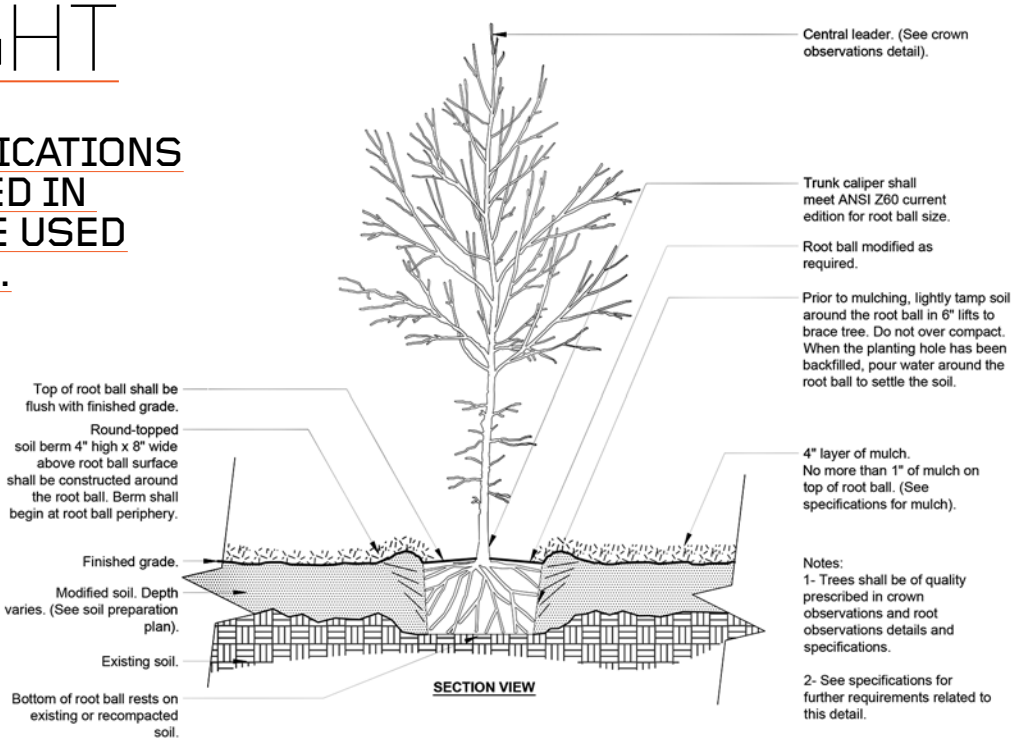
PLANT IT RIGHT

NEW DETAILS AND SPECIFICATIONS FOR CITY TREES ARE BASED IN SCIENCE AND READY TO BE USED IN CONTRACT DOCUMENTS.

BY TYSON CARROLL AND JAMES URBAN, FASLA



Many of the current standards, details, and specifications related to planting are seriously flawed and need to be updated to reflect contemporary science, problems in the industry, and modern practices. The profession of landscape architecture and the landscape industry have changed, reacting to budget pressures, environmental ethics, and project team dynamics. With the goal of developing science-based specifications and details, Brian Kempf and Tyson Carroll at the Urban Tree Foundation, a nonprofit organization in Visalia, California, that works on improving the success of trees in urban areas, collaborated with James Urban, FASLA, founder of Urban Trees + Soils in Annapolis, Maryland, and Ed Gilman, a professor of urban trees and landscape plants at the University of Florida, Gainesville, to create a set of peer-reviewed documents in four areas of practice: planting, planting soil, irrigation, and tree preservation. The project was funded by the CAL FIRE Urban and Community Forestry Program to support the needs of projects in California but is designed to be easily adapted to other regions and is a good basis for developing details and specifications across the United States.

The importance of science-based specifications arises from challenges landscape architects must deal with in projects and on sites. In the past several decades, projects have become increasingly complicated, requiring a higher level of construction knowledge and coordination of disciplines. Design ideas increasingly push the limits of natural systems or, worse, ignore nature's limitations. Urban soils make it difficult to establish plants and preserve large trees. The trend toward sustainable design requires that the design and construction of landscapes be supported by scientific research, but often, outdated details and specifications are used for project documents. Projects are praised for the appearance of sustainable design but often fail to build systems that are actually sustainable. Plants die or fail to thrive due to poor-quality root systems, structurally weak branching structures, or inappropriate planting conditions. Planting soil is often overly dependent on manufactured but poorly researched soil approaches and frequently ignores usable existing soil resources. Irrigation frequently uses standard specifications that aren't designed for specific soil and plant requirements or can't be easily maintained. Tree preservation is often just fencing, when new technology

ABOVE
A new tree planting detail for sites where soil has been modified drops the requirement to dig a planting hole twice the diameter of the root ball.

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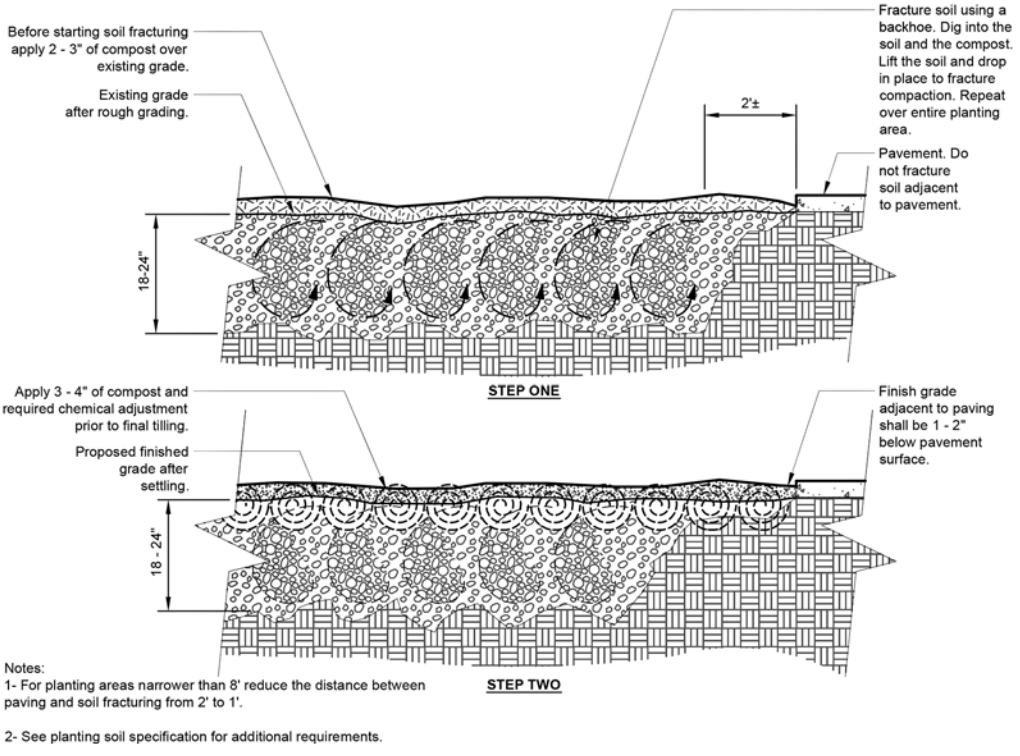
and techniques could enhance the tree's condition and still allow the construction of some site elements within the tree protection zone.

Landscape architects have increasingly focused on the aesthetic part of project development and have abandoned much of their interest in the important technical skills they need to support the images they can so beautifully draw with today's complex computer programs. Skills in horticulture, including plant requirements, soils, water, and drainage, aren't priorities. Time in the field overseeing installations or visits to nurseries to approve plants have been reduced and often eliminated, a victim of lower fees and a greater emphasis on selling design services over construction administration. This time in the field can help designers better understand how drawings and specifications are actually performing and recognize when failure or underperformance may be the result of inappropriate specifications and details rather than the fault of the contractor. Too often the emphasis in evaluating a failure is to find something the contractor did wrong rather than take a frank look at the design, detailing, and specification as a potential cause of the problem.

One of the principal causes of plant failure has been changes in the way the nursery industry produces the root system and prunes the tops of plants, which can cause plant decline or death. Container production is resulting in plants that have roots circling around the stem of the tree or shrub above the root collar. Plants are placed too deep in the soil at the nursery or within the container. Balled and burlapped trees are often grown for some period of time in a container, leaving an imprint of the circling roots (see "The Root of the Problem," *LAM,* April 2013). Trees are pruned to create full heads, which are attractive at the time of purchase but which leave the tree with multiple weak branch attachments that are difficult, if not impossible, to correct as the tree matures. The Bradford pear is a classic example of a tree that the industry has all but abandoned, in part because of recognized weak branch attachments, but these structural defects were created by nursery pruning practices and are not a genetic feature of this tree when it is properly pruned. These root and branch problems are not addressed in most specifications, and landscape architects may not even be aware of these issues. Most specifications leave the landscape architects with little contractual language that allows them to reject poor-quality root and branch systems, require defects to be modified, or even to inspect root systems. Nurseries are reluctant to fix problems during the production process or at the time of sale. Correcting poor-quality nursery stock at the end of the production process or at the time of planting is expensive.

The science that underpins the needed changes to details and specifications has been part of a series of best practices documents issued by several organizations including the American Society of Landscape Architects (ASLA, which publishes this magazine) and the International Society of Arboriculture (ISA). Some specification writers have adopted many of the recommendations in these best practice documents. But documents such as ASLA's Landscape Architecture Technical Information Series on soil,



ABOVE
Soil improvement in areas of deep compacted subsoil relies on fracturing the soil and adding compost instead of replacing the soil.

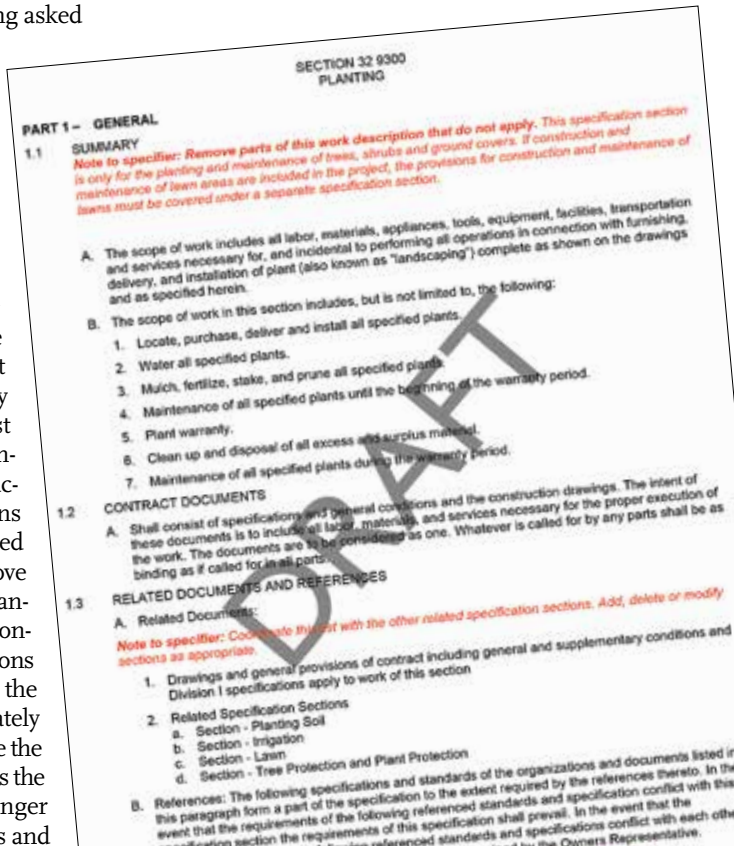
the *SITES v2 Reference Guide,* or ISA's *The Practical Science of Planting Trees* aren't written in the language and format of a specification and aren't useful as contract documents as they are too general and can't reference project-specific site conditions, goals, and budgets. They don't give specific solutions and often offer multiple options to solve particular problems.

Industry-produced standards documents may also be misused in a specification. For example, the American Standard for Nursery Stock (ANSI Z60.1) is often referenced in specifications to describe plant quality without the specification writer realizing that this document is primarily a measurement standard and plant quality is not generally discussed. Specification language that includes sentences such as "Follow applicable industry standards" creates wide holes that contractors can wiggle out of or hide behind as may suit their needs at the moment.

Contractors often use the plant warranty to deflect questions about plant quality, particularly issues with the root system. They may state that it is okay to leave a circling root system and that if the plant dies, they will replace it under the warranty. It's unfortunate that poor root systems usually do not kill the plant within the warranty period. But these conditions are setting up the plant for long-term decline that the owner will have to deal with decades later. The contractor alternatively may say if the landscape architect requires extensive root manipulation, the plant warranty is voided. Most current specifications do not give the landscape architect the tools to argue for and enforce better plant root quality. It's also not advisable to reference current scientific papers in specifications. Scientific research often results in conflicting conclusions or looks at a limited question out of context to a more complex environment. Research that shows conclusive benefits from certain practices may not be practical or affordable to implement, or an innovative research conclusion might have unintended and undesirable consequences that can cause skepticism with the overall process of science-based change. Finally, any research supporting innovation may be challenged or rejected by the part of the industry being asked to change. In the case of root system quality, the nursery industry has been slow to acknowledge that there is a problem and has been slow in helping to find a better solution.

It is the specification writers' duty to make their best assessment of the project conditions and set whatever requirements they feel are in their clients' best interest. In a successful contractual relationship, contractors bid on the specifications and details and are obligated to qualify their bids to remove any clause they feel they cannot comply with. Once the contract is signed, the specifications and detail drawings control the work. We all have unfortunately experienced situations where the contract provisions unravel as the project proceeds. The stronger and more reliable the details and specifications, the greater chance we have to enforce the intent of the documents.

It is important that specifications follow the formatting guidelines of the Construction Specifications Institute. Having consistent language and structure from section to section can make contract administration seamless from trade to trade. These new specifications are designed to meet these requirements. Details should follow drawing conventions and be coordinated with the specifications. Nomenclature must be consistent. For example, planting soil cannot be defined in



SECTION 32 9300
PLANTING

PART 1 – GENERAL

1.1 SUMMARY

Note to specifier: Remove parts of this work description that do not apply. This specification section is only for the planting and maintenance of trees, shrubs and ground covers. If construction and maintenance of lawn areas are included in the project, the provisions for construction and maintenance of lawns must be covered under a separate specification section.

A. The scope of work includes all labor, materials, appliances, tools, equipment, facilities, transportation and services necessary for, and incidental to performing all operations in connection with furnishing, delivery, and installation of plant (also known as "landscaping") complete as shown on the drawings and as specified herein.

B. The scope of work in this section includes, but is not limited to, the following:

1. Locate, purchase, deliver and install all specified plants.
2. Water all specified plants.
3. Mulch, fertilize, stake, and prune all specified plants.
4. Maintenance of all specified plants until the beginning of the warranty period.
5. Plant warranty.
6. Clean up and disposal of all excess and surplus materials.
7. Maintenance of all specified plants during the warranty period.

1.2 CONTRACT DOCUMENTS

A. Shall consist of specifications and general conditions and the construction drawings. The intent of these documents is to include all labor, materials, and services necessary for the proper execution of the work. The documents are to be considered as one. Whatever is called for by any parts shall be as binding as if called for in all parts.

1.3 RELATED DOCUMENTS AND REFERENCES

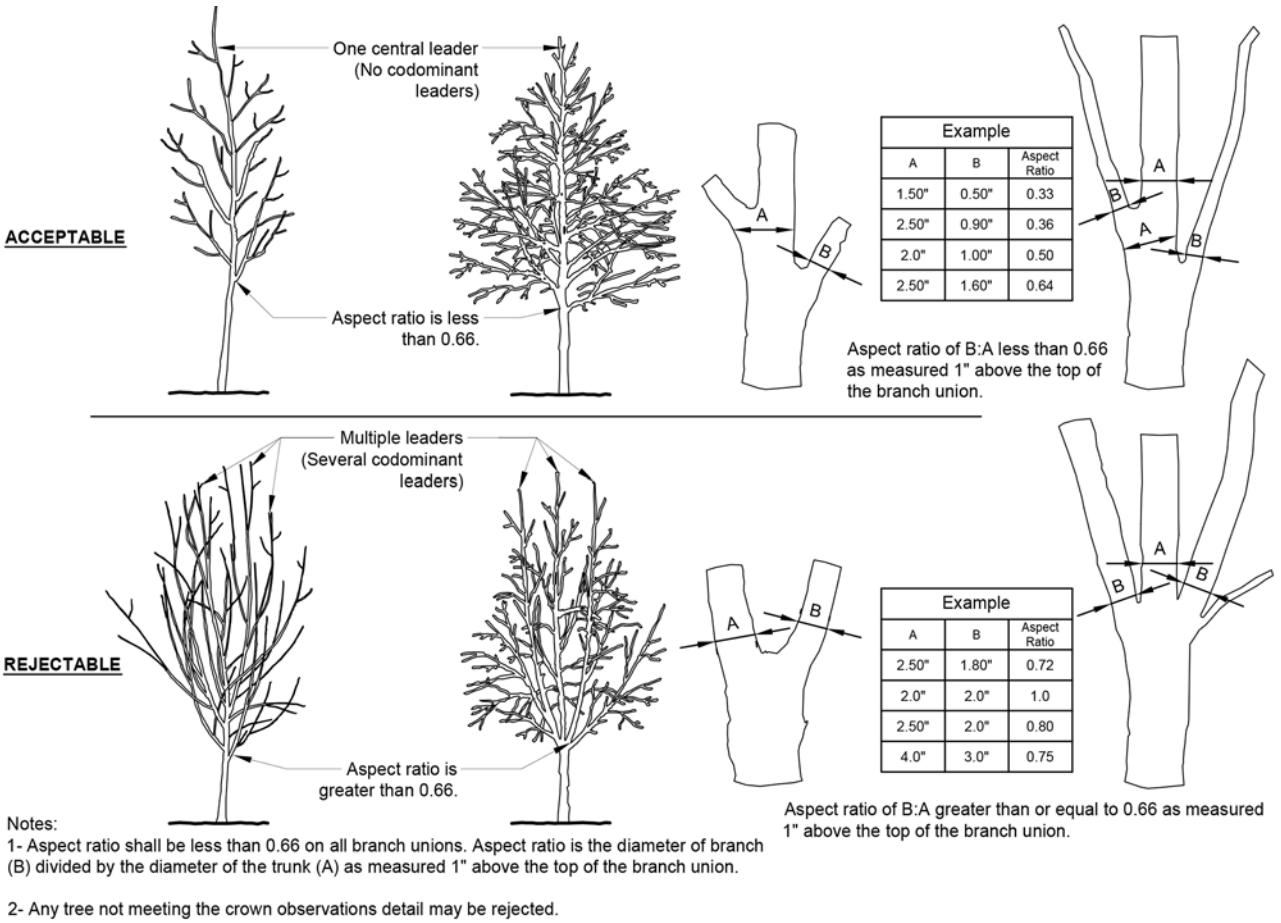
A. Related Documents:

Note to specifier: Coordinate this text with the other related specification sections. Add, delete or modify sections as appropriate.

1. Drawings and general provisions of contract including general and supplementary conditions and Division I specifications apply to work of this section
2. Related Specification Sections
   a. Section - Planting Soil
   b. Section - Irrigation
   c. Section - Lawn
   d. Section - Tree Protection and Plant Protection

B. References: The following specifications and standards of the organizations and documents listed in this paragraph form a part of the specification to the extent required by the references thereto. In the event that the requirements of the following referenced standards and specification conflict with this specification section the requirements of this specification shall prevail. In the event that the referenced standards and specifications conflict with each other

BELOW
Specifications contain many notes to the specifier, in red, that highlight items needing special attention during the editing process.



the specifications as "planting soil" and then as "growing medium" in the details. These documents retain nomenclature consistency, which needs to be maintained as they are amended and inserted into the larger set of project documents.

An important element of these specifications is the peer review process. The final draft of the documents was sent to more than 30 practitioners, contractors, growers, urban foresters, and researchers for their comments. While peer review never assures a perfect document, it increases the user's confidence in its accuracy. It is hoped that the first users of this work will report any errors or disagreements in the documents. Since the documents are amendable, the users are able to make changes and corrections that are appropriate for their work.

Embedded in the specifications is a series of "Notes to Specifier." These are informational directives to the specification writer that highlight where the specifications might need further modification or provide information on intent. These notes are in red in the document for clarity and to remind the writer to delete them prior to issuing the document.

The detail drawings are created in AutoCAD 2014 and Land F/X and are fully amendable by the user. Standard layer and line weight conventions were followed. The specifications are written in Microsoft Word 2008 for Mac. All the documents are also available as PDF documents. The documents are all open source and can be downloaded at *www.urbantree.org*. ●

TYSON CARROLL IS A LANDSCAPE ARCHITECT AT THE URBAN TREE FOUNDATION. JAMES URBAN, FASLA, IS A LANDSCAPE ARCHITECT WHO SPECIALIZES IN URBAN TREES AND SOILS AND IS A CONSULTANT TO OTHER LANDSCAPE ARCHITECTS.

ABOVE
The requirements for plant quality go beyond ANSI Z60.1 and provide a metric to accept or reject plants.