DESIGNING ALTERNATIVES TO AVOID STREET TREE CONFLICTS[1]

by David V. Bloniarz and H. Dennis P. Ryan, III[2]

Abstract. The use of representative crossectional illustrations of various street types presents a useful and effective method of examining the relationship between overhead electric lines and street trees. This design system can serve as the basis for proper species and site selection. Through the development of a series of street type criteria, ranging from larger major arterial roads to smaller local streets, this paper presents a workable and useful methodology that is available to municipalities and utility companies for aiding in the selection and management of street trees.

The impact of overhead wiring on the landscape is both physical and aesthetic. Views that otherwise would be unobstructed are often interrupted by the siting of electric distribution lines. The aesthetic quality of the streetscape is often shaped by the location of utility lines, with design responses often patterned after the utility infrastructure. The widespread use of trees along streets as a design element presents problems to the electrical distribution network, since ultimately many trees come in contact with the overhead wiring, causing interruption in the delivery of electricity and becomes a safety issue. Even the use of proper arboricultural pruning techniques has often led to a degradation in the form of the street trees, and has encouraged the development of misshaped and aesthetically unpleasing trees. A reduction in the number of such instances should be paramount in the development of a streetscape that uses trees as a design element.

Species selection, planting location, and cultural practices all have an impact on the visual quality, health, and cost of maintaining a street tree (2). The use of appropriate species, the proper location of plantings, and the implementation of a program of preventive maintenance for the street tree will allow for a cost effective tree management system. Reducing the conflict between utility wires and tree plantings will lead to a less costly procedure for the maintenance of overhead utility lines. The appropriate use of trees along streets also benefits other components of the urban infrastructure, including a reduction in the amount of damage by tree roots to streets and sidewalks.

The development of design criteria leading to more successful and less costly street tree planting and maintenance programs is important for the effective design and management of trees growing along roadways (3). Study of existing examples of street tree plantings allows for the development of design recommendations with appropriate species that will tolerate roadside conditions, reduce municipal infrastructure damage and limit the interface between utility wires and individual trees.

The development of these recommendations is based on street type, street width, size of tree belts, design intent, and the location of the physical infrastructure. The use of a standard set of criteria can ensure that a street tree will be able to develop to its desired shape, fulfil its design intent, and be aesthetically appropriate. The guidelines can be sued to choose the right tree for the right spot, so as not to interfere with overhead utilities, damage the municipal infrastructure, or increase of maintenance costs.

Street Tree and Utility Line Interfacing

The conflict between utility lines and street trees can be found in almost any community one examines. The degree of interfacing between the two is most evident on streets carrying 3-Phase primary conductors, where the wires are anchored to cross-arms. The 3-Phase type of wiring needs more overhead clearance space than does single

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phase wiring, and therefore increases the potential for interference with trees that grow nearby.

Increased use of the crossarm on many 3-Phase electric delivery systems has presented a problem for street tree managers, since many trees come within the line clearance area as the crossarms are added to nearby poles. The increased use of the crossarm means that the right-of-way or the clearance around the lines is more likely to impact the aesthetics and health of nearby trees. This is critical when crossarms are added to poles previously having no crossarm, making it necessary to dramatically trim trees that formerly did not interfere with the wiring.

Designing Alternatives

Through the use of a set of standard roadway types, an effective mechanism for determining the relationship between street trees, design intent, and electrical distribution is possible. Harris and Dines (1) group roads and street into four categories as the basis for creating a set of standard street types. These include Major Arterial, Minor Arterial, Collector, and Local streets. The addition of Boulevard streets completes the list and serves as a basis for developing a street tree planting program that addresses the aesthetic qualities of the streetscape.

Through the development of design criteria for specific street types, recommendations can be presented in a simple graphic manner. The use of design criteria aids in the implementation of policies that encourage the improved management of street tree inventories, while increasing the aesthetic and ecological quality of the streetscape. This design system also aids in reducing potential physical infrastructure damage to utility lines, and municipal and private property. The proper selection and placement of new trees reduces potential damage to streets, curbs, sidewalks, utilities and subsurface drainage structures. It becomes apparent that street patterns, combined with street types and other site factors, should play a role in the selection of plant materials.

Demonstration of methodology. The relationship between overhead utility lines, street trees and the importance of proper plant selection that is appropriate to the planting location can be illustrated by using the street type as the criteria for making planting and management decisions. Figure 1 shows a Major Arterial Road with two lanes of traffic in each direction with a 12 foot parking lane on both sides of the road. The maximum size of the tree belt is 24 feet, including the areas necessary to construct a sidewalk and plant trees. The trees that are illustrated are medium to large size deciduous shade trees, serving as typical representations of the mature size of many trees along typical roadways. Sidewalks are found on both sides of this type of roadway, reducing available space for tree planting. While the drawing illustrates the minimum design standards for a Major Arterial Road, many roadways fall below these standards.

The examination of a Major Arterial Road type can serve as a guideline to assist in making informed planting decisions for this street type, and can be used as the basis for recommendations for other street types. The recommendations ensure that the design intent is achieved while maintenance costs and damage to physical infrastructure is kept to a minimum. The following recommendations are meant to assist in this process of planting the right tree in the right spot.

When replacing street trees, or there is reconstruction of a Major Arterial Road, there are several alternative planting procedures that can be implemented to allow for increased viability of the streetscape trees and improved aesthetic quality. These alternatives include the following:

- Proper species selection, so that only trees that will not interfere with overhead utility lines, buildings, and sidewalks are planted along streets.
- Setback planting of street trees to a location where they can grow without interfering with the overhead utility lines, buildings, and sidewalks.
- Planting trees in locations within the right-of-way other than directly below the utility lines, including construction of new planting islands along the street edge.

Alternative Recommendations

Figure 2 shows a Major Arterial Road with the trees near the utility lines having been trimmed resulting in a degradation of the aesthetic quality of the streetscape, increased likelihood of insect

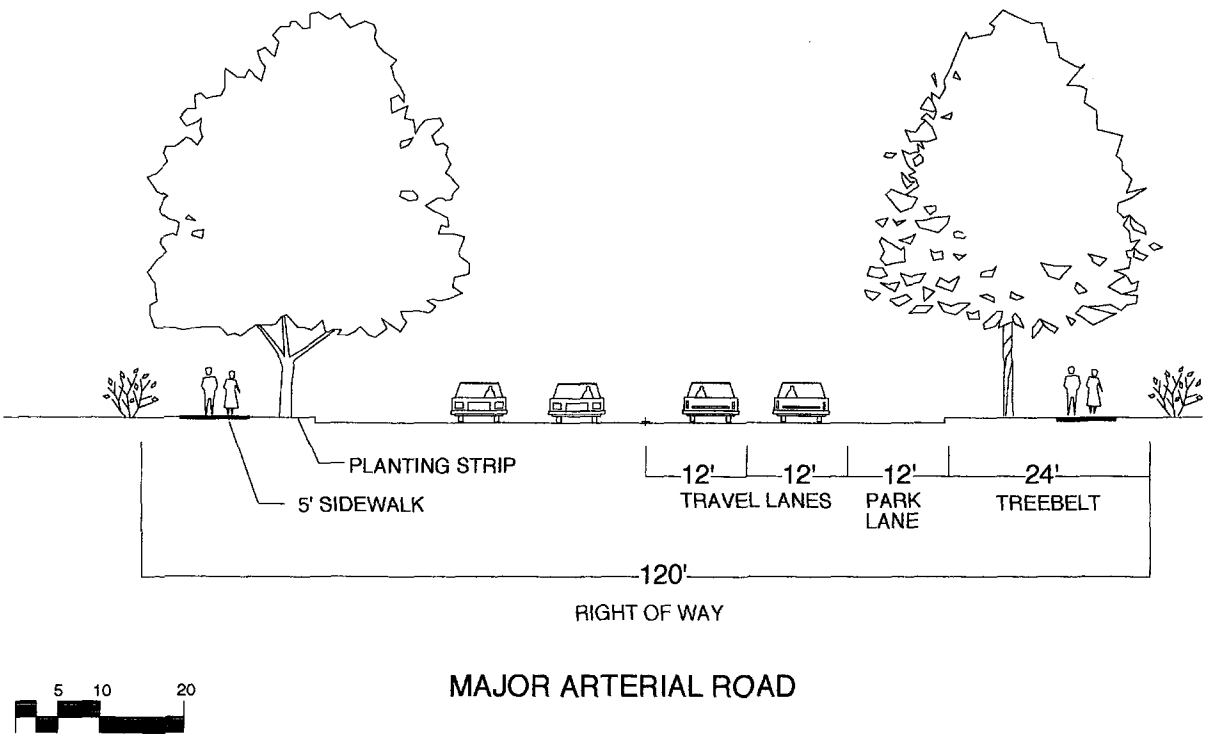

Figure 1. A Major Arterial Road illustrating design features including edge, enclosure and separation. This appearance is what the designer expects to have when the project is complete, but this arrangement does not take into account utilities and municipal infrastructure.

and disease damage, and the possible failure in achieving any design intent that may have been envisioned for the street. The loss of enclosure, edge, and separation of public and private space occurs, changing the entire sense of space that otherwise would be part of this streetscape.

Setback Planting. Figure 3 shows the same Major Arterial Road with the street trees planted in a set back location from the edge of the right-of-way. This planting location allows for sufficient room for the street tree to grow without growing into the utility lines, thereby not requiring the maintenance trimming that street trees planted in a more traditional arrangement on the tree belt or planting strip require. Legislation on a state or local level, allowing for the planting of public shade trees on private property, should be encouraged, enabling this type of planting where appropriate.

Planting with Reduced Plant Size. In Figure 4, the selection of a tree species whose ultimate size will not allow for growth within the vicinity of the overhead utility lines is shown. The use of slower growing and/or smaller species, which also tolerate streetscape condition, can be used to eliminate the need for maintenance trimming near the utility

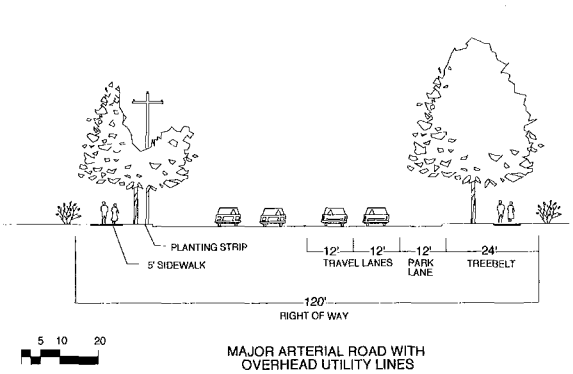

Figure 2. A common urban cross section of a Major Arterial Road, including sidewalks on both sides of the street, planting strips and utility pruning.

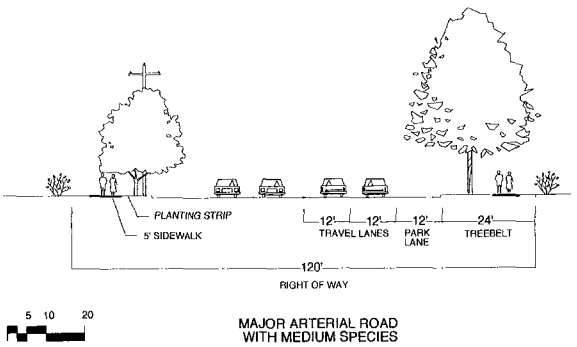

Figure 4. Cross section of a Major Arterial Road with medium size tree species used under the utility lines.

lines. The use of newer varieties of plants and the planting of trees that will achieve aesthetically pleasing results, makes this type of planting appropriate in many instances.

Planting with Columnar Plants. When choosing tree species for use on a street where overhead utility lines occur, it may be advantageous to choose a columnar or fastigiate variety of plant species (Figure 5). There are many species and cultivars available that have been developed having a form that will grow in a narrower streetscape space. These types of trees can be used to enforce the design scheme, while maintaining the attributes of height, color, and texture that would occur with a species that does not have a columnar form.

Conclusion

The use of representative cross section illustrations of various street types presents a useful and effective method of examining the relationship between overhead electric lines and street trees.

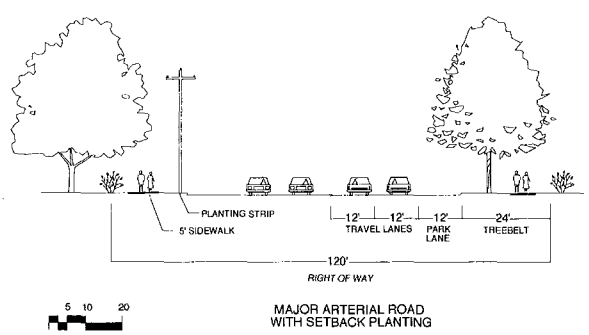

Figure 3. Cross section of a Major Arterial Road with setback planting to avoid the utility lines.

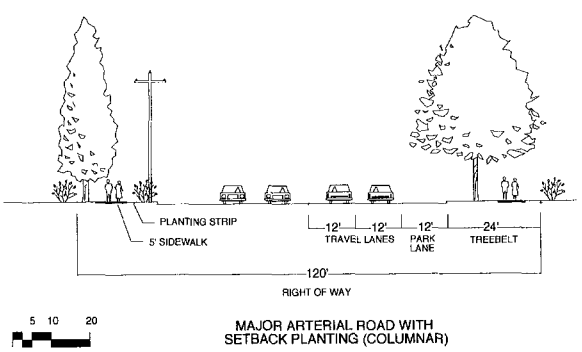

Figure 5. Cross section of a Major Arterial Road with columnar setback planting.

This design system can serve as the basis for proper species and site selection. Through the development of a series of street type criteria, ranging from Major Arterial Roads to smaller Local Streets, a workable and useful methodology is available to municipalities and utility companies for aiding in the selection and management of street trees. By incorporating physical factors with aesthetic and design considerations, this method can be an effective tool in the development of streetscapes that are less costly to maintain, are functionally more successful and are aesthetically pleasing.

Literature Cited

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Résumé. L'emploi d'illustrations représentatives de coupes de divers types de rues représente une méthode utile et efficace pour l'étude de la relation entre les réseaux électriques aériens et les arbres de rues. Ce système de dessins peut servir de base pour une sélection adéquate des espèces et des sites. À travers le développement d'une série de critères de classement des types de rues, depuis les grandes artères majeures jusqu'aux petites rues locales, cet article présente une méthodologie utile et pratique qui est disponible aux municipalités et aux compagnies de services et qui facilite la sélection et la disposition des arbres de rues.

Zusammenfassung. Repräsentative Querschnittsdarstellungen verschiedener Straßbentypen sind eine nützliche und wirksame Methode zur Untersuchung der Wechselbeziehungen zwischen den oberirdischen Stromleitungen und den Straßbenbäumen. Diese Darstellungsmethode kann als Grundlage für die Wahl geeigneter Arten und Standorte dienen. Durch die Entwicklung einer Reihe von Typenmerkmalen bestimmter Straßben, die von größeren Hauptverkehrsstraßen bis zu kleineren Nahverkehrsstraßen reicht, stellt diese Arbeit eine durchführbare und nützliche Methode dar, die für Gemeinden und Fachfirmen verfügbar ist, um bei der Auswahl und Pflege von Straßenbäumen behilflich zu sein.