SPECIFICATIONS FOR CONSTRUCTION AROUND TREES[1]

by Leslie S. Mayne

Specifications are usually divided into *General Specifications,* which cover the prescribed procedure common to all applicable plans, and *Detailed Specifications,* which cover in a precise manner the individual requirements of that particular situation using as a base the prescriptions described in the General Specifications. Since detailed specifications require the particulars for a given site, I can only address General Specifications. Once the formulas and procedures are established in the General Specifications, it is simple for the consultant to use them to establish the requirements for each individual tree.

The detailed specifications, when drawn up by the consulting arborist, should be so precise that nothing is left to the imagination, opinion, or judgment of the contractor who carries them out. These detailed specifications should have no ambiguity and should require no verbal elaboration so that there can be no misunderstanding or misquoting when the time comes for the acceptance of the job as complete.

Furthermore, since no specifications are any better than the enforcement of them, it should be required generally that the consultant inspects, during the progress of the work, when he can make corrections and keep the contractor on the right path, and most certainly an inspection should be required prior to the acceptance of the contract as complete.

In order to emphasize in the contract the necessity of carrying out the specifications with no deviations without a written work order, there should be provision in the General Construction Contract and the Tree Care Contract for penalties for any violation of the specifications which cannot be corrected. These penalties should be based on the appraised value of each tree as set forth in *The Guidelines for Evaluating Landscape Trees,* published by the ISA.

The consultant must make a thorough analysis of the site prior to writing the detailed specifications. The following checklist may aid in determining the factors that have been considered.

1. Grading and other equipment may damage subject trees directly or indirectly by their presence. Erect a temporary fence made from 2 × 4 posts and 1 × 6 rails around the root zone with instructions in the contract that such a zone must not be violated.

2. Place prominent notices stating that contractors, including subconstractors, will be held responsible for damage to trees, e.g., caused by painters dumping paint thinner after cleaning brushes in the vicinity of any tree, or contractors violating the other provisions.

3. The building contractor shall not cut any branches or limbs further away than 3 feet from the projected building without the express permission of the consultant. All limbs and branches cut by the building contractor shall be made without splitting the remaining portion of the tree, and he should not make an attempt to make a "finished" cut but should leave a stub which will subsequently be removed in the proper manner by a skilled arborist.

4. Digging foundations that cause root loss may possibly cause ultimate damage to the building. If possible, "bridge-over" roots both to save certain roots and also to prevent the anticipated pressure when the roots expand with growth. Type of bridging is a matter outside the scope of an arborist. If bridging is not possible, consider a means of permitting the root to grow through or immediately beneath the foundation by wrapping it (or partially wrapping it) with styrofoam, 2 to 3 inches thick which is firm enough that it will not be distorted by the concrete placed over it. This method is particularly applicable when roots are in the subbase of roadways. If the cutting of roots is inevitable, then follow the same procedure as when roots are cut during excavation.

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5. For roots lost by excavation the procedure is as follows: uncover the shattered end of a root so that 1 inch is exposed within the trench wall, cut off root squarely with a saw, and paint with a heavy dressing of asphalt emulsion. If a foundation wall or bulkhead is constructed along the face of the excavation, fill the top 3 feet of space between the bank of the excavation and the wall with a topsoil mix containing decomposed organic matter. The purpose being to provide a good medium for the new rootlets growing out from the cut root ends. This topsoil mix is placed after the lower levels have been backfilled with any available soil or the drain rock with drain pipe below. Of course, the treatment of the severed roots must come prior to the installation of the forms for the bulkhead or foundation wall.

After the placement of the topsoil mix, liquid fertilize the remaining root zone. The timing and number of applications will be determined by the extent of the root cutting. Furthermore, timing is important for liquid fertilizing. A wet season may cause a leaching away of the solution. At the first application, the solution shall consist of 4 pounds of soluble 22-14-14 dry fertilizer or its equivalent, plus 1 ounce of Superthrive (or its equivalent) root hormone per 100 gallons of water. Application shall be made through a feed needle (essentially a ½-inch ID pipe on the end of the hose) by a hydraulic sprayer with mechanical agitation and capable of 100-150 pounds per square inch pressure. Generally a large (minimum 35 gallons per minute) pump is required in order to use the capacity of a ½-inch ID needle. Application is made at 6-foot intervals in the root zone of the subject tree. The number of applications is predicated, as stated, on the severity of root cutting and shall be at 6-week intervals during the dry months of the year. The second and subsequent applications shall use a solution at half the strength of the first application.

Compensatory thinning of the foliage of the subject tree should be undertaken not only to reduce the physiological demands on the remaining roots but also to reduce the possibility of windthrow. Such pruning and thinning should be done with some sensitivity in order to maintain the aesthetic value of the subject tree and will require precise and detailed specifications by the consulting arborist.

6. Raising the ground level over the root zone inhibits the aeration of that zone and creates an environment for the invasion of such root and root crown diseases as *Armillaria mellea, Polyporus dryadeus,* and *Phytophthora cinnamomi.* The object of any corrective measures would be to increase aeration and to inhibit the invasion of root crown diseases. These measures will vary with each situation and should include one or more of the following procedures.

As a minimum, remove soil around base of tree to a level which is one-third below the tops of the highest lateral roots and install a tree well. Simplest type of well consists of 4 × 4 redwood posts (treated, if possible, since seldom is old-growth redwood found) with 2″ × 8″ or 10″ rough redwood boards placed outside the posts. On completion, a 2″ × 8″ finished cap is placed to cover the 4″ × 4″ posts and the 2-inch side boards, overhang about 1 inch. Tree well should be about 1 foot above ground level and, if on a slope, should slope at the same angle as the ground. The tree well should be placed no closer than 2 feet from the trunk of the tree and should be as large as possible in order to expose the maximum natural soil level. Drain the tree well if this appears to be required. Install the drain 1 foot below the grade in the well and cover the opening with a mesh to prevent its being filled up.

The advantage of a wooden tree well is that the bottom boards can readily be cut in order to accommodate any surface roots. The tree well, whatever its design, is usually determined by the architect or landscape architect; however, in no case should its construction require the damaging or cutting of roots.

In addition to a tree well, provisions can be made to increase the area of aeration by placing a 2-foot layer of drain rock with filter material on the top of it prior to placing the fill over a portion of the root zone outside the tree well. In order to promote aeration through the tree well walls, holes can be bored in the wooden bulkhead. The above system can be improved by laying perforated PVC 4-inch pipe on the original ground prior to placing the drain rock. The PVC pipe would be inserted through the tree well walls.

When you must place an impervious or air

restricting surface over a root zone, a subaeration system can be installed. Such a system would be a spoked wheel shape consisting of perforated 4-inch PVC pipe as both the rim and the spokes. Over this pipe is placed enough 1¼-inch drain rock to cover the PVC pipe with filter material between. Vertical vents reaching the surface can be installed at the junction of the "spokes" with the rim, providing that such a method fits into the general development plan. The spokes should slope downward towards the rim at ½-inch per linear foot. As in the installation of the PVC pipe in conjunction with the tree well and tree well drain, provision should be made so that the 4-inch PVC pipe does not get plugged. This method has the advantage that, when required, irrigation can be undertaken by hoses placed in the outlet of the spokes and, at times, liquid fertilizer can be introduced in order to encourage root development.

When neither of these methods is suitable, then resort to the following: Use a vertical mulch. This method consists of drilling numerous 3-inch diameter holes, approximately 30 inches deep, within the root zone and backfill with 75% perlite and 25% 10-6-4 fertilizer containing organic nitrogen. This system provides not only an aeration but also conduits for watering. Since perlite is a good medium for root growth, it enables the rootlets to grow into it and thus to the surface. The quantity required would be predicated on the size of the area. The consultant should specify the quantity of perlite and fertilizer required and the approximate distance between holes. The contractor would undertake to place the specified quantity of material in the correct prescribed manner. This method causes less disturbance to the surface of the ground than any other, should the filled ground already be in place.

7. When changing the drainage patterns during construction, it should be the duty of the consulting arborist to review any grade changes that create an unnatural moisture condition in the root zone. He can then make recommendations in order to mitigate the effects of the changes. These changes might include the diverting of a natural drainage channel to the root zone, or the reverse. For example, berms or banks now so common as a landscape feature, direct rainwater. A natural creek confined with concrete means the loss, without replenishment, of the water that would seep through the soil. The diversion of rain falling on a roof is directed first by roofs, then gutters, into storm drains. Also, gutters along new roads carry off the rain falling on their surfaces with the consequence that water is lost and ground water does not get replenished.

8. Removal of trees in order to accommodate construction may cause wind pockets to form and thus expose the remaining trees to windfall. Even if no actual wind pockets are formed, the remaining trees may be subject to unaccustomed winds. The consulting arborist should consider that such situations are within the area of his expertise and make recommendations for alleviating any conditions which, in his judgment, may arise. This alleviation would take the form of reducing the sail effect of the wind on the remaining trees.

9. Trenching for utilities must require the following: a) avoidance of the main root plate, b) routing trenches with the flow of the roots, i.e., by radiating from trunk, c) if inevitable, treat all cut roots, and d) when tunneling, the contractor must start below the main lateral level of roots as soon as a 1½-inch diameter root is encountered. Tunneling should be from both directions.

10. Penalties involving damage to trees are to be determined by a consulting arborist who is one of three acceptable choices or by an urban forester skilled in the knowledge of tree care. Penalties are to be based on the "Guidelines for Evaluating Trees." Negligence shall be twice the assessed penalty, gross negligence — three times the assessed penalty.

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Leslie S. Mayne Associates, Inc.
Burlingame, California