

Teragan & Associates, Inc.

Terrence P. Flanagan

Arboricultural Consultants

April 8, 2013

Joanie Beldin
10223 N. Hudson St.
Portland, OR 97203

RE: Impact to Sequoia grove at Pier Park from new trail spur

As requested, I have reviewed the plans that call for a trail spur to run from the south end of a planned bridge from Chimney Park to Pier Park, and the impacts that construction of the bridge and the increased use may cause to a grove of Sequoia trees (*Sequoiadendron giganteum*) where the trail dead ends. I completed a site visit on April 2, 2013 as part of the review of the project.

Concern #1 - During the construction of the bridge and the bridge's south abutment, damage may be caused to the trees that line the gravel road that is to be used for access to the project.

Number, type, and weight of equipment to be utilized to construct the bridge abutment and bridge needs to be considered. In addition, consideration should be given to where the equipment will be utilized in relation to the trees, as well as where the equipment will be located during the construction process. The plans show a limit of construction area, but there does not appear to be sufficient area set aside to allow for the staging of equipment and materials to construct the bridge and its south abutment, or enough area to allow the turnaround of equipment that will access the project.

There is no mention of how the stump from the removed Sequoia tree is to be taken out. Ideally, only the stump should be ground out with a stump grinder, not dug out with an excavator, nor should any of the roots from the stump be ground out beyond the main stump.

There are several surface roots in and adjacent to the gravel drive that is to be utilized by construction vehicles. There do not seem to be any steps proposed to protect those roots in the current tree protection plan.

There is a coastal redwood (*Sequoia sempervirens*) whose trunk is located just off the just south edge of the gravel road that will have to be protected as well.

The tree protection plan does not address the need to erect metal fencing to keep construction personal from inadvertently entering the areas that should be set up as tree protection areas. All that is called for in the plan is "temporary orange plastic mesh" that is easily breeched by construction activity.

Concern #2 - The developed, hard surface path off the south end of the new bridge that dead ends into the grove of Sequoia

Construction of a new bridge will increase traffic in a grove that historically has not been subject to a high volume of human usage. Increased use will cause impacts such as soil compaction, damage to surface

roots, and impacts to buttress roots and lower tree trunks from mountain bikes. With the dead end path inviting an increased number of pedestrians, bicyclists, and others to enter the grove without any direction to take, the concern is that over time, the impacts listed above will lead to the potential decline of the Sequoias.. An improved path constructed through the grove with a defined destination would tend to keep users on the path, reducing the potential for soil compaction and other impacts.

One of the best designs for an improved path would be a concrete path that is re-enforced with rebar to create a surface bridge over the soil. Such a path would transfer the weight of any vehicle and distribute it over a greater area, thus reducing the point load, and reducing the potential of soil compaction beneath the path. Although such a design would not allow for precipitation to penetrate through the path, soil moisture will travel by osmotic movement from the sides of the path. While such osmotic movement might not allow the center of the path to receive enough moisture for root growth, the majority of the area beneath the path should be fine, with soil moisture levels high enough to support root growth.

With a dead end path, pedestrians, bicyclists, and other users could disperse throughout the grove, potentially causing wide spread soil compaction. In contrast, continuation of a paved path through the grove would direct people through the grove, lessening the potential of soil compaction within the grove.

If the continuation of the path construction is not scheduled at the same time as the construction of the bridge, then the spur should not be constructed to insure that the possibility of soil compaction or other impacts to the trees does not occur.

The plans call for a new Sequoia to be planted just to the southeast of the proposed path. I question how well a new Sequoia would thrive under the shade of the neighboring Sequoias, as the species is not shade tolerant. Also, the path of an irrigation system to supply water to the tree would have to be designed to avoid the roots of nearby trees. Given the cost involved with supplying water to the tree and the possible impacts to nearby roots as well as the survivability of the tree, I question whether or not a tree should be planted within the grove.

In order to better protect the long term health of the grove of Sequoias just off the south end of the proposed bridge, either a continuous path should be planned for and carefully installed between the trees at the same time of the trail spur construction, or the spur path should not be built until such time as a complete review of the impacts to the trees and the area can be completed.

As this is an initial review limited in scope, there may be other information that I have not been made aware of that may impact the statements above.

Please feel free to contact us to discuss any questions or concerns.

Sincerely,

A handwritten signature in cursive script that reads "Terrence P. Flanagan". The signature is written in black ink on a light-colored background.

Terrence P. Flanagan
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