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Keelan Franzen
340 Chestnut Street
Santa Cruz, CA 95060

Re: Existing redwood tree at 339 Walnut Avenue

Dear Mr. Franzen:

I have visited the site of the subject project and made a visual observation of the structural conditions present at the exterior of the existing building at 339 Walnut Avenue, and I have reviewed the letter written by Jodi Collins, PE, addressed to Santa Cruz Property Management dated July 17, 2023, and the Arborist Report prepared by Donald Cox dated May 30, 2023.

In my site visit, some signs of distress in the existing foundation were observable, as mentioned in the Collins letter. Based on this observation, some remedial work at the existing foundation is warranted. Of note, although the need for such work is apparent, it does not currently appear to be an emergency, which gives us some time, from a structural engineering perspective, to explore various methodologies for addressing the necessary repairs.

To that end, there are a variety of potentially reasonable means of mitigation for addressing the foundation's current condition that are worthy of exploration which may not include removing the existing mature redwood. Some options are listed below for your consideration:

- *Pier and grade beam system:*
This would include the installation of a concrete pier at or near the southwest corner of the building, and potentially one more along the perimeter of the foundation along its south and west perimeter walls (so, three total piers). Such piers would be designed to reach down into firm soil or bedrock below (typically a depth on the order of 15 - 20 feet is recommended) to provide the building with stability at those locations. Once such piers are installed, concrete grade beams would be run between them to bring the existing building's loads to each pier. This solution would support the existing building while not relying on the soil immediately below its walls, reducing or eliminating the impact of the redwood roots' development.
- *Cantilevered floor system:*
This would entail the installation of a new line of bearing with a concrete footing set back from the perimeter wall in the existing crawlspace, which would allow the joists to support the floor above without needing to rest on a support at the existing perimeter. This option may also require the installation of new floor joists alongside the existing

joists. This would entirely eliminate the need for the building to bear at the existing perimeter, and would therefore reduce or eliminate the impact of the redwood's roots on the building system.

- *Retaining wall system:*

This would be the creation of a new concrete retaining wall between the existing tree and the existing building, dug into grade and secured into the slope with a tie-back system designed to counter the force that the redwood tree's roots would exert on it. In contrast to the two systems explored above, this system seeks to exert enough of a positive resistance to the bending and sliding force of the tree that the roots will not be able to generate enough force to impact the living quarters in question.

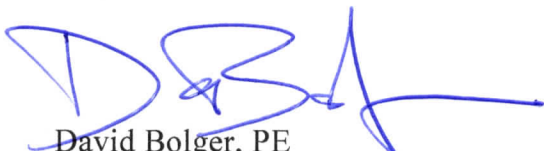
All of the above solutions would need to be approached with a team that at a minimum included a geotechnical engineer, an arborist, an architect, and a structural engineer. The various perspectives that each team member would bring to the discussion would shed light on which, if any, of the above options are feasible and/or most appropriate for the situation. I also would anticipate such a group generating ideas not outlined here for further consideration, as often happens in collaborative construction projects.

A final observation: at the corner of Walnut and Lincoln, where the subject tree is located, the grade differential between the public sidewalk and the living space's finished floor elevation would seem to necessitate a retaining wall of some sort. However, the presence of existing floor joists running out to foundation vents per the Jodi Collins, PE letter would indicate that any existing retaining wall, if it does exist, stops at the bottom of the floor joists. This would leave the top of the concrete to be perhaps four feet below the exterior soil level at the sidewalk, which is a cause for remedial foundation concrete work independent of the existence of the tree in question. I mention this in case it is helpful to consider the potential cost of the foundation work mentioned earlier in this letter in the context of some inevitable foundation improvement work that would appear to be required whether or not the tree remains where it is, or even whether or not it ever was there.

A caveat to this is that I was not able to examine existing plans for the existing building or a full geotechnical report for the site, so the previous paragraph is based on incomplete information. It is entirely possible that there is more than meets the eye at work in the existing structure.

Please feel free to contact me at 510-495-4494 with any questions about this report.

Sincerely,



David Bolger, PE
President - Cascadia Engineering, Inc.

