The Art of Tree Moving

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The art of tree relocation is a spectacular and wondrous feat. Adding the majesty of mature trees to a myriad of projects, tree moving has become a popular practice in the goal to beautify and mitigate large and small developments.

I have been involved with and observed many successful tree-moving projects where the relocated trees have contributed significantly to the community for decades. Some people may, however, have a different opinion on the successful relocation and long-term performance of relocated trees.

I also have worked with and read the reports of those who claim tree relocation to be a losing prospect, typically resulting in trees that fail to successfully establish. One known published field study included trees that began in poor conditions, lacked vigor and vitality, and, while boxed in the field, had experienced heavy fire damage. This was further exacerbated by a lapse in care for approximately one year. These circumstances clearly do not provide adequate grounds for arriving at a reasonable conclusion that tree relocation be dismissed as a means of protecting our heritage trees from the demise of development.

Some of us may recall “Old Glory,” a large heritage valley oak in Santa Clarita, California, that was transplanted in 2004 for political reasons, and with much protest. Many said the tree would not survive; however, 16 years later, the tree is still alive and performing as expected.

Although tree relocation is a complicated and risky prospect, it can usually be performed successfully. My experience is that, given a healthy tree, boxed correctly and at the right time, including a long-term maintenance program, a high rate of success can be expected.

There are only a handful of tree moving companies in the United States that are capable of moving large specimen trees with root balls in excess of 10 feet in diameter. I was the staff arborist for one of these companies for six years. During this time, I evaluated trees and their potential for successful relocation and supervised their care before, during, and after. I also made regular site inspections on many projects for up to five years following tree relocation to diagnose potential problems and to evaluate and help improve tree-moving procedures and maintenance practices.

Based on this experience, I will be discussing several topics significant to tree moving.

This article focuses primarily on the relocation of coast live oak (Quercus agrifolia). I have been involved with many tree relocation projects, both large and small, involving residential and commercial, golf course development, and community redevelopment projects. The following information and opinions are based on my more than 20 years of observations and hands-on experience working with the relocation of mature trees.
Defining a Good Candidate
The first step in defining a good candidate is conducting a comprehensive evaluation of the tree and site to determine the likelihood of the tree surviving and thriving following relocation. The tree must be healthy and vigorous, showing little to no indications of stress. Site, soil conditions, topography, and history, as well as the location and conditions of the tree’s future home, must be considered when selecting a specimen for relocation.

Structural integrity is critical because most trees are relocated from oak woodlands to areas of high traffic where risk potential is a definite concern.

Trees must be thoroughly inspected for the signs and symptoms of significant insect pests and diseases. Looking for structural problems (e.g., included bark, buttress formation, co-dominant stems, girdling roots, cracks, cavities, decay in the trunk and larger stems). Tree species must also be considered, as there are several that do not respond well to relocation.

Box Size and Timing
Determining the box size for a tree is an art that requires experience. Considerations include but are not limited to species, trunk diameter, canopy size, structure and size of roots, and of course site and soil conditions. The ANSI A300 (Part 6) standard for determining container size is approximately 8” to each 1” of trunk diameter; for most tree companies, about 7” per 1” of trunk is used. In the name of competitive bidding, tree-moving companies are often challenged to take this to the extreme by putting trees in comparatively small boxes. For the more sensitive species, I recommend using the largest box feasible considering the project budget. The greater the root mass captured, the greater the likelihood of success. Over the past few years, box dimensions have gotten shallower, sometimes eliminating tons of excess weight.

Timing also plays an important role in successful tree relocation. Generally, the dormant period is considered the optimum time for transplanting trees. Summer is usually considered a poor time for transplanting coast live oak, but I’ve been involved in some highly successful transplanting projects in the dead of summer—technically when coast live oak are dormant.

It also used to be a common practice to perform side boxing, then letting the tree(s) sit for 90 days prior to bottom boxing. Again, based on my experience, I have not seen a benefit to the 90-day side box phase.

Preparation
The process of moving trees induces drought, usually resulting in stress due to the large amount of root system that is lost. Although not a general practice, I’m convinced that drought stress in trees to be relocated can be significantly reduced by thoroughly irrigating them two or three times within a two- to three-week period, prior to any root pruning or excavation. This will allow the tree to take up water for storage, which will aid in its sustenance until new root development begins, this procedure will be especially helpful during periods of drought.

The use of pesticides as prophylaxis can also be beneficial in preparation and is discussed later in this article. Marking the tree’s orientation is important for reference when planting. It is preferable to replant a tree in its original orientation; primarily this will reduce the risk of sunscald to the bark and minimize the expenditure of much needed energy that would otherwise be used in acclimating to the new exposure.

Pruning
A tree’s response to pruning prior to relocation is very evident; pruning prior to boxing is not beneficial and may, in fact, be harmful. When I first began working in this field, it was common practice to prune heavily before boxing the tree; often I would see more than 50 percent of a tree’s canopy removed prior to boxing. At the time, I had recently become a Certified Arborist and was anxious to improve on the process. I knew from basic tree biology that heavy foliage removal, which has a negative impact on tree health, would only add to the stress of severe root loss. Provided they receive adequate care, trees will respond naturally to root loss by shedding leaves (abscission) and/or branches as needed. Foliage is necessary for energy production (photosynthesis) and the manufacture of hormones, both of which are critical for root regeneration.

It didn’t take long to convince company managers to reduce pruning to a minimum, only removing dead, dying, diseased, or structurally weak branches. Prior to this procedural change, relocated trees typically took several years or more to “recover.” With the new pruning practices in place, I noticed a remarkable change in how the trees responded to boxing and relocation. It appeared that defoliation was significantly reduced and that roots regenerated more quickly. Other advancements have been made in tree relocation over the past few years, but none I’ve seen have been as significant as minimizing pruning.

Fertilization, Supplements, and Soils
I have seen little in the way of fertilizers or supplements that provide a noticeable or significant difference in the survival of relocated trees during the critical period—30 to 180 days after boxing. I believe, and there is a general consensus within the industry, that fertilization and the use of certain supplements applied during the maintenance phase after this critical period can influence tree performance and long-term survival. Although, I have tried many of the so-called “miracle products,” I have yet to witness a miracle. I have also inoculated several trees using various forms and applica-
tations of mycorrhizae, but have not noted any observable change in survival or performance in the treated trees.

I believe that if a tree is healthy prior to relocation, soil nutrient and pH levels are favorable, and the native mycorrhizae are present, no supplements are needed. However, when a tree is relocated to another site where soil conditions may be unfavorable or nearly sterile due to excavation, loss of topsoil, etc., mycorrhizae and certain amendments may be useful, based on site and soil analysis.

According to ISA standards, amending the backfill soil for tree planting is generally not recommended; however, should a soil analysis reveal toxicity or deficiencies, corrective measures are appropriate. When dealing with soils of varying texture and structure, consideration must be given to water percolation, water-holding capacity, drainage, and aeration, as irrigation practices may affect survival and performance.

**Cabling/Guy Wires**
Stabilizing trees during the establishment period to prevent toppling and reduce risk is an extremely important topic when discussing tree relocation, and it can determine success or failure. Obviously, root anchorage is severely compromised during the boxing process, and for this reason, all large relocated trees should be guy wired. Typically, one considers installing cables after planting, but it is equally important to consider stability during boxing, transporting, and planting trees. It is advisable to provide temporary guy wires during these procedures. My experience is that cables must remain in place for no less than two years and in some cases up to five years. Maintenance of cables plays a vital role in the success and safety of tree relocation. Proper cable installation and maintenance ensures the safety of people, property, and the tree as well.

**Planting**
The planting of relocated trees is fairly straightforward. When working with large trees it will be important to install guy wires during planting to reduce the risk of the trees toppling. The planting pit dimensions will normally be 1 to 3 feet larger than the root ball and up to 12 inches shallower than root ball depth to allow for settling. Amending the backfill soil is seldom necessary, except to address specific problems. The compaction of backfill is very important; it not only increases stability but also affects irrigation efficiency by eliminating air pockets. Irrigation water can collect in large air pockets, bypassing the root ball. Based on drainage, it may advisable to install a drainage system in the planting pit, with the exception of those where excess water can freely drain away (e.g., sandy soil, slopes, mounds).

**Maintenance/Irrigation**
Maintenance and irrigation, I believe, are the most critical factors in the success and long-term performance of relocated trees. Trees are particularly sensitive to soil moisture levels following the loss of often more than 80 percent of the root system. The need for supplemental water greatly increases due to the reduced capacity of the remaining root system to absorb water.

Initially, the root ball soil provides the only reservoir for water until the roots begin to grow into the native soil. Trees that normally survive without water for long periods now require regular and sometimes frequent irrigation, resulting in an increased risk of soil pathogens. A fine balance between soil that is too wet and too dry must be maintained. This can only be achieved by regularly scheduled servicing by experienced staff, supervised by a qualified arborist. Although the practice of irrigating a tree may sound simple, great care and effort are required to insure proper soil moisture. It is imperative to check soil moisture by use of a soil probe before and after watering to determine needs and efficacy.

Monitoring of soil moisture can be scheduled, but the actual irrigation cannot. Two of the most common problems are over and underwatering.

In my experience, the most serious threat to the survival of relocated trees is overwatering. I would rather see irrigation error on the dryer side. Overwatering usually occurs when the tree is either planted below grade, the tree is receiving...
water from near landscape irrigation, or the soil grade has been increased around the tree. These conditions frequently result in serious problems. Other conditions that are associated with overwatering include broken irrigation lines and planting in poorly drained soil or at the base of an irrigated slope. Underwatering most often occurs when the irrigation water does not percolate readily into the root ball. This most commonly occurs as water runs over the top of the root ball and into the backfill. Consequently, soil within the root ball remains dry, as water in the backfill does not move readily into the root ball. Soil watering basins must be maintained just inside the edge of the tree root ball to ensure percolation. Mulching, which helps moderate soil temperature and conserve soil moisture, also favors new root growth, as newly developed fine roots are highly susceptible to desiccation.

One of the key pitfalls related to maintenance is that contractors, developers, and homeowners, and others rarely budget for post-relocation tree care.

Problems requiring immediate corrective action are likely to develop without a maintenance program and regular monitoring, and it is usually too late by the time someone recognizes a problem. I’ve found that about 70 percent of the failures in relocating trees are attributable to inadequate maintenance. Adverse site conditions, construction-related problems, and undetermined causes are responsible for the other failures.

**Pest and Disease Problems**

Root loss associated with tree relocation causes stress, increasing susceptibility to certain insect and disease pests. Careful monitoring for the signs and symptoms of developing pest problems is needed to prevent or minimize such problems.

When dealing with pest problems, the “best defense is a good offense.” It is preferable to prevent problems than to have to deal with them later; hence, careful evaluation and selection, preparation, timing, and follow-up care are critical. Some pest and disease issues are best managed by using appropriate chemicals as a prophylaxis.

This is especially true when preventing bark-boring insects on Quercus species. As mentioned earlier, trees undoubtedly become stressed during relocation; therefore, preventative measures must be taken. The most common disease problem encountered in relocated trees is phytophthora—a root and root crown disease of trees associated with poor drainage and overwatering. Although fungicidal treatment may be useful, the best way to manage phytophthora is through careful irrigation practices. Although other insects and diseases may be noted, only a handful actually threaten the health and survival of relocated trees. Chemical treatment can be reserved for serious problems.

**Reestablishment**

As stated earlier, my remarks regarding responses to relocation are relevant primarily to *Quercus agrifolia*. The reestablishment period of relocated trees varies widely among species. Trees reestablish their root-to-shoot balance by first regenerating roots at the expense of shoot growth. Therefore, some trees may have a period of reduced aesthetic quality. This period can be short, provided that the tree was healthy and initially vigorous. My experience is that a minimum of two years is required for reestablishment, contingent upon a closely supervised maintenance program. After approximately two years, maintenance demands greatly decrease, reducing tree care costs. I believe trees that have been relocated will require some level of maintenance and monitoring for the remainder of their lives; however, requirements continue to diminish as time passes. At the very least, it is recommended that relocated trees be evaluated by an experienced Certified Arborist no less than three or four times per year following the initial establishment period.

**Conclusion**

I have been involved with several projects involving the relocation of *Quercus agrifolia* in box sizes up to 18 feet. For many of these projects, more than 20 years have elapsed since the trees were moved, and the trees have performed beautifully and continue to show vigor. In more recent years, with greater experience and industry innovations, some trees exhibit minimal stress following relocation. I attribute these successes to proper selection, preparation, and pruning and adequate follow-up maintenance.

Tree moving is a big investment and should not be taken lightly. Not only is the relocation process costly, but long-term maintenance and monitoring must also be factored into the budget. There are obvious risks involved with relocation, and some chosen trees are poor candidates. In my opinion, tree relocation should be considered as a last resort, as it is always best when a tree can remain undisturbed. Tree moving has saved many trees to the benefit of countless communities. Landmark heritage and specimen trees can be spared when it is necessary to make way for development.

Kerry Norman has been working in the field of ornamental horticulture and arboriculture for over 30 years and holds ISA-BCMA, ASCA-RCA, and ISA-TRAQ credentials. As a California native, he enjoys travel, camping, hiking, and scuba diving. Kerry continues to work on several sites involving the relocation, preservation, and management of mature trees.