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Ryman Healthcare Park Terrace - Request for Information Response:

1.0 Fastigiate Oak Case Study

Introduction & Findings:

There are numerous impacts and constraints that have direct effects on any given trees ability to grow and thrive within urban environments. Following an investigation into adequate soil volumes and the direct effects on a tree's ability to grow and thrive within contained applications, four common themes were evident through most studies.

1. Soil compaction and excessive stoniness in urban areas reduces porosity and rooting room within urban tree pits.
2. Soil is often mixed with construction rubble, contaminants and dominated by sand and stones with little organic matter.
3. Heat from adjacent areas of compacted hardstand results in quicker evaporation of water, having a direct effect on the ability for irrigation to effectively nourish roots and promote growth.
4. It is generally accepted that a minimum of approx. $3m^3$ of potential rooting volume is required to give most tree species any viable chance of establishing successfully.

Case Study:

We assess these common themes against an example of a fastigiate Oak tree located on Centaurus Road in Christchurch. A 4.1m high reference pole was used to estimate the height of the tree.

Figure 1 illustrates the oak in terms of structure, scale, and context. Photograph taken on the 8th October 2020.
Figure 2 & 3 illustrates the oak in leaf. Photograph taken on the 3rd November 2020.

The following assumptions can be made from Figures 1-3:

- Assuming the tree pit has a depth of 1m, the total tree pit volume would estimate to be in the vicinity of $3\text{-}5m^3$.
- The tree pit is surrounded by compacted hardstand and subject to heat island effects.
- It is unlikely that irrigation is being provided to the tree.

Figure 1: Fastigiate Oak – Centaurus Road

- The tree is exposed to pollution and contamination, particularly from vehicles.
- The tree is exposed to all environmental factors, particularly wind.
- Annual Containment pruning will be undertaken by qualified arborists to ensure appropriate clearance from the carriageway is maintained. Hence a canopy diameter of approx. 1.9m
- The tree presents exceptional form, is healthy and thriving.

Figure 2: Fastigiate Oak (In Leaf) – Centaurus Road

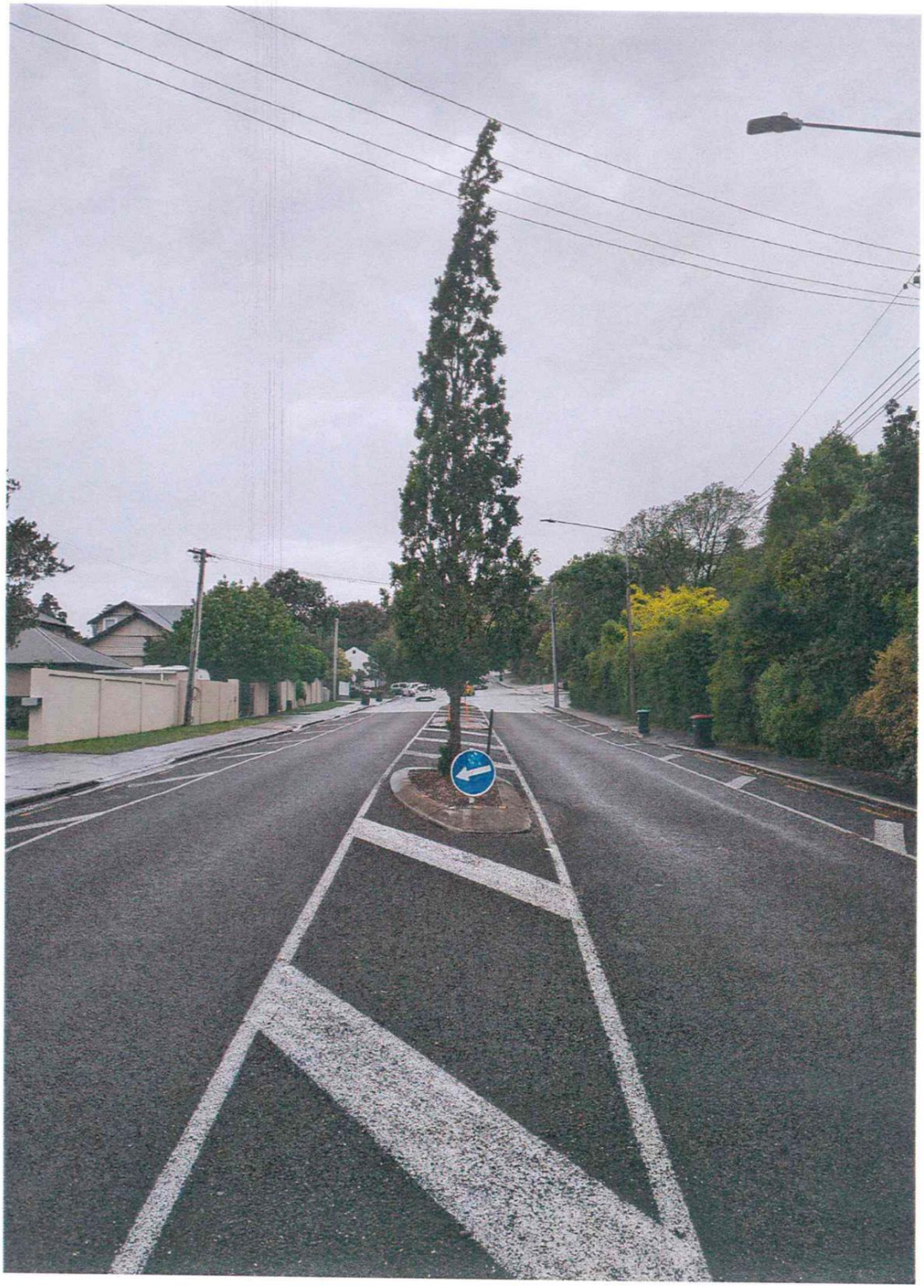

Figure 3: Fastigiate Oak (In Leaf) – Centaurus Road

Discussion:

Fastigiate Oaks are known to be suitable for tough, dry conditions. Therefore, the specimen may have a higher tolerance to any surrounding effects. Regardless, all trees still require an appropriate level of care, water, nutrition, and maintenance to successfully thrive.

It is evident within this study that containment pruning to a narrow diameter of 1.9m is not compromising the form or structure of the tree, nor is it affecting the trees ability to grow and thrive.

It could be assumed that because the Oak is subject to annual containment pruning, less energy and nutrients are required for the tree to thrive at this size. Because of this, a smaller root mass could be expected. In anticipation of a smaller root mass, a more conservative volume of growing medium would be acceptable. Additionally, smaller root mass could mean the root system may be less susceptible to the effects of compacted hardstand near the tree pit.

In direct comparison to the fastigiate Oak on Centaurus Road, the proposed trees for the Park Terrace sites will be provided with significantly better growing conditions, levels of care and maintenance. The proposed trees will be subject to following growing conditions.

- Regular irrigation provided by professionally designed, automated systems that ensure each specimen never suffers the stresses associated with drought. Promoting more contained root systems.
- Appropriate drainage to the base of planters that are connected to the stormwater system to ensure the removal of any surplus water. This will contribute to the successful passing of water through the growing medium and into the drainage cell at the base of the planter.
- Regular maintenance by Ryman Healthcare's gardening team, providing mulching as required to ensure that planters receive their required additional nutrients.
- Tree planters are raised and will not be subject to any surrounding soil compaction or consolidation. This provides specimens with perfect conditions for quality soil aeration and the promotion of healthier roots.
- Most trees are sufficiently distanced from any pedestrian or vehicle disturbance so have limited exposure to risk of physical damage.
- Provision of a quality growing medium that comprises of both soil conditioner and clean, screened topsoil.

Ryman Healthcare will employ a team of gardeners tasked with the maintenance of both sites. Trees will be carefully maintained, working to a provided management and maintenance plan that specifies when they are to be trimmed, how often, and when to fertilize and water. As the Landscape Architects, we have ongoing involvement in the villages to ensure that all planting and trees thrive to achieve what has been planned and we advise and update the gardening team accordingly as time progresses. Qualified arborists will be engaged to undertake tree trimming to ensure healthy and well-shaped trees.

Conclusion:

The fastigiate Oak on Centaurus road is an excellent example of a specimen tree that is performing well within a contained, maintained urban environment that is subject to considerable pressures and effects.

The proposed trees for the Park Terrace sites will be pruned and contained in a similar manner to that of the Oak. However, they will receive a far greater level of care, nourishment, and maintenance that contributes to healthier trees.

Having considered this case study in relation to the proposed growing conditions, maintenance strategy and the allocated soil volumes, I am comfortable that the proposed trees will perform and thrive within their proposed application.

References:

https://www.externalworksindex.co.uk/entry/117334/GreenBlue-Urban-Ltd/The-principles-of-successful-urban-tree-pit-design/

2.0 Strata Cell Tree Pit

Concern has been raised regarding the narrow space for inground tree planting along the boundary of Dorset Street at the Bishopspark Site.

Although narrow, additional soil volume can be provided longitudinally running east to west. Additionally, we propose to Strata Cell beneath the adjacent asphalt path to provide a greater volume of soil for the trees. Figure 4 illustrates an example of the Strata Cells. In regard to the Bishopspark application, artificial turf illustrated below would be asphalt.

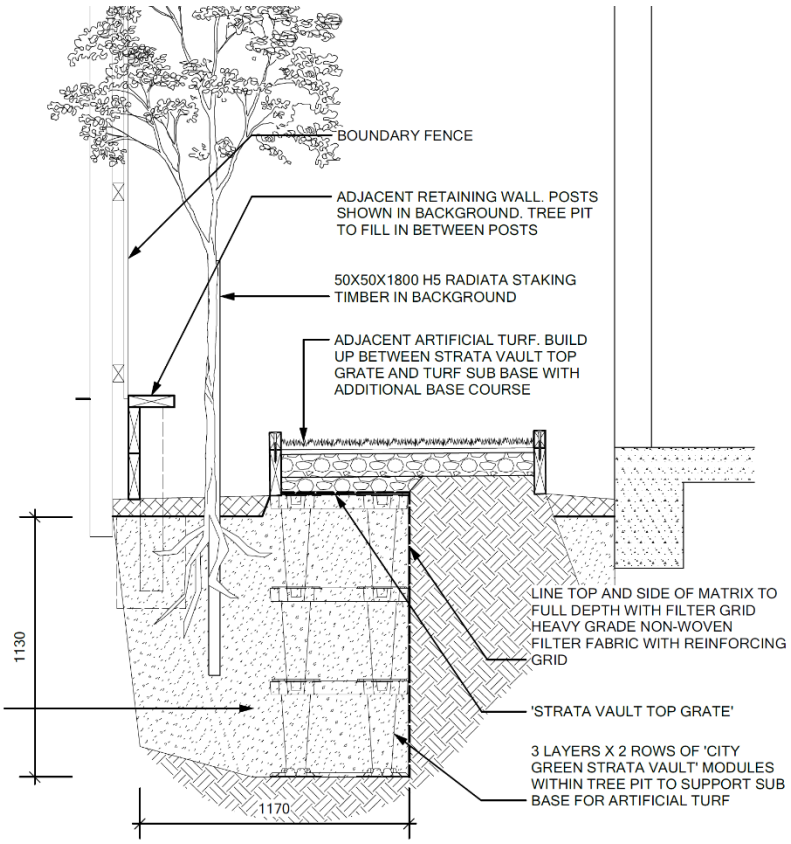

Figure 4: Strata Cell Example Detail