



Santa Cruz Memorial Park Crematorium Project

Tree Resource Analysis/ Construction Impact Assessment



**Prepared for
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Santa Cruz Memorial**

Consulting Arborists

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ASSIGNMENT/SCOPE OF SERVICES

Relocation of the crematorium is proposed at Santa Cruz Memorial Park, 1927 Ocean Street in Santa Cruz, APN 008-031-15/16. The proposed construction area is populated with two mature coast redwood trees/tree groups that meet “Heritage” criteria. In order to assess current tree health/stability, define project related impacts and protect the redwood trees during construction Peter Bagnall, Project Architect has requested the preparation of a Tree Resource Analysis/Construction Impact Assessment. To complete this assignment, I performed the following tasks:

- Locate, catalog and verify mapped locations of trees/tree groups greater than 6 inches in trunk diameter growing within 20 feet of the Limits of Disturbance
- Identify trees that meet “Heritage” criteria
- Rate individual tree health/structure and preservation suitability as “good, fair or poor”
- Map Critical Root Zones of preserved trees
- Review grading, construction, utility and landscape plans to determine potential impacts to trees
- Provide recommendations to decrease impacts from the proposed construction
- Create tree preservation specifications including a protection-fencing plan.
- Provide all findings in the form of a report accompanied by a Tree Location Map/Preservation Plan

SUMMARY

Two coast redwood trees/tree groups growing within the project extents have been inspected and inventoried. The impacts resulting from the proposed construction have been evaluated.

In order to construct the project as proposed there would be minimal impacts to redwood tree health and/or structure. Root damage from the required foundation excavation can be mitigated by hand digging. Once the trench is dug, damaged roots are to be pruned cleanly by skilled labor. A similar procedure can be followed if the asphalt surface near Tree #1 requires repair/replacement.

It is suggested that the foundation to be constructed near Trees #2 through 7 be deepened and widened to provide a mechanical diversion barrier to prevent damage from future root growth.

It is suggested that tree protection structures; fencing and rice straw bales be installed prior to construction.

Implementation of the above-described procedures will allow these trees maintain current levels of health and stability for many years.

Each tree/tree group is growing in proximity to the building. Although there is no visible damage currently, there may be unseen damage now or in future years.

Terms in **bold** text are defined in the attached glossary

BACKGROUND

The project involves relocating the crematorium from a property across the street to the landscape maintenance building at the rear of 1927 Ocean Street. This building will be retrofitted and expanded to the east within a covered parking area currently used for vehicle and motorized equipment storage. The footprint of the existing structure(s) will not be expanded. Perimeter walls will be constructed to connect the open ends of the carport to the existing buildings. Interior/Exterior finishes will be improved and beautified.

Additionally a new 1500 square foot landscape maintenance building will be constructed within the cemetery section.

A site inspection was conducted with Peter Bagnall on November 27, 2013. Mr. Bagnall reviewed the project plans and discussed the proposed construction with me. Two coast redwood trees/tree groups stand immediately to the south and north of the project. They were inspected to determine existing condition. Construction related impacts were assessed through review of project plans and field inspection.

Numbered metal tags were affixed to each tree's trunk for identification purposes. Tree locations are documented on the attached *Tree Location Map*.

OBSERVATIONS

Tree resources in proximity the proposed construction are comprised of two coast redwood *Sequoia sempervirens* trees/tree groups. Each of the trees/tree groups meet "heritage" status as defined by **City of Santa Cruz Code Section 9.56.040**.

Tree Descriptions

The following description identifies **trunk diameter, tree health, structure and suitability for preservation, Critical Root Zone (CRZ) radius**, construction impact severity and observations.

Tree #1, coast redwood *Sequoia sempervirens*

35.4 diameter inches at 4.5 feet above grade

15-foot canopy radius

Height of approximately 60 feet

Preservation Suitability is good

Critical Root Zone radius: 12 feet

Construction Impact Severity: Low

This tree has a stout, well-structured trunk that stands within 5 feet of the existing building. The canopy is full and dense with dark green foliage indicating good health.

Terms in **bold** text are defined in the attached glossary

Trees #2 through 7, coast redwoods *Sequoia sempervirens*

14.7, 4.5, 17.8, 17.2, 17.1 and 18.1 diameter inches at 4.5 feet above grade

15-foot canopy radius

Height of approximately 60 feet

Preservation Suitability is good

Critical Root Zone radius: 12 feet

Construction Impact Severity: Low

This tree/tree group is composed of six trunks growing within 18 inches of the existing building. Tree trunks are **codominant** with **imbedded bark** and **poor trunk/stem attachments**. The canopy of this tree/tree group is thin with lighter green colored foliage indicating a fair state of health.



Each of the tree/tree groups grows in proximity to the existing building. Although currently there is no visible damage, there may be unseen damage and/or damage may occur in the future from root development.

Terms in **bold** text are defined in the attached glossary

Description of Construction Impacts:

Construction of this project as presented requires the following procedures that often impact tree health and stability:

- Trenching for the foundation of the wall that will connect the two buildings near Trees #2 through 7
- Possible asphalt repair/replacement near Tree #1

The influences proposed construction activities will have on the tree are classified as **Low**; adverse affects from the proposed construction activities are minimal, requiring minor root severance.

RECOMMENDED PROCEDURES

The coast redwood trees on this site can be protected from inadvertent damage by installing Temporary Tree Preservation Fencing and rice straw bales. This temporary fencing is to be 48 inches in height and secured with metal stakes driven into the soil. Rice straw bales may be secured by driving metal or wooden stakes through the bales to a depth of 12 to 18 inches below natural soil grade. This barricade will prevent damage to the retained trees. Tree Preservation Zone fencing locations are documented on an attached map. Fencing and rice straw bales may be removed once construction is completed.

No storage of construction materials, debris, or excess soil will be allowed within the Tree Protection Zone. Driving/Parking of vehicles or construction equipment in this area is prohibited. Solvents or liquids of any type should be disposed of properly, never within this protected area.

In order to decrease root damage from the required foundation excavation indicated on the attached map the trench should be dug by hand. Once the trench is dug, damaged roots are to be pruned cleanly by skilled labor. A similar procedure can be followed if the asphalt surface near Tree #1 requires repair/replacement. Wood fibers should remain intact without shattering. The following tools should be used for root pruning:

- Hand-pruners
- Loppers
- Handsaw
- Reciprocating saw
- Chainsaw

Bark should adhere to the wood without tearing. When completed, the pruned portions should be covered with burlap or similar material and kept moist.

The foundation to be constructed near Trees #2 through 7 could be designed at greater depth and width to help prevent damage from future root growth.

Terms in **bold** text are defined in the attached glossary

Implementation of the above-described procedures will allow these trees to maintain current levels of health and stability for many years.

Please contact me at 831-426-6603 if you have any questions regarding this study.

Respectfully submitted,

James P. Allen
Registered Consulting Arborist #390

Terms in **bold** text are defined in the attached glossary

GLOSSARY/DESCRIPTION OF TERMINOLOGY

City of Santa Cruz Code Section 9.56.040

9.56.040 Heritage Tree and Heritage Shrub Designation Any tree, grove of trees, shrub or group of shrubs, growing on public or private property within the city limits of the city of Santa Cruz which meet(s) the following criteria shall have the "heritage" designation: (a) Any tree which has a trunk with a circumference of forty-four inches (approximately fourteen inches in diameter or more), measured at fifty-four inches above existing grade; (b) Any tree, grove of trees, shrub or group of shrubs which have historical significance, including but not limited to those which were/are:

(1) Planted as a commemorative; (2) Planted during a particularly significant historical era; or (3) Marking the spot of an historical event.

(c) Any tree, grove of trees, shrub or group of shrubs which have horticultural significance, including but not limited to those which are:

(1) Unusually beautiful or distinctive; (2) Old (determined by comparing the age of the tree or shrub in question with other trees or shrubs of its species within the city); (3) Distinctive specimen in size or structure for its species (determined by comparing the tree or shrub to average trees and shrubs of its species within the city); (4) A rare or unusual species for the Santa Cruz area (to be determined by the number of similar trees of the same species within the city); (5) Providing a valuable habitat; or (6) Identified by the city council as having significant arboricultural value to the citizens of the city.

Codominant Stems

Stems of similar size originating from the same position.

Critical Root Zone: Individual tree root systems provide anchorage, absorption of water/minerals, storage of food reserves and synthesis of certain organic materials necessary for tree health and stability. The Critical Root Zone (CRZ) is the species-specific amount of roots necessary to continue to supply these elements essential for each tree to stand upright and maintain vigor. This distance reflects the minimum footage measurement from the trunk required for the protection of the tree's root zone.

Construction activities proposed within these areas are subject to specific review and the implementation of recommended special treatments.

Diameter

The width of the trunk measured at 4.5 feet above natural grade (ground level).

Imbedded/Included bark

Bark developing between two structural components (trunks, stems, branches) with a **narrow angle of attachment**. As diameter increases the forces push against one another, in essence "growing itself apart." These systems are typically weak and prone to failure.

Poor trunk/stem attachments are the connection points between trunks, stems and branches with narrow angles. These weak attachments often have with included bark and do not form connective tissues between the stems. Stems push against one another as they develop, literally growing themselves apart. Canopy weight exerts additional stresses on these weak attachment points.

Weak unions of this type can open and crack when stresses are applied to the upper crown of the tree. Decay causing pathogens, organic material and moisture can enter through these cracks. In areas of included bark the tree cannot compartmentalize (the trees defense system that creates boundaries resisting decay) therefore the spread decay or other pathogens cannot be stopped or limited by the trees usual defense systems.

Forces of wind can cause the large stems to move in opposition to one another causing the attachment area to open allowing moisture and debris into the sites. The collection of this material can lead to the formation of decay. The callus visible on either side of the included bark indicates that the area has been open and the tree has attempted to seal the area.

The bulge on the trunk can be an indication of forces from inside the tree pushing against the bark and the attachment point. Bulges can indicate an area of internal decay (Mattheck 1997).

Suitability for preservation: This rating evaluates tree health, structure, species characteristics, age and potential longevity.

Trees with a “**good**” rating have adequate health and structure with the ability to tolerate moderate impacts and thrive for their safe, useful life expectancy.

A “**fair**” rating indicates health or structural problems have the ability to be corrected. They will require more monitoring and intense management with an expectation that their lifespan will be shortened by construction impacts.

Trees with a “**poor**” rating possess health or structural defects that cannot be corrected through treatment. Trees with poor suitability can be expected to continue to decline regardless of remedies provided. Species characteristics may not be compatible with redefined use of the area. Species which are non-native and unusually aggressive are considered to have a poor suitability rating.

Tree Health: This rating is determined visually. Annual growth rates, leaf size and coloration are examined. Indications of insect activity, decay and dieback percentages are also used to define health ratings.

Trees in “**good**” health are full canopied, with dark green leaf coloration. Areas of foliar dieback or discoloration are less than 10% of the canopy. Dead material in the tree is limited to small twigs and branches less than one inch in diameter. There is no evidence of insects, disease or decay.

Trees with a “**fair**” health rating have from 10% to 30% foliar dieback, with faded coloration, dead wood larger than one inch, and/or visible insect activity, disease or decay.

Trees rated as having “**poor**” health have greater than 30% foliar dieback, dead wood greater than two inches, severe decay, disease or insect activity.

Tree Structure: This rating is determined by visually assessing the roots, root crown (where the trunk meets the ground), supporting trunk, and branch structure. The presence of decay can affect both health and structural ratings.

Trees that receive a “**good**” structural rating are well rooted, with visible taper in the lower trunk, leading to buttress root development. These qualities indicate that the tree is solidly rooted in the growing site. No structural defects such as codominant stems (two stems of equal size that emerge from the same point), poorly attached branches, cavities, or decay are present.

Trees that receive a “**fair**” structural rating may have defects such as poor taper in the trunk, inadequate root development or growing site limitations. They may have multiple trunks, included bark (where bark turns inward at an attachment point), or suppressed canopies. Decay or previous limb loss (less than 2 inches in diameter) may be present in these trees. Trees with fair structure may be improved through proper maintenance procedures.

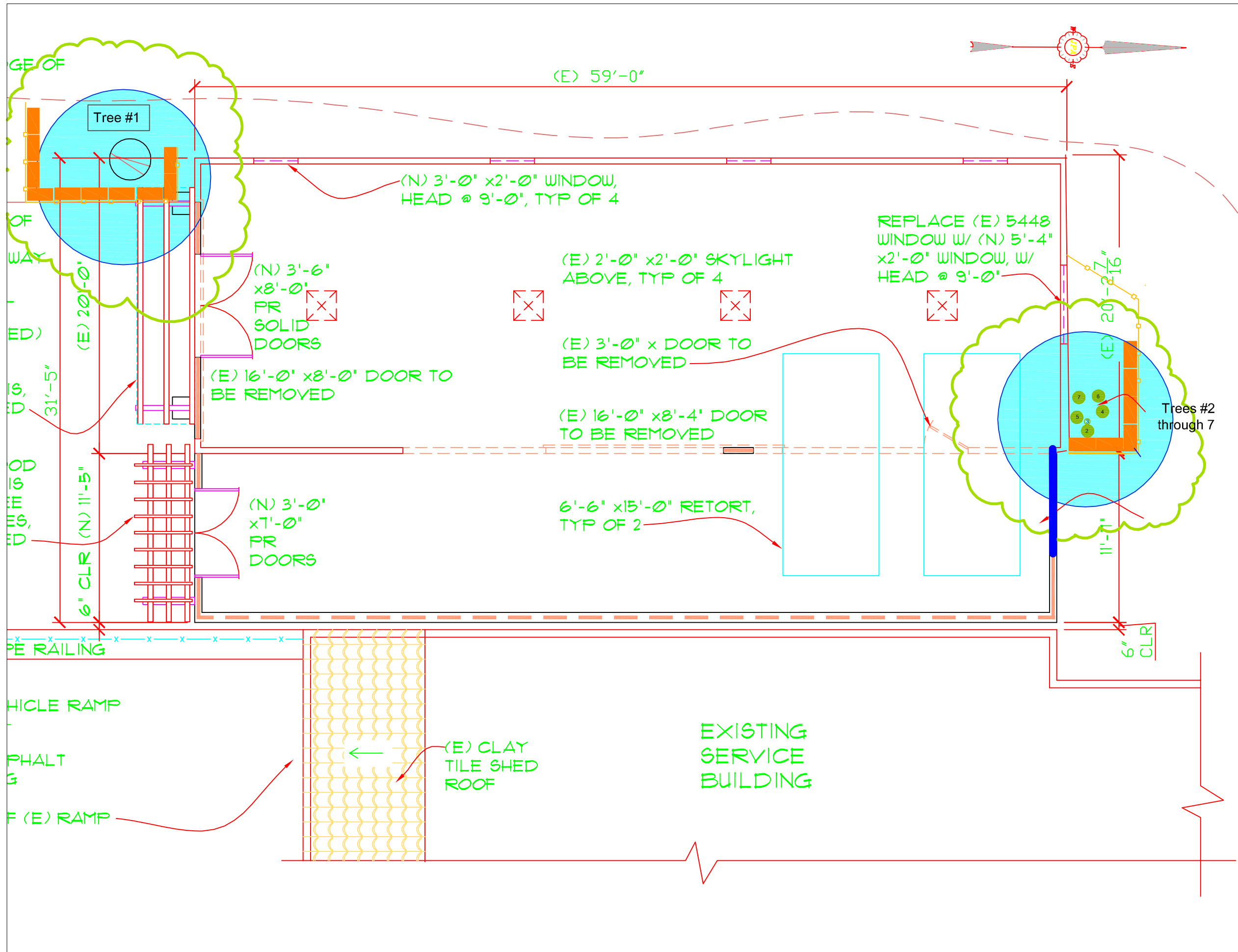
Poorly structured trees display serious defects that may lead to limb, trunk or whole tree failure due to uprooting. Trees in this condition may have had root loss or severe decay that has weakened their support structure. Trees in this condition can present a risk to people and structures. Maintenance procedures may reduce, but not eliminate these defects.

Tree health and structure are separate issues that are related since both are revealed by tree anatomy. A tree’s vascular system is confined in a thin layer of tissue between the bark and wood layers. This thin layer is responsible for transport of nutrients and water between the root system and the foliar canopy. When this tissue layer is functioning properly a tree has the ability to produce foliage (leaves). As long as the tree maintains a connected vascular system it may appear to be in good health.

When conditions conducive to decay are present, fungi, bacteria or poor compartmentalization, wood strength is degraded. As decay advances, the tree’s ability to continue standing is compromised. Thus, a tree can appear to be in good health, but have poor structure.

Trunk

The dominant vertical, super structure



Map Key / Legend

- Surveyed Tree Trunk Location
- Field Located Tree Trunk
- 2** Assigned Tree Number
- 2** Indicates "Heritage" Tree/Tree Group
- Critical Root Zone
- Tree Preservation Zone
- Tree Preservation Fencing With Rice Straw Bales
- Pre-construction Root Pruning
- Canopy Extents

Santa Cruz Memorial Park Crematorium Relocation Project

1927 Ocean Street
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APN 008-031-15/16

Tree Location Map Tree Protection Plan



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