Technical Memorandum

Project Name: Centennial Square Concept Design

Date: September 17, 2024

To: City of Victoria

Re: Centennial Square Sequoia

Introduction

The concept plan for Centennial Square outlines a new vision for this important public plaza. Grounded by key project objectives outlined in the Centennial Square Action Plan and Downtown Public Realm Plan, the concept is also informed by a number of technical considerations and an extensive site inventory and analysis. The recommendations of the Concept Plan bring a number of significant positive changes to the Square, including the relocation of the Monoliths, the enhancement of safety and universal accessibility through changes to existing grades, and the addition of seventeen new trees, proposed to be planted in soil cells to optimize growing conditions. These improvements are not without impact, and do require the removal of the existing 40 – 50 year old giant sequoia. This memo summarizes the technical, design, and programmatic rationale that informed that recommendation.

Tree Condition and Context

Tree in question is a giant sequoia (*Sequoiadendron giganteum*). The giant sequoia is native to the western slopes of the Sierra Nevada Mountain range of California, and as such is not naturally occurring on Vancouver Island. As its name suggests, the giant sequoia can grow very large, to an average height of 50 – 85m, with trunk diameters of 6 -8m. Its preferred habitat is on granitic based residual or alluvial soils, in groves or clusters of trees in natural conditions. In horticultural plantings, it requires full sun and deep, rich, moist, well-drained soils, as well as a very large open space, due to its potential size and growth capacity.

As the giant sequoia is a shade intolerant species, it can perform poorly in urban areas, where buildings create large shadows and cloud cover may be greater than in rural regions. Increased precipitation levels caused by urbanization may benefit giant sequoias, however soil compaction, such as underlying the concrete and pavers in Centennial Square, hurts them by decreasing the aeration and changing the drainage patterns of the soil. This is exacerbated by the conditions in Centennial Square, where incomplete removal of the Cormorant Street road bed would restrict soil aeration and drainage, impacting root growth and tree vitality.

Due to its significant size, most horticulturalists and arborists recommend that giant sequoia should only be planted in areas with abundant space, such as in passive parks, on campuses, or in large gardens. In such situations, a mature tree can be a strong focal point. Used in mass, giant sequoias can provide privacy, screening, or wind shelter near a building or home. In smaller, urban environments like Centennial Square, the size and spread of the giant sequoia will become problematic and even destructive over time, as its roots disturb paving and infiltrate below grade infrastructure, damaging pipes and electrical connections.

Figure 1: 1970s era photo, showing the original Square without the Sequoia.

This concern has been previously documented in Centennial Square, and is only expected to increase, with an enhanced risk of disturbance to the foundations of the adjacent historic City Hall.

The site inventory completed as part of the 2018 Centennial Square Action Plan, which recommended the removal of the sequoia, summarizes the history and condition of the tree. Planted in the 1970s, the tree was not part of the original design of the Square. At some point in its lifespan, the primary leader (upper stem) of the tree was damaged by decorative lighting hardware, which caused response growth and girdling of the trunk. The growth above this damage appears to be suppressed, and the long term impacts to the tree's structure are still unknown.

In 2024, as part of the Centennial Square Concept Plan, an updated Arboricultural Assessment was completed. This assessment estimated the current critical root zone for the sequoia to extend to a radius of 19.8m, almost the entirety of the eastern portion of the Square. It sits approximately, 21.7m north of the edge of Historic City Hall, and approximately 25m south of the Centennial Parkade. These dimensions not only highlight limited space for adequate root growth and soil volume, but also suggest an increasing likelihood of damage to the surrounding hard surfacing and also the potential to impact the adjacent building foundations.

Impacts to the Public Realm

The programmatic goals of the project were also another consideration in the recommendation about the tree. The 2018 Centennial Square Action Plan, which formed the basis for this phase of the project, outlined six major opportunities for the improvement of the space. In particular, three speak to public realm benefits that the tree's removal provide:

1. **Connectivity**: Enhance entryways and connections through the plaza to connect seamlessly with the surrounding street and open space network.
2. **Grade Change:** Incorporate places to sit and relax and green space, within a universally accessible terraced landscape.
3. **Douglas Street Interface:** Open up the Square to Douglas Street.

Connectivity: Enhance entryways and connections through the plaza to connect seamlessly with the surrounding street and open space network.

Sight lines to and through the Square are specifically limited by the size and configuration of the Sequoia. Its width and branching pattern obstruct views, which in turn impacts visual permeability. People do not like to walk to or through spaces that they cannot see where they are going or who might be in that space.

This visual connectivity speaks to a core principle of the second generation of the Crime Prevention Through Environmental Design (CPTED) guidelines, the concept of natural surveillance. First identified by Oscar Newman as one of four requirements needed for the establishment of Defensible Space, natural surveillance is a design strategy that is directed at keeping "intruders" under observation. It is based on a simple premise that a person inclined to engage in anti-social or criminal activity will be less likely to act on their impulse if he or she can be seen. Natural surveillance is commonly associated with the establishment of clear sight lines and is typically applied in public realm design by the removal of visual barriers and the enhancement of visual and physical connectivity and improved safety.

By blocking views on the east side of the Square, the Sequoia screens the central area of the Square, impacting real and perceived safety.

Grade Change: Incorporate places to sit and relax and green space, within a universally accessible terraced landscape.

The current configuration of the Square has a series of terraces connected primarily by stairs, a restrictive condition not conducive to universal accessibility, other wheeled users, or even families with strollers. The current geodetic elevation of the Sequoia is 18.20m. Trees are significantly impacted by grade changes and cannot tolerate either the removal or addition of soil in their root zones, as it will change their ability to access air and water. The proposed concept plan eliminates stairs through a regrading exercise which lowers the elevation of the area of the Sequoia. The proposed grading plan lowers the grade in this zone by almost a meter, to a proposed elevation of 17.30m. Given the size and location of the tree, it is not possible to regrade this area to eliminate the stairs and also retain the tree. The prioritization of universal access and inclusion was an important consideration in developing the grading plan, and the elimination of stairs is a substantial improvement to the safety and accessibility of Centennial Square.

Douglas Street Interface: Open up the Square to Douglas Street.
The Action Plan speaks to the desire for a more open and welcoming public interface on Douglas Street. As previously discussed, the sequoia is a large visual barrier blocking this important view and, because of this, it's removal was identified as one of the strategies for improving the visual connection and permeability into the Square from the street.

Impacts to Infrastructure and the Urban Forest
Second to the goals of the Action Plan, the Concept Plan also outlines the desire for a modern, energy efficient water feature to animate the Square. Most of the current services within Centennial Square are approaching sixty years old and are at end of life. These below grade services require replacement, and the opportunity to update the infrastructure with new, more sustainable systems is a significant improvement to the operations and maintenance of the Square. The current infrastructure conflicts with the tree roots and will continue to be damaged as the tree continues to grow. New systems will be installed around trees planted in soil cells. The soil cells are a modular system that provides below grade soil volume while also controlling where tree roots can and cannot grow, thus protecting infrastructure. The concept plan's proposed layout and details, including the soil cells, will also facilitate the installation of new infrastructure without limiting the number of trees – in fact, the plan proposes the addition of seventeen new trees for the Square. This will be a significant enhancement to the operations and maintenance of site infrastructure.


Figure 2: Tree roots in conflict with existing on-site utilities.

Hand in hand with the infrastructure improvements, species selection for the additional seventeen trees will be thoughtfully considered. Recommendations from the Urban Forest Master Plan (UFMP) identify the need to select appropriate species for the site conditions and context, increase urban forest cover, and make use of opportunities to integrate multiple functions, such as accessibility and ecosystem services. As such, tree shape, form, and size must be taken into account, on the first day the tree is planted, what it will look like after ten, twenty, fifty years. The trees proposed for the bosque are deciduous, with high canopies, compact form, and light, airy canopies, meaning they will not block sight lines and are appropriately scaled for the space between the Parkade and City Hall. The inclusion of soil cells for the bosque not only mitigates risk around conflict with new below grade utilities, but also enhances the growing conditions for the new trees, supporting quicker establishment and improved vitality and longevity. The soil cells also improve the Square's stormwater management, retaining water that would otherwise be directed to the sewer. This secondary benefit will improve the sustainability of the revitalized Square.

Summary and Conclusions
The preservation of existing trees was an important consideration during the Concept Design phase. However, the Sequoia and its current condition and location were deemed too problematic to responsibly recommend retention. The impacts of the tree to sight lines, universal accessibility, public safety, and potential damage to below grade infrastructure, along with the restrictions to gathering and programming are substantial, and the preservation of the tree fundamentally impacts the ability to achieve the functional and programmatic goals for the Square. Previous attempts to mitigate these impacts have been unsuccessful, and a new strategy better suited to the site conditions is needed, to provide growing conditions suitable for the future. This is a case where the wrong species was planted in the wrong location, and the revitalization of the Square provides an opportunity to rectify these conditions and create an improved and more vibrant civic space for the future.

References
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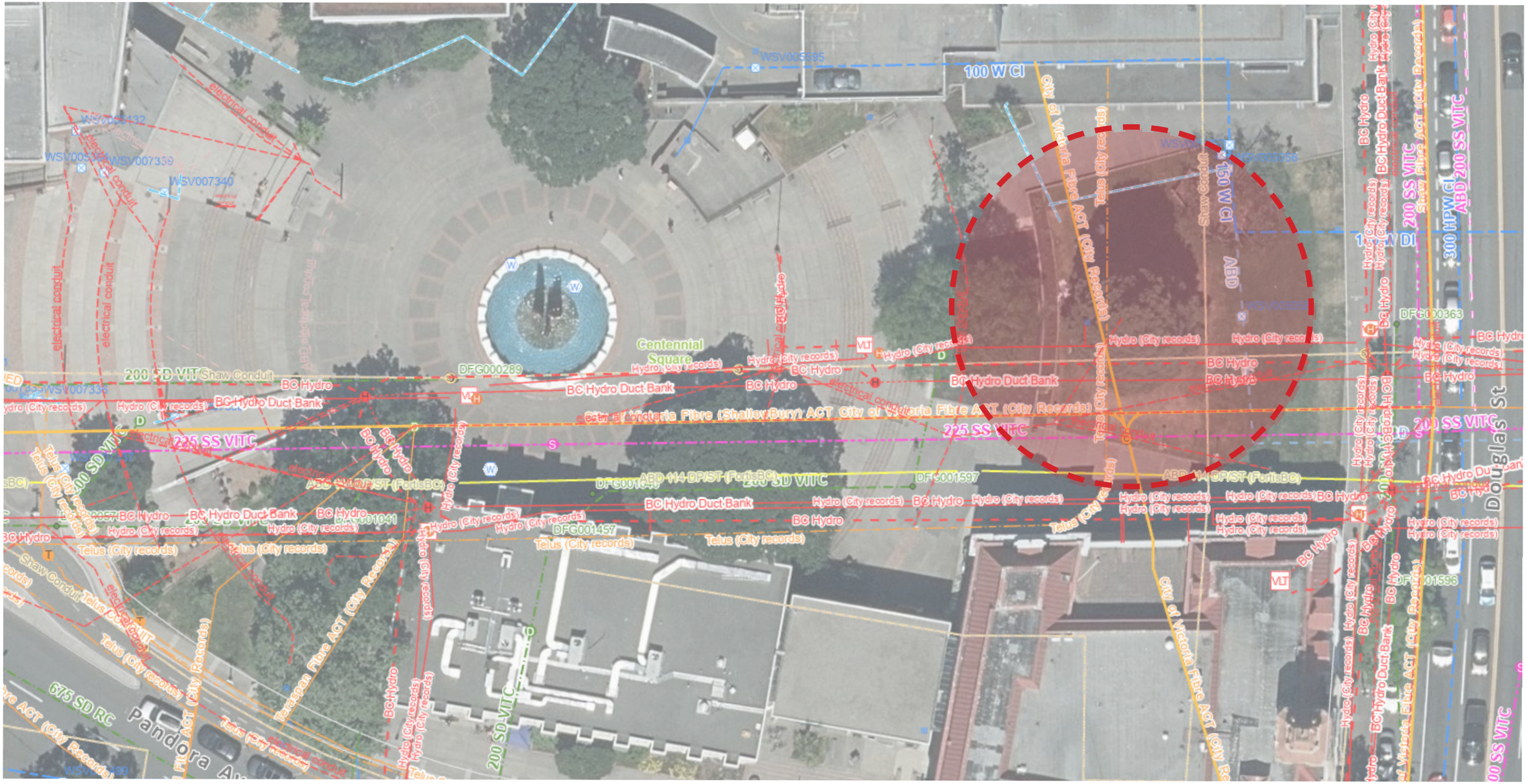

20m Critical Root Zone of the Sequoia

Figure 3: Critical Root Zone Overlay on Utility Plan