RKK Construction in the summer of 2021 on a plan to tear down the existing house and replace it with another (Figures 5 and 6). Knowing the Mercer Island would require a tree protection plan RKK reached out to Tree Harmony who in turn contacted Superior NW Enterprises. The request was to assess the significant trees present on the property, along with any within 20' of the borders, as to their health, stability, overall suitability for retention, and potential for construction impact. Mitigation and preservation requirements for those to be retained would also be addressed.

The following itemized tree list begins at the front left side of the current driveway coming off of North Mercer Way. The trees were marked with 1" circular orange tags and their numerical designations are reflected in Figure 7. Diameters were measured at the standard height of 54" above grade (DSH) during the October 2021 site visit. The majority of the ones standing in neighboring yards were conservatively estimated to the tree's favor. Most of those were not tagged. Heights were estimated. Spreads were measured as possible and estimated otherwise.

1. Douglas fir (*Pseudotsuga menziesii*) 20" DSH, 75' tall standing 12' NNW of the existing driveway, 12' NE of the white line of North Mercer, and 4.5' outside the existing wooden fence. Inside the fence there is a landscape timber retaining wall that is 7' from the fence at the closest point and 10' back at the furthest (Figure 8). A drainage ditch runs along North Mercer 3' below the base of the tree (Figure 9). The fir exhibits abundant new growth and good color. Its canopy comes down to within 10' of grade and is fairly balanced. Ivy is growing up the trunk. The tree was previously tagged as 50207.

2. Douglas fir 16" DSH, 70' tall standing 11' NNW of #1, 11' off the white line, and 6' outside the fence. Tree is in good health with slightly less new growth than #1 and the majority of its canopy extends to the west. There are some overextended branches reaching past the white line (Figure 10). Ivy is climbing up this tree also. It was previously tagged as 50205.

3. Pacific madrone (*Arbutus menziesii*) 7" DSH, 25' tall, 5 foot radial spread standing 7' N of the #2 fir, 2' outside the fence, and 14' back from the white line. Tree is in excellent condition with abundant new growth and good color. It is Exceptional by definition.

Various shrubs follow the fenceline around north of the madrone and onto the private road that serves the 7200-7208 properties. Hollies mostly with a large Andromeda, a large viburnum, and a large cotoneaster mixed in. Blackberry and ivy are trailing through them all. None of these overgrown shrubs reach 'significance' in size.

4. Mountain hemlock (*Tsuga mertensiana*) 7.5" DSH, 20' tall in good condition with ample new growth, rich color, and limited needle loss. The canopy is mostly in the NW quadrant due to pressure from the cotoneaster near its base and other trees in the yard proper. Tree stands 32" NNW of the corner post for the fence and 6' SE the fire hydrant at the corner. There are large landscape stones anchoring the landscape at this point. The two largest are 4' and 5' WNW of the tree (Figure 11).

5. A large English laurel (*Prunus laurocerasus*) hedge runs down the NW side of the property outside the fence line. It has been pruned to hold about 6' wide and goes to 16' tall. Hedge is in fair condition with decent new growth and color. It has a gap for a yard gate and then runs to the edge of the main driveway to the detached garage.

6. Italian Prune (*Prunus domestica*) 6" and 9.5" DSH, bifurcates at 36", it has been topped in the 14' range, spreads 8' on center and has been pruned to maintain these dimensions. Appears to be in below average condition. Tree stands 14' WNW of what is technically the west corner of existing house. The patio area is 54" SSE of the base of the tree. The stones for the water feature start at 6.5' N of the base of the tree (Figure 12).

7. Grand fir (*Abies grandis*) 8" DSH, 12' tall, standing 8" off of the brick patio on the northwest side of the existing house, 6.5' N of the west house corner, and there's a large stone at its base. Tree has needle blight and stunted growth. There is no viable material in the top 18" of the tree.

8. Mountain hemlock 10" DSH, 25' tall, standing 68" NNE of #7 and at the north end of the landscape stone. There are several other large stones around its base. It bifurcates at 9.5' and has an active fracture plane running up the SE face to where the stems fully separate two feet higher (Figure 13). The two stems spiral as they rise. Tree exhibits good health. The water feature starts 5' N of the tree, runs 10' SW of it, and extends more than 25' out to the northeast. Tree has a previous tag labeled 50614.

9. Serbian Spruce (*Picea omorika*) 5.5" DSH, 22' tall standing between the fence and the north side of the water feature. It is in good condition.

There is a 3.5" DSH Mountain hemlock standing 6' E of the #9 spruce that is in good condition. Several other mature landscape shrubs stand around the water feature including Mugo pines, a Bird's Nest hemlock, and a smaller Laceleaf Maple varietal (Figure 14).

10. Crimson Queen Laceleaf (*Acer palmatum dissectum* 'Crimson Queen') maple standing 15' N of what is technically the north corner of the existing house. It is sandwiched between the brick patio and the NE end of the water feature and there are large stones around its base that seem to be set into the side of the pond. The tree is 5' tall, has a 6' radial spread, and comes off of an 11" caliper base.

There is a Weeping Blue Atlas (*Cedrus atlantica glauca* 'Pendula') growing in the inside corner of one of the jogs on the north side of the house (Figure 15). There are a number of other ornamental shrubs in the yard like Weeping Spruce, viburnums, and small pines but nothing that reaches the size of significance.

11. Apple tree (*Malus domestica spp*) standing inside of a rail road tie planting bed near the center of the northeast end of the parcel, 17' SW of the property line, and 9' SE of the end of the parking area (Figure 16). Tree is 5" and 7" DSH, bifurcates at 49", reaches 14' tall on epicormic shoots, and has a 9' radial spread. Fair health, cluttered canopy, does not appear to have been pruned regularly for anything save size.

12. Fruiting cherry (*Prunus avium*) bifurcates at 40" mark fully separating at 54" into two main stems the larger of which instantly separates two inches higher. The three stems measured 10", 9", and 10.5" in diameter. Tree reaches 20' foot including the 6' epicormic sprouts. It stands 18' SE of the #11, 12' SW of the property line, and about 16' NW of southeast line. The cherry is in weak condition with Black Rot canker present. The majority of the viable canopy consists of epicormic growth. Previously tagged as 50365.

13. Noble fir roughly 18" DSH, 45' tall standing 15' SE of the SE property line at the SW end of the 7214 garage. Fair condition.

14. English Laurel hedge starts in the lower yard about 40' NE of the top of the stairs leading to the back door of the house and runs along the SE property line. Sheared to 8' tall at the house end and close to 16' tall at the far end. The client's side is sheared tightly across the face. The neighboring side has not been pruned and reaches 20' wide.

15. Noble fir 14" DSH, 45' tall with its entire canopy above the halfway point. Tree stands 11' SE of what is technically the SE corner of the existing house. It seems to stand fully on the 7214 property. The tree is in fair condition with average new growth and color. The top of the tree is amorphous and may have been damaged.

16. Douglas fir 30-34" DSH range, 100 tall standing 36' SE of the foundation for the existing house and roughly 16 SW of the SE corner. Tree appears to be in good condition. Not tagged. Exceptional tree by definition.

17. Bigleaf maple about 23" DSH, 65' tall, with a 26' NW spread, a 24' NE spread, and there are scaffolds to the SE that exceed 30' in length. Tree stands 20' SE of the foundation line of the house and nearly in line with the #16 fir.

18. Dual stem fir with an atrophied subordinate spar sandwiched between the two primary trunks (Figure 17). The larger trunk measured 30.5" DSH, the smaller 25" DSH. The larger side reaches near 90' tall while the smaller tops out around 75' high. The large stem has a structural fault near the 50-foot level. A large caliper lateral arm grows off to the NW quadrant and extends over the existing home. It comes out flat and then turns vertical about four feet out from the column. The main stem above this point is offset to the SE comes back into vertical about 9' further up the column. Tree stands 14' on center southeast of the foundation existing house. It is 26' NE of SE corner of the existing house. There is a concrete walkway along the SE side of the house that is 8' back from the base of the tree.

Methods: Tree assessment is both an art and a science. To properly perform, an arborist must have an extensive background in biology, tree mechanics, and tree structure that is equal parts academic and field knowledge. It takes years of study to recognize and correctly diagnose the subtle signs trees exhibit before their failure, whether it be partial or total. The process begins with a visual inspection (visual tree assessment, VTA) which is followed up as necessary with soundings, core testing, and/or other detection means. Each tree is examined and evaluated according to several factors including species type, size, vigor, injuries present, root and grade disturbance, deadwood, location and extent of decay, stem taper, exposure, and targets that are at risk.

Analysis: There are two levels of impact at this site, primary and secondary. The primary zone includes the environs immediately within the boundaries of the proposed new construction and the regions within ten feet of those boundaries. The #3, #4, and #6-10 trees are standing in this zone. The #3 madrone is to be retained and will be discussed further below. The others will be removed at time of demolition. The #5 hedge may be retained close to as is or it may be pruned back significantly.

The secondary impact zone includes the trees which have root systems extending within the construction impact area. This region, the Critical Root Zone (CRZ), is a radial area extending out from the tree a distance equal to one foot per inch of diameter. For example, the #2 fir, with a 16" DSH, has a theoretical 16' radial CRZ.

Typically intrusion within the Critical Root Zone is strongly discouraged by the tree care industry. However trenching type incursion, that is excavation that will occur along only one sector of a tree's CRZ, can reach significantly into the root growth area without having a detrimental long term effect. What does have to be absolutely protected is a tree's Structural Root Plate (SRP). This radial area is again related to the diameter inches of the tree in question but not quite in a direct proportion as in the CRZ. Figure 18 below illustrates the relationship.

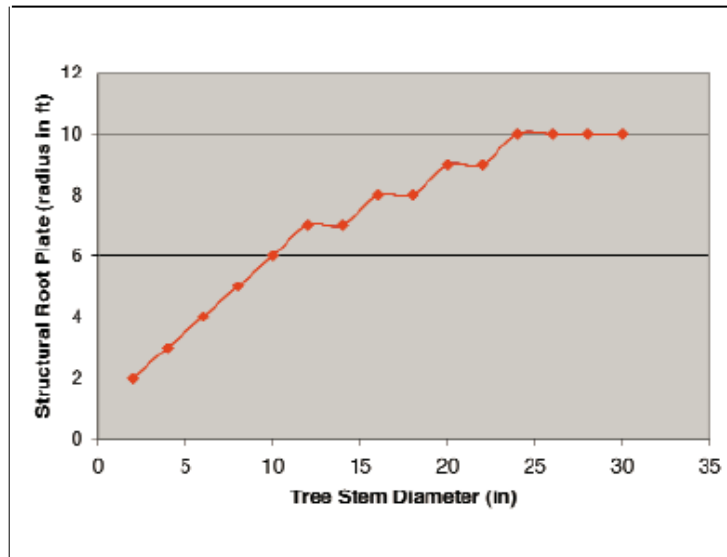


Figure 18. Size of the Structural Root Plate in relation to tree stem diameter. Note that the SRP levels off at 10' for any tree over 24" in diameter. (Coder, 1996)

In the case of the #2 fir mentioned above the plan shows a hammer head turn around point for the driveway coming to within 12' the tree. From the chart a 16" DSH tree has an 8' SRP. Because the proximity of the ditch at its base may have hampered SRP formation on that side the fir may have compensated by extending structural roots in to the yard. But even with a 25% adjustment factor the proposed new driveway will be significantly outside the fir's SRP and not interfere with the structural stability of the tree.

The other aspect to take into account is that the landscape timber retaining wall has been acting as a root barricade for this tree. The end of the turn-around point comes quite close if not exactly in line with where the retaining wall is currently. There should be no roots in the area of the driveway to disturb.

The #3 madrone has close to a 4' radial SRP. It is difficult to know with absolute certainty for this tree but it appears from the plans that no construction disturbance will be close than 5' to tree.

No other trees stand in areas in which they could have their SRPs intruded upon.

The chart shown in Figure 19 below is used to determine what percentage of a tree's Critical Root Area (CRA) will be affected by trenching type incursion. In general trees can sustain losses of up to 30% of the overall area within their CRZ without having long term detrimental results.

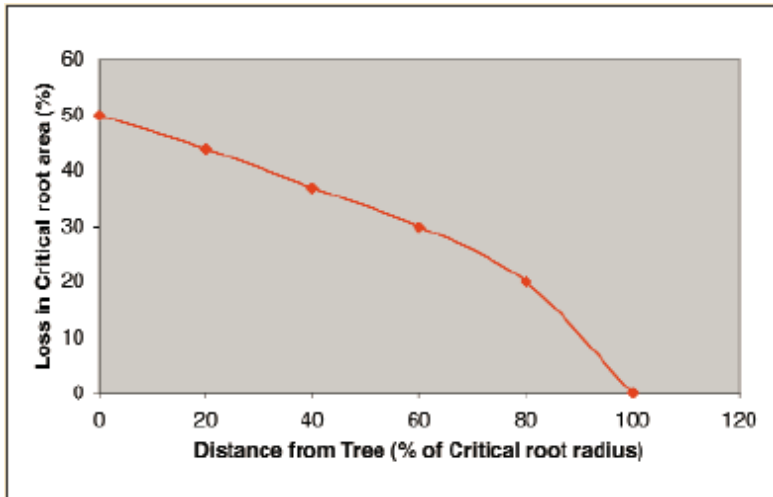


Figure 19. Chart giving the loss in critical root area as a function of the radial distance to the CRZ disturbance. (Coder 1996)

Using the #2 fir as the example, with the proposed new driveway hammerhead 12' from the tree's base and it having a 16" DSH, if the cut for the driveway ran all the way across the fir's rooting space it would result in impact at a linear distance equal to 75% of the tree's CRZ (12'/16'). The chart shows that this could equate to a 22% loss of the fir's Critical Root Area. As the timber frame retaining wall is quite close to the area for the driveway it is more likely than not that the #2 tree will realistically lose less than 15% of its CRA.

The #3 madrone stands close to 7' from the end of the hammerhead as measured on the plan. The timber retaining wall nearly fills the space the hammerhead will occupy. There is a 36 square foot notch of space in the corner of the existing retaining wall that will likely get cut out to create the space required to build the driveway. This area overlaps slightly with the madrone's CRZ and the tree should lose no more than 5% of its CRA.

The existing home stands nearly on the SE property line. The new home will be set at least 6' off the line according to the plans. This means that the #15 and #18 trees will gain a significant amount of rooting space rather than lose any. Roughly 450 square feet will be made available in the neighborhood of the #18 tree. At least 240 square feet will be open near the #15 fir.

Even though the #16 and #17 stand fairly distant from the construction zone their sizes imply that they could have roots extending into the space vacated by demolishing the existing one.

The #1 fir could end up with an additional 300 square feet of rooting space when the existing driveway off North Mercer Way is extracted.

No other trees stand close enough to the proposed site changes to be affected by the project.

Discussion: The demolition of the existing home has the potential to create root disturbance in the CRZ of the #15 and #18 trees. The section of the home near these trees should be cleared under the purview of a Certified Arborist. As should the removal of the North Mercer driveway.

Ideally the concrete path currently running along the SE side of the house would be extracted when the house is torn down. This would create additional rooting space for all four of the trees standing on the neighbor's property.

It will be vitally important to use care when removing the SE side of the existing house. There are likely roots from the #18 fir running quite close to the foundation in this area.

Ideally protection fencing will be set up prior to the demolition. On the SW side the fence should start at the south corner of the property, enclose the existing driveway trail inside the wooden fence following the contour of retaining wall and then cutting back to the wood fence 8' past the #3 madrone.

On the SE side the fencing should follow the north side of the walk path and tie into the #14 hedge.

The #11 and #12 trees can be simply circled at the perimeter of their canopies. It doesn't look like anything will be happening around these two trees.

Usually a layer of arbormulch 6-8" deep is laid down to 3' past the driplines for all the retained trees. In this case it makes sense to bring in mulch to cover the area exposed by removing the SW side driveway but that is about it. The neighboring trees stand in an area with undisturbed duff and will be fine. A mulch bed could be laid down along the SE border once the existing home is removed. If nothing else it will help with mud.

The ivy needs to be pulled off the bases of the #1-3 trees. They were clear of it a couple of times in the past so it should not be too difficult.

The overextended branches on the #2 fir should be pruned back lightly to help prevent breakage.

Ideally, and with the neighbor's permission, the big spar on the #18 tree would be pruned back to reduce its likelihood of cracking off also. A climbing arborist will have to evaluate the spars strength of attachment and reduce the weight on the scaffold accordingly. At minimum 15% of the end weight should be pruned off the spar.

The two fruit trees have been neglected and should be pruned annually to promote proper growth response and structure.

A number of the trees and plants at the site are worth salvaging, namely the Blue Atlas Cedar, the smaller Laceleaf maple, and some of the other small evergreens.

Waiver of Liability Because the science of tree assessment is constantly broadening its understanding, it cannot be said to be an exact science. Every tree is different and performing tree risk assessment is a continual learning process. Many variables beyond the control, or immediate knowledge, of the arborist involved may adversely affect a tree and cause its premature failure. Internal cracks and faults, undetectable root rot, unexposed construction damage, interior decay, and even nutrient deficiencies can be debilitating factors. Changes in circumstance and condition can also lead to a tree's rapid deterioration and resulting instability. All trees have a risk of failure. As they increase in stature and mass their risk of breakdown also increases, eventual failure is inevitable.

While every effort has been taken to provide the most thorough and accurate snapshot of the trees' health, it is just that, a snapshot, a frozen moment in time. These findings do not guarantee future safety nor are they predictions of imminent events. It is the responsibility of the property owner to adequately care for the tree(s) in question by utilizing the proper professionals and to schedule future assessments in a timely fashion.

This report and all attachments, enclosures, and references, are confidential and are for the use of the Scott Sinclair, Tree Harmony Arborists, Jason Koehler, RKK Construction, the home owners and their representatives only. It may not be reproduced, used in any way, or disseminated in any form without the prior consent of the clients concerned.

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ISA Certified Arborist
Qualified Tree Risk Assessor
#PN-5847A



Figure 1. Aerial view of the subject and surrounding properties from 2019.

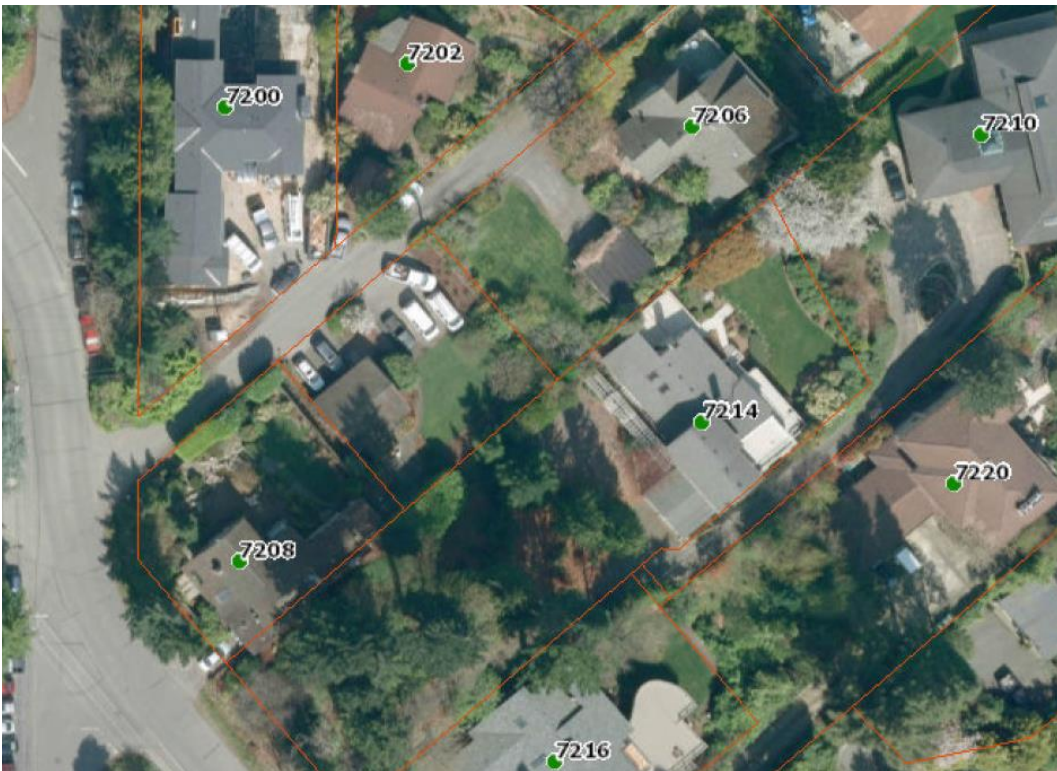


Figure 2. Aerial photo circa 2012 showing the layout prior to the 7214 rebuild.



Figure 3. Aerial photo circa 2013 showing the large evergreens missing in the path of the new driveway for the 7214 home.



Figure 4. Aerial photo circa 2015 showing the final layout of the 7214 home and driveway.

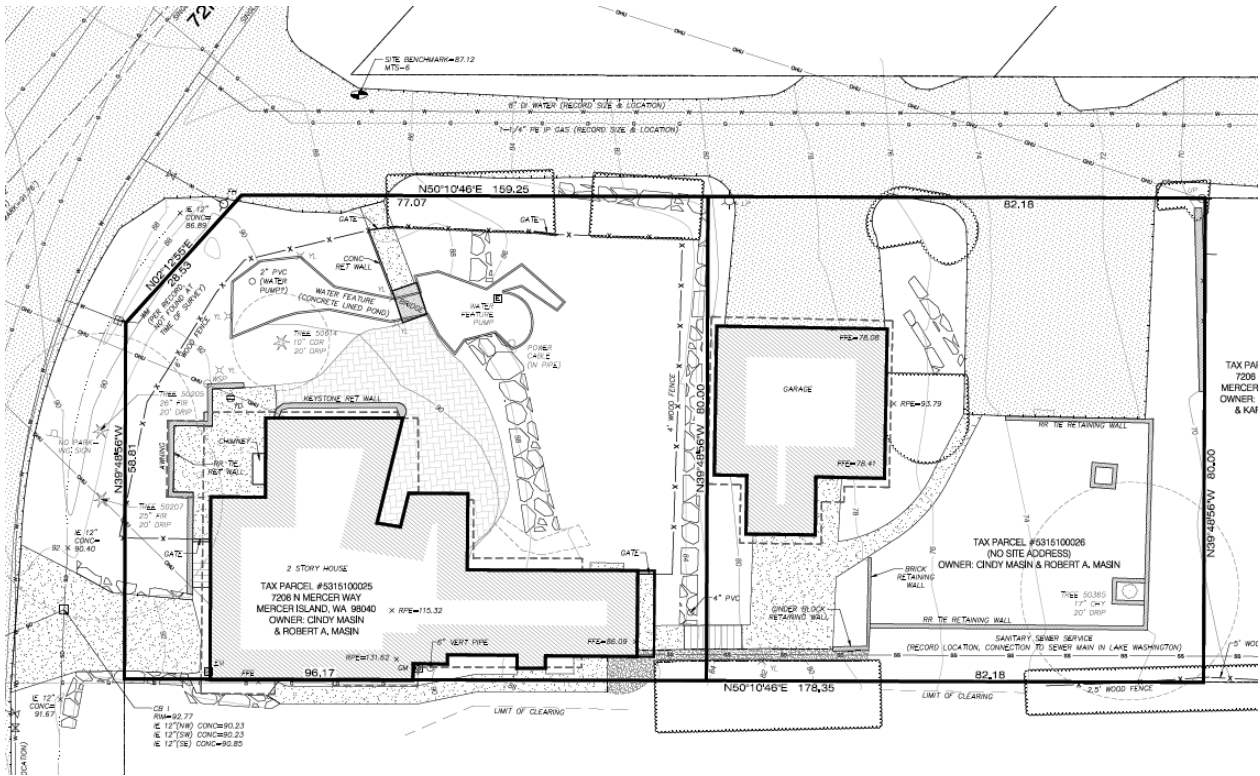


Figure 5. Excerpt from the survey showing the current layout of the subject property. Note how the house is set right on the property line.

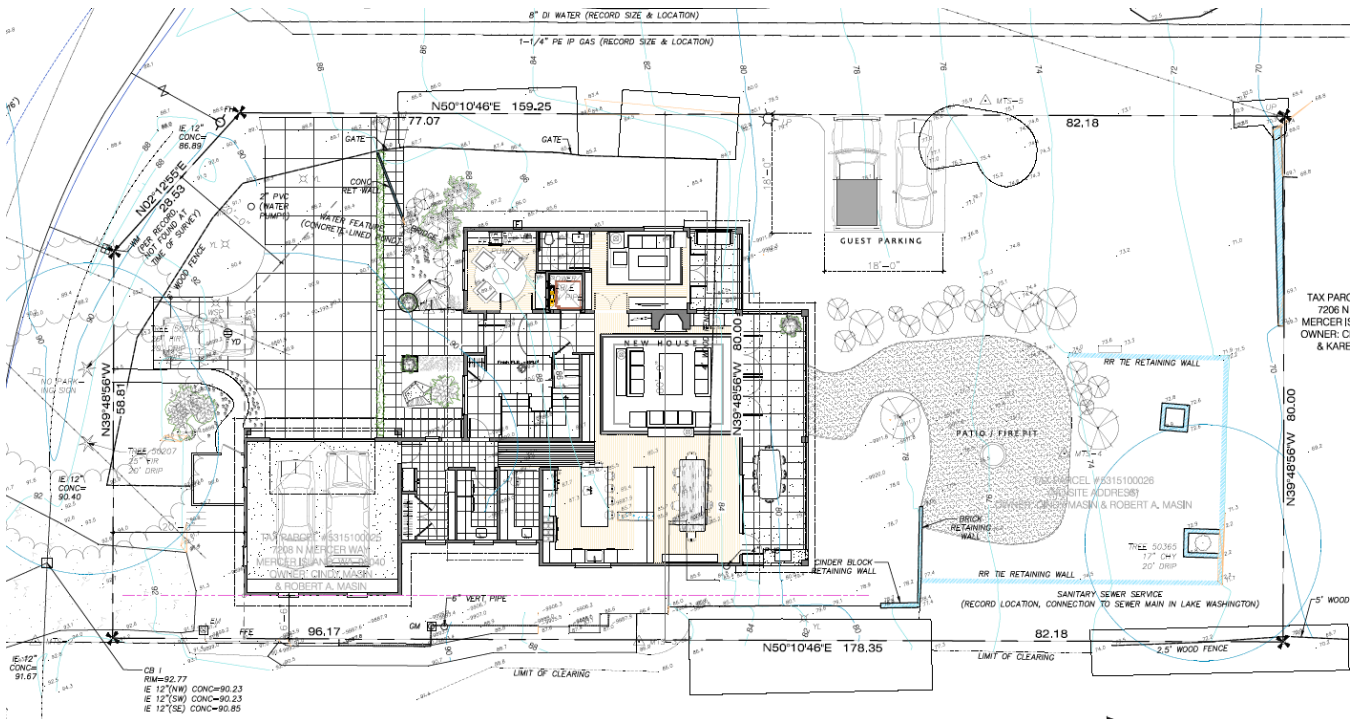


Figure 6. Excerpt from the proposed plan set showing the layout of the new house and driveway. Note the hammerhead extending to the left of the image. The foundation for the house is set at least 6' off the line now creating more rooting space for the large trees on the south side.



Figure 7. Aerial photo circa 2019 showing the approximate locations of the trees noted in the study (white numerals).



Figure 8. Looking at the landscape timber wall inside the fence.



Figure 9. Looking northwest along the ditch running below the #1 and #2 trees. The base of the #1 is just visible (arrow)



Figure 10. Looking up into the canopy of the #2 fir showing the overextended branches.



Figure 11. Base of the #4 Mountain hemlock behind the hydrant. Note the large stones.



Figure 12. Placement of the #6 plum between the retaining wall, fence and stones for the water feature. This is the area where the hammerhead will be placed.



Figure 13. Looking up at the fracture plane in the #8 Mountain hemlock.



Figure 14. Looking northwest across the courtyard and water feature. The #8 tree is at the left of the image and the #9 spruce is rear center.



Figure 15. The Weeping Blue Atlas cedar in the corner of the existing house. This tree is worth trying to salvage.



Figure 16. Showing the location of the #11 apple. Note the landscape timbers framing the planter box. The tree has outgrown this space and the timbers should be removed and a larger area created for the tree.



Figure 17. Looking at the base of the #18 fir showing the atrophied spar squeezed between the larger two trunks.