



Michael L. Bench
 Consulting Arborist
 (831) 594-5151

7327 Langley Canyon Road
 Prunedale, California 93907

**Tree Relocation and Maintenance Plan (TRMP)
 Castilleja School
 1310 Bryant Street
 Palo Alto, California**

1. The provider of service for all phases of transplanting must be an experienced tree moving company. The experienced tree moving company selected for the relocation of trees at the Castilleja School Campus is Environmental Design 800/376-4260, David Cox (281) 850-7365 and Jacob Cox (408) 643-1409.
2. The trees planned for relocation are listed in the Arborist Report, prepared by Michael L. Bench, June 13, 2016, among the complete List of Trees for the site. There are 37 trees planned for relocation.
3. The 37 trees are expected to be relocated in 2021 or 2022. These trees are expected to be larger by the time relocation would occur. The 37 trees are listed below, including their estimated increases in sizes, the expected methods of relocation, and the construction phase, in which they would be expected to be relocated.

Tree #	Tree Name	DBH	Estimated		Method of Relocation	Construction Phase
			2021	DBH		
3	Arbutus 'Marina'	3		5	Tree Spade	I
5	Arbutus 'Marina'	5		7	Tree Spade	I
6	Quercus agrifolia	17		19	Round Ball	I
10	Quercus agrifolia	11		14	Round Ball	I
13	Quercus agrifolia	16		18	Round Ball	I
14	Quercus agrifolia	7		10	Tree Spade	I
27	Acer palmatum	3/3/3/3	5/4/4/3		Box	I
29	Acer palmatum	4/3/3/3	6/5/4/3		Box	I
30	Acer buergerianum	11		14	Box	II
50	Pistacia chinensis	10		13	Round Ball	II
74	Arbutus 'Marina'	8		10	Tree Spade	II
75	Arbutus 'Marina'	8		10	Tree Spade	II
76	Pistacia chinensis	6		9	Tree Spade	II
77	Pistacia chinensis	7		10	Tree Spade	II
78	Arbutus 'Marina'	5		7	Tree Spade	II
79	Arbutus 'Marina'	4		6	Tree Spade	II

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Tree #	Tree Name	DBH	Estimated	Method of Relocation	Construction Phase
			2021 DBH		
80	Arbutus 'Marina'	5	7	Tree Spade	II
81	Pistacia chinensis	5	7	Tree Spade	II
96	Acer Palmatum	5/4/3/3	7/5/4/4	Tree Spade	I
97	Acer palmatum	4/3/3/3	6/4/4/3	Box	I
101	Crataegus laevigata	6	7	Tree Spade	I
111	Quercus agrifolia	22	25	Round Ball	I
114	Pistacia chinensis	13	15	Box	I
115	Sequoia sempervirens	14	16	Box	I
120	Sequoia sempervirens	24	30	Round Ball	I
136	Cercis canadensis	3	4	Tree Spade	I
139	Acer palmatum	6	8	Box	II
145-153	Queen Palm	8	8	Round Ball	I
156	Dwarf Olive	3/2	4/3	Box	II

Notes: The 9 Queen palm (Trees # 145-153) are planned to be relocated off-site in order to add species in the new planting plan that are more compatible with the neighborhood, possibly along the perimeter of the campus.

The Coast Live Oak (Quercus agrifolia) Trees #10 and #14 are included among this list based on the possibility that the design may impact them too severely at their current location.

1. Those trees planned to be relocated using a Tree Spade will be Boxed and stored in the event that the planting locations would not be available for planting immediately. The storage location is planned to be on the campus at Emerson Street.
2. There are several utilities in the area around Tree # 50. The feasibility of relocation of this specimen will depend on whether an adequate root ball can be captured. The digging to capture the root ball will be considered exploratory. Until the digging would be done the relocation of this specimen will be in question.
3. The size of the Boxes and the size of the Round Balls are planned to be 10-12 inches of soil for each inch of trunk diameter. The trunk diameter (DBH: Diameter at Breast Height = 54 inches above soil grade) of the specimen would dictate the size of the root mass to be transplanted. For example, Tree # 111 is estimated to have a trunk 25 inches in diameter in 2021. In this event, the root ball would be 21 feet in diameter.

4. Preparation for relocation will begin this year 2017. Preparation shall involve:
 - A. Establishing a healthy layer of organic material over the surface of the expected root ball, including the use of earthworms and earthworm castings. Although several root treatments claim benefits during the relocation process, the only additive that has been proven scientifically to increase root development is earthworms and earth worm castings.
 - B. The organic material on the root ball will be inspected annually and additional materials may be added as needed. The inspection of the organic material must be included in an annual report.
 - C. Establishing drip or soaker irrigation in the outer 1/3 of the root ball to encourage new root initials. Irrigation frequency would be monthly, but may be adjusted by the Project Arborist as a result of monitoring.
 - D. Irrigation will be monitored monthly. Monitoring may be done using a soil probe or using moisture metering.
5. The cutting of the root ball for Trees # 111 and 120, must be done at least 1 year in advance of relocation. At the time of cutting of the root ball, 12 inches of organic material and earthworm casting must be packed around the outside of the root ball face, to encourage new root terminals. When the tree would be relocated this organic layer around the outer edges would be relocated as part of the root ball.
6. The ideal time to move trees is between Nov. 1 and Jan. 30 but moving between Aug. 1 and Oct. 30 is acceptable. Other times of the year result in higher risk of survival.
7. For Boxed trees, the root balls must be cut at least 3 months prior to relocation. It will be essential to cut roots cleanly without rips or tears. This may be done using a root saw or a trencher. If a trencher is used, the initial trench must be 1 foot outside the desired diameter of the root ball. After trenching, the soil outside the trenching cut may be removed using a backhoe, allowing for a work space around the root ball. The final shaping and cutting of the root ball must be made with sharp tools leaving the roots with clean smooth cut ends in the side of the root ball.
8. For Boxed trees, the box size must be based on the trunk diameter (DBH: Diameter at Breast Height = 54 inches above soil grade) of the specimen, which dictates the size of the root mass to be transplanted. We recommend that the transplanted root mass be a diameter equal to 10-12 inches for each inch of trunk diameter for Tree # 30, Acer buergerianum. For example, a tree with a trunk diameter of 14-15 inches DBH would require a root ball of 13 feet diameter and a box size of 14 feet diameter.

9. The trenches around the root ball of boxed trees must be filled with a mixture of 3 parts native soil, 1 part fir, ¼ inch sawdust to which a polymer jell has been added (at label rates), earthworms, and earth worm castings. These trenches must be kept constantly wet until boxing occurs.
10. The soil must be thoroughly moist but not muddy at the time of root cutting. The moisture must be consistent throughout the root ball.
11. Boxing must be done immediately after cutting of the root ball. The box must be rigid and sufficiently strong to prevent the root ball from cracking or breaking apart during lifting and movement.
12. The gaps between the edges of the root ball and the box must be filled with a mixture of 25% compost, 75% native soil, earthworms, and earthworm castings. The edges must be irrigated repeatedly and filled with this mixture until no gaps exist between the box and the root ball. At this point, the tree is ready for moving to a storage site.
13. The root ball must be firmly secured to the box. This is typically done by installing braces across the top of the rootball across the box. The objective is to prevent the tree from slipping in the box during movement.
14. The central leader and the side branches of the tree must not be damaged or broken during relocation or transporting. Thus, the box must be secured without risk to the live parts of the tree during relocation.
15. If the boxed tree will be stored for a period, the tree must be irrigated every other day or on a schedule prescribed by a Project Arborist depending on the weather.

Replanting Boxed Trees

When the boxed trees are to be installed in the landscape, a contractor with demonstrated success in the process must perform this work.

The following steps must be employed.

1. The trees must be relocated within two months of having been boxed or they must be retained in the boxes for more than 12 months (for 90-100" boxes) or 18 months (for boxes larger than 100" width).
The reason for this timetable is that new roots will grow from the severed roots in approximately 2-3 months. If the tree would be transplanted immediately after the new roots will have emerged, the newly produced roots will break off, causing severe trauma to the already traumatized tree.
2. The tree root ball must be thoroughly watered 2-3 days before transplanting.
3. The planting hole must be prepared to be 6-12" less deep than the root ball to prevent post installation setting. The hole must not be over excavated, then refilled, but must be dug only to the correct depth. It must be at least 2' wider than the root ball.
4. A percolation test must be done prior to planting. One method is to dig 10"X10" holes (percolation test pits) in the bottom of the planting holes. Fill the percolation pits with water and allow to drain completely. Fill again and measure the decrease in water elevation. These percolation test pits must drain a minimum of 2 inches per hour. If the drainage is slower than this standard, percolation holes would be required (described in Item # 5 here).
5. If percolation holes are required, dig one 12" diameter hole to at least 3' deep in each corner of the planting pit. Dig a 12" wide cross to 12" deep from one corner to the other, and fill with ¾" drain rock, covered with filter fabric.
6. The backfill shall consist of 90% existing native soil and 10% nitrified compost.
7. Set the boxed root ball on the bottom of the prepared planter pit.
8. Remove the box walls but leave the box bottom in place.
9. Fill the space around the root ball with 12" of backfill soil and water thoroughly.
10. Repeat #9 with 12" lifts, each thoroughly watered in.

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11. Make a basin with site soil at the margin of the root ball to retain soil entirely on the root ball.

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12. Form a cross of raised native soil windrows on the root ball to retain water in four separate sections on top of the root ball.

13. Irrigate each tree with at least 150 gallons of water at least once per week. Inspect 3 representative root balls (not fill soil) with a soil probe weekly at 8-12" and 18-24" of depth. If all soil samples are not moist, increase the frequency of irrigation to 5 day intervals and report the soil moisture findings to the Project Arborist.

Maintenance After Transplant

1. The relocated trees must be irrigated consistently, thoroughly, and regularly without breaks in the schedule regardless of the season, holidays, or stoppages in the work schedule throughout the relocation process for a minimum of 2 years, depending on the size of the tree. Larger specimens require longer time to develop new roots. A single lapse in the irrigation schedule during this period may result in a dead tree.
2. The flow rate of the emitters must be inspected for consistency at the onset of the irrigation installation, and must be maintained throughout the duration of the project. Once the flow rate is established, the monitoring of one tree on an individual irrigation line would represent all of the trees on that line. However, each monitoring must inspect a different tree on the irrigation line in rotation. The individual tree inspected at each monitoring must be identified in the maintenance record. If an individual tree appears to be suffering, it must be monitored separately from the other trees.
3. The entire root balls of relocated trees must be mulched with wood chips at an initial depth of 6 inches, thereafter this mulch must be maintained at a depth of 4 inches for a minimum of 5 years following relocation.
4. **Monitoring**
The root balls of the relocated trees must be monitored with a soil probe by a trained individual or with at least two moisture meters set at different depths of the root ball (one set at 12 inches in depth; one set at 24-36 inches in depth depending on the size of the boxed tree) during the entire transplant period.
5. The project arborist inspect the relocated trees semi-annually for 3 years. This could coincide with an insect infestation or fertilization schedule.
6. I recommend that relocated trees be fertilized semi-annually (March/September) with Greenbelt 21-16-16, available from Romeo Packing Company, Half Moon Bay.

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7. Record Keeping

- A. For the first 3 months following transplanting, weekly records of monitoring must be kept and made available to a consulting arborist or done by a certified arborist.
- B. Irrigation may be adjusted based on this monitoring. After 3 months, records must be kept and made available for review for a minimum of 2 years concerning trees 4 inches in diameter or smaller at the time of transplant.
- C. For trees 5 inches in diameter or larger at the time of transplant, the irrigation must be monitored and the irrigation records must be maintained for 5 years.
- D. An annual report must be done by the Project Arborist for 5 years.
- E. The report at the end of the 5th year, must be done by the Project Arborist, and must include a recommendation concerning any continuing monitoring or special care.

Respectfully submitted



Michael L. Bench, Consulting Arborist
International Society of Arboriculture Certification # WE 1897
American Society of Consulting Arborists Member

