Superior NW Enterprises

August 18, 2021

Project: Pre-construction assessment for lot re-development at 7845 SE 62nd Street, Mercer Island, WA. Parcel number 4094800130.

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

Description: The present house was built in 1970 and the semi-detached garage in 1971. The McConnell family took possession of the property in spring of 2007. They made limited changes to the landscaping and few if any to the hardscaping. The landscape upgrades included a garden patch area in the SE corner of the property with associated walking paths. The project appears to have been started around 2012 and was complete by 2013 (Figures 1-3).

Small stone retaining walls were laid down north to south by a previous owner in order to create planting beds. The western (lower) wall starts at the south fence where it is 16" high, runs at least 25' getting taller as it moves north, and ends at 30" high where it intersects with the timber frame staircase leading to the upper garden area. The second (upper) stone wall is 11-12' E of the first, starts out a single stone high at the fence (Figure 4), increases in height as it moves north to about 24" tall, and then wraps to the southeast of the existing garden shed where it is 26 in tall as shown in Figure 5.

The tiny garden shed is set at an angle such that its south corner is 27' N of the south fence. The end wall moves away to the northeast from the corner and the side wall moves off to the northwest. The shed is set on pier blocks slightly above the soil line. Stones from the end of the upper wall are set around the south end of the shed. An offshoot line of larger stones are used as a border at the north end of the flattened garden space and curve to the east stopping just short of the top of the steps.

The garden beds between and below the stone walls were renovated during the landscape project but the stone walls were left intact. The area above the upper stone wall was leveled so that raised garden beds could be set up in the corner (Figure 6).

Recently the McConnells have been working with Heliotrope Architects to design an accessory unit for a spa and workout space. The small building will be set in the SE corner of the yard and its footprint will overlay the existing garden beds (Figure 7). Because there are several large evergreen trees standing around the space the architects contacted Superior NW Enterprises and asked for a formal assessment of the trees. The report was to include tree health, stability, suitability for retention, degree of construction impact, and means of mitigation.

A separate report directly addressing the risk components present in the site trees was requested by the home owner and agreed to by the arborist.

Site visits were made near the end of July 2021. Seven trees were noted to review for construction impact concerns. The following itemized tree list begins in the center of the south side of the 7845 parcel and runs roughly counter-clockwise. The numerical designations for the trees are reflected in Figures 8 and 9. Diameters were measured at the standard height of 54" above grade (DSH) and caliper measurements were made at 6" above grade. Heights were estimated.

1. Douglas fir (*Pseudotsuga menziesii*) measured at the mid slope average level and found to be 35.5" DSH. Bark is rather heavy low on the column and the more realistic diameter is probably closer to 32 inches. Tree goes to 80' tall. The canopy is above the halfway point, rather dense, and exhibits abundant new growth and good color as shown in Figure 10. The top of the tree has a rather flattened aspect and may have broken out or the tree might have been topped. Tree stands 9' N of the fence, 13' W of the lower stone retaining wall. This is an Exceptional tree.

2. Western Red Cedar (*Thuja plicata*) 40" DSH, 75' tall, stands in the SE corner of the yard 6' W of the east fence, 7' N of the south fence, and 18' E of the upper stone retaining wall (Figure 11). The yards on the other sides of the fences have mulch type coverings rather than lawns for at least 18' in either direction and little by way of contour changes. Tree exhibits good new growth and color, canopy comes down to within 14' of the ground. There is a low limb on the north face that is trying to curl vertical to form a subordinate spar. This is an Exceptional tree.

3. Sequoia (*Sequoia sempervirens*) 21.5" DSH, 45' tall standing 7' E of the lower wall, 4' NW the upper wall as it turns to the east, 6.5' S of the entry stairs, 5.5' SW of the garden shed, and 25' N of the south fence line. Tree is in good condition with a low canopy coming down to within 6' of the ground. Abundant new growth and decent color, canopy is a little one-sided to the southwest due to crowding.

4. Western Red Cedar 13.5" DSH, 40' tall standing at the end / edge of the upper stonewall and 12" off of the east corner of the garden shed (Figure 12). The secondary set of stones leading from the upper wall are 32" S of the base of the cedar. It exhibits average color and new growth. Its canopy comes down to 8' above grade and is stretching out a little far in each direction trying to find light from underneath the larger trees.

5. Douglas fir standing 34' N of the south fence line, 11' W of the east fence. The stair path curves around its base within 16" and slowly expands that distance (Figure 13). The large stones at the end of the path are just 38" to its south. Tree exhibits an abnormal basal morphology being narrow east to west and much wider north to south. It has two larger fungal bodies; one at 6' level and one at 8' (Figure 14), and then some smaller ones further up the stem which could not be picked up in a photo. Had a 22.5" DSH and is in the neighborhood of 95' tall. Canopy starts near the 40' level and exhibits average new growth and color.

6. Douglas fir 29" DSH, 95' tall standing 5' N of the #4 cedar, 5.5' NW of the #5 fir, and the stair path wraps passes 18" N of its base. Tree has an area on the northwest face where sap is currently oozing. More likely to be a surface torsion fracture than a beam fracture as there is no indications on the off-side of a fracture plane. Average new growth and color throughout the canopy that comes down below the half way mark.

7. Douglas fir 31.5" DSH, 100' tall standing 11' NW of the #6 tree, 24" N of the stair path, and 11' nearly due north of the #3 sequoia. Average new growth and color in a canopy that comes about to the halfway point. One of this tree's roots is visible stretching along the side of the garden shed which indicates they are passing mostly unimpeded by the path (Figure 15). This is an Exceptional 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 which are within the strike radius.

Discussion: There will technically be both primary and secondary impacts during the proposed project. The primary impact zone includes the environs immediately within the boundaries of proposed new construction and the regions within ten feet of those boundaries. The secondary impact area includes trees which have root systems extending within the construction zone. 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 cedar, with a 40 inch DSH, has a 40 foot 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. The SRP is 10' for all trees 24" DSH and larger. In this case, because of the client's desire to preserve the treed setting, there will be no extensive impact within the Structural Root Plates of any of the subject trees.

The architect is proposing to float the majority of the building on piles and only digging a foundation type base for the space where the spa will sit (Figure 16). The placement of the piles will be determined by light excavation or air spading to ensure that they do not cut through significant structural elements on the #2 cedar. The same care will be taken when locating the placement for the piles near the #3, #4, and #5 trees.

The chart shown in Figure 17 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 CRA without having long term detrimental results.

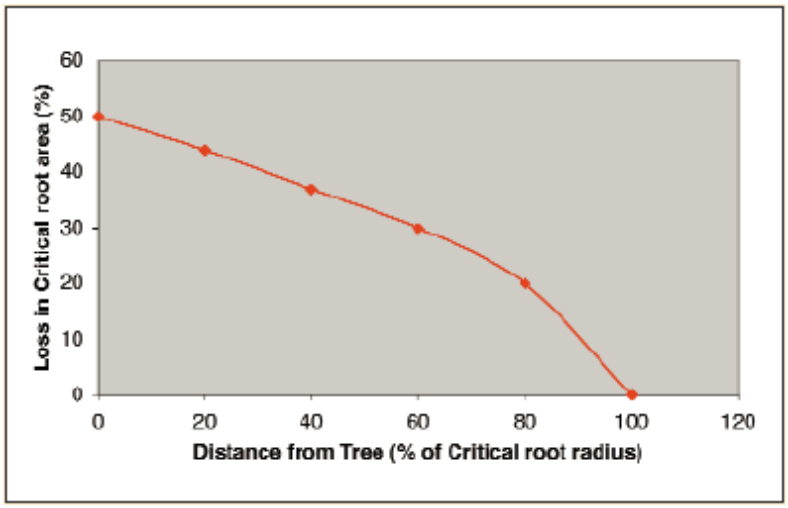

Figure 17. Chart giving the loss in critical root area as a function of the radial distance to the CRZ disturbance. (Coder 1996)

Using the #2 cedar again as the example, with the excavation for the new section of spa foundation located 19' from the tree's base and it having a 40" DSH, there will be impact at a linear distance equal to 48% of the maple's CRZ (19'/40'). The chart in Figure 17 shows that this would theoretically equate to a 32% loss of the cedar's Critical Root Area (CRA) if the cut continued completely across the circle of the root system.

The excavation will only extend 13' north to south however not even entirely across a whole quadrant of the cedar's root system. It will also be set west of the upper stone wall which may have been acting as a root barricade for the cedar as it matured. By calculation the loss should be much closer to 5% of the cedar's CRA. The tree should experience little to no long term detrimental impact.

The spa excavation will also intersect with the CRA for the #1 fir. The west side cut could be as close as 13' to the base of the tree a 37% CRZ linear impact. If the cut continued fully over the arc of the circle then there would be close to a 36% CRA loss. Even assuming a 3' setback to allow for the foundation forms the cut out space is only 7% of the total rooting space for the tree by calculation. Taking into account the lower retaining wall's limiting influence on the fir's actual root spread there could be as little as a 3% CRA impact. It should experience no long term ill effects.

As the rest of the building will be set on piles the loss of CRA for any of the other trees in the area will be negligible.

Recommendations: The spots where the pile post for the new building are to be placed will have to be inspected in real time to make sure they do not intersect with main roots. If roots larger than 3" caliper cross through the space(s) noted then a different arrangement will have to be designed. No roots of this size or larger can be cut within the Structural Root Plates of the #2 cedar, #3 sequoia, #4 cedar, or #5 fir tree.

It is likely that the excavation for the spa will occur by hand as the space is not readily accessible to machinery. The roots which have to be removed to allow the foundation forms to be laid should be cut with a Sawzall or other sharp blade. This will allow for proper healing response by the trees. The number and caliper of any pruned roots should be documented.

The dirt from the excavation will have to be hauled out front to the driveway. Building materials will likewise have to be stored in front as nothing should be stockpiled within the CRZs of any of the site trees. Even though the garden shed will be removed prior to the project onset nothing should be stored in the area it once covered.

Typically 6' chain link fencing is installed to designate no impact zones for the retained trees on a site. Because this is such a localized impact zone and it will ALL occur within the trees' Critical Root Zones I believe it makes more sense to simply fence IN the work space. The protection fencing should start at the south fence 12' E of the #1 fir, run at least 28' N, and then turn to the east and run up to intersect with east fence line.

Obviously there will have to be an access panel or opening somewhere in the fence. This can be determined in real time to provide for the best approach to the building site. The point is to limit extraneous impact to the site trees.

The excavation for the spa and the spotting of the pile post sites should be done with arborist oversite.

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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 McConnell family, Ben Humphrey, Heliotrope Architects, 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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Qualified Tree Risk Assessor
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Figure 1. Aerial imagery from 2007 showing the subject and surrounding properties.

Figure 2. Aerial photo circa 2012 showing the hardscaping in the south end of the 7845 yard.

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Figure 3. Aerial from 2013 showing the yard improvements in the SE corner.

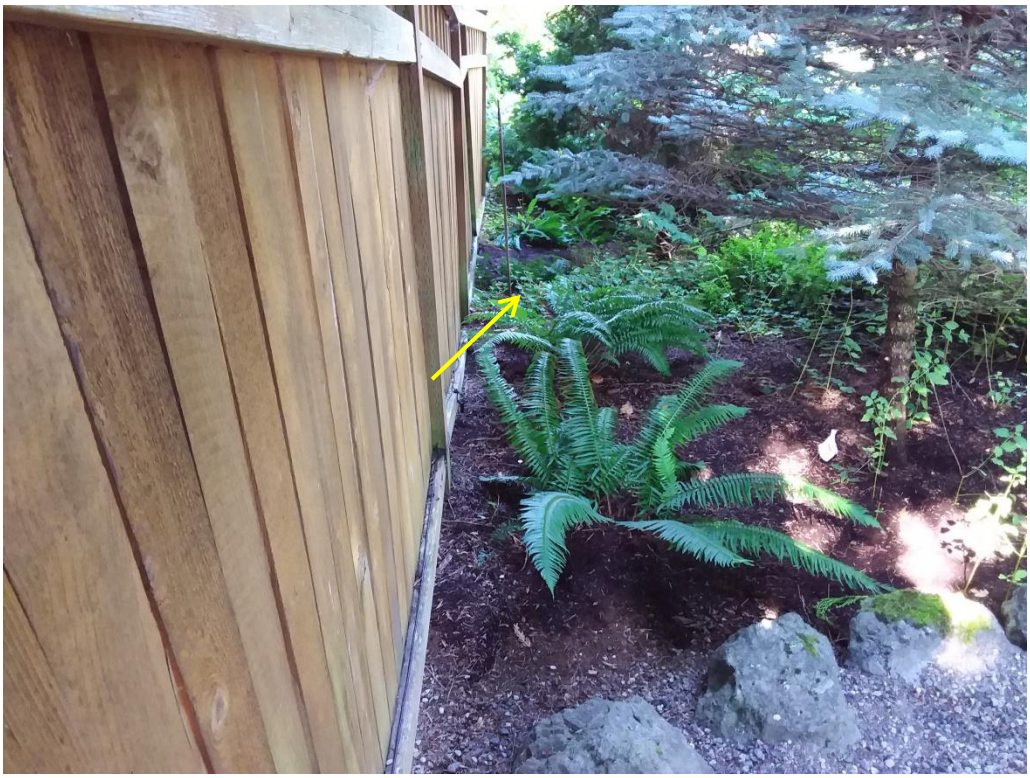
Figure 4. Looking west down the south fenceline. The stones at the south end of the upper retaining wall are shown at the bottom of the image. The lower wall starts where the yellow arrow points.

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Figure 5. Looking NW at where the upper stone retaining wall curves to the south of the garden shed. The #3 sequoia is in the center of the frame.

Figure 6. Looking south across the upper area where the raised garden beds were located. They had been here close to 10 years. The upper wall is just visible at the right side of the image (yellow dashed line).

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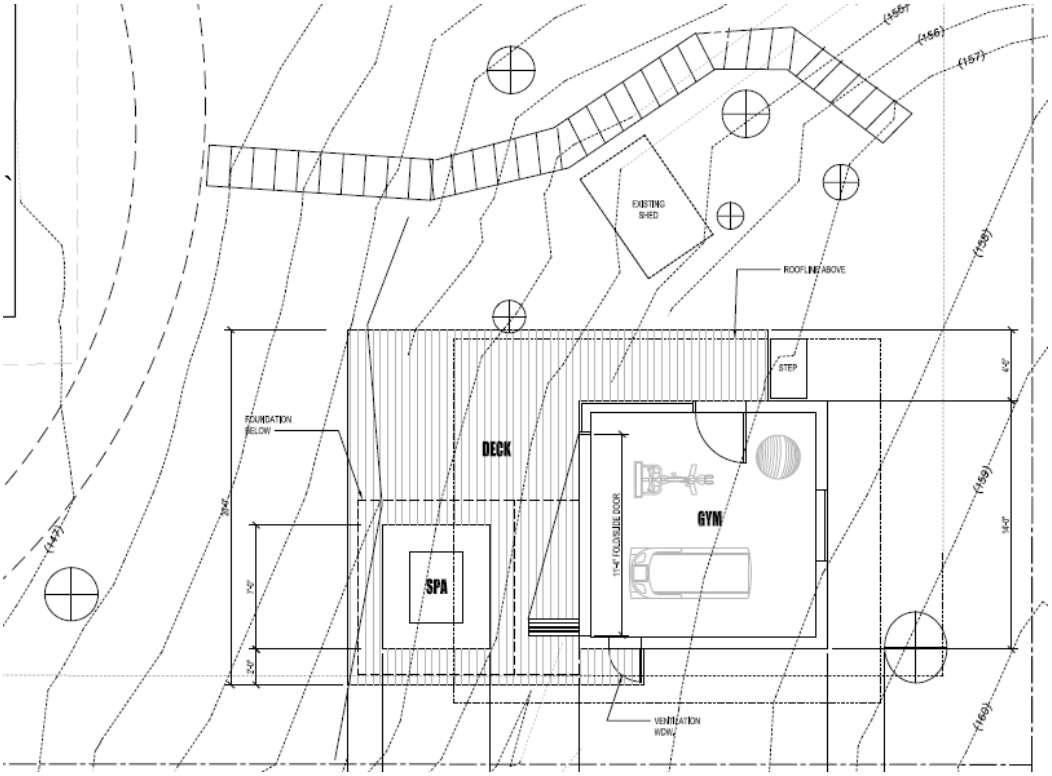

Figure 7. Excerpt from the plans showing the proposed location of the building.

Figure 8. Aerial photo circa 2019 showing the existing house and the rough locations of the trees noted in the report.

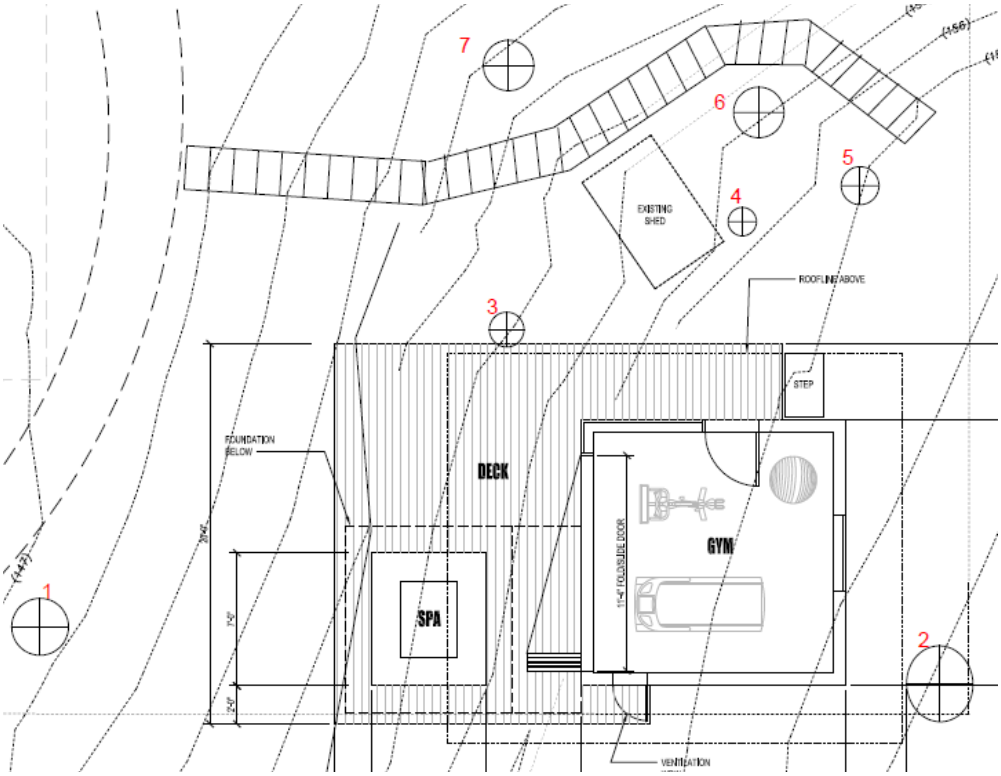

Figure 9. Excerpt from the plan with the trees labeled in red.


Figure 10. Looking up and SW at the canopy of the #1 fir.

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Figure 11. Looking east across the old garden bed space at the base of the #2 cedar.

Figure 12. Looking NNW at the base of the #4 cedar. The #6 fir is behind and to its right. The #5 fir is at the right side of the image.

Figure 13. Looking north at the base of the #5 fir showing the proximity of the stair path. Note the large stone at the bottom left of the image.

Figure 14. Looking at the fungal bodies low on the column of the #5 fir.

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Figure 15. Looking down and SSE at the #7 fir's root running alongside the garden shed.

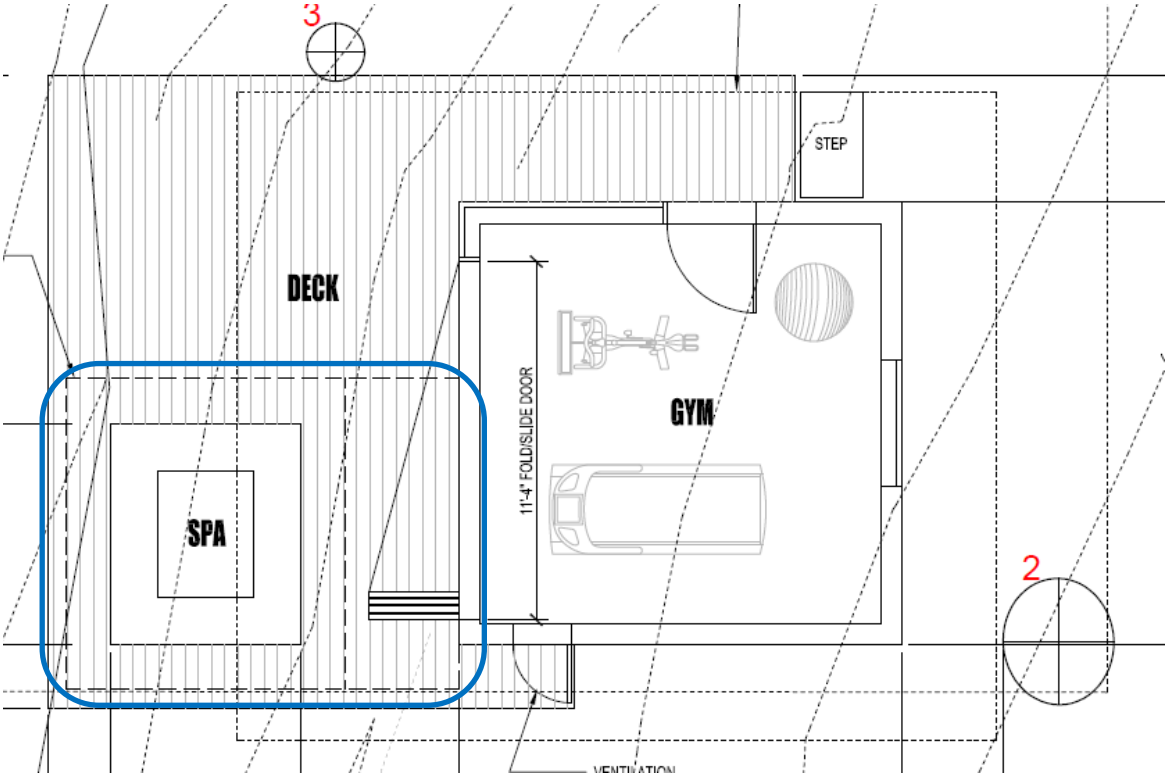

Figure 16. Enlargement of the plan showing the placement of the spa foundation. The SE corner of the building will be quite close to the base of the #2 cedar but floating on pile posts. Impact should be minimized.