SBCA TREE CONSULTING

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To: Chris Watkins, PLA, ASLA
CMG

Project: Potrero Power Plant Street Trees
Illinois St between 22nd and Humbolt St.

Assignment: *Arborist was asked to prepare a tree inventory for all City Street trees within the project's scope; provide summary report with procedures for working around tree roots during hardscape repairs, including under pavement treatments to mitigate future uplift; Specifications for tree preservation during construction will also be provided.*

Appendix items:

1. *Inventory Data*
2. *Photos link here*

San Francisco Director's Bulletin No.2006-01

Definitions

1. PROTECTED TREES: The City and County of San Francisco currently considers" Protected Trees" as street trees, significant trees and landmark trees. Removal of any of these requires a permit. If any activity is to occur within the dripline, prior to building permit issuance, a tree protection plan prepared by an International Society of Arboriculture (ISA) certified arborist is to be submitted to the Planning Department for review and approval.
2. LANDMARK TREES: Landmark Trees have the highest level of protection in the City. These trees are trees that meet criteria for age, size, shape, species, location, historical association, visual quality, or other contribution to the City's character and have been found worthy of Landmark status after public hearings at both the Urban Forestry Council and the Board of Supervisors. Temporary landmark status is also afforded to nominated trees currently undergoing the public hearing process. The Department of Public Works maintains the official "Landmark Tree Book" with all designated Landmark Trees in San Francisco.
3. SIGNIFICANT TREES: Trees within 10-feet of the property edge of the sidewalk that are above 20-feet in height, or with a canopy greater than 15-feet in diameter, or with a trunk diameter greater than 12-inches in diameter at breast height.
4. STREET TREES: Street trees are trees within the public right-of-way. Street trees may be maintained by either the adjacent property owner or the City.

Tree Inventory procedure – Trees were provided visual assessment of health and structural conditions from the ground. Data on individual trees was recorded in Excel sheets in *Appendix 1*. Species, common name, DBH[1], canopy spread, health and structural conditions, hardscape uplift and severity, tree

[1] DBH – Diameter at Breast Height or 4.5' above soil grade.

suitability for retention, TPZ[2], and pertinent arborist notes were recorded. Trees were not provided with metal number tags.

Hardscape uplift was measured with a tape measure, and severity of hardscape displacement was provided on a scale: Low, Moderate, High, and Severe. A severe rating was given when uplift was noted to be more than 6".

Summary

The Arborist tree inventory collected data on 14 Street Trees, all protected under City ordinance. Three species were noted: Cajeput Tree *(Melaleuca quinquenervia)* was represented with nine specimens; Cork Oak *(Quercus suber)* with four specimens; and Maidenhair *(Ginkgo biloba)* with one.

Root related hardscape displacement – The span of sidewalk between 22nd and just south of Humboldt requires repairs due to root related uplift. Displacement around 10 trees was estimated to be high or severe due to the height of pavement uplift and/or amount of large roots under hardscape in critical areas.

Suitability for retention –

- **Good** – Five (5) Melaleuca and one newly planted Ginkgo were given Good suitability ratings. The hardscape displacement was noted to be high or severe adjacent to the Melaleuca.
- **Fair** – Three (3) Melaleuca were given Fair retention suitability ratings due to poor included bark structures and an elevated risk of future branch failure.
- **Poor** – Five (5) trees were noted to have Poor retention suitability. Reasons for ratings are due to poor health conditions which would impact the trees' ability to survive root loss.

Recommended action –The action that will likely yield the most future success is removal and replacement of all trees between 22nd and Humbolt, and installation of structural soil and clean crushed rock under the sidewalk. The tree rooting environment will be significantly improved, and future root related hardscape repairs will be less likely to occur. It is likely that significant root loss will occur to return sidewalk to grade and future tree decline will be expected.

- **Tree retention** – Trees #s 13 and 14 are located on the south side of Humbolt St. These trees are the largest and most valuable and are worthy of retention efforts, including increasing parkway size to avoid excessive root loss to return hardscape to grade.
- **Tree removal** – At a minimum, two trees (#s 6 and 9) are best removed and replaced due to very poor conditions (#6 is a stump sprout). It is likely that additional trees will require removal when the extent of root loss necessary to return hardscape to grade is understood.

[2] TPZ – "The defined area within which certain activities are prohibited or restricted to prevent or minimize potential injury to designated trees" (Managing Trees During Site Development and Construction, Third Edition, Best Management Practices, 2023)

Recommended procedure – If there is a desire to evaluate the level of root loss before decisions are made regarding removal, this can be accomplished together as a team. Hardscape is demoed and AB material removed to expose roots. The team can review exposed roots and together decide if necessary root severance may result in tree decline/death or whole tree failure by roots.

- Under pavement treatment – For trees that can be preserved, using a 4-6" layer of crushed rock installed around existing roots (instead of compacted AB material)[3] will help to mitigate root growth in the critical interface between the dirt and hardscape which often results in root related hardscape displacement.

Observations

Hardscape displacement – Trees #s 1-14 are surrounded by asphalt and observed with varying levels of root related hardscape displacement, from low to severe.

Declining health – Five trees (#s 4, 6, 8, 9, 10) were observed with sparse foliage, off-color foliage, stunted growth, bleeding trunk lesions, and/or branch dieback indicating declining health. Trees #s 6 and 9 are recommended for removal due to poor health.

Problematic structures –

- **Included bark** – Two trees (#s 2 and 5) were observed with significant problematic stem attachments (included bark) and are more likely to suffer future branch failures. Included bark was also noted in trees #s 3 and 7 but was not as severe.
- **Tree leans** – Trees #1, 2, 3, 9, 10 and 11 all display leans towards the street. If root loss is required to return pavement to grade, this may increase likelihood of tree failure into the street.

Discussion

Roots and sidewalk repairs – The trees located on the south side of Humbolt (not within the project scope) were surrounded by new hardscape. These trees were observed to be in worse health conditions, likely due to the prior construction related root loss. If trees can survive and thrive after construction, their roots often become repeat offenders for future hardscape displacement.

Preserve or replace? – If the level of root loss required to return hardscape to grade will result in future tree decline, it is often best to remove and replace the tree. This also creates an opportunity to provide an improved situation for replacement trees so that hardscape uplift is less likely to occur.

Under-pavement treatments – Our industry has solutions to mitigate hardscape uplift by tree roots by encouraging roots to grow deeper, including the use of structural soil, a buffer of clean crushed rock below pavement, or root barriers. The Silva Cell is another treatment designed to offer a place for roots to grow and provide compressive support for hardscape. Costs associated with under pavement

[3] https://users.neo.registeredsite.com/0/9/2/13664290/assets/Comparison_of_Methods_to_Reduce_Sidewalk_Damage_from_Tree_Roots__S39983.pdf

treatments are higher in the short term. However, these costs begin to be returned when trees reach 20 years in good health without the need for hardscape repairs. Without improving the rooting environment, we are repeating the same problematic cycle of hardscape displacement, costly improvements and root loss, and tree decline and death.

Recommendations

Remove and replace all trees between 22nd and Humbolt – It is likely the root presence under the pavement is significant and the root loss required to return pavement to grade will result in tree decline and ongoing pest/pathogen issues. Therefore, removal and replacement of all trees between 22nd and Humbolt will allow for the installation of structural soil and clean crushed rock along the entire block. It is our professional opinion that this is the best long-term solution to the streetscape.

Retain trees #13 and 14 – The two trees on the south side of Humbolt are recommended for retention due to their good conditions and large sizes. The best long-term results will be achieved by increasing the parkway size to avoid excessive root loss to return hardscape to grade.

Tree Protection during hardscape improvements – If there is a desire to retain trees, tree protection will be required. Once hardscape is removed, City and/or project arborist can be called in to estimate level of root pruning required, or if tree removal is the best course of action.

- **Trunk and scaffold protection** – Whenever construction activity must occur inside the tree protection zone, the base of the tree, the first eight-feet of the trunk, and exposed scaffold limbs must be armored. Protection is generally provided by strapping 2x4s to trunks and scaffold branches and then wrapping with orange plastic construction fencing.

- **Construction activities within TPZ**– All excavation within specified TPZs will be performed with hand tools and under project arborist supervision. Scenario may include:

  - *Hand excavation* – Excavation will remove hardscape, base rock, and soil down to the level required, careful not to damage existing roots. All roots are left in place for arborist review. Exposed roots are covered with two layers of burlap to be always kept damp.

  - *Arborist review* – If the level of root pruning will result in tree decline or root plate destabilization, tree removal and replacement or project redesign may be recommended.

  - *Root pruning* – All root pruning will be performed by arborist or under arborist direction.

  - *Use of clean crushed rock below pavement* – A 4-6” layer of clean crushed rock can be used instead of AB material. Rock is installed around existing roots. Compaction can occur only from the surface of the rock. The rock is then covered with tensile and or filter fabric. Use of a crushed rock layer will help reduce risk of future root related uplift and maintain soil gas exchange under pavement for tree roots.

Tree procurement and planting – Many of the trees were noted with leans, which often develop as a result of root bound nursery specimens. Arborist involvement during nursery tree procurement will ensure quality stock is selected for replacement. Root ball preparation during the time of planting is also best performed under the direction of an arborist. Research has shown that the best root systems are achieved by shaving matted roots so that new root growth is directed outward. [4]

Image 1 – *Image to the right provides tree locations.*

End

Report submitted by:

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[4] https://sfyl.ifas.ufl.edu/media/sfylifasufledu/duval/urban-forestry/Shaving-Roots.pdf