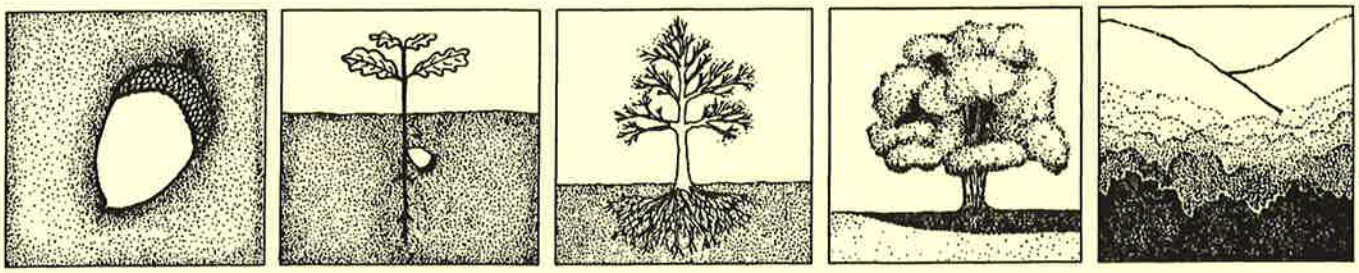
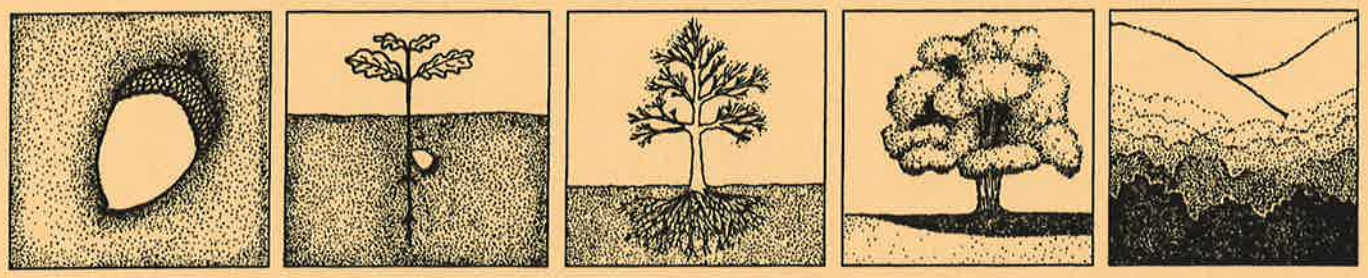


# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN

| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

OCTOBER 1989



# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN

## EXECUTIVE SUMMARY

| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

OCTOBER 1989

# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN

Interim City Hall
401 West Hillcrest Drive
P.O. Box 1496
Thousand Oaks, CA 91360
(805) 497-8611

WOLFE MASON ASSOCIATES
Landscape Architects
2119 West Street
Berkeley, CA 94702
(415) 841-8455

in association with
William Carney, Landscript Associates
Barrie Coate, ISA
Billy Goodnick, ASLA

# ACKNOWLEDGMENTS


**City Council**
Mayor Alex Fiore
Frank Schillo, Mayor Pro Tem
Larry Horner
Tony Lamb
Robert E. Lewis

**Planning Commission**
Judith A. Lazar, Chair
Frank Nekimken, Vice-Chair
Gregory P. Cole
Charles E. Vining

**Arts Commission**
Richard Johnson, Chair
Cate Brown
Maria A. Martin
Sidney O'Connell
Reni Pasricha
Gayle Simpson
Jeanne Stapp
Daniel Witting

**Forestry Master Plan Ad-Hoc Committee**
Frank Schillo, Chair
Steve Davis
James Dean
Poly L. Derr
Sidney G. Eisenberg
John Innes
Dr. Ali Kiafar
Carol Larsen
William McGinley
Joel Meyer
Robert Morrison
Doc Needham
Frank Nekimken
Terry Ryan
Rorie Skei
Jeanne Stapp
John Van Tilberg

**City Staff**
Grant Brimhall, City Manager
MaryJane V. Lazz, Assistant City Manager
William Elmendorf, Urban Forester and Project Manager
Joe Bravo, Landscape Supervisor

**Planning & Community Development**
Philip E. Gatch, Director
Michael J. Sangster, Deputy Director
John Prescott, Principal Planner
Ed Rinke

**Public Works**
John Clements, Director

**City Attorney**
Mark Sellers, City Attorney
Nancy Schreiner, Deputy City Attorney

**Finance**
Robert S. Biery, Director

**Utilities**
Donald H. Nelson, Director

**Library**
Marvin E. Smith, Director

**Building & Safety**
Barry Branagan, Director

**Law Enforcement**
Bill Wade, Commander

**Wolfe Mason Associates**
Gary Mason, Principal and Project Manager
Roseann Dal Bello
Michele Drescher
Susanna Maldonado
Lori Pottinger
Leslie Zimmerman
David Widelock
Sam Winklebleck
Doug Wolfe, Principal

**Consultants**
William Carney, Landscript Associates
Barrie Coate
Billy Goodnick

# MASTER PLAN TABLE OF CONTENTS

# OBJECTIVES AND ORGANIZATION OF THE MASTER PLAN

The overall goal of the Master Plan is to provide the city with a sound basis for the creation and management of its community forest and to set policies that will allow the community forest to provide the greatest number of benefits for residents as well as trees. To reach these goals, the plan encompasses eleven objectives, organized in five separate volumes for ease of use by the various groups responsible for the forest:

## Volume 1: Program and Policies

This volume is for use by city policy-makers and staff, business people, developers, residents and all others involved in community forestry decisions. It provides a statement of the city's policies and practices relating to trees and recommends ways in which they can be made as effective as possible.

**Objectives:**

1. To provide a comprehensive rationale and description of the city's forestry program.

2. To summarize city policies and ordinances relating to trees and recommend potential changes.

3. To set forth the roles of various public jurisdictions and the private sector in creating and managing the community forest, and identify means of effective coordination.

## Volume 2: Management and Design Plan

This volume is primarily for use by city staff, business people, developers and their consultants, residents and others involved in selecting species and sites for new plantings. It provides design and management guidelines for successfully applying plant to site, examines design issues for the major streets and neighborhoods, and recommends a palette of trees for local use.

**Objectives:**

1. To formulate community forest management guidelines addressing such issues as species diversification and tree removals.

2. To recommend budgeting for the city's forestry program based on a model for estimating the monetary value of the community's forest resource, relative to the costs of creating and maintaining the forest.

3. To describe the environmental issues that affect tree planting.

4. To formulate design criteria to guide the choice of street tree species in the city's various planning areas and along its major streets.

5. To compile a palette of street tree species for use in Thousand Oaks, based on the city's environmental conditions and aesthetic character.

**Volume 3: Planting and Maintenance Manual**

Primarily for use by public and private landscape crews, this volume might also interest residents interested in maintaining trees on their own property. It sets forth standards of practice for landscape work on public property.

**Objectives:**
1. To provide a day-to-day manual of proper planting and maintenance practices to ensure the best care possible for the community forest.

**Volume 4: Street Tree Inventory**

This volume will assist city staff in producing a complete, ongoing inventory of the community forest. Such an inventory allows staff to more easily and thoroughly manage the community forest.

**Objectives:**
1. To provide the framework for establishing and using a comprehensive inventory of the city's street trees.

**Volume 5: Community Participation and Education**

This volume suggests ways of involving members of the community in forestry issues and practices. Primarily meant for use by city staff, it will also prove useful to citizens interested in promoting community forestry.

**Objectives:**
1. To provide the framework for public participation in creating and caring for the community forest.

# BIBLIOGRAPHY

*Agricultural Publications Catalogue*, University of California, Division of Agriculture and Natural Resources, Oakland, CA: 1989. (Publications on pest and disease control, pruning, turf, irrigation.)

American Forestry Association. *Save Our Urban Trees: A Citizens' Action Guide*. Washington, D.C., 1989.

*American National Standard For Tree Care Operations*, American National Standards Institute, New York, NY: 1982.

Appleyard, Donald. *Livable Streets*. Berkeley, CA: University of California Press, 1981.

————. *Urban Forestry Forum*. Many issues.

Arnold, Henry F. *Trees in Urban Design*. New York: Van Nostrand Reinhold Company, 1980.

*Automatic Sprinkler System Scheduling*, Toro Company, Irrigation Div., Riverside, CA.

Beatty, Russell. *Trees for Lafayette*. Oakland, CA: ASLA, Northern California Chapter Publications Group, 1975.

Berg, Peter, Magilavy, Beryl, and Zuckerman, Seth. *A Green City Program for San Francisco Bay Area Cities and Towns*. San Francisco: Planet Drum Books, 1989.

Bernhardt, Elizabeth and Swiecki, T. J.: *The State of Urban Forestry in California*, Sacramento, CA, California Dept. of Forestry and Fire Protection, 1989.

Carney, William. *A Citizens' Guide to Maintaining Neighborhood Places*. Washington, D.C.: U.S. Dept. of the Interior, Heritage Conservation and Recreation Service, 19??.

————. *The Hip Pocket Urban Tree Planter*. Sacramento, CA: California Dept. of Forestry, 1979.

City of Oakland. *Green Streets*.

Comnes, Leslie, Cuomo, Celia, and Sly, Carolie. *The California State Environmental Education Guide*. A curriculum guide for kindergarten through sixth grade. Hayward, CA: Alameda County Office of Education, 1989.

Cotton, Lin and McNair, James. *Trees for San Francisco*. San Francisco: Friends of the Urban Forest, 1985.

East Bay Municipal Utility District. *Water Conserving Plants and Landscapes for the Bay Area*. Alamo, CA, 1986.

Hall, D.O., Margaris, N. S., and Myers, N. (eds.) *Economics of Ecosystems Management*. Dordrecht, the Netherlands: Dr. W. Junk Publishers, 1985.

Harris, Richard: *Arboriculture: The Care of Trees, Shrubs, and Vines in the Landscape*. Englewood Cliffs, NJ: 1983.

Irrigation Technical Services: *The ABC's of Lawn Sprinkler Systems*, Lafayette, CA: 1979.

Kelley, Alden: *Tree Value Appraisal*. Fullerton, CA: 1989.

Koehler, C. S.: *Diagnosing Tree Problems Caused by Pests*. U.C. Cooperative Extension, Berkeley, CA: 1988.

Mason, Gary and Starkie, Edward. *Maintenance Standards for Central California Naval Stations*. Palo Alto, CA: Hardesty Associates, 1987.

McPherson, E. Gregory (ed.). *Energy Conserving Site Design*. Washington, D.C.: ASLA, 1984.

Perry, Bob. *Trees and Shrubs for Dry California Landscapes*. San Dimas, CA: Land Design Publishing, 1981.

*Pruning Standards*, International Society of Arboriculture.

*Rainbird Irrigation Design Manual*, Rainbird Sales Inc., Turf Div., Glendora, CA: 1984.

*Rainbird Landscape Drip Irrigation Manual*, Rainbird Sales, Turf Div., Glendora, CA.

Schmidt, Marjorie G. *Growing California Native Plants*. Berkeley: University of California Press, 1980.

Sinclair, Lyon, and Johnson, *Diseases of Trees and Shrubs*, Cornell University Press.

Spirn, Anne Whiston. *The Granite Garden.* New York: Basic Books, 1984.

Stone, Christopher. *Should Trees Have Standing? Toward Legal Rights for Natural Objects.* Palo Alto, CA: Tioga Publishing Co., 1988.

Sunset Magazine. *Western Garden Book.* Menlo Park, CA: Lane Publishing Co., 1988.

————. *Sunset Pruning Handbook*, Lane Publishing Co., Menlo Park, CA.

University of California Cooperative Extension, Alameda County. *California Urban Forest Survey: Growing Points.* Hayward, CA, 1989.

Watkins, James: *Turf Irrigation Manual*, Telsco Industries, Dallas TX, 1987.

## City of Thousand Oaks Reports

*City Identity/Streetscape Study*, Thousand Oaks Arts Commission, 1986.

*Conejo Open Space Conservation Agency Brochure*, 1984.

*Conejo Valley Attitude Survey*, Dept. of Planning and Community Development, 1984.

*Freeway Corridor Visual Analysis and Design Study*, Dames and Moore, 1988.

*Ridgeline Study*. Dept. of Planning and Community Development, 1988.

*Scenic Highways Element*, General Plan, 1974.

*Thousand Oaks Development Plan*, 1971.

# RESOURCES

**American Forestry Association**
P.O. Box 2000
Washington, D.C. 20013
(202) 667-3300

(Membership fee includes subscription to *Urban Forestry Forum* and *American Forests* magazines.) The AFA is also the sponsor of the Global ReLeaf program (listed below).

**Global ReLeaf**
c/o Jim Geiger
California Department of Forestry
P.O. Box 944246
Sacramento, CA 94244
(916) 322-0109

**California ReLeaf**
c/o The Trust for Public Land
116 New Montgomery, 3rd Floor
San Francisco, CA 94105
(415) 495-5660

**Arbor Day Foundation**
100 Arbor Ave.
Nebraska City, Nebraska 68410
(402) 474-5655

This group sponsors the **Tree City U.S.A.** program. Some of the requirements for attaining this designation: the city must have a forester on staff, a minimum of $1/per capita set aside for the forest, and an overall tree ordinance that meets certain standards.

**Backyard Habitat Planning and Planting Kit**
available from:
National Wildlife Federation
1416 16th St. N.W.
Washington, D.C. 20036-2266

**Bio-Integral Resource Center**
P.O. Box 8267
Berkeley, CA 94707
(415) 524-2567

BIRC was formed over a decade ago to promote the Integral Pest Management (IPM) method in which chemical controls are used only as a last-ditch effort to suppress pest populations. The aim is "least toxic," not "no toxic." Valuable publications produced by this group include the following:

*The IPM Practitioner*, published ten times a year for professionals.
*Common Sense Pest Control*, published quarterly for homeowners.

**California Oak Foundation**
909 12th St., Suite 125
Sacramento, CA 95814
In southern California, the contact for the group is Michael Mahoney, (714) 474-9230.

This organization has set the goal of planting one million oaks by the turn of the century, and has designated 1990 as "The Year of the Oak."

***California State Environmental Education Guide***
by Carolie Sly, Leslie Comnes and Celia Cuomo
available from:
Alameda County Office of Education
313 W. Winton Ave.
Hayward, CA 94544-1198

A curriculum guide for elementary schools that outlines environmental lessons, divided by grade. There are a host of lessons about trees in this excellent book, and many creative ideas for teachers.

**California Urban Forests Council**
c/o Forestry Division
1320 North Eastern Ave.
Los Angeles, CA 90063

**Classes on Urban Forestry**
offered by the Dept. of Natural Resources Management
Cal Poly San Luis Obispo
San Luis Obispo, CA 93407
(805) 756-2021
Contact: Tim O'Keefe

The 30-unit urban forestry concentration in this department "emphasizes the application of forestry skills for management of urban forest ecosystems." Classes in arboriculture, urban soils, hardwood management and community forestry are offered. Other areas of concentration in this department include parks and forest recreation, forest resources management, and forest resources: watershed, chaparral and fire management.

**Evaluating Trees for Hazard**
An instructional videotape (1989).
Available for $20 from:
American Forestry Association
P.O. Box 2000
Washington, D.C. 20013

**Friends of the Trees Society**
Box 1466
Chelan, WA 98816

This organization has produced the *International Green Front Report*, a "compendium of noteworthy deeds, project, events, organizations, movements, indiduals, periodicals, books and articles concerning re-greening the earth." Available for $7 from above address.

**Global Forests**
An instructional videotape (1989) available for $20 from:
K.I.D.S.
(Kids Internationally Distributed Superstation)
Eureka, MO 63025
(314) 993-KIDS

This project is a global effort which encourages classrooms of children to plant large numbers of trees in cities around the world each school year. Many organizations are collaborating including the Sister Cities Ambassador Program

***Living Among the Oaks***
A Management Guide for Landowners.
Available from:
University of California Cooperative Extension
Natural Resources Program
163 Mulford Hall
Berkeley, CA 94720
(415) 642-2360

***Municipal Tree Ordinance Manual 1989***
and
***Municipal Forestry Guide for Contract Specifications 1989***
available for $15 each from:
MAUFS, Monmouth County Shade Tree Commission
P.O. Box 1255
Freehold, NJ 07728

**Street Trees Recommended for Southern California**
Available from:
Al Remin, City of Orange
(714) 532-0321

A chart of 65 trees in a matrix of environmental constraints, produced by Southern California Edison and The Street Tree Seminar, Inc.

**The State of Urban Forestry in California**
published by the California Dept. of Forestry and Fire Protection
August 1989
A 68-page report detailing the results of an urban forestry survey conducted by the state in 1988. Full of fascinating facts about urban forestry planning, education, and management.

**Tree Health Management**
A video, available for $25 from:
American Forestry Association
P.O. Box 2000
Washington, D.C. 20013

***Valuation of Landscape Trees, Shrubs, and Other Plants***
(Seventh edition)
Available for $10 (member) or $50 (nonmember) from:
International Society of Arboriculture
303 W. University
P.O. Box 908
Urbana, IL 61801

**Wildlife Habitat Enhancement Council**
1010 Wayne Ave., Suite 210
Silver Springs, MD 20910
(301) 588-8994

A nonprofit organization devoted to increasing wildlife opportunities on corporate land.

## FURTHER READING

Abbey, E. 1968. Desert Solitare. The University of Arizona Press, Tucson, Arizona.

Austin, M. 1903. Land of Little Rain. University of New Mexico Press, Albuquerque, New Mexico.

Anderson, D.B., Bohning, R.H., Fratianne, D.G., and Meyer, B.S. 1973. Introduction to Plant Physiology. D. Van Nostrand Company, New York, New York.

Alexander, C., Ishikawa, S., and Silverstein, M. 1977. A Pattern Language. Oxford University Press, New York, New York.

American Forestry Association. Urban Forests and American Forests. Journals of the American Forestry Association. 1516 P Street SW, Washington, D.C.

Appleyard, D., 1981. Livable Streets. University of California Press, Berkeley and Los Angeles, California.

Arnold, H., F., 1980. Trees in Urban Design. Van Nostrand Reinhold Company, New York, New York.

Bakker, E. 1972. An Island Called California. University of California Press, Berkeley and Los Angeles, California.

Boyce, J.S., 1961. Forest Pathology. McGraw-Hill Book Company, New York, New York.

Brady, N.C., 1974. The Nature and Properties of Soils. MacMillan Publishing Company, New York, New York.

City of Oakland, 1981. Greenstreets: A Street Tree Plan for Oakland. City of Oakland, Oakland, California.

City of Thousand Oaks, 1971. City of Thousand Oaks Oak Tree Ordinance. City of Thousand Oaks, Thousand Oaks, California 91320, (805) 497-8611.

Cornell, J. 1987. Listening to Nature. Dawn Publications, Nevada City, California.

Davis, K.P. 1966. Forest Management: Regulation and Valuation. McGraw-Hill Book Company, New York, New York.

Deneke, F. J. and Grey, G. W. 1986. Urban Forestry. John Wiley and Sons, New York, New York.

Doak, S., Green, K., Fairfax, S., and Johnson, S. 1988. The Legal Environment for Hardwood Land Ownership in California. Hammon, Jemsen, Wallen and Associates, Oakland, California.

Editors, Sunset Magazine, 1967. Western Garden Book. Lane Publishing Company, Menlo Park, California.

Editors, Sunset Magazine, 1983. Sunset Pruning Handbook. Lane Publishing Company, Menlo Park, California.

Fletcher, C. 1967. The Man Who Walked Through Time. Random House, New York, New York.

## FURTHER READING CONTINUED

Hardesty, Nancy M. 1984. Oak Woodland Preservation and Land Planning: Portola Valley Ranch. Hardesty and Associates, 855 Oak Grove Ave., Suite 205, Menlo Park, California, 94025, (415) 326-4268.

Harris, R.W. 1983. Care of Trees, Schrubs, and Vines in the Landscape. Prentice-Hall Inc., Englewood Cliffs, New Jersey.

Heritage Oak Committee. 1976. Native Oaks Our Valley Heritage. Sacramento County Office of Education, Sacramento, California, (916) 924-8733.

International Society of Arboriculture. Journal of Arboriculture. Professional Journal. International Society of Arboriculture. Post Office Box 908, Urbana, Illinois.

Johnson, W.T. and Lyon, H.H. 1988. Insects that Feed on Trees and Shrubs. Cornell University Press, Ithica, New York.

Leopold, A. 1949. A Sand County Almanac. Oxford University Press, New York, New York.

Mcharg, I.L., 1969. Design with Nature. Doubleday and Company, Inc., Garden City, New York.

Mcphee, J. 1971. Encounters With The Archdruid. Ballantine Books, New York, New York.

Mcluhan, T.C. 1971. Touch the Earth. Simon and Schuster, New York, New York.

Planet Drum Books. 1989. A Green City Program. Planet Drum Books, San Francisco, California.

Plumb, T.R. 1980. Proceedings of the Symposium on the Ecology, Management and Utilization of California Oaks. United States Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, Berkeley, California.

Russel, J. and Russel, R. 1969. On the Loose. Ballantine Books, New York, New York.

Sacksteder, C.J., and Gerhold, H.D. 1979. A Guide to Urban Tree Inventory Systems. School of Forest Resources, Pennsylvania State University, College of Agriculture, University Park, Pennsylvania.

San Francisco Friends of the Urban Forest. 1983. City Trees and Trees for San Francisco. San Francisco Friends of the Urban Forest, San Francisco, California.

Schigo, A.L. 1986. A New Tree Biology: Facts Photos and Philosophies on Trees and Their Problems and Care. Shigo and Tree Associates, Durham, New Hampshire.

Schigo, A.L. 1987. New Tree Health: New Information on How to Keep Your Trees Healthy. Shigo and Tree Associates, Durham, New Hampshire.

Simonds, J. 1983. Landscape Architecture. McGraw Hill Book Company, New York, New York.

Sinclair, W.A., Lyon, H.H. and Johnson W.T. 1987. Diseases of Trees and Schrubs. Cornell University Press, Ithica, New York.

**FURTHER READING CONTINUED**

Smith, P.M. 1962. The Practice of Silviculture. John Wiley and Sons Inc., New York, New York.

Stone, C.P. 1974. Should Trees Have Standing. William Kaufmann, Inc., Los Altos, California.

Sudworth, G.B. 1967. Forest Trees Of The Pacific Slope. Dover Publications, Inc., New York, New York.

Thoreau, H.D. 1854. Walden. Princeton University Press, Princeton, New Jersey.

Tree People. 1983. A Planters Guide to the Urban Forest. Tree People, 12601 Mulholland Drive, Beverly Hills, California 91210.

Tsu, L. 1972. Tao Te Ching. Random House, New York, New York.

United States Department of Interior. 1980. Citizens Action Manual: A Guide to Recycling Vacant Property in your Neighborhood. United States Department of Interior, Heritage Conservation and Recreation Services. United States Government Printing Office, Washington, D.C.

Listed below are publications pertaining to tree management published by the University of California Cooperative Extension. Many publications on oaks, amenity trees and other interests are available from Cooperative Extension, University of California Division of Agriculture and Natural Resources, Resource Program, 163 Mulford Hall, Berkeley, California 94720, (415) 642-2360.

1971 Fertilizing Woody Plants
U.C.C.E. Publication Number 2958

1975 Reducing Root Rots in Plants
U.C.C.E. Publication Number 4004

1976 Landscaping for Fire Protection
U.C.C.E. Publication Number 2401

1976 Planting Landscape Trees
U.C.C.E. Publication Number 2583

1977 Pit Scale on Oak
U.C.C.E. Publication Number 2544

1978 Oak Worm (Oak Moth) and its Control
U.C.C.E. Publication Number 2542

1978 Red Turpine Beetle: A Pest of Pines
U.C.C.E. Publication Number 21055

1979 Biological Control and Insect Pest Management
U.C.C.E. Publication Number 1911

1979 Erosion Control on Bare Slopes Around Your Home
U.C.C.E. Publication Number 21137

**FURTHER READING CONTINUED**

1979 Oaks on Home Grounds
U.C.C.E. Publication Number 2783

1980 Dutch Elm Disease in California
U.C.C.E. Publication Number 21189

1980 Mistletoe Control in Shade Trees
U.C.C.E. Publication Number 2571

1981 Labor Requirement Analysis for Landscape Maintenance
U.C.C.E. Publication Number 21053

1981 Pruning Landscape Trees
U.C.C.E. Publication Number 2574

1981 Whiteflies on Outdoor and Indoor Plants
U.C.C.E. Publication Number 21267

1983 Plant Your Own Oak Tree
U.C.C.E. Publication Number 21334

1983 Protecting Trees When Building on Forested Land
U.C.C.E. Publication Number 21348

1984 Foliage and Branch Disease on Landscape Trees
U.C.C.E. Publication Number 2616

1984 Water Conservation: The Potential
U.C.C.E. Publication Number 21382

1986 Tree Evaluation and Casualty Loss: A Homeowner's Guide
U.C.C.E. Publication Number 21418

1987 Insect Pest Managment Guidelines for California Landscape Ornamentals
U.C.C.E. Publication Number 3317

1988 Diagnosing Ornamental Plant Diseases
U.C.C.E. Publication Number 21446

1988 Evaluating Investments in Natural Resource Management
U.C.C.E. Publication Number 21459

1990 Pests of the Garden and Small Farm
U.C.C.E. Publication Number 3332

Younker, G.L. et al,. 1990. Urban and Community Forestry: A Guide for the Interior Western United States. United States Department of Agriculture, Forest Service, Intermountain Region, Ogden, Utah.

# LIST OF APPENDIX ITEMS

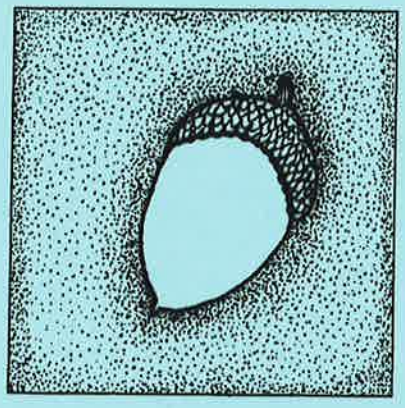
See supplementary documents for full text of appendix items.

## TABLE OF CONTENTS



**NOTE:** Planning worksheets for major streets are in a separate document from appendix text.

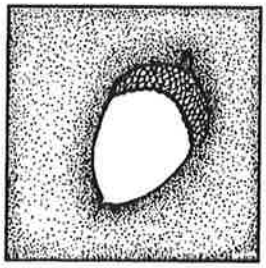
# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN



| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

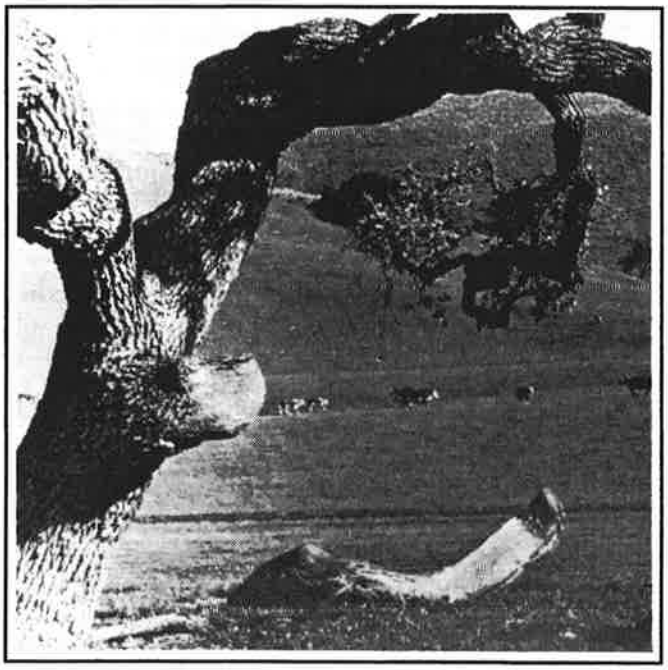
OCTOBER 1989



Volume 1

# PROGRAM AND POLICIES

## TABLE OF CONTENTS



## 1.1 INTRODUCTION

This chapter provides an overview of the reasons for preserving and enhancing the community forest in Thousand Oaks. It discusses the impact trees have on the city and outlines the objectives of the Forestry Master Plan.

### 1.1.1 THE COMMUNITY FOREST

The community forest is Thousand Oaks' largest, most visible, and arguably most important natural resource. Both environmentally and aesthetically, the forest makes the city a better place to live. Each tree makes an individual contribution, offering a welcome pool of summer shade, a stunning flower display or flame of fall color, or a leafy embrace for a ten-year-old seeking solitude. But in concert with each other and other natural systems, the trees become a forest—and a powerful influence on the community. The whole is greater than the sum of its parts.

To fully understand the importance of trees to Thousand Oaks, it might be helpful to imagine a completely treeless city. It would be a stark landscape—hot, dry and monochromatic. The air would be devoid of fragrance, quiet of the sound of birds and the rustle of leaves. Sidewalks would be hostile places, barren of shade and greenery, and unadorned by the artful play of shadow patterns created by leaf and limb. The city could be as much as ten degrees hotter than it is now if its forest cover were suddenly gone. Stairs would be the only things our children could climb. And without trees, we would have no living clocks marking the passage of time in our lifetimes—and no green monuments to the past.

The Thousand Oaks Forestry Master Plan seeks to strengthen the connection between trees and people in the city. It seeks to maximize the long-term benefits which trees provide to people by enhancing the environment and care which people provide to trees. In doing so, the plan aspires toward an ecological ethic in which the human species lives in creative harmony with the rest of nature—an ideal sorely needed now, both for inspiration and survival.

Trees are under increasing stresses of human origin. Pavement and structures cover and compact the soil, depriving roots of room, water, air and nutrients. Trenching severs existing roots. Car doors and delivery trucks slam into trunks, scraping off life-carrying tissues under the bark. In many regions, polluted air affects the natural processes by clogging leaf pores with particulates and toxins or pouring down acid rain. Reflected heat bakes trunks and foliage, at the same time that climatic changes threaten longer droughts, hotter summers and stronger winds. Beset by such stresses, city trees become susceptible to insects and disease. The unfortunate result is that the average life expectancy of an urban street tree is now estimated to be a mere 32 years, with down-

town trees living an average of only ten years.

Since most species take forty years to mature, these statistics mean that the majority of community trees never make it out of adolescence and never reach a size where their full benefits can be enjoyed. In fact, most struggle through their short lives diseased, disfigured or malnourished—hardly contributing their full potential to the community. At the same time, older trees dispensing the benefits gained from half a century or more of growth are quick to decline in the face of new stresses or new development.

As community forests have declined across the nation, an ever larger proportion of equally stressed municipal tree budgets have gone toward removing trees. That means that less funds are spent on the planting and maintenance work that sustain forest health. The spiral of decline accelerates, with barren streets the ultimate result. In almost every community in the country, more trees have been removed each year than have been planted, often by a factor of ten. Although the City of Thousand Oaks has in the past removed more trees than it has planted, selective tree removal as outlined in this Master Plan and a progressive planting program will help replenish and perpetuate the community forest.

At a time when the world's rain forests are being systematically destroyed, indiscriminate logging is deprecating world timber resources, and the woodlands of Europe and eastern North America are succumbing to acid rain, our community forests are also in crisis. Paradoxically—and perhaps promisingly—it is also a time when massive reforestation efforts have been proposed to help absorb the carbon dioxide largely responsible for the worldwide greenhouse effect. By contributing to this effort, it may be that the aggressive regreening of our communities will prove an important step in the restoration of our planet.

The basic means of overcoming the stresses that beset urban trees and restoring the vigor of the community forest is to correctly plant the right tree in the right place and provide it with proper care. Coupled with community education and participation, these are the essential tasks of the emerging profession of community forestry.

Community forestry combines three professional traditions: that of the arboriculturist, whose focus of concern is the health of the individual tree; that of the landscape architect, who helps find the fit between natural environments and human needs, including the need for beauty; and that of the forester, whose speciality is the management of the whole forest and its entire life cycle. It is this wholistic perspective—treating the community forest as an integrated asset that transcends property lines and political jurisdictions—which sets off community forestry from traditional municipal tree management.

Community forestry adapts such classical forestry concepts as multiple-use and sustained-yield to fit the community environment. Multiple-use means that trees are seen to co-exist with and serve a variety of other uses—a viewpoint essential to successfully balancing the requirements of trees with the demands of urban settings. Sustained-yield traditionally means selectively harvesting trees in a way which assures future harvests. This goal might be achieved through "uneven age management," by which some trees from several age or diameter classes are cut, rather than all trees of a single class. "Rotational management," which can be by uneven age or even age cutting, assures that a certain percentage of the forest resource will always be in the seedling, sapling, adolescent and mature classes.

The emphasis of traditional forestry on trees as a harvestable resource is transformed in community forestry to the maintenance and enhancement of forest benefits and amenity value. For instance in an urban context, sustained-yield translates into maintaining a high overall level of

forest cover through selective removal and replanting of declining or hazardous trees.

The Thousand Oaks Forestry Master Plan applies such community forestry principles to the management of the City's forest resource. It is, in the words of the City manager "a TOF plan," since the City has taken a tough stance on preserving and enriching its natural heritage. The City has set out to become a model in community-forest management. The Master Plan provides the necessary guidance, presenting the City's policies relating to trees and the means by which they can be implemented. By better informing people's decisions about trees, it seeks to make those decisions as beneficial as possible to both the forest community and the human community.

Since trees are so important to the people of Thousand Oaks, and since the decisions of individuals ultimately determine the quality of the forest, the plan also seeks to involve individual residents as fully as possible in the creation and care of the community's forest. As a first step, the document itself is designed to be of interest and use to the general public.

We hope you enjoy the plan—and its results.

## 1.1.2 THE BENEFITS OF TREES

In economic terms, the American Forestry Association estimates the amenity value of a community tree to be twenty-five times greater than the value of a tree grown strictly for its lumber. According to the AFA, such a tree "is appraised more like real estate than a commodity." Its value derives from the multitude of benefits it bestows on individual residents, the community and the larger ecosystem.

**Trees impart a distinctive character and identity to the City and to its various neighborhoods.** Thousand Oaks is noted for its environmental amenity, which trees help create. To come home to a green and shaded community establishes a powerful sense of place.

**Trees establish visual harmony and continuity along the City's streets.** The experience of driving—which is such a large part of the experience of Thousand Oaks and southern California—is immeasurably more pleasurable along tree-lined streets. If a single tree is a thing of beauty, a well designed street of trees can be a striking kinetic experience. Distinctive plantings on major streets also help orient drivers, making the City more "imageable" and therefore easier to navigate.

**Trees enrich the aesthetic experience of the City, adding pleasing shapes, colors, fragrance, texture, scale and seasonal change.** The beauty which trees add to any landscape is especially appreciated in urban settings, where the most people live and work and where environmental amenity is often hardest to find.

**Trees soften and screen urban development.** Combined with good planning and design, they are effective healers of the visual environment, helping to meld diverse urban structures and uses with a green unity and adding a natural dimension to the City's growth over time.

**Trees help diffuse noise.** Dense foliage helps break up the sound waves from traffic and other noises, and renders them less intrusive by visually screening their source.

**Trees help increase and stabilize property values.** Realtors report that trees increase residential property values from 7 to 20 percent. Surveys in California identify mature trees as the most desired amenity in home sales. Commercial districts, as well, are strengthened by the enhanced image trees provide. The economic return to the City in the form of property, sales and transfer taxes is substantial.

**Trees enhance children's play.** They are natural playthings, full of life, and far more capable of stimulating a child's imagination and sense of wonder than the most expensive toy.

**Trees enhance people's sense of connection to nature and history.** Emotionally and symbolically, trees represent people's relation to that which is larger than themselves. They allow us to experience the natural world in a tangible form for which we feel responsible. Since trees, like people, grow and change through time, we identify with them. And since they often live longer than we do, they link us to times beyond our own, spanning past and future generations. In short, trees become part of our personal environment and as such have an important psychological value, enriching people's passage through time as well as space.

**Trees enhance civic pride and involvement.** Tree planting programs allow citizens to participate in creating a city they can be proud of.

**Trees provide shade and help cool "urban heat islands," reducing energy costs and consumption.** During the summer a shade tree may prevent 80 to 90 percent of the sun's rays from reaching the ground. The daily moisture transpired from one large tree can have the cooling effect of five average room air conditioners running 20 hours a day. One study showed that air in a two-acre oak forest was 7 to 9 degrees cooler than air above a nearby grass fairway and 37 to 39 degrees cooler than in an asphalt parking lot.

**Trees moderate wind.** The funnelling of wind by city buildings and its strength over large paved areas can be partially broken by plantings. A 20-mph wind can be cut to 5-mph by a loose screen of trees.

**Trees absorb carbon dioxide, counteracting the global "greenhouse effect."** Photosynthesis fixes carbon in the biomass of a tree, where it stays "sequestered" as long as the tree lives. In this way, an average tree captures nearly half a ton of $CO_2$ over the first 30 years of its life. Worldwide planting efforts might therefore give our species the "breathing room" it needs to drastically reduce fossil fuel emissions before the atmospheric build-up of carbon dioxide throws the global climate system further out of control.

**Trees produce oxygen and filter airborne particulates, helping to reduce air pollution.** A tree's production of oxygen replenishes the atmosphere and dilutes pollutants. Airborne particulate pollution is also trapped on the surface of leaves, which act as significant "scrubbers" or filters—since the surface area of a tree may be a thousand times the surface area of the ground beneath it. In addition, the heightened humidity around plants condenses on particulates and causes them to settle out in a process called "air washing." Some studies even indicate that plants directly absorb certain pollutants like sulfur dioxide and nitrogen dioxide.

**Trees can help reduce soil erosion and surface runoff, leading to a steadier and cleaner supply of water.** Trees protect soil by breaking the fall of raindrops, absorbing water through their roots, covering the ground with protective humus, slowing runoff, and knitting the soil with roots. On the other hand, a square mile of land stripped for development may lose 25,000 to 50,000 tons of soil in a year. The resulting sediment can drastically reduce water quality. Moreover, the slow release of water from forested lands gives way to wasteful runoff and flooding, followed by parched drought conditions.

**Trees provide habitat for birds and other wildlife.** Trees are a city's prime medium for attracting wildlife. A single oak, for example, can provide home and food for as many as 300 species of insects, which in turn provide food for numerous species of birds.

## 1.1.3 THE HISTORY OF TREES IN THOUSAND OAKS

For the most part, the forest now seen in Thousand Oaks is the creation of the past twenty-five years, an artifact of settlement. It is truly a "community forest," planted to serve uniquely human pur-

## THE TREE DEFINED

A tree is a woody perennial plant, typically larger than other plants, and usually with a single, well-defined stem supporting a crown of branches. Thef roots, stem or trunk, leaves, branches, and fruit all have special functions.

The roots hold the tree upright, absorb water and nutrients from the soil, conduct them upward, and store food made by the foliage. Oxygen from within the soil is necessary for roots to function. The larger and older roots which, like branches have heartwood, sapwood and bark, provide the physical support for the tree. The smaller roots, hairlike at the extremities, absorb water and minerals.

The trunk also serves a number of purposes. It conducts water and nutrients from the roots to the crown, moves food from the crown to other parts of the tree, and lifts the branches and leaves to collect the sun's energy. The heartwood of the trunk is relatively lifeless compared to the outside layer. It is darker because its cells contain a deposition of complex compounds, which in many species improve the durability of the wood. The outer sapwood is lighter in color, and composed of living cells that move water and nutrients upward. A microscopic growth layer called the cambium, located between the sapwood and inner bark, produces new cells each year; this causes the tree to grow.

Like the woody part of the trunk, the bark has its live and dead parts. The spongy, wet inner bark carries food from the leaves to the adjacent cambium layer and the growing tips of branches and roots. The outer bark layer is dry and lifeless; it protects the tree from damage by weather, fire, pests, and physical contact. The bark layer is continually growing.

The crown of the tree is composed of branches, twigs, foliage, and reproductive organs (flowers and fruit). Using sunlight, water and nutrients from the roots, and carbon dioxide from the air, the leaves photosynthesize the tree's own food in the form of sugars. Oxygen is an important by-product of photosynthesis.

*from the California Dept. of Forestry and Fire Protection handbook*

poses—from aesthetics to home sales—as the area was developed.

As might be expected, most of the trees in this forest, like most of the people in the buildings, have their historical roots not in the Conejo Valley but all over the world. Eucalyptus from Australia, elms from Asia, plane trees from Europe, pines and palms from the Canary Islands, ash trees from Arizona, and sweet gums from the eastern United States are among the most numerous species in the City. As people have settled here, they have brought with them a preference for trees like those they knew in their homelands—often places with environmental conditions very different from those of Thousand Oaks. The result is a somewhat eclectic forest, young, and not particularly well-rooted in the conditions or traditions of the region.

But there were trees here when the Chumash Indians lived on this land, and some of those trees still remain today. For millennia, the tree community was of vital importance to the valley's human community. The Chumash people, congregated beneath the oaks each autumn to harvest the rich supply of "mast" or fallen acorns, which were ground by stone mortar and pestle into a flour that was a dietary staple. The Indians also harvested the berries of a variety of chaparral plants, and the seeds of the native bunch grasses and perennials. Today, remnant oaks still punctuate the City, reminders of an earlier time and landscape. And along streambeds and in other protected spots, other native species remain from the Conejo valley's original landscape—California sycamores, willows, bay laurel, big leaf maples and black walnuts.

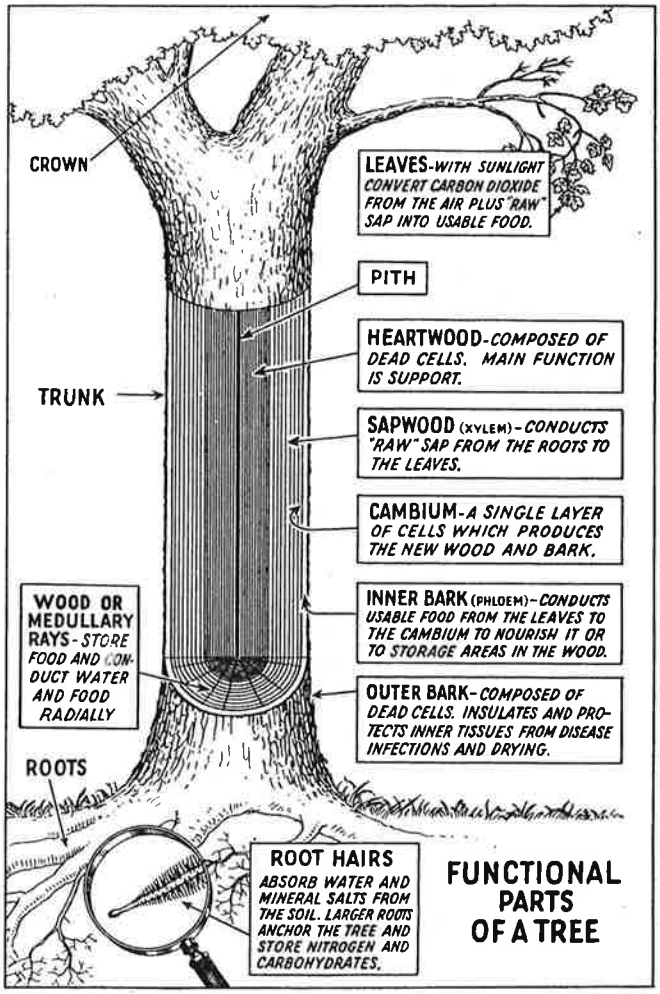
The oaks are towering, spreading valley oaks, sometimes reaching a hundred feet up and out, and smaller, round-headed, evergreen coast live oaks. The presence of both species together gives a precise reading of the City's geography—a hot interior valley just within the moderating influence of the ocean. The trees grew widely spaced in the

flatlands, with a sparse understory of chaparral, forming a sweeping "oak savannah" community of park-like proportions. The grazing of ranch animals that began with the Spanish and continued well into this century greatly affected the character of the oak savannah, as the compaction of soil and trampling and eating of oak seedlings by cattle reduced the ability of the trees to regenerate adequately. But on the ridges' north-facing slopes, more favorable environmental conditions allowed oak woodland to cloak the hills.

Between the time of the Chumash and the advent of the freeway, the era of the ranchero and then the farmstead left more layers to the valley's landscape, marked by characteristic species and patterns of trees—and by the prolonged grazing that left the land and surrounding hills covered in introduced grasses rather than native chaparral and abundant oaks. Driving around town, one still encounters densely planted eucalyptus windbreaks, rows of elms shading former roadways, and billowing masses of California peppers (a misnomer—it's from Chile) enclosing and protecting old houses from wind. As with the native species, these trees of an agricultural landscape now convey the texture of another time.

If trees help us read the history of the City's landscape, they are also the means to make history. The young trees planted today will become the grand community forest of the next century, profoundly affecting the quality of life in Thousand Oaks while connecting people today with future generations. Just as in the past, the reasons we plant today will be read far into the future.

We will, of course, continue to plant for our own satisfaction and pleasure. But if we choose species demanding great supplies of water, we may be remembered more for our short-sightedness than for our leafy legacy. On the other hand, as our knowledge and perspective expand to encompass the potential effect of tree planting on global warming and other far-reaching problems,




(Courtesy, Maine Forestry Department)

**Figure 1**

we may be remembered as the first generation to plant comprehensively for the future well-being of the planet as a whole as well as for the comfort and delight of our community.

If we choose to keep the long-term health of the planet in mind as we set about expanding and modifying our forest, our connection with the trees of Thousand Oaks will become emblematic of the balanced connection between people and nature so important for a healthy future. Our role in the continuum of the life-cycle will bring us full circle, back to the time of the Chumash gathered under the oaks a millennium ago—a time when people equated trees with life itself.

## 1.2 OVERVIEW OF THE COMMUNITY FORESTRY PROGRAM

The Thousand Oaks community forest program is a mutual effort of the City Council, business people, developers, residents, City staff and other public agencies. This chapter provides a synopsis of the community forestry program. It introduces roles and responsibilities relating to trees in Thousand Oaks.

### 1.2.1 ROLES AND RESPONSIBILITIES

As might be expected in a city which has grown so rapidly in the past decades, developers have played a major role in the creation of the community forest. All new development is required to have street trees and other landscaping along all streets, median landscaping on major arterials, and protected status for existing oaks and other historic trees.

Currently, the City, through its departments of Public Works and Planning and Community Development, oversees the planning and installation of all street trees and other landscaping. Upon completion of development and acceptance of the established trees, the City takes over maintenance of all trees within the public right-of-way and public service easement. Other public agencies, such as the Conejo Valley Park and Recreation District, Conejo Open Space Conservation Agency, CalTrans, and Southern California Edison have responsibility for trees in many areas of the City.

Individual residents, homeowners' associations and businesses, besides developing and maintaining their own landscape improvements, are responsible for preserving oaks and other landmark trees on their properties.

These various responsibilities and the means by which they are carried out are specified in a series of ordinances, resolutions, standards, and planning documents adopted by the City Council. These documents form an appendix to this volume of the Master Plan. Their main provisions are summarized in 1.4.

As the City nears build-out of its developable land and as the trees planted over the past few decades near maturity, a number of new issues related to the community's forest are beginning to arise. These include increased attention to maintenance, tree removals and replantings. To resolve these issues, the Master Plan recommends several adjustments to existing legislation, as well as several new Council actions to make the community forestry program as effective as possible. These adjustments and actions are summarized in the policies set forth in the following Goals Statement and in 1.3.

## 1.2.2 RESOLUTION AND GOALS STATEMENT

The following is the resolution to adopt the Thousand Oaks Forestry Master Plan and establish the goals of the Community Forest Program.

WHEREAS, the trees of Thousand Oaks are inextricably linked to the character of the city;
WHEREAS, trees link the people of Thousand Oaks to the natural world;
WHEREAS, trees provide the community with a multitude of environmental benefits, including reduced energy consumption, amelioration of air pollution, shade, wind-reduction, noise-screening, erosion control, clean water and enhanced wildlife habitat;
WHEREAS, trees can help reverse the trend toward global warming (the "greenhouse effect"), and tree-planting in Thousand Oaks therefore has international ramifications;
WHEREAS, trees establish visual harmony and continuity along the City's streets, impart a distinctive identity to the City and to its various neighborhoods, enrich the aesthetic experience of the City, soften and screen urban development, help stabilize property values, provide enhanced opportunities for children's play, and contribute to civic pride and involvement;
WHEREAS, trees are things of beauty that deserve our efforts to plant and care for them properly;

The City Council of the City of Thousand Oaks does hereby adopt the Thousand Oaks Forestry Master Plan, dated _____, including all policies, criteria, guidelines and standards contained therein; and further:

directs City staff to carry out the provisions of said plan; and further:

urges all residents and property owners within the City to support the creation and care of a healthy and beneficial community forest through their support of said plan; and further:

establishes the following specific goals and objectives of the City's community forest program:

1. To establish and maintain a full complement of street trees on every street in the City.
   a. By achieving a minimum 50% canopy coverage of all paved street areas.
   b. By replacing every tree removed from a street with at least one new tree.
   c. By using species well adapted to local environmental conditions and design objectives.
   d. By planting the largest trees with the widest spreading canopies in every appropriate and possible location.
   e. By achieving a diverse forest with no one introduced species comprising more than 10% of the whole or 25% of any one neighborhood, including major streets within that neighborhood.

2. To develop consistent and distinctive plantings along the City's major streets and within its neighborhoods.

3. To promote the creation and maintenance of off-street plantings which enhance the public forest resource.
   a. By requiring ample landscaping of new construction.
   b. By achieving a minimum 50% canopy coverage of parking areas.
   c. By encouraging new plantings at schools, parks, private holdings and similar sites.

4. To preserve and extend the City's legacy of oaks.

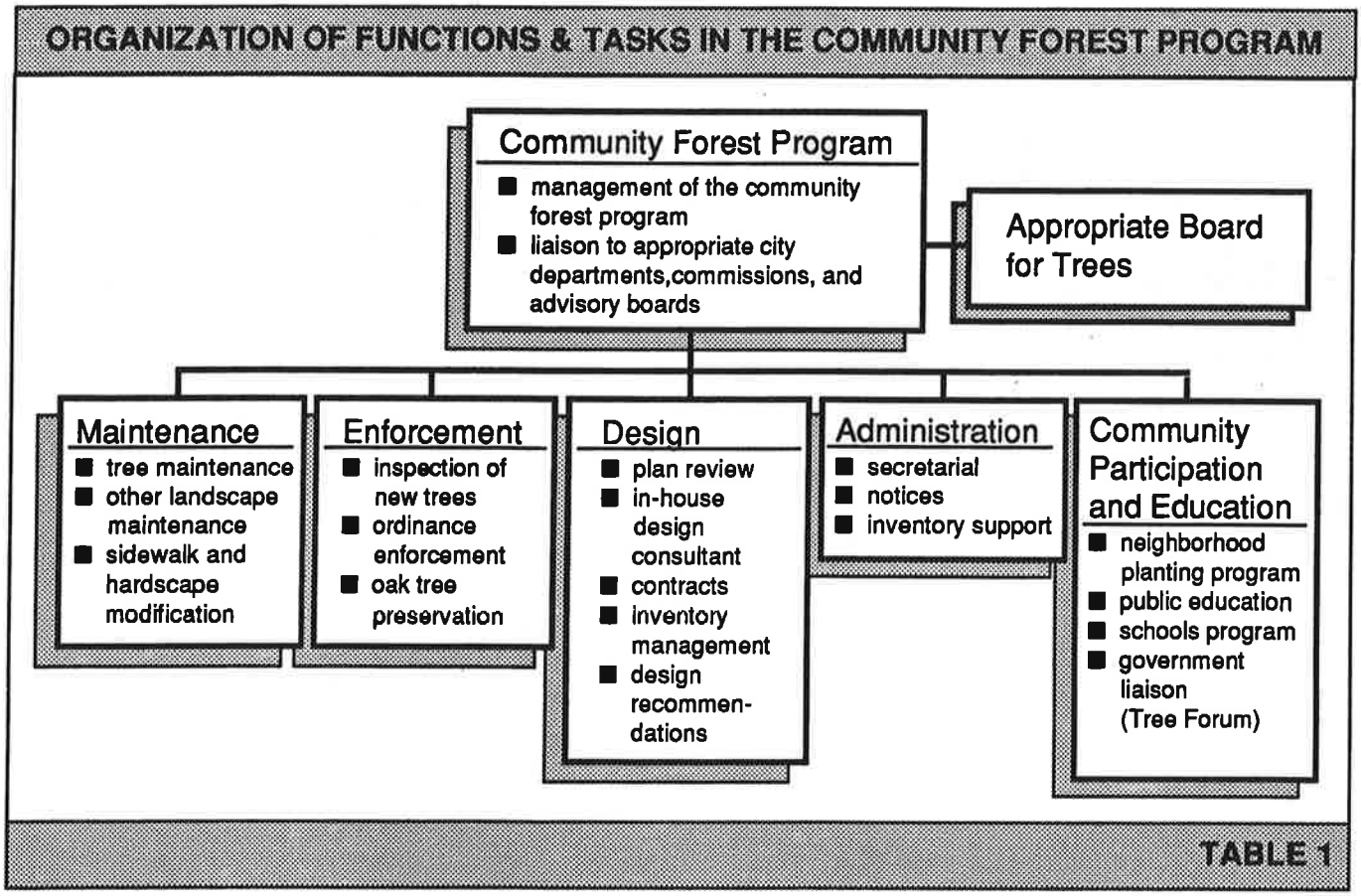
5. To establish the highest standard of maintenance for public and private trees.
   a. By enforcing City maintenance standards.
   b. By providing expert training of City maintenance personnel.

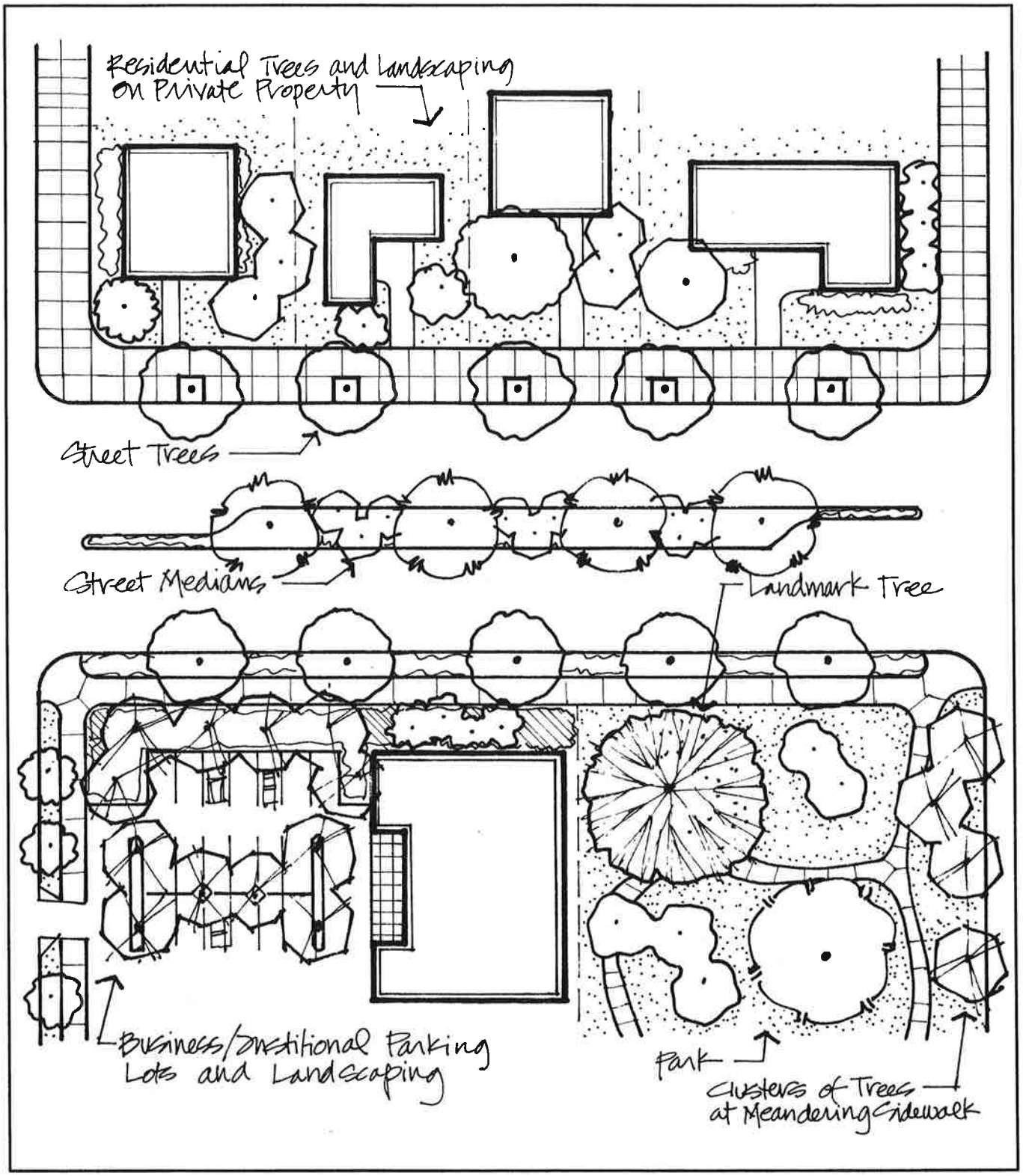
c. By developing an education and certification program for tree maintenance contractors.
d. By maintaining an inventory of the condition and value of all City street trees.
e. By allocating annual funds sufficient for appropriate and timely tree maintenance, exclusive of removals.

6. To maintain close cooperation among all public agencies affecting the community forest.

7. To promote public awareness of the value and proper care of trees, and to promote public involvement in the community forestry efforts.
a. By developing a program for an Advisory Board for decisions regarding trees.
b. By developing a participatory neighborhood planting program.
c. By encouraging monetary and other contributions to the community forestry program.
d. By promoting community forest curriculum elements within the public schools.
e. By undertaking an active program of community outreach and education.

8. To assure sustained funding of the community forestry program.
a. By basing annual forestry budgets on the achievement of maximum future forest value and benefits.
b. By considering a City-wide community forest assessment district.
c. By providing necessary funding for enforcement of the comprehensive City tree ordinance.






**Typical Composite of Trees in Thousand Oaks** **Figure 2**

## 1.3 MAJOR ISSUES AND POLICIES

This chapter sets forth the City policies on which the community forestry program is based, and identifies the critical issues which the policies address. It provides the foundation for the rest of the Master Plan. It is an all-encompassing statement of intent to guide the community's decisions about its forest resource.

### 1.3.1 ESTABLISHING A COMPREHENSIVE VISION OF THE COMMUNITY FOREST

Since the early 1970s the concern of Thousand Oaks for its natural environment has resulted in a number of ordinances and other measures relating to trees. Taken together, these documents have successfully guided the City's tree programs over the years. However, since the measures were adopted at different times to address separate concerns, they lack a sense of overall cohesion. There are also specific ways in which the measures could be strengthened, clarified and extended. Among the major purposes of the Master Plan is to consolidate and systematize the City's various laws and policies related to trees into one comprehensive statement regarding its community forest.

■ *The City's tree-related policies are scattered among nine different ordinances, resolutions, standards and other documents.* As a result, there is no one statement of the intentions and purposes of the community forestry program—a situation which can be disorienting to the policy-makers and professionals who work with the program and confusing to the developers, business people and residents who are affected by it.

**Policy 1.3.1.a: To conduct the community forest program in accordance with the Thousand Oaks Forestry Master Plan and a comprehensive goals statement.** The City Council resolution adopting the Master Plan and establishing the goals of the community forest program is set forth in 1.2. The statement is an overview of public policy, complementing the existing ordinances and providing a single point of reference and coordination among them. It sets broad goals and specific objectives by which the success of the forestry program in meeting the City's intentions can be judged.

■ *There are significant gaps in the existing ordinances, and the ordinances could be strengthened and clarified in a number of ways.* Although generally quite complete, the legal framework for community forestry in Thousand Oaks could be bolstered by several new provisions and augmented by a new ordinance reflecting the Master Plan.

**Policy 1.3.1.b: To conduct the community forest program in accordance with a coherent body of City ordinances, including a comprehensive City tree ordinance incorporating the**

**major provisions of the forestry Master Plan.** The City shall review all existing tree-related ordinances and propose specific changes to bring them into alignment with the forestry master plan. The city shall also draft a comprehensive City tree ordinance incorporating the major new provisions of the Master Plan. (A summary of existing ordinances is given in 1.4, together with the changes necessary to bring the existing ordinances into alignment with the Master Plan. The complete text of the ordinances is available from the community forest program. A draft of the new City tree ordinance prepared by staff appears in the appendix. The existing ordinances are to be replaced by amended ordinances incorporating the proposed changes, following preparation of exact language by the City and adoption by the City Council.) Major changes include the following:

a. Consolidation of Section 9-3.1006 "Street Tree Planting" with Section 7-2.9 "Landscaping Provisions in Public Rights-of-Way."

b. Fines, penalties and restitution for violations of the ordinances.

c. Prohibitions against damaging or endangering public trees.

d. Treatment or removal of nuisance trees on public or private land.

e. Permits for removal of trees on private land.

f. Education and certification of all tree services operating within Thousand Oaks.

g. Application of City maintenance standards to landscaped areas fronting public streets.

h. Coordination with Southern California Edison regarding pruning and undergrounding activities.

i. Review of existing policy in regards to City responsibility for damages to street improvements caused by street trees.

j. Expansion of landmark tree criteria.

k. Development of an Advisory Board for decisions regarding trees.

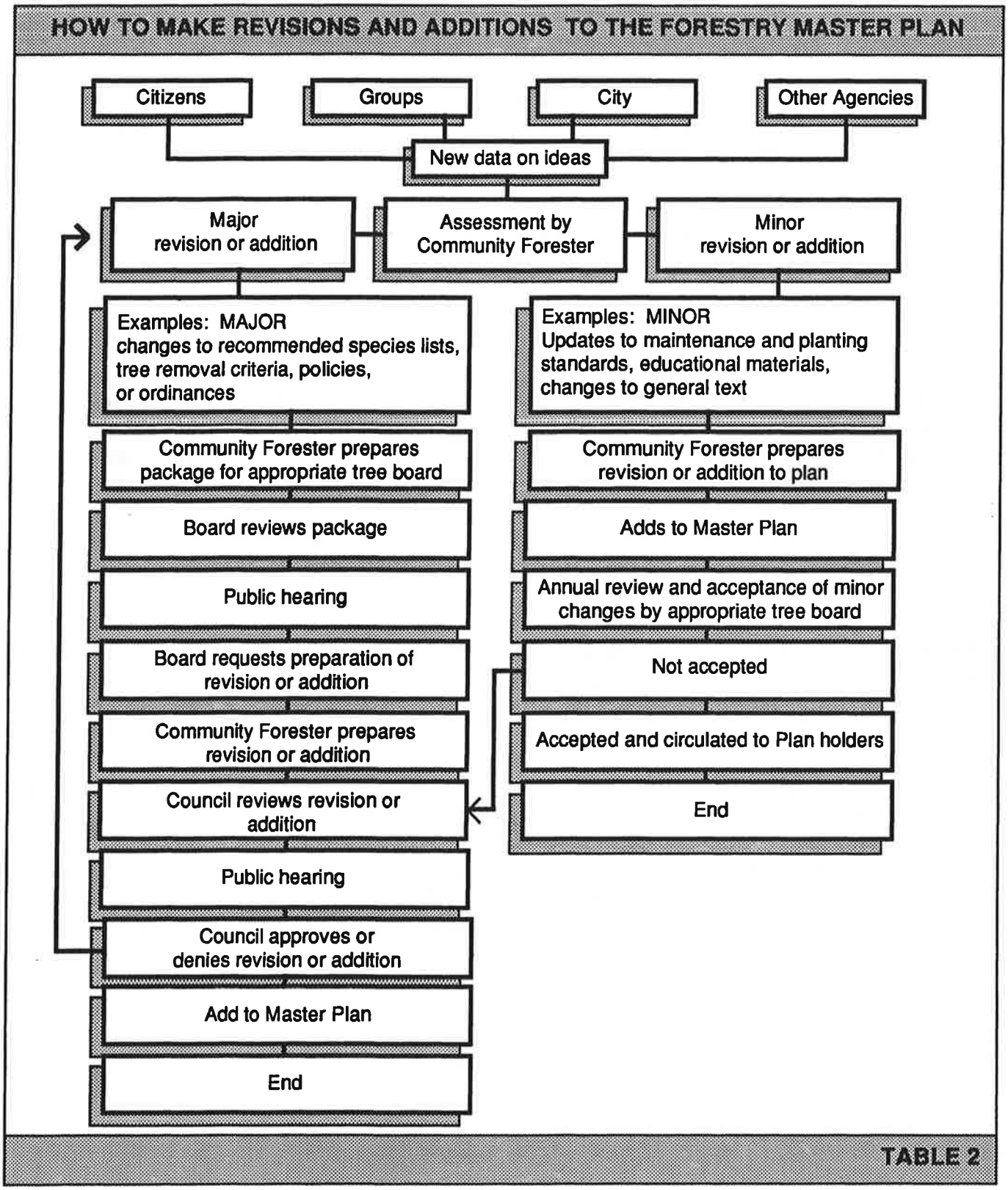
l. Expansion of Tree Trust and endowment sources and uses.

■ *The profession of community forestry, the City of Thousand Oaks, and the environment in general will continue to undergo major changes, which will in turn necessitate flexible responses.* Increasing experience with the City's trees and growing awareness of their needs and benefits will undoubtedly require periodic adjustments to the City's forestry program and policies.

**Policy 1.3.1.c: To review and revise the Forestry Master Plan after the first year and every five years thereafter.** The city will undertake a comprehensive review of the Master Plan to update and improve it every five years. The review will include ample opportunity for public participation and may result in a revised document for adoption by the City Council. The first such review will take place in 1991. Minor changes to the plan, including adjustments, maintenance and planting practices, addition of educational materials, and changes to wording or facts in the text, may be made at any time by the community forester with annual review for acceptance by the appropriate board for trees. Changes to policies, ordinances, species lists, or tree removal criteria can only be made by the City Council, which will seek the recommendations of the community forest program and review by the appropriate board for trees. (Policy 1.3.7.h describes this board.)

## 1.3.2 MAINTAINING THE EXISTING FOREST

Many trees in Thousand Oaks' forest are now reaching maturity, resulting in the need for increased pruning, sidewalk repair and other maintenance. With an aging forest population, the City can expect greater expenditures for its forest, especially compared to the early years when the


HOW TO MAKE REVISIONS AND ADDITIONS TO THE FORESTRY MASTER PLAN
Citizens
Groups
City
Other Agencies
New data on ideas
Major revision or addition
Assessment by Community Forester
Minor revision or addition
Examples: MAJOR changes to recommended species lists, tree removal criteria, policies, or ordinances
Examples: MINOR Updates to maintenance and planting standards, educational materials, changes to general text
Community Forester prepares package for appropriate tree board
Board reviews package
Public hearing
Board requests preparation of revision or addition
Community Forester prepares revision or addition
Council reviews revision or addition
Public hearing
Council approves or denies revision or addition
Add to Master Plan
End
Community Forester prepares revision or addition to plan
Adds to Master Plan
Annual review and acceptance of minor changes by appropriate tree board
Not accepted
Accepted and circulated to Plan holders
End
TABLE 2

expense of planting the forest was largely borne by developers. These costs may be stabilized in time by choosing and siting trees more carefully and by following a proactive maintenance program. But a healthy community forest will continue to require a healthy investment of community resources.

■ *Consistent maintenance standards are essential.* Workers are sometimes confronted with conflicting information and opinions regarding pruning and other maintenance techniques, not infrequently from residents concerned with work fronting their property.

**Policy 1.3.2.a: To perform City tree work in accordance with uniform planting and maintenance standards and practices, reflecting the best current knowledge of tree care.** The planting and maintenance manual contained in Volume 3 sets forth these standards and practices. With the guidance of the community forester and landscape supervisor, City crews will apply these standards to all public tree work.

■ *A high level of experience and training on City crews needs to be maintained.* Instituting standards for all work relating to the City's forest will ensure the longest possible life for each individual tree, while also increasing job satisfaction due to newly acquired professional skills.

**Policy 1.3.2.b: To provide a comprehensive training program for City tree-workers, with incentives for certification in various aspects of horticulture and arboriculture.** This program is centered on regular in-house training sessions conducted by the community forester and the landscape supervisor, using the maintenance manual as the basic text. The primary goal of these sessions is to impart to each participant a thorough working knowledge of the standards and practices contained in the maintenance manual as applied to the City's prevalent tree species. Development of a sense of professionalism and teamwork is an important secondary goal. Sessions will be structured by tests and reinforced by supervised field work to practice the skills learned. The participation of outside professionals, including nurserymen, contractors, landscape architects and horticulturists, as visiting instructors will add a variety of perspectives and expertise. In addition, maintenance workers are encouraged to attend relevant classes offered by nearby schools, with the goal of becoming a Certified Arborist or Certified Tree Climber under the standards of the International Society of Arboriculture. Such certification shall be considered a qualification for higher job classifications. The landscape supervisor will provide announcements of such classes on a regular basis. Allow other agencies with tree-care responsibilities to avail themselves of such classes.

**Policy 1.3.2.c: To provide routine consultation between City tree workers and the community forester, for professional advice, training and problem solving.** The community forester shall maintain a close working knowledge of all City activities relating to trees. He or she shall render advice and training, and perform research as necessary, specifically aimed at improving maintenance practices and overcoming problems encountered by City crews. To this end, the landscape supervisor shall consult with the forester on a regular basis concerning pests, diseases, pruning and other technical issues.

■ *Current knowledge of the forest's composition and condition is fundamental to good forest management.* Tree-by-tree information about the forest allows sound decisions to be made on every level of tree care, from routine servicing of individual trees to species selections that foster overall forest diversity.

**Policy 1.3.2.d: To develop and maintain a comprehensive inventory of all trees in the community forest.** The community forest program shall compile and keep current a computer-

based inventory of the forest, including an individualized record of all public right-of-way trees and type and quantity estimates based on aerial surveys and field verification of off-street public and private trees. All planting, maintenance and removals of street trees shall be recorded in the inventory, along with a field assessment of the condition of each tree at the time it is serviced. Maintenance personnel shall be trained to make such assessments as a routine part of their work, and sufficient office support shall be provided to input the data on a regular basis. A complete professional update of the inventory should be conducted so that every tree in the community forest is inventoried at least once every ten years. (The basic scope and format of the inventory is provided in Volume 4, together with the various forms necessary for compiling and maintaining it. A description of its uses appears in 2.4.)

**Policy 1.3.2.e: To use the inventory to schedule annual work programs.** The community forester and landscape supervisor shall use the inventory to set planting, maintenance and removal priorities each year and to plan and implement work programs to accomplish these priorities. The work programs shall be predicated on achieving the maximum long-term health and value of the community forest and shall be the primary basis for annual budget requests to carry out the community forestry program. (Information on scheduling and budgeting is given in 1.3.8, 2.4.4, and 3.1.4.)

■ *Valuable maintenance time and resources must not be expended on tasks which are not essential to the health of the community forest.* A plant requires relatively little maintenance when it is well adapted to the natural conditions of its site and when its mature size fits the available space. On the other hand, plants which require more water than the local climate provides, or are stressed by local soil conditions, or are planted where they conflict with buildings, utilities or traffic flow will require constant attention. Appropriate maintenance therefore begins with appropriate plant selection and siting. Once the right plant has been established, appropriate maintenance consists in large part of allowing it to grow to its natural size and appearance.

**Policy 1.3.2.f: To concentrate available maintenance resources on those activities which will have the most benefit to the long term health of the forest.** Timely and appropriate maintenance will help extend the projected life span of a tree, thus reducing future budget requirements. Pruning shall be undertaken only to rectify hazardous conditions, to enhance the health and natural shape of a plant or to remedy conflicts with surrounding uses. Superfluous pruning, especially the manicuring of shrubs and trees or pruning to reduce canopy coverage, shall not be undertaken. (Appropriate pruning practices are in 3.4.1.)

**Policy 1.3.2.g: To phase out lawns in medians and publicly maintained parkways and replace with mulches and drought tolerant ground covers to conserve water and maintenance funds.** The expense of maintaining lawn, both in water use and in labor, shall be systematically reduced by eliminating lawns in public areas other than those where the ground surface is actually used for play or other recreational purposes or where grass makes a critical contribution to the visual environment as an accent or special feature. No more than 15% of any planting shall be designated lawn for purely aesthetic reasons. (Several lawn substitutes are found in 2.7.7.)

■ *More street trees currently are being lost than planted in existing neighborhoods.* Residents frequently request the City to remove maturing street trees which have damaged sidewalks or utilities. Although the City will repair the damage and replace such trees for free at the first occurrence, residents often object to replacements

because they fear similar problems in the future for which they might be responsible.

**Policy 1.3.2.h: To consider assuming maintenance and liability responsibility for damages to public improvements caused by street trees which were planted or approved for planting by the City.** In taking on greater responsibility to repair such damages, the City will strengthen its prerogative to preserve existing street trees and to plant replacements. The benefits of retaining or replacing a tree can then be balanced objectively against the cost of repairing or mitigating any future damage which it may cause. The maintenance of safe sidewalk passage, including handicap accessibility, can also be better assured. Proactive management of public trees by the City will also help reduce damages to adjacent private property such as sewer laterals, paving and structures. Responsibility for repairs on private property will remain with the owner. Work done within the dripline of the tree must include protection of the tree as approved by the Community Forester. (Similar policies have been adopted by many California cities, including Beverly Hills and Carpenteria.)

■ *The entire responsibility for the decision to remove a tree currently falls to one City staff person.* This situation places unreasonable pressure on a single person and precludes adequate professional and public review of such an important decision, especially in the absence of established removal criteria and appeals processes.

**Policy 1.3.2.i: To remove street trees only in accordance with objective tree-removal criteria and a clear process of evaluation, consultation and public notice.** The landscape supervisor shall consult with the community forester regarding any proposed tree removal, except in cases of imminent danger to life or property. In all cases, the criteria established in the Master Plan shall apply. When a determination of removal is made pursuant to these criteria, property owners within an approved distance of the subject tree shall be notified of the proposed removal and given adequate opportunity to comment on and appeal the decision pursuant to the process established by the Master Plan. Appeals shall be made to the community forester, the appropriate board for trees, and the City Council, in that order. (See 2.4.2 for removal criteria and procedures.)

**Policy 1.3.2.j: To replace every street tree removed with an appropriate new tree not likely to cause the same problem for which the original tree was removed.** In addition to other design factors, the conditions and constraints of the site from which a tree is removed shall be carefully considered in selecting a replacement tree. The intent is to learn from past experience while maintaining a full forest cover. (See 2.7 for species appropriate to various situations.)

■ *Repaired sidewalks are often redamaged if a tree is allowed to remain.* A mature tree may well be judged more valuable than the sidewalk, justifying the cost of replacing the sidewalk on a periodic basis. However, steps can be taken to preserve such trees while minimizing future repair costs. The same measures can be put in place when a tree is first installed, if the species or situation can be expected to cause problems later.

**Policy 1.3.2.k: To apply special design solutions, such as flexible paving and root barriers, to minimize potential pavement damage from tree roots.** The community forest program shall consider whether the immediate surroundings of a tree can be modified to better accommodate the tree to its site. Techniques to be considered include grade beams, bridging, special concrete depth and width, concrete reinforcing, root pruning, and alternative street design and layout. In such cases, care shall be taken that the special solutions provide fully for handicap acces-

sibility, pedestrian and traffic safety and other functional considerations.

■ *The City continues to lose off-street trees of great value.* Street trees, while a highly visible element of the community forest, comprise only a portion of it. The privately owned segment of the forest contains trees which are of great value to the whole community and which therefore merit public protection.

**Policy 1.3.2.l: To preserve the City's legacy of oaks.** The City shall rigorously enforce its oak tree ordinance in order to retain the natural endowment for which it was named. The community forester shall keep current with research and practices relating to oak tree preservation and shall disseminate such information to maintenance personnel, property owners and others responsible for the City's oaks. (A summary of the ordinance appears in 1.4.)

**Policy 1.3.2.m: To protect landmark and historic trees.** The community forest program shall nominate, and the City Council shall designate, specific trees in the City for protection under the landmark tree ordinance. Such trees shall not be pruned, damaged or removed without a City permit. (A summary of the ordinance is in 1.4.)

**Policy 1.3.2.n: To consider regulation of the removal of specific existing off-street trees.** A City permit might be required to remove any tree larger than a certain caliper. Before issuing a permit, the community forester would determine that the tree is not protected under the oak or landmark tree ordinances. The forester would also determine and record the reason for the removal and advise the property owner of potential alternatives to removal or potential replacement trees and planting sites. When trees are removed for new development, the developer would be required to replace trees equaling the value of those removed, as determined by the tree valuation formulas found in the appendix. (See 2.2.2.) The city shall develop an ordinance or ordinance amendment embodying this policy for adoption by the City Council. (Such ordinances are in effect in many California cities, including Fremont, Newark, Los Gatos, San Clemente and San Mateo.)

■ *The tree maintenance done by contractors and others in the City is of uneven quality.* The quality of care given the trees on private as well as public property greatly affects the overall health and beauty of the City's forest. Assuring high quality care also protects the public from potentially hazardous practices and assists consumers in obtaining the level of service for which they have paid.

**Policy 1.3.2.o: To require city permits for all tree pruning on public land.** The city shall issue permits for such pruning pursuant to Section 7-2.906 of the City Code and the Community Forestry Ordinance. Permits shall specify that work comply with ISA and City maintenance standards. Pruning shall not be performed solely to reduce canopy coverage. (A summary of the code section appears in 1.4; the maintenance standards are in 3.4.)

**Policy 1.3.2.p: To consider requiring City permits for all tree pruning and removals on commercial, industrial and common area properties.** The City shall issue permits for such pruning and removal pursuant to the Community Forestry Ordinance. Work shall not be performed solely to reduce canopy coverage.

**Policy 1.3.2.q: To develop an education and certification program for contractors removing limbs from public or private trees within the City based on professional standards set forth by the International Society of Arboriculture.** This program is an effort to protect, preserve, and enhance the community forest resource, and protect homeowners and other people from inadequate and unhealthy tree work. Any contractor or other individual who prunes or in any way removes wood, two inches (2") or more in diameter,

from any tree on public or private land shall comply with the pruning specifications of the ISA Western Chapter.

**Policy 1.3.2.r: To monitor tree pest and disease problems which may affect Thousand Oaks and to take preventive measures to minimize their impact.** The community forester shall keep abreast of tree problems within both the City and the region and shall apply prudent and effective means of controlling them. Such means shall be based on the maintenance of healthy and resistant tree stock, rather than the widespread application of pesticides. (Common tree pests and remedies can be found in 3.7.4 and 3.7.5.)

**Policy 1.3.2.s: To properly dispose of removed trees and clippings and to recycle tree waste to the maximum extent feasible.** Tree waste which may harbor disease or insects shall be chipped, burned, buried, or tightly covered with a 6mil.clear plastic tarp to prevent infestation of living trees. Otherwise, tree wastes shall be recycled as much as possible, a practice which conserves landfill space, derives maximum value from the forest and returns maximum yields to the earth. The community forest program shall investigate and implement all such measures which prove practical. Receipt of landscape wastes from residents and other sources and the sale of recycled products shall also be considered. (References on recycling tree wastes are included in the bibliography; 3.4.2 has more on tree removal and disposal.)

## 1.3.3 EXTENDING THE FOREST

Thousand Oaks is expected to complete the build-out of all developable areas within the next decade. This growth will increase the current population by about a third, to a total of roughly 140,000 residents. Developers will continue to provide the street trees in these new areas, with guidance from the City, bringing the initial planting of the community forest to its completion as well. At the same time, individual property owners and the City will continue to add trees to areas which have already been developed.

**Policy 1.3.3.a: To assure complete street tree plantings of appropriate scale and spacing in all new developments.** Developers shall continue to provide street trees in accordance with applicable ordinances. Pursuant to the forestry program's goals and objectives, the intent of the City is to achieve at least a fifty percent summer canopy coverage of all pavement, including streets. (See Appendix). This will not only ensure that the community's character is maintained through a constant, consistent forest, but will also significantly reduce the amount of heat the City produces, resulting in reduced cooling costs and energy consumption. To reach this objective, trees shall be spaced per the requirements of each species to result in a twenty percent canopy overlap at maturity. In no case shall spacing exceed forty feet between trees. To the maximum extent feasible, this spacing shall apply to both the distance between trees along the same curb-line and between trees across the street from each other. To achieve this goal, alternatives such as narrower streets, greater use of medians and bumped-out planting bulbs within the parking lane may be considered. (Maximum spacing for individual species are given in 2.7.)

**Policy 1.3.3.b: To assure a diversity of species and ages of trees.** In order to avoid potentially unhealthy monocultures, the City's intent is to achieve a forest composition with no more than ten percent of any one introduced species and to vary species compositions within neighborhoods by limiting each species to no more than 25% for each neighborhood. Species native to this area may be planted at 20% city-wide. Plantings along major streets shall provide for differences between median and curbside plantings or similar means of introducing variety while maintaining landscape

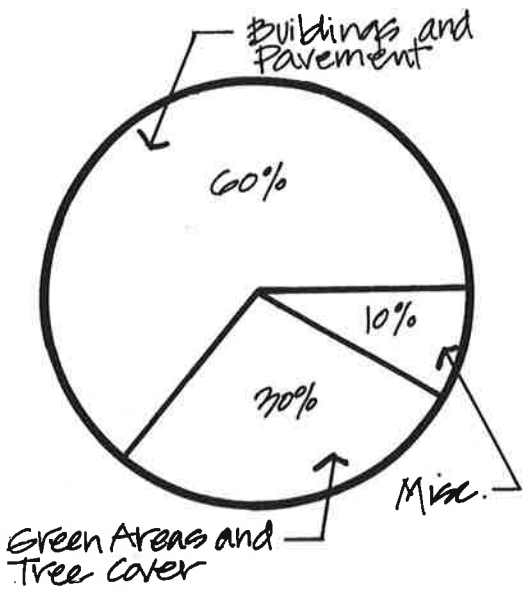



**Figure 3**

consistency. (See Vol. 2, Figure 1.) Plantings along single neighborhood streets may be of a single species, although the use of accent species at corners or as an understory is encouraged. (See Vol. 2, Figure 2.) The community forester shall use the tree inventory to monitor City-wide species composition and shall recommend changes to landscape submittals based on achieving the City's objectives. Age diversity shall be achieved by immediately replacing individual trees as they are removed, by intermixing fast and slow growing species, and by planting replacement trees next to declining trees where feasible (see Vol. 2, Figure 3). More information on maintaining forest diversity appears in 2.2.1.

■ *Species continue to be planted which are likely to cause serious problems in the future since they are not well matched to the environmental or engineering constraints of their site.* A number of species which have been widely planted in Thousand Oaks in the past have proven to be ill-suited to local conditions or to particular planting situations. Not only do such species perform poorly, but their performance may discourage people from planting additional trees.

**Policy 1.3.3.c: To plant species which are well adapted to the planting site and which will create maximum benefits and minimum problems.** Proposed species shall be carefully evaluated as to their likely performance in a given situation, the problems they may pose, and their ability to deliver the benefits which the planting is intended to provide. Trees shall be selected using species selection and design guidelines and the planting palette. Deviations from the palette or guidelines shall be considered experimental and shall not be widely used until adequately proven. The community forester shall review all planting proposals for conformance with the Master Plan. (Species selection guidelines are in 2.2, the design guidelines in 2.3, and the planting palette in 2.7.)

■ *Trees are frequently planted in situations in which they will be highly stressed and in which they will predictably come into conflict with their surroundings.* Under such conditions the full benefits of a tree are unlikely to develop, and it may well become a constant source of problems.

**Policy 1.3.3.d: To provide adequate space and site conditions for healthy tree growth to long life and full maturity.** The community forest program shall evaluate proposed planting sites and suggest modifications which will provide for the best possible growing conditions for the trees. In particular, adequate unconstricted and uncompacted root room and ample air space for the trees full growth shall be provided. In new developments, utilities shall be undergrounded outside the root zone of street trees. Tree wells in pavement shall be a minimum of 4 x 6 feet wide (24 square feet), with 6 x 6 feet wider or larger preferred. Smaller existing tree wells shall be expanded to these standards wherever possible. New parkways shall be a minimum of six feet wide wherever possible, allowing for adequate root room and

driveway slopes without compromising handicap access. Narrower existing parkways shall be widened wherever possible. Larger planting areas with clusters of trees shall be encouraged. (Details of recommended planting situations are in 2.3.3; Vol. 2, Table 3 and Figures 6-12.)

■ *Some older neighborhoods were never systematically planted or have lost their original complement of trees.* Many well-established areas of Thousand Oaks, where one would expect mature stands of trees, are quite barren.

**Policy 1.3.3.e: To actively plant or replant existing neighborhoods where trees are missing.** The City shall undertake an active program to assure the full complement of street trees in existing neighborhoods. A minimum of 20% of the annual community forestry budget should be allocated for plantings. (See Vol. 2, Table 2.) Based on the tree inventory, the community forest program shall prioritize those areas most in need of trees.

Planting shall be carried out either by City crews or through a neighborhood planting program combining City support with the volunteer labor of residents. In either case, residents shall be advised and their comments solicited well in advance of the proposed planting, both through community associations and by notices sent to all addresses where trees are to planted. The City shall actively seek the involvement of homeowners associations, businesses and other groups in funding and organizing neighborhood plantings, giving priority in its planting program to those neighborhoods providing such support.

(Planting recommendations and priorities for neighborhoods are provided in the appendix; Volume 5 describes ways to achieve community participation, including a detailed recipe for a neighborhood planting program.)

## 1.3.4 ACHIEVING THE OPTIMUM ENVIRONMENTAL BENEFIT OF TREES

As environmental problems increase in magnitude and scope, the environmental benefits of trees become increasingly important to the community and to the world at large.

■ *Energy consumption must be reduced as much as possible to support an increasingly energy-poor world.* Unshaded parking lots contribute significantly to the "urban heat island" effect, as well as increasing the need for air conditioning for neighboring buildings.

**Policy 1.3.4.a: To maximize canopy coverage of parking areas.** The community forester shall administer and enforce the revised parking lot landscape design guidelines, which provide for at least 50 percent canopy coverage of paved parking areas within 15 years of issuance of permit; specifies a minimum tree-well size of 4 ft. x 6 ft.; and regulates pruning to ensure proper canopy coverage. (See 1.4 for existing parking ordinance, and the appendix to Volume 2 for the city of Davis' ordinance.)

■ *Water is a precious, non-renewable resource in Thousand Oaks.* Watering of all landscaping in the City should reflect the region's natural limitations of rainfall as much as possible.

**Policy 1.3.4.b: To adopt a water management plan for all public plantings in the City.** This will have the following goals: reducing irrigation of medians, matching plant choices to available rainfall for all major public plantings, using permeable paving where feasible to help recharge groundwater, and using water-conserving irrigation systems and practices. This policy shall be closely coordinated with the City's utility department and the water management functions of the community forest program.

## TREE CITY USA

Tree City USA status was awarded to 84 California cities in 1988. The program is conducted by the National Arbor Day Association in cooperation with the U.S. Forest Service, the National Association of State Foresters, the U.S. Conference of Mayors, and the National League of Cities. The program has been designed to recognize communities that are effectively managing their urban forests. Further, it is geared to encourage the implementation of a local tree management program based on the Tree City USA standards.

There are four standards which must be met to qualify for Tree City USA status:

- A tree board or department
- A tree ordinance
- A community forestry program with an annual budget of at least $2 per capita
- An observance of Arbor Day

Approximately 80% of the tree program managers from Tree Cities who responded to the survey felt that Tree City USA status had benefited both their community and the tree program. Some of the benefits mentioned:

- Increased public awareness of trees and their importance
- Developers are more willing to work with the city to protect or enhance the urban forest
- The city receives recognition among sister cities for its efforts
- Increased morale for tree program employees

Among the 20% who did not report benefits from Tree City USA status, many were frustrated because they lacked sufficient resources to adequately manage the urban forest. Some felt that not enough public attention had been given to the status within the community, and consequently, many citizens were either unaware of or indifferent to the award.

*from The State of Urban Forestry in California, 1989*

■ *The City's community forest program can have far-reaching implications.* The connection between the City and other organizations devoted to trees can strengthen and reinforce the City's community forest program.

**Policy 1.3.4.c: To participate in the "Tree City, USA" program of the International Society of Arboriculture.** The City shall apply for this national designation and conduct its forestry program so as to receive and maintain it. (See adjacent sidebar.)

**Policy 1.3.4.d: To participate in the"California Releaf" and "Global Releaf" campaigns of the American Forestry Association.** The City shall establish a reasonable and challenging goal for trees to be planted by the year 2000 as part of the global effort to slow the "greenhouse effect" by absorbing atmospheric carbon dioxide into the living tissue of trees. The community forest program shall propose such a goal to the City Council for adoption at an earlydate, together with an appraisal of the resources required and how the goal might further the other goals and objectives of the community forest program. (See 2.3.1.)

■ *The continued use of oaks and other native species as major thematic trees in the City needs to be assured.* These native trees are particularly high in wildlife value, and are also intricately linked to the character of Thousand Oaks. Their numbers in the region and in the state are dwindling. Since oaks in particular are relatively slow-growing and require ample room for full development, they are sometimes passed over in favor of other species. Oaks are the official city trees of Thousand Oaks; one species, the valley oak, has been designated an endangered species by the California Native Plant Society.

**Policy 1.3.4.e: To assure the planting of a variety of species of oaks and other species native to this area in appropriate situations.**

Oaks shall be encouraged for use as street trees where adequate growing conditions can be provided. The design of major streets shall seek to create spaces where oaks can be used as a major thematic tree. Special plantings at important intersections and other visually important spots shall also give special consideration to the inclusion of oaks. Any oak removed by development shall be replaced with a number of other oaks, as determined by the size of the tree removed and pursuant to the oak tree preservation ordinance. (The planting palette in 2.7 includes several species of oaks appropriate for various situations; alternative street designs are given in 2.4.3; the oak tree ordinance is summarized in 1.4.)

**Policy 1.3.4.f: To participate in the efforts of the California Oak Foundation to protect, preserve and plant oaks in the state.** The community forester shall coordinate efforts with this group as appropriate, for instance in celebrating a special "year of the oak" in 1990. (See resources list in appendix.)

## 1.3.5 ACHIEVING THE OPTIMUM AESTHETIC BENEFIT OF TREES

Among the main reasons that communities plant trees is for their appearance and the natural character which they impart to the human environment. To maximize these benefits is to maximize the value of the community forest and the quality of life within the community.

■ *The coherence of plantings on major streets and the expression of neighborhood identity through distinctive plantings have not always been realized due to the segmented nature of development.* Since the most common visual experience of Thousand Oaks is from behind the steering wheel of a car, the quality of street tree plantings has an important impact on how the community is perceived.

**Policy 1.3.5.a: To develop the overall image of the community through coherent plantings along its major streets.** The planting schemes for extensions of major streets, shall extend or improve on the dominant theme and form of the existing portions. In addition, the community forest program shall prioritize opportunities to increase the amount, quality and coherence of plantings on existing arterials, including the addition of medians, and recommend these priorities to the City Manager for inclusion in the community forest program's annual budget request. Both extensions and enhancements shall follow the design guidelines and specific street recommendations of the Master Plan, which incorporates appropriate sections of the *Streetscape Identity Study* and *Freeway Corridor Plan.* (The guidelines are in 2.4, and the street recommendations in 2.5.)

**Policy 1.3.5.b: To enhance the civic identity of the City by special plantings at major intersections and other highly visible places.** Developments at major intersections shall be required to provide special landscape treatments at such corners, pursuant to the Guidelines for Landscape Planting. In reviewing proposed developments, the community forester shall assure the compatibility of these treatments with the intersection's other corners and with adjacent street landscaping. The forester should also include funding priorities for public improvements at major intersections and visual nodes in the forestry program's annual budget requests. (A summary of the guidelines is in 1.4; major intersection recommendations and priorities are noted in 2.5.)

**Policy 1.3.5.c: To develop the character of the City's neighborhoods through distinctive plantings and design approaches.** New developments shall extend and enhance the distinctive landscape character and patterns of the neighborhoods in which they occur, incorporating the design guidelines, recommendations and planting palette of the Master Plan. Plantings within exist-

ing neighborhoods, including replacement plantings, shall be compatible with existing vegetation, and shall involve neighborhood residents as much as possible. (2.4 gives city-wide guidelines, while 2.6 provides guidelines specific to the neighborhoods; Volume 5 addresses resident involvement.)

■ *The full richness and possibilities of available plant materials often go unused in deference to tried-and-true species and design solutions.* The range of plants which will grow well in Thousand Oaks and the community's dramatic natural landscape inspire an on-going enrichment of the visual environment.

**Policy 1.3.5.d: To encourage the expansion of the existing planting palette by using experimental species, new cultivars and species native to this area.** The community forest program shall set annual goals (minimum 5% of all new plantings) for using such species in new plantings, including plantings of shrubs and ground covers. (See 2.7 for experimental species.)

■ *A clear pattern of street trees is often not discernable in some new subdivisions where all planting occurs behind the sidewalk.* The widespread use of narrow "monolithic" sidewalks immediately behind the curb places required street trees in the public service easement, rather than in a clearly defined public planting strip. While this placement may benefit trees by giving them more root room, it can also reduce their visual impact as well as reduce their ability to shade the street.

**Policy 1.3.5.e: To provide a strong complement of street trees, especially when they are planted in easements behind the sidewalk or are otherwise not visibly part of the public right-of-way.** Such plantings shall be of a scale and regularity which provides both ample shading and a visual consistency to the street. (See 2.3.3 for alternative placements of trees within the public right-of-way.)

**Policy 1.3.5.f: To consider alternatives to existing right-of-way standards to provide greater tree coverage between the street and sidewalk.** Wide parkways in residential areas, meandering sidewalks, and planting areas for clusters of plants give consistency to the neighborhood while providing more ample growing areas for trees. (See Vol. 2, Table 3 and Figures 6-12.)

■ *Trees selected solely for their aesthetic character can be extremely unattractive if they are not well-adapted to site conditions or are drastically pruned to avoid conflicts with other site features.* Ironically, trees which are selected only for aesthetics often detract from the City's environment through their poor performance.

**Policy 1.3.5.g: To assure that environmental factors are given equal weight with aesthetic considerations when making planting decisions.** Careful use of the City's tree selection criteria and planting palette shall be required to assure environmentally appropriate selections which also enhance the aesthetic character of the community. (The criteria are in 2.3 and 2.4, and the planting palette in 2.7.)

## 1.3.6 ASSURING COORDINATION AMONG CITY DEPARTMENTS AND WITH OTHER JURISDICTIONS

At least six public agencies play important roles in the management of Thousand Oaks' community forest. As a result, the interconnected nature of the forest is sometimes the subject of disconnected human decisions. Fostering cooperation among these major actors, and the various constituencies they represent, is a major contribution to the health and character of the community forest.

■ *Decisions in virtually every City department have an impact on the community forest.* Because

trees are such a widespread part of the environment, they raise concerns and opportunities relating to most City services, from fire protection to libraries.

**Policy 1.3.6.a: To maintain close communication and cooperation among City departments on tree-related issues.** All City departments shall seek the advice and assistance of the community forester in any tree-related decision. The forester shall regularly add articles and notices to City employee newsletters.

**Policy 1.3.6.b: To coordinate all functions of the community forest program through the community forester.** The community forestry program includes a) the maintenance of street trees and other City-owned landscaping, including repair of pavement damaged by trees; b) the inspection of newly installed public and private landscaping and the enforcement of the City's tree ordinances; c) the review of plans and proposals for conformance with the Master Plan and City ordinances; d) the promotion of community forestry education and resident participation; and e) the administrative services necessary to support these activities, including maintenance of the tree inventory. The community forester position shall require the technical and managerial expertise, perspectives and experience necessary to professionally manage the program. (See 1.2.1 for functions and tasks chart.)

■ *Several jurisdictions other than the City are actively engaged in community forestry within Thousand Oaks.* The Conejo Recreation and Park District, the Conejo Open Space Conservation Agency, the Conejo Valley Unified School District, the Ventura County Flood and Fire Department, Caltrans and Southern California Edison all deal directly with trees in the City. Communication between these groups and the City usually occurs only randomly as particular issues arise.

**Policy 1.3.6.c: To foster regular exchanges among all tree-related jurisdictions in the Conejo Valley through a community forest forum.** The community forester shall organize and host a regular forum of the arboricultural professionals from these various groups in order to share professional expertise and experience relating to trees in the Conejo Valley and to foster cooperative efforts on behalf of the community forest. The forum shall include all such groups working in Thousand Oaks, those responsible for the municipal tree programs in adjacent communities, and others whom the forester deems appropriate. Presentations by the various professionals involved and by outside professionals are encouraged, but the primary purpose of all sessions is to engender open exchange and cooperation among the participants.

■ *Together, these jurisdictions plant and maintain a tremendous acreage in the City.* When major planting or maintenance efforts are undertaken by these groups, it would be very desirable for the City to formally review and comment on the proposed work.

**Policy 1.3.6.d: To maintain close liaison between the community forester and other jurisdictions planting or maintaining trees to assure compatibility with the spirit of the Master Plan.** The community forester shall establish cooperative arrangements whereby the review of major undertakings by the above groups which might affect the City's forest is assured. Although not binding on the other jurisdictions, the forester shall seek their cooperation in implementing the Master Plan.

■ *Caltrans maintains many acres of freeway right-of-way through Thousand Oaks, much of which is underplanted.* The impression of the community from the freeways is of major importance in forming the image of the City for both residents and visitors. The substantial area adja-

cent to the freeways offers many planting opportunities both to improve this impression and to help soften the impact of the freeway on the surrounding landscape, both visually and acoustically.

**Policy 1.3.6.e: To foster regular communication with Caltrans to implement freeway planting and maintenance programs compatible with the City's community forest goals.** The community forest program shall establish close communication with the State to assure the appropriate development of this important forest resource, in accordance with the Master Plan and the *Freeway Corridor Visual Analysis and Design Plan.* (The appendix contains recommendations for potential freeway plantings.)

■ *Trees and overhead utilities continue to create conflicts that are often resolved at the expense of the tree.* Although the maintenance of electrical power is of critical importance, pruning can frequently be accomplished with much less damage to the trees and for little or no additional cost by applying timely and appropriate pruning practices.

**Policy 1.3.6.f: To request Southern California Edison to notify the community forester prior to intended pruning so that the City might undertake the pruning or its supervision.** SCE pruning on public streets should be done by permit pursuant to the public-right-of-way landscape ordinance. Before issuing such permits, the community forester and landscape supervisor should determine if the work could better be accomplished by City crews or shall include in the permit any special conditions which may pertain to the particular trees, such as the class of pruning which shall be used. (A summary of the ordinance is in 1.4 .)

**Policy 1.3.6.g: To encourage SCE crews to follow City pruning standards.** Tree work performed by SCE should adhere to City and ISA standards. (Volume 3 contains these standards.)

**Policy 1.3.6.h: To plant species which will not interfere with existing overhead utilities, and to replace existing problem trees under lines.** The community forester shall use the tree inventory and the schedule for undergrounding utilities to determine where major conflicts occur between trees and utility lines, and following field verification, shall develop a schedule for the removal of such trees and their replacement with more appropriate species. In lieu of removal, the forester may implement a maintenance program which will protect both the utilities and the appearance of the trees. New plantings under utility lines shall be only of species which will not grow into the lines. (Volume 4 contains information on the inventory, and the planting palette in 2.7 gives appropriate species.)

**Policy 1.3.6.i: To require new underground utilities to be placed outside the root zone of existing or future trees.** Wherever possible, utilities shall be undergrounded to protect the utilities, unclutter the landscape and provide more room for trees. Such lines shall be the maximum distance possible from intended planting sites—at least twenty feet between the eventual root ball and the lines is preferred. When undergrounding takes place near existing trees, the community forester shall determine the distance necessary to protect the root zone and shall prescribe any compensatory pruning or other work which may be needed to offset roots which are damaged.

## 1.3.7 COMMUNITY PARTICIPATION AND EDUCATION

The private sector has been largely responsible for establishing Thousand Oaks' community forest. Under City guidance, developers have planted street trees and common areas. Businesses have greened their setbacks and parking lots. Homeowners have improved their properties. Greater

involvement of the private sector in the ongoing care and enhancement of the resource they have helped create will ensure a broad base of support for trees in the City.

■ *Developers are required to plant trees, but following initial establishment of the trees, the City assumes the full responsibility for their maintenance.*

**Policy 1.3.7.a: To require developers to plant street trees and to contribute a certain amount per tree to an endowment fund for the future maintenance of each tree planted.** In addition to planting street trees pursuant to City Code Section 7-2.904, developers shall be required to contribute a reasonable amount to the city as an endowment for the maintenance of the trees planted. The amount shall be based on the anticipated maintenance costs to the City during the first five years of the life of the trees. To implement this policy, the City shall develop an amendment to the ordinance for consideration by the City Council. (See 2.2.3, Table 2, for information on determining maintenance costs.)

■ *A large portion of the community forest is in public hands.* In numbers of trees, variety of design opportunities and availability of resources, the potential growth of the community forest beyond the public right-of-way is immense.

**Policy 1.3.7.b: To assure ample off-street plantings in new developments or rehabilitations.** Whenever the City issues a building permit for all construction, it shall require appropriate landscaping pursuant to its Guidelines for Landscape Planting and Irrigation Plans. The review of such plans shall be under the jurisdiction of the community forest program, which shall assure their compatibility with adjacent right-of-way and public service easement plantings. (A summary of the guidelines is given in 1.4.)

**Policy 1.3.7.c: To assure that homeowners' associations and others responsible for landscapes fronting public streets plant and maintain these areas in conformance with City standards.** The City shall require planting and maintenance in accordance with the Guidelines for Landscape Planting. In administering these guidelines, the community forest program shall assure that planting is compatible with adjacent public and private plantings and that the required maintenance plan references City standards. The forester or other designated representative of the community forest program shall take necessary steps to enforce these provisions, including protection of landscapes installed under the guidelines, while also undertaking public education efforts to encourage the proper maintenance of all trees within the City. (The guidelines are summarized in 1.4; the maintenance standards are in Volume 3; suggestions for public education are in Volume 5.)

**Policy 1.3.7.d: To encourage plantings at schools, parks, private holdings and other off-street sites.** Through active inter-governmental liaison and public education efforts, the community forester shall identify planting opportunities and assist their realization. (Volume 5 gives specific ideas.)

■ *There are few programs encouraging local businesses to be involved in the community forest .* The support of trees is an appealing way in which the private sector can express community pride.

**Policy 1.3.7.e: To encourage active support of the community forestry program by the private sector through contributions to the Tree Trust and the Tree Endowment Fund.** The City shall promote such contributions by undertaking a business-involvement program, emphasizing the value of trees to the local business environment and focusing contributions on special efforts like the improvement of particular commercial streets or other plantings. (Volume 5 suggests means of encouraging involvement.)

**Policy 1.3.7.f: To involve nurseries, landscape architects and contractors, and other local "green industries" in promoting the community forestry plan and good planting and maintenance practice.** The community forest program shall work with these natural allies of the community forest to assure their full participation in the forestry program, especially as points of dissemination for public information about the program. For instance, nurseries might be encouraged to stock appropriate species and to mark those species approved by the City with special "City approved" tags.

**Policy 1.3.7.g: To maintain clear and direct communication between the public and the City on forestry issues.** The community forest program shall provide for easy access to the forestry program by the public through a variety of means. (See Volume 5 for specific ideas.)

■ *An on-going means of public participation in City policies relating to trees would strengthen implementation of the policies.* There are numerous aspects of the forestry program, such as tree removals and neighborhood plantings, where broad-based citizen involvement would assist the City in implementing its policies.

**Policy 1.3.7.h: To develop a program for a permanent advisory board for trees.** The City Manager shall prepare a report to the City Council which develops the parameters, composition, authority and other elements of such a board to help implement the Forestry Master Plan. The purpose of the board should be to provide one central clearinghouse for information and decisions regarding the community forest program, as well as advise and assist the City in implementing the Master Plan, especially as regards a) appeals of tree-removal decisions; b) strategies for public involvement in the neighborhood planting program; c) public advocacy and promotion of the forestry program; d) funding strategies, and e) revisions to the Master Plan. (Many California cities have such tree boards, including Davis, Palo Alto, and San Francisco.)

**Policy 1.3.7.i: To involve residents directly in replanting their neighborhoods through a neighborhood planting program.** The community forest program shall implement a resident-based neighborhood planting program, providing City coordination, technical assistance and planting resources to match volunteer neighborhood labor in planting existing neighborhoods where trees are needed. With the assistance of the appropriate advisory board for trees, the forester shall publicize and promote the program and identify volunteer planting coordinators within each neighborhood to enlist the participation of their neighbors. (Volume 5 includes information for implementing such a planting.)

■ *Community forestry education can benefit trees, students and the community at large.* Reaching children with information about the importance and practice of community forestry provides an avenue for teaching a wide range of skills and attitudes.

**Policy 1.3.7.j: To promote a community forestry curriculum within the school district.** The community forest program shall work with the school district to develop a community forestry curriculum and shall make available staff and planting resources to include tree plantings by children on school grounds as a core element of such a curriculum. (Ideas and resources for such material is included in Volume 5.)

**Policy 1.3.7.k: To promote hands-on planting projects for the community's children.** The promotion of attitudes of care and respect for the environment shall be a major element of such plantings.

■ *On-going efforts to inform residents about the community forest can lend support to the program*

*and enhance a sense of community*. Conveying a sense to the entire community of its involvement in and responsibility for the community forest is a major goal of the forestry program.

**Policy 1.3.7.l: To pursue an active program of public education about the community forest.** The community forest program shall use all available means to reach as wide a public as possible with information about the value of the community forest and the forestry program. (See Volume 5 for specific ideas.)

■ *The City's forestry program offers ongoing opportunities to build a sense of civic pride and accomplishment*. The community creativity engendered by working on the community forest can be activated and celebrated on a continuing basis.

**Policy 1.3.7.m: To ritualize the importance of trees at annual community plantings.** The community forest program shall schedule these events and conduct them with full media and public participation as renewals of the City's commitment to its forest and its natural environment.

**Policy 1.3.7.n: To establish special places for trees, such as a memorial forests or heritage tree groves.**

## 1.3.8 ASSURING SUSTAINED FUNDING

The high regard in which the residents of Thousand Oaks hold their community forest has been shown in consistent funding of tree planting and care. The amount budgeted for all landscape planting and maintenance for fiscal year 1988-89 was just over $2,500,000. Although costs can be controlled by proactive maintenance practices, costs will increase as the forest expands and ages. Given these increases and the competition for public funds, grounding funding requests in the actual value of the forest may be necessary to assure adequate support.

■ *There is currently no agreed-upon method of assessing the economic value of trees in Thousand Oaks*. Trees are an appreciating community asset, the economic value of which can be professionally assessed and managed for optimal return. The total value of the community's existing public and private forest assets can be calculated, and its growth projected over the life of the forest. For instance, recent studies have shown that the value of an urban tree over a 50-year lifespan can range from $57,151 (Moll, AFA, 1988) to $162,500 (Das, University of Calcutta, 1986). Similarly, the potential for and cost of expanding the forest resource by additional planting can also be readily determined.

**Policy 1.3.8.a: To determine annually the total dollar values of the public and privately owned community forest, currently and projected in five-year increments for fifty years.** Using the tree inventory and other resources, the community forester shall prepare an annual report on the value of the community forest which shall be submitted to the City Council at the time of the annual budget request for the forestry program. The value shall be itemized for all public trees with an estimate of the value of private trees wherever possible. Values shall be based on tree evaluation methods, modified as may be appropriate for the purpose. (2.2.4 and the appendix contain information on appraising the forest, and Volume 4 describes the use of the inventory for this purpose.)

■ *The cost of managing the forest asset to maximize the values and minimize the liabilities associated with it needs to be established and projected over the lifetime of the forest*. By knowing the useful life expectancy of a given species and the particular maintenance tasks which it is likely to require during its life, together with the costs of installation and removal, the total cost of a given tree may be annualized and compared to the value

it represents. Projected over the whole forest and adjusted to the forest's actual age and species composition, such costs should approximate the amount necessary to maintain the value of the forest.

**Policy 1.3.8.b: To develop annual community forestry budgets based on securing a high future value for the forest.** The City Manager shall present the City Council with an annual community forest budget as a part of the annual budget process. The budget should include funds for a) maintenance work necessary for the long-term health of the forest; b) the removal of trees posing immediate hazards or in serious decline and the installation of replacement trees; c) the installation of new trees in existing neighborhoods, along major streets, at major intersections, and in special plantings on a prioritized basis; d) the design and construction of public improvements affected by street trees; e) inspection, enforcement and plan review; f) public education and participation; g) governmental liaison; and h) administrative support, including maintenance of the tree inventory. The budget shall identify the following line items: a) tree purchasing and planting; b) pruning and maintenance; c) tree removal; d) hardscape repair and modification from tree damage; and e) enforcement of the Master Plan and Community Forestry Ordinance. (Sample work program and budgeting worksheets are included in 2.2.3 and 3.1.4.)

■ *A reasonable investment in relation to value returned needs to be determined, and the means of assuring the necessary funds need to be identified.* Once the City Council has determined the annual budget justified to maintain and enhance the value of the forest, revenues from a variety of sources must be found to support the program.

**Policy 1.3.8.c: To administer a City-wide community forest assessment district as the primary means of securing dedicated funds on an on-going basis.** The City shall establish such a district to cover the basic costs of planting, maintenance, removals and replacements necessary to attain and sustain a full complement of street trees. Attendant administrative, plan review, inspection, repair and inventory maintenance work shall also be included in the amount assessed. The City shall work to develop the legislation necessary to establish the assessment district under existing law or to modify the City's existing landscape and lighting district to provide funds for the above purposes. (36 California cities use this method to fund portions of their tree programs.)

**Policy 1.3.8.d: To use Community Development Block Grant (CDBG), redevelopment funds and gas tax funds for special high-visibility public planting projects, such as major street medians through existing areas.** Large-scale, priority plantings shall be identified by the community forester each year for possible funding from these sources. Plantings involving other streetscape improvements, such as new planting islands or City entry statements, shall be given priority under this category. The use of CDBG funds is restricted to projects which would primarily benefit low-to-moderate income residents.

**Policy 1.3.8.e: To manage a Tree Trust and a Tree Endowment Fund for community forest enhancement.** The Tree Trust shall be structured to receive all special fees designated for planting and maintenance from developers and other sources including the first five years of maintenance of developer-planted trees. The Tree Endowment Fund shall be structural to receive funds from all tree-related sources, including but not limited to fines and penalties for violation of tree ordinances, court and arbitration awards, accident restitution, developmental conditions and contributions from corporations, institutions and the general public. This endowment for future or unforeseen needs of the forestry program shall be dedicated to special uses including but not limited to

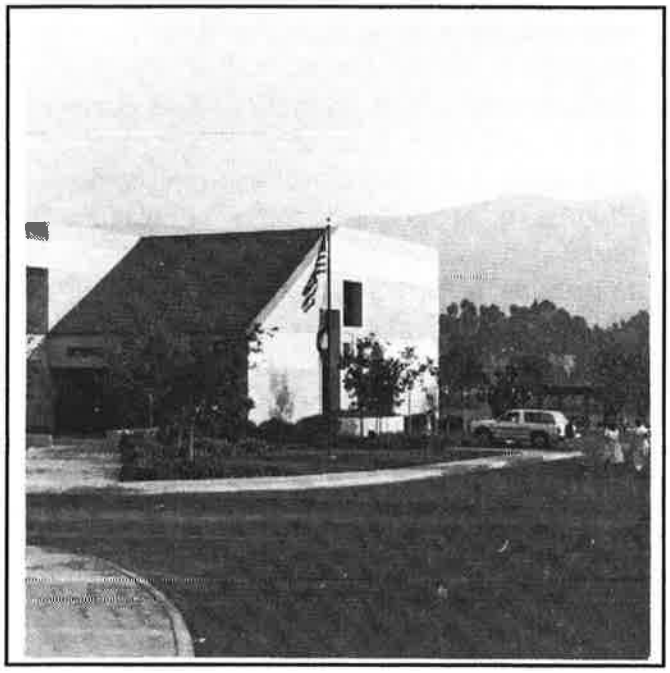
the tree inventory, community and staff education, tree purchasing, research, community plantings or replacements of specific trees, specific requests of the donor. Interest from the funds shall be credited directly to each appropriate fund annually in order to fund future community forest needs.

**Policy 1.3.8.f: To seek funding for special projects like the tree inventory from foundations and government sources such as the California Urban Forestry Program.** The community forester shall apply for such funds as may become available to pay for special projects undertaken by the program.

**CONCLUSIONS FROM *THE STATE OF URBAN FORESTRY IN CALIFORNIA* REPORT**

- Most California cities need an aggressive tree planting program to simply maintain tree densities at current levels.
- To keep pace with urban growth, increase species diversity, and maintain the health and vigor of their trees, California cities need to put more effort into long-term master planning of their urban forests.
- To derive the maximum ecological benefit from the urban forest, the current trend toward planting smaller trees will need to be reversed.
- There is potentially enough room along existing city streets to at least double the current number of city-managed street trees.
- Most tree programs need to put greater emphasis on educating the public on the benefits that the urban forest provides.

*—Bernhardt and Swiecki, 1989*



## 1.4 SUMMARY OF EXISTING ORDINANCES AND STANDARDS

This chapter summarizes the City's current ordinances and standards relating to trees and makes specific recommendations for enhancing each. It is intended to serve as an abbreviated guide for developers, business people, residents, City staff and others affected by these documents. However, actual decisions relating to these laws should be based on their full text, which is available from the community forestry program and which may be amended from time to time.

### 1.4.1 LANDSCAPING PROVISIONS IN PUBLIC RIGHTS-OF-WAY

(Article 9 of _____)

**Purpose and Intent** (Sec. 7-2.901)

Establishes the public purposes served by trees and other landscaping within the City, including City beautification, enhancement of the visual character of streets, increased contact with nature, amelioration of air pollution and noise, provision of economic benefits, improvement of visual identity and environmental quality, and enhancement of scenic highways.

■ *Add the following benefits:*
*—energy conservation and cost savings from reduced air conditioning due to summer shading of buildings and pavement*
*—amelioration of global greenhouse effect by direct absorption of carbon dioxide and by reduced carbon dioxide emissions from air conditioning.*

■ *Describe how distinctive planting of streets and neighborhoods assists in orienting drivers within the city.*

■ *Add the importance of proper tree selection and placement in minimizing potential conflicts between trees and other improvements (sewers, sidewalks, power lines, etc.).*

■ *Add the value of water conservation and the appropriateness of drought-tolerant species to the climate.*

■ *Add the value of the forest in attracting, housing and feeding wildlife.*

■ *Specify economic benefits associated with tree planting, including enhancement and stabilization of property values.*

**Definitions** (Sec. 7-2.902)

Defines various terms used in the ordinance and references supporting documents and plans. Provides for Council adoption of "Landscaping design criteria."

■ *Expand definition of "street tree" to include any tree growing within the public right-of-way and public service easements.*

■ *Expand definition of "historic trees" to include historic and landmark trees as defined by Council*

*Resolution No. 70-45, "Preservation and Protection of Historical and Landmark Trees."*

**General requirements: Landscape plans** (Sec. 7-2.903)
Requires developers to hire a landscape architect to prepare and oversee implementation of landscape plans for primary or secondary highways adjacent to a development. Plans are to be prepared in consultation with and approved by the departments of Public Works and Planning.

**Medians: Types of landscaping required** (Sec. 7-2.904)
Specifies kinds of landscape treatment according to median widths and traffic sight distances.
■ *Eliminate mention of lawn as a median material in order to reduce water consumption.*

**Trees in parkways, public service easements, and the like** (Sec. 7-2.905)
Requires developer to install street trees on fronting streets prior to occupancy of any structure. The type of tree for each street is to be approved by the departments of Public Works and Planning. Provides for City Engineer to assist developers in designating street trees and for Council adoption of standard specifications for street tree planting.
■ *Combine provisions relating to parkway, public service easement and peripheral right-of-way trees since the process described for each is essentially the same and the differing language may be misconstrued.*
■ *State that planting shall conform to City specifications, and provide for City inspection after trees are installed.*
■ *Require involvement of a landscape architect tn preparation of street-tree planting plans for large developments.*
■ *Change City Engineer to Community Forester.*

**Trimming, removal, and replacement of parkway and other trees.** (Sec. 7-2.906)
Requires developer to replace dead, dying or diseased trees within one year of final occupancy of a development. Thereafter, the City is to be responsible for tree removal and replacement. Requires a City permit to remove or prune any parkway tree. Requires any removed parkway tree to be replaced with a City-approved species, with cost of the removal and replacement to be borne by either the City or the homeowner as determined on a case-by-case basis.
■ *Specify "street tree" throughout, rather than "tree" or "parkway tree."*
■ *Provide for process and criteria for determining tree removals and replacements. (See 2..2.e for recommendations.)*
■ *Provide for City inspection of developer-installed trees one year after final occupancy to determine any need for replacement trees.*

**Repairs of street improvements within public rights-of-way where damages have been caused by street trees.** (Sec. 7-2.907)
Provides for City to repair damages to street improvements caused by street tree roots, to remove trees causing damage, and to replace such trees with an approved species. A fronting property owner may retain an offending tree by assuming the responsibility to pay for any future damage which it may cause. Oaks and other historic trees shall not be removed.
■ *Relieve the property owner of any responsibility for damages to street improvements caused by street trees planted with City approval, clarifying that removal decisions and repair responsibility rest solely with the City.*
■ *Provide for Council-adopted process and criteria for street-tree removals, which process should include consultation with the property owner.*
■ *Clarify that City will pay for repairs in connection with historic and landmark trees.*

■ *Add language addressing damage caused to street improvements by trees growing outside the public right-of-way.*
■ *Add provisions on City determination and removal of hazardous or nuisance trees affecting the public right-of-way or public well-being.*

**Scenic highways.** (Sec. 7-2.908)
Requires specific design measures on highways designated in the Scenic Highways Element of the General Plan, including continuous medians and parkways developed with a dominant landscape theme.
■ *Specify design and review process for scenic highways.*
■ *Provide for establishment of specific design criteria and landscape themes for each scenic highway.*

**Installation and maintenance programs, costs, and operation for medians and parkways on secondary and primary highways, including scenic highways.** (Sec. 7-2.909)
Requires improvement of medians and parkways on secondary and primary highways as condition of development approvals. Provides for Council establishment of landscape maintenance districts for specific areas to share installation and maintenance costs for medians and parkways. Provides for Council adoption of capital improvement programs to construct median and parkway improvements on primary and secondary highways, with priority given to scenic highways in general and Moorpark Road and Thousand Oaks Boulevard in particular.
■ *Clarify that landscape maintenance districts could cover landscape costs on any right-of-way, not just primary and secondary roads.*

**Planting lawns and ground cover.** (Sec. 7-2.910)
Permits property owners to plant lawns and ground cover within public right-of-way as long as public access and improvements are not compromised.

■ *Add information on high water consumption of lawn, and specify preferences for drought-tolerant species.*
■ *Require drought-tolerant ground covers under oaks.*
■ *Require plantings to be no closer than six feet from the trunk of mature oaks.*

**Planting and erecting hedges, shrubs, and fences.** (Sec. 7-2.911)
Requires a permit for hedges, shrubs and fences either within or obstructing public right-of-way.
■ *Add permit requirement for planting trees within the public right-of-way and/or provide for City to plant additional street trees at request of property owner.*

**Maintenance of hedges, shrubs, and fences.** (Sec. 7-2.912)
Requires maintenance of hedges, shrubs and fences within the right-of-way, subject to their removal if not maintained.
■ *Include maintenance of approved privately planted street trees or provide for City maintenance.*

## 1.4.2 STREET TREE PLANTING

(Sec. 9-3.1006)
Requires subdivision improvement agreements to provide for at least one street tree for every lot or two for corner lots. Street -tree plan is to be prepared by a licensed landscape architect and approved by the City Engineer. Tree species are to be approved by the City Engineer and Planning Director. Trees are to be installed prior to occupancy.
■ *Combine or conform language with Sec. 7-2.905.*
■ *Increase required plantings to at least one street*

*tree for every forty feet of frontage (less if small trees are used; see 2.7 for spacing guidelines).*
■ *Change City Engineer and Planning Director to Community Forester.*

### 1.4.3 TREE TRUST FUND

(Article 2 of ___, Sec. 3-5.201-3)
Creates special fund for money received from developers who don't plant street trees pursuant to Sec. 9-3.111 of Article 1 of Chapter 3 of Title 9 of Municipal Code. The fund is to be used to plant and maintain the trees required under that section.
■ *Expand sources of money for fund to include fines for violations of City ordinances relating to trees, private contributions from citizens, and other sources. (See 1.3.8.f)*
■ *Require developers to contribute funds sufficient for the first five years of maintenance for each tree planted.*
■ *Expand use of fund to planting and maintenance of street trees throughout the City.*

### 1.4.4 PRECISE GUIDELINES AND STANDARDS FOR THE LANDSCAPING OF HIGHWAY MEDIANS AND PARKWAYS

(Res. No. 75-246)
Section 1.
Calls for provision of specific guidelines and standards for improvements within and adjacent to the public right-of-way.
■ *Seems redundant with "Landscaping design criteria" provided for in Sec. 7-2.902 of Landscaping Ordinance; can be combined with this section.*
■ *Clarify meaning of "adjacent to" the public right-of-way by specifying setback area or a specific distance from the property line.*

Section 2.
Requires landscape architect to be involved in above improvements. Specifies items to be included in design concept and precise plan submittals, including analysis of existing streetscape and proposals for scenic corridor design. States preference for use of native plants and oak trees.

■ *Expand plan submittal requirements relating to plant requirements to conform with Plant Palette and Design Criteria (See 2.7).*

Section 3.
Requires landscape installations to follow specifications in City's land development manual.
■ *Seems partially redundant with Sec. 7-2.905 of Landscaping Ordinance. Combine these two provisions.*

### 1.4.5 STANDARD SPECIFICATIONS FOR SUBDIVISION STREET TREE PLANTING

Specifies procedure for planting street trees, including plan preparation and approval, bonds, timing, species selection, plant and soil materials, soil analysis, planting locations, staking, inspection and maintenance. Provides official street tree list. References City standard tree planting and staking detail.
■ *Expand application to cover any street tree, not just those in parkways.*
■ *Require inclusion of proposed tree species and locations on planting plan submittal.*
■ *Increase per tree bond requirement to the actual amount needed to plant a street tree.*
■ *Increase required planting to at least one tree every forty feet and more if small trees are used (see 2.7 for spacing guidelines).*
■ *Adopt new official street tree list (see Planting Palette, 2.7.)*

**Guidelines for Landscape Planting and Irrigation Plans**

General Requirements

Specifies required submittals, fees, plan inclusions, reviews, inspections and approvals for private landscape improvements in connection with building permits. Requires landscape architect to prepare plans. Requires existing trees of certain species to be indicated on plans.

■ *Clarify which developments are covered by guidelines and cite ordinance authority for guidelines.*

■ *In addition to the species mentioned, require that any existing tree over six inches in caliper be indicated on plans.*

■ *Reference Historical and Landmark Tree Ordinance, as well as Oak Tree Ordinance.*

Planting Plans

Specifies design elements and graphic standards to be included on plans. Requires planting for erosion control, fire clearance zones, screening, solar control, design continuity and aesthetic enhancement. Encourages drought-tolerant, low-fuel, climatically adapted plants. Requires preservation measures for existing trees and soil analysis.

Irrigation Plans

Specifies design elements and graphic standards for irrigation plans. Requires automatic system designed for healthy growth with minimum water waste. Requires separate control valves for planting areas with different watering needs. Encourages low-use sprinkler heads.

■ *Encourage use of drip irrigation and other low-volume systems.*

Landscape Standards

Provides standards for landscape improvements, including:

1. Design compatibility with City's natural setting and scenic beauty, and character of site architecture and existing landscaping on adjacent sites; 2. Size of plant materials at installation; 3. Preference of evergreen over deciduous trees; 4. Use of evergreens for screening; 5. Use of evergreens to frame and soften buildings and views; 6. Use of deciduous trees to veil buildings, as accents and for solar control; 7. Preservation of oak trees; 8. Use of vines and espaliers for screening; 9. Water conservation, including drought-tolerant species and minimal use of lawn; 10. Maintaining safe sight distances through low-growing plants (references Plate 10-D of Dept. of Public Works Road Standards); 11. Mounding and screen walls; 12. Numbers of trees in commercial and industrial setbacks; 13. Parking-lot landscaping, including fifty percent canopy-coverage to reduce heat production; 14. Planting of manufactured slopes; 15. Planter curbs and slough walls; 16. Street trees, including selection, spacing, root barriers and minimum distances from walks and other improvements; 17. Installation of coast live oak as a theme tree behind any street sign occurring in a median; and 18. Provision of a maintenance program.

■ *Coordinate these standards with Landscaping Design Criteria for public rights-of-way. (See Volume 2).*

■ *Add language on compatibility with public right-of-way landscaping and landscape themes.*

■ *Add standards for fire- and erosion-control landscaping.*

■ *Include preservation measures for historic and landmark trees and other species in addition to oaks.*

■ *Encourage use of native plants, especially those of local origin or particularly suited to the environmental conditions here.*

■ *Consolidate street tree provisions in "Standard Specifications for Subdivision Street Tree Planting" and incorporate here by reference.*

■ *De-emphasize use of coniferous trees in favor of broadleaf evergreens, which are more compatible*

*with the native forest here.*

■ *Replace preference for evergreen trees with more general guidelines about the situation in which their use should be considered.*

■ *Give use of coast live oaks in medians as one example of thematic planting, rather than as a prescription.*

### 1.4.7 PARKING ORDINANCE

(No. 857-NS)

Landscaping (Sec. 9-4.2404(e))

Requires that ten percent of parking lot area be landscaped, in addition to setbacks and perimeter landscaping of various widths. Specifies distribution of landscape areas, curbs, height of shrubs, irrigation and plan submittal and approval.

■ *Incorporate provisions from above guidelines relating to trees in parking lots. Specify use of wide-spreading trees for maximum canopy coverage.*

■ *Require a minimum of 50% shading within 15 years.*

■ *Require a minimum 4' ft. x 6' ft. tree well.*

■ *Establish pruning standards to ensure maximum tree-canopy coverage is retained for the life of the tree.*

■ *Require approval of completed landscape prior to occupancy.*

### 1.4.8 PRESERVATION AND PROTECTION OF HISTORICAL AND LANDMARK TREES

(Resolution No. 70-45)

Recognizes "the unique and irreplaceable value of landmark trees" and declares the City's intention to preserve them. Defines "landmark trees" as native sycamores, coast live oaks and valley oaks and specimens of other species deemed historically or culturally significant. Establishes minimum standards for the protection of such trees, including protective devices, grading and filling limitations, and prohibitions of chemical usage and attachment of signs or other fixtures. Provides for preservation of such trees where feasible within existing and proposed public rights-of-way. Requires identification of landmark trees on development plans and permit applications and review by Planning Commission.

■ *Add prohibition of cutting, removing, pruning or in any way damaging a landmark tree without a City permit.*

■ *Add fines and penalties for violation, with any resulting revenues going toward corrective actions and/or replacement trees.*

■ *Add trees deemed horticulturally significant by reason of size, rarity or form.*

■ *Strengthen the recitation of public purposes served by the ordinance.*

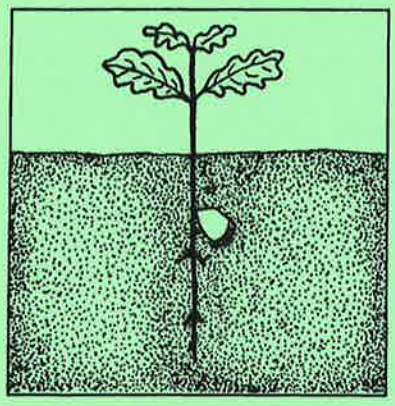
### 1.4.9 OAK TREE PRESERVATION AND PROTECTION ORDINANCE

(937-NS)

Sets forth a policy to preserve all healthy oak trees in the City and details its implementation including extensive guidelines and procedures. Obligates property owners to maintain oaks in good health and safe condition and requires a permit for any work affecting an oak. Establishes procedures and standards for issuing permits and conditions for removal of trees. Sets violation as a misdemeanor and provides for restitution to the City for loss or damaged oaks, including replacement with two or more trees of like size and value.

■ *Consider strengthening the health and welfare purpose to give the firmest possible basis for this strong ordinance.*

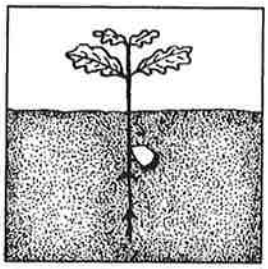
# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN



| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| **VOLUME 2: MANAGEMENT & DESIGN PLAN** | **GREEN BOOK** |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

OCTOBER 1989



Volume 2

# MANAGEMENT & DESIGN PLAN

## TABLE OF CONTENTS



*continued next page*

*continued*

## 2.1 INTRODUCTION

This chapter provides an overview of the Management and Design Plan and describes how it can be used to reach sound decisions about the selection and siting of trees.

### 2.1.1 CREATING AND CARING FOR THE COMMUNITY FOREST

In their day-to-day decisions about trees, the people of Thousand Oaks are engaged in a cooperative effort with each other and with the forces of nature to create and maintain a mutually satisfying environment. It is a creative process, involving equal measures of ecology, politics, horticulture and aesthetics.

Despite this complexity, it is a process which boils down to the act of properly planting the right tree in the right place to achieve the greatest benefit for the longest time. When successful, the result affirms the unity of the natural and human communities.

The purpose of this volume is to provide basic guidance to this process of community creativity. The plan sets forth guidelines for the overall management of the community forest, including maintaining species diversity, tree removal decisions, and maximizing the value of the city's forest resource. It describes environmental and design factors that should be considered prior to all planting decisions. Two chapters discuss specific areas of the community forest: the major streets and neighborhoods. The appendix to this volume offers specific recommendations to help develop the identity of each major street and neighborhood in the city. Finally, this volume provides a palette of recommended trees for use in the city, including a matrix that describes the main characteristics, tolerances and uses for each.

### 2.1.2 THE PROCESS OF COMMUNITY CREATIVITY

The process by which trees are selected and sited varies according to the planting situation: whether in new developments, in existing neighborhoods, along major streets, or outside the public right-of-way. Wherever trees are planted, decisions about their selection and siting are reached through a process of consultation between the private parties who will be most directly affected by the particular planting and the public representatives who have responsibility for the forest as a whole. The more members of the public affected by the decision, the greater the role of community participation in helping to guide the city's decision.

In all cases, the guidelines and information contained in this Management and Design Plan should be used to inform the process to benefit all concerned, including the trees themselves.

**New developments.** After consulting the Master Plan and city staff, the developer's land-

scape architect submits plans for city review. Staff reviews the plans for conformance with this document, and seeks public comment. Staff works with the developer to adjust the plans and makes recommendations to the Planning Commission and City Council as part of the permit approval process.

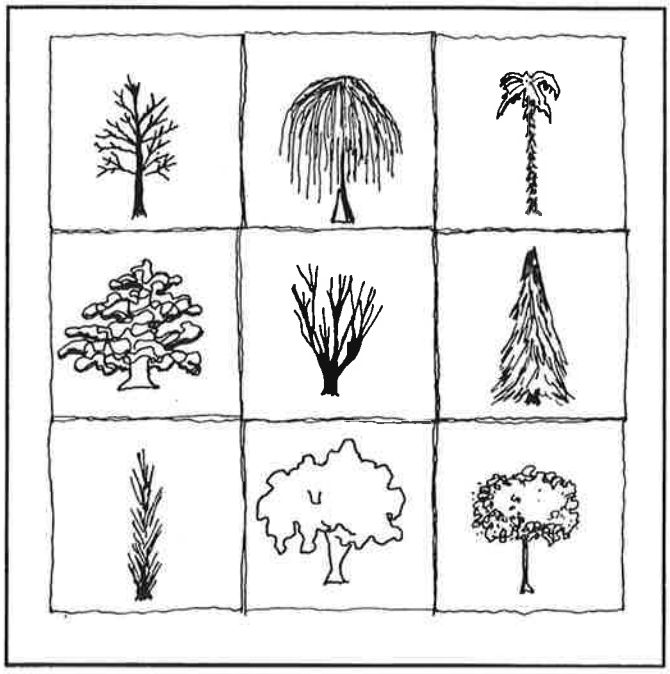
**Major streets.** Same process as above for major streets within new developments. For existing streets, the city initiates the plans, either developing them in-house or hiring a consulting landscape architect. The plans are presented to the public for comment and approved by City Council as a capital improvement budget item.

**Replacement trees.** The community forester selects species and placement in conformance with Master Plan criteria and with prior notification of fronting property owners. Property owner may appeal decision through staff, the appropriate board for trees, Planning Commission and City Council.

**Neighborhood plantings.** For city-initiated plantings, the community forester recommends acceptable alternative schemes and species at a neighborhood meeting, then finalizes plans, taking into account the residents' advice and concerns. The plans are then reviewed and approved by the Tree Advisory Board. (See Volume 5 for ways to approach neighborhood-initiated plantings.)

**Off-street plantings.** Property owner prepares plans with reference to the Master Plan and with advice from the community forester. In the case of large holdings, including corporate or commercial properties, the process and standards for new developments will be followed to the extent possible. In the case of public lands, such as parks and Caltrans rights-of-way, the community forester reviews plans and works with the appropriate jurisdiction to encourage compliance with the Master Plan.

**Removal and major management decisions.** The community forester notifies property owners in immediate area affected, stating purpose and findings relating to the proposed action. The public may appeal through staff, the appropirate board for trees, the City Council and the Planning Commission.



## 2.2 MANAGEMENT GUIDELINES

This chapter outlines the major strategies for managing the community forest, many of which have been adapted from classical forestry for use in the urban environment. It provides city staff with guidelines to assist them in monitoring and managing the rates of planting and removal and the overall composition of the forest. Policy makers, business people, developers and residents will find these strategies of interest since they set the context for day-to-day decisions affecting the forest.

### 2.2.1 MAINTAINING FOREST DIVERSITY

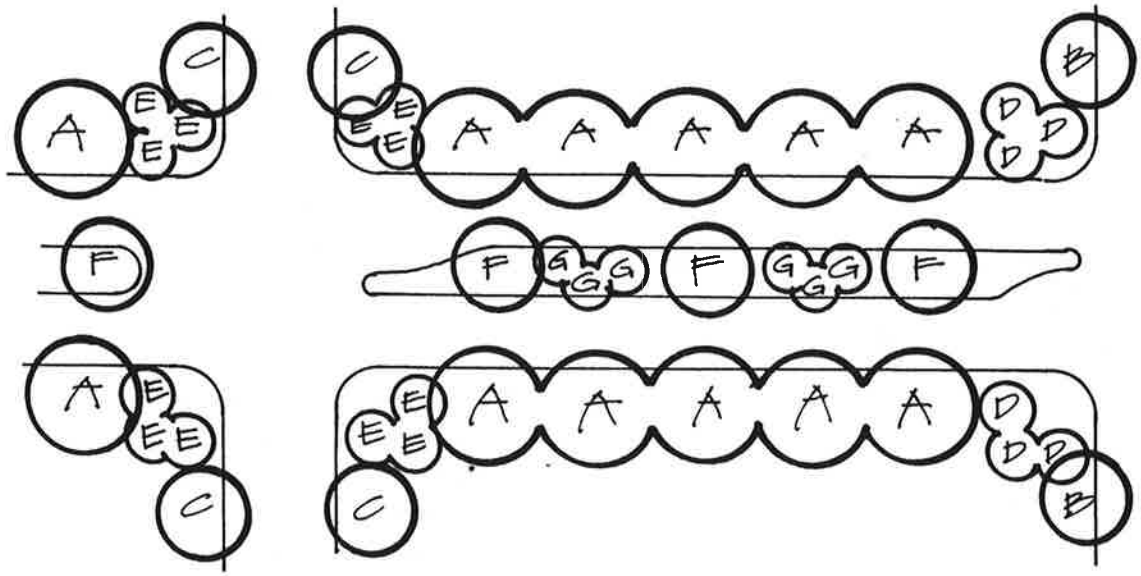
From the perspective of the long-term health and appearance of the community forest, maintaining a diversity of tree species and ages is vital. Although at times more difficult to manage, a diverse forest, like a diverse natural ecosystem or a diversified economy, is likely to be more stable than a simple one, undergoing gradual change as individual trees die and are replaced.

And should a pest, disease, climatic occurrence or other problem cause the removal of an entire species, diversity provides insurance against the kind of wholesale denuding of the forest cover that took place in many eastern communities with the invasion of Dutch elm disease. (See 1.3.3 for policies.)

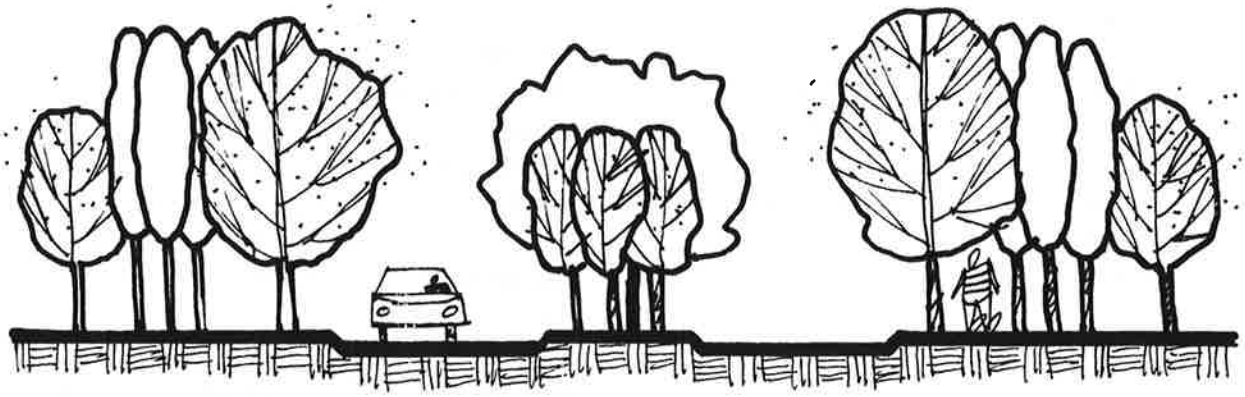
■ **Monitor overall species and age diversity.**
The city staff must keep track of the percentages of each species in the city by neighborhood and assess where imbalances may be developing. This monitoring will be a primary use of the city's tree inventory, with assessments made annually.

■ **Encourage planting a variety of species and cultivars.**
When a species begins to be over-planted, the city should discourage its use and recommend alternative species. A variety of cultivars of a single species might also be appropriate, if each is known to possess tolerances to certain conditions not found in the others. Although environmental stresses that are predictable will be selected against, a range of adaptability in the tree stock ensures against unanticipated problems. In general, the city as a whole should contain no more than 10% of any species. Each neighborhood should contain no more than 25% of any one species. (See 1.3.3.b.)

■ **Do not plant the sidewalks and medians of major streets with the same species.**
The different planting conditions in these two situations often suggest different species, either of which would provide a planted presence on the street should the other fail. (See Figure 1.)

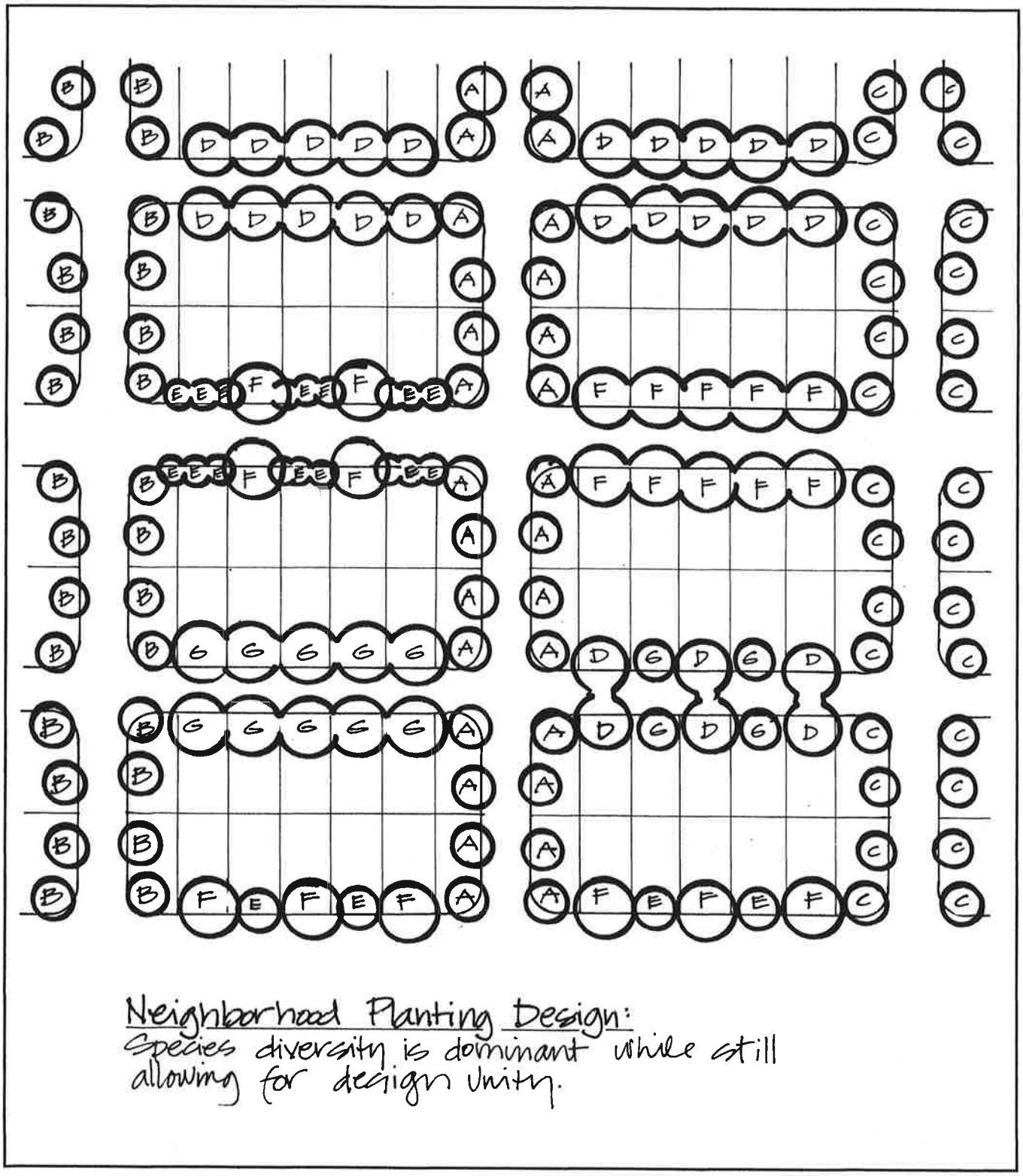



A: Dominant tree species on both sides of the street
B and C: Dominant tree species on side streets
D and E: Accent species at street intersection
F: Dominant tree species in median
G: Accent understory tree

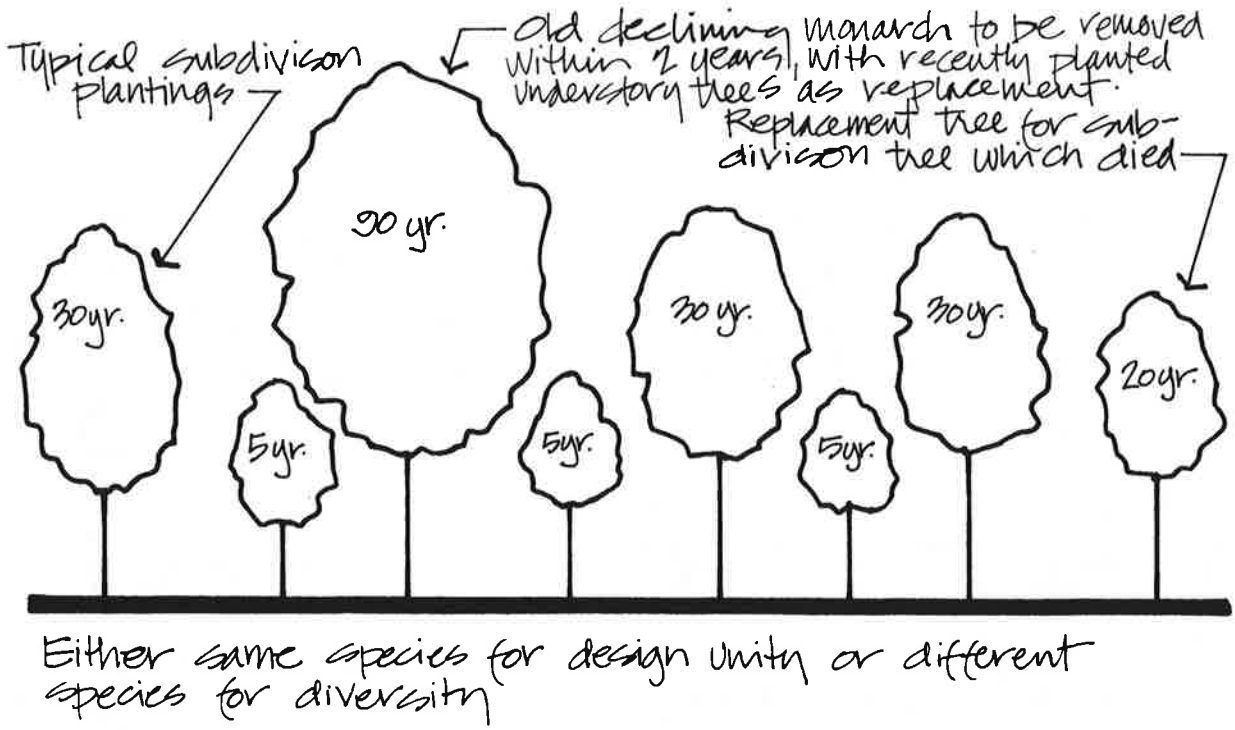


Major Streets: Design continuity is dominant while still providing species diversification (7 different species)

**Planting Design for Major Streets** **Figure 1**




**Planting Design for Neighborhoods** **Figure 2**




**Age Diversity** **Figure 3**

■ **Do not plant whole neighborhoods with one or two species.**
Although consistent plantings on individual streets often give the strongest visual effect, the repetition of the same species on street after street can create a monoculture situation that would subject the neighborhood to a sudden erosion of character if the trees encountered problems. (See Figure 2.)

■ **Maintain a sense of order within diversity by planting trees with compatible forms.**
Many of the visual benefits of trees outlined in the design guidelines rely on the large-scale repetition of species. These effects should not be sacrificed to diversity for diversity's sake, which can result in visual chaos. Consult the design guidelines for ways of balancing unity and diversity, such as alternating species of compatible forms, and using accent species or tree groupings. (See 2.4.1 for further explanation of tree forms.)

■ **Test new species and cultivars for wider application.**
The city should actively seek to expand its palette of acceptable trees by test-planting species not widely planted here and monitoring their performance. Since availability is often a limiting factor to the use of new species, the city could contract with nurseries both to provide experimental stock and to supply usable quantities once a species is proven. The city might also contract to have nurseries provide oaks and other native species grown from local genetic stock rather than those developed elsewhere in California. (See 1.3.5.d.)

■ **Monitor pests and diseases within Thousand Oaks and other communities.**
To prepare for problems which may entail large-scale removal and replacement of trees, the city should actively monitor all major pest and disease populations, both locally and regionally, that could adversely affect its forest. Preparations should then

include special preventative health care of targeted species to help them withstand the disease, pest or other threat.

■ **Foster age diversity by immediately replacing trees as they are removed and by growing young trees under aging stands.**
Ideally, when a tree is removed its replacement will already have been planted and will be well established. However, since this is frequently not possible due to shading, lack of space or aesthetic reasons, replacement at removal will create a staggered-age new generation providing more-or-less continuous tree cover. (See Figure 3.)

■ **Anticipate removals and plan for plantings accordingly.**
To properly monitor age diversity, a useful life expectancy must be established for each species. This describes approximately how long the tree can be expected to remain in a healthy and vigorous condition, before serious decline sets in. At that point, the expense of maintaining the tree in a pleasing and non-hazardous condition may exceed its amenity value. Its removal should then be considered, although the final decision should be subject to the careful evaluation process outlined in the next section.

The tree palette indicates an average life expectancy for each species under urban conditions. Adjusted for the more specific conditions of each area, this figure will allow the city to undertake a program of gradual removals and replacements with minimal interruption to the forested character of the community.

## 2.2.2 REMOVING TREES

Tree removal is perhaps the most sensitive decision to be made regarding the community forest. The depth of people's attachment to trees and the values associated with them become clear when one is slated for removal. However, when seen in the context of the life-cycle of the forest, and when complemented by vigorous efforts to preserve and replant trees, removals are an essential part of the overall care of the forest. Establishing clear criteria and a well-defined process for determining removals will help ensure that this aspect of forest management is accepted by the community.

In general, trees in a city should be allowed to grow to the maximum age possible. Unlike traditional forestry management, where value is measured by monetary return when harvested, the value of city trees comes from their ability to grow old and large, providing shade and beauty. (See 1.3.2h-k for policies.) As a part of routine maintenance, all trees will be monitored for hazardous conditions. (See 3.8.3 for assessment checklist.)

The relationship between timely removals and the long-term health of the forest cannot be overemphasized. Educating the community now about the benefits of a managed forest is essential to avoid problems later on. Meeting with environmental groups to explain city management policies, as well as informing the public about tree-removal criteria, will help the tree removal process proceed more smoothly.

**Criteria for removal**

■ There is immediate danger of dropping limbs.

■ There is recognized danger of falling or dropping limbs in the next few years combined with other factors which make corrective measures not cost-effective.

■ The tree is competing for light or space with adjacent trees which are judged to be more valuable, because of their potential longer life, attractiveness, and/or more sturdy growth.

■ The tree is host to an aggressive life-threatening

disease or pest which threatens to spread to other trees.

■ Even after the planting area has been enlarged to a minimum 4 x 6 feet, root-damage results in repeated pavement repair, the cost of which exceeds the amenity value of the tree. In some cases the value of the tree may be great enough to justify continued repair. An evaluation of the tree, based on the "ISA Guide for Establishing Values of Trees and Shrubs in the Landscape" should be used to help make this decision. (See Appendix for the form that is usually used.)

■ Tree is in decline, and has less than an estimated two years of lifespan remaining.

■ Tree is in the way of construction which cannot be accommodated by special construction techniques or re-siting the construction.

■ Root cutting of the tree for pavement repair would probably result in irreparable decline of the tree or the creation of a hazard. (Refer to 3.4.8 for more discussion of this.)

■ Systematic removal. When a species is consistently performing poorly or is gradually killed off by insects, a systematic removal and replacement of the unsuccessful species with a more appropriate species can make the transition gradual and relatively painless. The alternative is waiting until the affected trees begin dying in large quantities, leaving significant openings in the city's tree canopy. A removal program should be planned for three stages, over a nine-year period, with replacement trees installed during the same year as the removals, so that in twelve years the new tree population contains trees of nine, six and three years of age.

**Common conditions which may lead to removal**

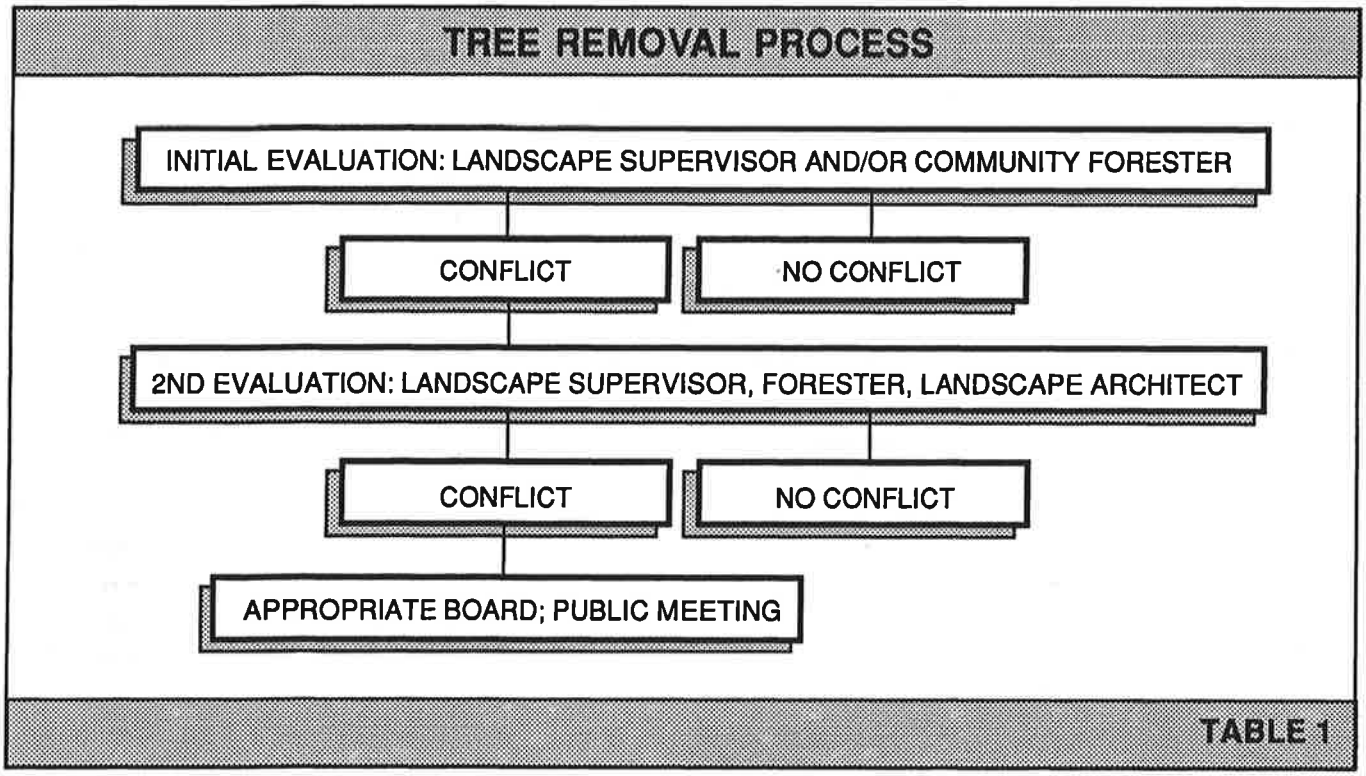
■ **Brittle species.** An old specimen of an inherently brittle species should be inspected annually; check-up should include an increment borer sample. When annual growth is less than one third of normal growth for the species, or observation of the upper one third of the foliage shows the canopy to be significantly less fully foliaged than in the previous year, these characteristics should be considered warnings of root loss and increased danger.

■ **Sudden summer limb drop.** Large, healthy trees which have long, large-diameter, horizontal limbs should be checked annually by a qualified arborist for likelihood of susceptibility to this problem. Preventative measures include endweight thinning, cabling or installation of a support post to prevent this potentially dangerous problem.

■ **Poorly tapered limbs.** If a tree has produced very long limbs which are not tapered in diameter from near the limb base to 20 to 30 feet from the base, the limb is inherently more vulnerable to breakage than an equivalent limb which is well tapered from its base. This poorly tapered condition may be caused by excessive interior thinning, which forces end growth to become heavier but does not increase limb diameter, or by the tree having grown to significant size as one of a dense stand of trees, or by a combination of these factors. Deodar Cedar and Coast Live Oak are examples of trees susceptible to limb damage as a result of overthinning.

**Process for determining removal**

■ An initial evaluation is done by the landscape supervisor or community forester to determine whether corrective measures or removal is advisable, using established criteria. If a decision cannot be made or is in conflict, a second evaluation is done by the community forester, landscape supervisor and landscape architect together.




■ If removal is recommended, a notice is placed on the tree and sent to all residents and businesses on the block or within the area affected by the proposed removal. State reasons and date for removal, intended replacement species and process of appeal.

■ If appealed, community forester meets with concerned party to attempt to reach agreement. If unsuccessful, the appeal is brought to the appropriate board for trees, which makes a recommendation to the City Council, whose decision is final. (See Table 1.)

Tree removal may sometimes be a better answer than pruning, root cutting or some of the other procedures involved in municipal tree main tenance. Dead trees will, of course, always need to be removed. (See Appendix, tree removal evaluation chart, for a means of clarifying the decision-making process.)

**Removals on Private Land**

Cooperation between private citizens and the community forest program is necessary. Removal should be a last resort. This process is designed to differentiate between trees which truly are not worth being preserved and those which should be preserved, for the benefit of the entire community. It is the city's policy to preserve as many worthy amenity trees as possible in proposed developments, and all historic and landmark trees.

If removal of a useful tree is necessary to develop a site, replacement of that tree with trees of equivalent value to the tree being removed is required by the permit process (see 1.3.2.n for policy, and 3.4.2 for more on tree removals).

Many existing trees in Thousand Oaks have been damaged by adjacent construction and have been declining over the years. It is the task of

the community forester to determine when these trees have become dangerous, and then take steps to have those specimens pruned or removed before they begin dropping major limbs. Whenever heritage oaks must be removed, they should be replaced with at least two large specimen oaks on the specific site, or elsewhere in the city if that is not possible, to assure that the population of native oaks is at least stabilized, and preferably increased. (See Appendix 1 for Oak Preservation Ordinance.)

## 2.2.3 MANAGING THE VALUE OF THE FOREST

The staff professionals responsible for the city's forest must be able to show that the value of the forest is worth the city's investment in its creation and maintenance. Although this value has many intangible dimensions, it becomes very useful to be able to express the value of trees in dollar amounts when funds are being allocated in the city's annual budget process.

**■ Use the PRC and ISA formulas to determine the value of a tree.**

The International Society of Arboriculturists has developed a formula for establishing the value of an amenity tree. Alden Kelley has used the ISA formula to develop a more accurate formula for California trees called the Production/Replacement Cost (PRC) method. In its full form, these formulas and the evaluation process which accompanies it can be used by community forester with professional arborists to determine the amounts due for tree losses in insurance or tax cases, or as penalties for trees illegally damaged.

These formulas sets a base value for a tree by multiplying the area of the trunk in square inches (measured at breast height) by a standard dollar amount ($27 in 1988) set by the ISA and periodically adjusted. This base value is then multiplied by percentages representing the species class, the condition and the location of the tree. The result represents the tree's value: Value = Base value x species class x condition x location

See Appendix for tree evaluation forms and a comparison of the two methods. For greater precision, these may be supplemented with a manual issued by the ISA or Alden Kelley.

**■ Use the tree inventory to monitor the value of the entire forest.**

As described in Volume 4, the city's tree inventory will allow these values to be recorded for every street tree in the city and thus give an aggregate dollar amount for the entire community forest. The inventory will enable projections of the change in value as the trees grow and decline and as new trees are planted. Thus the value of the forest can be estimated over time.

These same variables also allow maintenance, removal and replanting needs to be projected far into the future. Expressed as anticipated program costs, these needs become the basis of long-term budget projections. A comprehensive inventory can therefore be used to estimate both the value of the city's forest and the cost of maintaining that value at a given point in time. By making plain the return on the city's investment in its forest, this system can be invaluable in assuring future funding. (See 1.3.8 for policies.)

**■ Use the inventory to enhance forest value.**

In the short term, the active use of the inventory can also help reduce program costs in a number of ways.

*Efficient scheduling*. It enables efficient work schedules and procurement of materials based on current management needs. (See scheduling information in 3.1.4.)

*Accurate annual budgets*. The documentation of these needs not only leads to operational effi-

## COMMUNITY FORESTRY BUDGET WORKSHEET

| JOB CATEGORY | TASK | TIMING | THIS YEAR: 1990 Number | Unit Cost* | Total | % |
|---|---|---|---|---|---|---|
| **PLANTING** | | | | | | |
| NEW TREES (5,296 per year) | by City by capital improvements | | 5,296 | $50 | $264,800 | 20% |
| TREE REPLACEMENT (1 x removals) | | | 220 per year | $50 | $11,000 | |
| **MAINTENANCE** | | | | | | |
| EXISTING TREES (5 years and older) | pruning<br>fertilizing<br>watering | once per 5 years<br>once per 5 years<br>twice a summer | * | $20<br>$25<br>2 @ $10 | | 40% |
| NEW TREES (up to 5 years old) | watering | yr. 1: 52 times<br>yr. 2: 25 times<br>yr. 3: 6 times<br>yr. 4: 2 times | * | $520<br>$250<br>$60<br>$20 | * | |
| | pruning<br>fertilizing | once per year<br>onceper year | | $40<br>$25 | | |
| * Cannot be determined until inventory is complete. | | | | | | |
| TREE REMOVALS (stumps also) | | 220 per year | 220 | $250 | $55,000 | 10-15% |
| PHYSICAL IMPROVEMENTS | | | | Lump sum | | |
| INVENTORY DESIGN & PLAN REVIEW | | once per10 years | 28,000* | $2 per tree | $56,000 | 10-15% |
| EMERGENCY/CONTINGENCY (including pest control) ADMINISTRATION AND EDUCATION | | | | | | 10-15% |
| **TOTAL** | | | | | | 100% |

TABLE 2

## THE FOREST AS A GROWING ASSET

The ability of the municipal tree resource to increase in value rather than depreciate makes it unique among city assets. It is an asset that should not be taken for granted by city government. A tree maintenance budget needs to seriously address the value of urban trees because it is an asset that can't be replaced. A building can be destroyed and replaced in kind, but a tree cannot. The tree maintenance budget is therefore an investment with an increasing return.

The city of Sunnyvale annually spends approximately $30 per tree on maintenance. This investment maintains a resource valued at $900 per tree. Slightly more than three percent of each tree's value is spent on maintenance, while the resource value grows a minimum of five percent annually due to growth and maintenance. In Santa Ana, the difference in the amount invested in tree maintenance and the return on the investment is more dramatic. Approximately $25 is spent on each tree for maintenance. The value of the average tree in Santa Ana is approximately $1,600. The $25 invested returns $80 annually. This is a 220% turnaround on the tree maintenance dollar.

*—Excerpted from the March 1989 issue of* American City and County, *"Investment in the Municipal Tree Resource," Gold Coast Environmental Services.*

ciency, but results in well-grounded annual budget requests for the community forestry program.

*Preventative maintenance*. Over time, the overall value of the forest is increased by the increased quality of care, even though the actual time and money spent servicing trees may decline because problems are being addressed before they become major.

*Decreased liability*. The city's potential losses from liability claims are also greatly reduced, both from healthier and therefore less hazardous trees and from the ability to accurately demonstrate the degree of care exercised by the city in relation to a particular tree.

*Timely removals*. By anticipating the likelihood of major removals as trees decline, the city may be able to spread out the expense of removals over a number of years. By replacing trees when they are removed, the result would be a diversity of ages in a given area, reducing the future visual and budgetary traumas created by wholesale removals.

*Balanced species composition*. Likewise, by managing the diversity of species, the city can reduce its exposure to large-scale removal and replacement costs should a given species suddenly fail.

### ■ Keep the inventory current.

For all these reasons, it is essential that each servicing of a tree be recorded in the inventory, together with an updating of the information about the tree to reflect any change in its status or condition. An accurate inventory will serve as the nerve center of a forestry effort which maximizes both program efficiency and forest value.

### ■ Adopt the AFA management scheme for the community forest.

The American Forestry Association recommends a management plan that places more weight on maintenance than the typical community forestry budget. Their ideal urban forestry budget breaks down as follows: Planting trees, 20%; maintenance, 40% (of which 80% goes to pruning); tree removals, 20%, and administration, 20%.

The formula for Thousand Oaks modifies this as follows: Planting trees, 20% minimum; maintenance, 40% minimum; tree removals and hardscape modifications, 10-15% maximum; inventory, design and plan review, 10-15% maximum; and administration and community education, 10-15% maximum. (See Table 2.)

The advantage to spending a disproportionate amount of the budget on preventive maintenance is that the community's trees live longer with better care. In effect, the percent of the budget that goes toward community education can be thought of as additional preventive maintenance, since a tree-educated public results in a healthier forest. The AFA estimates that by increasing the lifespan of urban trees—which live an average of 32 years—by eight years, the value of those trees is increased by 60%.

## 2.3 THE ENVIRONMENTAL BASICS

This chapter describes the environmental conditions affecting trees in Thousand Oaks, including ways in which conditions on a particular site can be analyzed and modified. The adaptability of various tree species to these conditions is indicated in the Planting Palette section of the Plan. By using these two sections together, city staff, local business people, developers and individual residents can select the trees best adapted to their particular surroundings.

### 2.3.1 FIT THE CLIMATE

Thousand Oaks is located in an interior valley surrounded on all sides by hills and ridges. The interior location gives it the hot summers and fairly cold winters characteristic of southern California's inland areas. However, the city is close enough to the Pacific to be influenced by the ocean's greater humidity and moderating temperatures.

The presence of hills and ridges also affects the climate by influencing air drainage. Heavy, cooler air flows off the outlying slopes and collects in the basin of the valley. The air movement hampers the formation of frost in the hillside areas, creating thermal belts designated as Sunset hardiness Zone 19. The more frost-prone lowlands are classified as Zones 18 and 20.

The effect of the climate on plants is mainly through the variables of temperature, rainfall and wind.

■ **Use species which are hardy in the temperature extremes of local climate zones.**

Winter temperature lows are the most critical factor in limiting the range of ornamental plants. Yearly lows in Thousand Oaks reach the mid- to low-twenties. Thousand Oaks is not within the moderating influences of the coastal plain, and therefore freezes are common. A strong understanding of microclimate is needed when planting tender plants. Young trees especially need protection.

■ **Use drought-tolerant species.**

California experiences a yearly drought from mid-spring to mid-fall, as a continental high pressure system keeps moist oceanic weather systems well off-shore. When cooler winter temperatures dissipate the high pressure, a stream of winter storms flows down from Alaska and Asia, leaving an average annual precipitation in Thousand Oaks of 13 inches. During years in which the high pressure system lingers, winter storms can be reduced drastically, leading to periods of sustained drought such as occurred in 1975-77 and 1986-89.

The result is a semi-arid climate in which plants must be adapted not only to relatively low overall rainfall but also to the stress of regular summer dryness and occasional long-term drought.

Although irrigation on a deep-watering cycle can be used to sustain trees which are not drought-tolerant, it is wiser to select species which will survive here on the natural supply of water. Even these species need periodic watering during the first two or three summers until their root systems are well developed.

■ **Use strong-branched and wind-tolerant trees.**

Strong winds sometimes accompany the winter storms. In addition, a steady summer wind from the ocean is occasionally drawn in through gaps in the western ridges. Also, dry, powerful Santa-Ana winds come in from desert regions to the east and south.

Trees with strong branching habits are the best insurance against breakage from wind. Proper staking of young trees helps stabilize them until they become established. Careful pruning to remove weak or poorly formed limbs helps strengthen the remaining structure, while thinning the canopy to allow winds to pass through. However, species which are genetically predisposed to breakage usually cannot be pruned frequently enough to prevent all breakage.

Winds can also increase the effect of drought by drying out a plant's tissues and causing windburn. The coated leaves of many drought-tolerant species resist this effect. (The tree matrices in 2.7 indicate species' relative wind tolerance.)

■ **Fine-tune plant selection to the microclimate of the planting site.**

Just as the geography and topography of Thousand Oaks combine to determine the overall climatic conditions affecting trees here, the conditions at a specific planting site can vary greatly depending on its immediate surroundings. These locational conditions are referred to as the microclimate, and can often affect the choice of trees for a site. The main influences on microclimate are topography (aspect and slope), structures, pavement and existing vegetation.

*Topography.* As already mentioned, the shape of the land can affect air drainage, resulting in warmer zones on sloped ground and cool areas in basins or where air flow is stilled. In addition, a valley or a low point along a ridge may funnel winds, causing greater turbulence and increasing velocity. The angle of the land in relation to the sun is also very important, with south- and west-facing slopes receiving the most direct sunlight and therefore being significantly hotter and dryer than the cool, moist microclimates of a north- or east-facing slopes.

*Structures.* Buildings or other structures act as artificial topography, both funnelling and deflecting winds and creating oven-like southern exposures or completely shaded northern areas. Where building forms combine, as along a street or setback line, or where buildings are especially tall or massive, these effects are intensified. As a result, appropriate tree species may differ greatly from one side of a building to another.

*Pavement.* The reflected heat from street, sidewalks, parking lots and other paved surfaces, as well as roofs, turns cities into "heat islands" several degrees warmer than the surrounding countryside. In hot summer climates like Thousand Oaks, this effect is especially pronounced. For trees, the result is hotter, drier conditions, moving the microclimate of a parking lot, for instance, to near-desert intensities.

*Other Vegetation.* Stands of existing trees near a planting site can block wind or create shade in the same way that buildings do. Large areas of vegetation, including shrubs and ground cover, reverse the effect of urban heat islands by absorbing sunlight and by releasing moisture into the air by transpiration from the leaves, cooling the surroundings like a huge air conditioner. Airborne moisture from ocean fog or other sources also tends to condense on the surfaces of leaves and

needles, causing a wetter, cooler microclimate.

■ **Plant for potential future climatic changes.**

Worldwide, the six hottest years in the last century occurred during the 1980s. There is much evidence that the "greenhouse effect," caused by human actions including the burning of fossil fuels and the destruction of the world's forests, is bringing about significant shifts in global climate. More violent weather and greater extremes of weather have been predicted. Although experts disagree on the potential effects of this trend, it seems prudent in light of such predictions to plant increasing numbers of drought-tolerant and wind-resistant species able to withstand extremes of hot and cold temperatures. (The tree matrices in 2.7 call out wind, drought and temperature tolerance.)

The American Forestry Association has begun a program to help counteract this phenomenon, called Global ReLeaf. The program has the goal of planting 100 million trees in this country by 1992, and includes plans for funding and implementation. Trees reduce the greenhouse effect by removing carbon dioxide from the atmosphere. Thousand Oaks should join this effort. In addition, the program has federal, state and international goals. The state program, California ReLeaf, intends to plant 20 million trees in the state by the year 2000. Many municipalities, including San Francisco, Los Angeles, Sacramento, and San Diego have joined these efforts. (See Resources for addresses, and adjacent box for Global ReLeaf goals.)

## 2.3.2 MATCH THE TREE TO THE SOIL

A tree draws its life from the air and the soil. The soil is itself a complex living medium of mineral particles, organic materials, trace elements, water, air and living organisms. Since these components vary greatly from place to place, trees differ in

### GLOBAL RELEAF GOALS

■ Plant twice as many trees as are removed each year for the next ten years.

■ Extend the average lifespan of existing city trees from 32 years to 40 years.

■ Lower city temperatures by planting streets, parking lots and vacant lots.

■ Use windbreaks of trees to lower winter heating costs.

■ Reduce use of air conditioning by planting to shade the southern exposure of buildings during the summer.

Global ReLeaf
American Forestry Association
P.O. Box 2000
Department GR2
Washington, DC 20013

their ability to adapt to soil conditions. Selecting trees that will thrive in the natural soil of the site is therefore critical to the success of a planting.

**■ Determine the soil type and composition.**

*Soils maps.* The soils map and legend on the facing page gives a general idea of soil conditions in Thousand Oaks, although they do not accurately reflect post-development levels of compaction or otherwise altered soils. Any type of development causes compaction and mixture of traditional alluvial soils with non-fertile bottom horizons, greatly affecting the tree's ability to survive. The city's six soil types roughly correspond to its topography, with deeper soils accumulated in the valleys, and shallower, rocky soils in the uplands. The soils also vary depending on the sandstone, shale or igneous bedrock from which they were derived. (See Figure 4.)

*Test pits and soil probes.* Visual inspection of the soil by digging a pit, using a soil probe or simply finding an exposed area can give more specific information about a site. Particle size, moisture content and rockiness can be appraised. Drainage rates can be observed by filling a pit with water. An important clue to chemical make-up is the presence of white deposits of calcium carbonate in many parts of the city, indicating very high alkalinity.

*Performance of existing plants.* Yellowing of leaves between the veins can mean iron deficiency; brown edges may indicate high salinity, and undersized leaves may result from scarce nutrients. (See Volume 3 for more information on these conditions.)

*Laboratory analysis.* For large plantings, soil samples from several spots on the site should be submitted to a professional soil laboratory. The resulting chemical analysis gives both the makeup of the soil and recommendations for corrective measures and appropriate plants.

**■ Select trees adapted to the soil's drainage characteristics.**

Too little soil moisture can desiccate trees, but too much water can suffocate roots for lack of air.

*Water retention.* Sandy soil is made up of large particles, allowing water to pass freely among them; such soil is very well aerated, but drys out quickly. Clayey or silty soil consists of minute particles which bind tightly together; water is trapped in the small spaces between these particles by capillary action, moving slowly and restricting oxygen to the roots. Absorbing root tips may be killed from this lack of oxygen. Either drought or saturated soil will therefore prevent distribution of moisture and minerals to foliage crowns, reducing vigor or even killing plants. Most trees prefer intermediate soils with good drainage but adequate water retention, such as those found in many valley areas in Thousand Oaks. Trees requiring especially good drainage are noted in the planting palette (2.7).

*Water table.* Groundwater reservoirs within reach of a tree's roots can allow some species to thrive in soils that would otherwise be too dry. However, a water table that is too close to the surface will drown the roots of most species.

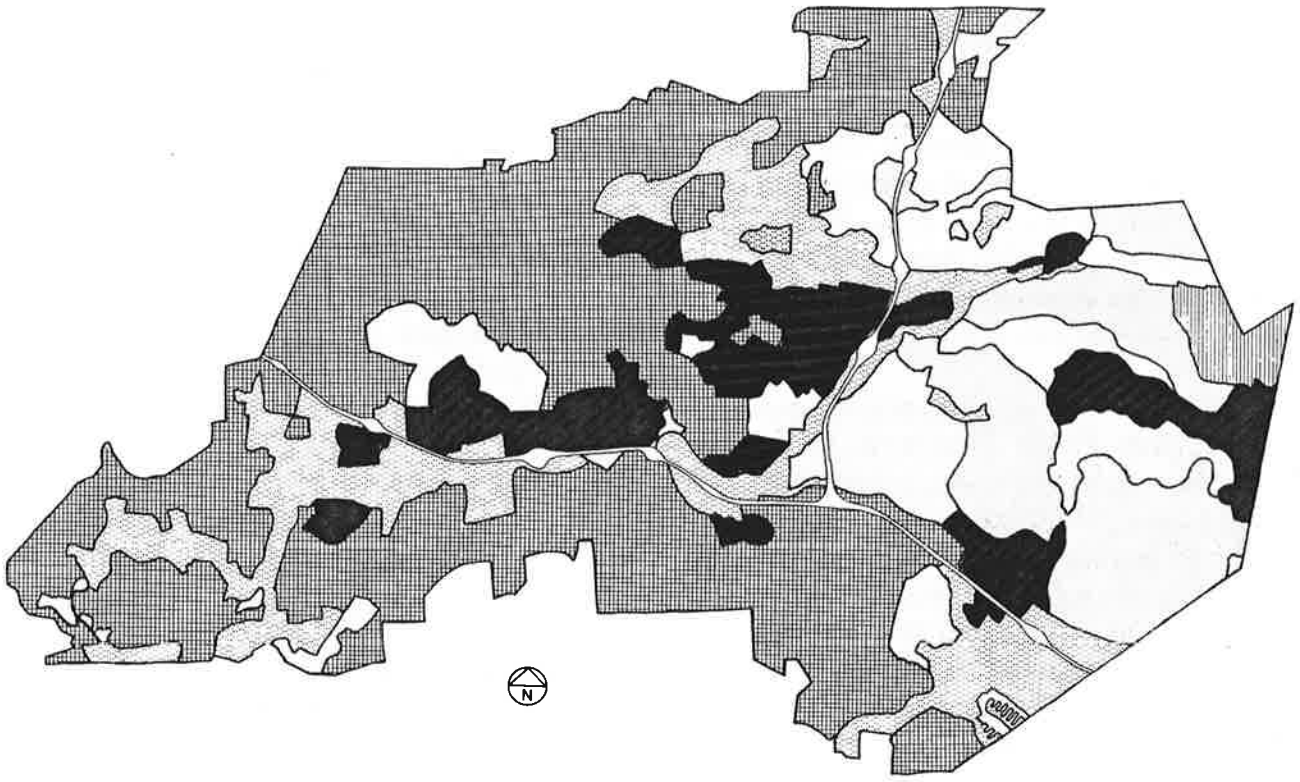
*Slope.* Quick run-off of water from steep slopes can also contribute to excessively dry soil, while low spots collect run-off and may therefore be wetter than the surrounding soil.

**■ Select trees adapted to the soil's chemistry.**

While the planting palette generally consists of trees adapted to poor soil conditions, the following conditions may require special attention.

*Nutrients.* Serious deficiencies of nitrogen, phosphorus, potassium or other elements necessary for plant life will limit species to those able to withstand the particular deficiency.

*Soil pH.* The soils in Thousand Oaks tend to be alkaline, a condition typical of low-rainfall



## SOILS ASSOCIATIONS LEGEND

Mocho-Sorrento-Garretson association: Level to moderately sloping, very deep, well drained loams to silty clay loams.

Rincon-Huerhuero-Azule association: Level to moderately steep, very deep, well drained and moderately well drained, very fine sandy loams to silty clay loams, slowly permeable sandy clay subsoil.

San Benito-Nacimiento-Linne association: Strongly sloping to very steep, well drained clay loams and silty clay loams that are moderately deep to deep over shale or sandstone.

Calleguas-Arnold association: Stronly sloping to steep, well drained shaly loams that are shallow over shale or sandstone, and excessively drained sands that are very deep over sandstone.

Hambright-Igneous rock land-Gilroy association: Rock land and strongly sloping to very steep, well drained clay loams that are shallow to moderately deep over basic igneous rock.

Sedimentary rock land-Gaviota association; Moderately steep to very steep, excessively drained rock land and well drained sandy loams that are shallow over sandstone.

**Soils Map** **Figure 4**

areas. The visible presence of calcium carbonate indicates especially high alkalinity in many areas. In such soils, roots will not be able to absorb the broad range of balanced minerals needed for normal growth and will develop chlorosis, which limits growth and produces unhealthy foliage. Low pH conditions (acidic soils) are unlikely in the city, so species preferring these conditions, such as rhododendrons, azaleas and redwoods, should be avoided. Alkaline tolerance is noted in the planting palette.

*Salinity*. High salt content is another soil problem characteristic of dry areas. Low rainfall and rapid evaporation tend to concentrate salts near the ground's surface, where it stunts plant growth by desiccating the root system. Brown or withered leaves sometimes indicate salt burn.

*Iron*. Chlorosis caused by iron deficiency, indicated by a yellowing of leaves between the veins, is commonly observed in Thousand Oaks. Species especially subject to chlorosis should be avoided where iron is low.

■ **Where soil penetration is limited, select trees that can survive in shallow soils.**

*Bedrock*. Shallow bedrock can prohibit deep root development and prevent a tree from obtaining adequate moisture and nutrients.

*Stoniness*. Although roots can move among them, loose rocks in the soil take up space otherwise available for a better growing medium.

*Hardpan*. Layers or lenses of clay in otherwise porous soil can limit the penetration of roots and water. Roots may expand adequately when young, but with age will be adversely affected by the poor percolation of water, and the tree will begin to decline.

*Compaction*. The soil on construction sites is often compacted—either unintentionally, due to the movement of heavy equipment and materials, or deliberately, to help the soil bear the weight of buildings and pavement. These "engineered" soils can create conditions similar to both bedrock and hardpan, especially when the existing soil has a high clay content. Trees should never be planted in soils which have a compaction rate higher than 85%. Loosen the planting-area soil as described in Volume 3 for all planting areas.

■ **As a last resort, consider soil modifications for particularly troublesome situations.**

Most trees' roots eventually reach quite deep and wider than its branches, making extensive modification of the soil to improve it impractical. Therefore, the Master Plan has stressed the selection of trees able to thrive on the natural economy of the site. However, the following measures can sometimes be useful to overcome specific soil problems.

*Nutrients*. Specific deficiencies can be counteracted by adding the missing ingredients in slow-release form directly to the root zone.

*Iron*. Likewise, iron can be added where chlorosis is a problem.

*Drainage chimneys*. In very slow-draining soils or where rock or hardpan is encountered, small holes bored through the hardpan or to a minimum depth of twice the planting pit can help reduce the problem of standing water in the root-ball area.

*Soil amendments*. Soil amendments should only be used in the case of highly alkaline soils. The use of amendments or improved soil mixes in the planting pit of a newly planted tree can create a sharp boundary between "improved" and native soils, inhibiting roots from venturing into the real world beyond and inhibiting water movement into the pit. The use of natural soil, without amendments, is therefore usually preferred.

## 2.3.3 FIT THE TREE TO THE SPACE

Trees share the city environment with many other

elements and uses. They must be selected and sited to work in concert with the rest of the environment, rather than creating conflicts. Such practice not only keeps surrounding elements from being damaged or compromised, but also protects the tree from injury, excessive pruning and premature removal. Costly repairs and maintenance are avoided, and the trees are perceived in their rightful role as contributing members of the community, rather than as problems.

Planting-site conditions ultimately control the longevity and health of any plant. If tree roots are constrained by a small opening to air and water, as in the case of a street tree in a four-square-foot opening in concrete, the tree cannot be expected to grow as rapidly, be as healthy or live as long as the same type of tree growing in an open field. A typical 4 ft. x 6 ft. planting hole will support a mature tree of only 20 to 25 feet in height (from *The Granite Garden.*).

**■ Size trees to the space they will grow into.**

Species should be chosen that will comfortably fit the space available to them—both above and below ground—when full grown. This growing space is usually defined by surrounding buildings, streets, sidewalks and other trees.

Most standards for the height and spread of trees are for optimum growing conditions. Since most street-tree planting conditions are not optimum, a different set of criteria for spacing and locating trees has been developed. The following rule of thumb applies to trees which are to be planted in an even-spacing pattern:

Large canopy trees: 30 to 40 feet apart

Columnar or medium-sized trees: 20 to 30 feet apart

Smaller accent trees: 15 to 20 feet apart

**■ Place trees away from conflicting uses.**

*Intersections.* 25 feet for sidewalk and median trees to keep traffic sightlines clear.

*Traffic signs.* Placed far enough away to allow easy visibility, given the speed of traffic on the street.

*Parking.* For parallel parking, place trees at least 3 feet inside the curb and between stall markings to avoid damage from opening car doors. For diagonal or perpendicular parking, place trees at least 4 feet inside the curb to allow for car overhang.

*Driveways.* At least 5 feet to avoid being hit by turning cars.

*Bus zones.* At least 6 feet inside the curb to allow loading and unloading.

*Pedestrian and wheelchair clearances.* A minimum of 4 feet of clear sidewalk should be provided to allow comfortable passage.

*Street lights and utility poles.* At least 15 feet so as not to obstruct light or access to the poles.

*Fire hydrants.* At least 5 feet away to keep accessible.

*Meter and valve boxes.* Far enough to keep clear of tree wells. At least 5 feet away.

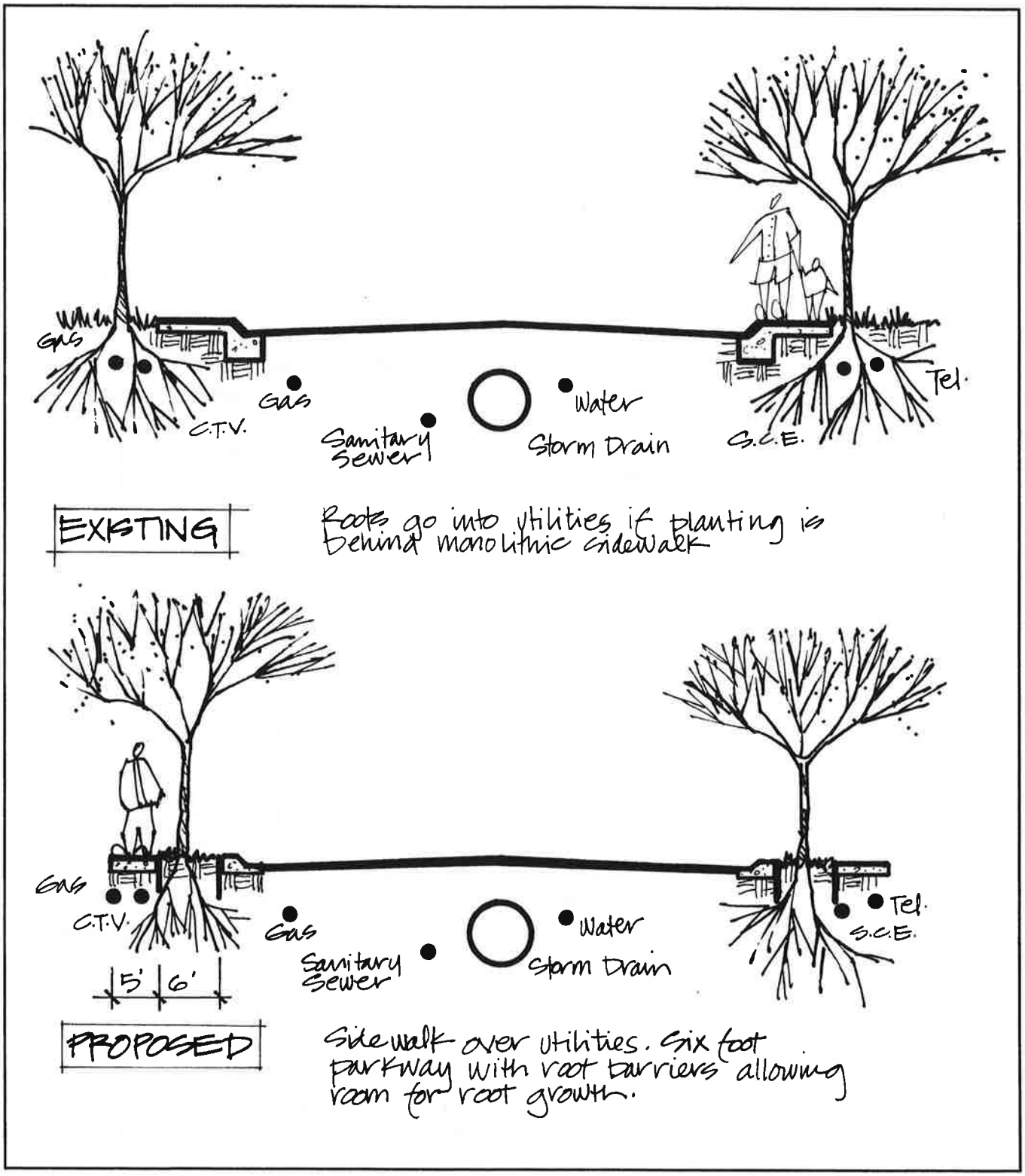
*Other street furniture—benches, trash cans, etc.* Space in a pleasing, logical and functional composition. Often aligned with trees in a sidewalk amenity zone along the curb. At least 5 feet away.

**■ Use species which can be pruned as they mature above the height of trucks and service vehicles and commercial signs.**

A vertical clearance of 13 feet to the first limbs will generally not interrupt deliveries or visibility of storefronts. Residential areas usually only require 9 feet of clearance.

**■ Use strong-branched trees near structures, streets and activity areas.**

Harm to people and property, as well as interruption of traffic and costly clean-up, can be avoided.




**Tree Roots and Underground Utilities** **Figure 5**

■ **Only plant fruiting trees or those with large seed pods in planting areas that have a broad band of soil or ground cover to catch the fruit.**

Fruit drop is not only messy, but can create a hazard on sidewalks, in parking lots and over bike lanes. Large seed pods, such as those of Liquidambar and some Eucalyptus, can be dangerous to pedestrians, wheelchair users and cyclists. (Trees that produce debris are called out in the tree matrices in 2.7.)

■ **Locate trees to minimize conflict with overhead and underground utilities.**

Oversized trees under utility wires results in either damaged lines or misshapen trees, and often both. However, since trees greater than 25 feet in height will come in contact with overhead wires, this must be considered an important design constraint. Some overhead wires may be scheduled to be placed underground, or can be realigned to accommodate a street-tree planting. If neither of these options is possible, select a species with a thin upper canopy so that pruning it will not destroy the form of the tree. Another alternative is to plant small, closely spaced trees that will not reach the height of the wires. *Water, sewer and other underground utility lines.* As far away as possible to avoid damage to lines from roots in search of moisture, and to avoid trenching through the root zone when lines are serviced.Contact utility companies to locate lines before determining planting location. (See Figure 5 and 3.3.1.) (Trees that are appropriate under power lines are called out in the tree matrices in 2.7.)

■ **Match the tree's root behavior to the planting space.**

Existing sidewalk tree wells in Thousand Oaks are thirty inches, four feet or six feet on a side. Existing parkway strips are thirty inches, three feet or five feet wide. Street trees are also planted in easements behind the sidewalk and in front yards and medians. The planting palette lists species which will grow in each of these spaces while lessening the threat of lifting the surrounding pavement if existing openings cannot be enlarged. In most soils, any species will eventually damage surrounding pavement if planted in openings less than three feet wide. (See Table 3 and Figures 6-12.)

*Tree Wells.* Tree species must be selected to conform to the available planting space. The minimum allowed in Thousand Oaks is 4 x 6 x 3 ft. deep, with 6 x 6 or larger recommended. Tree wells with an opening of less than 8.3-square-feet (2.5 x 2.5) will support only small trees to maturity or medium-sized species for 10 to 15 years. Tree wells with an opening of 48-square-feet (6 x 8), on the other hand, will support large trees to maturity. Use of root barriers on two sides is advised for many species, however.

*Parkway Strips.* The same constraints associated with tree wells apply to strips, in regards to species selection. The design of new streets or retrofitting existing streets with a 6-ft.-wide parkway is essential for healthy tree growth. (See 1.3.5.f.) A 2.5-feet-wide planting strip will not support a medium or large sized tree without pavement damage any better than would a 2.5 x 2.5 feet (8.3-square-foot) opening. The benefit of planter strips over tree wells is increased tree vigor, due to the larger surface area of exposed soil.

*Back of Sidewalk.* When planting behind the sidewalk, place the trunk at least 3 to 4 feet from the pavement. The larger surface area of exposed soil in this configuration allows greater air and water access to the roots. The increased water supply from homeowner irrigation can also be a benefit, except in the case of trees that do not tolerate summer watering (coast live oaks, for example).

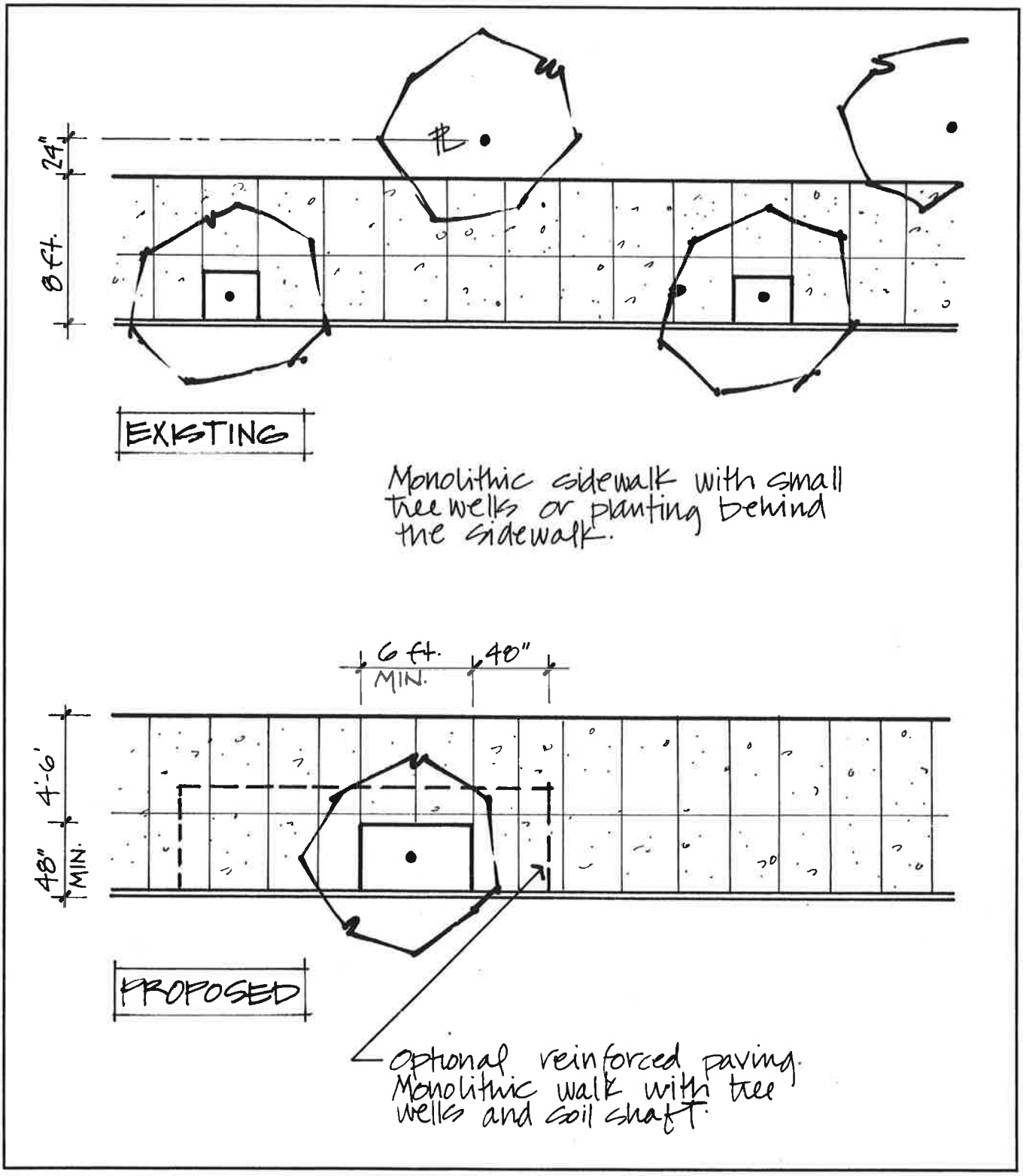
*Meandering Sidewalk.* Meandering sidewalks create the opportunity for using groups of

## PLANTING AREA STANDARDS FOR STREETS

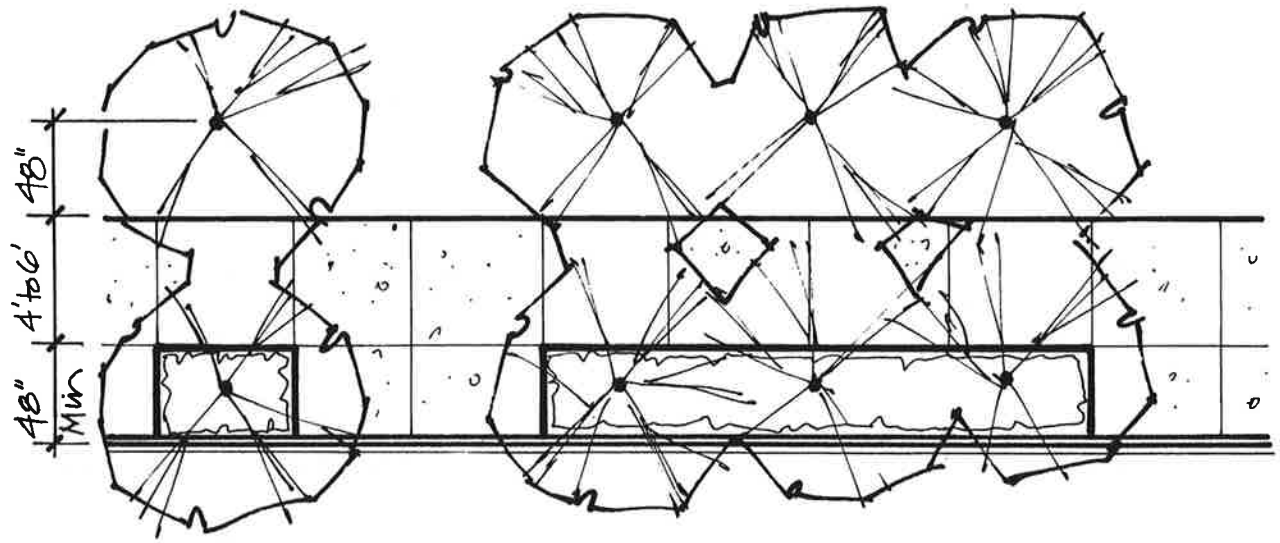
| TYPE OF ROAD | EXISTING CONDITIONS | PROPOSED DESIGN OPTIONS |
|---|---|---|
| Primary and Secondary<br>Controlled access<br>(4 lanes divided<br>with parking) | 8 ft. ROW<br>8 ft. monolithic sidewalk<br>with curb<br>14 ft. median | 1. Monolithic sidewalks with<br>4 ft. x 6 ft. min. tree wells (Fig. 6)<br>2. Double rows of trees (Fig. 7)<br>3. Planting cutouts in parking lane (Fig. 11) |
| Secondary<br>Limited access<br>(4 lanes with parking) | 10 ft. ROW<br>5 ft. monolithic sidewalk<br>with curb | 1. No sidewalks, 10 ft. parkways<br>2. 6 ft. parkway with 4 ft. detached sidewalk (Fig. 9)<br>3. Adjust sidewalk at existing trees to<br>provide a larger planting area (Fig. 10)<br>4. Planting cutout in parking lane (Fig. 11) |
| Industrial/Commericial<br>Low traffic volume<br>(4 lanes, no parking) | 10 ft. ROW<br>Sidewalks required<br>but no standard given | 1. 6 ft. parkway with 4 ft. detached sidewalk (Fig. 9)<br>2. Meandering 4 ft. sidewalk with<br>clusters of trees in large planting area (Fig. 8) |
| Collector and Minor<br>Residential<br>(built after 1976)<br>(2 lanes with parking) | 5 ft. ROW<br>6 ft. PSE<br>5 ft. monolithic sidewalk<br>with curb | 1. 6 ft. parkway with 4 ft. detached sidewalk (Fig. 9)<br>2. Adjust sidewalk at existing trees to<br>provide a large planting area (Fig. 10) |
| Collector and Minor<br>Residential<br>(built before 1976)<br>(2 lanes with parking) | 10 ft. ROW<br>2-1/2-3 ft. parkway<br>4 ft. detached sidewalk | 1. Adjust sidewalk at existing trees to<br>provide a larger planting area (Fig. 10) |

ROW = Right of Way
PSE = Public Service Easement

TABLE 3




**Tree Wells In Sidewalks** **Figure 6**




Tree Well or Extended Planting Area in Monolithic sidewalk with a double row of trees for screening and pedestrians

**Planting Areas In Sidewalks** **Figure 7**

trees in a single large planting area rather than single trees in smaller spaces, which significantly increases tree health, reduces structural problems and prolongs longevity. Design solutions which allow such large planting areas are preferred.

Existing spaces should be enlarged by removing pavement whenever possible. The available size for the planting hole is probably the most limiting factor in species selection.

■ **Give the tree the largest planting area possible.**

Make the tree planting area as wide as possible (minimum four feet by six feet) and only as deep as needed (approximately 36"). Most roots grow horizontally in the top 12-30" of soil. More than 1,000 cubic feet of rooting space is needed to grow a tree to 25" to 30" in caliper. Trees planted in less soil will probably begin to show signs of decline, stunting or dieback at smaller and smaller sizes as the soil volume is decreased.

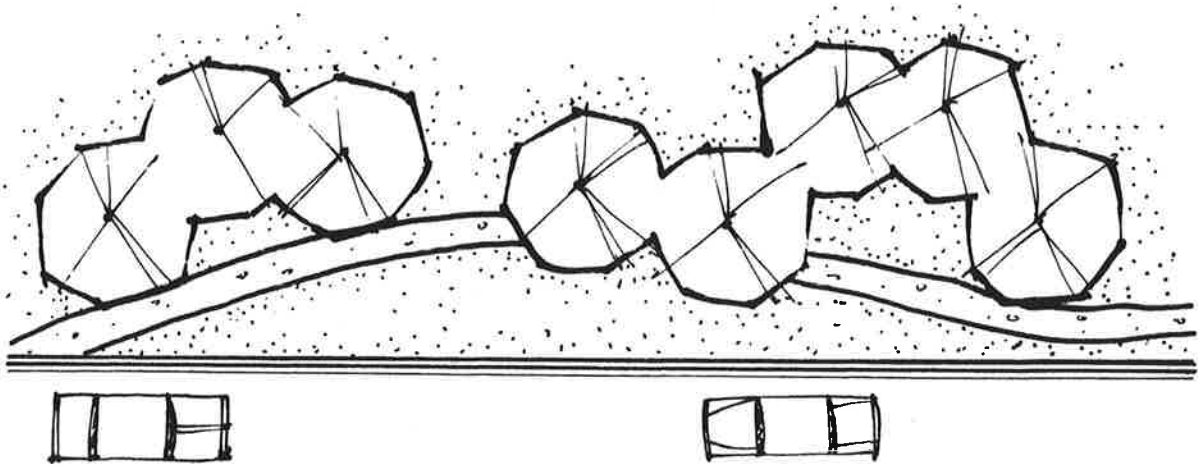
Assuming that little additional soil is available beyond the planting hole in the urban environment, the following volumes represent the rooting space required by urban trees under various conditions. A typical four inch caliper tree will completely fill the rooting space of a 4 x 4 ft.tree well in less than four years.

**Ways to Enlarge Planting Areas**

■ Build wider parkway strips (6 feet wide) in new developments to allow the trees to be close to the street. This will provide greater shade canopy over the street.

■ Use meandering sidewalks, planting area islands in parking lanes, and medians.

■ Plant behind sidewalks in planting beds or lawn areas. In lawn areas, keep the grass at least 4 ft. from the trunk to reduce competition for nutrients.



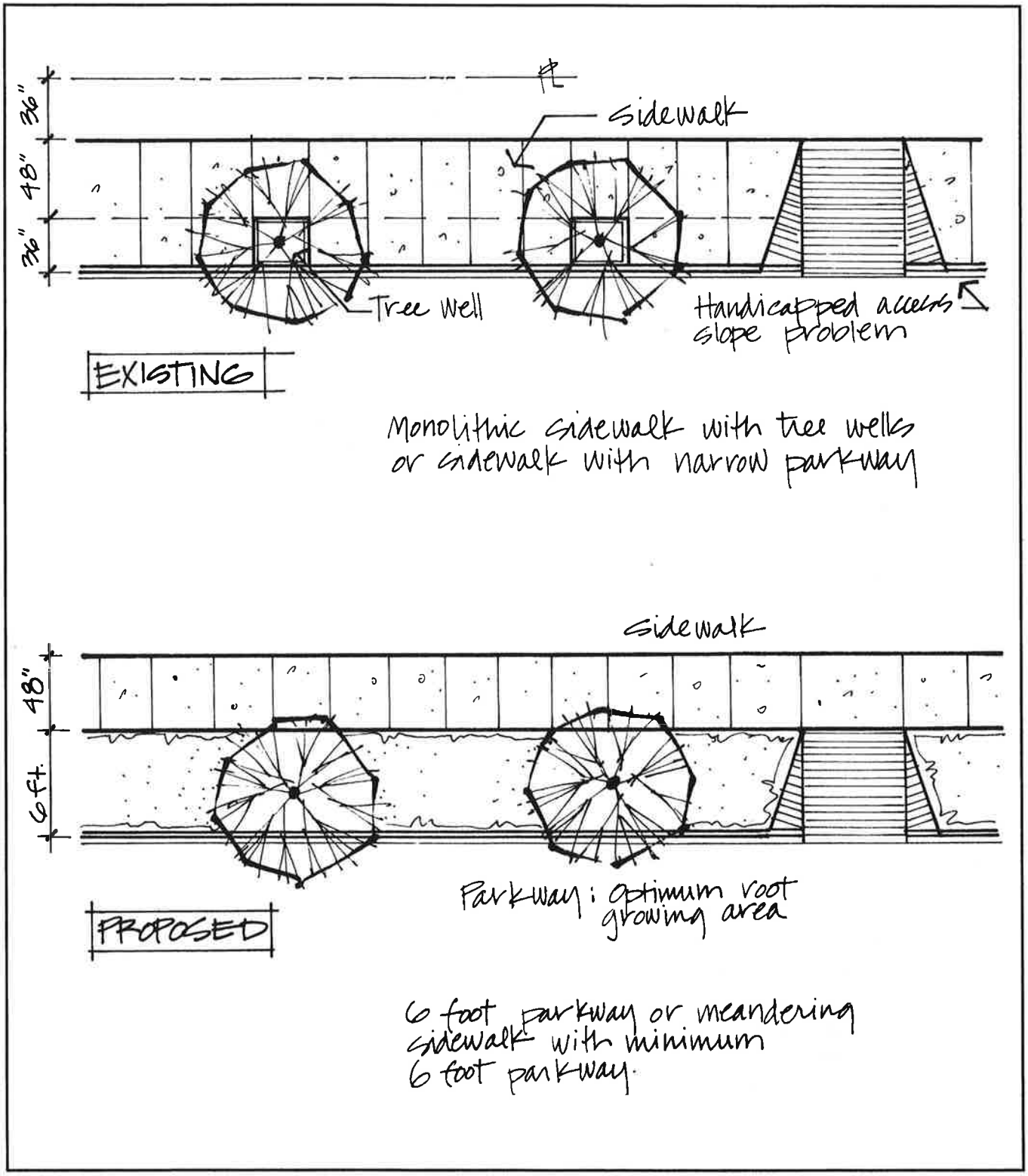
Alternate tree locations to break linearity of trees into more natural tree groupings and to open up views.

**Meandering Sidewalks** **Figure 8**

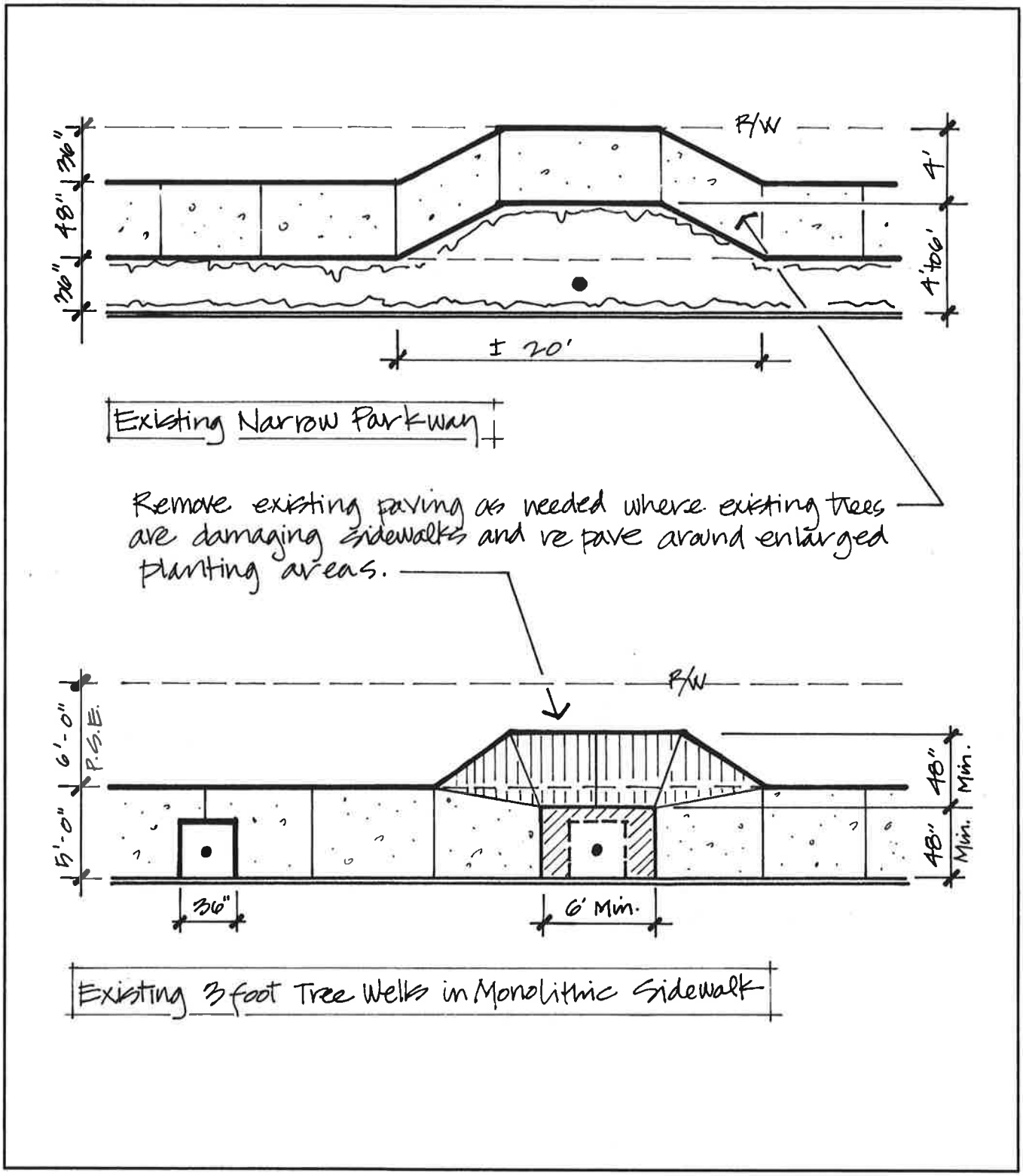
■ Use pervious paving materials around tree wells. Interlocking pavers, bricks, and decomposed granite, all of which accommodate wheelchair access, allow greater amounts of air and water to reach the root zone.

■ Cut larger planting holes in paving for existing trees (minimum 4 x 6 feet).

■ Use subsurface soil shafts. This involves creating a gravel-filled air gap under the concrete slab around the tree well, and reducing the compaction under the slab in this area to less than 85%. A typical concrete slab can be made to span up to four feet beyond the tree well with only minor modifications to its reinforcing.

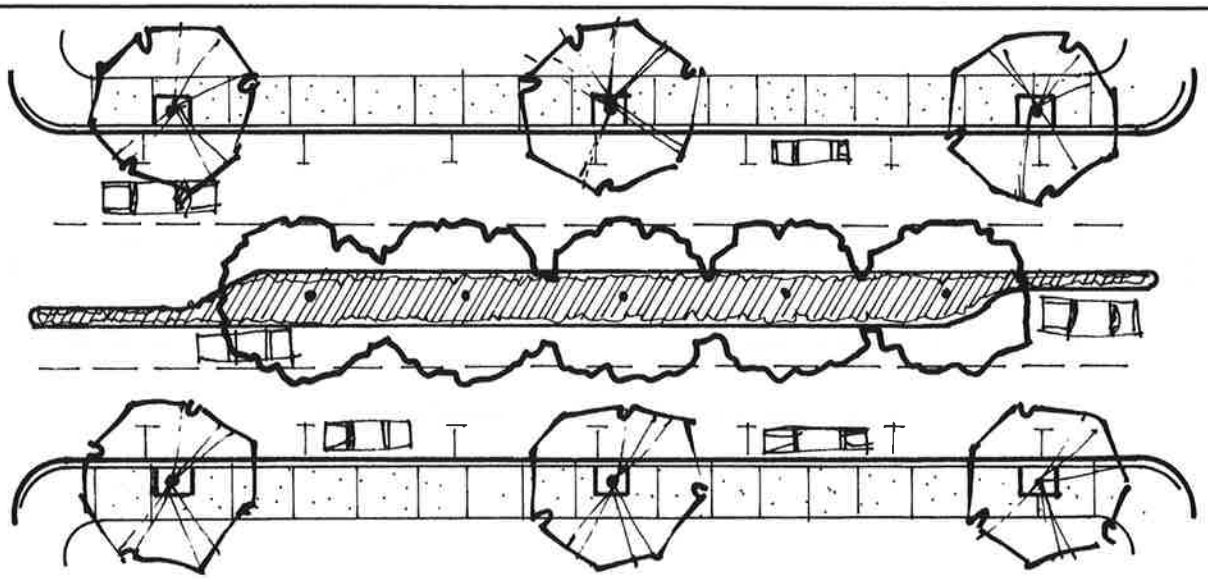



**Parkways** **Figure 9**

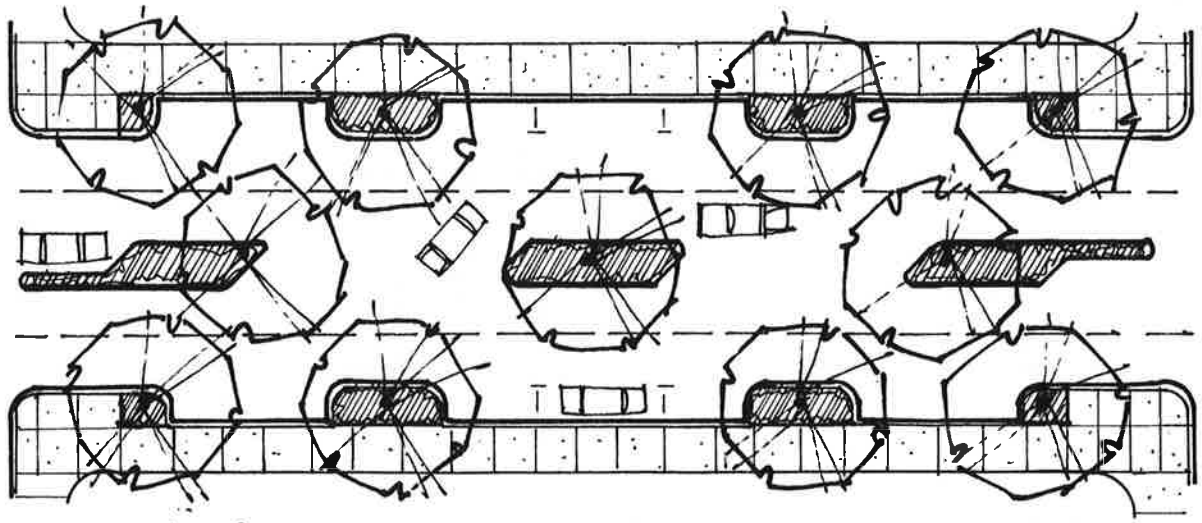



**Enlarging Existing Planting Areas**

**Figure 10**



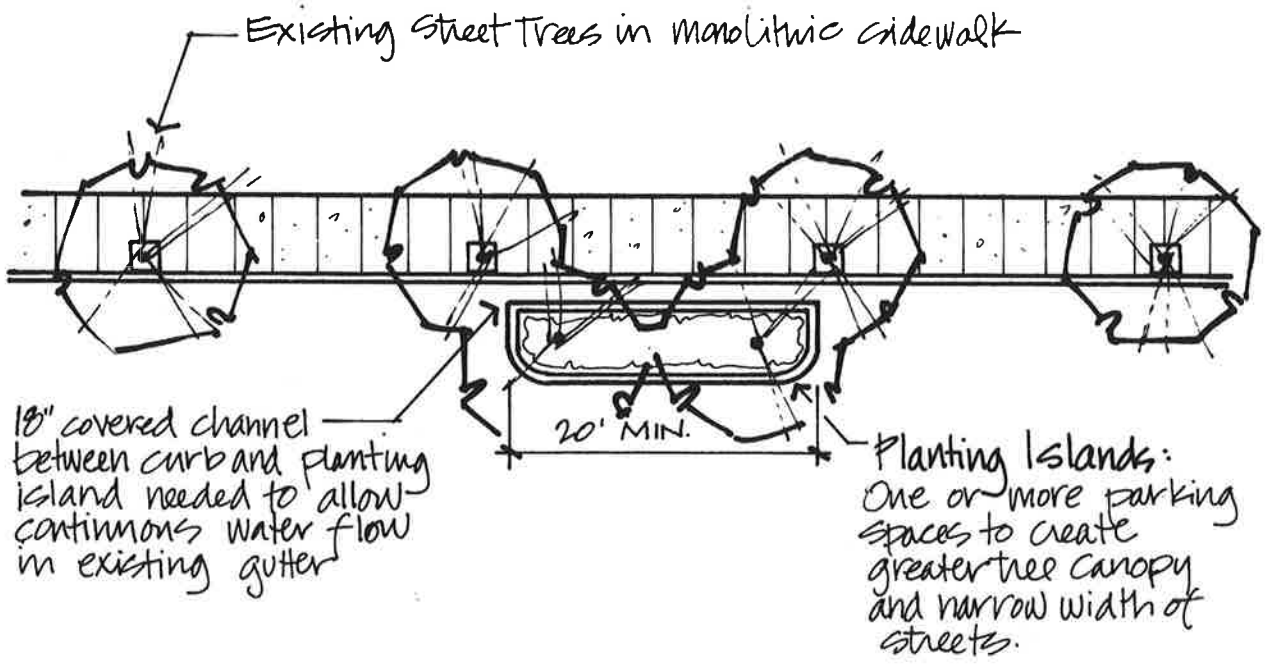
Full Medians: Consistant tree cover; turns only at intersections



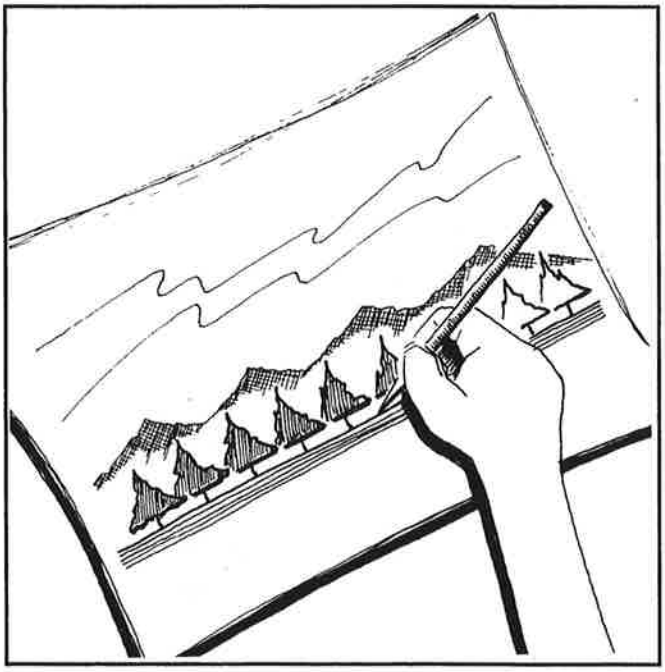
Partial Medians: Consistant tree cover with addition of planting islands in parking lane; left turns into parking lots; right turns only out of parking lots.

Note: These alternatives may be combined with each other.

**Median Design Options** **Figure 11**




**Planting Islands in Parking Lanes** **Figure 12**



## 2.4 DESIGN WITH TREES

In addition to working well with its natural and man-made environment, a tree should be chosen and sited to make the highest contribution to the character of the neighborhood or commercial area in which it is planted. The design process is probably the most pleasurable part of creating the community forest. It is often the only time in the decision-making process that the choice of species is based on opportunities rather than constraints.

This chapter includes a description of landscape design, definitions of key terms, and design guidelines that apply to the community forest as a whole. The following chapters (2.5 and 2.6) go into more specific detail to assist residents, business people, developers and city staff in planning for the design of the major streets and neighborhoods. The final element of design is the Planting Palette (2.7), which offers a wide array of trees meeting the environmental constraints described in the previous chapter.

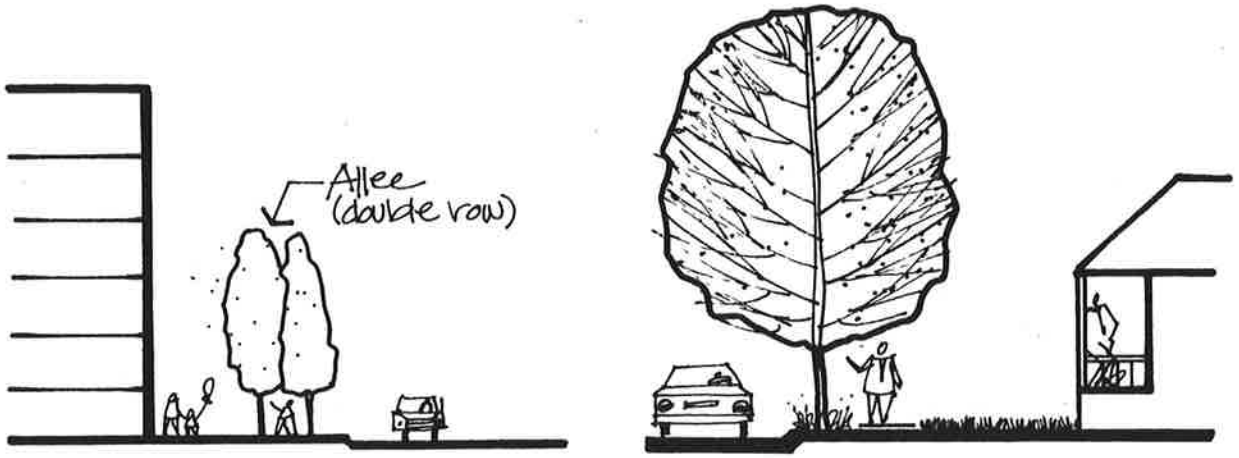
### 2.4.1 PRINCIPLES OF LANDSCAPE DESIGN

Landscape design is the process of altering the environment to meet human needs. The changes can be very subtle or quite dramatic. When sensitively carried out, the environment is enhanced, not harmed by such changes. A careful design considers the needs of species besides *Homo sapiens*, and reveals hidden natural wonders. Good landscape design finds the balance between human needs and the natural world.

In the case of the community forest, the human needs can vary greatly, as can the environmental conditions. After narrowing down the choice of trees to ones that will work well in the planting environment, the next step is to evaluate the human conditions that will affect the tree. Will cars or trucks be driving under its limbs? Will children be climbing it? Is the tree being planted to reduce the effects of wind? Perhaps the area to be planted is crying out for a burst of color. Or maybe the site's nearness to a natural open space area suggests the use of native oaks and other plantings to maintain visual harmony. These are just some of the issues to consider when trying to choose a tree that will meet the needs of the people who use the site.

Trees can also be used to solve a variety of problems. Shade trees on the south and west sides of a building can reduce cooling costs by 20 to 40 percent. Rows of densely planted trees can reduce wind speeds in the immediate area. Planted along roads, trees can catch the particulates emitted by cars and prevent them from fouling the air of adjacent backyards and sidewalks.

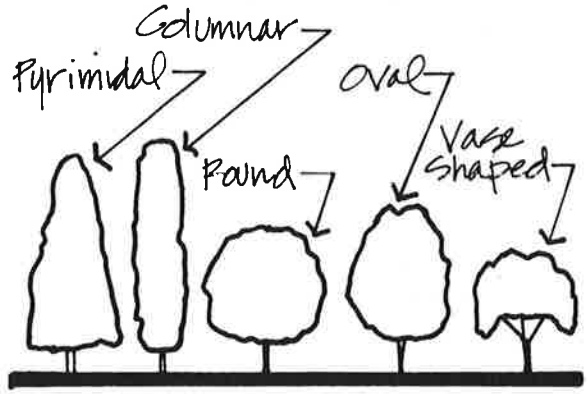
After all these needs and potential uses have been considered, the aesthetic character of the tree must be evaluated. Aesthetics is not an entirely subjective matter. Trees have a number of visual characteristics that help determine appropriate species selection:




**Scale in Commercial and Residential Areas** **Figure 13**

*Scale*. The size of the tree, reflected mostly by its height and diameter of the canopy, but also by its limb and trunk size. Choosing an appropriately scaled tree for the site can bring a large building or wide street down to human scale.

*Form*. The shape of the canopy. Each has uses that best suit it. The most distinctive forms, such as tall pyramidal or narrow columnar trees, must beused carefully, sincethese forms are not native to the area. Round-headed trees are suited to the hills, as they reflect the landform and the native oaks.




**Tree Forms** **Figure 14**

*Color*. Trees are generally known by the color of their summer foliage, but other strong color effects can be achieved by using trees with colorful bark, or trees with impressive fruit or flower displays. Leaf color can also vary from season to season. Unusual color combinations can create striking effects.

*Texture*. This refers to the size of the foliage, with large-leafed species (such as magnolias) referred to as coarse-textured, and small-leafed ones (peppers, for example) as fine-textured. The density of foliage must also be evaluated. Extremely dense trees are not appropriate for narrow pedestrian corridors because they can create a boxlike feeling. However, they may be appropriate for large areas such as parks when shade is desired.

## 2.4.2 DESIGN PHILOSOPHY

The following statements describe the underlying philosophy for the design of the community forest. This philosophy reflects statements found in previous documents produced for the city.

■ **The symbol of the oak is key to the character and image of Thousand Oaks.** The forest should reflect this important relationship by including a high percentage of oaks. Suggestions that would enforce the relationship of the city and the native oaks:

- Locate all existing oaks on a comprehensive "oak map."
- Join the efforts of the California Oak Foundation to replant the state's dwindling wild oaks (see Resources for more information on this group).
- Plan major oak plantings for 1990, recently designated The Year of the Oak by the California Oak Foundation.

■ **The forest should be used to reinforce the community's connection to the natural world.** This can be accomplished in a variety of ways:

- Bring the oak woodland from the hills into the city by creating "green fingers" of trees and other vegetation linking the hills and the heart of the city.
- Use indigenous tree species as much as possible. In addition to being better suited to local environmental conditions, their place in the natural and social history of the area gives them much higher learning value.
- Use a variety of educational tools to explain the forest to its inhabitants. Offering docent-led and self-guided tours, as well as making the forest an integral part of the local curriculum (for all ages), are just two ways to "open up the forest" to residents.
- Plant for wildlife as much as possible, especially indigenous fauna.

## 2.4.3 DESIGN GUIDELINES

The following guidelines, written in the spirit of the philosophy described in the previous section, have been formulated to direct the design of the community forest as a whole. Guidelines specific to the major streets and neighborhoods appear in the next chapters, and individual recommendations for each street and neighborhood are found in the appendix.

It should be noted that the design guidelines can be applied to the renovation of existing areas as well as new construction. Where existing landscaping has been found to conflict with the use of an area or create high maintenance conditions, these guidelines can aid in planning the renovation of those areas, thereby creating a more effective relationship between use and design as well as a corresponding reduction in maintenance problems.

■ Select trees adapted to the environmental conditions of the site.

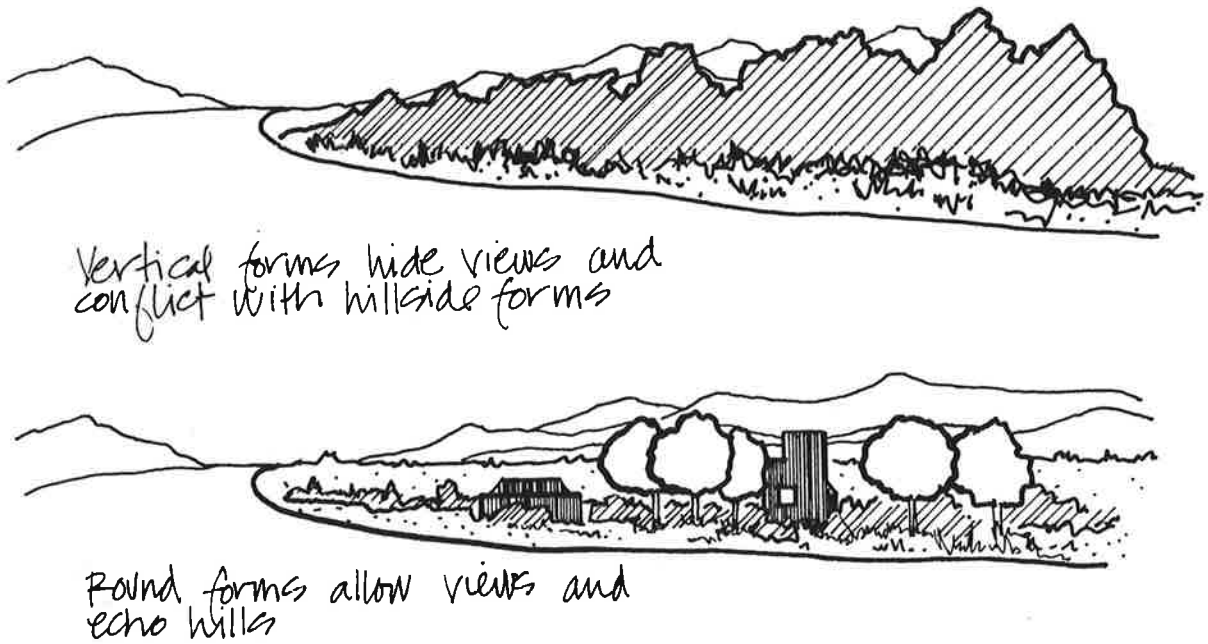
■ Harmonize with existing and future built elements.

■ Satisfy any functional reasons for the planting.

- Energy conservation
- Wind reduction
- Air pollution abatement
- Noise reduction
- Shading pavement to reduce "heat island" effect
- Screen objectionable views

■ Extend and complement the native tree species of the Conejo Valley.

- Use native species.
- Use such species in places where they might naturally occur.
- Use non-natives of a similar form, texture and color as natives.




**Trees Accent Views** **Figure 15**

- Use special care when modifying conditions near existing natives.

■ Respect and emphasize the city's geographic setting.
- Frame, but don't block, views to the surrounding hills and into the city.
- Use accent species in the foreground of such views.
- Use vertical species as focal points in valley areas.

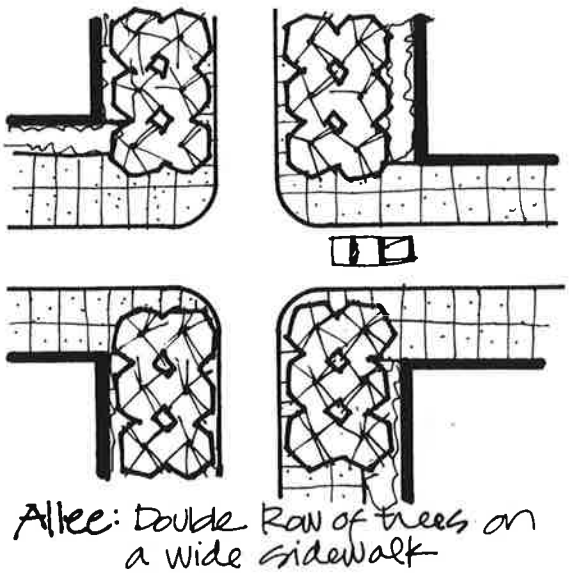
■ Complement the natural topography.
- Use round-headed trees in hilly areas.
- Avoid trees on open ridgelines
- Where ridgeline development occurs, use round-headed trees to help blend structures into the ridgeline.

■ Complement existing trees and other vegetation.
- New tree forms should be compatible.
- Horticultural requirements should be consistent for healthy growth.

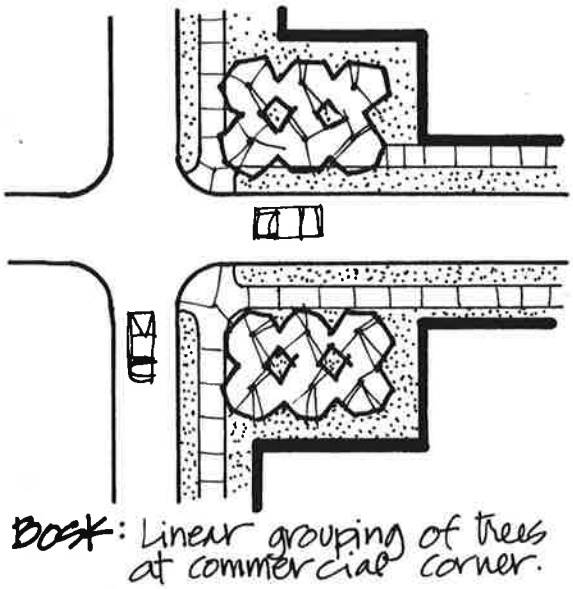
■ Extend and replicate native and historical landscape patterns.
- Oak savannah
- Hillside oak woodland
- Riparian communities
- Homestead groves
- Agricultural windbreaks
- Roadside shade trees and landmarks

■ Use trees to create a variety of spatial experiences.

Allees, bosks and groves are all traditional ways to use trees to form "outdoor rooms." Trees can be used to create small, enclosed spaces, or to emphasize a feeling of openness, as when a huge, lone tree is used to punctuate a large open space. Trees define both horizontal space, as a wall of trunks, and vertical space, as a leafy roof.




**Allee** **Figure 16**




**Bosk** **Figure 17**

■ Use a diversity of species where possible to avoid overplanting of popular species. Some ways to do this include the following:

- Use alternating species in the neighborhoods on a block-by-block basis.
- Intermix accent species in the dominant tree grid, as understory species, or to highlight key buildings or intersections.
- Group popular but overplanted trees in large plantings, lessening their use as street trees.

■ Plant to attract and support wildlife.

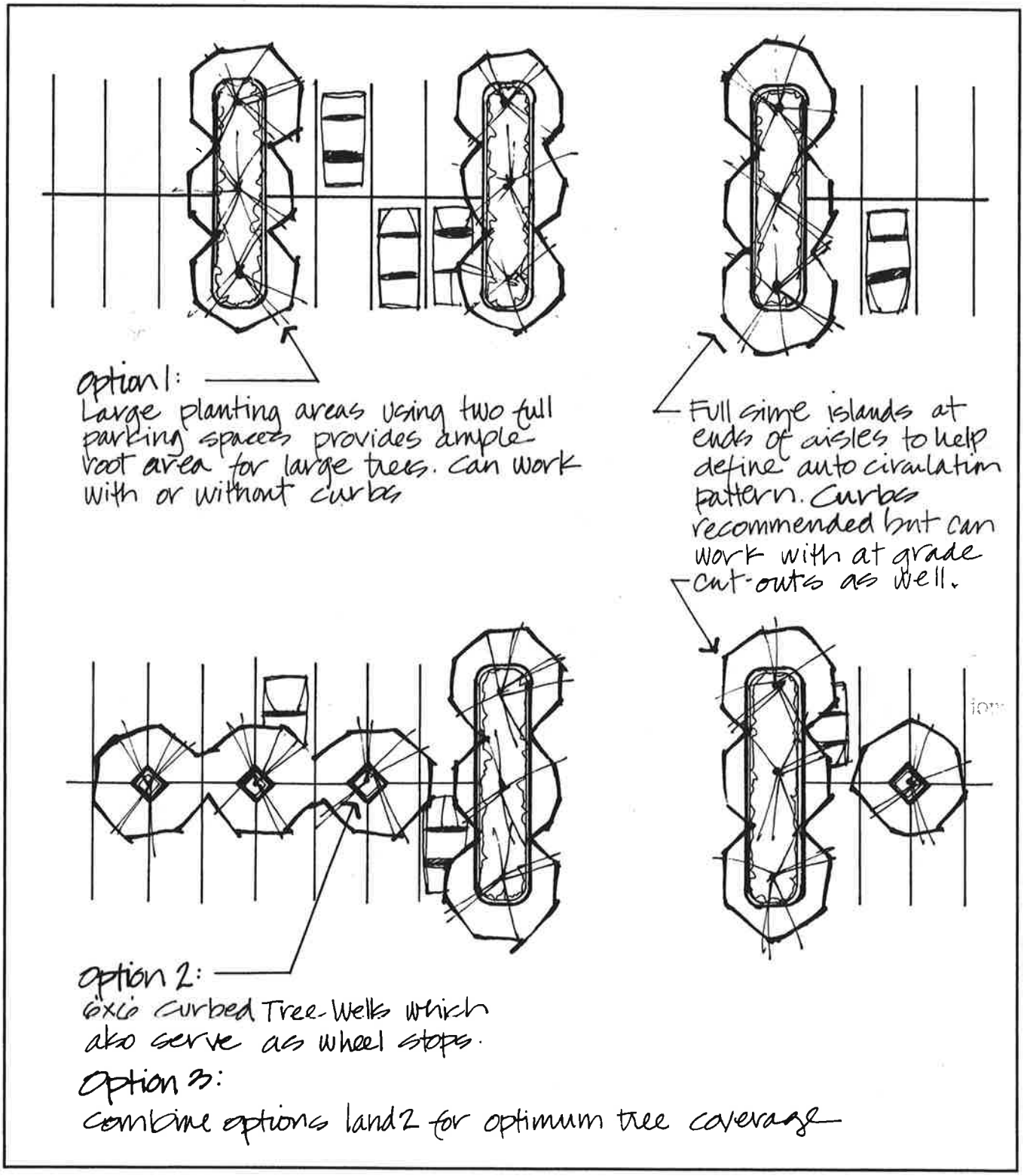
- All animals need food, housing and water. Experts on local wildlife species can recommend appropriate species to meet these needs.
- Plant wildlife-attracting species in sizable numbers and with some continuity throughout the community to mimic natural habitat—isolated patches are less effective.
- A diversity of habitat types is best—shrubby edge, woodland, meadow, chaparral.
- Enhance stream corridors' natural wildlife value with dense plantings of native trees and understory plants; culverted streams have little wildlife value.

## 2.4.3 HIDDEN DESIGN OPPORTUNITIES

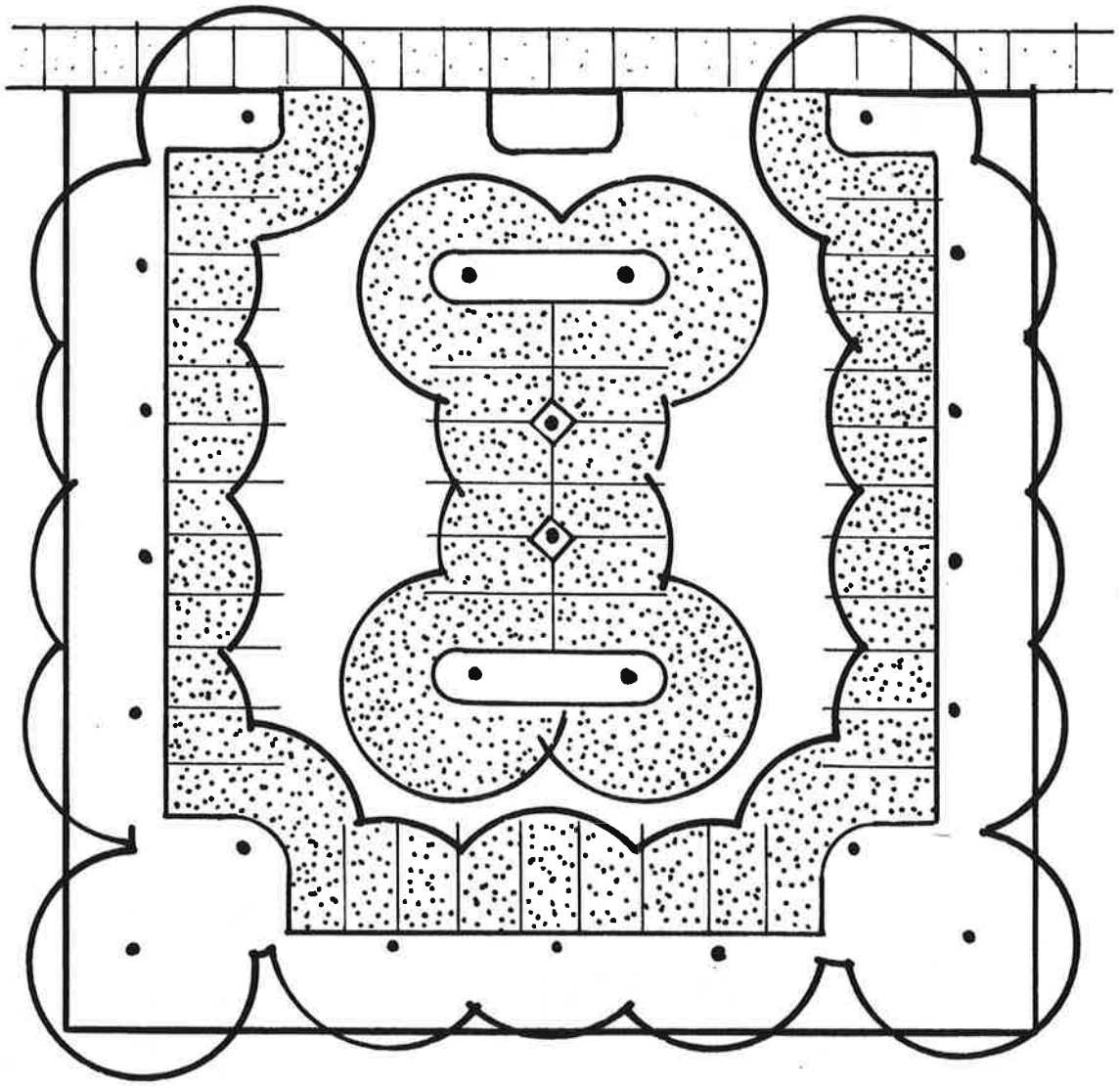
Street-tree planting is only one way to help reforest a city. Besides the other predictable places to plant trees—parks and schools, to name two—there are many other innovative ways to extend the community forest.

*Vacant lots* or other types of undeveloped and unused land can be turned from community eyesores into vest pocket parks, mini-forests, or food-producing fruit and nut groves.

*Hillsides*, often "leap-frogged" over by development, can be restored to their natural landscape pattern of oak woodland on the north and east facing slopes. This "restoration ecology" approach might be done in conjunction with the California Oak Foundation's planting program,




**Parking Lot Design Options** **Figure 18**



Total Paved Area: _____

Total Paved Area Shaded: _____

Estimated Percentage of Paved Area Shaded at 15 years: _____

Actual Percentage of Paved Area at 15 years: _____

POLICY: 50% of the paved parking lot surface shall be shaded with canopies within 15 years of acquisition of building permit.

**Parking Lot Tree Canopy Coverage** **Figure 19**

which has the goal of planting one million oaks throughout the state by the year 2000. (See Resources.)

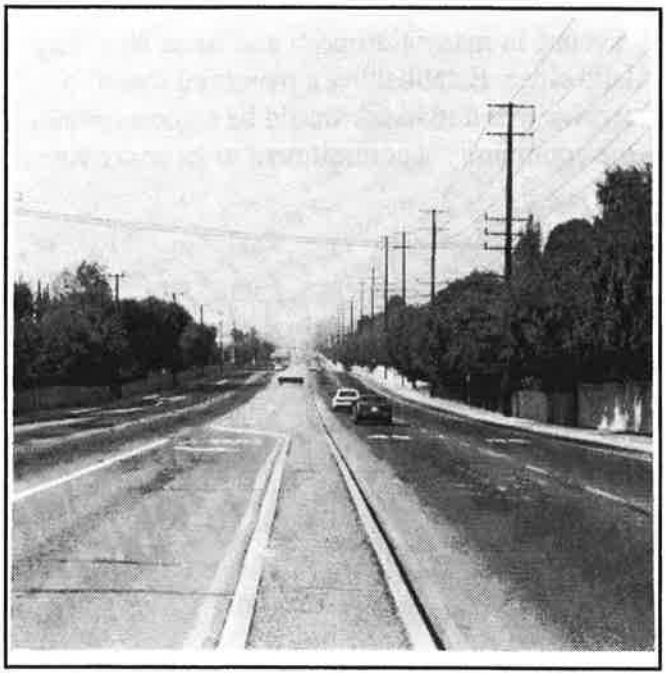
*Stream corridors* are another neglected resource for extending the forest, restoring habitat for riparian species (flora and fauna), and creating a network of walking paths throughout the community. (See 2.6.2, Figure 27.)

*Corporate and institutional holdings* are another situation where screening and a good public image can be accomplished with groves of trees, sometimes at substantially reduced costs in maintenance compared to traditional lawn. There is also a move afoot to convert some portions of large corporate "campuses" to wildlife uses, in which trees figure prominently. (See 5.3.3 for more information.)

*Parking lots* are generally unsightly, cover acres of land and contribute substantially to the "heat island" effect. This phenomenon, universal to urban areas throughout the world, is caused by the ability of paving materials to absorb more heat more quickly than natural surfaces. Combined with the effects of combustion, the result is an increase in temperature from the surrounding countryside—usually higher by 10 degrees or more. There is also substantial evidence indicating that unshaded parking lots create significant energy drains on surrounding buildings. (See Figure 18.)

Thousand Oaks policy (see 1.3.4.a) defines the minimum canopy coverage for parking lots, to be in place within 15 years of building-permit issuance. (See Figure 19.) Planting trees to achieve this coverage not only reverses the "heat island" effect and reduces heat damage to cars and their contents (cars exposed to summer sun can reach temperatures in excess of 200 degrees), but also goes a long way to humanize these omnipresent blights on the urban landscape.

*City forests and land preserves,* uncommon in California, provide a source of pleasure and revenue in many European and some New England cities. Establishing a memorial forest to receive tree donations would be a good symbol of the community's commitment to its entire forest.



## 2.5 RECOMMENDATIONS FOR MAJOR STREETS AND INTERSECTIONS

This chapter describes the place of the major streets in the community forest, and provides design guidelines to ensure they fulfill their potential as major components of the forest. The final section describes general design themes for each street. A set of street-by-street worksheets to aid in planning these areas are found in the Appendix.

While it is not within the scope of the Master Plan to design at the street level, the inclusion of the basic data on each street in an easy-to-use format will make this work consistent and comprehensive. The worksheets are to be used by staff or consulting landscape architects chosen by the city to plan each specific major street or intersection. All work done by consultants should include input from neighborhood residents and business people, and be reviewed by the community forester. These worksheets will be more effective if used in conjunction with a completed street-tree inventory, as described in Volume 4.

### 2.5.1 THE ROLE OF THE STREETS IN THE COMMUNITY FOREST

The network of streets in Thousand Oaks serves a diversity of functions. The primary need for a system of roads is, of course, circulation: the movement of goods and people within the community itself and through it to destinations outside the city limits. The layout of the streets, while designed mostly with these circulation needs in mind, also becomes the overriding structure of the city that helps determine character, form and land uses.

The streets of the city perform a social function as well, for it is on the streets that we come together as a community. Celebratory events—parades, block parties and the hanging of holiday decorations—take the street as their medium. We "hit the streets" to buy goods, disseminate information, run races, and meet our neighbors. Even in the face of the isolating effects of the automobile and television, the street will continue to be the most public of places in any community.

The importance of the network of roads to the community is reflected in the physical land mass devoted to them: streets and their rights-of-way are the second largest use of land in Thousand Oaks, after housing (Thousand Oaks Development Plan, 1971). There are approximately 100 miles of major streets and 275 miles of residential neighborhood streets in Thousand Oaks. Their sheer acreage makes them impossible to ignore when considering the city's image and character.

Thousand Oaks' streets vary considerably, both from street to street, and along the length of individual roads. Some of the variables that determine a street's character include width of the road,

volume of traffic, the primary land use fronting it, connections and intersections along the way, and the "streetscape"—the overall design of the street, including furniture, width of sidewalks, medians, commercial signage trees.

Street trees probably comprise the largest percentage of the public trees in the community forest. They are also its most visible members, since it is from the roads of Thousand Oaks that most people form their visual impressions of the city. This "view from the road" element of street plantings, so often overlooked in street design, is integral to the image a city conveys. Considering that 70% of surveyed residents say they moved here because of Thousand Oaks' aesthetic appeal, this factor should not be underestimated (Conejo Valley Attitude Survey, 1984).

Trees possess the magic to transform undistinguished asphalt into a leafy river expressing the community's basic values. They are an eloquent reminder of the community's place in the natural world—in keeping with the General Plan goal urging better understanding of the relationship between the people of the Conejo Valley and its ecological systems. And they mark the passage of time in a way that no element of the city's built environment can—they grow, as we do.

## 2.5.2 EXISTING RESOURCES

Thousand Oaks has already begun the process of evaluating the design issues for its major streets. Four reports touching on various aspects of design for major streets have been produced in recent years. The oldest is the *Scenic Highways Element of the General Plan*, adopted in 1974. It gives general recommendations for sections of roads deemed scenic highways. The *Highway Beautification Ordinance* was signed into law to implement some of the goals and policies outlined in this report. The *City Identity/Streetscape* study, produced by the Thousand Oaks Arts Commission and City Identity Committee in 1986, discusses design issues that would help make the city more visually memorable and create a unified city image. It identifies five city entry points where design treatment would enforce the image of the city, and suggests basic street-improvement elements for major streets, including trees, street furniture and paving.

The final report is *The Report of the Freeway Corridor Design Subcommittee*, produced in 1988 by the General Plan Review Committee. This very thorough document carefully analyzes the existing conditions of the two freeways in Thousand Oaks, and makes specific recommendations for these corridors.

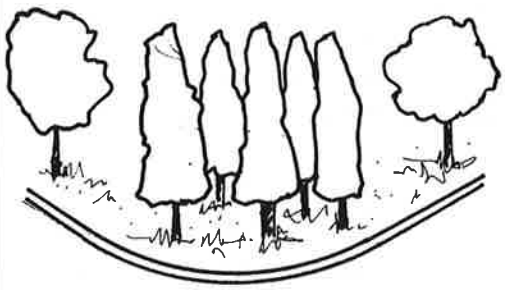
Much of the information from these resources has been incorporated into this section. In the case of the freeway corridor report, there is little need for further detail concerning design issues at the scale of the corridor, and it is recommended that this document become the blueprint for the design treatment of the freeway corridors. The *Streetscape* report, too, should be used to guide the design of the network of streets. The only caveat for using this report regards its statement that oaks should not be used as street trees. Oaks make appropriate street trees where the planting area is large enough and a large shade tree is required. The oak, so integral to the character of the city, should not be overlooked in the design of the major streets.

## 2.5.3 DESIGN ISSUES FOR THE MAJOR STREETS

The variety of street types within the community call for a diversity of design treatments, relating to the use of trees. A street of mostly rural character will certainly have different design needs than one primarily devoted to retail establishments. A

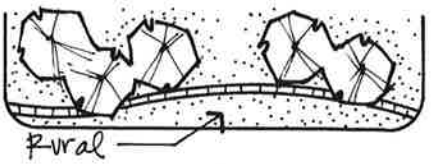
20. Defining entry and welcome.
21. Facilitating navigation by using "landmark species."
22. Easing the transition from rural or residential to the central business district.
23. Creating enclosure and defining space.
24. "Grounding" buildings to the landscape and bringing them down to human scale.

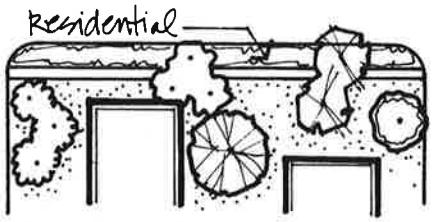

(20)



Landmark grove of vertical trees contrasts with round shaped street trees

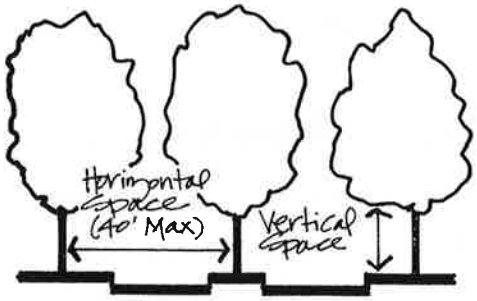
(21)



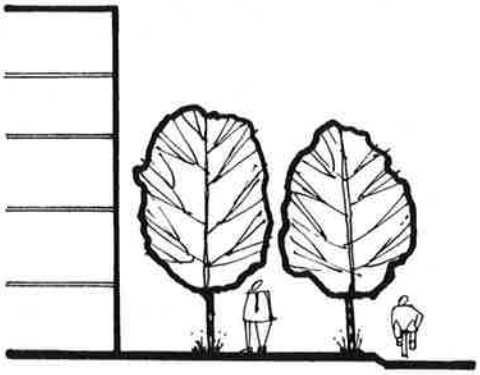

Do not plant in a row; plant alternative design type

(22)




Horizontal Space: Maximum 40'-0"
Vertical Space: Varies 5'-0"-13'-0"

(23)



(24)

**Figures 20-24**

freeway has completely different connotations than an arterial road in the center of town. Trees are the easiest, most flexible tool to employ in transforming the character of existing streets. Each type of street brings up different design issues:

- Defining entry and welcome.
- Facilitating navigation by using "landmark species."
- Easing the transition from rural or residential to the central business district.
- Creating enclosure and defining space.
- "Grounding" buildings to the landscape and bringing them down to human scale.

Streets are usually described in terms of traffic volume, width of roadbed and connections: *freeways* provide for rapid movement of large volumes of through-traffic; *arterial streets* connect with freeways and also provide for through-traffic within the city; *collector streets* connect arterials with local streets and provide property access, and *local streets* are intended only for property access. Streets may also be thought of in terms of their general character, which is closely associated with the character of the areas a street goes through, in addition to its use, number of lanes and speed of traffic. To effectively design with street trees, both of these perspectives must be considered.

In addition to evaluating the street's character and uses, its planting conditions must be thoroughly studied. Streets present special problems for trees, including dust and dirt, poor soil, difficulty of maintenance, reflected heat from pavement and buildings, and limited root space. The tree matrices in 2.7 should be used to determine appropriate species for these very difficult conditions.

## 2.5.4 DESIGN GUIDELINES

The following design guidelines apply specifically to the conditions found along most major streets. They combine information on urban tree survivability with basic design principles, to give a framework for the design of each major street. The general design information found in section 2.3 also applies to the major streets, and should be considered as well.

- Use repetition of a dominant species to make a strong, lasting impression on motorists, who see the street more quickly and peripherally than pedestrians or cyclists. Consistent use of a species for each of the major streets will also reinforce the distinct character of each. Rural roads, for example, are an appropriate place to extend oaks from the hills into the heart of Thousand Oaks.

- Create "gateways" to announce the city to those entering on major thoroughfares. (See *Freeway Corridor* study for more detail.)

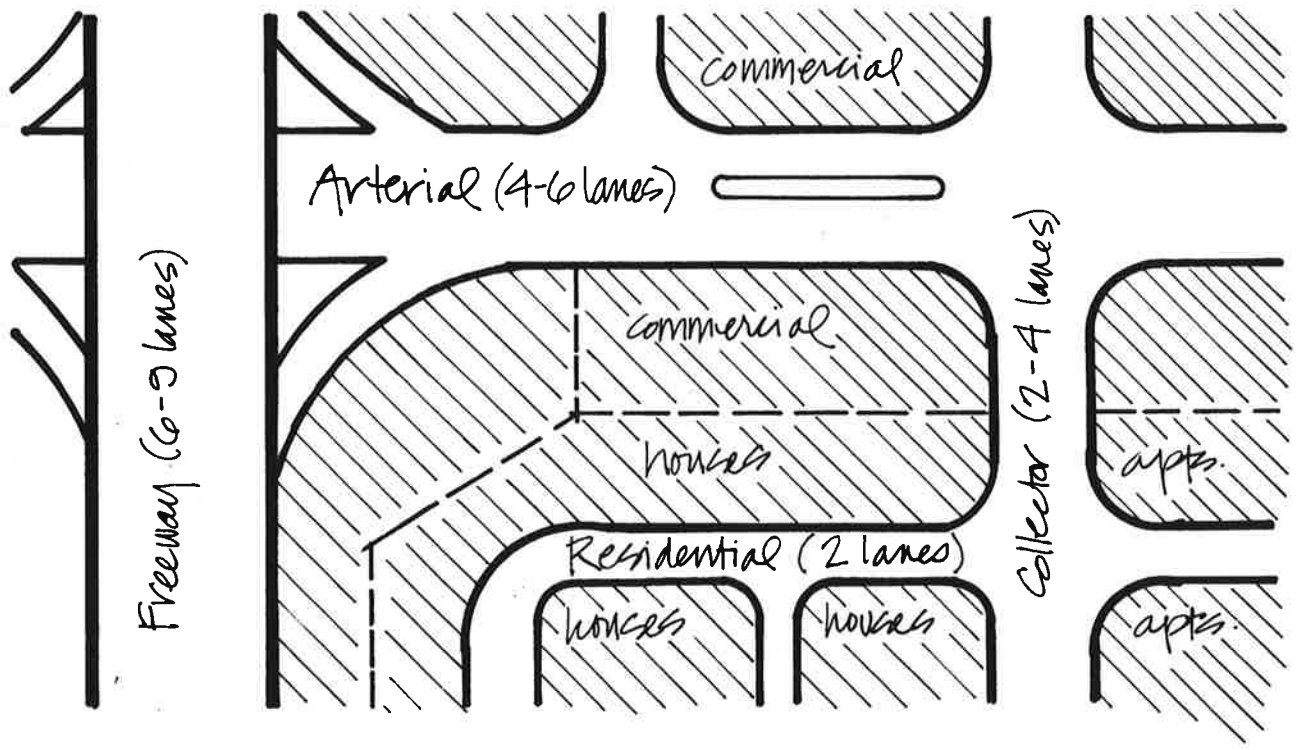
- Mark major intersections with special plantings (refer to the *City Identity/Streetscape* report mentioned above for some specific recommendations).

- Use accent trees to call out commercial areas, highlight building facades, or add visual interest. These are usually smaller than the dominant species. Accent trees can also be used as part of the dominant theme, found regularly along the street.

- Consider the speed of the automobile and when choosing species and determining spacing.

- Use informal, naturalistic tree groupings along freeway corridors rather than straight-line plantings. (See *Freeway Corridor* study for more detail.)

- Create a canopy of foliage overhead to bring wider roads down to human scale.




**Types of Streets** **Figure 25**

■ Spacing trees closely to create an open, translucent canopy arching over the street. Widely spaced trees will develop a denser, lower-branched crown, but slightly crowded trees will reach up and over in their search for light and room. (Actual spacing depends on the species, as noted in 2.7.)

■ Protect views both into and out of the city. This includes views to the surrounding open space, views of historic or memorable structures, and views of the city from above. Trees can be used to frame these views, but should not obstruct them. (See *Freeway Corridor* study for more detail.)

■ Screen objectionable views—including large parking lots—with trees.

■ Enhance pedestrian activity through the use of street trees that enclose the pedestrian corridor but are not so aggressive or densely foliaged as to create a claustrophobic environment.

■ Shade bike lanes should where possible. Select species that do not drop fruit or large seed pods, which create a hazard for cyclists.

■ Use masses of a particular species for positive aesthetic effect, such as the sparkling of poplar leaves.

■ Fall color and attractive branching patterns of deciduous trees are two special effects that are particularly appropriate for the higher speeds of these streets. While the speed of traffic is not conducive to more subtle special effects, the repetition of species along these roads would make either of these effects particularly breathtaking.

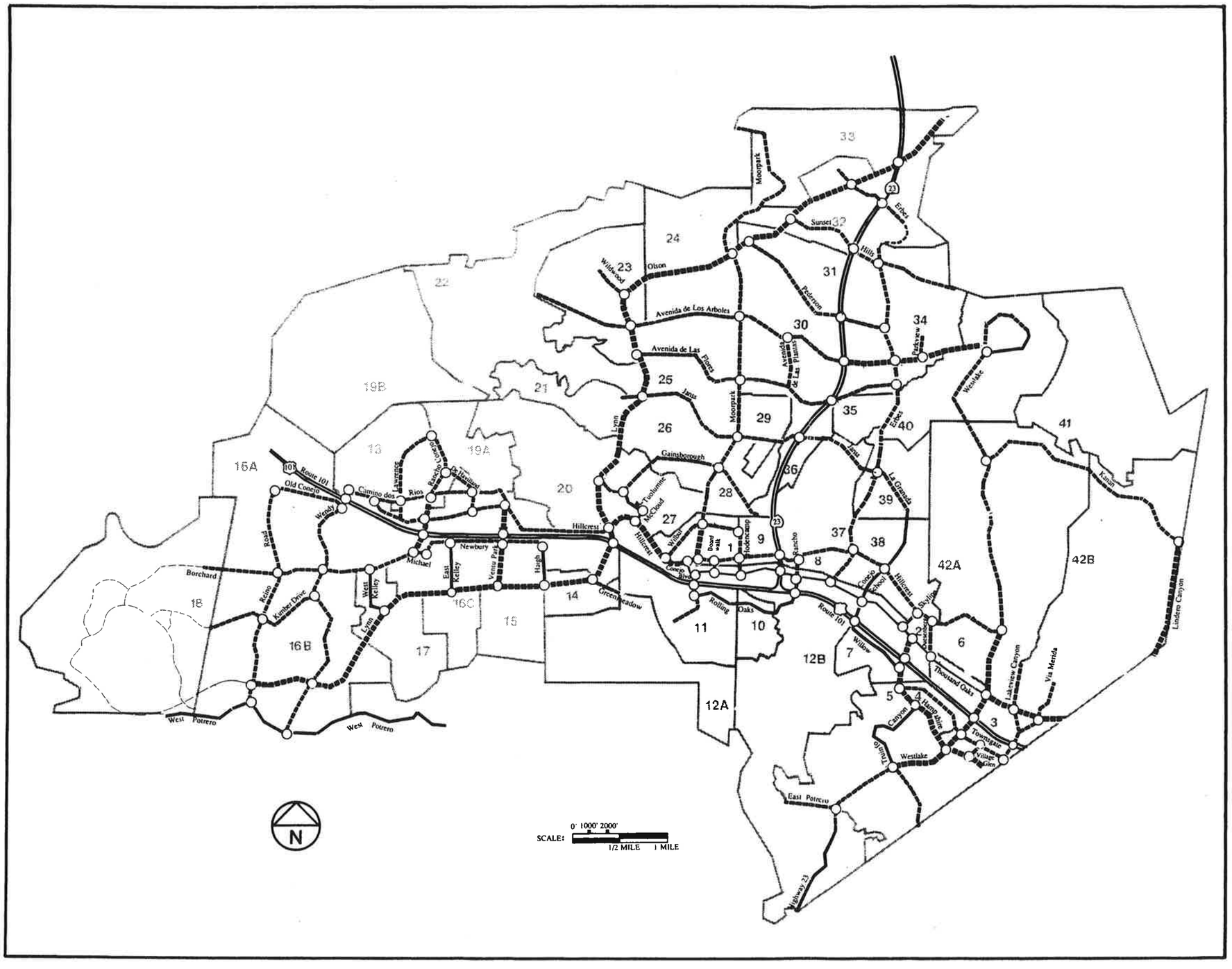
**Tree Selection**

■ Trees should be tolerant of the low rainfall conditions of the valley in summer, in addition to being more heat-tolerant than trees intended for less harsh conditions.

■ Lower limbs must be able to be pruned at maturity to a minimum height of 13 feet above the curb to allow truck access beneath their branches on major streets (9 feet is usually sufficient for residential streets).

■ Trees should be chosen to shade the roadway as much as possible to reduce the "heat island" phenomenon created by the street environment.

**NOTE:** The 1988 Circulation Plan for the city identifies 59 existing or future major streets traversing Thousand Oaks. They are identified by size of roadway section, indicated by number of traffic lanes. The five categories are Freeway, 6-Lane, 4-Lane, 2-Lane, and Multi-lane. The term multi-lane applies to streets whose design has not yet been determined. The major streets are divided therefore into these five categories according to size. Use the following index map to find a street, and then turn to the **appendix** to find the map and specific recommendations for each street.




## INDEX OF MAJOR STREETS

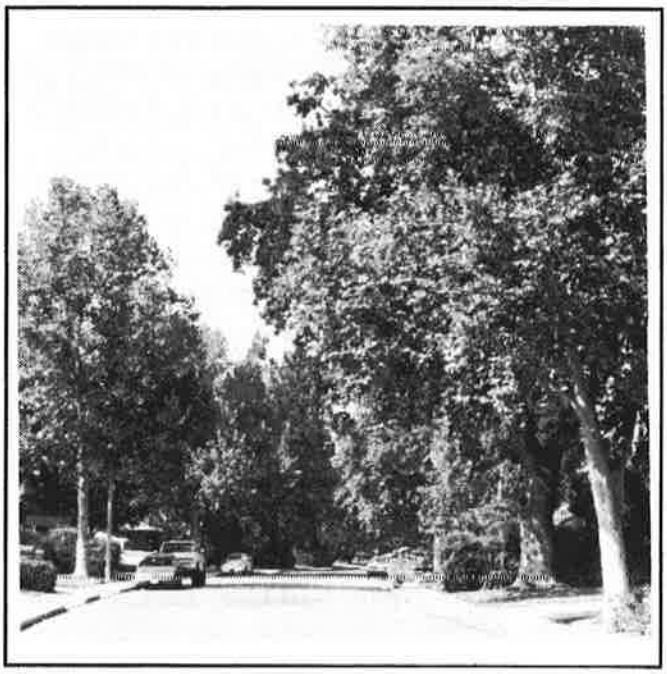
**FREEWAY**
HIGHWAY 101
HIGHWAY 23

**6 LANE**
HAMPSHIRE/AGOURA ROAD
LINDERO CANYON ROAD
LYNN/OLSEN ROAD
VENTU PARK ROAD

**4 LANE**
AVENIDA DE LOS ARBOLES
AVENIDA DE LAS FLORES
AVENIDA DE LAS PLANTAS
BOARDWALK AVENUE
BORCHARD AVENUE
CAMINO DOS RIOS
DE HAVILLAND DRIVE
DOS VIENTOS PARKWAY
DUESENBERG DRIVE
ERBES ROAD
GAINSBOROUGH ROAD
GREENMEADOW DRIVE
HILLCREST DRIVE
HODENCAMP ROAD
JANSS ROAD
KANAN ROAD
KIMBER DRIVE
LAKEVIEW CANYON ROAD
LAWRENCE DRIVE
MICHAEL DRIVE
MOORPARK ROAD
NEWBURY ROAD
OLD CONEJO ROAD
PARKVIEW DRIVE
PEDERSON ROAD
POTRERO ROAD: EAST
RANCHO ROAD
RANCHO CONEJO BOULEVARD
REINO ROAD
SUNSET HILLS BOULEVARD
TOWNSGATE ROAD
VIA MERIDA
VILLAGE GLEN
WENDY DRIVE
WESTLAKE BOULEVARD
WILBUR ROAD
WILDWOOD AVENUE

**2 LANE**
CONEJO SCHOOL ROAD
EAST KELLEY ROAD
HAIGH ROAD
LA GRANADA DRIVE
MCCLOUD AVENUE
POTRERO ROAD: WEST
ROLLING OAKS DRIVE
SKYLINE DRIVE
TRIUNFO CANYON ROAD
TUOLUMNE AVENUE
WEST KELLEY ROAD
WILLOW AVENUE

**MULTI-LANE**
CONEJO BOULEVARD
THOUSAND OAKS BOULEVARD



## 2.6 RECOMMENDATIONS FOR NEIGHBORHOODS

This chapter describes the role the city's neighborhoods play in the community forest, and how these areas differ from the major streets. Guidelines specific to neighborhood design comprise the next section. The appendix provides a breakdown of the city by neighborhoods. It includes information on existing conditions as well as planting recommendations. This information will assist residents and others make appropriate choices about trees for their neighborhood. All planting plans will need to be reviewed by the community forester.

### 2.6.1 THE ROLE OF NEIGHBORHOODS IN THE COMMUNITY FOREST

A city is like a set of nested boxes. If the largest box represents the city as a whole, and each smaller box is a new layer of detail—streets, neighborhoods, individual houses—then the innermost box must represent the individual citizen. To carry the metaphor to its natural conclusion, the largest box would be empty and dull if it were not for the smaller boxes within it.

Like the nesting boxes, a city doesn't stand alone: it is the sum of its parts. And a prime component of any city is its neighborhoods—the part of the city most of us call home. Thousand Oaks has been divided by the planning department into 42 neighborhoods, based on subdivision maps. Each has its own distinctive character and its own set of opportunities and constraints for trees.

Up until the 1930s, most of Thousand Oaks was ranchland, including some large holdings dating back to the days of Spanish rule. Even as late as the 1950s, there were two ranches totalling some 25,000 acres of land in the planning area of the city. Today, most neighborhoods consist of a variety of tract-housing styles, a school or two, a park or other type of open space, and occasionally some commercial uses. The age of the trees usually corresponds to the age of the housing stock, although there are some 100 year old stands of street trees along Conejo Blvd., for example.

### 2.6.2 DESIGN ISSUES FOR THE NEIGHBORHOODS

The personal nature of most neighborhoods requires a very different touch than the major streets. While the major streets need unity and strong overall themes, the neighborhoods call for variety. On the major streets, the wide range of experiences and architectural styles is best complemented by repetition of a regularly spaced dominant tree species. But in the neighborhoods, where the houses are often of similar styles on lots of one size, a judicious variety in the treescape can bring richness. But plantings should retain enough consistency to enhance the public character of the streetscape and help harmonize the neighborhood.

And it is in the neighborhoods where the finer points of a particular tree can be showcased: details that would be lost on the motorist traveling at 40 miles per hour become important at the pedestrian's pace. Fragrance, texture, shadow patterns, and unusual bark can be used to full effect on the local-street scale. And it is in the neighborhoods where the ecological diversity so important to the health of the forest can be realized.

Trees can also be used to create a diversity of spatial experiences in the quiet streets of the neighborhoods. In areas where some parking space can be sacrificed, small groves can be established. Even more unusual measures might be considered where practical. In the Netherlands, for example, a move to create safer streets for children has resulted in the creation of neighborhood pedestrian streets, called "woonerfs." The amount of road available to cars is significantly narrowed in the woonerf through the use of planting beds, benches, and mounds. The entire street becomes usable for people. Huge amounts of space are opened up for planting trees, and the social nature of the street is intensified. Cars are forced by the design of the street to stick to a safe speed. Considering that studies show children to be at ten times more at risk of being killed by a car than adults, such innovative design solutions deserve close consideration (from *Livable Streets*).

There are other design opportunities in the neighborhoods. Streams are very often a "missed opportunity." Where they haven't been culverted, they can become linear parks linking neighborhoods, with the native riparian species—willow, bay, big leaf maple—acting as a wildlife draw and visual flag for these mostly undervalued wild places. (See Figure 26.) Schools, parks and vacant lots can provide the large bodies of open space needed for impressive massing of trees and even productive groves of fruits and nuts.

Schools in particular present an ideal place to expand the community forest. The educational and play value of groves of oaks and other species should be considered in the design of school yards, which traditionally are sterile places. Imagine a high school that boasts of having a productive grove of fruit trees that acts as a hands-on science lab as well as providing money for other school activities from the sale of its produce. Teaching tomorrow's citizens about the community forest makes the job of expanding and maintaining this resource much easier in the long run.

## 2.6.3 DESIGN GUIDELINES

The following guidelines will direct the planting of the neighborhoods. Like the guidelines for major streets, these should be used in conjunction with the general design information found in 2.4.

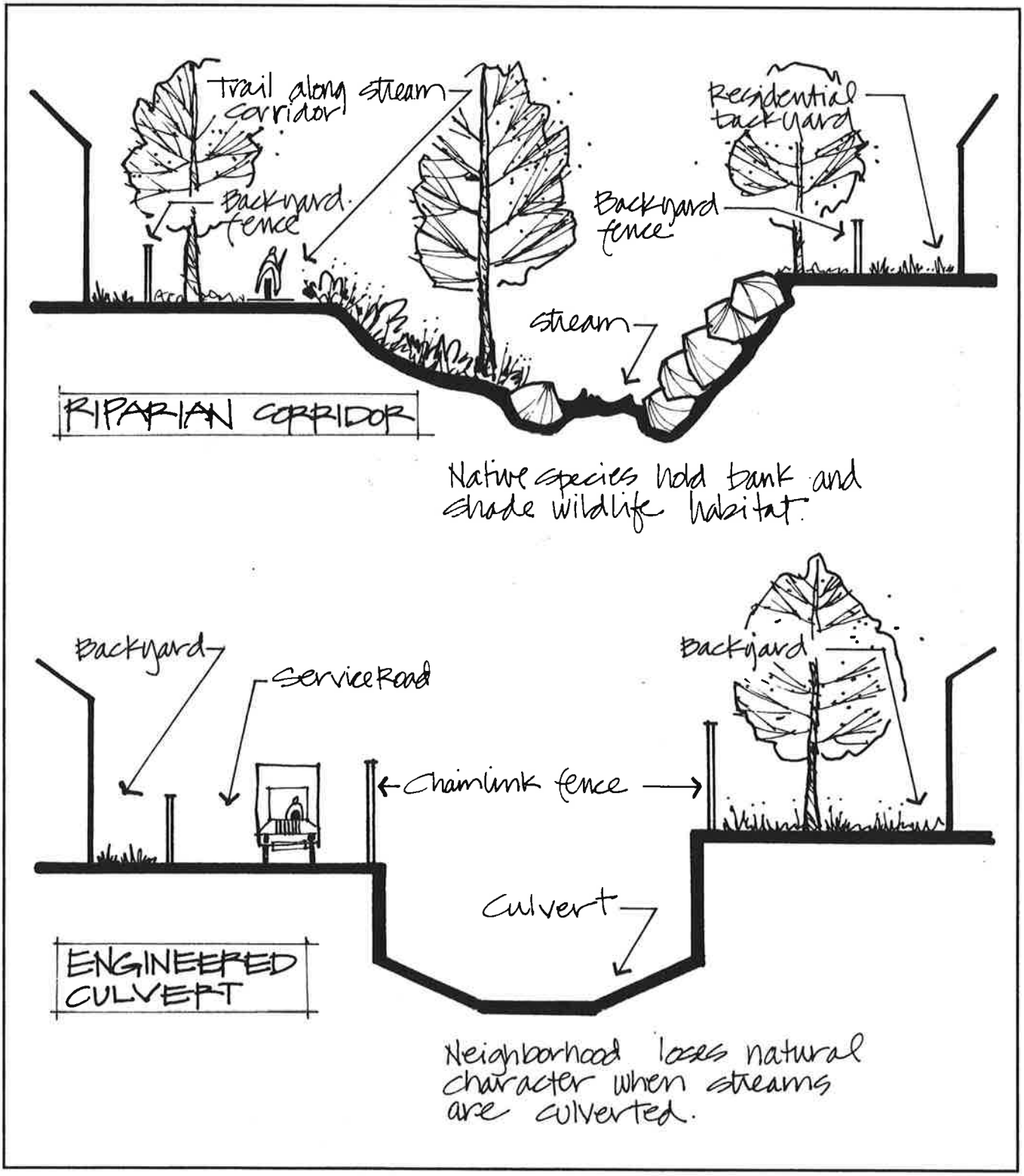
■ Create a distinctive planting palette and design approach for each neighborhood.

- Fit the planting palette to match the scale and image of the area.
- Vary tree spacing and species to create a richer streetscape.
- Consider unusual alternatives to traditional tree-lined streets (e.g., woonerf-like plantings).
- Involve the residents in the decision making as much as possible.

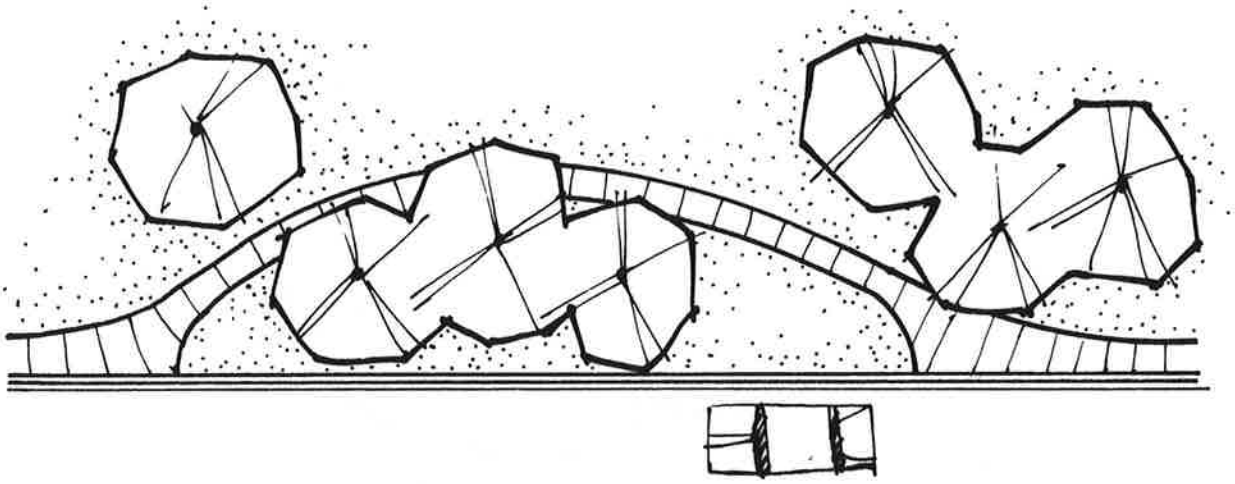
■ Consider the impact of existing trees and vegetation. Existing, privately planted trees can have a huge influence on the character of a neighborhood and should be considered when prioritizing the street-tree planting schedule.

■ Emphasize special effects that might be lost on a larger-scale street: flowers, fragrance, unusual bark, leaf patterns and textures, shadow patterns, and the expression of wind.

■ Ensure the natural diversity of the community forest by planting the neighborhoods with species




**Streams** **Figure 26**



**Clustering Trees** **Figure 27**

not found in abundance along the major streets or elsewhere in the area. Determine the percentages of all species planted in Thousand Oaks, and restrict the planting of any species that accounts for more than 10% of the forest. (Indigenous species can be planted at 20%, reflecting their native adaptability to the area.) Use no more than 25% of any one species in each neighborhood.

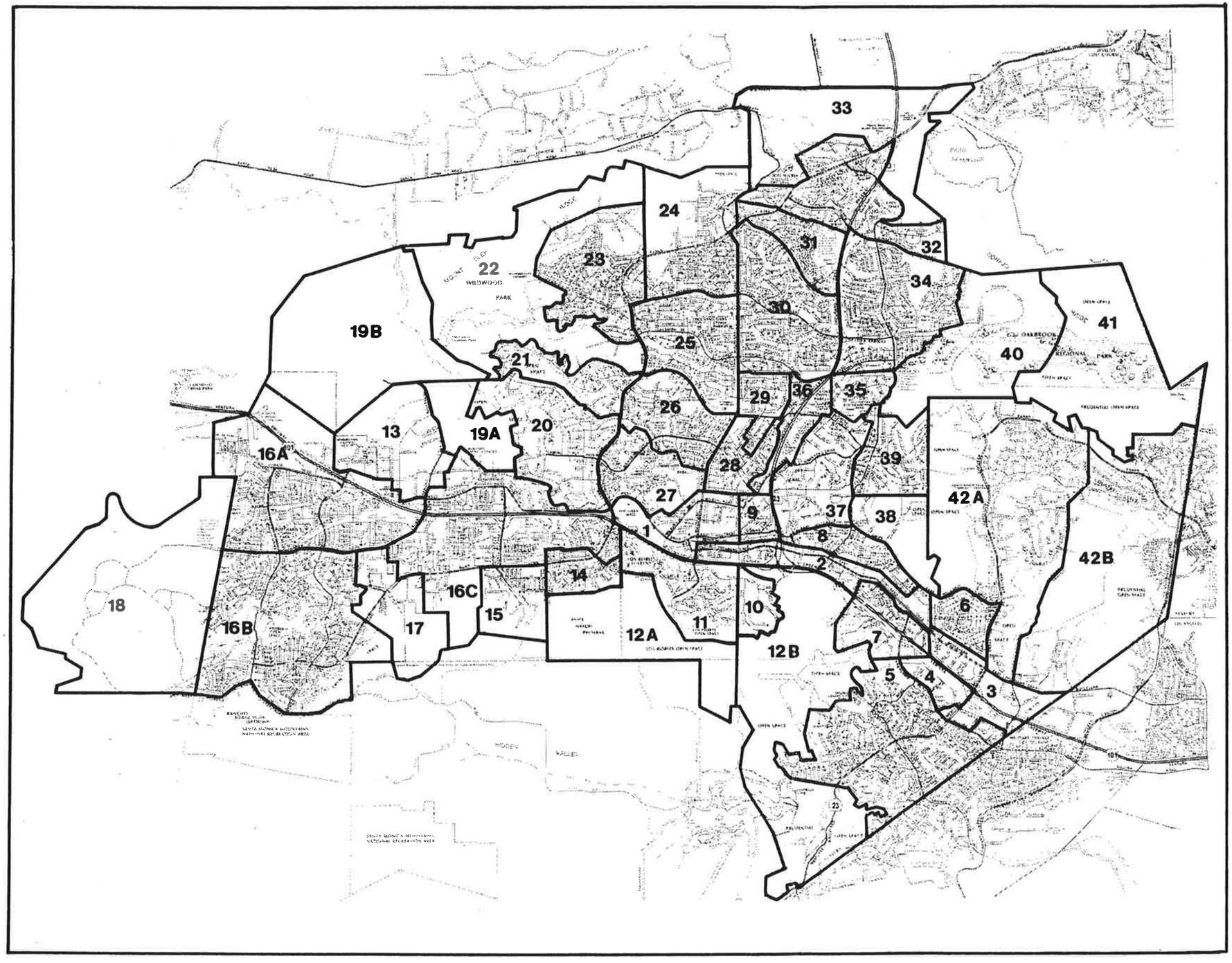
■ Make use of public land in neighborhoods for groves of trees and to break up the linearity of street trees. (See Figure 27.)

■ Consider making room in each neighborhood for a small grove of oaks, or at least a symbolic oak that will become a future heritage tree for the neighborhood. The oaks could even be planted from acorns, adding to the mystery, excitement and learning value for neighborhood children.

■ Inform the residents of the horticultural needs of trees fronting their property, especially for drought-tolerant species in parking strips in front of houses. In these cases, residents should be given a list of water-conserving alternatives to lawn to plant under such species, and a watering schedule appropriate to the established tree.

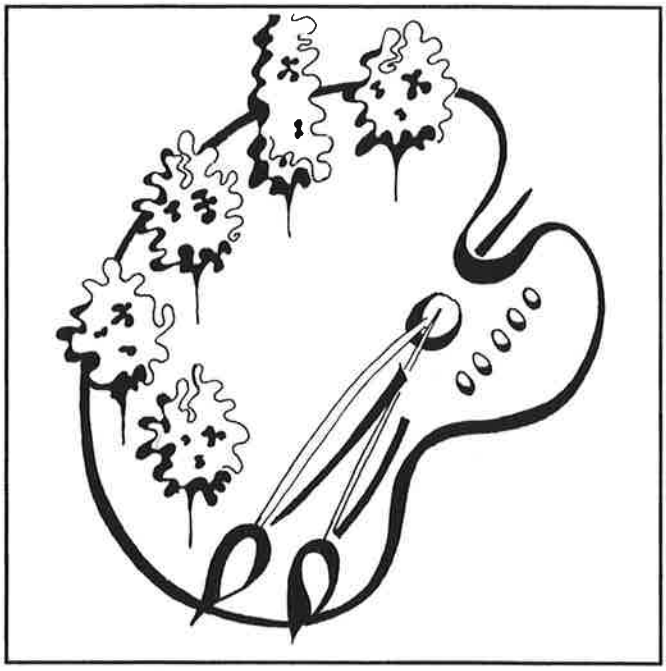
■ California state law mandates that all new trees be carefully sited to avoid shading existing solar collectors. For this same reason, evergreen trees with dense winter foliage should be avoided on neighborhood streets with an east-west axis.

**NOTE:** The neighborhood boundaries shown on the following index map adhere to existing or planned areas as identified by the city planning department. The intent was to divide the city into more manageable human-scale areas for planning. Use the index to find a neighborhood, then turn to the **appendix** to locate the map and specific recommendations for the area.




## INDEX OF NEIGHBORHOODS

1 CENTRAL THOUSAND OAKS
2 THOUSAND OAKS BLVD. COMMERCIAL STRIP
3 WESTLAKE-COMMERCIAL
4 WESTLAKE INDUSTRIAL PARK
5 WESTLAKE-SOUTH RANCH
6 WESTLAKE HILLS
7 OLD TOWN RESIDENTIAL-SOUTH
8 OLD TOWN RESIDENTIAL-NORTH
9 PARK OAKS
10 ROLLING OAKS
11 CARRIAGE ESTATES
12A OPEN SPACE-WEST
12B OPEN SPACE-EAST
13 RUNNING SPRINGS RANCH
14 LYNN OAKS
15 VENTU
16A NEWBURY PARK-WEST
16B NEWBURY PARK-SOUTH
16C NEWBURY PARK-EAST
17 RURAL ZONE-SOUTH
18 DOS VIENTOS
19A RANCHO CONEJO-EAST
19B RANCHO CONEJO-WEST
20 LYNN RANCH
21 LYNN BROOKE
23 WILDWOOD
24 UNIVERSITY AREA
25 CONEJO HILL
26 SHADOW OAKS
27 CIVIC CENTER HILL
28 GLENWOOD
29 WAVERLY HEIGHTS/WESTGATE
30 PARK OAK
31 PEDERSON
32 SUNSET HILLS
33 RURAL ZONE-NORTH
34 OAK BROOK
35 OLD MEADOWS
36 WAVERLY AND CONEJO CREEK PARK
37 CONEJO OAKS
38 RURAL ZONE-EAST
39 STARVIEW/KEVINGTON
40 LANG RANCH
41 OPEN SPACE
42A NORTH RANCH-WEST
42B NORTH RANCH-EAST



## 2.7 A PLANTING PALETTE FOR THOUSAND OAKS

This chapter provides a palette, or range of choices, of trees for use in Thousand Oaks. The index of trees lists recommended, experimental and conditional trees for future plantings, and trees which should not be used as street trees, and identifies which matrix the tree appears on. Following the index are the matrices, identifying design and horticultural factors for trees. A list of shrubs and ground covers concludes the chapter.



### 2.7.1 USING THE MATRICES

The tree matrices are used to narrow down choices. They should be used in conjunction with the computer inventory database and recommendations in previous sections to make individual site-specific tree selections. Photographs, sketches and additional horticultural, functional, or aesthetic descriptions found in supplementary materials (such as *Sunset Western Garden Book*) can also help in this decision making.

Since the number one factor which limits the growth of a tree is the size of the available planting area, each list of trees is subdivided into the following categories based upon the minimum distance from paving required for healthy growth without breaking up sidewalks and paving.

*Small Planting Sites:* Existing spaces less than 4 feet wide which cannot be enlarged. Root barriers required.

*Medium Planting Sites:* 4 to 6 feet wide tree wells, 10 to 15 feet wide medians. Root barriers recommended at the edge of the planting area.

*Large Planting Sites:* Parkways, tree wells and other openings between 6 and 10 feet wide, medians over 15 feet wide. Root barriers recommended at the edge of the planting area.

On all charts, the plants are listed alphabetically by botanic name with the most widely used common name following. The capitalized first name indicates the plant genus, and the second lower-case name is the species. The third name, which is capitalized and in quotation marks, indicates the cultivar. A cultivar is a variety that is asexually reproduced from the parent stock to exhibit particular positive characteristics or eliminate debilitating horticultural problems.

Except for the overall index and the "trees not to use" sections, the matrix format is two pages facing each other, with information for each tree running across both pages.The factors on the **left-hand** pages of the matrix are defined as follows:

**Type:** Evergreen trees hold their leaves all year while deciduous trees lose their leaves each year, usually in the fall or winter. For the purposes of the Master Plan, evergreen trees are divided into broadleaf evergreens, a tree with leaves, or a conifer, a tree with seed cones and evergreen needles. Deciduous trees are identified as trees which drop leaves all at once.

**Height:** Threeheights are used, based on expected growth for trees in restrictive street tree environments. Sizes are smaller than in references where sizes reflect optimum growing conditions.

*Small:* Under 20 feet tall
*Medium:* 20 to 40 feet tall
*Tall:* More than 40 feet tall

**Spread:** Spread is a more dominating factor than height in describing the impact a tree will have on a street. For example, a tall, narrow tree such as *Pinus canariensis* provides minimal canopy, while a tall, broad tree such as *Quercus lobata* provides maximum canopy. Horizontal width of the tree canopy is identified as:

*Narrow:* Less than 20 feet wide
*Average:* 20 to 40 feet wide
*Broad:* More than 40 feet wide

**Growth rate:**

*Slow:* Will take many years to develop its mature form.

*Medium:* Will begin to acquire mature characteristics within 20 years.

*Fast:* Will begin to develop a tree canopy after the first five years, if planted from a 15 gallon can or larger size.

*Very fast:* The same as for fast trees except form begins within five years. These trees should be used as secondary or support species only, as they usually have high maintenance requirements and are short-lived.

**Spacing:**

*Small trees:* 15 to 20 feet apart
*Medium trees:* 20 to 30 feet apart
*Large trees:* 30 to 40 feet apart

The factors on the **right-hand** pages of the matrices are defined as follows:

**Life span:** Useful life expectancy under the stressful conditions of the street.

**Form:** The shape of the crown of the tree.

**Preferences:** Horticultural conditions preferred by tree, such as good drainage, regular watering, no watering, etc., or design situations which limit growth, such as overhead utilities and medians. California natives are also identified.

**Tolerances:** Horticultural conditions which a tree tolerate, such as alkaline soil, wind, frost, etc.

**Debris:** Abundant seeds or fruit which fall from the tree periodically. Trees that produce litter should be planted over surfaces that accommodate it without becoming an excessive maintenance or safety problem. These trees are wonderful assets if planted in the appropriate locations.

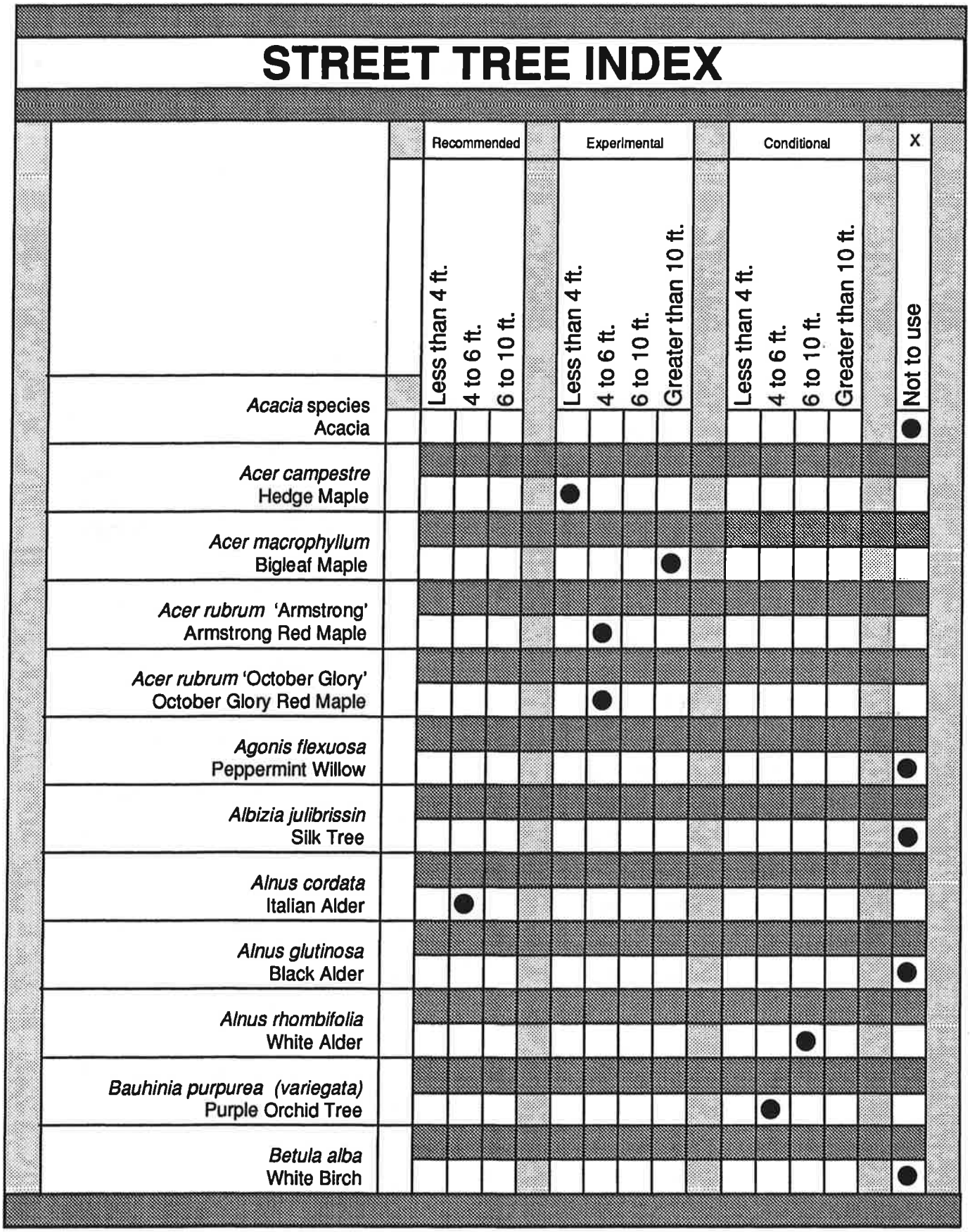
**Impact:** Dominant trees are the largest and widest spreading trees on the lists. They are the primary trees to be used for regular street-tree and median plantings. Accent trees are smaller trees to be used for infill planting under dominant trees or as a design highlight.

**ISA Species Classification:** Refers to a tree's relative rating compared to other species in the area, based on a variety of factors, including longevity, structural integrity, pest and disease resistance, and pruning needs as determined by the International Society of Arboriculturists.

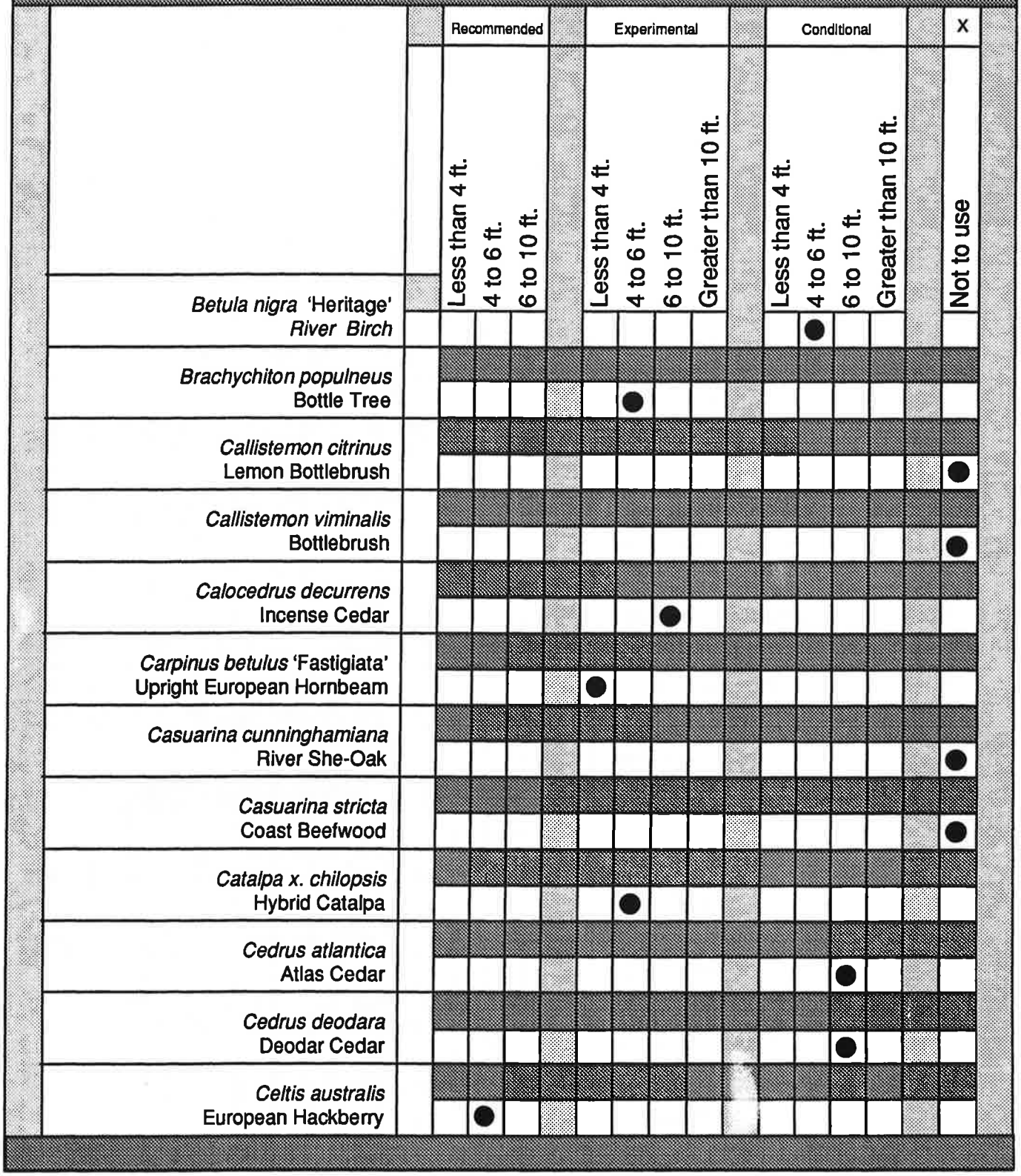
## 2.7.2 INDEX OF TREES

This first matrix lists trees from all of the street-tree categories described herein, and identifies which matrix they can be found on.

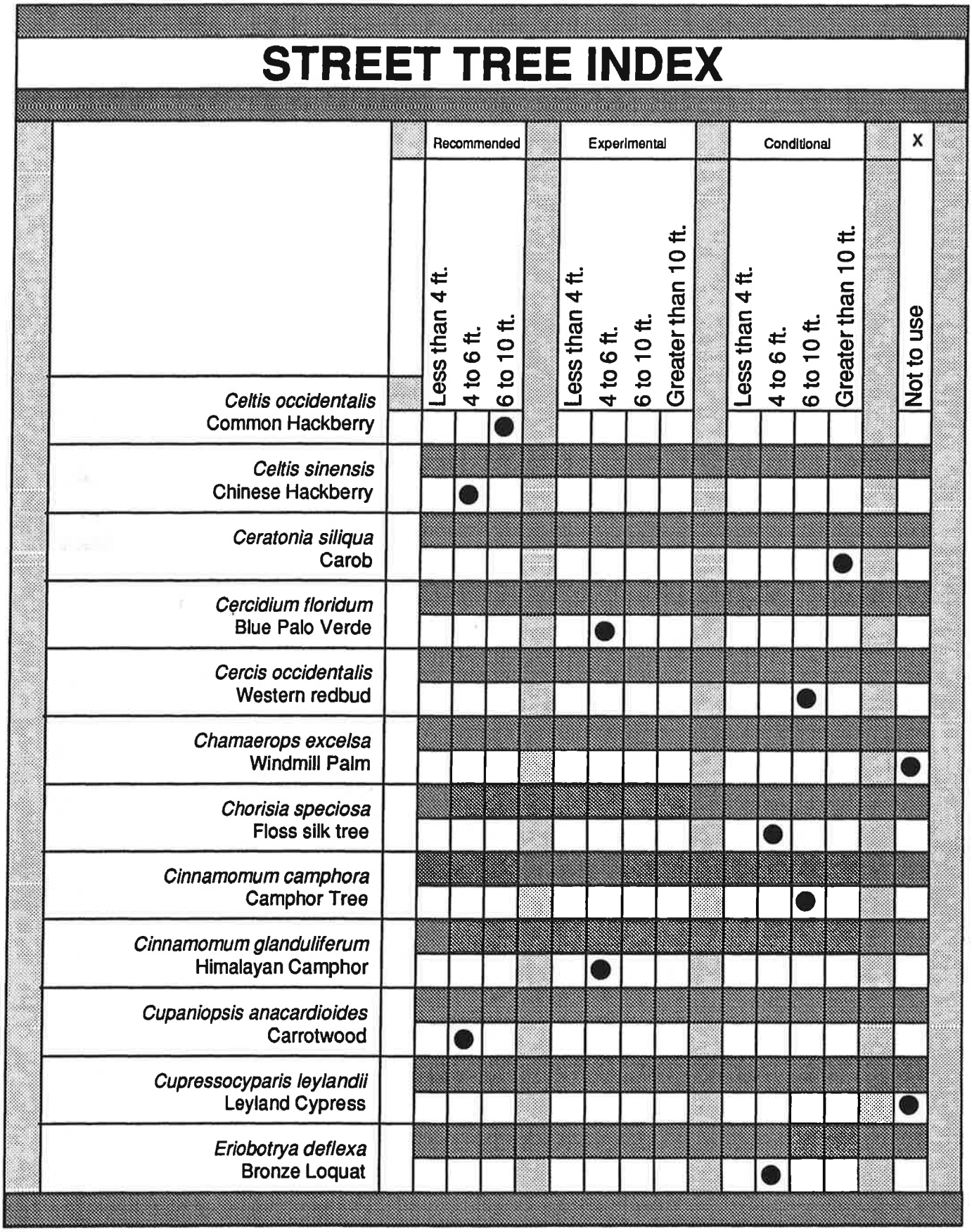
# STREET TREE INDEX



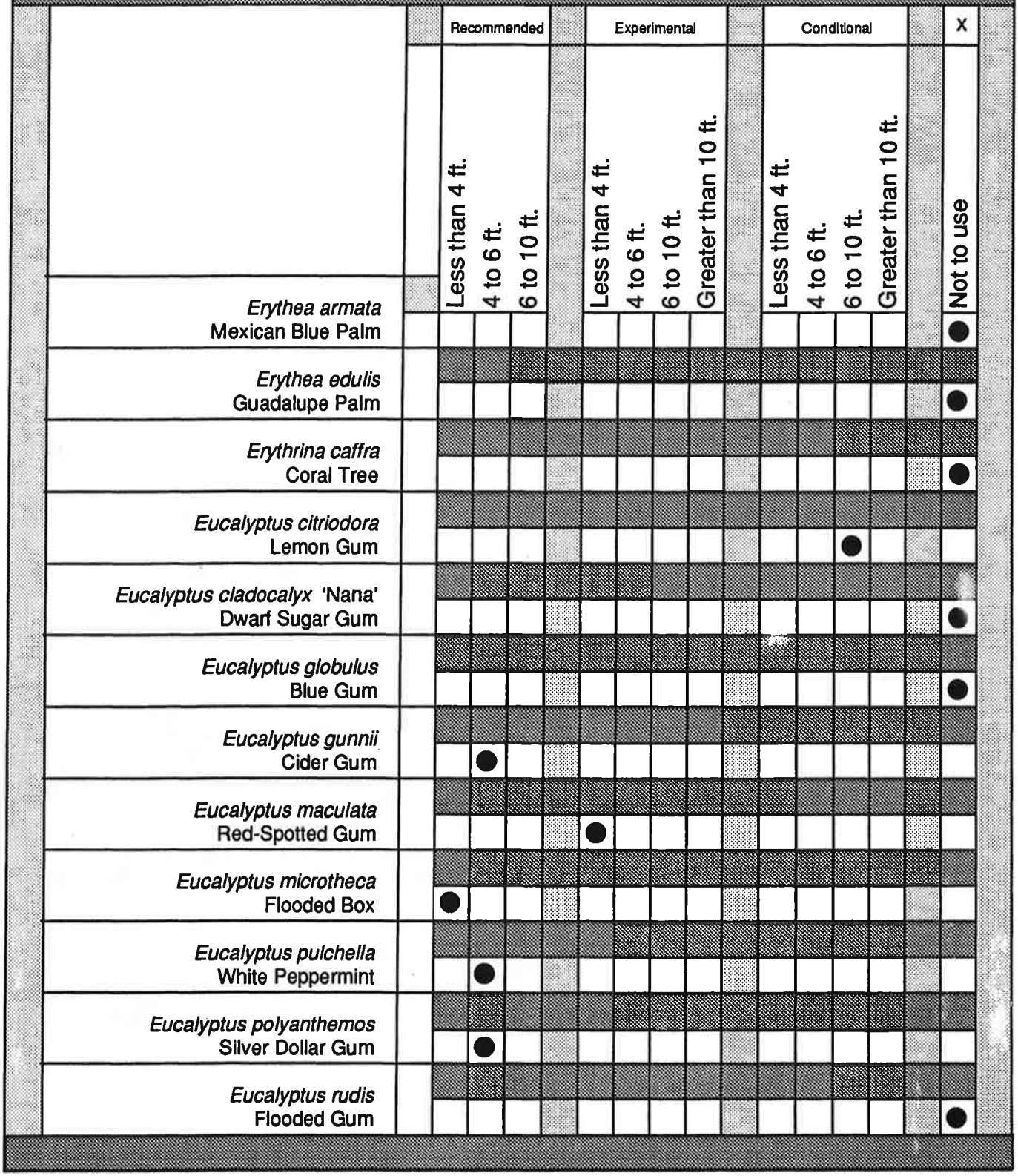
# STREET TREE INDEX



# STREET TREE INDEX



# STREET TREE INDEX



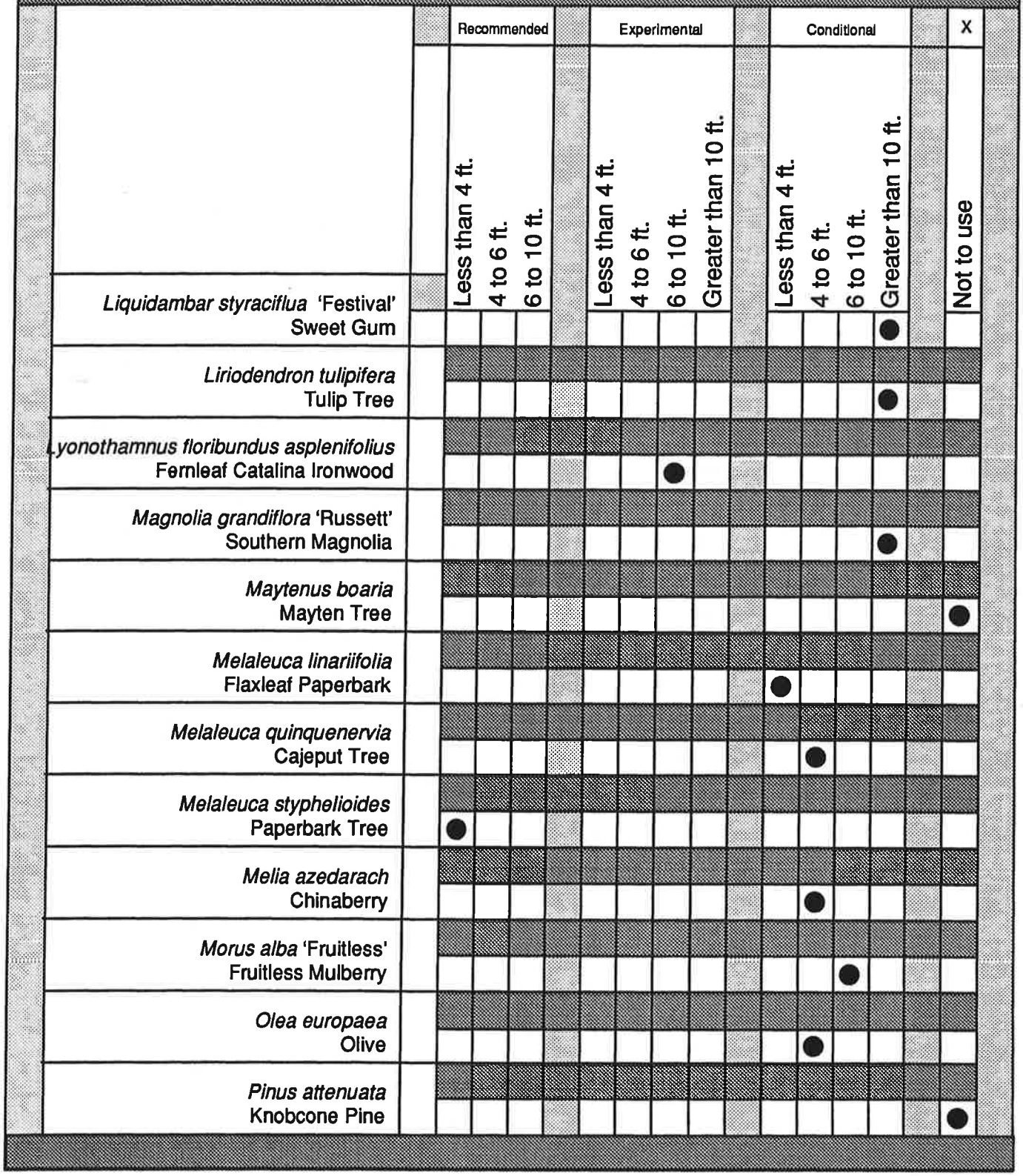
# STREET TREE INDEX

| | Recommended | | | Experimental | | | | Conditional | | | | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Not to use |
| *Eucalyptus sideroxylon* 'Rosea' Pink Ironbark | | | | | | | | | | | | ● |
| *Eucalyptus torquata* Coral Gum | | | | | | | | | | | | ● |
| *Eucalyptus viminalis* Manna Gum | | | | | | | | | | | ● | |
| *Ficus* species Fig | | | | | | | | | | | | ● |
| *Fraxinus dipetala* Foothill Ash | | | | | | | | | | | | ● |
| *Fraxinus holotricha* 'Moraine' Moraine Ash | | ● | | | | | | | | | | |
| *Fraxinus oxycarpa* 'Raywood' Raywood Ash | | ● | | | | | | | | | | |
| *Fraxinus uhdei* 'Tomlinson' Evergreen Ash | | | | | | | | | | | ● | |
| *Fraxinus uhdei* 'Majestic Beauty' Evergreen Ash | | | | | | | | | | | ● | |
| *Fraxinus velutina* 'Modesto' Modesto Ash | | | | | | | | | | | | ● |
| *Geijera parviflora* Australian Willow | | ● | | | | | | | | | | |
| *Ginkgo biloba* 'Autumn Gold' Maidenhair | | | | | | | | | ● | | | |

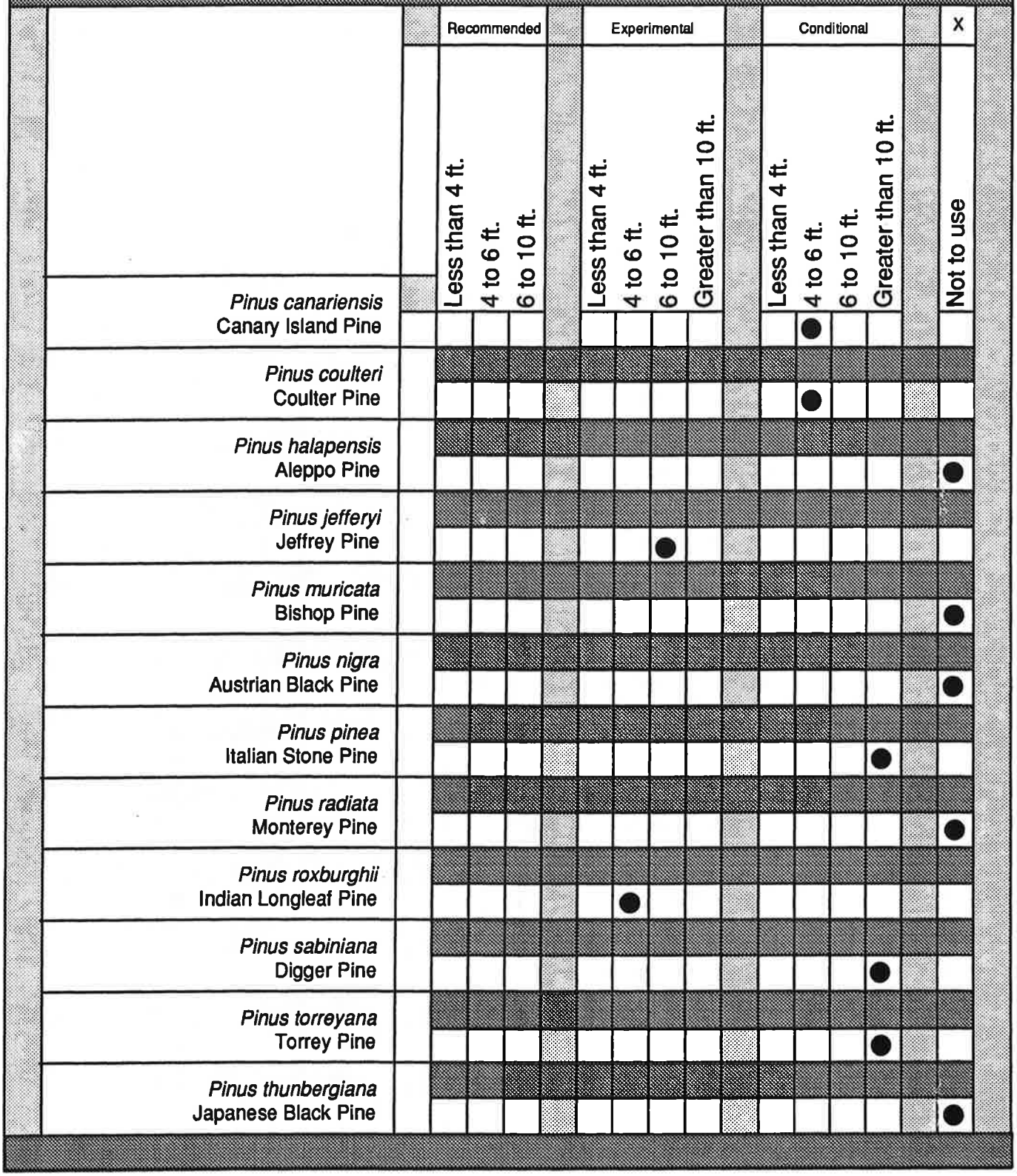
# STREET TREE INDEX

| | Recommended | | | Experimental | | | | Conditional | | | | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Not to use |
| *Ginkgo biloba* 'Fairmont' Maidenhair | | | | | | | | | ● | | | |
| *Grevillea robusta* Silk Oak | | | | | | | | | | | | ● |
| *Hymenosporum flavum* Sweet Shade | ● | | | | | | | | | | | |
| *Ilex altaclarensis* 'Wilsonii' Wilson Holly | | | | | | | | | | | | ● |
| *Jacaranda mimosifolia* Jacaranda | | | | | | | | | ● | | | |
| *Juglans californica* California Black Walnut | | | | | | | ● | | | | | |
| *Koelreuteria bipinnata* Chinese Flame Tree | | ● | | | | | | | | | | |
| *Koelreuteria paniculata* Goldenrain Tree | ● | | | | | | | | | | | |
| *Lagerstroemia* hybrids Crape Myrtle | | | | | | | | ● | | | | |
| *Ligustrum japonicum* Japanese Privet | | | | | | | | | | | | ● |
| *Ligustrum lucidum* Glossy Privet | | | | | | | | | | | | ● |
| *Liquidambar formosana* 'Afterglow' Chinese Sweetgum | | | | | | | | | | | | ● |

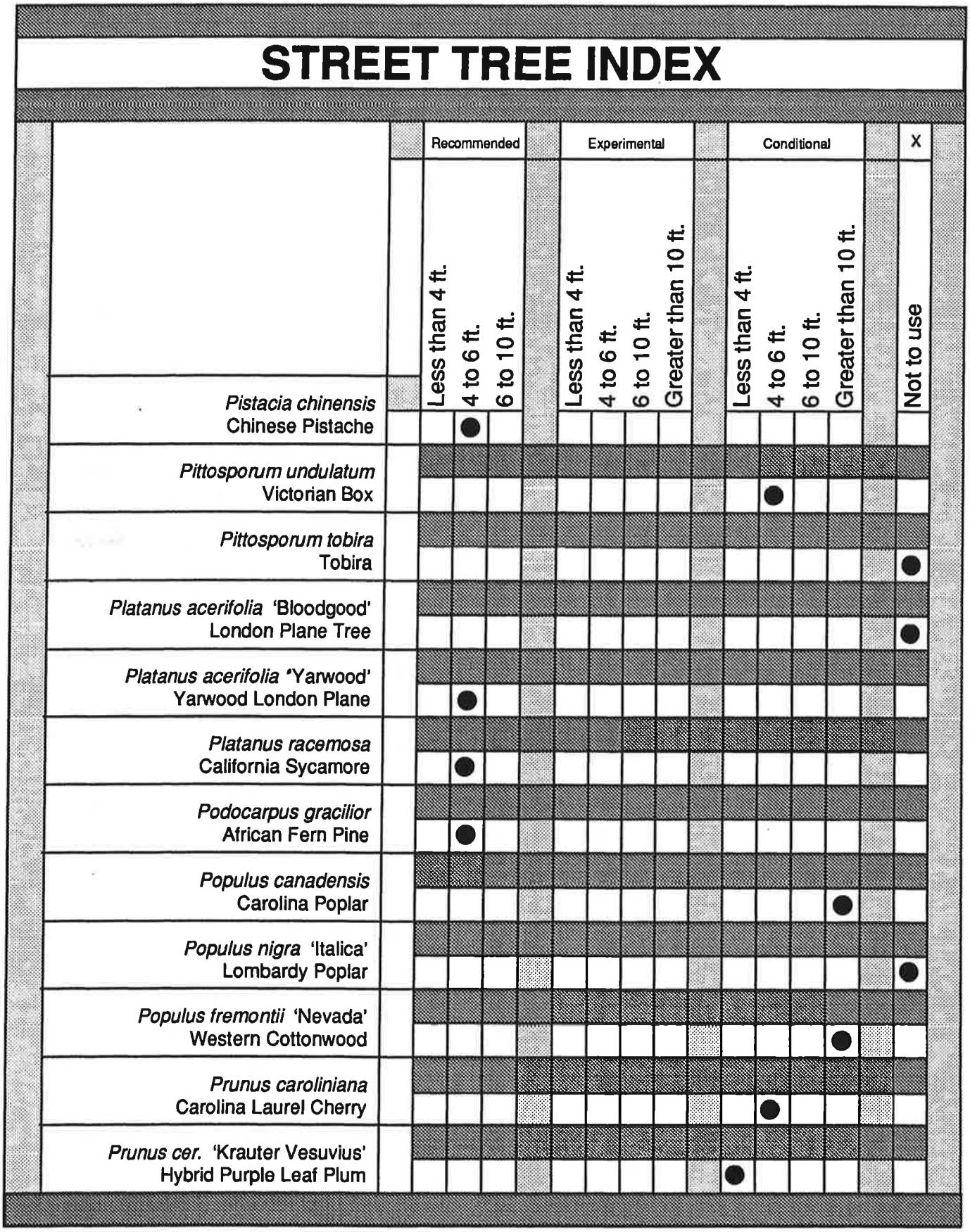
# STREET TREE INDEX



# STREET TREE INDEX



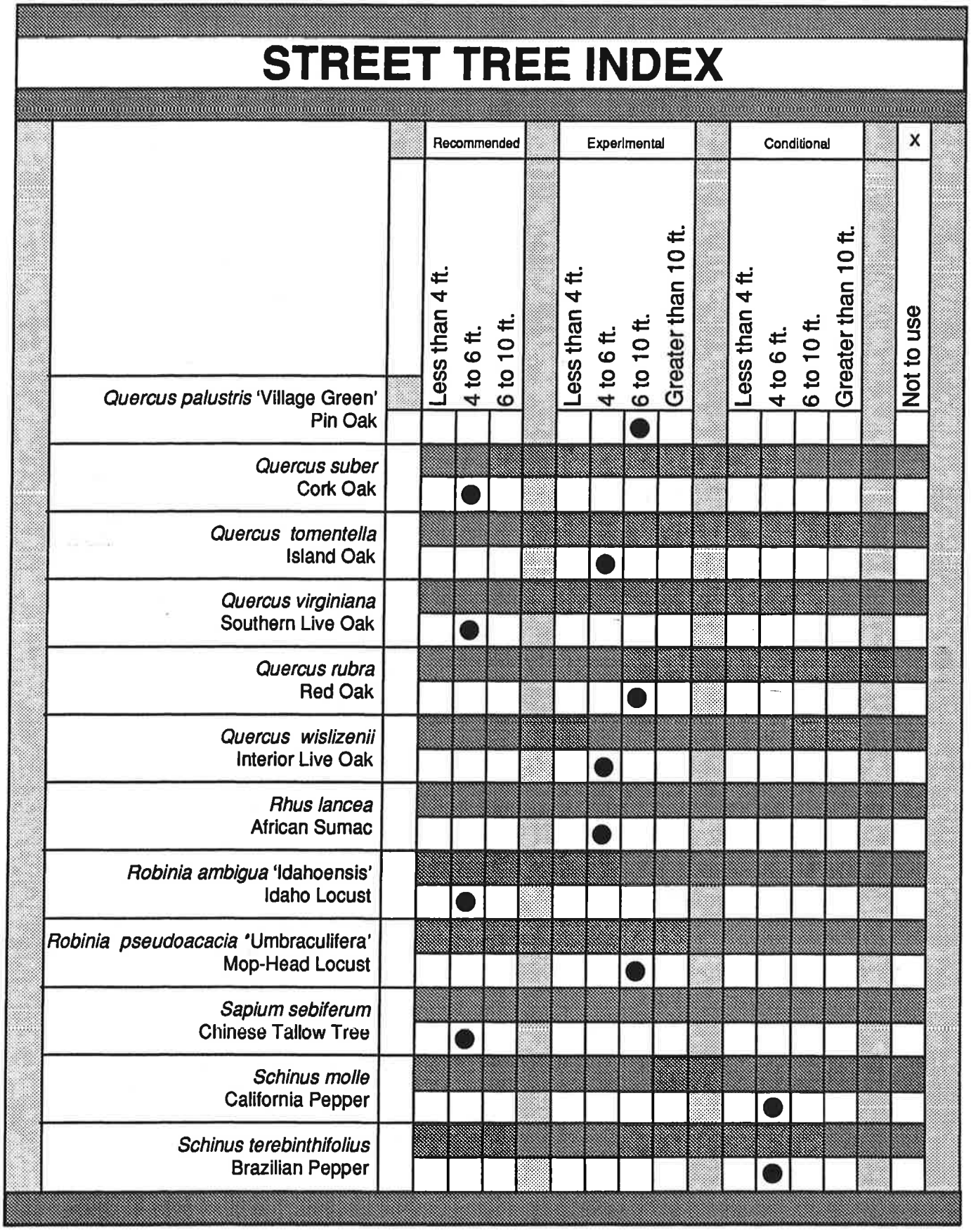
# STREET TREE INDEX



# STREET TREE INDEX

| | Recommended | | | Experimental | | | | Conditional | | | | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Not to use |
| *Pseudotsuga macrocarpa* Big Cone Spruce | | | | | | | | | | ● | | |
| *Pyrus calleryana* 'Aristocrat' Aristocrat Pear | | ● | | | | | | | | | | |
| *Pyrus calleryana* 'Bradford' Bradford Pear | | | | | | | | | ● | | | |
| *Pyrus calleryana* 'Redspire' Redspire Pear | | ● | | | | | | | | | | |
| *Pyrus kawakamii* Evergreen Pear | | | | | | | | | | | | ● |
| *Quercus agrifolia* Coast Live Oak | | ● | | | | | | | | | | |
| *Quercus chrysolepis* Canyon Oak | | | | | ● | | | | | | | |
| *Quercus douglasii* Blue Oak | | | | | ● | | | | | | | |
| *Quercus engelmannii* Mesa Oak | | | | | ● | | | | | | | |
| *Quercus ilex* Holly Oak | | | | | | | | | ● | | | |
| *Quercus kelloggii* California Black Oak | | | | | | | | | ● | | | |
| *Quercus lobata* Valley Oak | | | ● | | | | | | | | | |

# STREET TREE INDEX



# STREET TREE INDEX

| | Recommended | | | Experimental | | | | Conditional | | | | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Less than 4 ft. | 4 to 6 ft. | 6 to 10 ft. | Greater than 10 ft. | Not to use |
| *Sequoia sempervirens* Coast Redwood | | | | | | | | | | | | ● |
| *Sophora japonica* Japanese Pagoda Tree | | | | | ● | | | | | | | |
| *Tabebuia chrysotricha* Golden Trumpet Tree | | | | | | | | | ● | | | |
| *Tipuana tipu* Tipu Tree | | ● | | | | | | | | | | |
| *Torreya californica* California Nutmeg | | | | | ● | | | | | | | |
| *Tristania conferta* Brisbane Box | | | | | | | | ● | | | | |
| *Ulmus pumila* and *americana* Elms | | | | | | | | | | | | ● |
| *Ulmus americana* 'Centennial' American elm | | | | | | ● | | | | | | |
| *Ulmus parvifolia* 'Drake' or 'Brea' Chinese Elm | | | ● | | | | | | | | | |
| *Umbellularia californica* California Bay Laurel | | | | | | | | | | ● | | |
| *Washingtonia robusta* and *filifera* Fan Palms | | | | | | | | | | | | ● |
| *Zelkova serrata* Sawleaf Zelkova | | | ● | | | | | | | | | |

## 2.7.3 RECOMMENDED STREET TREES

The trees on the recommended list are either proven performers in the city or new species and cultivars of trees which are suited to the conditions found in the area. These new species replace some old favorites which have proven to have serious problems and therefore cannot be recommended. There may also be other tree types which are growing in the city but are not on the recommended list. These trees were eliminated because they were not good choices for the street's restrictive growing environment, or have insect or pest problems. Also, all the trees on the recommended list will do well if their environmental requirements are met, but they will not necessarily do well in every location.

**Recommended: less than 4 feet wide**

*Eucalyptus microtheca*
Flooded Box
*Hymenosporum flavum*
Sweet Shade
*Koelreuteria paniculata*
Goldenrain Tree
*Melaleuca styphelioides*
Paperbark Tree

**Recommended: 4-6 feet wide**

*Alnus cordata*
Italian Alder
*Celtis australis*
European Hackberry
*Celtis sinensis*
Chinese Hackberry
*Cupaniopsis anacardioides*
Carrotwood
*Eucalyptus gunnii*
Cider Gum
*Eucalyptus pulchella*
White Peppermint
*Eucalyptus polyanthemos*
Silver Dollar Gum
*Fraxinus holotricha* 'Moraine'
Moraine Ash
*Fraxinus oxycarpa* 'Raywood'
Raywood Ash
*Geijera parviflora*
Australian Willow
*Koelreuteria bipinnata*
Chinese Flame Tree
*Pistacia chinensis*
Chinese Pistache
*Platanus acerifolia* 'Yarwood'
Yarwood London Plane
*Platanus racemosa*
California Sycamore
*Podocarpus gracilior*
African Fern Pine
*Pyrus calleryana* 'Aristocrat'
Aristocrat Pear
*Pyrus calleryana* 'Redspire'
Redspire Pear
*Quercus agrifolia*
Coast Live Oak
*Quercus suber*
Cork Oak
*Quercus virginiana*
Southern Live Oak
*Robinia ambigua* 'Idahoensis'
Idaho Locust
*Sapium sebiferum*
Chinese Tallow Tree
*Tipuana tipu*
Tipu Tree

**Recommended: 6-10 feet wide**

*Celtis occidentalis*
Common Hackberry
*Quercus lobata*
Valley Oak
*Ulmus parvifolia* 'Drake' or 'Brea'
Chinese Elm
*Zelkova serrata*
Sawleaf Zelkova

# RECOMMENDED STREET TREES

**Planting areas less than 4 ft.**

Root Barriers Recommended

| | | TYPE | | | | HEIGHT | | | | SPREAD | | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Eucalyptus microtheca* Flooded Box | | ● | | | | | ● | | | ● | | | ● | | | | 25 |
| 2 | *Hymenosporum flavum* Sweet Shade | | ● | | | ● | | | | ● | | | | | | ● | | 20 |
| 3 | *Koelreuteria paniculata* Goldenrain Tree | ● | | | | | ● | | | | ● | | | | | | ● | 20 |
| 4 | *Melaleuca styphelioides* Paperbark Tree | | ● | | | | ● | | | ● | | | | | | ● | | 15 |
| 5 | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |

# RECOMMENDED STREET TREES

| | LIFESPAN | | | FORM | | | | | PREFERENCES | | | | | | TOLERANCES | | | | | | IMPACT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 30 years | 30 to 60 years | Over 60 years | Rounded | Oval | Columnar | Pyramidal | Vase | Good under utilities | Good for medians | Good for irrigated beds | Prefers monthly watering | Native to California | Requires good drainage | Little or no water | Frost (below 25 degrees) | Wind | Alkaline soil | **NOT** for alkaline | Produces debris | ISA class | Dominant tree | Accent tree | |
| | | ● | | ● | | | | | ● | ● | | | | | ● | ● | ● | ● | | | 2 | ● | | 1 |
| | | ● | | ● | | | | | ● | | ● | ● | | ● | | | | | ● | ● | 3 | | ● | 2 |
| | | ● | | ● | | | | | ● | ● | ● | ● | | | ● | ● | ● | ● | | ● | 1 | | ● | 3 |
| | | ● | | | ● | | | | | | ● | ● | | | ● | ● | ● | ● | | | 2 | | ● | 4 |
| | | | | | | | | | | | | | | | | | | | | | | | | 5 |
| | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| | | | | | | | | | | | | | | | | | | | | | | | | 12 |

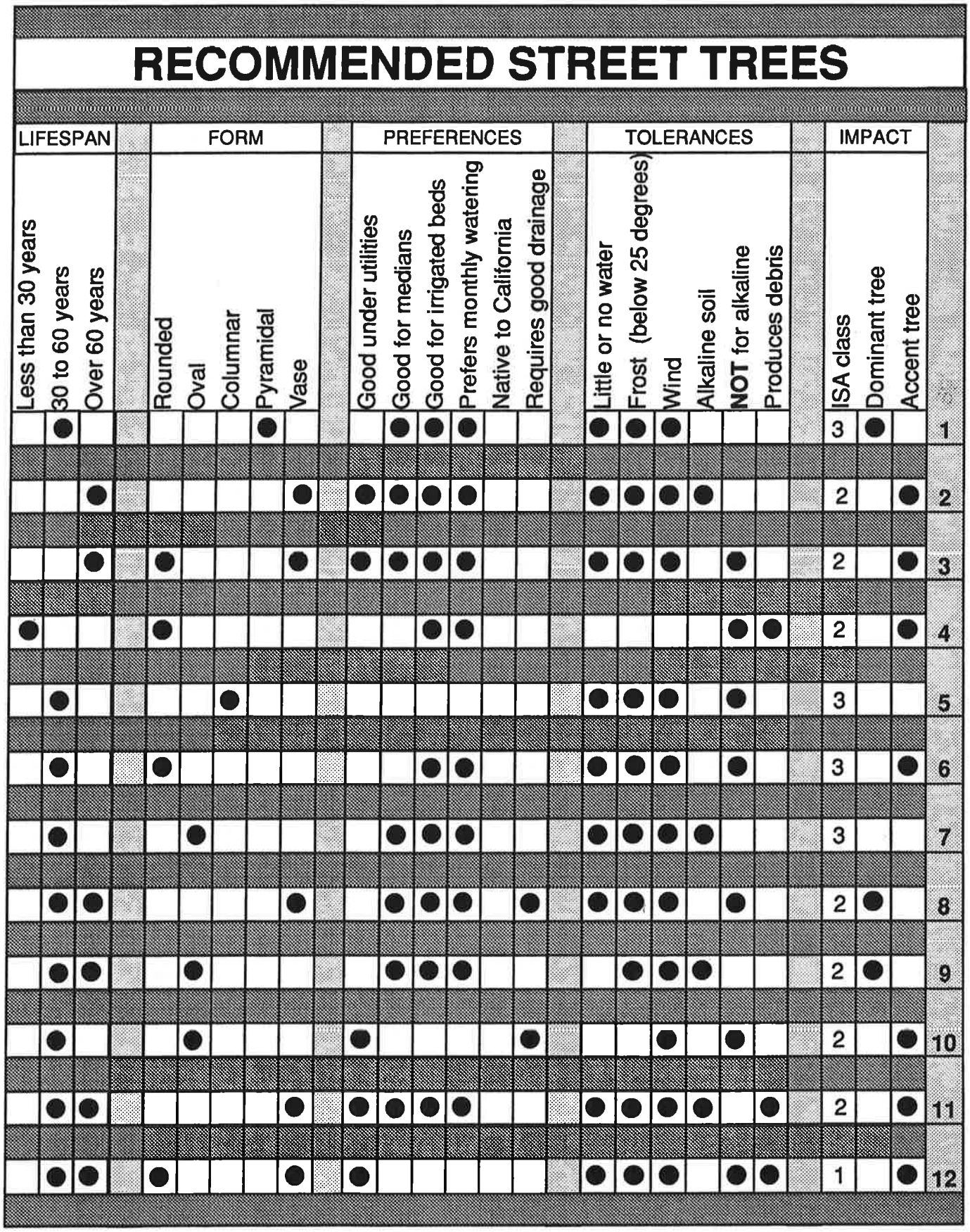
# RECOMMENDED STREET TREES

**Planting areas 4 to6 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Alnus cordata* Italian Alder | ● | | | | | ● | | ● | | | ● | | | 25 |
| 2 | *Celtis australis* European Hackberry | ● | | | | ● | | | ● | | | | ● | | 30 |
| 3 | *Celtis sinensis* Chinese Hackberry | ● | | | | ● | | | ● | | | | ● | | 25 |
| 4 | *Cupaniopsis anacardioides* Carrotwood | | ● | | | ● | | | ● | | | | ● | | 30 |
| 5 | *Eucalyptus gunnii* Cider Gum | | ● | | | | ● | ● | | | ● | | | | 30 |
| 6 | *Eucalyptus pulchella* White Peppermint | | ● | | | ● | | | ● | | ● | ● | | | 30 |
| 7 | *Eucalyptus polyanthemos* Silver Dollar Gum | | ● | | | | ● | | ● | | ● | ● | | | 30 |
| 8 | *Fraxinus holotricha* 'Moraine' Moraine Ash | ● | | | | ● | | | ● | | | | ● | | 30 |
| 9 | *Fraxinus oxycarpa* 'Raywood' Raywood Ash | ● | | | | | ● | | ● | | | ● | | | 30 |
| 10 | *Geijera parviflora* Australian Willow | | ● | | | ● | | | ● | | | | | ● | 20 |
| 11 | *Koelreuteria bipinnata* Chinese Flame Tree | ● | | | | ● | | | | ● | | | ● | | 20 |
| 12 | *Pistacia chinensis* Chinese Pistache | ● | | | | ● | | | ● | | | | ● | | 20 |

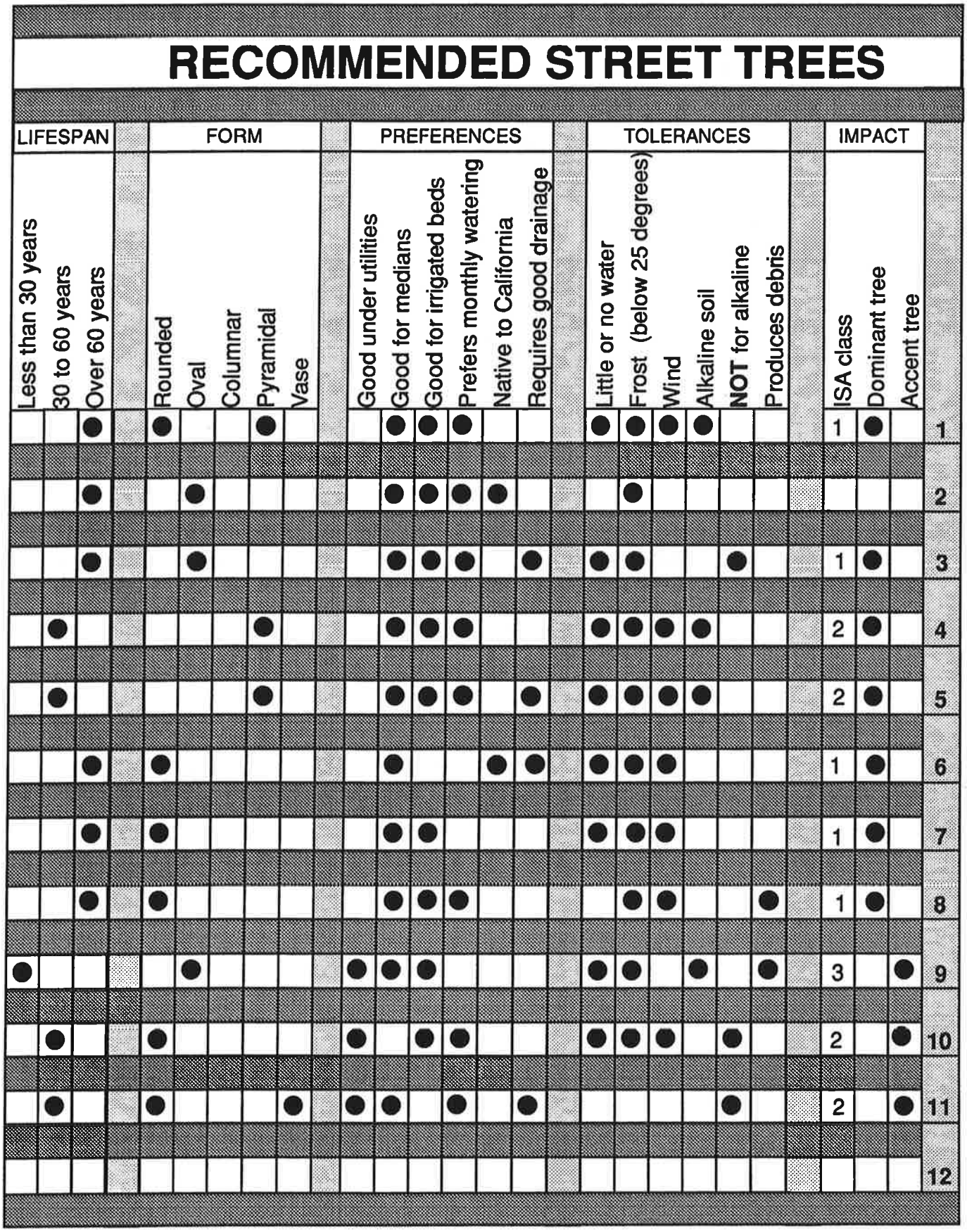
# RECOMMENDED STREET TREES



# RECOMMENDED STREET TREES

| | Planting Areas 4 to 6 ft. | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| |  Root Barriers Recommended | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Platanus acerifolia* 'Yarwood' Yarwood London Plane | ● | | | | | ● | | ● | | | ● | | | 30 |
| 2 | *Platanus racemosa* California Sycamore | ● | | | | | ● | | | ● | | ● | | | |
| 3 | *Podocarpus gracilior* African Fern Pine | | ● | | | | ● | | | ● | | | ● | | 30 |
| 4 | *Pyrus calleryana* 'Aristocrat' Aristocrat Pear | ● | | | | ● | | | ● | | | | ● | | 25 |
| 5 | *Pyrus calleryana* 'Redspire' Redspire Pear | ● | | | | ● | | | ● | | | | ● | | 25 |
| 6 | *Quercus agrifolia* Coast Live Oak | | ● | | | | ● | | | ● | | | ● | | 30 |
| 7 | *Quercus suber* Cork Oak | | ● | | | | ● | | | ● | | | ● | | 30 |
| 8 | *Quercus virginiana* Southern Live Oak | | ● | | | ● | | | | ● | | | | ● | 25 |
| 9 | *Robinia ambigua* 'Idahoensis' Idaho Locust | ● | | | | ● | | | ● | | ● | | | | 20 |
| 10 | *Sapium sebiferum* Chinese Tallow Tree | ● | | | | ● | | | ● | | | | ● | | 20 |
| 11 | *Tipuana tipu* Tipu Tree | ● | | | | ● | | | | ● | | | ● | | 30 |
| 12 | | | | | | | | | | | | | | | |

# RECOMMENDED STREET TREES

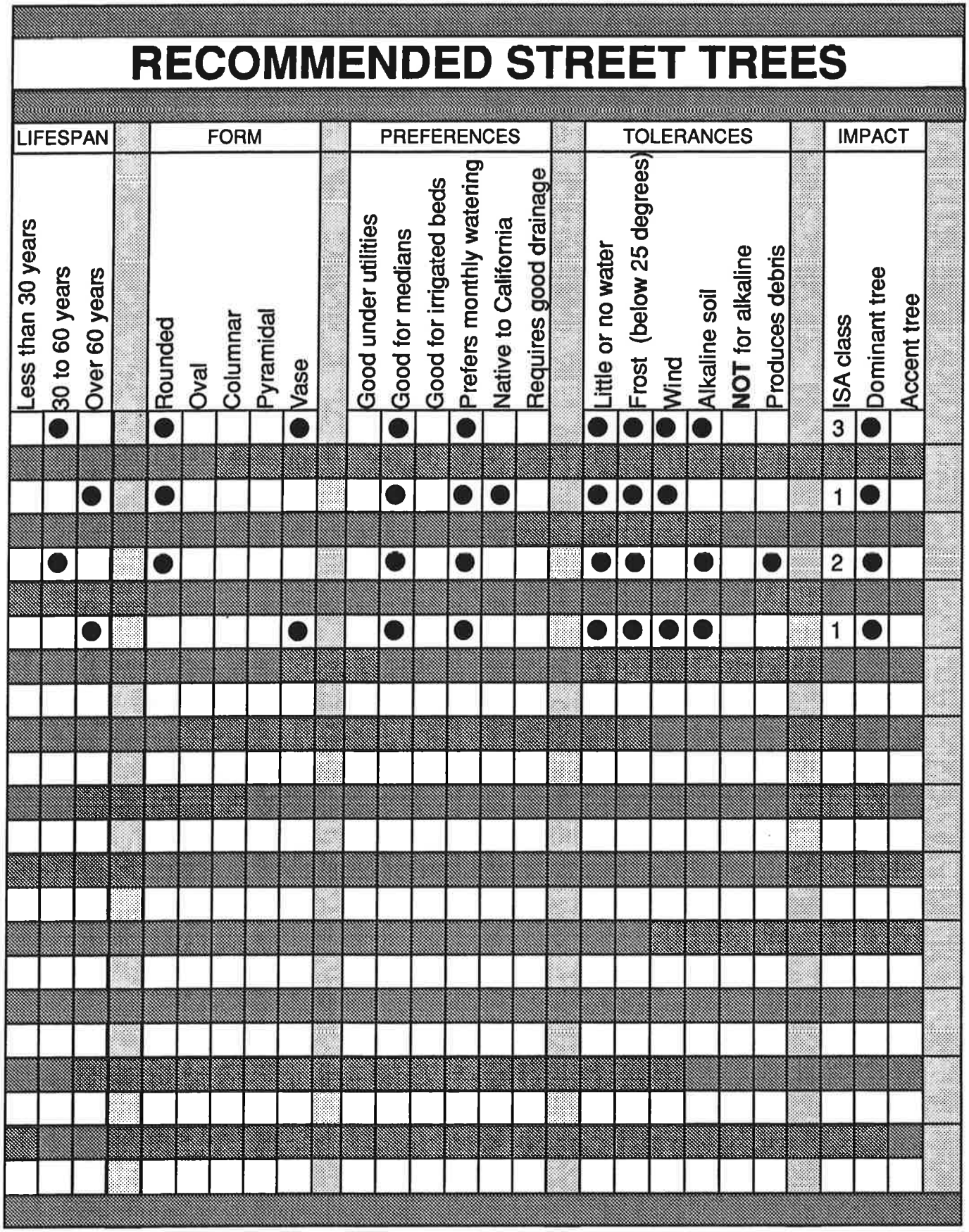


# RECOMMENDED STREET TREES

**Planting Area 6-10 ft.**

Root Barriers Recommended

| | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| *Celtis occidentalis* Common Hackberry | ● | | | | | ● | | | ● | ● | | | | |
| *Quercus lobata* Valley Oak | ● | | | | | ● | | | ● | | | ● | | |
| *Ulmus parvifolia* 'Drake' or 'Brea' Chinese Elm | ● | | | | ● | | | | ● | | ● | | | |
| *Zelkova serrata* Sawleaf Zelkova | ● | | | | | ● | | | ● | | ● | | | |


RECOMMENDED STREET TREES
LIFESPAN
Less than 30 years
30 to 60 years
Over 60 years
FORM
Rounded
Oval
Columnar
Pyramidal
Vase
PREFERENCES
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
TOLERANCES
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
IMPACT
ISA class
Dominant tree
Accent tree
3
1
2
1

## 2.7.4 EXPERIMENTAL TREES

Experimental trees are those which meet all the same environmental, functional and design requirements of the trees on the recommended list but which have not been planted in large enough numbers or for a long enough period of time in Thousand Oaks to be able to judge their longterm performance. These species should be planted in smaller quantities at first and monitored for more widespread use. At least 5% of all trees planted annually are to come from these lists.

**Experimental: less than 4 feet**
*Acer campestre*
Hedge Maple
*Carpinus betulus* 'Fastigiata'
Upright European Hornbeam
*Eucalyptus maculata*
Red-Spotted Gum

**Experimental: 4-6 feet wide**
*Acer rubrum* 'Armstrong'
Armstrong Red Maple
*Acer rubrum* 'October Glory'
October Glory Red Maple
*Brachychiton populneus*
Bottle Tree
*Catalpa x. chilopsis*
Hybrid Catalpa
*Cercidium floridum*
Blue Palo Verde
*Cinnamomum glanduliferum*
Himalayan Camphor
*Pinus roxburghii*
Indian Longleaf Pine
*Quercus chrysolepis*
Canyon Oak
*Quercus douglasii*
Blue Oak
*Quercus engelmannii*
Mesa Oak
*Quercus kelloggii*
California Black Oak
*Quercus tomentella*
Island Oak
*Quercus wislizenii*
Interior Live Oak
*Rhus lancea*
African Sumac
*Sophora japonica*
Japanese Pagoda Tree
*Torreya californica*
California Nutmeg

**Experimental: 6-10 feet wide**
*Calocedrus decurrens*
Incense Cedar
*Lyonothamnus floribundus asplenifolius*
Fernleaf Catalina Ironwood
*Pinus jefferyi*
Jeffrey Pine
*Pseudotsuga macrocarpa*
Big Cone Spruce
*Quercus palustris* 'Village Green'
Pin Oak
*Quercus rubra*
Red Oak
*Robinia pseudoacacia* 'Umbraculifera'
Mop-Head Locust
*Ulmus americana* 'Centennial'
American Elm

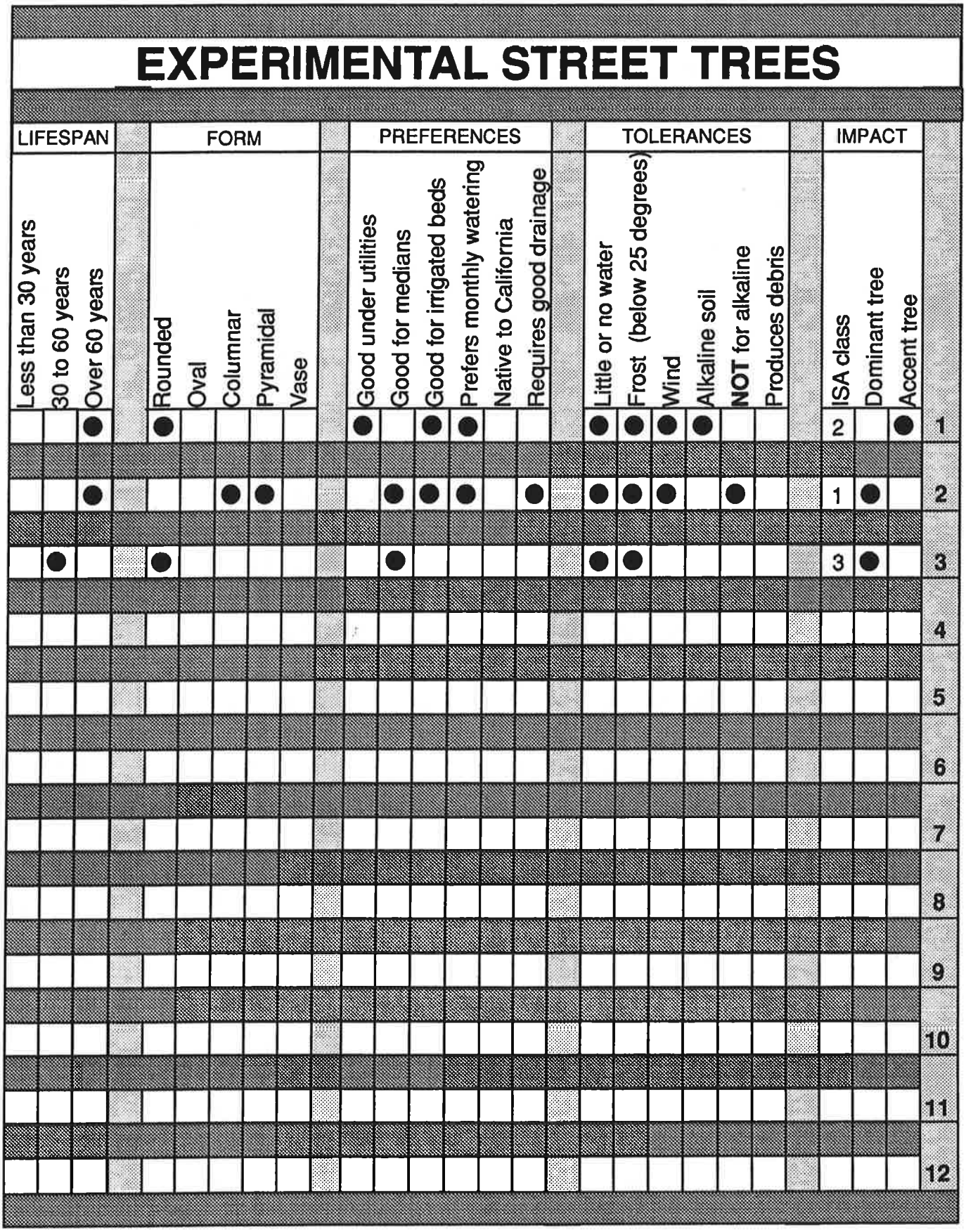
**Experimental: 10 feet or wider**
*Acer macrophyllum*
Bigleaf Maple
*Juglans californica*
California Black Walnut

# EXPERIMENTAL STREET TREES

**Planting areas less than 4 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Acer campestre* Hedge Maple | ● | | | ● | | | ● | | | | | | ● | 15 |
| 2 | *Carpinus betulus* 'Fastigiata' Upright European Hornbeam | ● | | | | ● | | ● | | | | | | ● | 15 |
| 3 | *Eucalyptus maculata* Red-Spotted Gum | | ● | | | | ● | | ● | | ● | | | | 30 |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

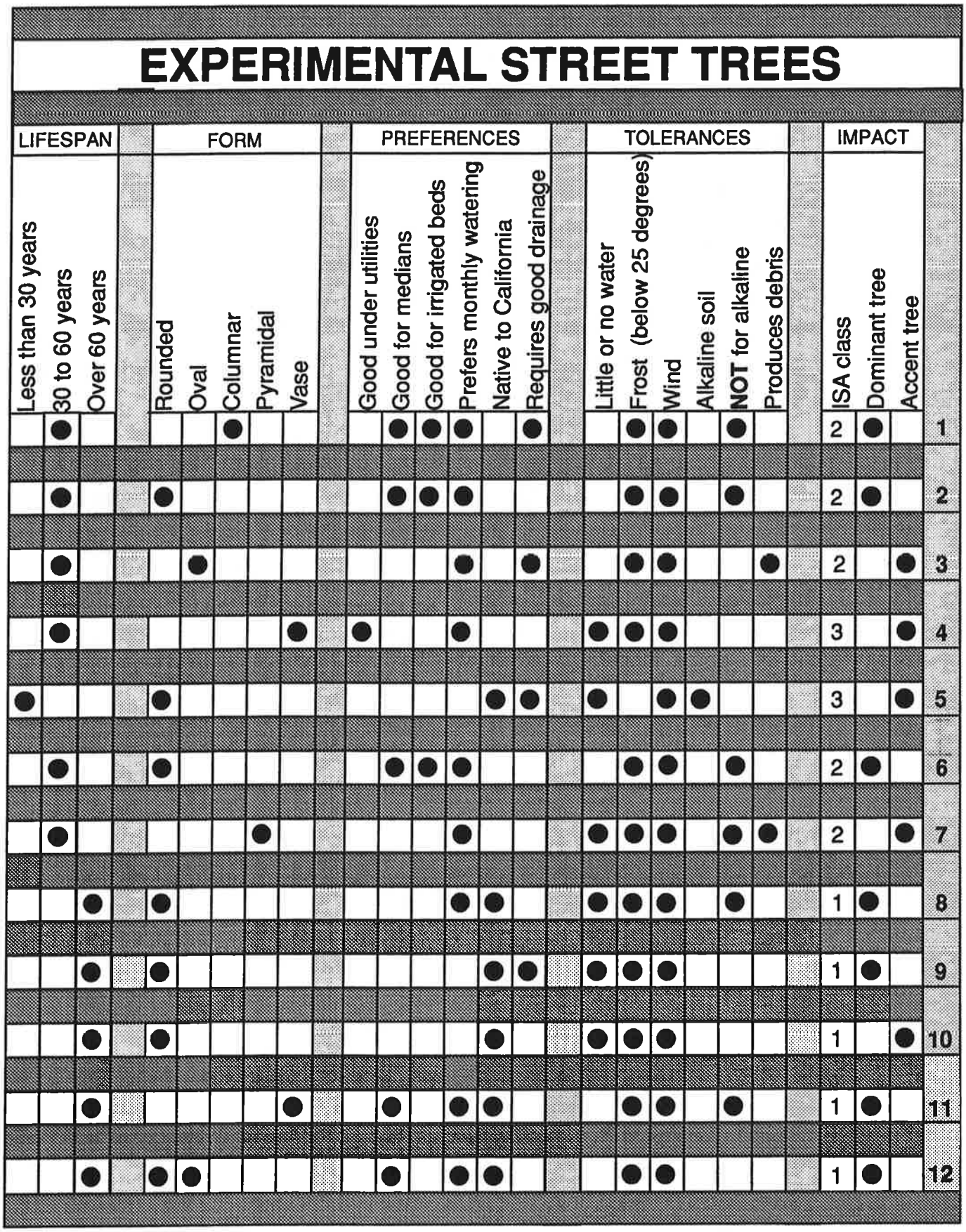

EXPERIMENTAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1 2 1
2 1 2
3 3 3
4
5
6
7
8
9
10
11
12

# EXPERIMENTAL STREET TREES

**Planting areas 4 to 6 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Acer rubrum* 'Armstrong' Armstrong Red Maple | ● | | | | | ● | | ● | | | ● | | | 15 |
| 2 | *Acer rubrum* 'October Glory' October Glory Red Maple | ● | | | | | ● | | ● | | | ● | | | 25 |
| 3 | *Brachychiton populneus* Bottle Tree | | ● | | | ● | | | ● | | | | ● | | 30 |
| 4 | *Catalpa x. chilopsis* Hybrid Catalpa | ● | | | ● | | | ● | | | | ● | | | 15 |
| 5 | *Cercidium floridum* Blue Palo Verde | ● | | | ● | | | ● | | | | ● | | | 15 |
| 6 | *Cinnamomum glanduliferum* Himalayan Camphor | | ● | | | ● | | | ● | | | | ● | | 20 |
| 7 | *Pinus roxburghii* Indian Longleaf Pine | | | ● | | | ● | ● | | | | ● | | | 15 |
| 8 | *Quercus chrysolepis* Canyon Oak | | ● | | | | ● | | | ● | | | | ● | 25 |
| 9 | *Quercus douglasii* Blue Oak | ● | | | | ● | | | ● | | | | | ● | 25 |
| 10 | *Quercus engelmannii* Mesa Oak | ● | | | | ● | | | ● | | | | | ● | 25 |
| 11 | *Quercus kelloggii* California Black Oak | ● | | | | | ● | | | ● | | | | ● | 25 |
| 12 | *Quercus tomentella* Island Oak | | ● | | | | ● | | | ● | | | ● | | 25 |

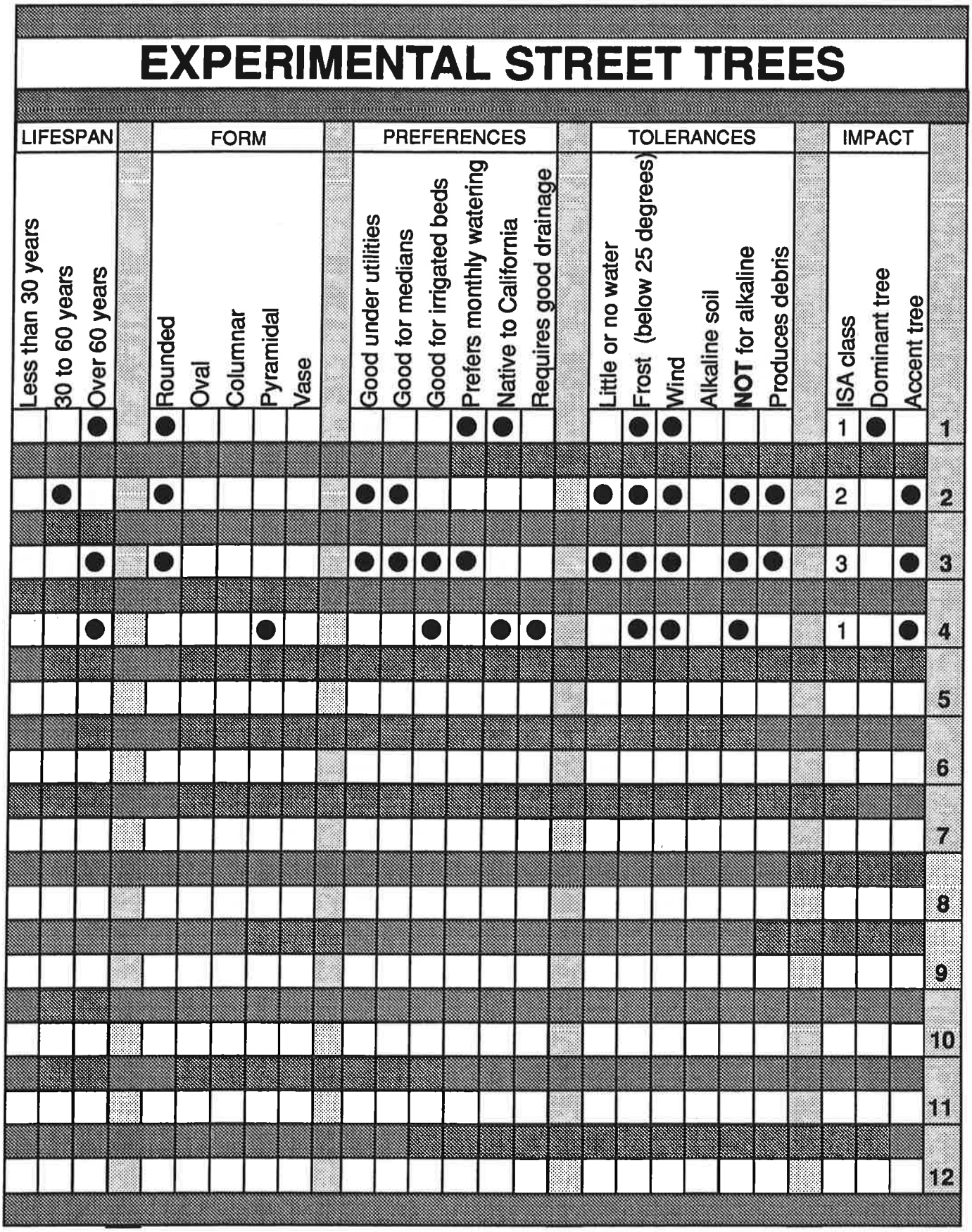

EXPERIMENTAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1
2
3
4
5
6
7
8
9
10
11
12

# EXPERIMENTAL STREET TREES

**Planting areas 4 to 6 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Quercus wislizenii* Interior Live Oak | | ● | | | | ● | | | ● | | | ● | | 25 |
| 2 | *Rhus lancea* African Sumac | | ● | | ● | | | | ● | | | ● | | | 15 |
| 3 | *Sophora japonica* Japanese Pagoda Tree | ● | | | | ● | | | ● | | | | ● | | 15 |
| 4 | *Torreya californica* California Nutmeg | | ● | | | ● | | ● | | | | | | ● | 25 |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

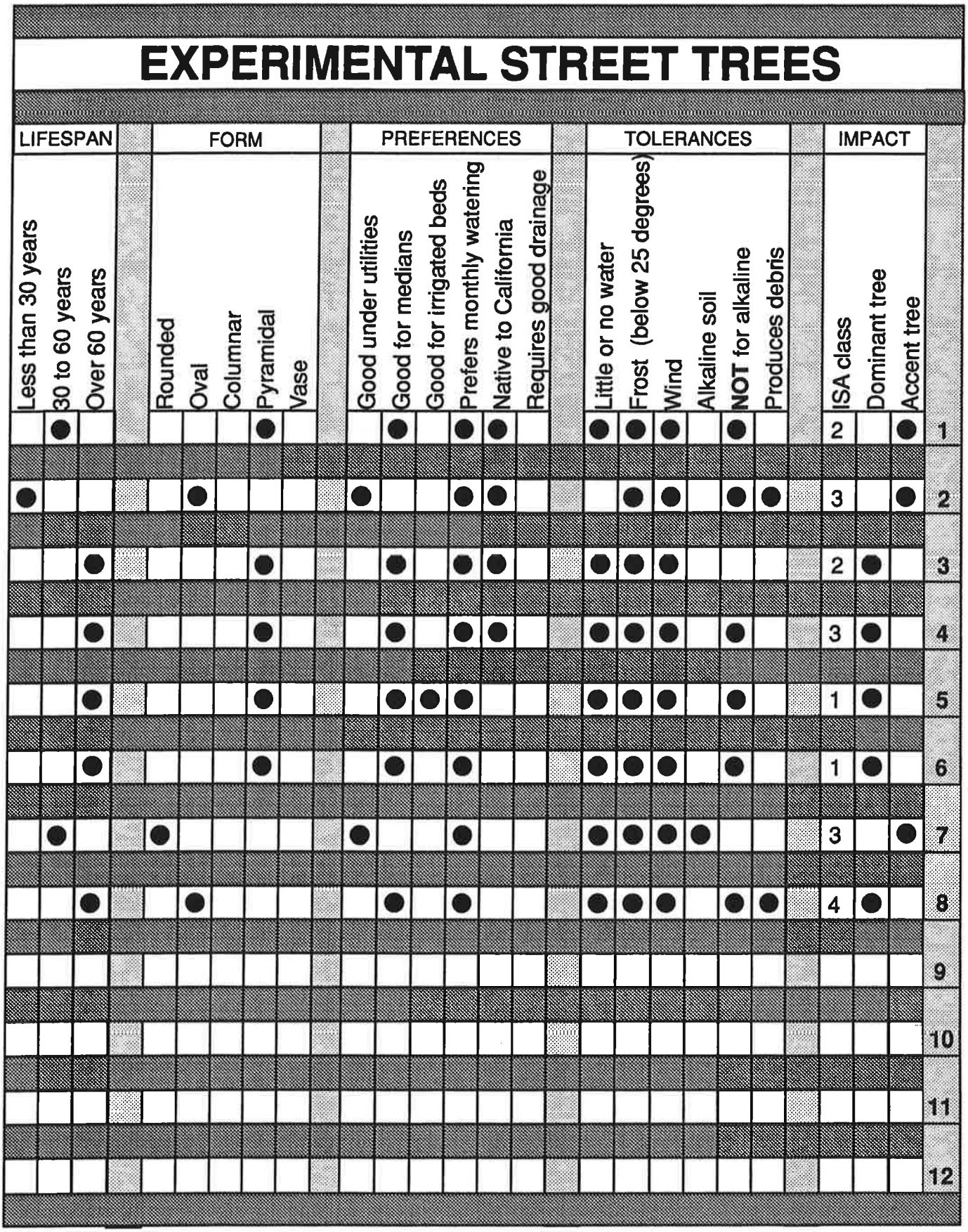

EXPERIMENTAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1
2
3
4
5
6
7
8
9
10
11
12

# EXPERIMENTAL STREET TREES

**Planting areas 6 to 10 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Calocedrus decurrens* Incense Cedar | | | ● | | | ● | | ● | | | | | ● | 30 |
| 2 | *Lyonothamnus floribundus asplenifolius* Fernleaf Catalina Ironwood | | ● | | | ● | | | ● | | | | ● | | 25 |
| 3 | *Pinus jefferyi* Jeffrey Pine | | | ● | | | ● | | ● | | | | ● | | 25 |
| 4 | *Pseudotsuga macrocarpa* Big Cone Spruce | | | ● | | | ● | | ● | | | | | ● | 30 |
| 5 | *Quercus palustris* 'Village Green' Pin Oak | ● | | | | | ● | | | ● | | | ● | | 35 |
| 6 | *Quercus rubra* Red Oak | ● | | | | | ● | | | ● | | | ● | | 25 |
| 7 | *Robinia pseudoacacia* 'Umbraculifera' Mop-Head Locust | ● | | | ● | | | ● | | | | ● | | | 25 |
| 8 | *Ulmus americana* 'Centennial' American elm | ● | | | | | ● | | | ● | ● | | | | 40 |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

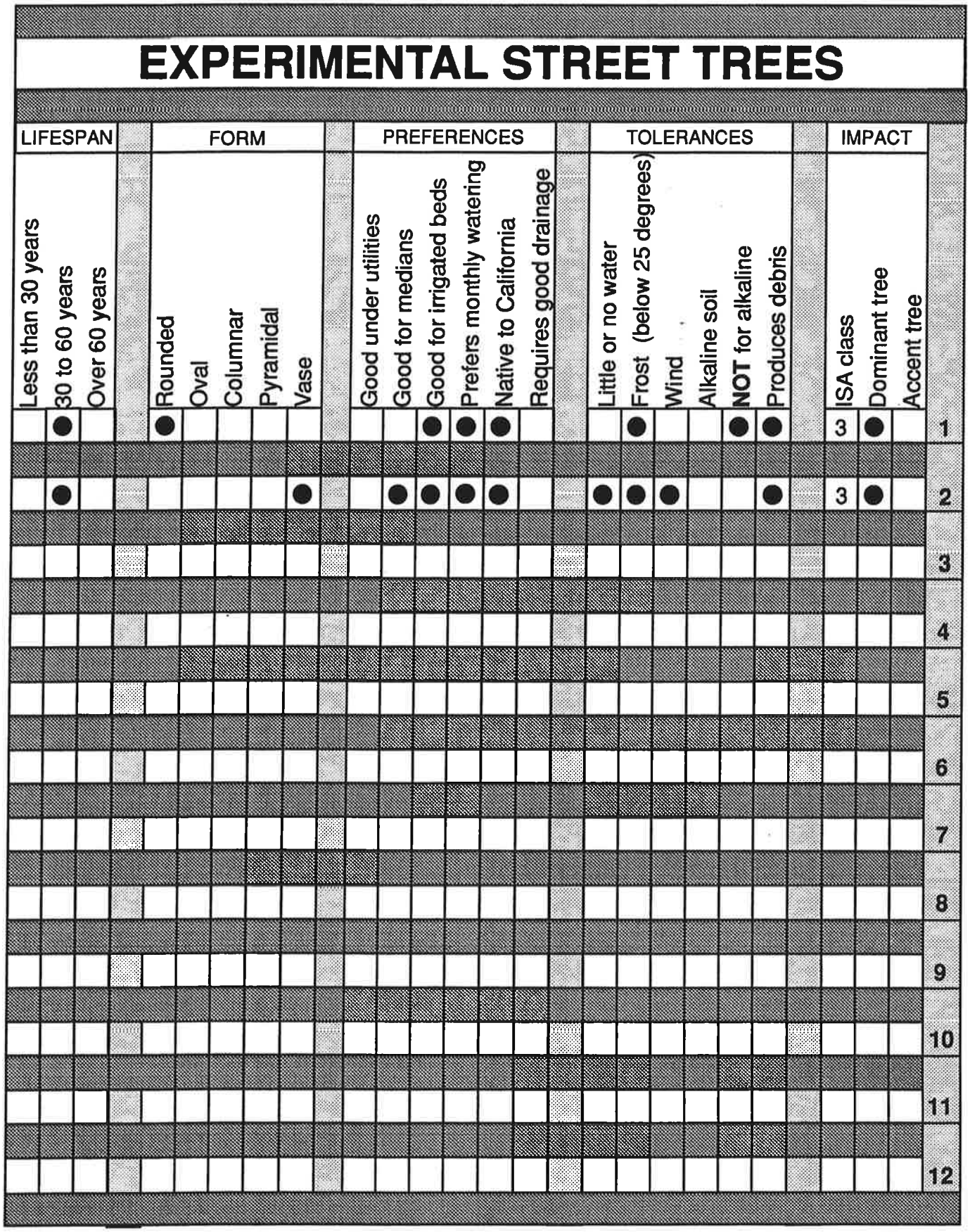

EXPERIMENTAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1 2 3 4 5 6 7 8 9 10 11 12

# EXPERIMENTAL STREET TREES

**Planting areas 10 ft. or more**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Acer macrophyllum* Bigleaf Maple | ● | | | | | ● | | ● | | ● | | | | 30 |
| 2 | *Juglans californica* California Black Walnut | ● | | | | | ● | | | ● | | ● | | | 30 |
| 3 | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |


EXPERIMENTAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1
2
3
4
5
6
7
8
9
10
11
12

## 2.7.5 CONDITIONAL STREET TREES

Conditional trees are those with specific limitations in their use as street trees. These limitations are listedbelow. Conditional trees may only be used with the written approval of the community forester.

**Conditional: less than 4 feet wide**
*Lagerstroemia* hybrids
Crape Myrtle
*Melaleuca linariifolia*
Flaxleaf Paperbark
*Prunus cer.* 'Krauter Vesuvius'
Hybrid Purple Leaf Plum
*Tristania conferta*
Brisbane Box

**Conditional: 4-6 feet wide**
*Alnus rhombifolia*
White Alder
*Bauhinia purpurea (variegata)*
Purple Orchid Tree
*Betula nigra* 'Heritage'
*River Birch*
*Chorisia speciosa*
Floss silk tree
*Eriobotrya deflexa*
Bronze Loquat
*Ginkgo biloba* 'Autumn Gold'
Maidenhair
*Ginkgo biloba* 'Fairmont'
Maidenhair
*Jacaranda mimosifolia*
Jacaranda
*Melaleuca quinquenervia*
Cajeput Tree
*Melia azedarach*
Chinaberry
*Olea europaea*
Olive
*Pinus canariensis*
Canary Island Pine
*Pinus coulteri*
Coulter Pine
*Pittosporum undulatum*
Victorian Box
*Prunus caroliniana*
Carolina Laurel Cherry
*Pyrus calleryana* 'Bradford'
Bradford Pear
*Quercus ilex*
Holly Oak
*Schinus molle*
California Pepper
*Schinus terebinthifolius*
Brazilian Pepper
*Tabebuia chrysotricha*
Golden Trumpet Tree

**Conditional: 6-10 feet wide**
*Cedrus atlantica*
Atlas Cedar
*Cedrus deodara*
Deodar Cedar
*Cercis occidentalis*
Western redbud
*Cinnamomum camphora*
Camphor Tree
*Eucalyptus citriodora*
Lemon Gum
*Umbellularia californica*
California Bay Laurel

**Conditional: 10' feet and wider**
*Ceratonia siliqua*
Carob
*Eucalyptus viminalis*
Manna Gum
*Fraxinus uhdei* 'Tomlinson'
Evergreen Ash
*Fraxinus uhdei* 'Majestic Beauty'
Evergreen Ash
*Liquidambar styraciflua* 'Festival'
Sweet Gum
*Liriodendron tulipifera*
Tulip Tree
*Magnolia grandiflora* 'Russett'
Southern Magnolia
*Morus alba* 'Fruitless'
Fruitless Mulberry
*Pinus pinea*
Italian Stone Pine
*Pinus sabiniana*
Digger Pine
*Pinus torreyana*
Torrey Pine
*Populus candicans*
Carolina Poplar
*Populus fremontii* 'Nevada'
Western Cottonwood

The following gives reasons for each tree on the conditional list, broken down by recommended planting size.

**Under 4 ft. planting area:**

*Lagerstroemia* hybrids (Crape Myrtle)
Reason: Small tree with no useful canopy coverage; use sparingly, as accents only.

*Melaleuca linariifolia* (Flaxleaf Paperbark)
Reason: Too small to use as street tree; special design only.

*Prunus cerasifera* "Krauter Vesuvius'
(Hybrid Purple Leaf Plum)
Reason: Use only in well-drained soils; use as an accent tree only due to small size.

*Tristania conferta* (Brisbane Box)
Reason: Excellent street tree as substitute for eucalyptus; frost-tender at 26 degrees when young.

**4 to 6 ft. planting area:**

*Alnus rhombifolia* (White Alder)
Reason: Overplanted; needs lots of water. Use only as accents, in clusters.

*Betula nigra* 'Heritage' (River Birch)
Reason: Needs water. Use sparingly, in clusters.

*Bauhinia purpurea (variegata)* (Purple Orchid Tree)
Reason: Small tree which drops seedpods; frost-tender at 22 degrees F; use sparingly as accent tree only.

*Chorisia speciosa* (Floss silk tree)
Reason: Frost-tender at 25 degrees F. Use hybrid without spines. Use as accent tree only.

*Eriobotrya deflexa* (Bronze Loquat)
Reason: Too small to use as street tree; special design areas only.

*Ginkgo biloba* 'Autumn Gold' (Maidenhair) and *Ginkgo biloba* 'Fairmont' (Maidenhair)
Reason: Slow growing. Excellent tree when mature; plant from 24" box or larger size.

*Jacaranda mimosifolia* (Jacaranda)
Reason: Frost-tender below 25 degrees F when young; use as accent tree only

*Melaleuca quinquenervia* (Cajeput Tree)
Reason: Frost-tender at 25 degrees F. Small tree; plant as accents only, in clusters.

*Melia azedarach* (Chinaberry)
Reason: Small tree; good for heavy alkaline soils.

*Olea europaea* (Olive)
Reason: Hard to find fruitless varieties; use as accent tree only due to small size

*Pinus canariensis* (Canary Island Pine)
Reason: Excellent tree which has been overplanted; use in clusters as accent in medians and intersections only until inventory verifies that number planted is below 10% of total forest cover; do not use in foothills.

*Pinus coulteri* (Coulter Pine)
Reason: Huge cones can be dangerous around play areas, patios, and parked cars

*Pittosporum undulatum* (Victorian Box)
Reason: Frost-tender at 25 degrees F. Needs water, drops messy fruit. Use sparingly.

*Prunus caroliniana* (Carolina Laurel Cherry)
Reason: Small tree; formal growth habit. Needs water. Use sparingly.

*Pyrus calleryana* 'Bradford' (Bradford Pear)
Reason: Weak branch structure; use recommended cultivars if possible.

*Quercus ilex* (Holly Oak)
Reason: Small, unattractive tree; dull, grey-green foliage. Currently overplanted.

*Schinus molle* (California Pepper)
Reason: Pest problem; use sparingly until problem is corrected.

*Schinus terebinthifolius* (Brazilian Pepper)
Reason: Small, bushy tree.

*Tabebuia chrysotricha* (Golden Trumpet Tree)
Reason: Small tree which is frost tender below 25degrees F; use as accent tree only.

**6 to 10 ft. planting area:**
*Cedrus atlantica* (Atlas Cedar)
Reason: Low branching habit; use in medians, intersections, and large accent areas only

*Cedrus deodara* (Deodar Cedar)
Reason: Low branching habit; use in medians, intersections, and large accent areas only.

*Cercis occidentalis* (Western Redbud)
Reason: Too small to use as street tree; use as understory accent in medians and naturalized areas.

*Cinnamomum camphora* (Camphor Tree)
Reason: Potential for major pavement damage.

*Eucalyptus citriodora* (Lemon Gum)
Reason: Frost-tender at 24-28 degrees F. Weak trunk when young.

*Umbellularia californica* (California Bay Laurel)
Reason: Needs water; plant in riparian areas.

**Over 10 ft. planting area:**
Reason: All trees on this list should only be used in planting areas over 10 ft. wide due to the potential for major pavement damage; root barriers are recommended as well.

*Ceratonia siliqua* (Carob)
*Eucalyptus viminalis* (Manna Gum)
*Fraxinus uhdei* 'Tomlinson' (Evergreen Ash)
*Fraxinus undei* 'Majestic Beauty' (Evergreen Ash)
*Liriodendron tulipifera* (Tulip Tree)
(Additional reason: Susceptible to aphids.)
*Liquidambar styraciflua* 'Festival' (Sweet Gum)
*Magnolia grandiflora* 'Russett' (Southern Magnolia)
(Additional reason: Needs lots of water, good drainage, deep soil.)
*Morus alba* 'Fruitless' (Fruitless Mulberry)
*Pinus pinea* (Italian Stone Pine)
*Pinus sabiniana* (Digger Pine)
*Pinus torreyana* (Torrey Pine)
*Populus candicans* (Carolina Poplar)
*Populus fremontii* 'Nevada' (Western Cottonwood)

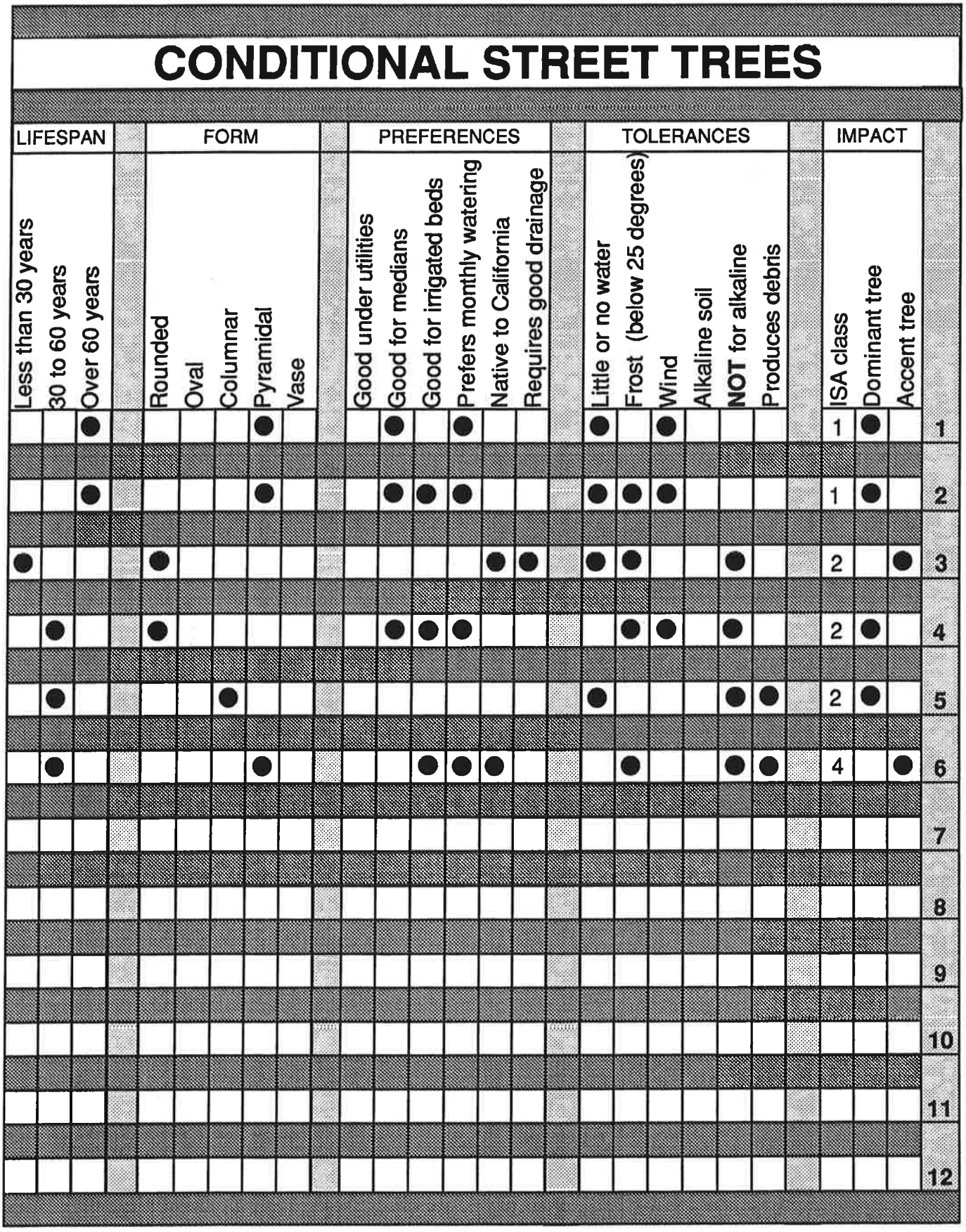
# CONDITIONAL STREET TREES

**Planting Area 6 to 10 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Cedrus atlantica* Atlas Cedar | | | ● | | | ● | | | ● | | ● | | | 30 |
| 2 | *Cedrus deodara* Deodar Cedar | | | ● | | | ● | | | ● | | ● | | | 30 |
| 3 | *Cercis occidentalis* Western redbud | ● | | | ● | | | ● | | | | | ● | | 15 |
| 4 | *Cinnamomum camphora* Camphor Tree | | ● | | | ● | | | ● | | | | | ● | 30 |
| 5 | *Eucalyptus citriodora* Lemon Gum | | ● | | | | ● | ● | | | ● | | | | 20 |
| 6 | *Umbellularia californica* California Bay Laurel | | ● | | | | ● | | ● | | | | | ● | 25 |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

# CONDITIONAL STREET TREES



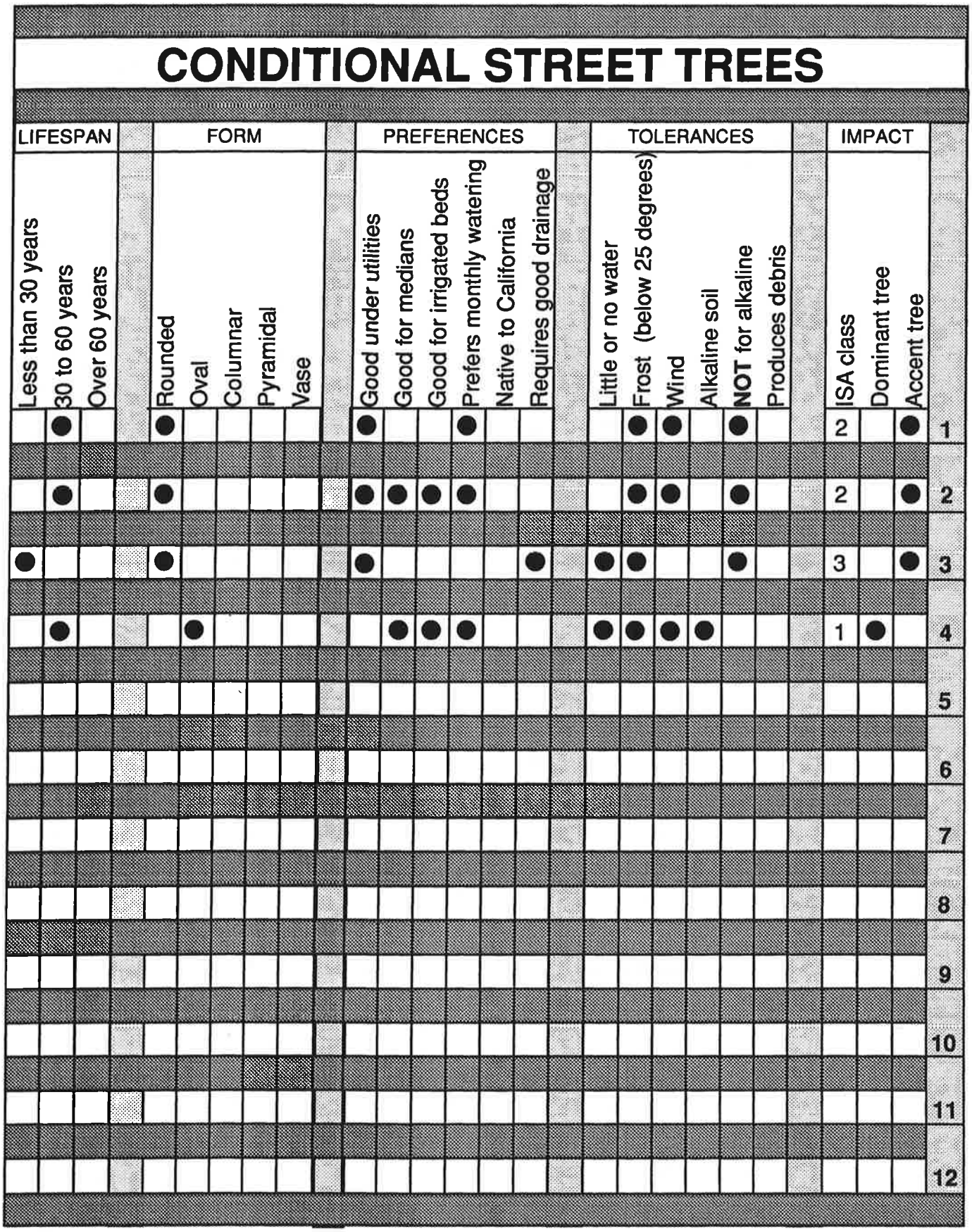
# CONDITIONAL STREET TREES

**Planting Area Less Than 4 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Lagerstroemia* hybrids Crape Myrtle | ● | | | ● | | | ● | | | | | | ● | 15 |
| 2 | *Melaleuca linariifolia* Flaxleaf Paperbark | | ● | | ● | | | ● | | | | | | ● | 15 |
| 3 | *Prunus cer.* 'Krauter Vesuvius' Hybrid Purple Leaf Plum | ● | | | ● | | | ● | | | | ● | | | 15 |
| 4 | *Tristania conferta* Brisbane Box | | ● | | | ● | | | ● | | | ● | | | 30 |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

# CONDITIONAL STREET TREES



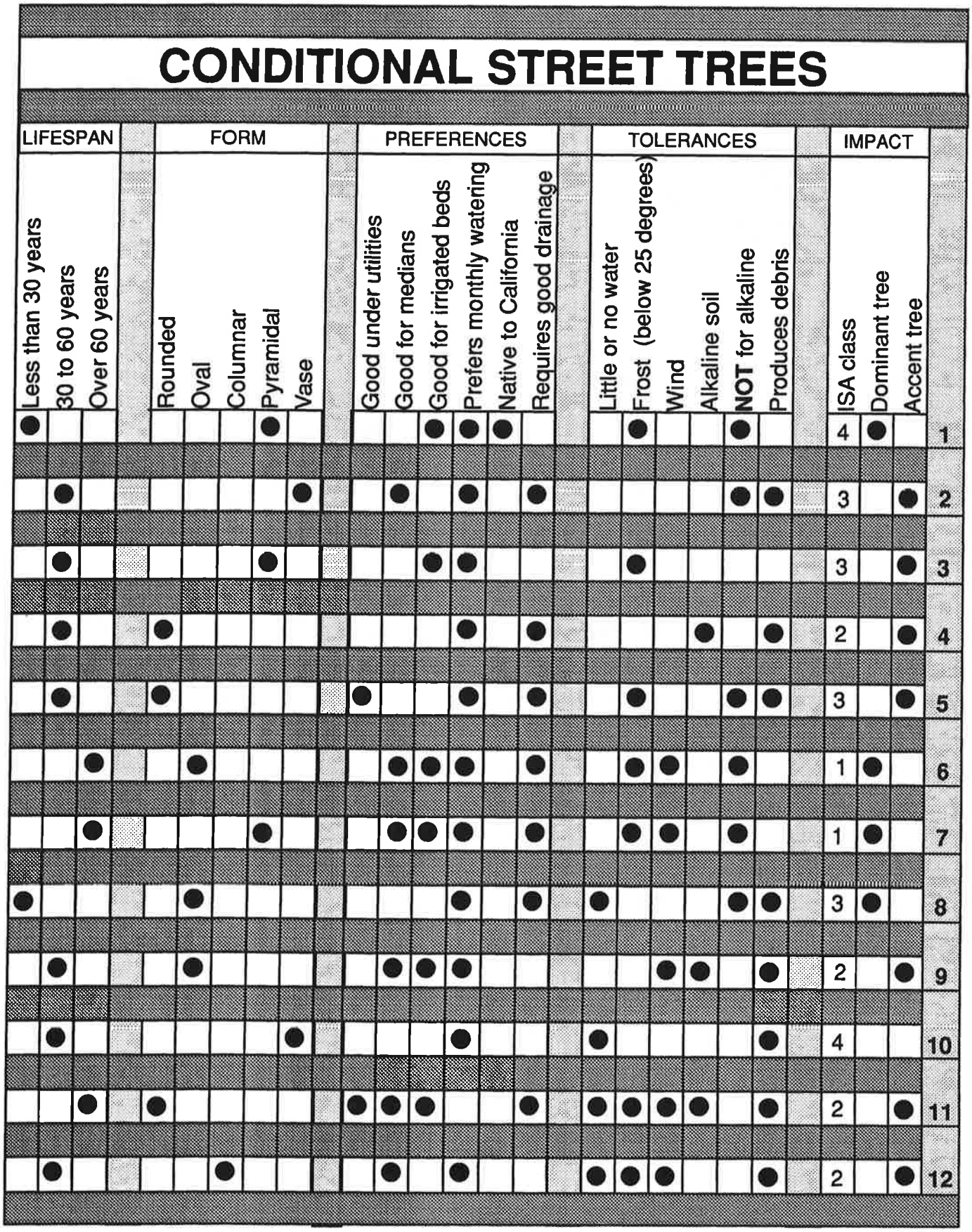
# CONDITIONAL STREET TREES

**Planting Area between 4 & 6 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Alnus rhombifolia* White Alder | ● | | | | | ● | | ● | | ● | | | | |
| 2 | *Bauhinia purpurea (variegata)* Purple Orchid Tree | | ● | | | ● | | | ● | | | ● | | | 20 |
| 3 | *Betula nigra* 'Heritage' *River Birch* | ● | | | | ● | | | ● | | | | | | 20 |
| 4 | *Chorisia speciosa* Floss silk tree | | ● | | | | ● | | ● | | | | ● | | 20 |
| 5 | *Eriobotrya deflexa* Bronze Loquat | | ● | | ● | | | ● | | | | | ● | | 20 |
| 6 | *Ginkgo biloba* 'Autumn Gold' Maidenhair | ● | | | | | ● | | ● | | | | | ● | 30 |
| 7 | *Ginkgo biloba* 'Fairmont' Maidenhair | ● | | | | | ● | | | ● | | | ● | | 35 |
| 8 | *Jacaranda mimosifolia* Jacaranda | ● | | | | ● | | | ● | | | ● | | | 25 |
| 9 | *Melaleuca quinquenervia* Cajeput Tree | | ● | | | ● | | ● | | | | | ● | | 20 |
| 10 | *Melia azedarach* Chinaberry | ● | | | | ● | | | ● | | ● | | | | 20 |
| 11 | *Olea europaea* Olive | | ● | | | ● | | | ● | | | | ● | | 15 |
| 12 | *Pinus canariensis* Canary Island Pine | | | ● | | | ● | ● | | | | ● | | | 15 |

# CONDITIONAL STREET TREES

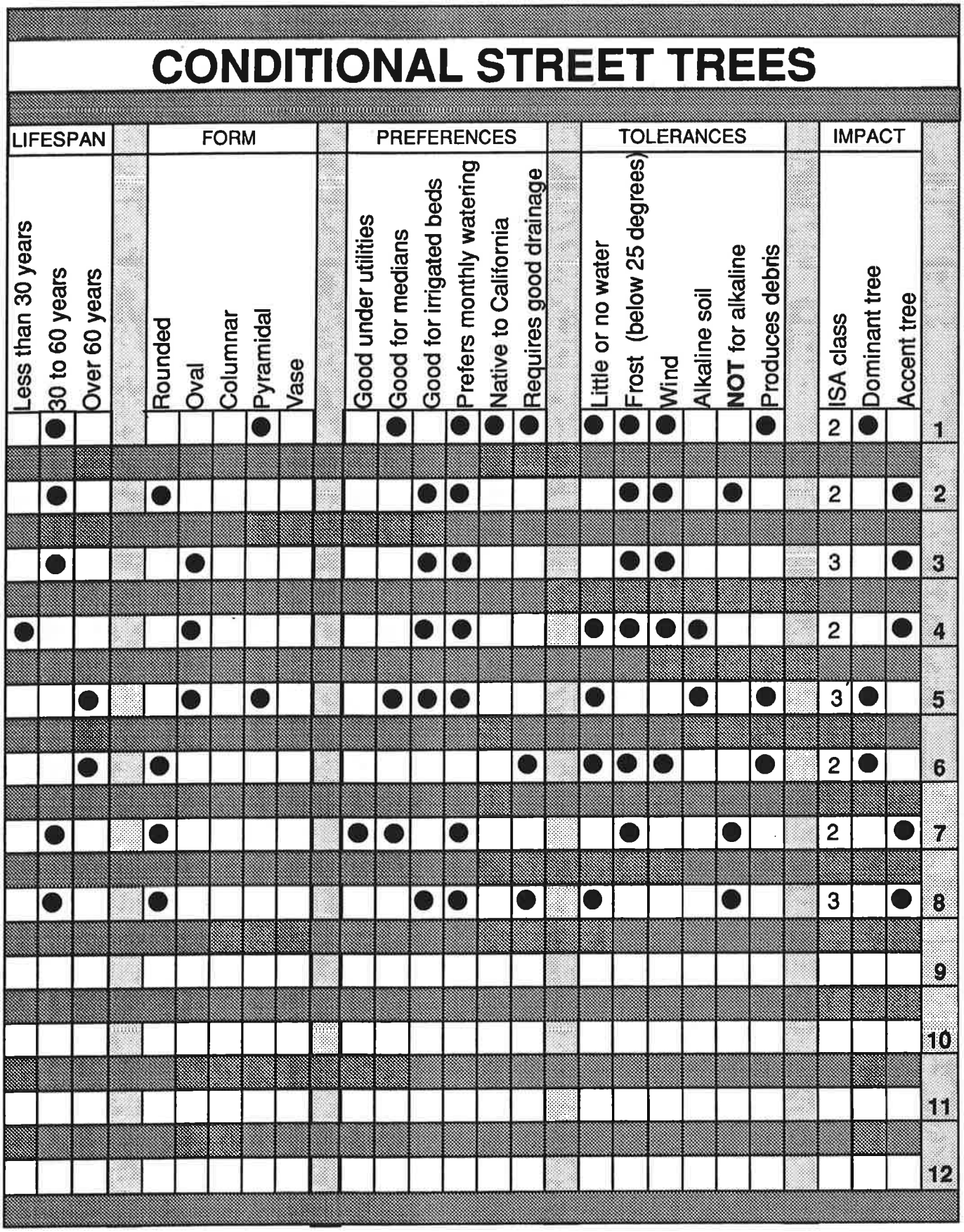


# CONDITIONAL STREET TREES

**Planting Area between 4 & 6 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Pinus coulteri* Coulter Pine | | | ● | | ● | | | ● | | | | ● | | 20 |
| 2 | *Pittosporum undulatum* Victorian Box | | ● | | | | | | ● | | | | ● | | 20 |
| 3 | *Prunus caroliniana* Carolina Laurel Cherry | | ● | | ● | | | ● | | | | ● | | | 15 |
| 4 | *Pyrus calleryana* 'Bradford' Bradford Pear | ● | | | | ● | | ● | | | | ● | | | 25 |
| 5 | *Quercus ilex* Holly Oak | | ● | | | ● | | | ● | | | | ● | | 20 |
| 6 | *Schinus molle* California Pepper | | ● | | | ● | | | ● | | | ● | | | 20 |
| 7 | *Schinus terebinthifolius* Brazilian Pepper | | ● | | ● | | | | ● | | | | ● | | 20 |
| 8 | *Tabebuia chrysotricha* Golden Trumpet Tree | ● | | | ● | | | | ● | | | | ● | | 20 |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |


CONDITIONAL STREET TREES
LIFESPAN
FORM
PREFERENCES
TOLERANCES
IMPACT
Less than 30 years
30 to 60 years
Over 60 years
Rounded
Oval
Columnar
Pyramidal
Vase
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
ISA class
Dominant tree
Accent tree
1 2 2 3 4 5 6 7 8 9 10 11 12

# CONDITIONAL STREET TREES

**Planting Area 6 to 10 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Cedrus atlantica* Atlas Cedar | | | ● | | | ● | | | ● | | ● | | | 30 |
| 2 | *Cedrus deodara* Deodar Cedar | | | ● | | | ● | | | ● | | ● | | | 30 |
| 3 | *Cercis occidentalis* Western redbud | ● | | | ● | | | ● | | | | | ● | | 15 |
| 4 | *Cinnamomum camphora* Camphor Tree | | ● | | | ● | | | ● | | | | | ● | 30 |
| 5 | *Eucalyptus citriodora* Lemon Gum | | ● | | | | ● | ● | | | ● | | | | 20 |
| 6 | *Umbellularia californica* California Bay Laurel | | ● | | | | ● | | ● | | | | | ● | 25 |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |

# CONDITIONAL STREET TREES

| | LIFESPAN | | | FORM | | | | | PREFERENCES | | | | | | TOLERANCES | | | | | | IMPACT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Less than 30 years | 30 to 60 years | Over 60 years | Rounded | Oval | Columnar | Pyramidal | Vase | Good under utilities | Good for medians | Good for irrigated beds | Prefers monthly watering | Native to California | Requires good drainage | Little or no water | Frost (below 25 degrees) | Wind | Alkaline soil | **NOT** for alkaline | Produces debris | ISA class | Dominant tree | Accent tree | |
| 1 | | | ● | | | | ● | | | ● | | ● | | | ● | | ● | | | | 1 | ● | | 1 |
| 2 | | | ● | | | | ● | | | ● | ● | ● | | | ● | ● | ● | | | | 1 | ● | | 2 |
| 3 | ● | | | ● | | | | | | | | | ● | ● | ● | ● | | | ● | | 2 | | ● | 3 |
| 4 | | ● | | ● | | | | | | ● | ● | ● | | | | ● | ● | | ● | | 2 | ● | | 4 |
| 5 | | ● | | | | ● | | | | | | | | | ● | | | | ● | ● | 2 | ● | | 5 |
| 6 | | ● | | | | | ● | | | | ● | ● | ● | | | ● | | | ● | ● | 4 | | ● | 6 |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | 11 |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | 12 |

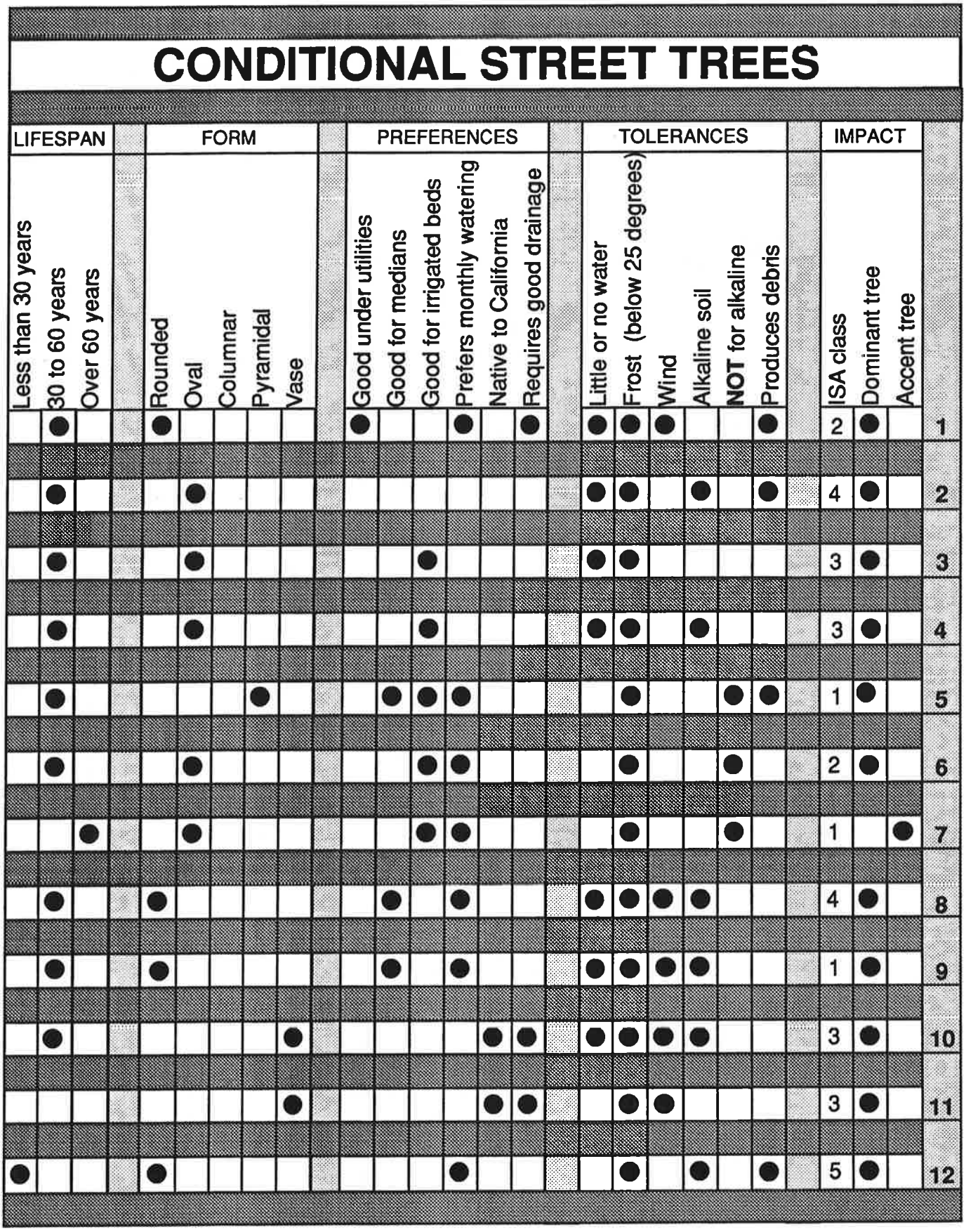
# CONDITIONAL STREET TREES

**Planting Area 10 ft. or more**

Root Barriers Recommended

| | | TYPE | | | | HEIGHT | | | | SPREAD | | | | GROWTH RATE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Ceratonia siliqua* Carob | | ● | | | | ● | | | | ● | | | | | ● | | 25 |
| 2 | *Eucalyptus viminalis* Manna Gum | | ● | | | | | ● | | | ● | | | ● | | | | 25 |
| 3 | *Fraxinus uhdei* 'Tomlinson' Evergreen Ash | | ● | | | | ● | | | | | ● | | | ● | | | 35 |
| 4 | *Fraxinus uhdei* 'Majestic Beauty' Evergreen Ash | | ● | | | | | ● | | | | ● | | ● | | | | 35 |
| 5 | *Liquidambar styraciflua* 'Festival' Sweet Gum | ● | | | | | ● | | | ● | | | | | | ● | | 20 |
| 6 | *Liriodendron tulipifera* Tulip Tree | | ● | | | | | ● | | | | ● | | | ● | | | 25 |
| 7 | *Magnolia grandiflora* 'Russett' Southern Magnolia | | ● | | | | ● | | | | ● | | | | | | ● | 30 |
| 8 | *Morus alba* 'Fruitless' Fruitless Mulberry | ● | | | | | ● | | | | | ● | | ● | | | | 30 |
| 9 | *Pinus pinea* Italian Stone Pine | | | ● | | | | ● | | | | ● | | | | ● | | 30 |
| 10 | *Pinus sabiniana* Digger Pine | | | ● | | | | ● | | | ● | | | | ● | | | |
| 11 | *Pinus torreyana* Torrey Pine | | | ● | | | | ● | | | | ● | | | | ● | | |
| 12 | *Populus candicans* Carolina Poplar | | ● | | | | | ● | | | ● | | | ● | | | | |

# CONDITIONAL STREET TREES

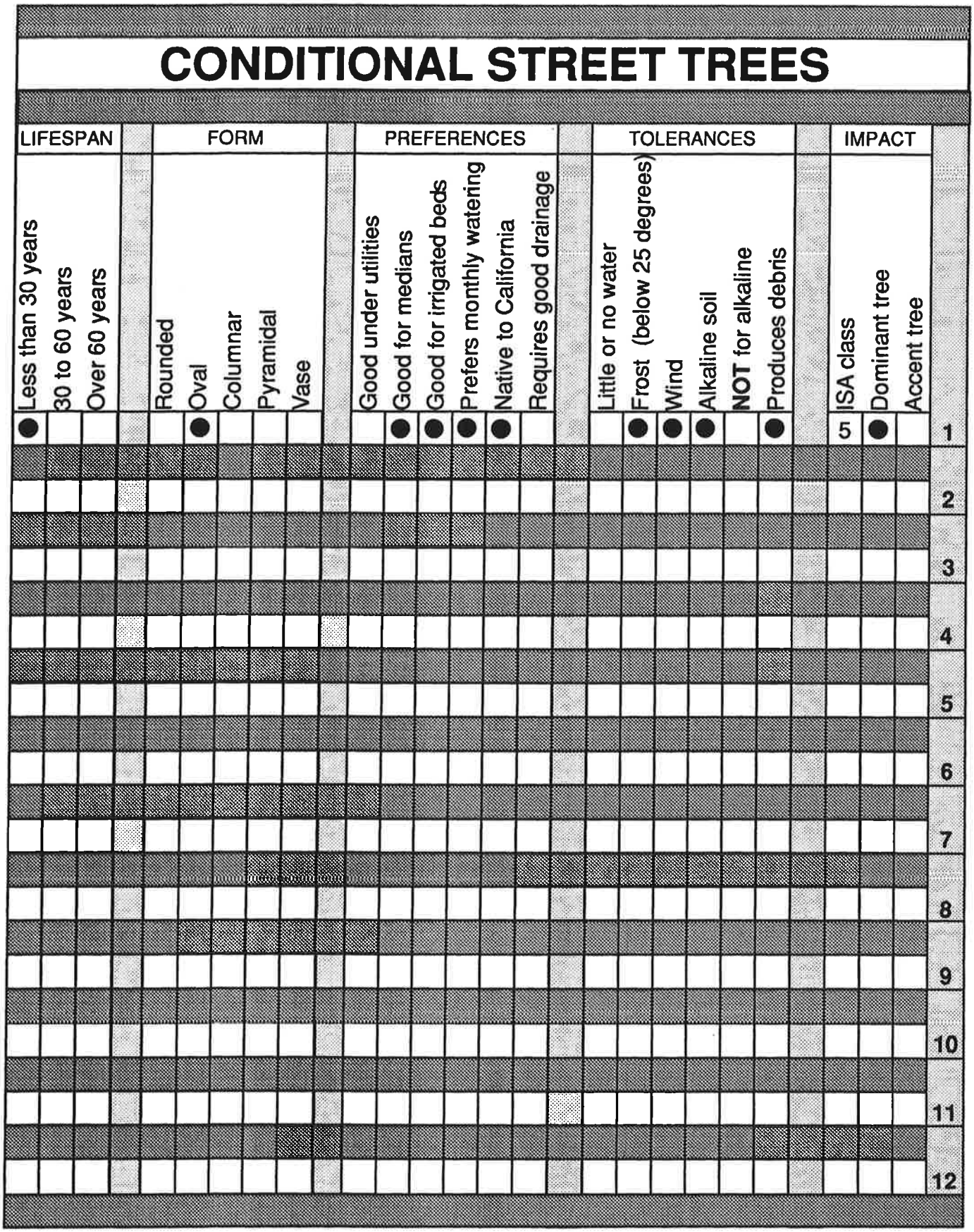


# CONDITIONAL STREET TREES

**Planting Area 6-10 ft.**

Root Barriers Recommended

| | | TYPE | | | HEIGHT | | | SPREAD | | | GROWTH RATE | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Deciduous | Broadleaf Evergreen | Conifer | Small, under 20 ft. | Medium, 20 to 40 ft. | Tall, over 40 ft. | Narrow, under 20 ft. | Average, 20 to 40 ft. | Broad, over 40 ft. | Very Fast | Fast | Moderate | Slow | Spacing |
| 1 | *Populus fremontii* 'Nevada' Western Cottonwood | ● | | | | | ● | | | ● | ● | | | | 30 |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |


CONDITIONAL STREET TREES
LIFESPAN
Less than 30 years
30 to 60 years
Over 60 years
FORM
Rounded
Oval
Columnar
Pyramidal
Vase
PREFERENCES
Good under utilities
Good for medians
Good for irrigated beds
Prefers monthly watering
Native to California
Requires good drainage
TOLERANCES
Little or no water
Frost (below 25 degrees)
Wind
Alkaline soil
NOT for alkaline
Produces debris
IMPACT
ISA class
Dominant tree
Accent tree
5
1
2
3
4
5
6
7
8
9
10
11
12

## 2.7.6 TREES NOT SUITABLE AS STREET TREES

The trees on this list are not to be planted as street trees in the public right of way. The matrix identifies one or more reasons for inclusion on this list. These problems are identified as follows:

■ *Untreatable disease* causing eventual death or potential for hazardous conditions.

■ *Debilitating insects* causing poor growth or potential for hazardous conditions.

■ *Genetic structural problems* in the way the branching structure develops, causing the potential for hazardous conditions as the tree matures.

■ *Environmentally unadabtable* to the warm, dry climate and generally poor soils of southern California. These species require long periods of frequent watering, rich, well-drained soil, or colder temperatures to grow well.

The tree species identified as having any of these first four problems are not recommended for use anywhere in Thousand Oaks. The following four reasons only limits a tree's use as a street tree. They may be used for other appropriate design areas or on private property.

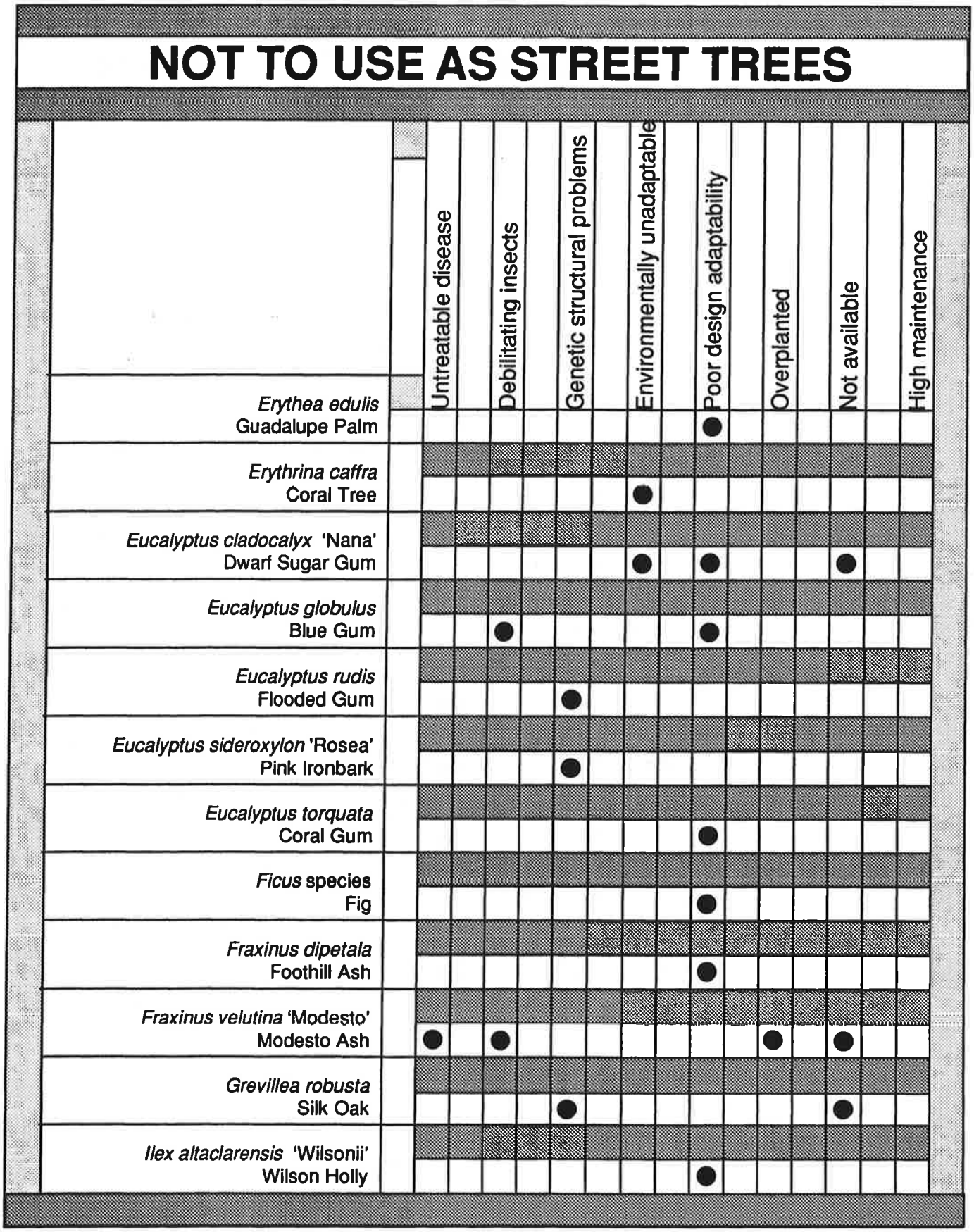
■ *Poor design adaptability* for use as a street tree. These species are too small, do not provide a large enough shade canopy, have low branching or multiple trunks which cannot be pruned up without damaging the tree, or have roots which will not allow the tree to grow in a small planting area.

■ *Overplanted* trees are those species currently growing abundantly. Due to the susceptibility of monoculture plantings to disease or pest problems, these trees cannot be planted until an inventory determines that they do not make up more than 10% of the tree population in the city.

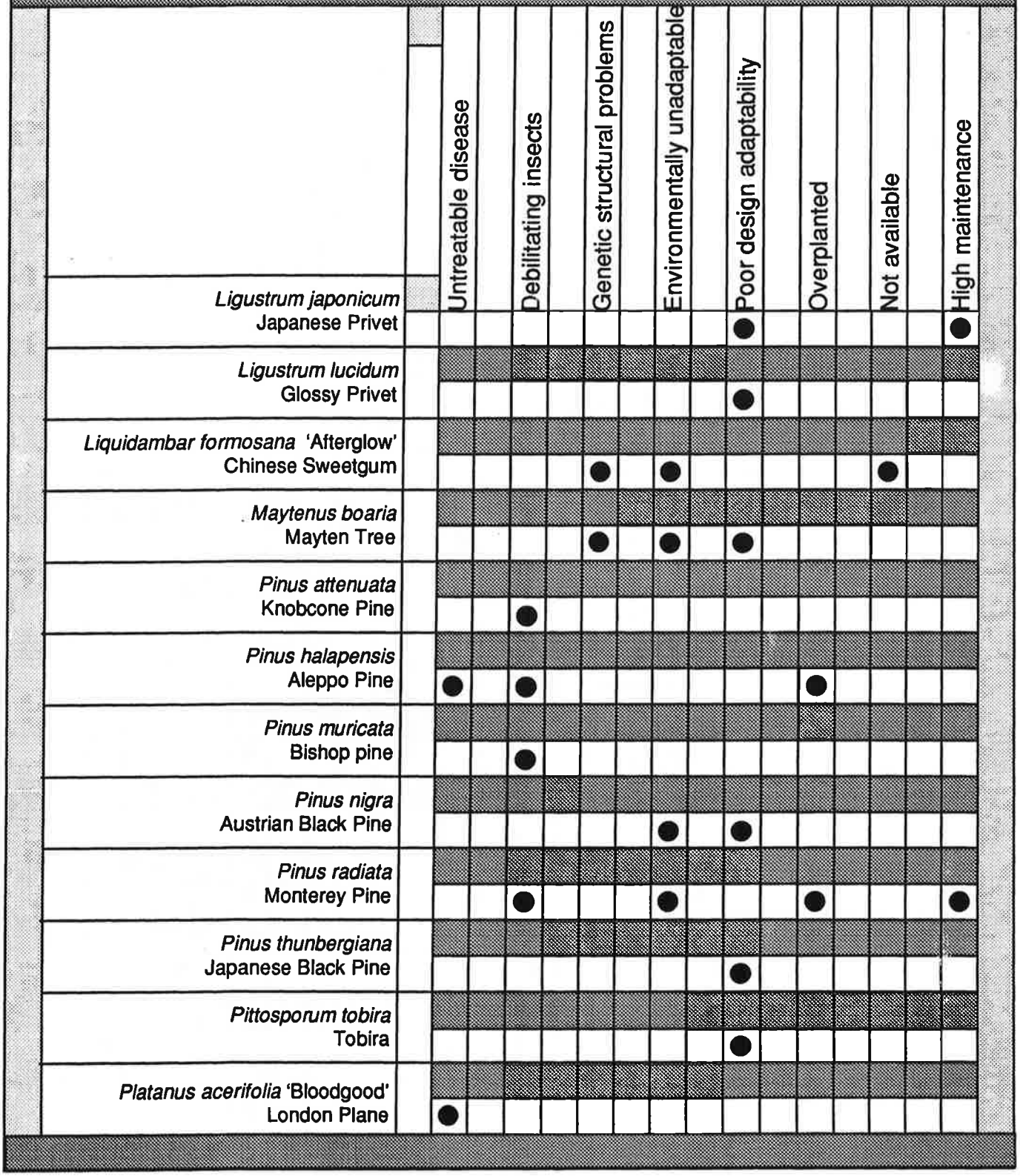
■ *Not available* currently in the nursery trade.

■ *High maintenance* requirements such as frequent watering, pruning or cleanup of debris.

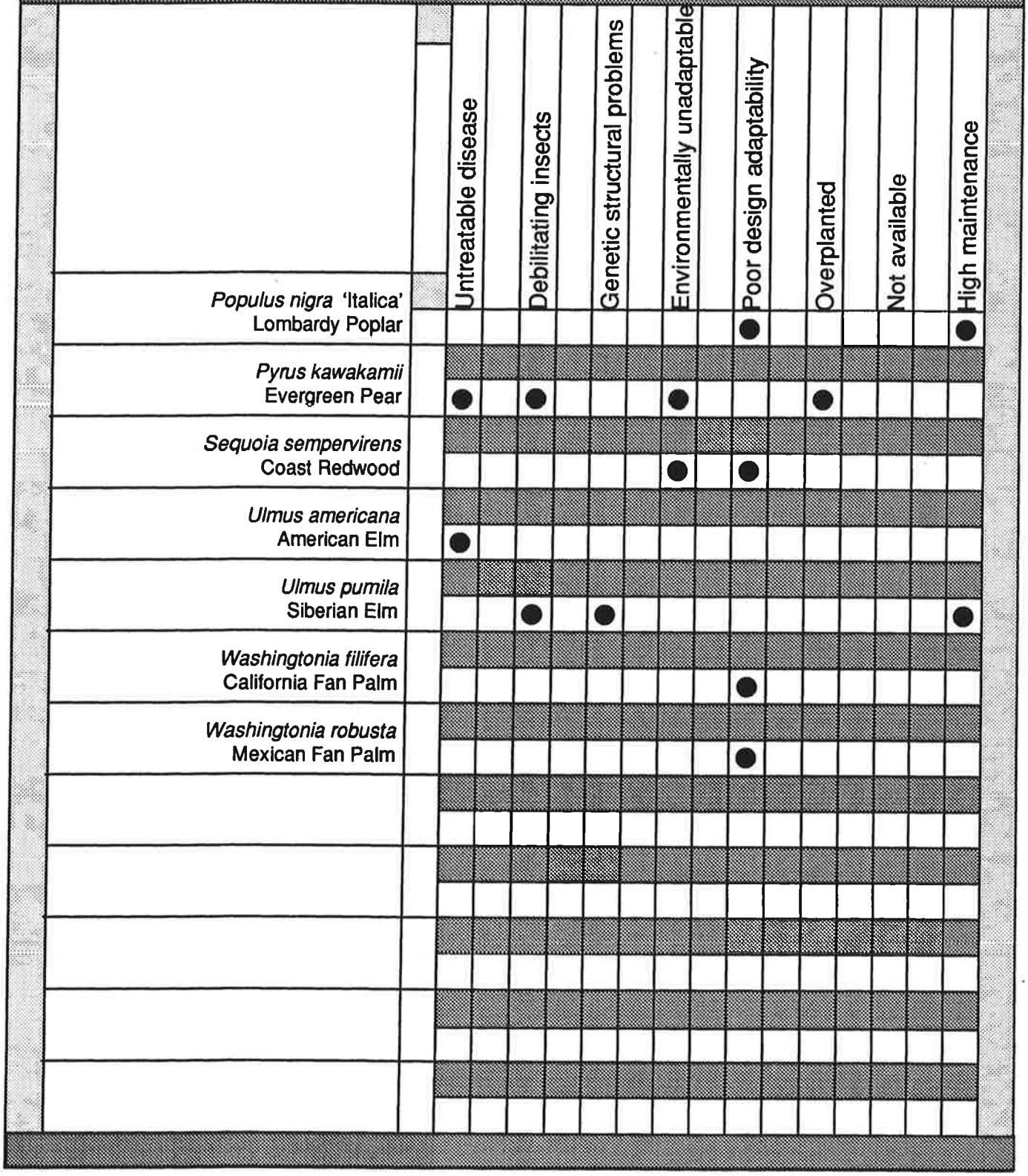
# NOT TO USE AS STREET TREES



# NOT TO USE AS STREET TREES



# NOT TO USE AS STREET TREES



## 2.7.7 SHRUBS AND GROUNDCOVERS TO USE UNDER TREES

The palette of shrubs and groundcovers included here was specifically chosen as appropriate for use with the trees recommended herein. Like the tree palette, they are primarily low-water-use species, and weighted toward the indigenous and native end of the spectrum. The list is long to cover a wide variety of situations, from large open-space areas to more restrictive urban situations.

The plants are grouped by recommended planting area, just as with trees. Here, however, the categories are more general: parkways and small medians are restricted to the smallest shrubs and groundcovers, while large medians and slopes can handle the larger sized plants. It is important that shrubs and ground covers be selected for the ultimate size, form and shape that they will achieve without severe consistent pruning. For example, if a 3 ft. tall shrub is desired in a certain location, don't use Abelia grandiflora, which will reach 5 to 6 ft. in height. You could, however use Abelia grandiflora 'Sherwoodi', which grows to a height of 3 ft.

**FOR PARKWAYS AND SMALL MEDIANS**
**(All plants under 30" tall)**

SHRUBS
Agapanthus africanus, A. orientalis, Lily of the Nile
Berberis thunbergii, Japanese Barberry
Eriogonum species, Wild Buckwheat
Escallonia dwarf forms
Euryops pectinatus 'Virdis', Golden Shrub Daisy
Galvezia speciosa, Island Bush Snapdragon
Juniperus chinensis 'Mint Julep', Mint Julep Juniper
Lavandula angustifolia, English Lavender
Nerium dwarf forms
Pittosporum tobira 'Wheeleri'
Rhapiolepis dwarf forms
Ribes viburnifolium, Evergreen Currant

HERBACEOUS PLANTS
Centaurea cineraria, Dusty Miller
Coreopsis species
Diplacus hybrids, Monkey Flower
Eschscholzia californica, California Poppy
Festuca ovina glauca, Blue Fescue
Helichrysum petiolatum, Perennial Strawflower
Heuchera species, Alum Root
Hypericum calcinum, St. John's Wort
Iris douglasiana, Douglas Iris
Lantana montevidensis, Trailing Lantana
Lobularia maritima, Sweet Alyssum
Lupinus species, Lupine
Oenothera berlandierii, Mexican Evening Primrose
Stachys byzantia, Lamb's Ears
Teuchrium chamaedrys, Germander
Zauschneria californica, California Fuchsia

BULBS
Crocosmia crocosmiiflora, Montbretia
Scilla peruviana, Peruvian Scilla
Zantedeschia aethiopica, Calla Lily

GROUND COVERS
Abelia grandiflora 'Prostrata'
Acacia redolens and cultiformis
Arctostaphylos 'Emerald Carpet' and 'Pt. Reyes', Manzanita
Baccharis pilularis 'Twin Peaks' and 'Pigeon Point', Dwarf Coyote Brush
Ceanothus hearstiorum, Hearst Ceanothus
Cistus salvifolius, Sageleaf Rockrose
Cistus skanbergii, Hybrid Rockrose
Correa 'Carmine Bells', Australian Fuchsia
Cotoneaster congesta 'Likiang'
C. horizontalis
C. 'Lowfast'
Gazania species and hybrids
Juniperus chinensis 'Parsonii', Prostrata Juniper
J. virginiana 'Silver Spreader'
Rosmarinus officinalis cultivars
Symphoricarpos mollis, Creeping Snowberry
Trachelospermum jasminioides asiaticum

VINES
Clytostoma callistegioides, Lavender Trumpet Vine
Distictis buccinatoria, Blood-red Trumpet Vine
Gelsemium sempervirens, Carolina Jessamine
Jasminum polyanthum, Pink Jasmine
Macfadyena unguis-cati, Yellow Trumpet Vine
Parthenocissus tricuspidata, Boston Ivy
Passiflora caerulea, Passion Vine

Rosa banksiae, Lady Banks' Rose
Rosa 'Cecile Brunner', Cecile Brunner Rose
Vitis vinifer, Grape
Wisteria species
Note: Many vines are useful ground covers on large banks.

**FOR LARGE MEDIANS AND SLOPES**

MEDIUM-SIZED SHRUBS (30"-6 ft.)
Arctostaphylos densiflora 'Howard McMinn', McMinn Manzanita
Carpenteria californica, Bush Anemone
Cistus hybridus, White Rockrose
Lavandula angustifolia, English Lavender
Leonutus leonuris, Lion's Tail
Mahonia pinnata, California Holly Grape
Nandina domestica 'Nana', Dwarf Heavenly Bamboo
Rhamnus californica 'Eve Case', California Coffeeberry
Rhapiolepis dwarf cultivars
Ribes speciosum, Fuchsia-flowered Gooseberry
Trichostema lanatum, Wooly Blue Curls
Westringia rosmariniformis, Rosemary Bush Westringia

MEDIUM-SIZED HERBACEOUS PLANTS
Chrysanthemum frutescens, Marguerite
Dietes iridioides, Fortnight Lily
Gaillardia grandiflora, Blanket Flower
Hemerocallis species, Daylilies
Kniphofia uvaria, Red Hot Poker
Rudbeckia hirta, Gloriosa Daisy
Salvia leucantha, Mexican Sage

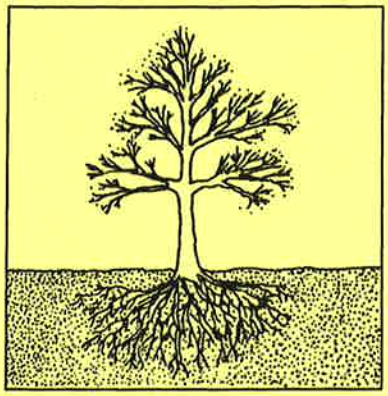
GROUND COVERS
Ceanothus 'Joyce Coulter'
C. ridigus 'Snowball'

TALL SHRUBS (6-10 ft.)
Abelia grandiflora, Glossy Abelia
Arbutus unedo 'Compacta', Compact Strawberry Tree
Ceanothus 'Concha'
C. 'Frosty Blue'
C. thyrsiflorus 'Snow Flurry'
Chaenomeles cultivars, Flowering Quince
Comarostophylos diversifolia, Summer Holly
Cotoneaster lacteus, Red Clusterberry
Dendromecon rigida, Bush Poppy
Echium fastuosum, Pride of Madeira
Escallonia 'Fradesii'
Feijoa sellowiana, Pineapple Guava
Heteromeles arbutifolia, Toyon
Leptospermum scoparium cultivars
Myrtus communis (not 'Compacta'), True Myrtle
Nerium oleander, Oleander
Plumbago auriculata (P. capensis), Cape Plumbago
Rhapiolepis indica, India Hawthorn
R. umbellata, Yeddo Hawthorn
Rhus integrifolia, Lemonade Berry
Ribes sanguineum, Flowering Currant
Viburnum suspensum, Sandankwa Viburnum
Xylosma congestum, Shiny Xylosma

TALL HERBACEOUS PLANTS
Cosmos sulphureus, Yellow Cosmos
Romneya coulteri, Matilja Poppy

VERY TALL SHRUBS (10 ft. +)
Arbutus undedo, Strawberry Tree
Cercis occidentalis, Western Redbud
Cercocarpus betuloides, Mountain Mahogony
Eleagnus pungens, Thorny Eleagnus
Fremontodendron species, Flannel Bush
Grevillea "Canberra'
Letospermum laevigatum, Australian Tea Tree
Photinia serrulata, Chinese Photinia
Pittosporum eugenioides
Pittosporum tenuifolium
Prunus caroliniana, Carolina Laurel Cherry
Prunus ilicifolia, Holly Leaf Cherry
Prunus lusitanica, Portugal Laurel
Prunus lyonii, Catalina Cherry
Punica granatum 'Wonderful', Pomegranate
Viburnum tinus, Laurustinus

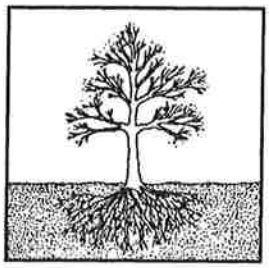
# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN



| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

OCTOBER 1989

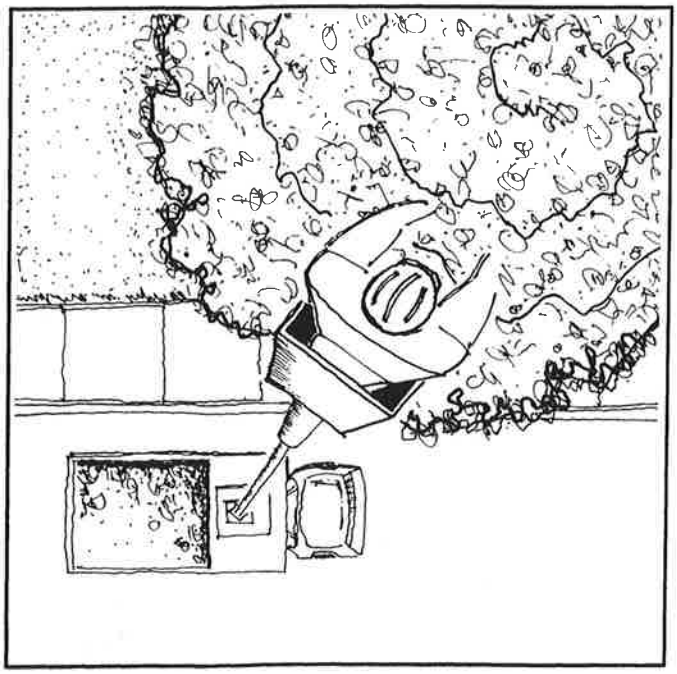


Volume 3

# PLANTING & MAINTENANCE MANUAL

## TABLE OF CONTENTS

*continued*



## 3.1 INTRODUCTION

This chapter provides the rationale for creating a planting and maintenance manual. It explains how different users of the manual, such as city crews, outside contractors and homeowners, will use it. In addition, it identifies ways these users can gain additional training and education in tree care.

### 3.1.1 THE PURPOSE OF THIS VOLUME

The purpose of this manual is to provide a day-to-day manual of proper planting and maintenance practices to enhance the professionalism of city crews and others working in the city's forest. The manual will serve as a field reference for crews; offer instruction to contractors working in the city; make inspection of work more objective, and help the public understand the techniques being used by the city crews and the reasons for using them.

The most important factors in growing healthy trees are thorough, careful and timely tree selection and installation procedures, and careful maintenance during the first four years of a tree's life. Proper pruning and irrigation practices during this young stage will produce a tree that requires less care in later years, when maintenance tasks such as pruning are significantly more expensive.

This volume provides specific instruction in planting and maintenance procedures and techniques, and addresses the timing of tasks. Since plants respond so strongly to seasonal influences and weather changes, it is important that tasks be performed at the time which elicits the best plant response with the least investment. Advance planning will allow for the necessary materials to be on hand and for crews to be efficiently scheduled.

### 3.1.2 HOW TO USE AND MODIFY THIS VOLUME

This manual will be of benefit for maintaining existing trees as well as newly planted trees. When planting new trees, the site and species should be selected first, following the guidelines in Volume 2. This volume details the process of planting and maintenance after these decisions are made.

The primary user will be Public Works Department maintenance personnel. Other users include outside contractors; other public and semi-public agency maintenance personnel such as the Conejo Valley Unified School District, Conejo Valley Recreation and Park District, Conejo Open Space Conservation Agency, Caltrans, and Southern California Edison; business people; and homeowners. The landscape supervisor in the Public Works Department and the community forester in the Planning Department are the key contact people for use of this manual. The manual is written to a technical level compatible with the educational and professional requirements of those two job classifications.

The manual is arranged for direct access and flexible use. Each chapter covers a particular planting or maintenance task. It identifies the task, describes how it should be implemented, and explains the reasons for the recommended method of action. In addition to the text, supporting graphics, charts and sketches are included. As new technical information is published which is pertinent to these subjects it should be added to or substituted for appropriate sections of this document. All manual holders will receive notice of these changes and copies of the new information. (See Vol. 1, Table 2.)

## 3.1.3 RESPONSIBILITIES

The protection, enhancement and maintenance of the community forest requires the involvement of all the citizens of Thousand Oaks, as well as the city maintenance personnel and other agencies. The responsibility of the city is to maintain trees and other plants on city rights of way in a healthy, safe condition. (See 1.3.6, Functions and Tasks.)

Citizens should understand the laws and ordinances which pertain to the community forest and city owned or privately owned trees adjacent to their property. Citizens and developers must obtain a city permit to plant or remove any tree in the public right of way or public service easement areas. Pruning any limb in these areas may require a permit, and should be done with the supervision of a certified arborist, landscape architect, or registered professional forester. A permit is also required for any pruning or removal of oak trees or landmark trees, even on private land (see 1.4). Citizens can help by giving deep watering once a month to street trees adjacent to their homes and businesses; notifying the city when they observe pest and disease problems or broken limbs; and notifying the city when they observe illegal pruning or removals.

The responsibility of institutions, businesses, and other organizations (such as homeowners' associations) is to hire qualified contractors who are recognized by the city, and who follow these guidelines and cooperate with the goals of the Master Plan.

The responsibility of other public agencies, such as the Conejo Valley Park and Recreation District, is to maintain trees and other plants under their jurisdiction in a healthy, safe condition.

An appropriate board or commission for trees would serve as the central clearing house for all issues concerning trees in the city. It would help resolve disputes and recommend action to the City Council, with the community forest program serving as the liaison between the city and this board. (See 1.3.6.)

## 3.1.4 SCHEDULING PROCEDURES

To realize the goal of creating a healthy, balanced community forest for Thousand Oaks, a *proactive* schedule for tree planting, maintenance, and removals is essential. Quantifiable yearly allocations for each of these three areas must be planned, budgeted, and implemented so that a stable forest of uneven age and diverse species is attained.

The City of Thousand Oaks has been divided into 101 planning units to facilitate these tasks. These planning units consist of 42 neighborhood areas and 59 major streets. Requirements for tree planting, maintenance, and tree removal are to be developed for each planning unit. The first step in developing these requirements is collecting an inventory of existing trees and vacant areas. (The information needed to compile this inventory is described in Volume 4.)

The information collected in the inventory will enable a yearly schedule of tasks to be worked out for each planning unit, and these schedules can be used to draw up a budget. Subjective schedul-

## SEASONAL MAINTENANCE SCHEDULE

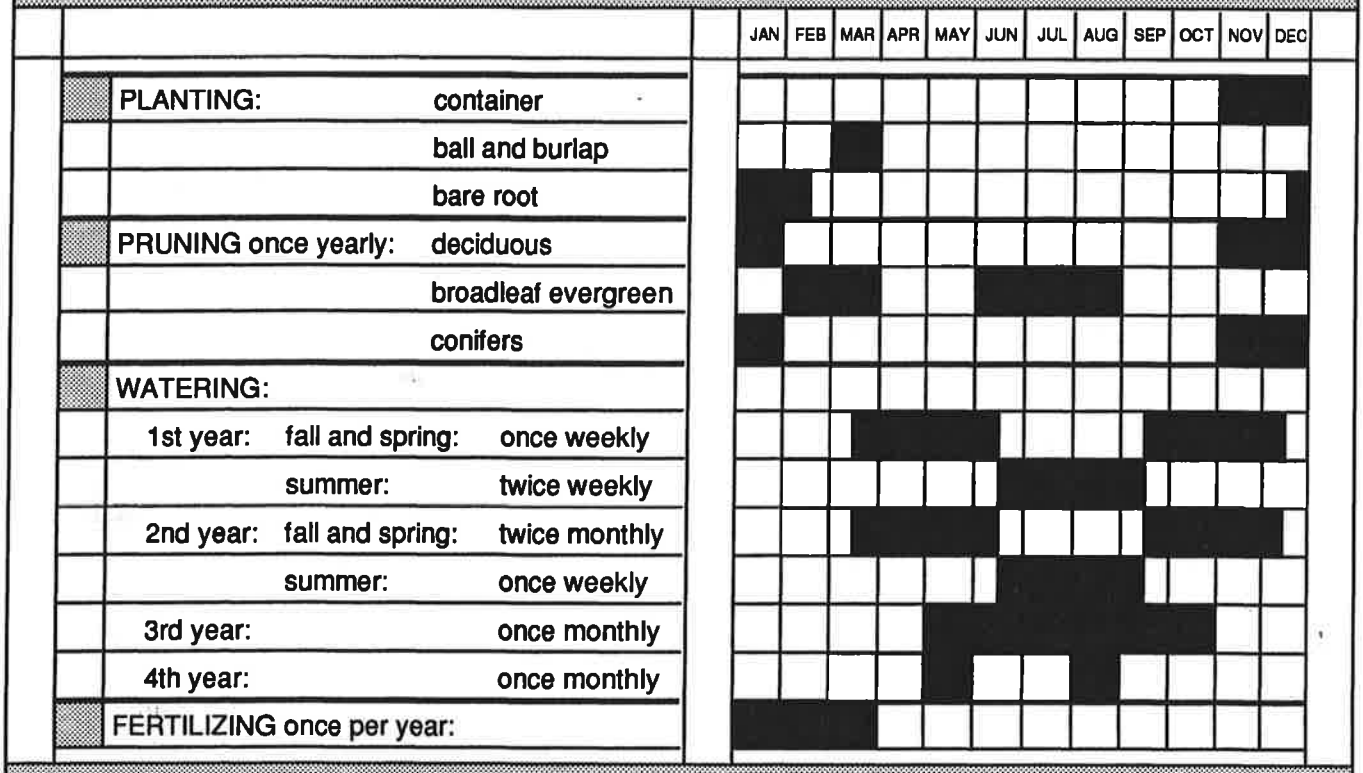



TABLE 1

ing and budgeting is thus eliminated. It will be necessary to set priorities for the most important areas and the most important tasks within each area, especially in the first few years of implementing the schedule. (See 2.2.3.)

**Scheduling of Planting and Maintenance Tasks**

Planting is most successful when done at the time of year when rapid rooting can occur. Installing plants in Nov.-Dec. is optimum, because new roots can expand rapidly into soil at a time when moisture demand is at a minimum. This produces a tree which is ready to produce rapid new growth in spring, supported by active new roots.

In order to make this planting schedule work efficiently, the appropriate trees must be on hand at the right time. Since fall planting is becoming an industry-wide goal, competition for the best nursery stock is strong, resulting in poor availability of desired species or of high quality stock. Thus, getting good stock requires two to three month advance ordering from the wholesale nurseries. If bare root or ball and burlap stock of less common species is to be used, it should be ordered by June. (Bare root and ball and burlap are usually ordered from Oregon nurseries.) This advance planning also encourages advance ordering of materials needed for planting and efficient scheduling of work crews.

Tree maintenance must be performed on a regular basis. The scheduling of maintenance is critical because plants may be disfigured, severely damaged or even killed by pruning performed at the wrong time. Pruning must be done in a timely fashion if the most beneficial results are to be obtained. For example, the best time to prune is

just before new growth appears,while fertilizing should be done during the fall or early spring.

In addition, fertilizer, or even water, may be partially or wholly wasted if it is not applied at the time of year when the plant is most able to absorb it. Advance scheduling can prevent this.

### 3.1.5 TRAINING AND EDUCATION

It is ultimately the maintenance person's responsibility to acquire the necessary knowledge and skills to perform his or her job. However, the city should encourage and support attendance at pertinent college classes and seminars. Attendance at a minimum level of such seminars should be encouraged to seek certification for each job classification. A pay raise upon certification is recommended. All personnel should be encouraged to take the International Society of Arboriculture (ISA) examination for Certified Tree Climber or Certified Arborist.

It is recommended that outside contractors working either for the city, other agencies, or for private citizens be certified for work in the city. They should have an ISA-certified arborist on the job, and require that these personnel comply with the Western Chapter ISA Pruning Specifications. The responsibility for providing crew members with this expertise lies with the individual contractor.

Training should be provided by this maintenance manual; by continuing education (college or junior college, University of California Cooperative Extension Service classes); and by training sessions conducted on a regular basis by city staff. Tests should be given and graded after these sessions. Training should also be provided by outside consultants, with tests given periodically. Whether conducted by in-house staff or outside consultants, these sessions should be a combination of classroom instruction immediately followed by field practice. Information regarding landscape maintenance subjects will be understood and retained far more successfully using this technique.

Development of a staff lending library will complement the education provided by the training sessions. (A list of recommended references can be found in the bibliography in the appendix.)

### 3.1.6 SAFETY

Landscape maintenance, particularly tree maintenance, involves dangers to personnel which exceed those of most professions. Sharp cutting instruments, many of them powered, are used in rough terrain or above ground in trees; heavy lifting is often required; and activities are often carried out near car traffic. Specific attention must be given to safety considerations to ensure the greatest protection for the public, employees, and the trees.

Proper safety procedures serve as examples to the general public of how to carry out maintenance tasks, while improper procedures not only serve as bad examples, but are dangerous to the health and safety of the city crews, and can create liability problems for the city. Each employee must be trained to do his or her job safely. It is human nature to fall into habits where all procedures aren't followed, or where cutting corners gets the job done a little faster. Following good safety procedures is also a habit, and must be encouraged. Common sense will go a long way toward preventing accidents.

Following are guidelines, some of which are adapted from the American National Standards Institute handbook for tree care operations (ANSI Z133.1-1982, 1430 Broadway, New York, NY 10018). The landscape supervisor and all members of the tree crews should have copies of these standards, which are only excerpted here.

## CHECKLIST FOR SAFETY

### General

☐ Employees should observe all provisions of applicable laws.
☐ They should be trained in and follow procedures for the proper use of all equipment.
☐ All equipment should also meet existing standards, and be properly maintained.
☐ Never exceed the manufacturer's rated capacity for lifting loads.
☐ Never let unqualified personnel use a piece of machinery or perform a task.
☐ Inspect all equipment each day before use.
☐ Always use personal protective equipment. This includes helmets, safety belts or saddle belts and climbing ropes in tree work, and safety belts in aerial-lift equipment; hearing protection equipment for noisy machinery; and respiratory, eye and skin protection when spraying.
☐ Ropes which are being used for climbing should not be used for lowering limbs or raising and lowering equipment. Use separate ropes for these tasks.
☐ A first-aid kit should always be available on the job site. Employees should be trained in first-aid procedures, and in rescue procedures for tree workers.
☐ All employees should know how to identify poison oak and other common poisonous plants.

### Electrical Hazards

☐ Always assume that an electrical wire or cable is energized and dangerous.
☐ If an electrical hazard exists in a tree, only a qualified line-clearance tree trimmer should do the work. A second specialist may have to be present (see ANSI standards for details). All other workers must remain at least ten feet from the power lines (and in some cases more—see ANSI standards).
☐ If a branch is hanging on a power line, the utility company should be called. Insulated equipment must be used to remove it.
☐ Rubber footwear is not to be considered protection from electrical hazards.
☐ When ladders, platforms, and aerial devices contact a live wire, they should be considered energized and dangerous.
☐ Work should be suspended when an emergency condition develops involving electrical conductors.
☐ Emergency rescue should only be attempted by properly trained persons familiar with electrical hazards. Southern California Edison offers classes.
☐ Pole pruners and pole saws should be made of non-conducting poles and cords. Ladders used near power lines should be of nonconducting materials .

### Vehicle Safety

☐ Always set out safety cones when working near traffic, and use a flagman or flagwoman if needed to direct traffic.
☐ When trucks with obscured rear vision must back up, outside guidance is necessary.
☐ All materials carried on vehicles should be stored so as not to fall off the truck during transit.
☐ Workers should not ride outside or on top of a truck unless this is required by the job, such as in roadside spraying.
☐ Do not leave vehicles unattended while running, or leave ignition keys in the vehicles.
☐ Do not leave wood chips in truck beds for extended periods, as spontaneous combustion may result.

### Gasoline-powered machinery

☐ Do not refuel gasoline-powered equipment while the engine is running.
☐ Do not smoke around gasoline-powered machinery.
☐ Store gas only in approved safety cans.
☐ Refuel machinery at least ten feet away from where the equipment is being used.

**Hand Power Tools**

☐ All portable electric hand tools should be equipped with a grounded three-prong cord, be double-insulated, or be connected to the power source through an isolated transformer.

☐ When using a lawn mower, make sure that the area to be mowed is free of rocks, bottles, or other objects which could come into contact with the mower blade. When starting and operating a mower, keep feet and hands clear of the blade. Disconnect the mower (if electric) or remove the contact to the spark plug (if gas-powered) before doing any repair or maintenance near the mower blade.

**Lifting**

☐ Be sure clear ground is available if the weight is to be carried from one place to another.

☐ Decide exactly how the object should be grasped.

☐ Make a preliminary lift to be sure the load can be safely handled.

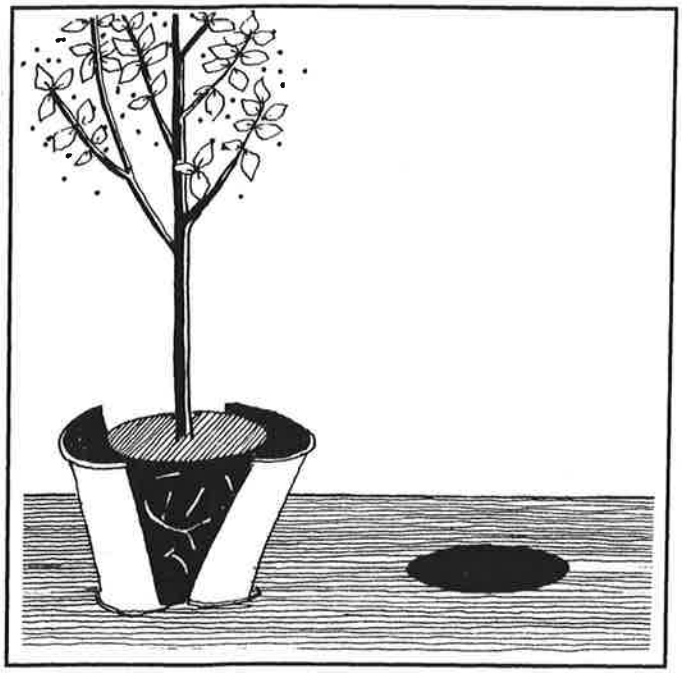
☐ Place his or her feet solidly.

☐ Crouch as close to the load as possible with the legs bent at an angle of about 90 degrees.

☐ Keep the back as straight as possible. It may be far from vertical but should not be hunched. Lift with the legs, not the back.

**Other Guidelines**

See the ANSI standards for other specific rules concerning aerial lifts, brush chippers, sprayers, stump cutters and grinders, hoists, trucks, portable power tools, chainsaws, backpack power units, hand tools, electrical hazards, mobile equipment, safe work procedures in tree pruning and removal, and general safety requirements.



## 3.2 BEFORE YOU PLANT

Choosing the appropriate type of tree for a particular location is the beginning of the planting process, and is covered in Volume 2. Choosing the plant size and purchasing the stock is the next step. This chapter guides the user through the necessary preparations before planting.

### 3.2.1 SITE-SPECIFIC TREE SELECTION

New trees will have to meet different functional requirements, depending on the areas where they are to be used (see design guidelines in Vol. 2). Common denominators for all new trees must be:

- Adaptation to the soils of the microsite in which they are to be planted;
- Ability to survive with minimal soil for root growth;
- Lack of severe insect or disease problems;
- Lack of serious structural problems or tendency to produce surface roots;
- Ability to grow into a structurally sound tree without frequent pruning.

Many commonly used tree species and cultivars cause serious, expensive problems as they mature. For example, *Liquidambar styraciflua* causes sidewalk damage with its shallow roots, drops round seed pods that can be dangerous on sidewalks, and often loses large limbs in early fall wind storms. *Cinnamomum camphora* is notorious for causing sidewalk damage. In addition, when under stress it is very susceptible to verticillium wilt, a vascular fungus disease. Both of these trees are useful in medians and wide parkways, but should not be used in narrow planting areas.

Planting site conditions create ultimate control of the longevity and health of any plant. Poor conditions cannot always be improved, and trees must be chosen which are as tolerant as possible to the particular problems of the site.

■ If tree roots are constrained by a small opening to air and water, as a street tree in a 2 ft. by 2 ft. opening in concrete, the tree cannot be expected to grow as rapidly, be as healthy or live as long as if it were installed in an open field.

■ If the top soil is shallow, and underlain with impervious clay, tree roots may expand adequately when young, but with age, they will be adversely affected by the poor drainage of water below the root system and begin to decline.

■ If the top soil or sub-soil is highly alkaline, roots will not be able to absorb the broad range of balanced minerals needed for normal growth and will develop chlorosis, which limits growth and produces unhealthy foliage.

■ In saturated soil, root tips are killed by lack of oxygen and excessive water. They no longer carry

water to foliage crowns, and plants die.

Some of these problems will cause a tree to fail early in its life. However, many such problems do not appear until the trees have been in the ground for many years, and are serving the function for which they were intended. Removal of troublesome trees at this stage is expensive and unpopular. Citizens often do not want a tree to be removed.

The objective of the Master Plan is to consider the long-term results of tree selection, instead of selecting trees based on such short-term benefits as fast growth rate or ease of availability. (See 2.4 and 2.7 for guidelines on how to choose the appropriate tree for a particular location.)

### 3.2.2 CHOOSING PLANT SIZES

The nursery plant size to use in any given site is often decided when the species is selected. In general, smaller plants will develop more rapidly and be healthier than larger plants, and have a higher survivability rate if cared for properly. Purchasing larger specimens will create greater impact at planting time, but have a lower survivability rate under the normal stressful urban growing conditions. The various sizes available for planting are:

■ **Seed:** Hydromulching of large areas. Hand seeding of acorns or other large seeds can be done; these may be planted in revegetation areas with or without concurrent hydroseeding. The average contractor installed cost (1989) is $900 to $1,000 per acre.

■ **Liners:** These are small pots, usually 2" to 4" square. They are commonly used when large quantities of ground cover are needed, or in native plant revegetation.

■ **One-gallon containers:** Shrubs and ground covers are usually installed from this size. Trees can be installed from this size in naturalized and open-space areas, due to rapid establishment by the young plant. Careful inspection of roots must accompany their use. (See 3.2.3 for a discussion of inspection of stock.) The average contractor-installed cost (1989) is $10 per container. (See 3.3.2 about using "Tuley tubes" to protect one gallon trees.)

■ **Five-gallon containers:** This size is often used when an instant effect in shrub plantings is desired. In most cases, one-gallon shrubs will out grow five-gallon plants. Trees can be installed in this size in naturalized and open space areas, and on the street, if well protected. The average contractor-installed cost (1989) is $25 per container.

■ **Fifteen-gallon containers:** This size is the most commonly used for street trees, although five-gallon trees can also be used. Where vandalism is especially high, an even larger size than fifteen-gallon is recommended. On steep slopes, this size is the largest that should be planted, due to the difficulty in watering and stabilizing root growth in larger sizes on slopes. The average contractor-installed cost (1989) is $50-$90 per container.

■ **Bare Root:** This is a logical substitute for five-gallon or fifteen-gallon trees but must be ordered several months in advance. They would arrive between December 15 and February 15. If bare root trees are properly stored on arrival and the roots are not allowed to dry out before installation, a survival rate of at least 90% should be expected. (See 3.2.3, checklist for bare root stock.) If city crews are unaccustomed to planting bare root trees, a small number should be ordered at first so that successful procedures can be learned. (See 3.2.4 for species suitable for Thousand Oaks.)

■ **24" Box:** This is a logical substitute for fifteen-gallon street trees in many cases where quick results are necessary, and when there is a sufficiently large pavement opening for the root ball. (A planting area can be enlarged by redesign of the hardscape and/or removal of concrete.) The average contractor-installed cost (1989) is $350 per box.

■ **Ball and Burlap:** These would be purchased almost exclusively from Oregon and would arrive in March. They would usually be alternatives to fifteen-gallon, 24" box or 36" box trees. (See 3.2.4 for species suitable for Thousand Oaks.) Large ball and burlap trees may be purchased for 30 to 35% of the price of equivalent boxed tree sizes. Much greater care must be taken in the storage, installation and care of ball and burlap trees. A loss factor of 10% is common.

■ **Larger specimens:** These become geometrically more expensive, greater in weight, and more difficult to install as the size increases. They should only be used where a large, instant impact is essential. The average contractor-installed cost (1989) for a 36" box is $1,000.
(See 3.2.3 for standards for size of trees purchased from the nursery.)

## 3.2.3 QUALITY OF STOCK

Nursery stock purchased should be carefully inspected at the site before acceptance. The investment in installation and several years of care far exceed the cost of the plant. It makes no sense to install a severely root bound or genetically inferior specimen if the installation and maintenance costs are not rewarded by excellent growth.

**Note:** Trees should never be handled by the trunks (except bare root trees). Handle all trees by their containers or root balls.

### GUIDELINES FOR QUALITY OF STOCK

**Tree vigor**

■ Trees should have green leaf color or other color typical of healthy specimens of the species (if leafed out at the time of inspection).

■ Vigorous trees will have larger leaves and denser foliage than weaker specimens of the same species (if leafed out at the time of inspection).

■ Shoot growth should be at least 12" per year for faster and 6" per year for slower growing species.

■ Bark should be smooth or shiny on most species, rather than rough and dull.

■ Trunks should taper, with the widest part near the soil level. Trunks with no taper or a reverse taper should be avoided.

**Lack of serious insect and disease pests**

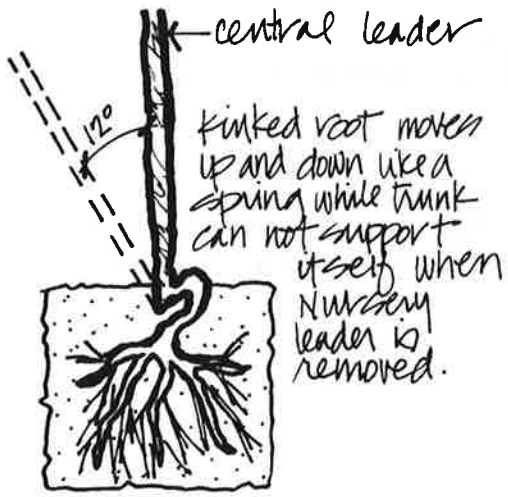
■ Knowledge of the pests likely to be found is necessary for this inspection. (See 3.7.) But in general, stock showing symptoms of pest or disease problems should be avoided.

**Well-formed root systems**

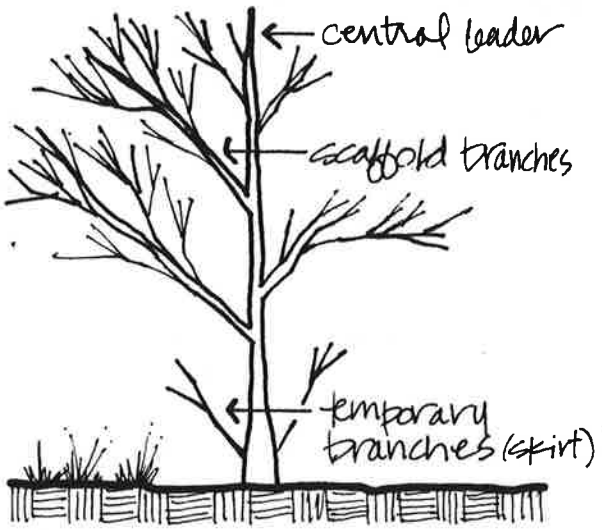
■ Some white root tips should be visible on the perimeter of the root ball or root mass.

■ Older roots should be firm and healthy, and white or light yellow in color beneath the bark.

■ There should not be any large kinked roots. If a taproot or major branch root is bent more than 90 degrees, and less than 20% of its lateral roots are above the kink, it should be rejected. The root ball will probably not provide good support for the trunk when the stakes are removed. See Figure 1.




**Kinked Root** **Figure 1**




**Tree Structure** **Figure 2**

■ Trees with circling or girdling roots which wrap around 60% or more of the root ball mass should also be rejected.

■ Multi-trunk trees should have one root ball. They should not be made up of several trees in the same container.

**Well-formed crown** (See Figure 2)

■ At least half of the branches should arise from points on the lower two-thirds of the trunk.

■ Trees should be purchased with a skirt of foliage to within one foot of the ground, whenever possible. ( Most bare root trees are not available in this form.) The skirt is the group of branches between ground level and the permanent scaffold branches. These temporary branches feed the tree and accelerate the growth rate of the tree.

■ Single-trunk trees should have a definite central leader (the highest upright stem, which holds terminal buds extending the growth upward.)

**Lack of shipping damage or other injury**

■ Inspect the tree at delivery time for shipping damage to the trunk or branch breakage, or being unstable in the container.

**Delivery of the species ordered**

■ When ordering, specify that each tree be delivered with a tag indicating the species and cultivar. When the trees are delivered, check the label to assure that the cultivar or species ordered was actually delivered. This is an item that is not usually checked. Since many nurseries will ship whichever closely related plant they have to fill an order, and different cultivars of the same species often produce quite different growth habits at maturity, this is quite important.

## CHECKLIST FOR CONTAINER STOCK

### Inspection

☐ 2% of the trees to be purchased should be carefully removed from their containers, and the root system checked. They should have roots sufficiently developed to the perimeter of the root ball to hold the root ball together, but should not display roots of 1/4" diameter or larger.

☐ Check all other relevant guidelines for quality of stock.

### Storage

☐ Newly received trees should be placed in a predetermined storage area and watered with a wetting agent/water mix (Aqua-gro or equivalent).

### Standards for Size

☐ The tree must have produced between 6" to 18" of new growth (depending on species) during the previous growing season. This implies healthy root growth.

A tree measured at 6" to 8" above the root ball must have the height and trunk caliper found in the following table for acceptance. These standards are derived from the "American Standard for Nursery Stock", ANSI z60.1, 1980. They do not apply to multi-trunked trees.

The minimum standards for planting oak trees to replace oaks which have been removed, as described in the Oak Tree Preservation Ordinance, appear in Table 3. (Refer to the Oak Preservation Ordinance, Vol. 1 appendix, for the required number and minimum size of replacement trees in various situations.)

**CONTAINER STOCK STANDARDS**

| Tree Type | Size | Height | Caliper |
|---|---|---|---|
| broadleaf | 1 gal. | 1 to 2 ft. ht. | 1/4" |
| | | 2 to 4 ft. ht. | 1/2" |
| broadleaf | 5 gal. | 4 to 6 ft. ht. | 1/2" to 5/8" |
| conifers | 5 gal. | to 6 ft. ht. | 5/8" to 3/4" |
| broadleaf | 15 gal. | 7 to 10 ft. ht. | 3/4" to 7/8" |
| | | 10 to 12 ft. ht. | 7/8" to 1" |
| conifers | 15 gal. | 6 to 8 ft. ht. | 7/8" to 1" |
| broadleaf | 24" box | 10 to 12 ft. ht. | 1" to 1/1/4" |
| | | 12 to 15 ft. ht. | 1-1/4"-1-3/4" |
| conifers | 24" box | 8 to 12 ft. ht. | 7/8" to 1-1/4" |

TABLE 2

**OAK REPLACEMENT STANDARDS**

| Size | Height | Spread | Caliper |
|---|---|---|---|
| 15 gal. | 7 to 8 ft. | 2 to 3 ft. | 1-1/4" to 2" |
| 24" box | 8 to 10 ft. | 5 to 6 ft. | 2" to 2-1/2" |
| 30" box | 10 to 12 ft. | 6 to 8 ft. | 2-1/2" to 3" |
| 36" box | 12 to 14 ft. | 8 to 10 ft. | 3" to 3-1/2" |
| 42" box | 14 to 16 ft. | 10 to 12 ft. | 3-1/2" to 4" |
| 48" box | 16 to 18 ft. | 12 to 13 ft. | 4" to 4-1/2" |
| 54" box | 18 ft.+ | 13 to 14 ft. | 4-1/2" to 5" |
| 60" box | 20 ft.+ | 14 to 15 ft. | 5" to 6" |
| 72" box | 22 ft.+ | 15 ft.+ | 6"+ |

TABLE 3

**BARE ROOT STANDARDS**

| Diameter of Caliper | Root spread |
|---|---|
| 1/2 to 3/4" | 12" |
| 3/4 to 1" | 16" |
| 1 to 1-1/4" | 18" |
| 1-1/2 to 1-3/4" | 22" |
| 1-3/4 to 2" | 24" |
| 2 to 2-1/2" | 28" |
| 2-1/2 to 3" | 32" |
| 3 to 3-1/2" | 38" |

TABLE 4

## CHECKLIST FOR BARE ROOT STOCK

### Inspection

☐ When the trees arrive, cut the bundles apart, separate the trees and check for shipping damage, such as broken major roots or broken main branches. Broken roots should be pruned off at this stage.

☐ Reject all trees which do not meet the following standards :

No more than 20% of major roots may be broken.

No fungus cankers allowed on the trunk or branches.

Individual trees should be similar in their vigor and branch structure.

☐ Check all other relevant guidelines for quality of stock.

### Storage

☐ Dig holes in prepared piles of wet sand and insert each tree's entire root mass in the hole. Backfill the hole with sand and water each tree immediately.

### Standards for Size

☐ Bare root stock should meet the following standards listed above in Table 4 . (caliper measured 6" to 8" from the root mass)

## CHECKLIST FOR BALL AND BURLAP STOCK

### Inspection

☐ When delivered, check for specimens whose trunks move in the root ball. Reject all specimens whose trunks move more than 12 degrees. Reject

**BALL & BURLAP STANDARDS**

**STANDARD AND BROADLEAF EVERGREENS**

| Caliper | Ball diameter |
|---|---|
| 1/2 to 3/4' | 12" |
| 3/4 to 1" | 14" |
| 1 to 1-1/4" | 16" |
| 1-1/4 to 1-1/2" | 18" |
| 1-1/2 to 1-3/4" | 20" |
| 1-3/4 to 2" | 22" |
| 2 to 2-12" | 24" |
| 2-1/2 to 3" | 28" |
| 3 to 3-1/2" | 32" |
| 3-1/2 to 4" | 38" |
| 4 to 4-1/2" | 42" |
| 4-1/2 to 5" | 48" |
| 5 to 5-1/2" | 54" |

**SMALL UPRIGHT TREES**

| Height | Ball diameter |
|---|---|
| 2-3' | 10" |
| 3-4' | 12" |
| 4-5' | 14" |
| 5-6' | 16" |
| 6-7' | 18" |
| 7-8' | 20" |
| 8-9' | 22" |
| 9-10' | 24" |
| 10-12' | 26" |

**CONIFERS**

| Height | Ball diameter |
|---|---|
| 1 to 1-1/2' | 10" |
| 2 to 3' | 12" |
| 3 to 4' | 14" |
| 4 to 5' | 16" |
| 5 to 6' | 20" |
| 6 to 7' | 22" |
| 7 to 8' | 24" |
| 8 to 9' | 27" |
| 9 to 10' | 30" |
| 10 to 12' | 34" |
| 12 to 14' | 38" |
| 14 to 16' | 42" |
| 18 to 20' | 50" |

**TABLE 5**

all specimens whose trunks do not recover to their original position when tested.

☐ Check for cracked attachments of main limbs to the trunk.

☐ Check for squashed root balls, due to excessive stacking in truck.

☐ Check all other relevant guidelines for quality of stock.

☐ Water with a wetting agent/water mix (Aqua-gro or equivalent).

**Standards for size**

☐ Ball and burlap trees should meet the following standards (caliper measured 6" to 8" from the bottom of the trunk):

## 3.2.4 PURCHASING THE TREE

**Buying Trees at the Nursery**

*The City:* For container grown trees, the designated representative of the community forest program will hand-pick trees at a wholesale grower's yard before delivery, or inspect them very carefully upon delivery for the following:

- Correct identification of species and cultivar
- Root binding
- Root health
- Top growth
- Transportation damage
- Insects or diseases

(See 3.2.3 for details on inspecting trees.)

*The Developer or Outside Contractor:* Trees purchased by the developer or contractor should meet the specifications noted for each species, as well as passing the inspection noted above. The designated representative of the community forest program will inspect trees before they are installed. Each tree should have a printed nursery label on it in order to assure that the required species and cultivar has been delivered.

*The Homeowner:* Retail nurseries may not carry all of the trees which are on the recommended tree list. Some retail nurseries will custom-order trees.

Trees are usually purchased at a wholesale or retail nursery out of available stock. However, the available stock may not include the species desired, and/or the quality and quantity required, especially at fall planting time. If trees are to be purchased out of available stock, it is critical that they be hand picked and tagged at the nursery.

**Contract Growing**

*Containers:* An alternative to purchasing existing nursery stock is container contract growing. This offers the opportunity for the city to be assured that the species of tree needed will be available in the quantity and quality required. The process should start by inspecting the available stock at several wholesale nurseries, and discussing contract growing procedures with the managers. Questions to ask include the following:

■ Will they separate your order from their other stock of the same species? If not, your carefully selected plants may be taken by other customers.

■ Will they assure that the stock they deliver will have been in the containers in which they are delivered for at least 9 months (for fifteen-gallons) or one year (for 24" boxes)?

■ Will they allow the community forester to select the five-gallon trees which are transplanted into fifteen-gallons for delivery 9 to 12 months later? (This may not be necessary if the nursery commonly produces only very high quality stock.)

The growing contract should be signed at least one year before the desired delivery date, allowing the grower time to purchase or reserve high quality five-gallon or fifteen-gallon stock for transplanting into the fifteen-gallon or 24" box containers. If the contract is signed less than 9 months from delivery date, stock already in the containers must be used and should be carefully selected for vigorous growth produced during the previous growing season,and for well formed structural limbs. A 20% deposit is commonly required.

It is essential that the designated representative of the community forest program inspect fifteen-gallon or larger size trees in the nursery at least once during the life of the contract.

*Bare Root Contract Growing:* Another option is bare root tree contract growing. Bare root contract growing arrangements are simpler since the production/digging cycle is controlled by the size of the plant and is relatively inflexible. As a result, the plants available for the growing contract will already be at some stage of production in the field at the inception of the contract arrangements. There are few bare root growers in the west, so selection of a grower is more limited.

Use of bare root rather than container produced trees requires very good planning, since they are dug between the middle of December and the middle of February, and will be delivered by the grower soon after digging. Sand piles must be prepared for heeling-in of the trees when they arrive and they must be installed by the middle of February if transplant losses are to be kept to a minimum.

Species which are well suited to this method are:

| | |
|---|---|
| *Acer* sp. | *Quercus rubra* |
| *Fraxinus* sp. | *Sophora japonica* |
| *Quercus palustris* | *Zelkova serrata* |

The benefits of bare-root contract growing are:

- A tree the same size as a fifteen-gallon tree (3/4" to 1-1/4" diameter) can be grown for one-third the price.

- Roots become established in the backfill soil quickly without problems of interface. Planting labor cost is reduced since installation is simpler.

*Ball and Burlap Contract Growing:* Trees may also be contract-grown in ball and burlap form. Ball and burlap stock of large sizes may be purchased for much less than equivalent container grown trees. Unfortunately, the clay root balls often create the same interface with the surrounding soil seen when containerized stock is used, reducing new growth and often resulting in high losses. Some species are more adaptable to this technique than others, including *Acer rubrum* and *Zelkova serrata.*

**In-House Nursery Production**

An alternative to purchasing stock is in-house nursery production. Nursery production is a very specialized profession which requires knowledge of a broad range of specialized topics that are not necessarily common to other parts of the "green" industry. Even when it is successful, the actual cost per plant installed is always higher than if it were purchased from a wholesale nursery. The only potential benefit is improved quality, climatized stock and timely availability. Unfortunately, even these benefits are seldom really achieved, due to lack of experience by personnel. Several cities which have already attempted in house growing have found that the quality of stock produced was inferior, but since city crew time was invested in its production, it was installed in spite of the poor quality. It is far wiser to hand pick high quality plants from a good grower and not be burdened by the inferior plants seen in any crop.

### 3.2.5 GROWING TREES IN STREETSCAPE CONTAINERS

Trees in streetscape containers have particular maintenance needs. More frequent watering is necessary—up to once a week, depending on the species, exposure, and size of the container. Fertilizing will be needed monthly if applied as a top dressing, and quarterly if applied below the surface. Species must be selected which will tolerate living in containers. Drainage out of the containers across pavement can be a liability problem. The containers should be at least three feet in diameter in order to be in scale with the streetscape.

One method that cities sometimes use is to install a young tree in a large container and use this as a temporary street tree. When the tree begins to outgrow the container, it is planted in the ground. This is a way of buying younger trees at a lower cost. In three years, a bare root or five-gallon tree can reach the size of a 24-inch box specimen. However, the cost of maintenance will be higher for a containerized tree than for the same tree planted in the ground, and the tree will not develop as quickly in the container. In addition, the cost of moving and replanting the tree must be figured in. Concrete containers, probably the best choice aesthetically, can get chipped or broken during transplanting, and then could not be reused. Wood and fiberglass are more vandal-prone than concrete, and tannins from wood containers can stain pavement.

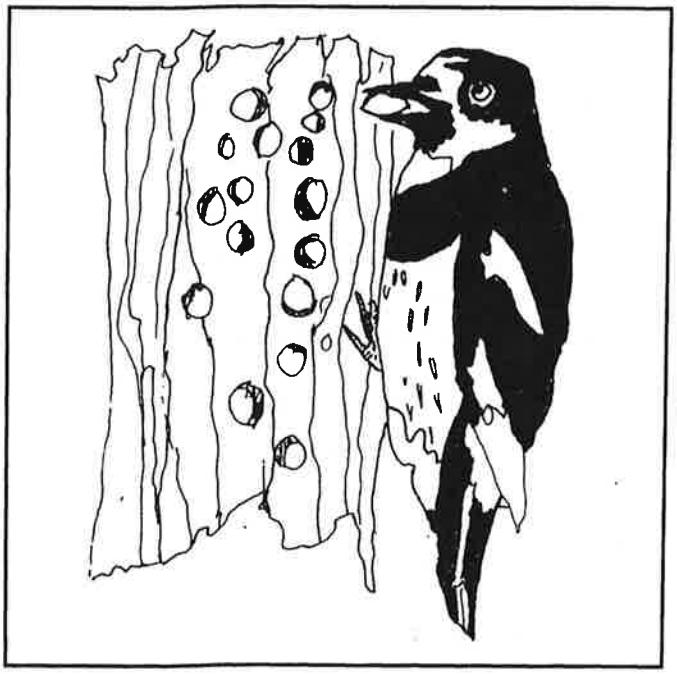
BARE ROOT SPECIES THAT COULD BE USED IN CONTAINERS INCLUDE:

*Fraxinus oxycarpa* 'Raywood'
*Pyrus calleryana* 'Aristocrat'
*Fraxinus holotricha* 'Moraine'
*Zelkova serrata* 'Village Green'

GOOD CHOICES FOR PLANTING IN CONTAINERS FROM 5-GALLON SIZE ARE:

*Melaleuca linariifolia*
*Fraxinus oxycarpa* 'Raywood'
*Pyrus calleryana* 'Aristocrat'
*Ulmus parviflora* 'Drake'

TABLE 6



## 3.3 PLANTING GUIDELINES

This chapter describes the actual installation of a tree, an event which is the culmination of the careful process of site and species selection. Proper planting techniques can greatly affect the lifelong health of the tree.

### 3.3.1 PLANTING THE TREE

The location for planting a tree has been determined. Underground utilities have been identified and the planting area sited so that the tree will not be in conflict with them. An appropriate species has been selected which meets the design guidelines, matches the environmental conditions, and fits the size of the planting area. The tree has been acquired and is ready for planting. (See Fig. 3.)

The time of year when the tree is planted has a major impact on the long term success of a tree. Installation of trees during the months of November and December will facilitate movement of new roots in the surrounding soil before the hot weather arrives, and thereby accelerate the establishment of the tree in its new soil environment. It will also save on maintenance costs since much of the watering during the first four to five months will be taken care of by the winter rains. This timing has such a significant effect on the proportion of success in establishment of new trees that sincere efforts should be made to avoid planting street trees at any other time of the year than late fall.

By contrast, the worst time to install street trees is mid-spring through summer, when the maximum demand for moisture is taking place. At this time it is most difficult to resupply moisture to the root mass as fast as it is being used by the foliage canopy of the tree. Transplant success ratios for trees installed during these months are significantly less than for those installed in early winter.

When spring or early summer planting is necessary, the following steps must be taken:

- Soak the rootball in wetting agent before removal from the container.
- Fill the planting hole with water and let settle before planting.
- Check rootball moisture at least two times per month for moisture.

**GUIDELINES FOR TREE PLANTING**

- **Contact utility companies to locate underground utilities.**
- **Obtain the necessary permit from the community forest program.**
- **Notify nearby property owners if they have not been previously notified.**
- **Gather tools and materials needed** (see the checklist which follows). If the tree is to be planted by city crews, or by a resident during an

approved neighborhood planting, tools and materials may be available from the city's corporation yard. A requisition form must be filled out and approved by the department of public works. City personnel must supervise or operate city tools and equipment.

- **Set up safety barricades.**
- **Prepare the planting area** (min. 4 ft. by 6 ft. by 3 ft. deep).
  - Cut the pavement, if needed
  - Dig the planting area
  - Check for soil and drainage problems
  - Add special materials such as root control barriers or drainage materials
  - Add watering tubes
  - Fill the area with backfill and water to allow settlement overnight.
- **Check for drainage problems the next day.** If water has not drained, choosing a different planting location is highly recommended.
- **Dig planting holes and plant and water the tree.**
- **Install non-wire stakes and tree ties.**
- **Add mulch over the planting area.**
- **Place paving materials, tree guards and tree grates if required.**
- **Clean up.**
- **Record the tree planting in the city inventory database.**

**CHECKLIST FOR PLANTING**

**The Basics**

- ☐ trees
- ☐ source of water
- ☐ people-power

**Power tools**

- ☐ concrete saw cutter
- ☐ backhoe
- ☐ auger
- ☐ dump truck

**Hand tools**

- ☐ mattock
- ☐ planting bar
- ☐ shovel
- ☐ stake pounder
- ☐ broom
- ☐ can snips
- ☐ gloves

**Materials**

- ☐ mulch
- ☐ backfill
- ☐ gravel
- ☐ water retaining polymer
- ☐ water wetting agent
- ☐ fertilizer
- ☐ PVC perforated drainpipe, 36" min. lengths
- ☐ tree stakes
- ☐ tree ties
- ☐ paving materials:
  - interlocking pavers
  - cobbles
  - decomposed granite
  - bricks
  - gravel

## 3.3.2 PREPARING THE PLANTING AREA

The lifespan of a street tree planted in typical urban conditions (i.e., a 36" square planting hole surrounded by extensive paving, with frequent pedestrian traffic) can be as brief as ten years. Providing the largest available amount of uncompacted soil volume for growth is the most important factor in helping a tree grow to maturity.

Make the planting area as wide as possible. Most tree roots grow horizontally in the first 12" to 30" of soil below finish grade. The minimum planting area is 4 ft. by 6 ft.wide by 3 ft. deep. Larger planting areas (6 ft. by 6 ft. by 3 ft.) are recommended on major streets and wherever

possible. Parkways and tree wells that do not meet these standards must be widened by cutting the concrete, or by using soil shafts under the pavement. (See Figures 4 and 5.)

Soil is purposely compacted in urban areas to facilitate construction of pavement and buildings. In construction work a stable surface which will not settle is desired. Usually soil is compacted to 95% of the possible maximum. When trees grow in compacted soil their access to oxygen is limited, and both percolation and drainage of water are slowed. A tree's roots cannot absorb needed nutrients without sufficient aeration and good moisture levels. In addition, deep rooting is discouraged.

Often trees grown near pavement in compacted soil will put their roots under the hardscape as they seek water and air. (Shallow irrigation can also be a factor in this, and some tree species are naturally shallow rooted and/or aggressive in their rooting habits.) Moisture tends to collect under pavement, and the gravel layer often present there is a source of air. The temperature under pavement is often less vulnerable to extreme changes than the temperature of soil exposed to air.

Creating a large uncompacted planting area, providing good drainage and aeration, using deep watering practices, and fertilizing will all help mitigate the problem of compaction. Preparing the planting area allows soil compaction to be lowered from the usual 95% to a maximum of 85%. Using a backhoe or power auger greatly eases the task of digging the planting hole. If the hole is dug with an augur, the walls must be roughened with a planting bar to allow roots to penetrate the soil after the tree is planted.

**Locate Underground Utilities**

Every home and business in Thousand Oaks is served by public utilities: water, wastewater, gas, electric, telephone, and cable television. Wastewater laterals are particularly susceptible to damage and stoppages due to root intrusion by trees and even large shrubs, especially in times of drought. This results in both added and unnecessary costs to the city as well as the individual property owners.

City crews and/or property owners must contact the various utility companies prior to scheduling planting to determine the location of their respective utility laterals prior to digging. The location of a water service lateral is usually obvious because the water meter should be visible at the ground surface. This is not, however, true with the other utilities. It is not uncommon to dig or drill directly into a gas main or wastewater lateral. People may not be aware that they have hit a wastewater lateral and unknowingly plant their tree, resulting in possible flooding at a later date. There is also potential danger from cutting into a gas main (resulting in explosions or fire), or electrical conduit (causing shock or electrocution).

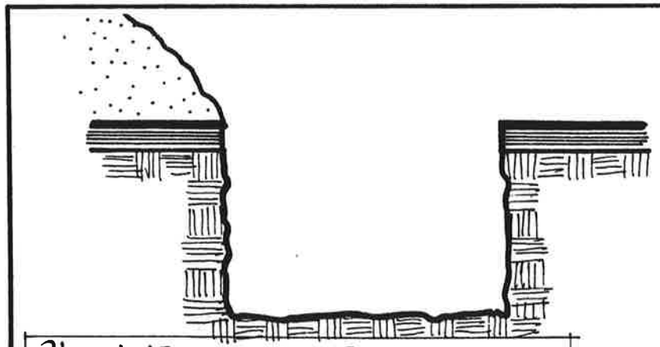
**Planting in Tree Wells**

Cutting existing pavement may be needed to create an adequate tree well. This work requires the use of heavy equipment and should only be done by city crews or an appointed contractor with a permit from the city. A diamond saw cutter, jackhammer, backhoe, loader and dump truck may all be required depending on the situation.

A soil shaft may be used to increase the planting area in tree wells and narrow parkways which cannot be widened. This is an area under the pavement which is filled with loosened backfill. An air space filled with gravel separates the soil from the pavement. The pavement must be reinforced because of the lack of support from below since pavement is usually constructed on compacted soil for stability. (See Figures 4 and 5.)

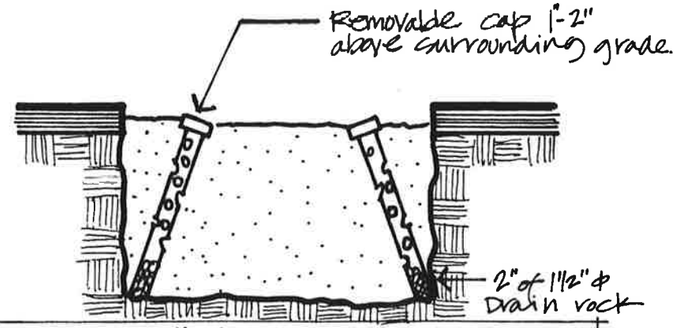
**Check For Soil and Drainage Problems**

While digging and preparing the planting area, it is recommended that you check for any adverse or unusual soil conditions such as alkalinity, poor



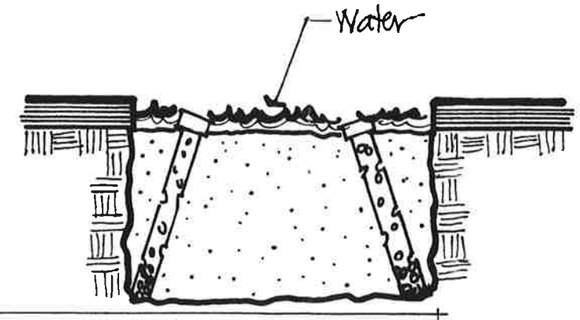
## Step 1: Prepare the Planting Area

Cut the pavement as necessary to create a minimum 4x6 foot planting area. For soil shaft, option 2A, enlarge to minimum 4x12 foot. Dig minimum 4x6x3 feet deep pit. Scarify sides. Check for soil drainage problem and correct. Water must drain overnight, or tree must be relocated.



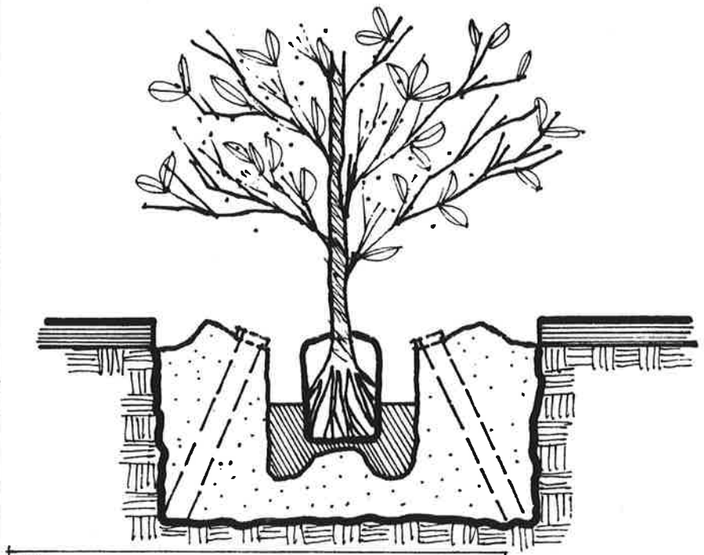

## Step 2: Install Aeration, Drainage and Watering Materials

At a minimum, install 2"-4" ϕ perforated PVC drain tubes with gravel in the bottom and wrapped in filter fabric. Return soil with clods broken up to a maximum compaction of 85%. For other options see steps 2A-C on back of this sheet.



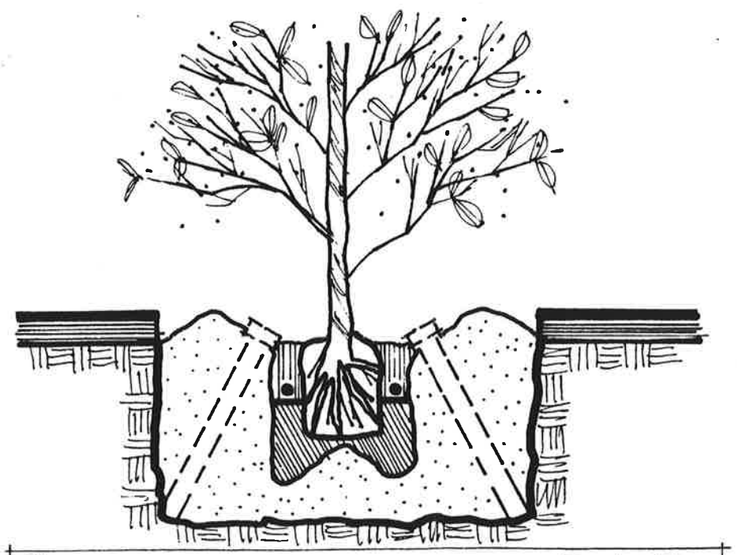

## Step 3: Settle the Backfill

Water thoroughly and tamp. Add soil as necessary to achieve finish grade before digging planting hole.



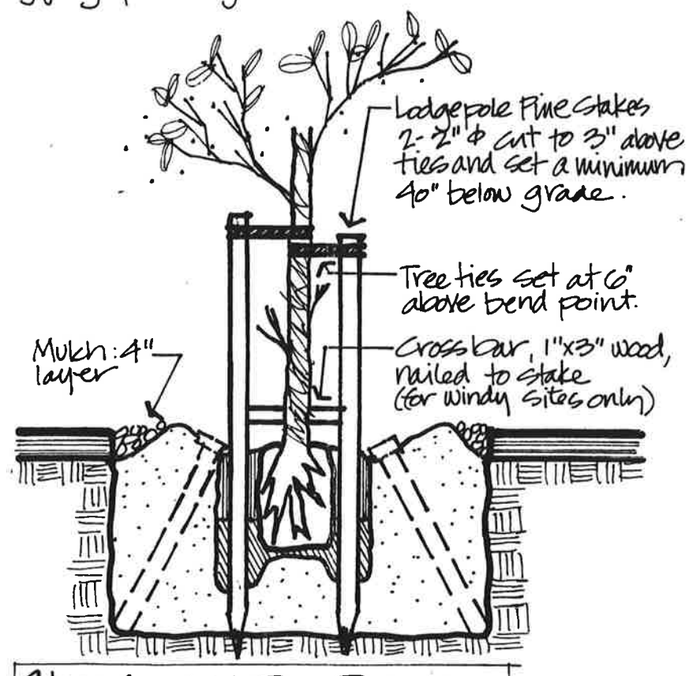
## Step 4: Dig the Planting Hole

Make hole 2 times wider than the rootball. Form a compacted mound of soil at the bottom of the hole. Place the tree and backfill halfway with soil. See 3.3 for variations required if bare root or ball and burlap trees are used



## Step 5: Add Nutrients and Finish Backfilling

Install water retaining polymer and slow release fertilizer. Finish backfilling with soil. The top of the rootball should be 2" above finish grade. Construct a 4" high watering basin and fill with water three times.

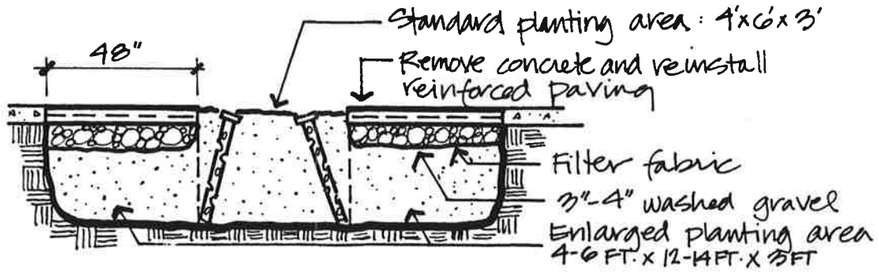



## Step 6: Add Tree Protection

Remove nursery stakes. Stake the tree and install mulch around, but not in the basin. If needed install optional tree grates with gravel mulch and tree guards. Clean up area.

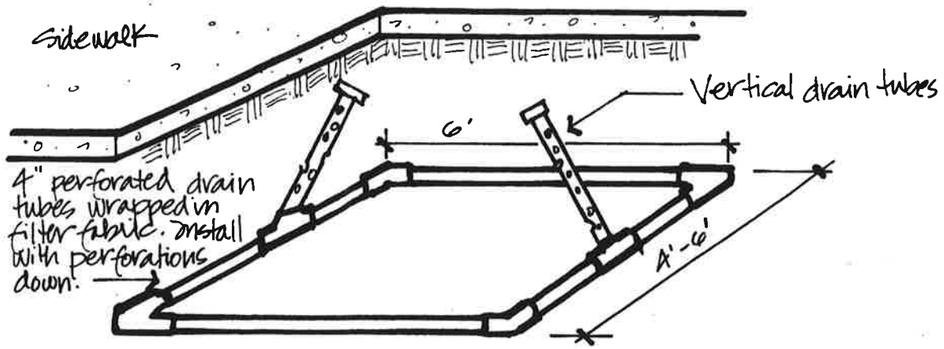
**PLANTING A TREE**

FIGURE 3



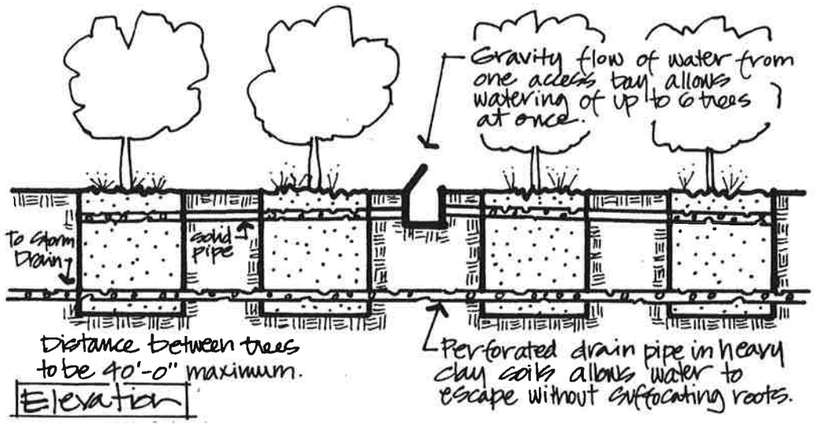

Cut 4x4 ft. sections of pavement on each side of the planting area. Excavate enlarged planting area. Install gravel. Install horizontal aeration tubes (Option 2b) or irrigation and drain lines (Option 2c). Install new concrete paving with reinforcement to support the soil and gravel below. This option provides aeration below the pavement.

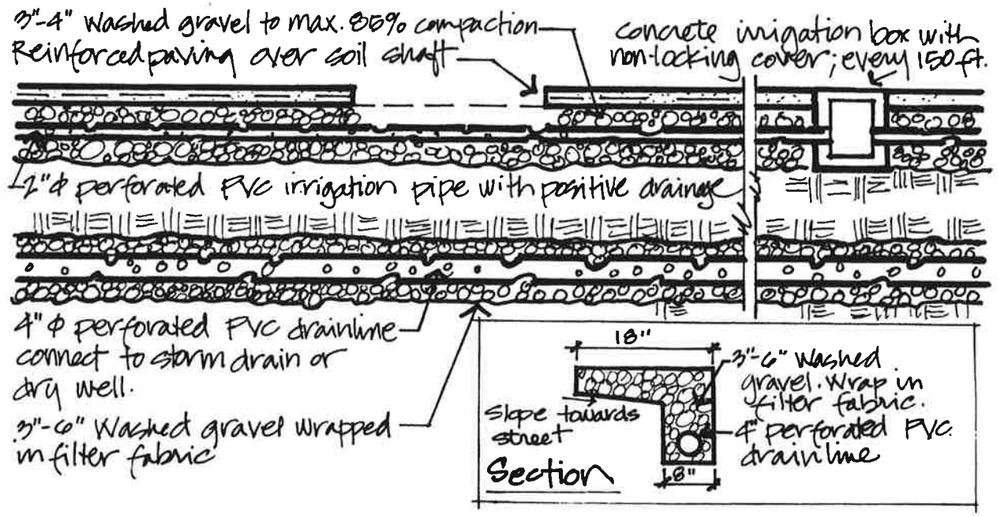
## OPTION 2A: SOIL SHAFT FOR MAJOR STREETS




Install tubes at the bottom of the planting area, along the perimeter of the excavated pit. Connect to vertical drainage tubes. This option is useful for an isolated tree well with aeration and compaction problems and can also be used in conjunction with the soil shaft shown in option 2A.

## Option 2B: Horizontal Aeration Tubes for Major Streets

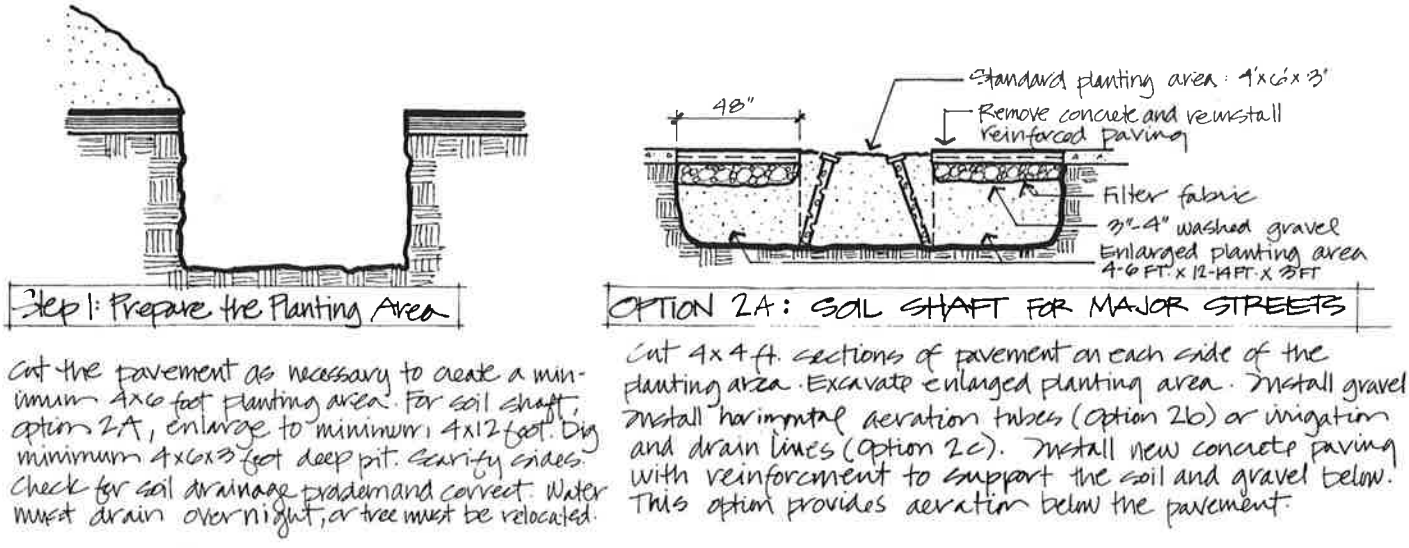



For newly constructed streets with a series of tree wells, this complete system may be installed for optimum tree growth. The soil shaft promotes horizontal root growth. The watering system allows for quick watering of multiple trees. This watering system may also be installed in conjunction with aeration system shown in 2A. The drainage system assures that water is removed from bottom of tree well.

## Option 2C: Irrigation and Drainlines for Major Streets

FIGURE 4




**Preparing the Planting Area** **Figure 5**

drainage, rocks or debris, or compaction. These conditions must be remedied prior to planting.

Alkalinity may be found by looking at color. Gray or white soil usually indicates an alkaline condition. The use of alkaline-tolerant species is recommended. (See 2.7 for such species.)

Poor drainage can be identified by filling a planting hole with water and seeing how long it takes to drain. If water in the hole has not settled at least one inch in one hour, do not plant before special drainage preparations are tried. If the water has not drained overnight, a new planting location should be chosen. Also check the species selected to be sure it will grow in poorly drained soil. If not, contact the community forest program.

If compaction is severe, a breaker bar may be needed to loosen the soil or drill through hardpan. (See the following section on improving drainage.)

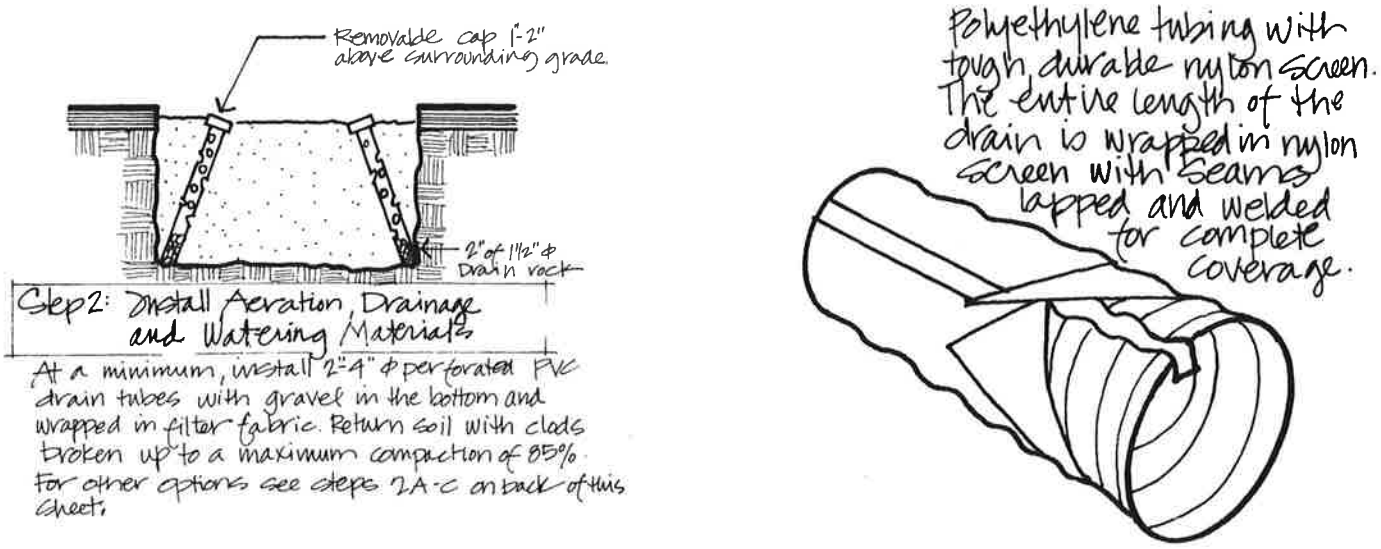
**Backfill**

When preparing and planting trees in clay soils, do not add soil amendments unless special conditions require it, such as highly alkaline soil. Although organic materials can improve the structure and permeability of any soil, if you add a large quantity to a planting hole in clay soil you can, in effect create an underground "container" for a new tree's roots. Upon reaching the perimeter of the planting hole and its soft, permeable, conditioned soil, roots will then run into dense native clay and have difficulty penetrating it. Excess water also collects in the amended planting hole, waterlogging the root zone and possibly killing the tree from lack of air in the soil.

In the clay soils typical of Thousand Oaks, the backfill mix should be native soil which has been loosened by excavation of the planting area.

Water immediately after placing the backfill in the planting area to settle the backfill to finish grade.

Import soil should only be used as a last resort, in areas of highly alkaline native soil.




**Aeration and Watering Tubes with Filler Fabric** **Figure 6**

Import soil meeting the Soil and Plant Laboratories Import Landscape Soil Specification (#430) should be used as backfill to replace the soil in the entire planting area (minimum 4 ft. by 4 ft. by 3 ft. deep). The soil should be a sandy loam with:
- coarse sand: 15% max. by weight (0.5-2.0 mm)
- silt plus clay: 15-45% by weight (less than 0.05 mm)
- gravel: 20% max. by weight (2-13 mm)
- rocks: 1/2-1" 25% max. by volume
- no rocks larger than 1" diameter
- pH should be between 5.5 and 7.5.

**Improving Drainage**

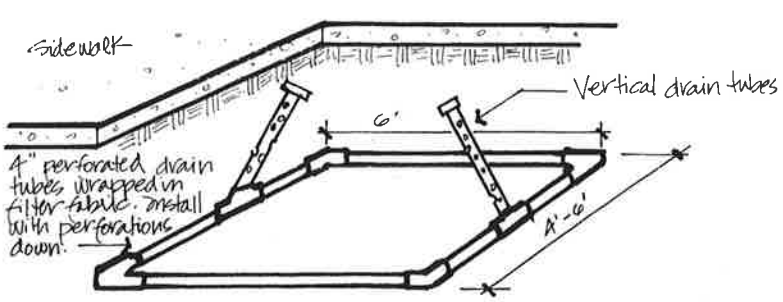
Constantly wet soil prevents active root growth. Trees should never be planted in swales or depressions. Various methods for assuring acceptable drainage in the planting area should be used.

■ In the very worst cases, where no percolation takes place, and the layer creating the problem is too thick to drill through, planter holes must be thought of as bathtubs. A drainline must run from the bottom of the "bathtub" to a common drain.

■ Where a hardpan layer is encountered, drill numerous 2" diameter holes through the hardpan.

■ In clay soils which drain fairly slowly but in which the top soil is at least 6 ft. deep, and continuous (the dominant condition in Thousand Oaks), watering tubes are recommended in all cases Irrigation should be thorough and infrequent. If water does not drain when tested while preparing the planting area, 6" diameter holes augered to a depth of 2 ft. minimum, and filled with gravel, may help keep water away from the roots.

■ In deeper soils with an uninterrupted soil profile to a depth of 10 ft. or more, no drainage arrangements should be needed other than the watering tubes recommended in all cases.




Option 2B: Horizontal Aeration Tubes for Major Streets

Install tubes at the bottom of the planting area, along the perimeter of the excavated pit. Connect to vertical drainage tubes. This option is useful for an isolated treewell with aeration and compaction problems and can also be used in conjunction with the soil shaft shown in option 2A.

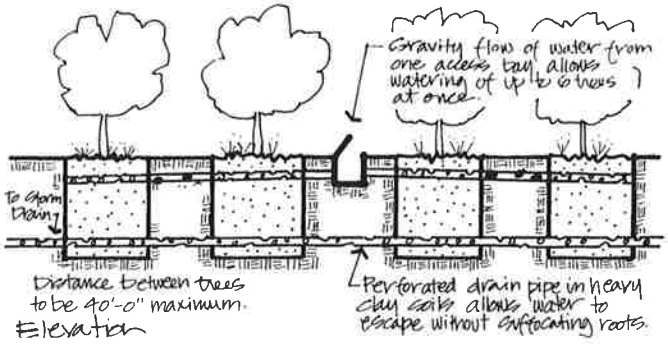



**Figure 7**

**Watering and Aeration Systems**

It is essential that moisture and air reach the feeder roots of the tree. All new trees must be installed with watering tubes. It is recommended that existing trees under 5 years old be retrofitted with these tubes. These will also serve as drainage tubes where no other provisions have been installed.

■ Dig holes 3" to 6" in diameter, 2 to 3 feet deeper than the bottom of the planting hole.

■ Install two 4" diameter perforated PVC drain-pipes which have been wrapped with filter fabric. The top of the pipe should be 1" to 2" above finish grade with a removable cap. (See Figure 5.)

■ Place a 2" deep layer of 1 to 1-1/2"-diameter clean, washed gravel at the bottom of the tube to break the velocity of the water (unless a horizontal system is also used at the bottom of the hole, as recommended for major streets).

For tree wells in major streets, an additional system of aeration pipes is recommended in addition to the two watering and aeration tubes recommended for all trees. The pipes are installed horizontally at the bottom of the planting area and connected to the two vertical pipes. (See Figures 4 and 7.)

When a number of tree wells are installed in a row on a street, a watering system can be set up to water multiple trees at once. A treewatering box is installed which receives water from a hose. Perforated pipe runs from the box to the planting area of the trees. Similarly, if a row of tree wells need drainage lines installed, a common line can be run from one tree well to another and then to one outlet. (See Figures 4 and 7.)

An irrigation system using either bubblers or drip emitters is another alternative, although unless well-monitored such systems tend to overwater trees and have higher initial capital costs. (See 3.4.3, tree watering.)

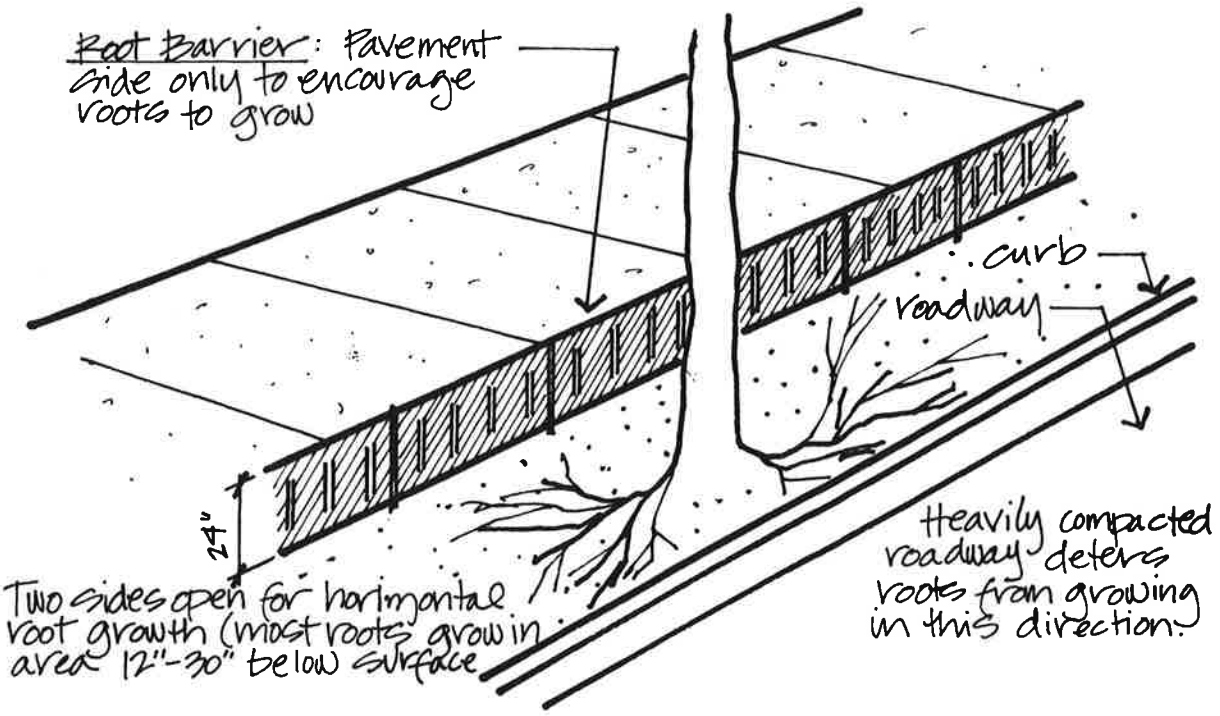



**Figure 8**

**Root Control Barriers**

The recommended minimum planting area is 4 ft. by 6 ft. Root control devices should be used whenever the tree must be in a 48" square or smaller opening of a pavement area. They should also be used when a tree is planted in an area adjacent to pavement, within 3 ft. of the pavement. Any tree species, in most soils, will eventually damage surrounding pavement in openings less than 36" square without root control, and many will cause damage in areas of less than 48". While barriers help direct the tree's root growth downward, they should not be thought of as removing the need for proper species selection.

Trees with vigorous root systems may eventually crack pavement even with root control, with the deep root barrier only delaying this occurrence. Examples include *Cinnamomum camphora* and *Fraxinus uhdei*. Root barrier strips 24" in depth are more effective than root control boxes. They may be installed either during tree planting or near established trees. They may also be used to help direct roots away from underground utilities. Root pruning may be required for established trees (see 3.4.8). Barrier strips are installed flush on the pavement side; the compacted soil beneath the roadway usually serves as an adequate barrier on the curb side. No more than two sides of the tree should have root barriers so that roots have some horizontal room to grow. (See Figure 10.)

An alternate method of root control is to use a vapor barrier strip. This is a geotextile fabric (a synthetic textile which can be placed underground) impregnated with an herbicide. The herbicide forms a vapor barrier about 2" on either side of the fabric. Roots which enter this zone are inhibited, and other root tips take over moisture absorption. The barrier is advertised as being effective for fifteen years, although it is too new to the market to confirm this. It should be considered for experimental use only until environmental concerns as well as functional success are documented.

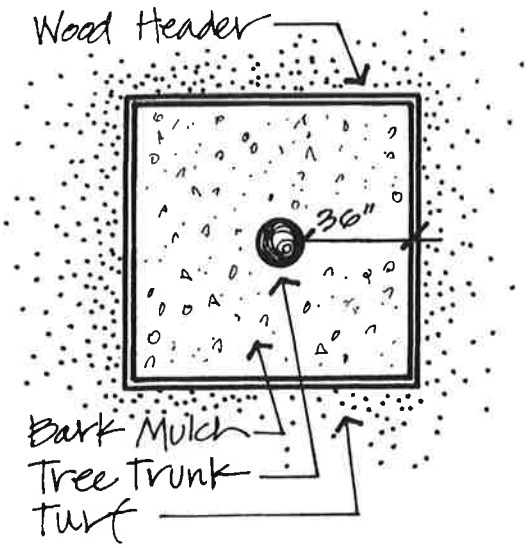



Figure 9

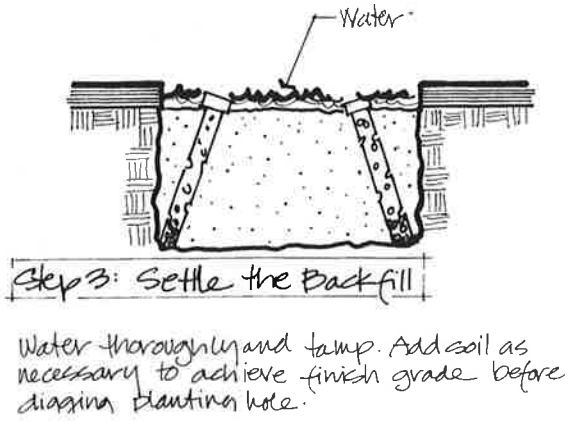



Figure 10

**Trees in Turf Areas**

In turf areas, trees must have a minimum 3 x 3 ft. wood header to keep turf away from the tree trunk. Lawn mowers and weed whips cause tremendous destruction of the cambium layer, and must be kept away from tree trunks. (See Figure 9.)

## 3.3.3 PREPARING PLANTING HOLES AND PLACING THE TREE

After the planting areas have been prepared, all needed watering, aeration and drainage, and root barrier systems have been installed, and the backfill has been well settled, the planting holes are dug and the trees planted. (See Figures 10-12.)

**Container grown trees**

■ First, soak the root ball thoroughly with a wetting agent/water mix (Aqua-gro) for 15 minutes, preferably eight to twelve hours before planting. Avoid planting recently saturated root balls, which can fall apart when handled. Dry root balls should never be planted, since it is very difficult to wet a dry root ball after installation.

■ Dig the planting hole at least twice as wide as the root ball, and 8" deeper than the container.

■ Form an 8" mound of soil to set the root ball on, and tamp it down firmly.

■ Remove the tree from the container, carefully supporting the root ball from below. Trees should never be handled by the trunks (except bare-root trees). Handle all trees by their containers or root balls.

Check the root ball for signs of being rootbound. Reject any badly rootbound trees, or trees with kinked roots. (See 3.2.3.) Otherwise, sever any circling roots 3/16" diameter or more with a sharp shears or a knife.

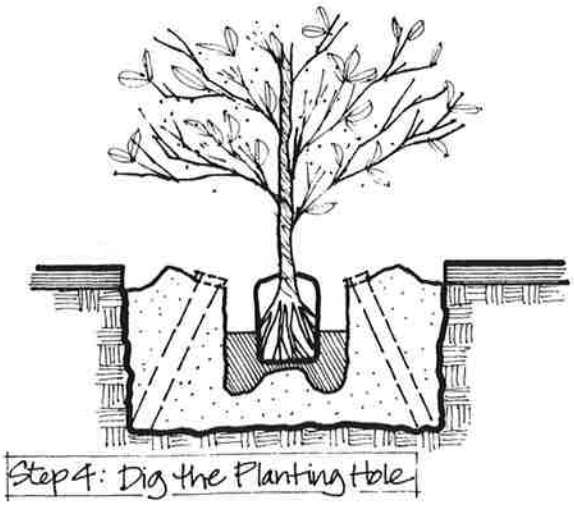



Figure 11

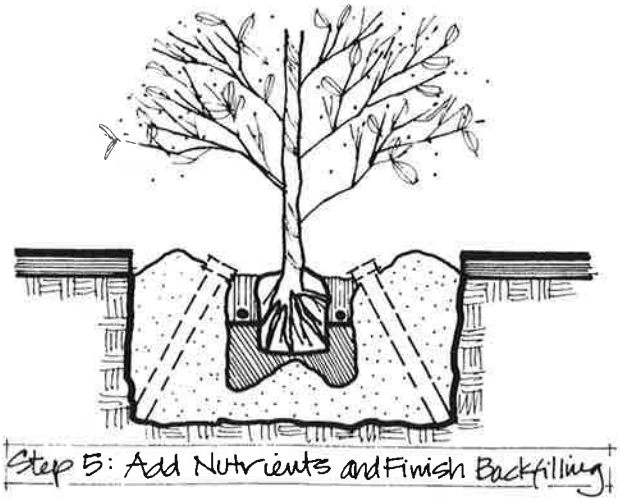



Figure 12

■ Set the tree in the planting hole so that the top of the root ball is 2" above grade. (The tree will settle to grade when watered.)

■ Fill in about half the hole with backfill and soak the soil. When the water has drained away, place slow release fertilizer (3 oz. Osmocote 18-6-12 or equivalent for a fifteen-gallon tree) and water-retaining polymer (1-1/2 oz. Broadleaf P-4 or equivalent for a 15-gallon tree) on the soil. These materials placed adjacent to the root ball will provide for the needs of newly emerging roots during the first two years. Fill in the rest of the planting hole.

■ Form a watering basin of the same diameter as the root ball, and fill up the basin three times, letting the water drain each time. (See Figure 12.)

**Bare root**

■ Soak the tree's roots in water or keep them in a moist plastic bag while preparing planting hole.

■ Form a mound or cone of soil in the center of the planting hole.

■ Place the roots of the tree on this mound, carefully spreading them out at their natural angles. Roots should fit the planting hole without bending or cutting them.

■ Plant the tree at the same depth that it had been previously growing. Look for a distinct color change in the bark on the trunk just above the root flare. The mark indicates the former soil level. Position the tree in the planting hole so that this point is about an inch above the soil surface (it will settle down to grade when watered in).

■ With the tree positioned on the cone of soil, fill in about half of the hole with backfill soil. Add slow release fertilizer and water-retaining polymer. Use Osmocote (4 oz.) or equivalent, and Broadleaf P-4 (1 oz.) or equivalent per cubic foot of soil in the planting hole. Soak the soil.

■ When the water has drained away, fill in the rest of the planting hole with more backfill and water it. If the tree settles too low in the process, you can raise it to the proper position while the soil is moist by grasping it firmly and gently, lifting it up with a side-to-side rocking motion until it is at the proper height.

■ Apply more soil and water until the tree remains at the correct level.

■ Form a watering basin which is the same diameter as the root system, and fill up the basin three times, letting the water drain each time.

**Ball and burlap**

■ Soak the root ball thoroughly with a wetting agent/water mix (Aqua-gro or equivalent) one to two days before installation.

■ Dig a planting hole twice the diameter of the root ball and 6" deeper than the depth of the root ball.

■ Form a mound of soil to set the root ball on, and tamp it down firmly. Set the still-wrapped root ball on the mound. Do not break the root ball. Check the level of the root ball, making sure that the top of the root ball is 2" higher than the level of the surrounding soil to allow for settling.

■ After the tree is properly positioned in the planting hole, fill the hole to half its height with backfill soil and water. Untie the burlap wrapping and pull the burlap to the edge of the root ball. You don't need to remove the burlap from the root ball.

■ Finish backfilling with soil and add slow-release fertilizer and polymer (4 oz. Osmocote and 1 oz. Broadleaf P-4 or equivalent per cubic foot of soil in the planting hole).

■ Form a watering basin which is the same diameter as the root ball, and fill up the basin three times, letting the water settle in between soakings.

**Staking the Tree**

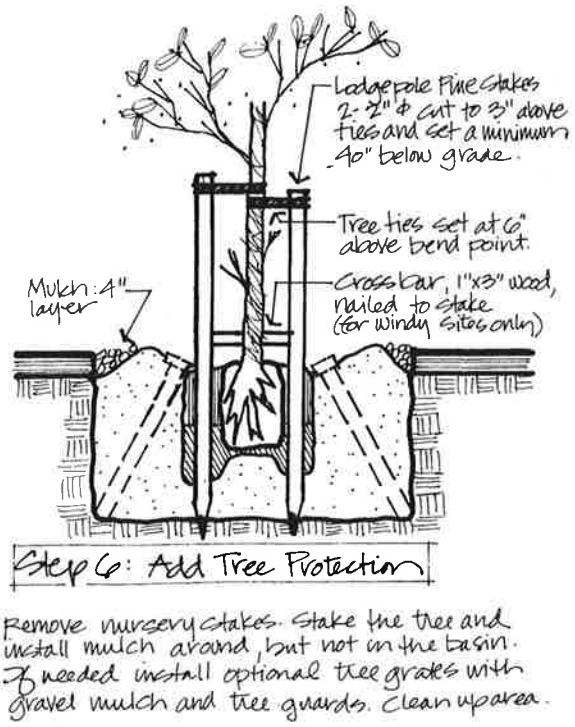
The purpose of staking is to stabilize the root ball until the roots can anchor the tree, supporting the trunk in an upright position, and protecting the trunk from injury. Whenever possible, it is better to not stake a tree if it can stand without one. The tree will develop a strong trunk in a shorter period without staking. Conifers, upright growing trees, and trees planted bare root may not need staking. However, most nursery-grown trees will need staking for stability and protection from injury. (See Figure 13.)

■ As support stakes for five-gallon to 24-inch box trees, install two 2" diameter (or 2" by 2") stakes per tree, tall enough for the particular tree. Install the stakes outside the root ball and a minimum 30" below grade to ensure stability.

■ Supplemental stakes for anchoring the root ball or for protection should be 3 ft. long, with half the length of the stake below grade.

■ Support stakes should be perpendicular to the prevailing wind direction. A 1" by 3" cross bar in may be added for stability. On windy sites where the wind comes from several directions, a three-stake system may be needed.

■ Ties should be flexible to allow for growth of the trunk. Wire ties should never be used. Install ties at one point only, at 6" above the natural bend point of the tree. To find the bend point, remove the nursery stake (the small stick attached to the trunk at the nursery) and pull the top of the crown to one side, holding the trunk with one hand. The point on the trunk where the canopy will snap back to an upright position by itself is the natural bend




**Staking the Tree** **Figure 13**

point. Pruning the tree at planting time, when indicated, will lighten the weight of the canopy and raise the natural bend point. (See 3.4 for pruning guidelines.)

■ Cut the tops of the stakes so that they are only 2" to 3" taller than the point where the ties are placed. This prevents the top of the tree from rubbing against the stakes in strong winds.

■ The nursery stake should usually be removed at planting time. However, if the trunk is too weak to stand without the stake, it should be cut and reattached as an auxiliary stake. The auxiliary stake should be attached 2" above the root ball and no higher than 24" from the tip of the tree's central leader.

An even better auxiliary support in this case would be a flexible spring steel rod (or other flexible support stake such as fiberglass or bamboo) extending from 2" above the root ball to 6" above the natural bend point of the tree. The rod should be 1/4" diameter for five-gallon cans and 3/8" diameter for fifteen-gallon cans. Tie the rod to the trunk with one-inch-wide plastic tape at 6" to 10" on center.

Auxiliary stakes do not take the place of support stakes. Their sole purpose is to help strengthen and straighten the trunk while allowing movement.

■ Ties should contact the trunk with a broad surface to minimize rubbing or girdling, and should have some elasticity. Wire should **never** be used. Elastic webbing, tire cording, or heavy polyethylene tape (for small trees) can be used. The tie should be loosely looped around the trunk. Two ties, one from each stake, should be used.

■ Larger trees, 36" box or larger, may require a guying system for anchorage. The least hazardous method for pedestrians is an underground auger anchor, such as Duckbill earth anchors. Above-grade guy wires should not be used.

■ For small trees which may need protection against weed competition and human and machine damage, tree shelters known as "Tuley tubes" can be installed. These are twin-walled, translucent, photodegradable polypropylene tubes from two to six feet high, which serve as miniature greenhouses for the trees. The use of these tubes can allow a mass planting to be done at a fraction of the cost. The tubes cost about $2, and allow a seedling or one gallon tree to be used rather than a five or fifteen gallon specimen.

**Adding Mulch**

A 4"-deep layer of shredded bark or bark chips should be spread over the entire planting area outside the watering basin at planting time wherever possible, to conserve soil moisture, inhibit weed growth, and prevent baking of the soil by the sun. Mulch will also improve soil fertility and soil

structure as it degrades into the soil. For trees in tree wells or narrow planting strips, where mulch would tend to spill out on the pavement, it may be necessary to use a thinner layer. Shredded bark is preferable on slopes as it has less tendency to slip than bark chips.

**Placing Paving Materials**
Paving materials laid flush with the soil in a tree well generally cause compaction and limit access for watering, but are a better method than planting in smaller cutouts. They will also cause crown rot problems if they touch the trunk. In high-traffic areas, where the planting areas need to be diminished to allow for pedestrian movement, use a tree grate or other self-supporting system which does not compact the soil.

Where new paving is installed, it should slope away from the planting area so that excess runoff does not drain toward the tree in the winter. Water from paved surfaces also carries alkaline chemicals and motor oil residue into the soil.

**Installing Tree Guards and Grates**
In high-traffic areas more protection is needed for young trees. In some cases aesthetics may demand iron tree guards, but they must be removed as the tree matures or they will strangle the tree.

Perforated iron tree grates or precast concrete tree covers with perforations may be used if they are self-supporting above the soil. The perforations allow air and water to reach the soil. The grates must be expandable (by means of knock-out sections) to allow for trunk growth. When grates are used which cover the watering tubes, remove the tube cap so that access to the tube is possible through the grate. Pea gravel is the recommended mulch material when tree grates are used.

**Turf and Ground Covers**
Turf and ground covers should not be installed within a tree's watering basin, as they will compete with the tree for nutrients; the tree may also suffer mower- or weed-whip damage.

Frequently when trees are planted, ground cover is kept at least 3 or 4 ft. from the tree. However, sometimes the aesthetic benefit of ground cover, or the need to protect or enhance trees in high traffic areas, outweighs the problem of competition for nutrients. This is a design decision that needs to made for each situation.

**Cleaning Up**
The work area should be swept, debris removed, and tools returned.

## 3.3.4 WHY TREES SOMETIMES DIE AFTER PLANTING

- Loss of roots from too severe root pruning (roots are often pruned to compensate for a root-bound condition in containers) or from a root ball breaking apart when handled.

- Drying of roots from exposure to sunlight before planting, in bare root trees.

- Air pockets, stones, or hard clumps in the soil which prevent contact of the roots with the soil.

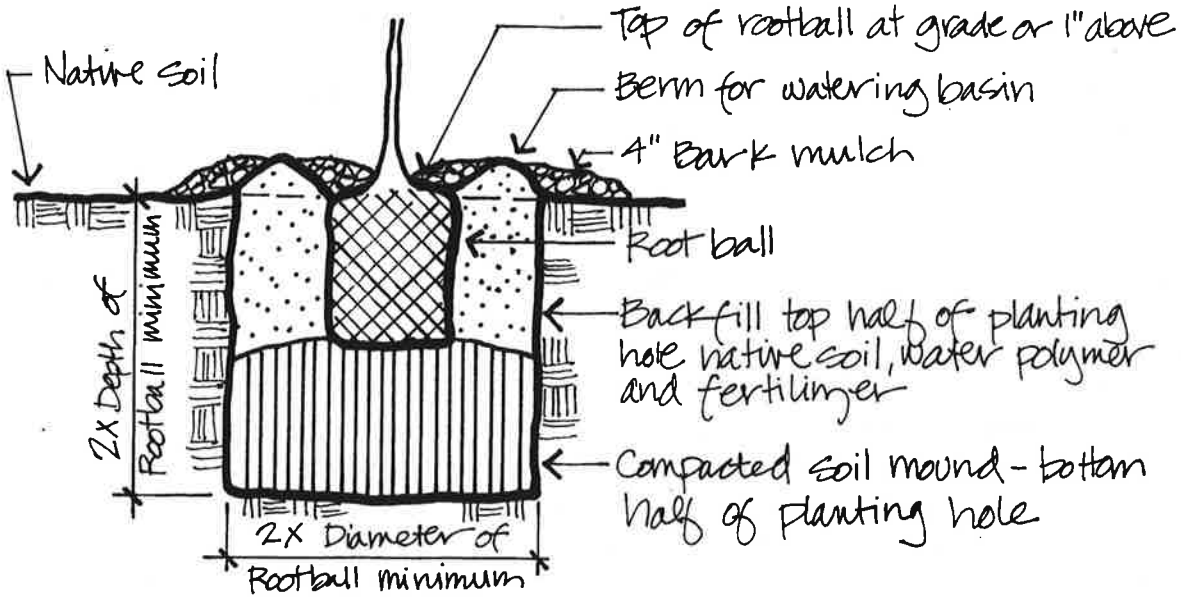
- Insufficient preparation of the planting area, so that soil compaction is not corrected.

- Crowding of the roots into too small a planting hole.

- Overwatered, soggy soil

- Lack of water

- Failure to correct alkalinity in the soil and to plant an alkaline-tolerant species.




**Planting a Shrub** **Figure 14**

## 3.3.5 PLANTING SHRUBS, VINES, AND GROUND COVERS

Since the focus of this Master Plan is trees, all references to shrubs, vines and ground covers will be for those that are planted under trees in the public right of way. This includes street medians and parking lots. In general, recommendations for purchasing, planting, and maintaining trees also apply to other plant materials.

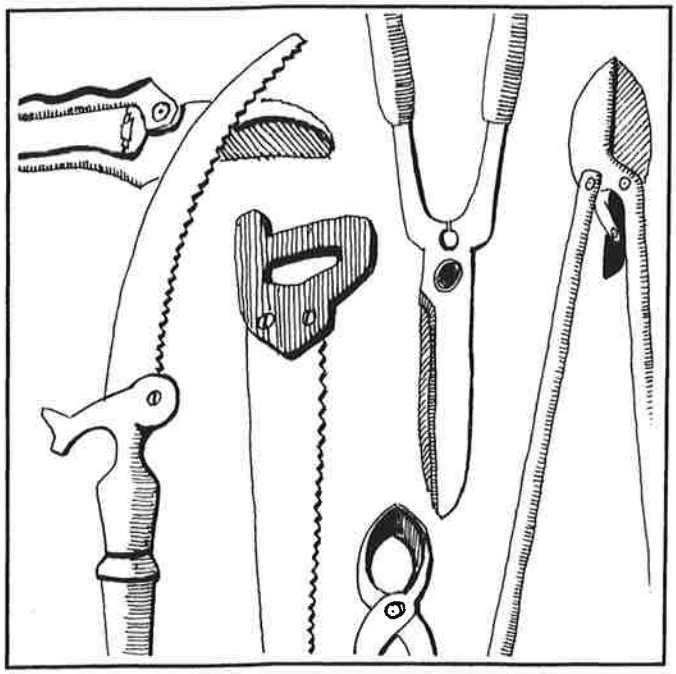
Although the plant palette recommends drought tolerant species, all new plantings require water for at least the first two growing seasons. Since shrubs have smaller, shallower root systems, they require more frequent watering than trees.

Staking of shrubs is usually not necessary.

## 3.3.6 STANDARD DETAILS

Most planting details seen on typical landscape architectural plans or in a city's set of standard details are based upon standards established more than 30 or 40 years ago. Most trees planted then were in estate or residential settings where the essentials for healthy growth—air,water and nutrients—were plentiful. These typical planting details are not adequate for most planting situations in the city.

Figures 3-14 in this volume offer practical solutions for improving the ability of a tree to survive and mature in restricted planting areas.



## 3.4 PRUNING

This chapter describes proper pruning techniques for trees in Thousand Oaks, from young plants through maturity, decline and removal.

### 3.4.1 WHY IS PRUNING NEEDED?

Pruning is the removal of parts of the tree to protect its health, preserve and enhance its natural form, create and maintain a strong structure, and protect people, property and utilities. In general, a tree should be left to grow into its own natural form. Correct pruning will not destroy the natural form of a tree.

Pruning of trees in the public right-of-way and public service easement can only be done by the city. Pruning private trees on private property should be done under the supervision of a certified arborist or other licensed professional. Pruning of oaks or landmark trees on either public or private land requires a permit. Pruning of trees on commercial, industrial and common areas may also need a permit. The following lists some reasons for pruning.

**To train young plants.**
Pruning should take advantage of the tree's growth habit, accenting its natural form, seldom modifying its natural form greatly. Prune to keep the tree's growth in balance, to establish a strong scaffold structure (the framework of the trunk and major limbs), and to maintain a dominant leader.

■ Branches forming the scaffold should be well spaced and crotches should be wide-angled. Narrow crotches are usually weak and may split out as the tree matures. (In a narrow crotch, more bark can be embedded between the branch and trunk, reducing the proportion of connective wood.)

■ Remove crossing and interfering branches, water sprouts (vertical shoots growing from the trunk or main branches) dead and diseased branches, and root suckers (vertical shoots growing from the rootstock).

■ A few minutes of proper pruning on a young tree can eliminate hours of costly corrective pruning on a mature tree. It is easier and less costly to cut a two-inch diameter branch on a young tree than to wait and have to cut the same branch when it is ten inches in diameter, leaving a space in the tree canopy. Also, when a tree is young, cuts heal much faster and the likelihood of disease or pest problems at the cut surface are greatly reduced.

**To maintain the health and appearance of a tree.**
Pruning is used to remove dead, diseased, injured, broken, rubbing and crowded limbs. A dense crown may be thinned lightly to allow for passage

of light and air to the interior of the tree, and to decrease wind resistance.

**To control the size of a tree.**
Pruning can reduce shade, interference with utility wires, and prevent obstruction of views and traffic. Safety clearance at signs and corners, and pruning of lower branches which obstruct parked cars and street sweepers is particularly important. Choosing a tree that will be an appropriate size for its location will minimize the need for pruning. If a tree must be pruned more than every five to seven years, it is the wrong tree for the location. A tree should not need heading back.

(Much of the section on why pruning is needed is adapted from Dr. Richard Harris' book *Arboriculture: Care of Trees, Shrubs, and Vines in the Landscape).*

**Pruning Questions**
The following questions should be asked before making pruning decisions.

**What will the tree do in response to the pruning?** Grow taller, or be shorter or narrower? Grow slower or faster? Produce increased new foliage?

**Is the tree healthy enough to respond to the pruning?**

**Is pruning being done to accentuate the species' natural form and habit?**

**Is this the time of the year to prune this species?**

If the answer to any of the last three questions is "no," do not prune at that time.

## 3.4.2 QUALIFICATIONS OF PRUNING PERSONNEL

The person responsible for leading and training the forestry crew should be a trained arborist who is certified by the Western Chapter, International Society of Arboriculture (ISA), and has at least five years field experience. He or she should also be capable of supervising and managing the crew.

If outside contractors are to be used, a list should be prepared of companies who have demonstrated competence in pruning some of the important large trees in Thousand Oaks, such as *Quercus agrifolia, Quercus lobata, Eucalyptus rudis,* and *Platanus racemosa.* Companies that practice stub cutting techniques (heading back large limbs) should not be allowed for work in the city. Tree workers should not be allowed to use climbing spikes except when removing trees.

## 3.4.3 PRUNING TECHNIQUES

The latest edition of the Pruning Standards of the Western Chapter of the International Society of Arboriculture (ISA) will serve as the City's specifications manual. The 1988 standards, reproduced here with adaptations, are presented as general working guidelines. The tree pruner will sometimes have to vary slightly from these rules, since individual trees may have unique needs.

**General Guidelines**

■ Pruning cuts should be clean and smooth with the bark at the edge of the cut firmly attached to the wood.

■ Large or heavy cut branches should be lowered on ropes or thrown clear to prevent injury to personnel, the tree, or other property. (See 3.1.6, safety, and 3.4.9, tree removal.)

■ Pruning tools should be kept sharp and rust-free. When pruning diseased branches, the pruning

blade should be dipped in a disinfectant after each cut. A 10% chlorine bleach solution is often used.

■ Wound dressings and tree paints have not been shown to be effective in preventing or reducing decay. They are therefore not recommended.

■ When pruning a limb which is more than 1" in diameter at the point of the cut, use a three step cutting method to prevent splitting of wood and bark. First make an undercut about six inches away from the branch collar, and then cut the limb off an inch or two farther out from the trunk. Finish by trimming the branch stub just outside the branch collar.

**Order of Tasks**

Pruning should start at the top of the tree and proceed downward.

■ Remove broken and diseased limbs first.

■ Then remove crossing branches and those which grow towards the center of the tree, or which otherwise interfere with the tree's shape and growth, including water sprouts.

■ Finally, thin the remaining branches if needed. Root suckers should also be removed at each pruning.

**Climbing Techniques**

Pruning large trees is a dangerous, specialized task, and requires experience and care if injury to workers, the public, and damage to property are to be avoided. Pruning should always be performed under the supervision of a qualified tree specialist. Tree climbers should have an ISA Climber's Certificate and on-the-job rope training.

■ Climbing and pruning practices should not injure the tree.

■ Climbing spurs or gaffs should not be used when pruning, unless the branches are more than throw-line distance apart. In such cases, the spurs should be removed once the climber is tied in.

■ Spurs may be used to reach an injured climber and when removing a tree.

■ Rope injury to thin-barked trees from loading out heavy limbs should be avoided by installing a block and tackle in the tree to carry the load. This technique may also be used to reduce injury to a crotch from the climber's line. (See 3.1.6.)

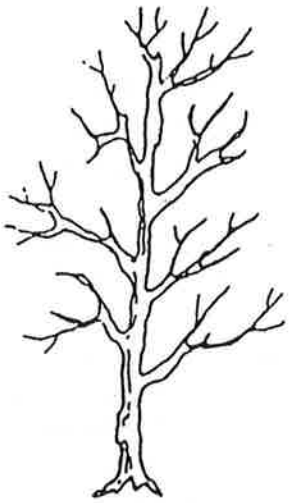
## 3.4.4 TYPES OF CUTS

There are two basic methods of pruning, thinning or heading back. Thinning is the removal of a branch at its point of attachment to the trunk or shortening it to a large lateral branch. Heading back is the shortening of a branch back to a bud or stub.

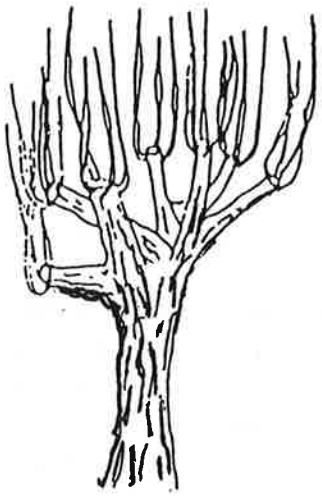
Thinning, which opens up a tree canopy, is almost always the preferred method of pruning. (See Figure 15.) Heading back, which stimulates denser growth, should only rarely be used on mature trees. It is sometimes useful in training young trees (see the following yearly schedule). A form of heading back called stub cut pruning is the removal of branch wood back to stubs (this has often been done, for example, when pruning under utility lines). This is also called topping when used to lower the height of the tree. Stub-cut pruning or topping can cause damage to the tree which is sometimes irreparable, and **should not be used.** Overthinning can also cause irreparable damage. (See Figure 17.)

**Thinning Cuts**

■ A thinning cut removes a branch at its point of attachment or shortens it to a lateral branch at least



THINNING: Protects and enhances a tree's natural form. A proper pruning technique



TOPPING: Destroys tree's natural form. Causes long term structural concerns.

**Thinning Cuts** **Figure 15**

one-half the diameter of the branch which is removed (a 4" diam. branch cut back to a 2"+ diam. branch). Thinning opens the canopy of the tree, reduces weight on heavy limbs, can reduce a tree's height, distributes ensuing invigoration throughout a tree and helps retain the tree's natural shape. Thinning cuts are therefore preferred in tree pruning.

■ When shortening a branch or leader (the central vertical stem of a tree), the lateral to which it is cut should be at least one-half the diameter of the cut being made. Removal of a branch or leader back to a sufficiently large lateral is often called "drop crotching."

The following description of how to make thinning cuts is adapted from Dr. Alex Shigo's research, and the method is called "natural target pruning" because the tree provides visible targets that can be used to locate the appropriate place to make the cut. These targets are the branch bark ridge and the branch collar. The branch bark ridge is a raised ridge on the trunk which begins at the crotch formed between the trunk and the branch. The branch collar is the slightly swollen area at the base of the branch. (See Figure 16.)

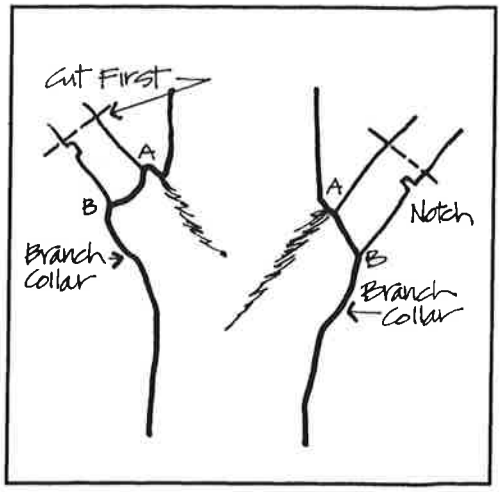
■ When removing a live branch, pruning cuts should be made in branch tissue just outside the branch bark ridge and collar, which are trunk tissue. If no collar is visible, the angle of the cut should approximate the angle formed by the branch bark ridge and the trunk.

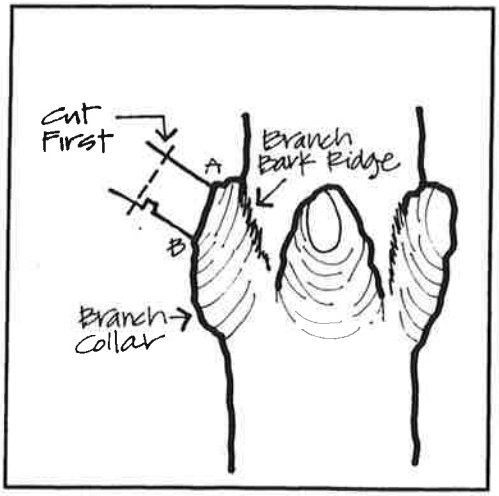
■ When removing a dead branch, the final cut should be made outside the collar of live callus tissue. If the collar has grown out along the branch stub, only the dead stub should be removed. The live collar should remain intact and uninjured.

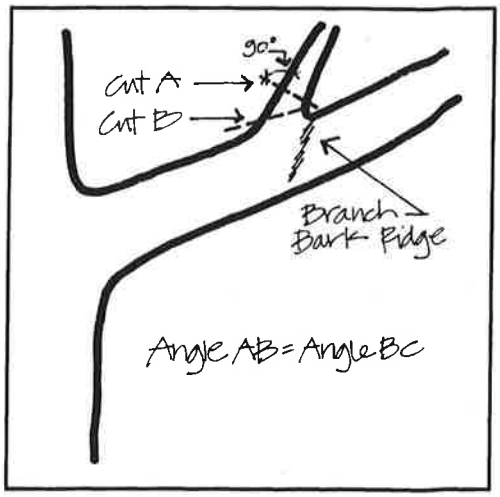
■ When a tree has more than one major limb of

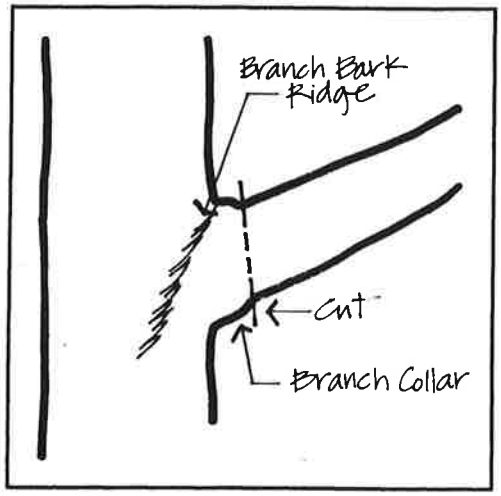
## Natural Target Pruning Steps

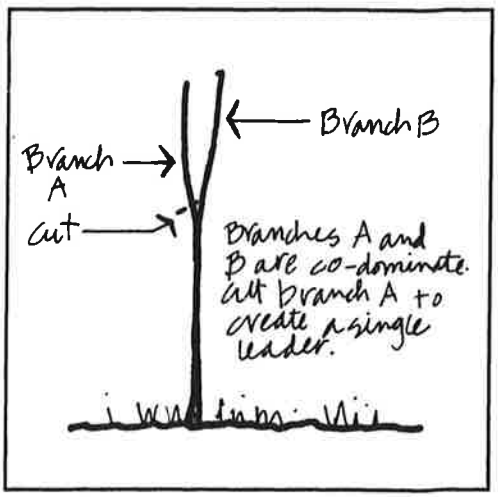
1. Locate the bark ridge.
2. Find Target A.- outside of branch bark ridge.
3. Find Target B - swelling at branch collar.
4. Notch branch to be pruned.
5. Stub cut at first cut line.
6. Make final cut at AB Line.



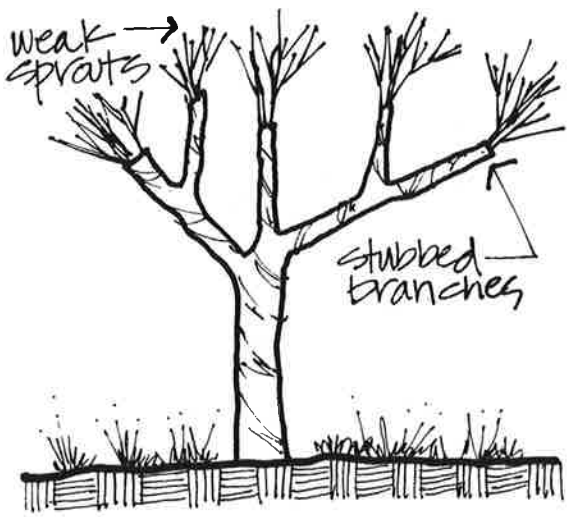




**Natural Target Pruning** **Figure 16**




**Heading Back** **Figure 17**

roughly equal size (co-dominance) thin the foliage of one limb (choose the one which is slightly smaller) to slow its growth and develop a stronger branch attachment. If a limb is more than three-quarters the size of the parent limb, it is said to be co-dominant.

■ When thinning a limb back to a large lateral branch, the final cut should be made just beyond the branch bark ridge. The cut should approximately bisect the angle formed by the branch bark ridge and an imaginary line perpendicular to the branch being cut.

**Heading Back**

■ A heading cut removes a branch to a stub, a bud or a lateral branch not large enough to assume the terminal role. Heading cuts should seldom be used because vigorous,weakly attached upright sprouts are forced just below such cuts, and the tree's natural form is altered. If weakly attached sprouts are allowed to mature, they become limbs which have a high potential for breaking. In some situations, branch stubs die or produce only weak sprouts. Often these sprouts produce structurally weak branches. Heading back is allowed only under special conditions as approved by the community forester, landscape architect, or landscape supervisor. (See Figure 17.)

## 3.4.5 ESTABLISHING A PRUNING MAINTENANCE SCHEDULE

**Defining Priorities**

To establish a pruning schedule, the first task is to inventory and categorize the trees to be maintained. Timing should include consideration of the benefits to the tree's health and growth and the wisest scheduling of maintenance personnel. The city can be divided into pruning areas based on the city's main roads and neighborhood boundaries.

Trees which present a safety hazard should be the highest priority. Define how many trees in each area need this kind of attention, and multiply by the number of person-hours needed for each. This will help budget the time needed for a particular area visit. (See Table 1.)

**The Seasonal Schedule**

Current studies indicate that pruning can be done on a more flexible schedule than was previously thought, but there are times of the year when pruning can be very harmful.

■ Pruning should not be done from Aug.-Sept. Pruning at this time could produce new growth in late fall, which would not have sufficient time to harden off before winter. At this time of year, plant foliage is manufacturing carbohydrates for transmission to the trunk and roots for winter storage. Pruning at these times reduces stored carbohydrates and minerals and thereby reduces vigor in spring. In an already weak tree, this can lead to its death.

■ Prune deciduous trees between leaf-fall and February 1.

■ Prune broadleaf evergreens between February 1 and March 15, or between July 1 and August 1.

■ Prune conifers in the winter to avoid bark beetle attack.

■ Chip, bury or burn all pine and eucalyptus wood, or stack and cover with a sealed 6 mil. clear plastic tarp for at least six months.

■ Avoid pruning trees between April and June 1. In the spring, carbohydrates stored in the trunk and roots are used to manufacture new foliage. Then the foliage, through photosynthesis, makes more food to restore supplies to the trunk and roots, primarily in late summer.

**The Yearly Schedule**
The pruning of a tree can be defined by the three main stages of its life:

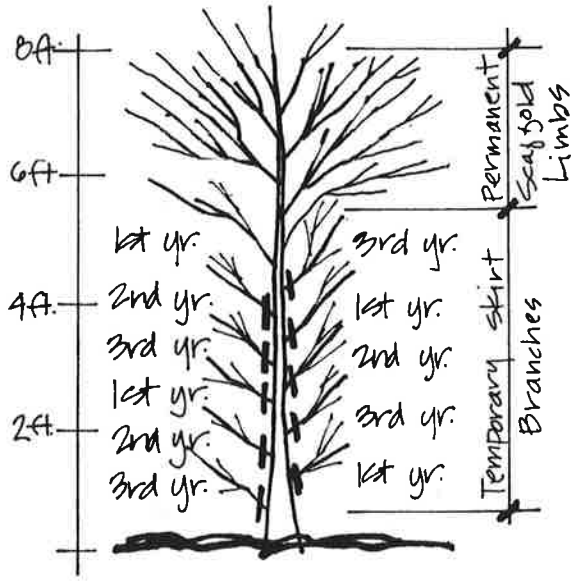
■ The first stage is the first two to four years after installation when the tree is anchoring its roots in the soil, growing a heavy enough trunk to stand without a stake, and establishing its basic branching structure.

■ In the second stage, the majority of the life of the tree, it develops a crown and maintains itself as a vigorous maturing specimen.

■ The third stage is a period of old age, declining vigor, and reduction in annual shoot growth accompanied by greater likelihood of limb drop.

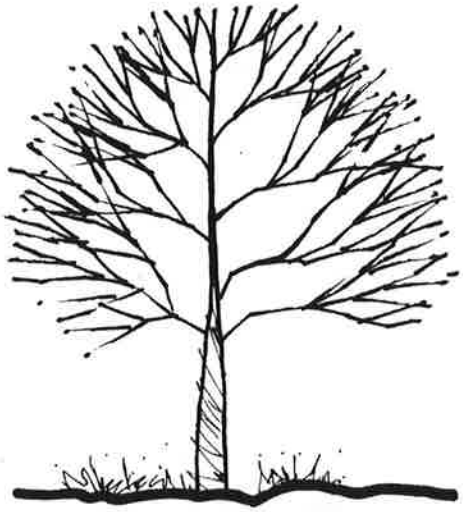
## 3.4.6 THE FIVE TREE GROUPS

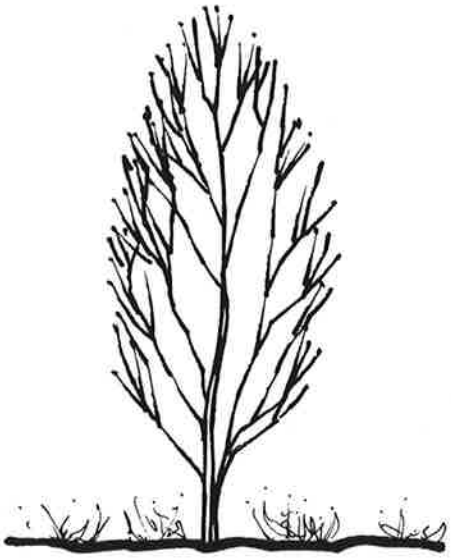
The trees in Thousand Oaks fall into one of five groups. These categories form a convenient framework around which a yearly maintenance schedule can be designed for Thousand Oaks. The tasks deal generally with timing required to create a branch structure, prune the temporary skirt, and, later in the tree's life, promote maximum size and mass of a healthy, structurally sound tree.




**Pruning "Skirt" Branches** **Figure 18**

**Group 1:** Round-headed trees (slow to moderate growth rate) Examples: *Cinnamomum camphora, Ceratonia siliqua, Cupaniopsis anacardioides, Podocarpus gracilior, Pyrus calleryana* 'Aristocrat', *Quercus agrifolia.*
**Group 2:** Round to oval upright (very fast growth rate) Examples: *Eucalyptus* species, *Fraxinus uhdei, Tristania conferta.*
**Group 3:** Deciduous pyramidal. Examples: *Acer rubrum* 'Armstrong', *Liquidambar styraciflua.*
**Group 4:** Vase-shaped. Examples: *Celtis australis, Ulmus americana, Zelkova serrata.*
**Group 5:** Conifers and conifer-like. Examples: *Pinus, Cedrus, Casuarina.*
(See tree matrices in 2.7 to find which group a specific tree is in.)





## GROUP ONE: ROUND HEADED TREES (slow to moderate growth rate)

**At planting time**

☐ Remove one-third of the branches in the skirt. (The skirt is the group of branches between ground level and the permanent scaffold branches. These temporary branches feed the tree and speed the growth rate of the tree. See Fig. 18.) Select the largest diameter of these to remove (the larger the branch, the more competition with the leader for nutrients). Leave the balance distributed up and down and around the trunk, and shorten by about 10% of their length, pruning to buds or laterals facing outward from the trunk. This step is essential to proper health and development of the tree.

☐ Remove or reduce by 50% any branches challenging the leader.

**At 2 years**

☐ Remove half of the remaining branches in the skirt.

☐ Select the main scaffold limbs, remove competing limbs, and thin the remaining crown up to 20%.

**At 3 years**

☐ Remove the remaining branches in the skirt.

**Every 5 to 8 years thereafter**

☐ Perform crown cleaning or thinning as needed. (See the following section, Pruning Mature Trees).

## GROUP TWO: ROUND TO OVAL UPRIGHT TREES (very fast growth rate)

**At planting time**

☐ Remove one-third of the branches in the skirt between the permanent branches and the soil. Select the largest diameter of these to remove. Leave the balance distributed up and down and around the trunk, and shorten by about 10% of their length, pruning back to outward-facing buds or laterals.

☐ Select the main scaffold limbs and remove competing limbs, including any branches challenging the leader.

☐ Thin balance of crown up to 10% of remaining foliage.

**At 1 year**

☐ Remove half of the remaining branches in the skirt to diminish competition with the crown while still promoting caliper growth of the trunk.

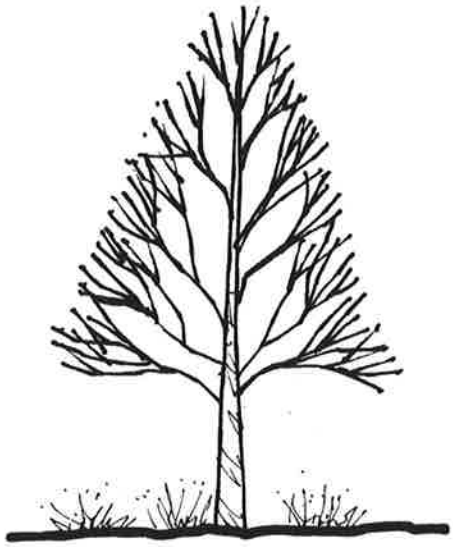
☐ Remove limbs which compete with the main scaffold branches. Branches should be spaced evenly around the trunk, and at least 8" to 12" apart.

**At 2 years**

☐ Remove the remaining branches in the skirt.

**At 2 years and every 5 years thereafter**

☐ Perform crown cleaning or thinning as needed. (See the following section, Pruning Mature Trees.)



## GROUP THREE: DECIDUOUS PYRAMIDAL TREES

**At planting time**

☐ Remove one-quarter of the side branches over the full height of the tree. Select the largest diameter branches to remove, leaving the balance well distributed up and down the trunk.

☐ Remove or reduce by three-quarters any branches competing with the leader.

☐ Shorten the remaining branches by 10% of their length, pruning back to outward-facing buds or laterals.

**At 2 years**

☐ Remove or reduce branches which compete with the leader.

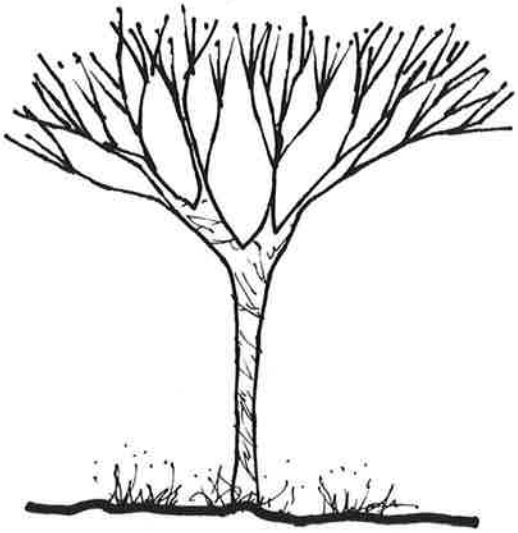
☐ Shorten the remaining branches by 10%, and shorten limbs which protrude beyond the canopy. Prune back to outward-facing laterals.

**At 3 years**

☐ Remove one-third of the branches in the lower skirt up to the height that will be needed to allow vehicle and pedestrian clearance. Shorten the remaining branches up to this height by 20% of their length.

**At 4 to 5 years, and thereafter as needed**

☐ Remove branches as needed for clearance.



## GROUP FOUR: VASE SHAPED TREES

**At planting time**

☐ Select the main scaffold branches, which will all be clustered near one point on the trunk. Remove up to one-third of the main branches, leaving scaffold branches distributed as far apart as possible.

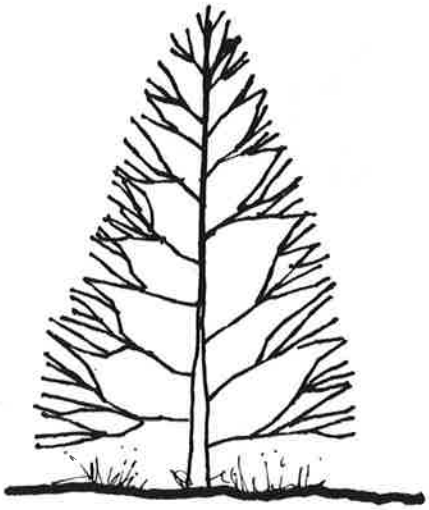
☐ Shorten branches in the skirt of the tree by 10% of their length. Remove any branches in the skirt which are 50% of the diameter of the trunk or greater.

**At 2 years**

☐ Remove half of the remaining branches on the trunk. Remove any crossing limbs.

**At 4 years, and every 5 years thereafter**

☐ Perform crown cleaning or thinning as needed.



## GROUP FIVE: CONIFERS AND CONIFER-LIKE TREES

**At planting time**

☐ Shorten the side branches by 10% of their length.

**At 1 year**

☐ Remove one-third of the branches over the entire height of the tree if increased height is the goal. Select the largest diameter branches to to remove, leaving the remainder evenly distributed along the trunk.

☐ Shorten the remaining branches by 10% of their length.

**At 2 to 3 years, and every 5 years thereafter**

☐ Conifers do not respond well to heavy pruning. Mature wood will not develop any new needles. Shears or saws can be used on immature growth when the candles have hardened, about six weeks after they have started to elongate in the spring. The central leader on a branch should never be removed, but can be shortened about halfway to keep the distance down between laterals on the branch. Make the cut at an angle, so one of the new buds will dominate.

## 3.4.7 PRUNING MATURE TREES

These recommendations apply to all of the five tree groups previously described.

### Crown Cleaning

Crown cleaning or cleaning out is the removal of dead, dying, diseased, crowded, weakly attached, and low-vigor branches and watersprouts from a tree crown. This should not include removal of live branches other than those mentioned. If there is a problem with sunscald, or with a hole in the canopy because of poor pruning in the past, some watersprouts may be left on the tree.

### Crown Thinning

Crown thinning includes crown cleaning and the selective removal of branches to increase light penetration and air movement into the crown. Increased light and air stimulates and maintains interior foliage, which in turn improves branch taper and strength. Thinning reduces the wind-sail effect of the crown and the weight of heavy limbs. It can emphasize the structural beauty of the trunk and branches as well as improve growth of plants beneath the tree by increasing light penetration.

Crown thinning is the most important pruning procedure in the development of the structure of a young tree, and in the maintenance of a mature tree. The amount of live wood removed depends on the species and the vigor of the tree. It is important at all stages to avoid leaving gaps in the perimeter canopy, to keep a well formed tree and to avoid sun scald on interior branches.

■ A young vigorous tree can have as much as 35% of its foliage removed as the scaffold structure is being established.

■ When thinning the crown of mature trees, no more than one-third of the live foliage should be removed.

■ At least half of the foliage should be on branches in the lower two-thirds of the trees.

■ Avoid the practice of removing all interior branches when thinning. Thin lateral branches selectively and evenly throughout the interior of the canopy. Pruning this way will distribute stress more evenly throughout the tree.

■ An effect known as "lion's tailing" results from pruning out the inside lateral branches. Lion's tailing, by removing all the inner foliage, displaces the weight to the ends of the branches and may result in sunburned branches, water sprouts, weakened branch structure, and limb breakage. Lion's tailing should be avoided.

■ A goal of structural pruning is to maintain the diameter of lateral branches at less than three-fourths the diameter of the branch or trunk to which they are attached. If the branch is co-dominant or nearly the size of the parent branch, thin the branch's foliage by 15% to 25%, particularly near the terminal. Thin the parent branch much less, if at all. This will allow the parent branch to grow at a faster rate, will reduce the weight of the lateral branch, slow its total growth, and develop a stronger branch attachment. If this does not appear appropriate, the branch may need to be shortened to a large lateral or be completely removed.

■ On large-growing trees, except whorl-branching conifers (trees such as pines which have several branches growing from the same joint on a limb) branches that are more than one-third the diameter of the trunk should be spaced along the trunk at least 18" apart, on center. If this is not possible because of the present size of the tree, such branches should have their foliage thinned 15% to 25%, particularly near their terminals, and/or be shortened.

**Crown Reduction**

Crown reduction is the reduction of the height and/or spread of a tree. Since the goal of the Forestry Master Plan is maximum shade canopy, it should be done only as necessary for safety. Crown reduction may be needed when trees interfere with power lines or with other nearby trees, although crown thinning usually provides the same result in a better way. Try to prune to fit power lines through the natural form of the tree. Thinning cuts are most effective in maintaining the structural integrity and natural form of a tree and in delaying the time when it will need to be pruned again. The lateral to which a branch or trunk is cut should be at least one-half the diameter of the cut being made. Conifers should never have their crowns reduced.

Stub cuts should be avoided in utility line clearance. Thinning cuts will not stimulate as many vertical shoots as stub cuts, and trees will not have to be pruned as often.

■ Crown reduction is most often used for extremely vigorous species such as *Fraxinus uhdei*. This particular species may not produce side branches which can be easily thinned. The tree will produce 4 to 8 ft. long shoots annually, which will need to be headed back in order to effect a crown reduction. Without this pruning the tree will develop a weak structure composed of many long vertical shoots.

■ This procedure is used on less vigorous species such as oaks when individual limbs produce heavy, vigorous branch ends beyond the canopy. It is critical in this case that the cut be made to a side branch of at least half the diameter of the limb being removed (a 4" diameter limb is cut back to at least a 2" branch).

■ With *Eucalyptus* species which have not been previously stub cut, a well formed crown which does not need frequent repruning can be created.

**Crown Restoration**
Crown restoration is the rehabilitation of the structure and appearance of trees that have been topped or severely pruned using heading cuts. Restoration may require several prunings over a number of years.

■ One to three sprouts on main branch stubs should be selected to reform a more natural appearing crown.

■ Selected vigorous sprouts may need to be thinned to a lateral, or even headed, to control length growth in order to ensure adequate attachment for the size of the sprout.

**Crown Raising**
Crown raising removes the lower branches of a tree in order to provided clearance for buildings, vehicles, pedestrians, and vistas.

■ It is important that a tree have at least one-half of its foliage on branches that originate in the lower two-thirds of its crown to insure a well formed, tapered structure and to uniformly distribute stress within the tree. Short side branches may have to be retained temporarily during crown raising.

■ When pruning for view, it is preferable to develop "windows" through the foliage of the tree, rather than to severely raise or reduce the crown.

**SIZE OF PRUNING CUT**

Each type of pruning can be done to different levels of refinement. The removal of many small branches rather than a few large branches will require more time, but will produce a less pruned appearance, will force fewer water sprouts and will help to maintain the vitality and structure of the tree.

## 3.4.8 PRUNING OLD TREES

Trees which have entered a stage of maturity in which there is declining vigor and reduction in annual shoot growth should be pruned somewhat more conservatively than other full grown trees. In any given year, the maximum amount of foliage removed should not exceed 20% of the tree. Avoid limb cuts of more than 8" in diameter if possible since healing is slower in these trees.

**Root Pruning**
Root pruning may be needed when trees lift sidewalks and other pavement, destroying hardscape and utilities. The community forester must determine when root pruning can be safely done without injuring the tree. Some cases may require removal of the tree. The decision is based on the vigor of the specimen, the proportion of roots which will be cut, and the particular species involved. Removal must meet the criteria of the tree ordinance, and be approved by the community forester.

**Guidelines For Root Pruning**
■ A general rule to follow for root pruning is to take the diameter of the trunk 12" above ground, and multiply by seven. This will tell you how close to the tree you can prune. Measure the distance from the face of the trunk, not the center of the trunk. (See Figure 19.)

■ When root pruning is done to trees over 8" in caliper, prune only one-quarter of the tree each year.

■ When a tree 12" in caliper or larger is in a 3 to 4 ft. square cutout, root cutting on all sides in the same year may cause the tree to decline and may reduce its stability. Cutting one side per year for four successive years is a safer procedure. At most, two sides could be cut each winter for two years. If

a decision *is* made to cut all four sides at once, monthly deep waterings for several months should precede the root pruning.

■ If several roots of more than 3" diameter must be cut, removal of the tree should be evaluated.

**Trees Which Are Intolerant of Root Pruning**
Certain species are intolerant of severe root pruning, which may cause these trees to decline within 3 to 5 years after pruning. Only minor root pruning is recommended for the following trees:

*Cinnamomum camphora*
*Brachychiton populneus*
*Fraxinus velutina glabra*
*Ulmus americana*
*Eucalyptus globulus*
*Liriodendron tulipifera*
*Liquidambar styraciflua*
*Grevillea robusta*

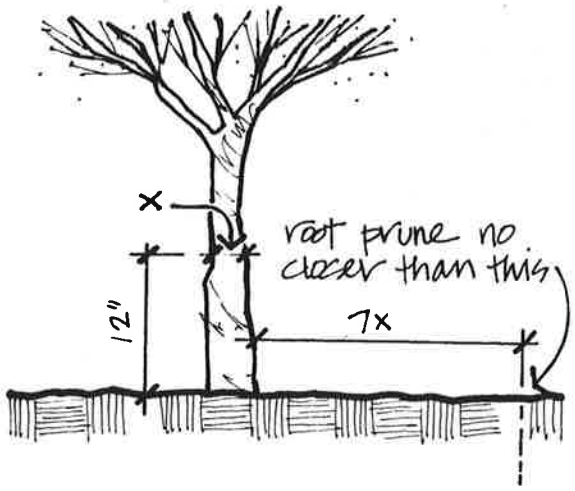
**Canopy Thinning When Root Pruning**
Trees will require some canopy thinning (compensatory pruning) before root pruning.

■ When root pruning is done within four trunk diameters of the tree, remove about 30% of the foliage.

■ When root pruning is done within seven trunk diameters from the tree, remove 20% of the foliage.

■ Trees with dense crowns may need more end weight removal (drop crotch pruning—see the preceding discussion of thinning cuts).

**Care After Root Pruning**
■ After root pruning, backfill the cut with 3/4" to 1-1/4" gravel, to promote deep watering to the new root zone.




**Root-pruning Clearance** **Figure 19**

■ When root pruning has been done, 2 ft. deep root barriers should be installed adjacent to the pavement in strips 10 to 15 ft. long, centered on the tree.

■ If roots over 1 inch in diameter are cut, immediately cover the cut with a plastic bag tied with a rubber band or tape. This will facilitate the development of new roots from the cut end.

## 3.4.9 TREE REMOVALS

All trees eventually will need to be removed due to old age, disease, death, or problems with hardscape destruction. (See 2.2.2 for the procedure for determining when a tree should be removed.) Once that decision has been made, permits acquired, and nearby property owners notified, the tree is ready for removal.

Removal of any tree of 15 feet in height or more is a procedure which, like tree pruning, should have the supervision of a qualified tree

specialist. Tree climbers should have an ISA Climber's Certificate and on-the-job rope training. It is a dangerous operation requiring specialized knowledge and equipment, and care must be taken to avoid injury to workers or the public, or damage to property.

**TREE REMOVAL**
(See 1.5, Appendix, for specific requirements in the tree ordinances.)
STEP ONE: An evaluation is made by the city whether a city crew or outside contractor may remove the tree.
STEP TWO: A removal notice is posted at the tree.
STEP THREE: Nearby property owners are notified.
STEP FOUR: Safety barricades are set up.
STEP FIVE: Tree is removed.

**GUIDELINES FOR TREE REMOVAL**

**Limb and Branch Removal**

- Work from the top of the tree down.
- Remove suckers and small branches.
- Remove larger limbs (any limbs which cannot be safely dropped to the ground) in sections of 6 ft. maximum length. Remove dead limbs first. Leave 12" stubs on tree to facilitate climbing.
- Lower limbs to the ground with ropes to minimize damage to understory plants and property.
- Remove the trunk in sections small enough to be lowered by ropes.
- Cut the trunk and all limbs over 4" in diameter into firewood length.
- Chip all remaining vegetation into mulch.
- Deliver firewood and mulch to the city yard, or to a designated location. The city has a goal of minimizing additions to landfills.

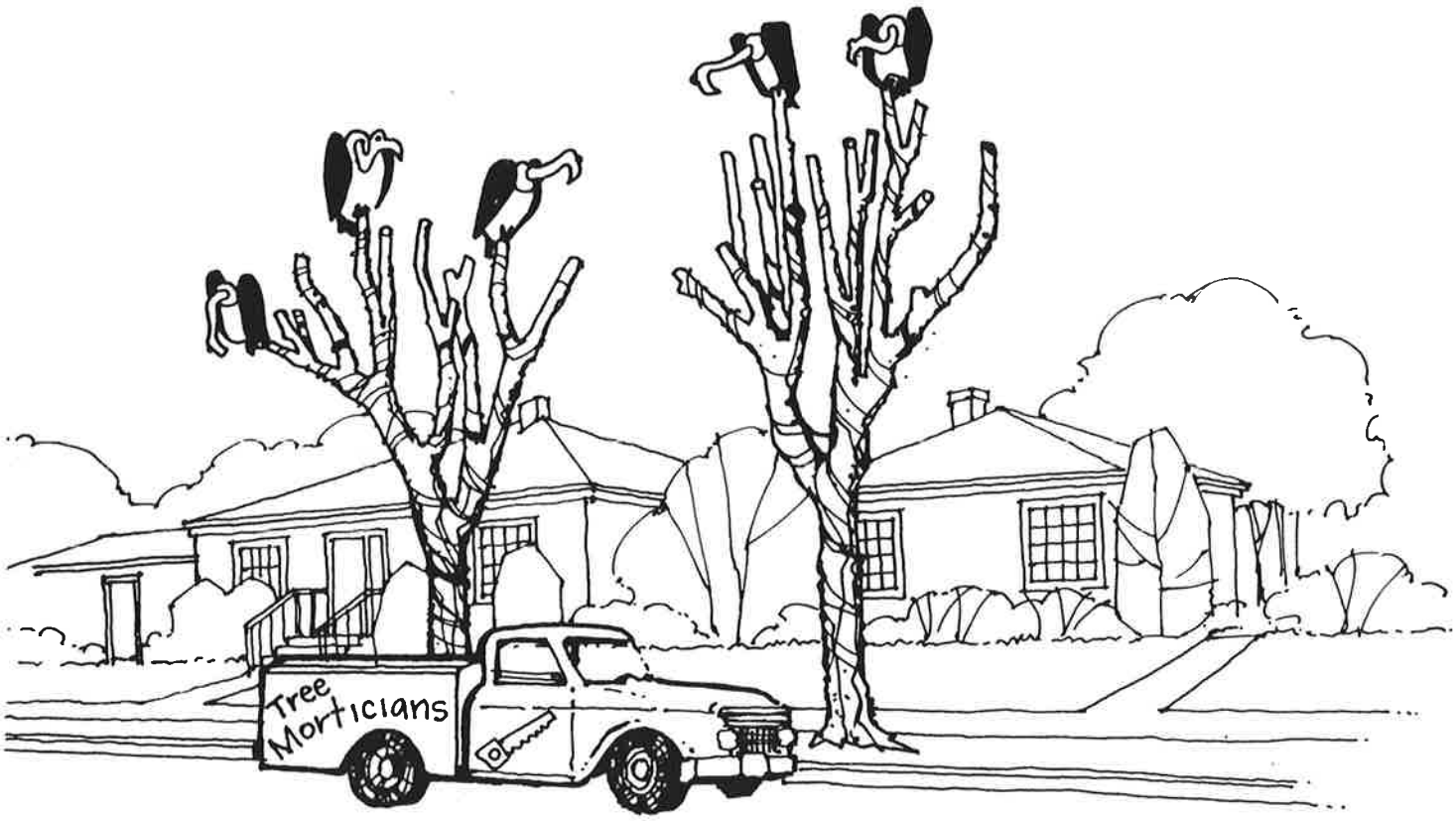
Eucalyptus and pine wood must be handled differently because of insect problems. Chip, bury, burn, or tarp all infected wood. Tarp with 6 mil thick clear plastic, and leave stored for at least 6 months. It is illegal to transport infected eucalyptus fire wood. (See 3.4.5 for more on the eucalyptus longhorn beetle and the pine bark beetle.)

**Stump Removal**
Stumps should be ground out or pulled out even if they aren't in the way of replanting. They provide sites for insect infestations and fungus infections, particularly the fungus *Armillaria mellea* (honey mushroom fungus). Pine stumps are also attractive to the pine bark beetle, and the California turpentine beetle. Eucalyptus stumps can harbor eucalyptus longhorn beetle. These infestations can spread to nearby live trees.

Stumps should be removed to a depth of 18" for most trees. For larger trees the rule of thumb should be at least three times as deep as the diameter of the trunk.

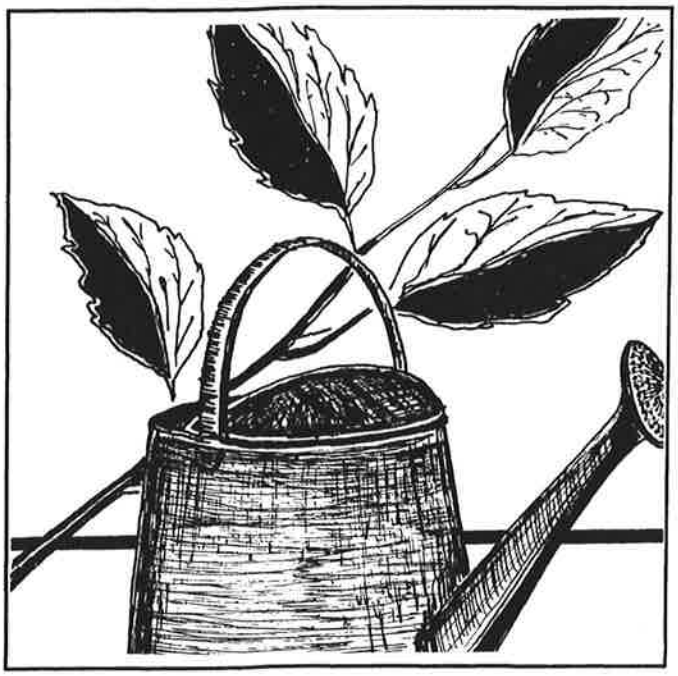
For large stumps such as Eucalyptus which can resprout, if grinding is not practical, frill cut around the circumference of the stump and treat with glyphosate (Roundup). However, if a stump is located in a grove of trees of the same species (or even the same genus in the case of poplars, alders or willows), a herbicide should not be used since the chemical will move through root grafts to nearby trees.

**Replanting**
The designated representative of the community forest program will indicate, on the tree removal permit, the type, quantity, and size of trees to be replanted. (Follow planting instructions in 3.3.)




This Butcher Parks the Same Way He Prunes — Incorrectly!

Courtesy – United States Forest Service, Intermountain Region, Ogden, Utah



## 3.5 WATERING

This chapter describes the best ways to water trees, and how often to water them.

### 3.5.1 WATERING BASICS

No absolute rule exists that will tell you precisely how often to water trees. Watering frequency will be influenced by the type of tree, weather conditions, soil type, root competition from other plants, and how well the tree is established.

A basic goal of this Master Plan is to plant trees which are compatible with the natural water cycles of this dry Southern California valley. Most of the trees on the recommended list will survive on normal rainfall once they are established.

Proper tree irrigation creates a root zone that will be moist enough to encourage growth of new roots but not so wet that air is excluded from the soil pore space, which hampers growth. In addition, proper irrigation should encourage deep root penetration that can sustain a tree in dry periods. This also keeps the tree from developing shallow roots which can crack pavement. Infrequent, slowly applied, deep watering is the best way to accomplish these goals. Frequent light sprinklings or surface irrigation, such as turf watering, will discourage deep rooting. Deep watering is facilitated by deep watering tubes installed when planting the tree. A new 15-gallon tree will need to have the soil moistened to a depth of at least 12", and a mature tree to a depth of at least 24" with each irrigation.

Newly installed trees can easily have their root balls dry out, even when the surrounding soil is very wet. Care must be taken to make sure that water is getting to the root ball by making the watering basin of a newly installed tree the same size as the root ball.

As a general rule, clay soils, which are typical in Thousand Oaks, absorb water very slowly. But since clay soils retain water longer, water less frequently than you would in a sandy soil. Let the soil dry between waterings as this allows the soil to take in air as water drains out. The following table explains how soil texture affects water infiltration.

**INFILTRATION RATES**

| Soil Texture | Infiltration Rate (Inches/hour) |
|---|---|
| Sand | 1 to 10 |
| Sandy loam | 0.5 to 3 |
| Loam | 0.3 to 0.8 |
| Clay loam | 0.1 to 0.6 |
| Clay | 0.01 to 0.4 |

TABLE 6

The use of a mulch around the tree is recommended to slow the evaporation of water. A 4"

**SOIL MOISTURE**

| AMOUNT OF MOISTURE | FEEL OR APPEARANCE OF SOIL |
|---|---|
| Close to 0% field capacity. Little or no moisture available | Sandy loam: dry, loose; flows through fingers<br>Clay loam: Dry clods that break down to powder |
| 50% or less. Approaching time to water. | Sandy loam: Dry, will not form a ball.<br>Clay loam: Somewhat crumbly; will hold together with pressure |
| 50-75%. Enough available moisture. | Sandy loam: Tends to ball under pressure but will seldom hold together.<br>Clay loam: Forms a ball; somewhat plastic; may stick slightly with pressure |
| 75%. Plenty of available moisture. | Sandy loam: Forms weak ball; breaks easily.<br>Clay loam: Forms a ball, very pliable; may be |

TABLE 7

layer of shredded bark or bark chips will help retain moisture and discourage weed growth. Most standards call for a 2" minimum layer, but recent studies show that a 4" layer is 5 times more effective in retaining moisture and discouraging weed growth. In tree wells and narrow planting strips where there might not be enough room for the full 4" depth, install as deep a layer as possible without spilling over.

Using a soil probe to determine the soil moisture content in the root zone is the most effective way to schedule watering. If the soil is wet enough to make a solid, firm ball, the tree should not be watered.

According to the infiltration rate chart, it will take water from 20 to 120 hours to wet a clay loam soil to a depth of one foot (the most important variable is the slope of the soil). Thus the use of watering basins and watering tubes around young trees is very important in order to retain water in place long enough to be absorbed. It is also important to begin irrigating in the spring before the soil has dried out, in order to make use of the reservoir of water from the winter rains. It requires much less irrigating to replace the water lost through a week of evapotranspiration than it does to totally recharge the planting area reservoir.

### 3.5.2 WATERING FREQUENCY GUIDELINES

These guidelines assume average weather conditions and rainfall.

**For the first 2 to 3 weeks after planting:**
New trees may require water every 2-4 days, especially in hot weather. In winter, container-grown evergreens need water at least once a month.

**First year:**
- Fall and spring: once weekly

■ Summer: twice weekly

**Second year:**
■ Fall and spring: twice monthly

■ Summer: once weekly

**Third year:**
■ Once a month during the dry season

**Fourth year and after:**
■ Two waterings during the entire dry season, if needed.

■ Drought tolerant trees often do not need any further irrigation.

■ In times of drought, a normal watering program may not be possible, even if the regular program has been a careful, conserving one. It will be most important in these times to give a deep watering at the beginning of the dry season. Established drought-tolerant trees should be able to survive the dry season with just one watering.

## 3.5.3 METHODS OF WATERING

**By hand with a hose:** Insert the hose into watering tubes if they are available after removing the tube cap. Care should be taken to water long enough to soak the root ball deeply. Flow through the hose should be gentle enough that it does not destroy the watering basin or compact the soil. A mulch helps prevent compaction.

**With a water truck:** One unit with a one or two person crew can efficiently irrigate many trees. This is the most cost-effective method, since most trees will need only infrequent irrigation once established. This method is much more efficient if watering tubes have been installed near the trees.

**Automatic irrigation:** This is expensive to install, and usually results in overwatering. A bubbler head is installed on either side of the tree. If the tree is planted in an area that has sprinkler irrigation, only one bubbler is needed. Bubblers should be on their own valve separate from spray heads. As the tree grows and the root ball expands away from the trunk, the bubblers will eventually be ineffective in watering the feeder roots, which are typically near the dripline of the tree, and should be capped or turned off. Alternatively, a bubbler system may be installed which takes into account the future growth of the tree. Bubblers closer to the trunk are turned off, and those farther out are turned on, as the tree grows. A bubbler system may be cost-effective in areas where an irrigation system is going to be installed for other reasons (for turf, ground cover, or shrubs), or where watering with a water truck is difficult.

**Manually operated irrigation:** This is similar to an automatic system, but a manually operated valve controls the system. This saves the cost of installing a controller, but labor costs will be higher.

**Drip irrigation:** Drip irrigation is very conserving of water, and less expensive to install then spray and bubbler systems. It may require more maintenance than bubbler systems. The emitters clog fairly often, so regular inspection of the system and regular cleaning of the filter is important. Do not use emitters with a precipitation rate less than one-gallon per hour, as they tend to clog more easily. It is best to use rigid PVC pipe in the system and put multi-emitters on adapters which connect to PVC risers. This is a more permanent and lower maintenance solution than polyethylene pipe.

Drip irrigation is not practical for lawns or herbaceous ground cover because it does not provide an even enough coverage, and the number

of emitters required would be very high. It is useful for shrubby ground covers, shrubs and trees.

Weeding and cultivating the soil around plants can damage the system. In areas where foot traffic or machinery may be a problem, the emitters need to be installed below ground, so regular inspection is time consuming.

On slopes a drip system is often chosen because it will produce the least amount of runoff. Also on slopes there is less danger of damage to the emitters from foot traffic, and so they can be installed above grade, thus being easier to inspect. Emitters on slopes should be installed upslope from the root balls. A drip system can also be effective in Thousand Oaks in non-turf medians, since there is little foot traffic there.

It is necessary to change the location and number of emitters as the trees mature, so that water continues to get to the feeder roots around the driplines of the trees. As a tree grows, emitters should be placed so that, at a minimum, an area between the dripline and 3 ft. toward the trunk from the dripline is irrigated (if the tree continues to need irrigation).

### 3.5.4 IRRIGATION REPAIR

Any sprinkler system needs to be monitored to make sure it is operating properly. The most obvious and important sign is plant material that looks unhealthy. Too much or too little water should be one of the first things considered when this occurs.

"Automatic" systems are not maintenance free, and need care in terms of programming to fit weather conditions, and monitoring to see that the system is working properly. This is particularly important since most systems are programmed to run in very early morning. This means that the system will go on when no one is there to see how it's functioning. Periodic "early bird" inspections are needed to check the functioning of the systems. In systems which cover a large area, such as in parks, it may be helpful to use a clock which can be controlled by a remote control device. Inspections, adjustments, and repairs can be made without having to travel back and forth from the clock to the area being worked on.

The irrigation systems should be monitored for problems with sprinkler heads, which are commonly of three kinds. Either the riser has been broken off and needs to be replaced, or the sprinkler is blocked by foliage which needs to be pruned away from the head, or the head has become clogged and needs to be removed and cleaned out. Sometimes a head only needs to be adjusted to get better coverage, but it may be that the adjustment is needed because of partial clogging, so this should be checked.

Frequent clogging may be a sign of a small break in the pipe. A broken pipe can cause large amounts of water to be wasted. Usually the problem will be obvious, with a telltale area of standing water and mud. When a sprinkler head needs to be replaced, if the identical head is not available it is important that the replacement has a similar precipitation rate and radius of throw. Manufacturer's catalogues will have this information.

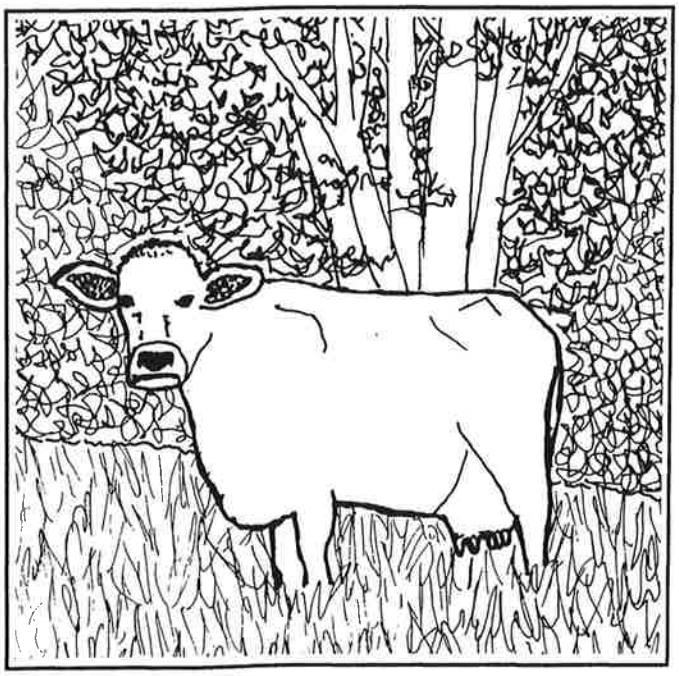
Another common problem is a stuck valve, which can prevent the water from shutting off at the end of a cycle. This can waste a large amount of water in a short time if not reported, as well as overwatering the plants. Most valve manufacturers sell replacement kits for the innards of the valve. Valves should always be installed with a union connection to the pipe, so they can be more easily removed and replaced.

When a valve doesn't open, or doesn't close, it can sometimes take some troubleshooting to determine if the problem is caused by a valve or controller. Most controller problems are not fixable in the field, since most modern controllers are solid-state computerized models. The clock

will need to be replaced or fixed at the factory. Care must be taken if automatic controllers are used, that if power failures interrupt the programs, the clocks are reprogrammed. Most controllers have battery backups, but the batteries must be replaced every year.

When valves, controllers, heads, and other equipment need to be replaced, it is important that the quality of the replacement parts be at least equal to the original parts. If poor-quality parts have been used originally, the quality should be upgraded when the parts are replaced.

When irrigation repair is needed, often the repair crew will need to refer to the as-built drawings in order to locate various components of the system. It is important that accurate as-built plans are filed with the city when an irrigation system is constructed.



## 3.6 FERTILIZING

This chapter gives scheduling information for fertilizing trees, describes how to apply fertilizer and how much is needed, and identifies deficiency symptoms as well as symptoms of excess minerals in the soil.

### 3.6.1 SCHEDULING

**The First Year:**

■ The first feeding for trees is done when the tree is planted. (See 3.3.) About 3 ounces of actual nitrogen is needed for the first year. Fertilizer should be a slow release type, Osmocote 18-6-12 or equivalent. In alkaline soils, include iron chelate with the fertilizer.

**Years Two to Five:**

■ Fertilizing once a year in winter is sufficient.

**After Five Years:**

■ A fertilizer schedule of one application every five years may be sufficient .

**During A Drought:**

■ If the watering schedule is going to be cut back, it is best not to fertilize the trees. New growth stimulated by the fertilizer will need water to survive.

**When A Tree Is Weak:**

■ Fertilizing a weak tree can be harmful in some cases, although it may be indicated in others. If there is a pest or disease problem, or any other problem affecting the vigor of the tree other than lack of fertilizer, check with a qualified professional before fertilizing.

### 3.6.2 HOW TO APPLY FERTILIZER

For young trees, fertilizer can be spread in the planting basin and watered in thoroughly. The fertilizer can also be split in half, and half of it watered in through a deep watering tube if there is one by the tree. Fertilization is most effective if done in February.

For established trees, fertilizing should be done through the deep watering tube (for trees in tree wells), or by drilling small holes in the ground around the tree and pouring fertilizer down them (if the soil is exposed). Using a soil auger or sampling tube, make holes 12" to 18" deep, and 3 to 6 ft. apart in a ring in the area around the dripline. One ring of holes should be made for each 2" of trunk caliper. Rings should be 3 to 4 ft. apart. Angle the holes away from the trunk of the tree. (See Figure 20.)

The practice of top dressing fertilizer is not recommended, since it encourages surface rooting, and because phosphorous and potash do not infiltrate the soil very well.

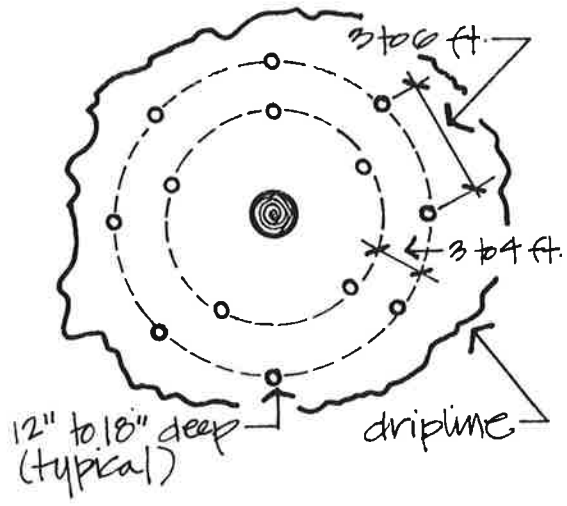



Figure 20

## 3.6.3 HOW MUCH TO APPLY

The amount of actual nitrogen needed by an established tree is the most important factor.

■ Measure the diameter of the trunk at a point 4.5 ft. above the ground.

■ The diameter in inches, multiplied by itself, and then divided by 30, equals the pounds of actual nitrogen needed.

■ The fertilizer formula, such as 10-6-4, tells the percentages of nitrogen, phosphorous, and potash, respectively, in the fertilizer. For example, a trunk with a diameter of 6" would need 36 [6x6] divided by 30 = 1.2 pounds of nitrogen. If you used a fertilizer with a 10-6-4 formula, you would apply 12 pounds of fertilizer (12 x 10% = 1.2).

■ A slow release nitrogen source, as urea or IBDU, is always preferred.

## 3.6.4 NUTRIENT DEFICIENCY SYMPTOMS

**Nitrogen:** The leaves are yellow-green and small. They have have fewer leaves, high fall color, and drop early. Shoots are short, small, and may be reddish to reddish brown. There may be heavy flower bloom.

**Phosphorus:** Leaves are darker green than usual, and slightly smaller. Veins, petioles, or lower surface may be reddish-purple, especially when young. Shoots are smaller diameter, and bloom is light.

In pines, lower needles die.

**Potassium:** Leaves are crinkled and roll up (older leaves show the problem first). Shoot tips die back late in the season. Lateral buds grow short and brushy, in a zigzag pattern. Herbicide toxicity can also cause these symptoms.

**Iron:** Leaves are yellow with green veins, showing on young leaves first. Shoots are of small diameter, and can die back if the condition is severe. In Thousand Oaks this may be caused by excessive calcium in the soil (lime induced chlorosis).

**Boron:** Leaves may be red, bronzed, or scorched, with young leaves showing the problem first. Veins are yellowish. Some species show leaf distortion. New growth dies back. Shoots are zigzag, short, and brushy.

**Zinc:** Leaves are green with yellow blotches between the veins. Leaves may have dead spots. Shoots are of small diameter and may have a tuft of leaves at the tips. Twigs may die back.

**Sulfur:** The entire leaf is pale yellow-green, and may be small in some species.

**Magnesium:** Thin and brittle leaves which drop early, and look yellow with green veins.

**Manganese:** Young leaves are yellow with wide green bands along the veins, followed by dead spots.

### 3.6.5 SYMPTOMS OF EXCESS MINERALS IN THE SOIL

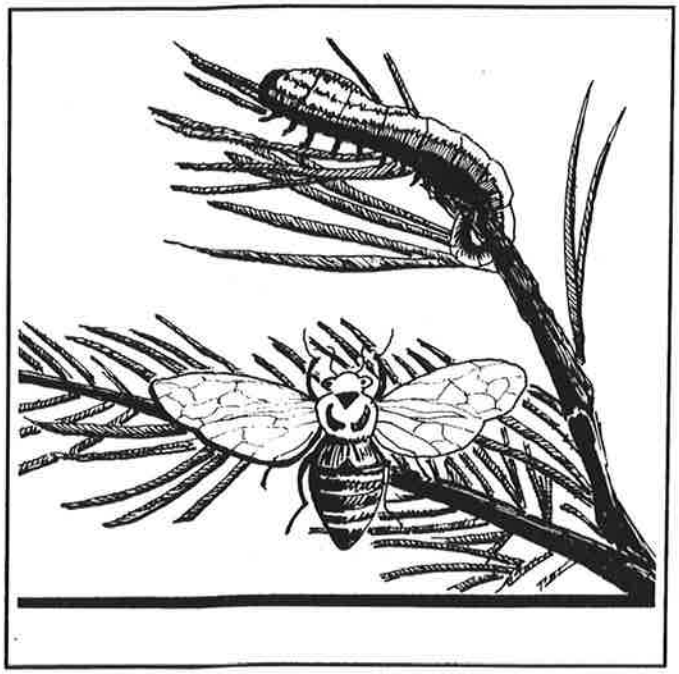
**Calcium:** Leaves develop dead tissue at the tips, and gradually down the margins. It is often accompanied by iron, zinc, and/or manganese deficiency symptoms. Oversupply of calcium combines with iron, zinc, and manganese to make them unavailable to plant roots.

**Magnesium:** This is usually found when calcium supply is excessive, and the same symptoms are shown.

**Boron:** The leaves show scorching on the tips and margins. Dark dead spots appear. The condition will look worse at the base of shoots than at the tips. Shoots swell and crack below buds. Excess boron usually occurs together with calcium, magnesium, and sometimes sodium oversupply.

**Sodium:** Leaves show scorching at the tips and margins.

**Chloride:** Leaves show scorching at the tips and margins.



## 3.7 PESTS AND DISEASES

This chapter describes the most common pest and disease problems in Thousand Oaks, how to treat them, and which species are most likely to be affected. Also included is a tree-by-tree list of pest and disease problems.

### 3.7.1 FACTORS LEADING TO PEST AND DISEASE PROBLEMS

Most pests are attracted to weakened trees more quickly than to trees in optimum health. For this reason, the most effective pest and disease control measures involve keeping the trees in top health. When a problem is caused by an adverse environmental condition, chemically treating the disease or pest condition will not prevent its recurrence, but will be symptomatic treatment only.

Trees should be chosen for the soils and climatic conditions they prefer. Good watering, fertilizing and pruning programs will help a tree stay healthy. Soils which are too wet or too dry, over-shaded trees, or trees which have been excessively pruned are all examples of conditions which can lead to disease problems, due to weakened vigor and increased susceptibility of the tree. For example, *Pyrus kawakamii* , if grown in a constantly wet soil, will be very susceptible to fungal leaf spot.

### 3.7.2 INTEGRATED PEST MANAGEMENT

The concept of integrated pest management (IPM) is the guiding principle for Thousand Oaks. In IPM a proactive maintenance program, including a good system of monitoring and record keeping is considered the first line of defense. Biological controls and relatively safe chemicals are then considered for use, often in combination, with stronger chemicals being a last resort.

When there is a minimal level of infestation or disease, it is often not enough of a problem to warrant treatment. In some cases the pests will disappear on their own . For example, maple aphids will disappear in late May. In some cases, however, such as plum leaf aphids, it is known that a minimal infestation is likely to expand rapidly.

As the name implies, IPM uses combination of maintenance and control measures to forestall the use of chemicals, while trying to correct the underlying environmental problems. Important factors in the success of an IPM program include:

- Knowledge of the existing site, with its typical vegetation and prevalent problems.
- Planting vegetation best suited to the site.
- Having an active monitoring program
- Proactive maintenance to keep plants in vigorous condition.
- A control and sanitation program when necessary.
- Adequate record keeping.

Integrated pest management may have a higher initial cost than just using a spraying program, but in the long term it is often cost-effective, and results in healthier trees and wildlife and lower spraying costs. Frequent spraying can result in a chemical dependent situation, where an insect comes back stronger than it was before. Increasing doses and frequency of spraying are then needed for control of the pest. For example, pesticides which kill aphids also kill aphid predators. Since aphids reproduce more quickly than their predators, when they return to the tree, their natural enemies will be gone, and they may also become resistant to the pesticide. The following lists some non-toxic methods used in the IPM method.

**Non-toxic Insect Controls**

■ Biological controls—lacewing larvae, ladybugs. Useful for aphids. Lacewings are effective against mites.

■ Mechanical controls—Tanglefoot tree barrier. Can keep ants from carrying aphids onto a tree.

■ Bacillus thurengiensis (Thuricide, Dipel, Biotrol). Effective against various caterpillars.

■ Insecticidal soap (Safer's). Effective against aphids, whiteflies, scale crawlers, cottony cushion scale, leafhoppers, others.

■ Oil spray (Some trees are sensitive to oil sprays, including maples). Effective against scale, mites and aphids. Usually applied in the winter to deciduous trees, when it kills eggs overwintering on the trees. Can be used in the summer in a more dilute form.

## 3.7.3 CHEMICAL INSECT CONTROLS

Any planned use of chemicals registered as "Restricted" must be reported to the Ventura County Agricultural Commissioner's office. In California such chemicals require a permit for their use. This list is not intended to be a complete list of available controls, but is selected for the various problems most likely to appear in Thousand Oaks. Recommendations for each specific situation in the field can only be made by a Licensed Pest Control Applicator (LPCA). The directions on the product label must be followed strictly. All city personnel should be trained in safe use of chemicals. Clothing and apparatus for respiratory, eye and skin protection should be used. Spraying operations should be performed when there is no wind, and at times when the site is not being used by the public.

**(Listed in order of increasing toxicity)**

Chemical controls are listed with their LD-50 number, which is the number of milligrams of chemical per kilogram of body weight needed to cause death in 50% of laboratory animals tested. (The larger the number, the safer the chemical.)

■ Pyrethrins. LD-50=2500. Toxic to fish and swine. Effective against many insects

■ Fenbutatin-oxide (Vendex or Hexakis). LD-50=2361. Effective against spider mites.

■ Malathion. LD-50=1200. The smell may be objectionable in public areas, and it is toxic to honeybees. Effective against a variety of insects.

■ Acephate (Orthene). LD-50=900. Effective against a variety of insects. A systemic ( it is absorbed into the leaf tissue, which makes it effective for a long period of time).

■ Carbaryl (Sevin) LD-50=700. Toxic to bees and earthworms (Sevin XLR liquid is somewhat less toxic to bees). Effective against variety of insects. This chemical is on the restricted list in California

and requires a permit from the Ventura County Agricultural Commission.

■ Diazinon. LD-50=350. Toxic to birds. Effective against a variety of insects.

■ Fluvalinate (Mavrik). LD-50=261. Effective against spider mites, whitefly and aphids.

■ Rotenone. LD-50=132. Toxic to fish and mammals, especially swine. Effective against a variety of insects. Usually combined with pyrethrins, which do not persist as long, and are less toxic.

**Fungicides**

■ Sulfur. Non-toxic.

■ Benomyl. LD-50=10,000. A systemic fungicide.

■ Chlorothalonil.LD-50=10,000

■ Fixed copper. LD-50=1,000

## 3.7.4 IDENTIFICATION AND CONTROL OF PESTS AND DISEASES

This list is not intended to be exhaustive, but describes the most common and serious problems likely to be found in Thousand Oaks. Specific situations in the field must be treated under the supervision of a Licensed Pest Control Applicator. Additional help is available from the Ventura County Agricultural Inspector.

**Alder aphid**
TREES AFFECTED: *Alnus* species
SYMPTOMS: Foliage will be sticky and black. Aphids are yellow-green.
CONTROLS: Lacewings and ladybugs are biological controls. Insecticidal soap can be sprayed on insects. (Spray again 10 days later.) If ants are maintaining the colonies, use Tanglefoot tree barrier on the trunk to keep ants off the tree. Wrap the trunk with plastic tape and put the Tanglefoot on the tape. Chemical controls: Rotenone-pyrethrin, malathion or acephate.

**Ash anthracnose**
TREES AFFECTED: *Fraxinus* 'Modesto', *F. velutina,* occasionally *F. uhdei*
SYMPTOMS: Large brown blotches appear on leaves, which drop; twigs may die back.
CONTROLS: Use copper spray or benomyl. Spray benomyl when buds break, then again two weeks later. Additional applications may be needed as new growth appears, or if rain washes the spray off.

Anthracnose diseases can cause cankers (other diseases can also cause them), which are oval discolored areas on branches or the trunk. Cut infected branches below the canker, or trace out and remove trunk cankers. Disinfect tools after each cut. If treatment would seriously affect the tree's appearance, consult a tree specialist.

**Ash curl aphid**
TREES AFFECTED: *Fraxinus* 'Modesto', *Fraxinus velutina, Fraxinus uhdei*
SYMPTOMS: Leaves at branch tips are curled, twisted and galled. Pale green or grey insects.
CONTROLS: Non-toxic: Use lacewings or ladybugs. Chemical control: Rotenone-pyrethrum mixture, malathion, acephate or carbaryl. Spray before foliage curls up. Once foliage has curled, a systemic such as acephate would be necessary for control.

**California oak leaf caterpillar (oak moth)**
TREES AFFECTED: *Quercus agrifolia, Q. ilex, Q. lobata*
SYMPTOMS: Moths emerge in May or June, and then again in October and November. Damage is not usually severe, but can defoliate trees.
CONTROLS: Spray in spring after deciduous trees have leafed out, and again in summer when the second brood of caterpillars emerge. Non-toxic: Use Bacillus thurengiensis when caterpillars are young. Chemical controls: Rotenone-pyrethrum, acephate, or carbaryl. Restrict use of acephate or carbaryl to the summer brood. Honeybees may be present in the spring if the oaks are flowering, and these chemicals will kill bees on contact. Carbaryl will kill bees as a residual.

**California turpentine beetle**
TREES AFFECTED: *Pinus radiata, P. muricata, P. canariensis, P. thunbergiana*

SYMPTOMS: Beetle is are cinnamon brown, about 1/4" long. Attacks the base of the trunk, rarely above 6 to 8', and can cause moderate damage.Turpentine beetles cause 1" long bronze pitch tubes to appear near ground level, accompanied by white or pink granular droppings. It may weaken the tree and invite attack by more aggressive species, such as pine bark beetle. Pine bark beetles are attracted by the pheremones of turpentine beetles.
CONTROLS: Use carbaryl if more than one pitch tube or dust pile is found per foot of trunk circumference; apply to tree base where beetles attack. Spray the basal 6 ft. of trunk with a high pressure sprayer. Mix carbaryl with a wetting agent. Spray in April.

**Coryneum canker fungus**
TREES AFFECTED: *Cupressocyparis leylandii*
SYMPTOMS: Cankers on trunk at 4 to 6 ft. high, leading to decline and eventual death.
CONTROLS: None practical.

**Dutch elm disease**
TREES AFFECTED: *Ulmus americana*
SYMPTOMS: Wilted foliage in summer, then leaves turn yellow and fall, tree declines and dies over a period of years. This disease is a fungus disease spread by the elm bark beetle. Beetles are brown to black, 18" long. Larvae are white legless grubs which overwinter in bark.
CONTROLS: Remove infected trees and dispose of the wood. Do not prune trees when beetles are active (March to September.) Report all elms showing yellowing or wilting in the spring to the County Agricultural Commissioner. Do not plant this species unless the new resistant cultivar 'Centennial' is used (see 2.7)

**Elm anthracnose**
TREES AFFECTED: *Ulmus parvifolia*
SYMPTOMS: Brown spots on leaves; leaves turn brown in early spring and drop off.
CONTROLS: Copper spray or benomyl may be effective. Spray in spring as new leaves unfold. Anthracnose diseases can cause cankers (other diseases can also cause them), which are oval discolored areas on branches or the trunk. Cut infected branches below the canker, or trace out and remove trunk cankers. Disinfect tools after each cut. If treatment would seriously affect the tree's appearance, consult a tree specialist. *Ulmus parvifolia* 'Drake' is resistant.

**Elm leaf beetle**
TREES AFFECTED: All *Ulmus* species
SYMPTOMS: Orange eggs, black larvae, yellow-green adults with a black stripe on wings, 1/4" long. They live on underside of leaves. In late spring or early summer, they cause skeletonizing of leaves, which turn brown and often drop.
CONTROLS: Use carbaryl, 1 pound per 100 gals. of water, or 6 tbs. of 50% carbaryl in 3 gals. of water. Apply to the undersides of foliage in spring when new larvae appear, and again if a second crop of larvae appear. Acephate is also effective.

**Eucalyptus longhorn borer**
TREES AFFECTED: *Eucalyptus* species
SYMPTOMS: Dying or dead limbs appear on trees, or entire trees die. Broad tunnels are found beneath bark, and sawdust can sometimes be seen outside the bark. Adult beetles are 3/4" to 1-1/4" long, reddish brown, and are found under loose strips of bark during the day in spring. Larvae beneath bark are off white, 1"-1-1/2" long when mature, found spring to fall.
CONTROLS: No chemical controls are available.

Keep the trees in a good state of vigor. Give the trees infrequent deep watering, and avoid fertilizer if adequate watering cannot be done. Avoid changes in watering patterns, grading and drainage. Quick detection of infestation, and removal and disposal of infested trees is important to keep the insects from spreading. Report all infested trees to the County. If trees are removed, grind the stumps; if this is not practical, cut as close to the ground as possible. Frill cutting around the circumference of the stump and applying glyphosate (Roundup) will prevent regrowth. Chip, bury, tarp or burn all infected wood. Avoid heavy pruning, and prune only in winter and spring (beetles are least active then).

It is illegal to transport infected eucalyptus fire wood. Tarp all firewood with 6 mil thick clear plastic, and leave stored for at least 6 months.

**Fungal leaf spot**
TREES AFFECTED: *Pyrus kawakami*, some *Malus* cultivars
SYMPTOMS: Red, brown, or yellow spots appear on the leaves.
CONTROLS: Use copper, sulfur, benomyl or chlorothalonil. Spray the trees in the spring as soon as flower buds open. Clean up dead leaves and other refuse

under the tree. Avoid overwatering trees, which creates saturated soil conducive to this problem.

**Fruit tree leafroller**
TREES AFFECTED: *Quercus agrifolia, Q. lobata, Q. ilex, Platanus, Fraxinus*
SYMPTOMS: One generation of moths per year; green caterpillars in spring, hanging on threads; mottled brown and tan moths in late spring. Leaves are rolled together with silken threads and tender new leaves are chewed. Defoliation may occur in severe cases.
CONTROLS : Non-toxic—Bacillus thurengiensis is effective if caterpillars are less than 1/4" long. Chemical controls—Pyrethrum-rotenone mixture, carbaryl or diazinon (also more effective on young caterpillars than older ones.)

**Honey mushroom fungus**
TREES AFFECTED: *Quercus agrifolia, Q. lobata*, most fruit trees, *Cinnamomum camphora*
SYMPTOMS: Also known as oak root fungus. Symptoms may start as dull or yellowed leaves, or sparse foliage. Leaves may wilt, and branches die. Beneath the bark of the tree near ground level there will be a mat of white fungus. In late autumn or early winter, a cluster of tan mushrooms may appear at the tree's base.
CONTROLS: No chemical control is available. If infection sites can be cleaned of diseased tissue with hammer and chisel, and the cuts painted with denatured alcohol, the disease can sometimes be arrested. Remove soil from the base of the tree to find these sites. If the tree must be replaced, choose a resistant species. Trees on the recommended list which are resistant are *Cupaniopsis, Eucalyptus, Fraxinus, Geijira, Ginkgo, Jacaranda, Liquidambar, Melaleuca styphelioides, Pistacia, Prunus cerasifera, Pyrus calleryana, Sapium, Sequoia, Ulmus.*

**Lime-induced chlorosis**
TREES AFFECTED: Any tree exposed to high levels of calcium.
SYMPTOMS: Leaves are yellow or brown, and veins may remain green. This is a deficiency disease caused when trace minerals like iron, zinc and manganese form compounds with calcium and magnesium, which make the true minerals unavailable to plant roots.
CONTROLS: Treat with iron and zinc chelate.

**Oak anthracnose fungus**
TREES AFFECTED: *Quercus agrifolia, Q. lobata, Q. ilex*
SYMPTOMS: Brown leaves on dead twigs appear in rainy spring weather. Leaves remain on the tree.
CONTROLS : Non-toxic—Prune out infected twigs and branches if feasible. Chemical controls—A fixed copper and light oil mixture can be used in late winter. Benomyl can be applied in spring. Treatments are not reliably effective.

**Oak mildew**
TREES AFFECTED: *Quercus agrifolia, Q. lobata*
SYMPTOMS: Leaves are covered with a white powder, new leaf shoots are shortened and excessively branched and leaves are small and distorted. New growth is stimulated, and will be infected, with a typical "witches broom" look.
CONTROLS: Non-toxic—Avoid excessive pruning, irrigation and fertilizing. Remove diseased young growth. Chemical control—use copper spray or benomyl . Treatments are not reliably effective.

**Oak pit scale**
TREES AFFECTED: *Quercus lobata*; occasionally *Q. agrifolia*
SYMPTOMS: Brown or green scales are found in small volcano-like depressions on twigs. They may cause dieback of twigs in in mid to late summer; dead leaves stay on twigs over the winter.
CONTROLS: Non-toxic—Use a 2% oil spray in the winter, 22 gals. oil to 100 gals. of water. Large oaks will need a high pressure sprayer to reach the tops of the trees. Chemical control—If necessary, use a summer oil mixture with malathion or carbaryl, applied once in late April to July.

**Oak treehopper**
TREES AFFECTED: *Quercus lobata*; occasionally *Q. agrifolia*
SYMPTOMS: 1/4" long incisions in a spiral pattern appear on twigs. Adults are 1/4" long, olive green to brown with red dots. Larvae tunnel in the phloem tissue of the twigs.
CONTROLS: Pyrethrin-rotenone mix or carbaryl in May

**Oak twig borers**
TREES AFFECTED: *Quercus agrifolia*
SYMPTOMS: Look for tunnels under the bark of twigs

which have patches of dead leaves. In May and June, 1/4" long brown beetles are outside the bark.
CONTROLS : Non-toxic—If practical, prune out infested wood. Chemical control—carbaryl

**Pear blight (fireblight)**
TREES AFFECTED: *Pyrus kawakami*, some *Malus* cultivars
SYMPTOMS: The blossoms will first look as if they had been water-soaked. They wilt and turn dark brown. Flowering shoots die suddenly and look as if they had been scorched. Cankers can also form. Young terminal shoots are occasionally infected in moist spring weather.
CONTROLS: Prune out and burn diseased wood in June. Cut 6" below infected wood on small branches; 12" on larger ones. Disinfect tools between cuts in 10% bleach solution. Spray the next spring with agricultural streptomycin, every 4 to 5 days during flowering. Spray when temperatures are between 65 and 86 degrees, which is when the bacterium is active.

If the tree dies, replace it with a species that is not susceptible to the disease. (*Pyrus kawakami* is the only tree on the recommended plant list which is susceptible, but shrubs growing near the tree which may become infected include *Cotoneaster, Pyracantha, Chaenomeles, Heteromeles arbutifolia*.) Cultural practices which can lead to fireblight include planting in poorly drained sites, heavy pruning of the tree, too heavy fertilizing or fertilizing too late in the year. Root suckers and water sprouts are especially susceptible to infection and should be removed each dormant season. Cankers should also be removed.

**Peppertree Psyllid**
TREES AFFECTED: *Schinus molle.*
SYMPTOMS: Doughnut-like pits in leaflets, petioles, and young twigs. Leaves appear grayish-green, stunted and distorted, and trees are sparsely foliated. Adult insects are green, 1/16" long.
CONTROLS: Acephate. Use 1 lb. Orthene Tree and Ornamental Spray (75% soluble powder) to 100 gallons of water. This has controlled the insect for at least 35 days in experiments in Ventura County.

**Pine bark aphids and pine needle aphids**
TREES AFFECTED: *Pinus radiata, P. muricata, P. sylvestris, P. thunbergiana, P. pinea*
SYMPTOMS: Cottony white material appears on bark, twigs and needles.
CONTROLS: Non-toxic—Lacewings and ladybugs are biological controls. Dormant oil spray in winter. Chemical controls—Rotenone-pyrethrin, malathion, or carbaryl in the spring, and add a miticide such as sulfur, fenbutatin-oxide, or fluvalinate if needed. A wetting agent and high pressure spray will improve control.

**Pine bark beetle**
TREES AFFECTED: *Pinus radiata, Pinus muricata*
SYMPTOMS: Some beetle species are benign, but the California five-spined engraver beetle is very destructive. Adults are brown to black, 1/8 to 1/4" long. Trees may die quickly. Boring dust will be found in crotches of the tree or surface of bark. Pine bark beetles are attracted by the pheremones of turpentine beetles. Turpentine beetles cause 1" long bronze pitch tubes to appear in trunks near ground level, accompanied by white or pink granular droppings.
CONTROLS: Spray with carbaryl, and add sulfur, hexakis, or fluvalinate as spider mites are often a secondary problem. For turpentine beetles, spray the basal 6 ft. of the trunk with a high pressure spray of carbaryl mixed with a wetting agent. Spray in Feb. to protect pines for the entire season. Prune trees in winter when beetles are not active. Chip, bury or burn all pruned wood, or store under a 6 mil. clear plastic tarp for at least six months. Avoid any wounds to bark, including nailing signs to trees. Avoid stressing trees by cutting or filling near trunks. Give occasional deep watering.

**Pink rot**
TREES AFFECTED: *Washingtonia, Archontophoenix* species, *Phoenix canariensis*
SYMPTOMS: Plant appears weakened with many dead sheaths. Often pink spore masses appear on the surfaces of infected tissues at the base of the plant.
CONTROLS: Use benomyl. Disinfect pruning tools after each cut. Do not overwater.

**Plum leaf aphid**
TREES AFFECTED: *Prunus blieriana*
SYMPTOMS: These aphids can be a serious problem, quickly becoming a severe infestation.
CONTROLS: If trees have been infested in previous years, treatment should be preventative. The timing is important. In early March, as the new leaves unfold, spray with acephate or carbaryl.

**Pseudomonas canker**
TREES AFFECTED: *Olea europaea*
SYMPTOMS: Gray galls on twigs and branches.
CONTROLS: Remove galls by pruning where practical. They seldom kill trees.

**Sequoia pitch moth**
TREES AFFECTED: *Pinus radiata, P. muricata*
SYMPTOMS: This moth causes 1 to 2" diameter masses of white, yellow or pink pitch to form on the branches. Although messy looking, little harm is done to the tree.
CONTROLS: Non-toxic—If control is needed for aesthetic reasons, scrape away the pitch masses and kill the larvae, which are found just below the surface of the bark. No insecticide is useful. Avoid pruning pines in the summer, as the moths are laying eggs then, and they are attracted to pruning cuts and other mechanical injuries to the tree.

**Shot hole fungus**
TREES AFFECTED: *Prunus* species
SYMPTOMS: Red, brown, or yellow spots form on leaves, and drop out, leaving holes in the leaves.
CONTROLS: Use copper, sulfur, benomyl or chlorothalonil. Spray when blossoms open in the spring. Clean up dead leaves under the tree.

**Spider mites**
TREES AFFECTED: A broad range of trees
SYMPTOMS: Leaves have yellow stippling on them, and may have fine webbing and silvery coloring on the undersides. Mites are tiny specks of red, yellow, or green.
CONTROLS: Non-toxic: Lacewing larvae are a biological control. Light oil spray is an option.
Chemical control: Pyrethrin-rotenone mixture, sulfur, fenbutatin oxide, fluvalinate; respray 7 to 10 days later. If a miticide is needed more than occasionally, alternate two or more chemicals, as mites adapt rapidly to any one chemical.

**Sycamore anthracnose**
TREES AFFECTED: *Platanus* species
SYMPTOMS: Leaves, buds and shoots are blighted in the spring. Irregular dead areas appear along the veins of leaves.
CONTROLS: Non-toxic: Prune out infected twigs and branches. Fertilize trees after the rainy season is over. Chemical control: Spray when leaves first begin to unfurl in the spring with chlorothalonil . Repeat two weeks later. (In dry springs, the first application may be sufficient.) Control by spraying will be more effective on young trees, as it is difficult to spray large trees as thoroughly. Variety 'Bloodgood' is resistant. Sycamore anthracnose can cause cankers (as can other diseases), which are oval discolored areas on twigs.

**Sycamore mildew**
TREES AFFECTED: *Platanus* species
SYMPTOMS: A white or gray powdery coating forms on young leaves and stems in May or later.
CONTROLS: Non-toxic: Do not prune trees severely. Variety 'Yarwood' is resistant. Chemical control: Sulfur, copper, benomyl . In May and June, mix 1/2 lb. benomyl and 6 lbs. agricultural sulphur per 100 gallons.

**Sycamore scale**
TREES AFFECTED: *Platanus* species
SYMPTOMS: White dots on leaves and white wooly bits under bark in severe cases.
CONTROLS: Non-toxic: Spray with dormant oil in winter. Chemical control: If infestation is severe mix a light oil with malathion or diazinon; spray in May-June.

**Tent caterpillar**
TREES AFFECTED: A broad range of species.
SYMPTOMS: Will defoliate tree in severe cases.
CONTROLS: Non-toxic: Use Bacillus thurengiensis. Cut off branches containing nests.
Chemical control: Use carbaryl in severe cases.

**Tulip poplar aphid**
TREES AFFECTED: *Liriodendron tulipifera*
SYMPTOMS: Leaves will be sticky and black. Aphids are green, and form colonies on the undersides of leaves. Ground may be sticky from aphid secretions.
CONTROLS: Non-toxic: If ants are present, use Tanglefoot tree barrier applied over a band of plastic taped to the trunk. Chemical control: Rotenone-pyrethrin mixture, malathion, acephate or diazinon. These are seldom effective over a long period.

**Tulip poplar scale**
TREES AFFECTED: *Liriodendron tulipifera*
SYMPTOMS: 1/4" to 1/2" brown, round scale insects accumulate in rows on twigs.
CONTROLS: Non-toxic: In winter, use dormant oil.

When scales are young in spring, before hard shells have developed, use light oil. Chemical control: Severe infestations man need carbaryl, malathion, diazinon, or acephate. Apply in May.

**Verticillium wilt**
TREES AFFECTED: *Acer, Cinnamomum, Schinus,* and many others
SYMPTOMS: In late spring one side of the tree may wilt. The leaves turn yellow,and the wood just under the bark turns dark brown, olive green or black.
CONTROLS: Give deep infrequent irrigation and fertilize with a low-nitrogen formula. If replacement of the tree is necessary, choose a species that is resistant to the disease. Resistant trees on the recommended list are *Eucalyptus, Liquidambar, Pinus, Platanus, Quercus, and Pyrus.* Those which are susceptible to verticillium wilt are *Acer, Cinnamomum, Cupaniopsis, Fraxinus, Olea, Prunus, Robinia, Schinus, and Ulmus.* There is no chemical control available

**Western pine rust galls**
TREES AFFECTED: *Pinus radiata, P. halapensis*
SYMPTOMS: Swellings surround small branches. In spring, yellowish orange powdery spores are produced in fissures on the galls.
CONTROLS: Prune out infected branches before spores form in the spring.

**Water mold fungus**
TREES AFFECTED: Any species in very wet soil.
SYMPTOMS: Leaves may die or look scorched, and there will be little or no new growth.
CONTROLS: Non-toxic: Correcting drainage and irrigation problems is the best control.
Chemical control: Metalaxyl (LD 669) or aliette (LD 5800) are two chemicals for control.

**Whitefly**
TREES AFFECTED: *Betula* species, *Liquidambar, Platanus acerifolia,* others.
SYMPTOMS: A cloud of tiny white insects fly around frantically when disturbed. Yellow spots appear on undersides of leaves where chlorophyll has been removed by them. Usually caused by overwatering.
CONTROLS: Non-toxic: Put lacewing eggs in cups tied to affected trees. Reduce frequency of watering.
Chemical: If severe, spray alternately with Mavrik and Vendex in April-May.

## 3.7.5 INSECT AND DISEASE PROBLEMS IN THOUSAND OAKS

Analysis and identification of tree problems is important, and if there is doubt about a diagnosis a tree specialist should be consulted. Some root problems cause foliage symptoms which look like those caused by insects. For example, Pythium water molds, which kill absorbing root tips, may cause foliar symptoms which are similar to nitrogen deficiency symptoms. Pythium can also increase susceptibility of the tree to fungal leaf spot.

Table 8 lists the most common problems associated with tree species found in Thousand Oaks. If a tree is not listed, it does not have any significant pest or disease problem in Thousand Oaks at this time.

## PESTS AND DISEASES COMMON TO THOUSAND OAKS

| Tree | Problem |
|---|---|
| *Acacia* species | chlorosis in alkaline soils |
| *Acer campestre,* Hedge maple | occasional aphids |
| *Acer rubrum* 'Armstrong', Armstrong red maple | aphids |
| *Acer rubrum* 'October Glory' | caterpillars in May (ignore aphids in April) |
| *Alnus rhombifolia,* California white alder | alder aphid, tent caterpillar |
| *Alnus cordata,* Italian alder | alder aphid |
| *Betula alba,* White birch | aphids |
| *Callistemon* species, Bottlebrush | chlorosis in alkaline soils |
| *Ceratonia siliqua,* Carob | root crown rot if watered frequently. Squirrel damage to branches |
| *Carpinus Betulus* 'Fastigiata', Upright European hornbeam | occasional black scale |
| *Celtis occidentalis,* Common hackberry | caterpillars |
| *Cedrus atlantica,* Atlas cedar | oak root fungus in heavily watered turf |
| *Cedrus deodara,* Deodar cedar | oak root fungus in heavily watered turf |
| *Cercis occidentalis,* Western redbud | water molds, Rhizoctoria root rot, black stem fungus |
| *Cinnamomum camphora,* Camphor tree | honey mushroom fungus<br>verticillium wilt |
| *Cupaniopsis anacardioides,* Carrotwood | aphids in the spring |
| *Cupressocyparis leylandii,* Leyland cypress | Serious coryneum canker fungus |
| *Eriobotrya deflexa,* Bronze loquat | fireblight, black scale |
| *Erythrina caffra,* Coral tree | caterpillars in summer |
| *Eucalyptus* species | lime-induced chlorosis in alkaline soil, Eucalyptus longhorn borer |

TABLE 8

**TABLE 8 con't.**

| Tree | Problem |
|---|---|
| *Fraxinus* 'Moraine', Moraine ash | ash lygus bug a minor problem |
| *Fraxinus velutina glabra,* Modesto ash | ash anthracnose, ash curl aphid, honey mushroom fungus |
| *Geijera parviflora,* Australian willow | occasional black scale |
| *Jacaranda mimosifolia,* Jacaranda | caterpillars in the spring |
| *Lagerstroemia indica,* Crape myrtle | mildew (new hybrids are resistant) |
| *Liriodendron tulipifera* | tulip poplar aphid, tulip poplar scale |
| *Ligustrum lucidum* , Glossy privet | black scale |
| *Liquidambar styraciflua,* American sweetgum | brown softshell scale |
| *Magnolia grandiflora,* Southern magnolia | aphids in spring |
| *Maytenus boaria,* Mayten | thrips in late May, carrying a virus. Cottony cushion scale. |
| *Olea europaea,* Olive | black scale, *Pseudomonas syringa* canker |
| *Pinus canariensis,* Canary Island pine | pine bark aphid, pine needle aphid |
| *Pinus coulteri,* Coulter pine | Pine scale |
| *Pinus halapensis,* Aleppo pine | pine bark aphid, pine needle aphid,western pine rust gall, Sequoia pitch moth, severe spider mite |
| *Pinus pinea,* Italian stone pine | pine bark aphid, pine needle aphid, Sequoia pitch moth, occasional spider mite |
| *Pinus thunbergiana,* Japanese black pine | pine bark aphid, pine needle aphid |
| *Pinus radiata,* Monterey pine | pine bark beetle, California turpentine beetle, pine bark aphid, pine needle aphid, western pine rust galls, sequoia pitch moth, very severe spider mite |
| *Pinus roxburghii,* Indian longleaf pine | pine scale |
| *Pittosporum tobira,* Tobira | aphids, scale |
| *Pittosporum undulatum,* Victorian box | aphids in the spring |
| *Platanus acerifolia* , London plane tree | sycamore mildew, syc. scale, syc. anthracnose |

**TABLE 8 con't.**

| Tree | Problem |
|---|---|
| *Platanus racemosa,* Western sycamore | sycamore anthracnose, sycamore scale |
| *Prunus caroliniana,* Carolina cherry laurel | chlorosis in alkaline soil |
| *Prunus cerasifera,* Purple plum | shot hole fungus, water mold fungi (in over-wet soils), plum leaf aphid (in variety 'Blieriana') |
| *Pyrus kawakamii,* Evergreen pear | aphid, pear blight, fungal leaf spot |
| *Pyrus calleryana* varieties, Ornamental pear | check for fireblight |
| *Quercus agrifolia,* Coast live oak | fruit tree leaf roller, oak leaf caterpillar, oak twigborer, oak tree hopper, honey mushroom fungus |
| *Quercus ilex,* Holly Oak | fruit tree leaf roller, oak leaf caterpillar, oak tree hopper, oak mildew |
| *Quercus lobata,* Valley Oak | fruit tree leaf roller, oak leaf caterpillar, oak tree hopper, honey mushroom fungus, oak pit scale, oak anthracnose fungus |
| *Quercus robur,* English oak | fruit tree leaf roller, oak mildew |
| *Quercus rubra,* Red oak | oak leaf caterpillar |
| *Quercus palustris* 'Village Green', Pin oak | oak leaf caterpillar |
| *Robinia ambigua* 'Idahoensis', Pink locust | aphids |
| *Robinia pseudoacacia* 'Umbraculifera', Mophead locust | aphids |
| *Schinus molle,* California pepper | pepper tree psyllid |
| *Schinus terebinthifolius,* Brazilian pepper | verticillium wilt |
| *Tipuana tipu,* Tipu tree | aphids |
| *Tristania conferta,* Brisbane box | chlorosis |
| *Ulmus americana,* American elm | elm bark beetle (Dutch elm disease) |
| *Ulmus parvifolia* , Evergreen elm | elm anthracnose, elm leaf beetle |
| *Washingtonia robusta,* Mexican fan palm | pink rot |

## TIPS FOR DIAGNOSING TREE PROBLEMS CAUSED BY PESTS

*By C. S. Koehler,*
*Cooperative Extension, U.C. Berkeley*

1. More than half of the problems brought to your attention will be attributable to factors other than insects and mites.
2. The cause of poor plant performance may not be evident on the plant sample given to you for diagnosis. The cause may lie farther down the plant.
3. The mere presence of insects or mites does not always mean that they are the real cause of poor plant performance. (Improper maintenance or poor plant selection also contribute.
4. If the entire tree is dead, the chances are great that insects or mites were *not* the cause of death. Insects and mites seldom kill their host plants.
5. Most insects and mites show specificity in their choice of plants. Some are general feeders, but most are not. Knowing the name of the affected plant is therefore extremely helpful in determining the identity of the offending insect or mite, because lists of pests and other references are often organized by host plant.
6. The application of a pesticide is not the solution to every pest problem.
7. By the time many people notice a pest problem and seek your advice, it is often too late that season to take corrective action.
8. Especially when reporting by telephone, people tend to magnify the actual size of an insect.
9. Insects and mites must feed in order to survive and reproduce. Evidence of their feeding will nearly always remain on the plant even after the pest is gone. Most signs and symptoms of pest activity fit into one or more of the following categories:

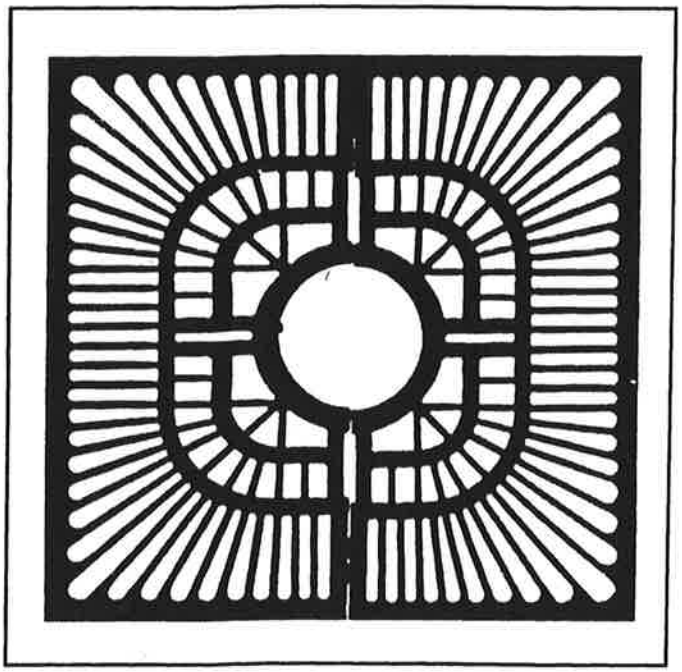
| **Symptom or Sign** | **Probable Pest Responsible** |
|---|---|
| I. Chewed leaves, blossoms | Caterpillars, beetles, sawflies, snails, slugs. Also leafminers (chewing is inside leaf) |
| II. Stippled, bleached, yellowed or bronzed leaves | Leafhoppers, aphids, psyllids, thrips, lace bugs, spider mites |
| III. Distortion (twisting, cupping, swelling of plant parts | Thrips, aphids, blister (bud) mites, gallmakers |
| IV. Dieback of plant parts gallmakers | Borers, scales, |
| V. Presence of excrement, sooty mold, flocculence, froth, cast skins, tents, pitch tubes, or other insect product | Aphids, soft scales, mealybugs, whitefly, adelgids, thrips, lace bugs, spittlebugs, certain caterpillars, etc. |

## DIAGNOSING OTHER TREE PROBLEMS, PESTS AND DISEASES

| Symptoms | Probable Cause |
|---|---|
| Leaf or stem spotting with necrosis (dead areas), chlorosis (absence of pigment) | Bacterial, viral or fungal infection, or damage or from chemical spray. |
| Marginal burning of leaves and stunted growth. | Excess salts in soil or water. |
| Mottling or mosaic patterns of yellow green or light and dark green, often with leaf distorting and stunting. | Virus infection, chemical injury, or genetic variegation. |
| Discoloration in the vascular system of roots and stem, often with one-sided yellowing or wilting. | Wilt fungi, wilt bacteria, or toxicity from fertilizer. |
| Galls (irregular overgrowths) on stems, leaves, roots or crown | Aerial galls are most often insect problems. Galls on roots may be bacteria or nematodes. |
| Stippled, bleached, yellowed, or bronzed leaves | Leafhoppers, aphids, psyllids, thrips, lace bugs, spider mites |
| Interveinal or uniform chlorosis mainly on new growth | Mineral deficiency of iron, zinc or other mineral |
| Poor growth, general weakening, yellowing of leaves | Nitrogen deficiency, overwatering, virus, lack of water, soil compaction, chemicals in soil (oil, salt, soap, dog urine) change of grade around tree, change in water table |
| Chewed leaves or blossoms | Caterpillars, beetles, snails, slugs, leafminers |
| Dieback of plant parts | Borers, scales, gallmakers, overwatering |
| Distortion (twisting, cupping, swelling) of plant parts | Thrips, aphids, mites, gallmakers, mineral imbalance in soil |
| Whitish powdery growth on leaves | Powdery mildew-rake and burn infected leaves |

## DIAGNOSING OTHER TREE PROBLEMS, PESTS AND DISEASES con't.

| Symptoms | Probable Cause |
|---|---|
| Foul smelling liquid exudes from tree; dark brown,water-soaked bark, often with oozing sap. | Slime flux bacteria. This may not affect the tree adversely. Consult an arborist to see if treatment is needed. |
| Twigs, branches, new growth killed after cold spell. | Frost damage |
| Spindly growth and death of lower limbs and inner branches of tree. | Lack of sunlight |
| Yellowing, browning, and withering of leaves on one side of the tree. Starts on tips and margins of leaves. | Sun scorch-caused by high temperature combined with drought; overwatering |
| Bark tissues dry, crack and curl on limbs and trunk, where bark was smooth or previously shaded. | Sudden exposure of bark to sun and wind through poor pruning, or by planting young trees in hot weather. Paint bark with white latex paint. |
| Discoloration and browning of foliage, often with mottling of foliage and browning between veins. | Air pollution from nearby factories. Increased susceptibility to pollution damage can be caused by high-intensity sodium street lights. |
| General weakening and death of part or all of tree; often one side of tree will show lighter green foliage, which drops earlier in fall on deciduous trees. | Girdling roots. Cut root and remove. (See sec. 3.4.1 for a discussion of root pruning) |
| Localized, rough open wounds, sometimes with death of limbs. | Contact with power lines in wet weather causes short circuit. Mechanical injury can be caused by chafing. |
| Wilting of foliage, often with trunk abrasions, | Lightning (rare in Thousand Oaks) |



## 3.8 OTHER MAINTENANCE

This section describes how to maintain the "furniture" of tree planting—stakes, paving, grates, etc.—as well as detailing tree protection and hazardous tree assessment.

### 3.8.1 STAKES AND TIES

■ Check stakes and ties several times during the year to see if they are intact, and if there is any slipping of the ties or girdling of the trunk.

■ Ties must be flexible to allow for the trunk of the tree to expand. Ties must not prevent the trunk from being able to move. The tree will develop a much stronger trunk if the trunk is not immobilized. Remove all wire tree ties which may have been used. Replace them with rubber ties if support is still needed. Wire ties should **never** be used when planting and maintaining trees.

■ Check stakes and ties for possible removal starting at the first year after planting. The stakes should be removed if the tree can stand alone. Auxiliary stakes can usually be removed before the support stakes. In most cases, anchor stakes are unnecessary after the first year. If protection is still needed, the ties can be undone and the anchor stakes left in place.

Test the tree for its ability to stand without stakes. Grasp the tree 3 to 4 ft. above the ground and move it back and forth at least 12". If the root ball doesn't move but the stem bends, the stake can probably be removed. If the root ball moves, the tree will probably never form a sufficient root system and should be considered for removal.

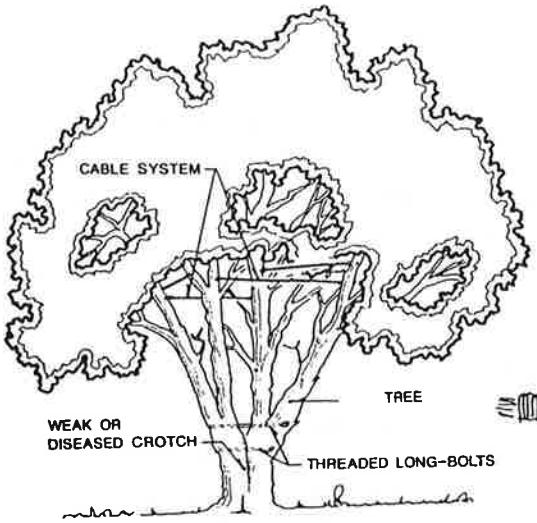
■ If trees have blown over they are usually not worth saving.

■ If trees have pulled out of wet soil without severe damage, they can often be pulled back to an upright position. Thin about one third of the canopy. Anchor the trees.

**Tree Cabling and Bracing**

Even when trees are properly trained, maintained and pruned, they may develop weak or poor structure and require special care. Horizontal branches, branches weakened by decay or storms, and branches of equal size arising from the same level on the trunk can all create structural problems. Cabling involves attaching a flexible steel cable between branches to limit motion of the limbs. Bracing uses bolts or threaded rods to secure split crotches, trunks or branches, and hold rubbing limbs together or apart. (See Figure 21.)

Cabling or bracing should be undertaken under the direction of a certified arborist. An assessment of the value of the tree and the cost of the work should first be undertaken to determine if the tree is worth the effort.




## Steps to Install Cabling

1. Select proper cabling system (i.e. one or more cables) to support weak branching and to minimize twisting.
2. Position cable attachments so as to combine support with flexibility.
3. Attach cables to limbs at 2/3 of their length from crotch. Take care to attach all branches at about the same distance.
4. Attach cables as high as possible on the main supporting branches at about a 45 degree angle.
5. Use drop forged bolts for maximum strength.
6. Use large round or oval washers or amon nuts on threaded bolt ends.
7. Use braided cable with thimbles.
8. Tighten cables securely to eyelets which have been tightened so as to almost touch the bark. Attach only one cable to each eyebolt.
9. Countersink nuts and washers to the cambium layer.
10. Allow some slack to the cable so as to provide for the branches to move with the wind.

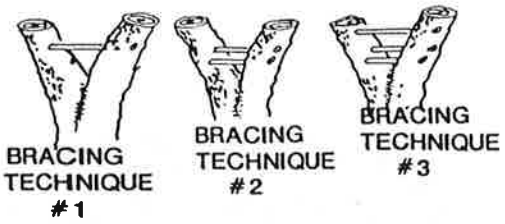
## Bracing of Weak or Damaged Crotches

1. Center Holes on trunk.

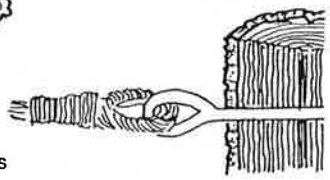
2. When two rods are used, place just above the crotch and parallel to each other, separate from each other approximately the limb or trunk radius, but no closer than 5 inches. A third rod may be placed just below the crotch.

3. Use self threaded rods. Drill a hole one sixteenth inch smaller than the rod diameter.

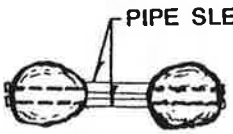
4. Counter sink bolt ends to the cambium layer. Install tightly fitting sleeves on exposed rods.



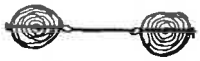

## Bracing Techniques



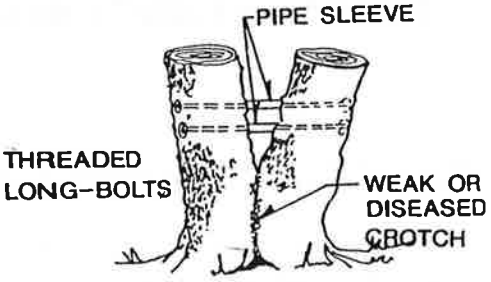
## Forged Eyelet



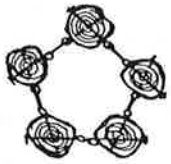

## Plan View



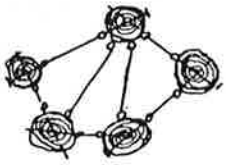
## Cabling System A



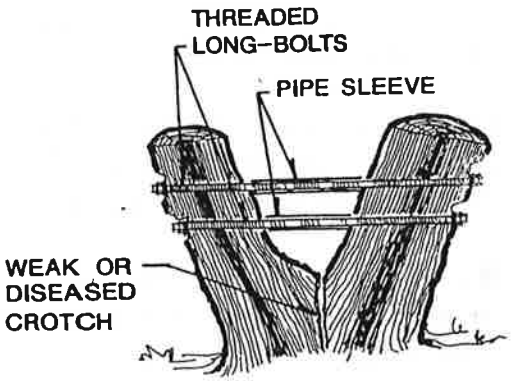

## Partial Elevation



## Cabling System B



## Cabling System C




## Section

**Reprinted by permission of James Dean, ALSA**

**Cabling and Bracing** **Figure 21**

## 3.8.2 IN AND AROUND TIIE BASE OF THE TREE

**Tree Grates and Paving Materials**
As the tree trunk increases in diameter, it will need a larger opening. Punch out sections of the grate as needed, or remove tree well covers.

**Watering Basins**
Usually the basins are needed through the first two growing seasons. If the tree is being watered by a drip system, the basins are only necessary for the initial hand watering at planting time.

**Protecting Tree Trunks**
Trees, especially newly planted trees, can be damaged by electric weed whips which trim weeds and ground cover right up to the trunk. The trimmer can easily cut the cambium layer of the tree bark and kill the tree. All trees must have trunk protection in sod areas.

Existing trees without headers could benefit from a plastic or rubber tree boot to protect the trunk until the tree is mature, or the soil could be removed and a wood header installed.

## 3.8.3 HAZARDOUS TREE ASSESSMENT

Each time tree maintenance is performed, personnel should carry out an overall check for hazardous conditions. City maintenance workers should be trained to check for these conditions. (A form for assessing hazardous conditions is found in Appendix 2. See the resources list also, for a reference to the "Tree Health Managemcnt Vidco.")

**CHECKLIST FOR HAZARDS**

☐ Thinning out foliage and/or branches
☐ Faults in the branch structure (poor branch attachments, poor spacing of major branches, many water sprouts or suckers)
☐ Cavities in the trunk or major branches
☐ Decay in major branches
☐ Old pruning wounds that haven't healed
☐ Insect infestation
☐ Fungus infection
☐ Cracks in the bark (indicating dead cambium)
☐ Evidence of hollowness (tap with a wooden mallet) or use a shigometer or increment borer
☐ Cankers at the root flare or on large roots
☐ Dead vascular tissue at the root flare or on large roots
☐ Decay at the root flare or on large roots
☐ Available targets in the form of people or property

If a tree is judged to be hazardous, all protective measures such as pruning, cabling, bolting or bracing, etc. should be evaluated and tried before considering removal. The tree's value should be determined (see 2.2.3) and the tree removal evaluation done (see 2.2.2).

**Tree Wounds**
Improper pruning or branch breakage may result in branch stubs which do not callus properly. Wind breakage, maintenance equipment such as lawn mowers, nailing signs to trees, and repeated trunk injection of pesticides may cause trunk wounds which do not heal easily. In these cases a cavity may form in the trunk or branch as a result of decay organisms entering the wood. The cavity may weaken the tree structurally, serves as a breeding place for insects, and may reduce the vigor of the tree. In an old tree decay may progress rapidly enough to be a serious threat to the tree. (See 3.9 for a discussion of root wounds.)

■ Remove dead and loose bark from around the wound with a sharp knife. Leave live attached

bark, and form a clean smooth surface of healthy wood and bark. Smooth any damaged wood into an elliptical wound, pointed at the bottom, so it will not trap water.

■ Press any remaining loose bark tightly against the wood and hold it in place with small aluminum nails.

■ Trim branch stubs back to the branch collar, leaving the collar intact. (See 3.4 for a discussion of pruning.)

■ Proper watering and fertilizing will promote wound healing.

■ If a cavity is present in the trunk or limb, siphon water out of it with a turkey baster, and cover the cavity with a piece of sheet metal to prevent further moisture accumulation.

■ If the bark is sunburned, it will blister, crack, dry, and peel away from the wood. Carefully remove loose bark with a knife. Paint the wounded bark with light gray latex paint to reflect sunlight. This condition most often occurs when newly installed trees' root balls are not properly watered, resulting in reduced sap flow and decreased resistance to sunscald.

## 3.9 PROTECTION OF EXISTING TREES

This chapter explains how to protect existing trees when construction work is taking place around them.

### 3.9.1 PROTECTION PRACTICES

No mature amenity tree in the city on public property, may be removed without authorization from the city.

Before construction work is undertaken near existing trees, procedures for protection of the trees should be understood. Specific procedures for protection during and after construction should be agreed upon and approved by the community forester. It is important to realize that the result of damage to the root system of the tree may appear anywhere from five to fifteen years after the work has been done.

The following guidelines are basic tree protection practices. The city may require additional conditions as part of their plan review or permit process. (See 1.5, Appendix.)

**Compaction**

Do not compact the soil any closer than 5 ft. out from the dripline of any tree during construction (the tree's "protected zone"). Fence off the tree at the outermost edge of the protected zone before any equipment is allowed on the site.

**Cut and Fill**

In general, no cut or fill is permitted beneath the protected zone of existing trees in Thousand Oaks (See 1.4). Filling will require installation of drainage and aeration tubes to protect the tree (refer to the discussion of paving below).

When soil is cut (removed), promptly apply a 4" to 6" layer of mulch to conserve soil moisture. Fill should not be placed closer to the trunk than three times its diameter, and a minimum of 6 ft. from the trunk. Do not store any excess fill under the tree. The natural root flair of the trunk should always be visible. With native oaks, limit the depth of cut or fill to 6".

**Trenching**

Utilities and footings for buildings and walls should be designed and located to minimize disturbance to tree roots. If a footing must be laid near a tree, use only pier and grade beam footings with bridge foundations within the dripline. Do not use a continuous grade beam footing. Dig 30" deep pilot holes with a two-man power auger, using an 8" bit. If roots of 4" in diameter or greater are encountered, move the proposed location of the pier 12". If utility lines must travel through a dripline the trenches must be dug by hand. Tunnel under any roots encountered rather than cutting the roots.

Trenching under oaks can only legally be

done with hand tools.

**Root Damage**

■ If roots over 1" are broken, cut the root cleanly and immediately cover the cut with a plastic bag tied with a rubber band or tape. No oak roots over 1" may legally be cut.

■ If a major root (over 3" in diameter) is removed, or a large portion of smaller roots are damaged, the tree canopy must be pruned to balance the tree. Prune the same percentage of canopy that have been lost in root mass, up to 30% of the canopy. For example, if 10% of the roots are damaged, prune out 10% of the canopy.

**Branch Pruning**

See 3.4 for guidelines.

**Watering**

If one-quarter or more of a tree's roots will be disturbed, a special watering schedule is necessary. The tree should be watered before construction begins. The tree will need 10 gallons of water for each 1" of tree caliper, applied to a minimum depth of 12" over the outer half of the dripline area. Continue watering once a month during the dry season.

**Fertilizer**

Deep root fertilizing should be carried out during April and May of the year of construction or the year following. (See 3.6.)

**Drainage and Erosion Control**

If grading alters the drainage patterns, be sure that water is directed away from the trunks of the trees to prevent fungus infections.

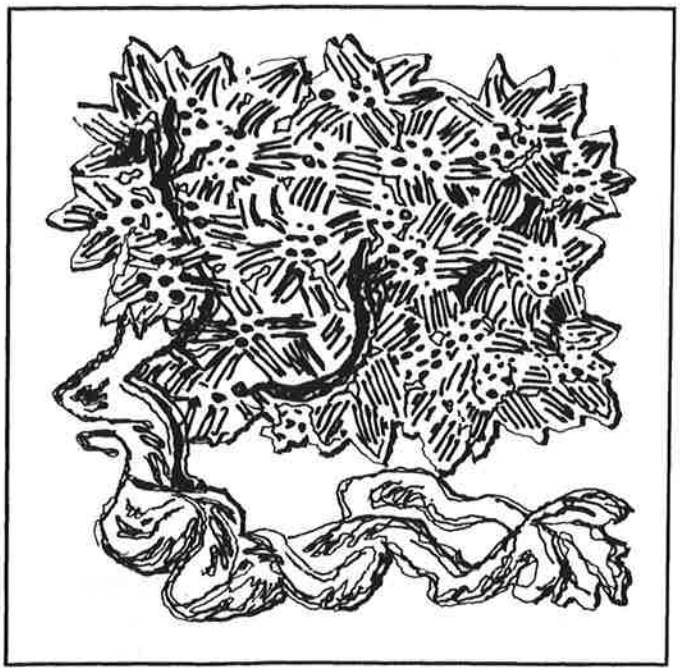
**Paving**

If paving is to be laid over a tree's roots within 5 ft. out from the dripline, install vertical drain tubes in a circle near the dripline, 3 to 4 ft. apart. Use perforated PVC pipe 18" deep, and fill with 3/4" gravel. Cap with an open grate. (See 3.3.6) If the tree will need watering, install an adjustable bubbler head in each drain tube, and connect a soil sensor (tensiometer) to the system to regulate the watering. The sensor should be placed 18" deep midway between the two most accessible drain tubes. Paving or other structures under oaks, and paving under landmark trees requires a permit.

**Planting Under Oaks**

In the case of native oaks, old specimens are adapted to dry summers, and will be susceptible to fungus diseases if they are exposed to summer water. Either frequent irrigation or altered drainage patterns can cause problems. Other specimens may have grown up with summer water and are better adapted to it. With specimens which have grown up without summer water, no planting should be done inside the protected zone, five ft. out from the dripline of the tree.

In all cases irrigation creates the danger of infection by honey mushroom fungus or water mold diseases. (See 3.7.4.)



## 3.10 SHRUBS, VINES AND GROUND COVERS

Shrubs and ground covers should be chosen to complement their location so they require only minimal care. A maintenance schedule for shrubs and ground covers only needs to deal with problems, such as a lack of water or fertilizer, insects or pests, dead plants, dead wood which needs to be removed, conflicts with trees and other plants, or to open up sight lines for safety.

This chapter details the maintenance practices needed to ensure the health of the tree as well as the plants at its base.

### 3.10.1 PRUNING

In general, no pruning should ever be needed for the shrub species recommended to be planted in the right of way areas. A rule of thumb should be to prune only for the health of the plant or safety of the community. (See 1.3.2.f.)

The majority of shrub species used in the landscape, if allowed to form their own shape, without direction by pruning, would become rounded forms, in many cases, broader than tall, and would be branched to the ground. If the goal of the landscape maintenance pruning is to achieve the healthiest, best looking plant with the least possible work, the best means to that goal is to encourage the plant to grow into the form that it would achieve naturally. The common practice of pruning all shrubs into a "round ball" form with hedge shears is not recommended for reasons of economy, aesthetics, or in some cases the health of the plant. Shrubs which have been pruned this way can be restored by letting them grow and performing thinning operations over a period of several years to help restore their natural shape.

Where the shrub is pruned up from the ground up into a "round ball" shape more soil surface is exposed, evaporation from that soil is accelerated, and the plant's roots become dry much more rapidly. When this soil is blown or raked clean, so that no organic material or foliage covers the soil, it becomes very difficult for air or water to penetrate the surface and the water which is applied runs off into the surrounding lower areas. All of these factors increase the cost of maintenance and reduce the vigor of the shrub.

Where ground covers grow up beneath shrub canopies, the ground cover should be removed in favor of the expansion of the canopy of the shrub. The shrub should not be pruned to facilitate maintenance of the ground cover.

Some ground cover species, including *Hedera, Hypericum calycinum,* and *Osteospermum fruticosum*, require mowing to eliminate dead wood build-up which can be unhealthy for the plant, and can become a fire hazard. Mow every two years, in late winter, to a height of 12". Use a flail mower for the job.

### 3.10.2 WATERING

Irrigation duration and frequency should be determined by the needs of the shallowest rooted plants in the area, which will need more frequent irrigation. Generally, ground cover and shrub areas should have their own valves, with trees watered separately, or with adjustable bubblers if they are on the same valve. In addition, slopes should be valved separately from flat areas, and shady areas separated from sunny ones.These separations allows different watering requirements to be met. Irrigation systems should be designed by a landscape architect or irrigation consultant.

As with trees, the use of a mulch in all areas is highly recommended, to slow the rate of evaporation of water from the soil. This also keeps the soil surface from baking in the sun, allowing air to keep reaching the roots, and is a good weed control barrier. As the bark breaks down it gradually improves soil structure and fertility. Use a 4" layer of shredded bark or bark chips. Most standards recommend 2", but a 4" layer greatly increases water savings.

In general, try to set an irrigation schedule to water as deeply and infrequently as possible. This encourages deep-rooted, vigorous plants which can withstand hot spells. Established drought tolerant material may need only monthly waterings: some get by with two waterings in a dry season, and some drought tolerant plants prefer no summer water at all.

Moisture checks should be made periodically, preferably twice a month during the first year,with the use of a soil probe in various ground cover areas. When an automatic controller is used, a soil tensiometer can be installed with the controller which will override the controller program to water when necessary, and to shut off the program if no water is needed. As these sensors are not foolproof, they should not be thought to take the place of moisture checks and intelligent programming. However, studies on the value of tensiometers have shown that a significant reduction in water use can be accomplished through the use of them. (See Appendix.) It is usually not necessary to install a sensor on each valve of a system; using strategic locations are sufficient.

The soil should be kept moist to a depth of 12" during the establishment of new plantings, in order to facilitate deep rooting of plants and to keep the root balls of new plants from drying out. The amount of water needed each week is a function of the type of plant, weather conditions, soil type, competition by other plants, and the stage of development the plant has attained. The timing of irrigation cycles is also a function of the precipitation rate of the sprinklers and the time it takes before runoff begins. The slope and soil type affects the runoff time.

Generally, plants in Thousand Oaks will need about 1-1/4" of water per week to replace evapotranspiration losses in hot weather, and 1/2" to 3/4" per week in cooler weather. (Evapotranspiration is the amount of water the plant transpires through its leaves plus the amount lost to solar evaporation). However, established drought tolerant plants may need only 1" to 1-1/2" applied monthly.

Each irrigation system is unique, and is best programmed after installation and observation of how it functions, using both the expertise of the designer and field personnel. The use of repeat cycles, available with most modern controllers, can minimize runoff on slopes and in tight soils. Program the cycles a half-hour apart to allow water to percolate into the soil. Usually three different schedules per year, a hot-weather, a spring and fall, and a winter schedule, are needed. During the first two or three years irrigation will have to be more frequent. When the plants are older and well established, less frequent, deeper waterings can be programmed. Sprinklers should be programmed to go on in the early morning, to

minimize the chance of fungus diseases which can occur if leaves of the plants are wet all night, and to avoid inconvenience to people from the spray.

Drip irrigation, while very conserving of water, does require more maintenance than bubbler systems. The emitters clog fairly often, so regular inspection of the system and regular cleaning of the filter is important. Do not use emitters with a precipitation rate less than one-gallon per hour, as they tend to clog more easily. It is best to use rigid PVC pipe in the system and put multi-emitters on adapters which connect to PVC risers. This is a more permanent and lower maintenance solution than polyethylene pipe.

Weeding and cultivating the soil around plants can damage the system. In medians and other areas where foot traffic or machinery may be a problem, the emitters need to be installed below ground, so regular inspection is time consuming. On slopes, however, a drip system is often chosen because it will produce the least amount of runoff. Also on slopes there is less danger of damage to the emitters from foot traffic, and so they can be installed above grade, thus being easier to inspect. Emitters on slopes should be installed upslope from the root balls of the plants.

With large shrubs, it is necessary to change the location and number of emitters as the plants mature, so that water continues to get to the feeder roots around the driplines of the plants (if irrigation is still needed). Automatically controlled irrigation systems are usually only cost-efficient for large areas. For the safety of maintenance personnel, it is also best to use a controller in all street medians. The controller should be placed in the sidewalk right of way so that maintenance personnel can visually inspect the median system without having to cross the street. Manual irrigation systems should only be used if frequent and regular maintenance is available. Hand watering is usually not efficient or cost-effective for large planting beds.

**Drought strategies:**

■ In a drought situation, give a deep watering early in the growing season. Established drought-tolerant plants should be able to survive with no further irrigation.

■ If necessary, give one or two additional deep waterings during the growing season. Wait until symptoms of water stress occur before irrigating.

■ If planting beds are crowded, removal of some plants will lessen competition for moisture.

■ An anti-transpirant can be sprayed on the leaves of plants to reduce the transpiration rate.

## 3.10.3 FERTILIZING

**At planting time:**

■ Shrubs, vines and ground covers should be fertilized at planting time with a slow release type. It can be the same fertilizer as is used for the trees. (See 3.6.2.) The fertilizer should be mixed into the planting holes or planting beds before installing the plants. About 1/4 pound of actual nitrogen per 1000 square feet is recommended.

**The first year:**

■ If there is time before summer, follow this initial application with another, about three months later, applying 1/4- to 1/2-pound of actual nitrogen per 1,000 square feet. Avoid fertilizing during the warm summer months, when the weather would stimulate too-rapid growth.

**Established plants:**

■ Established plants need one fertilization yearly, with some exceptions. Some native plants prefer no fertilizer, and some established plants do not require it. Fertilizing can be done in early spring, or it can be done in two stages, with half in early

fall and half in early spring. A minimum of one-half to one pound of actual nitrogen per 1,000 square feet is required. If a ground cover is sheared in the spring, it should be fertilized at that time.

Mix the fertilizer with an equal amount of sand, soil, or peat moss, and scatter the mix around the outer two-thirds of the area around shrubs and vines. Do not concentrate fertilizer against the main stems of shrubs. If there is ground cover, scatter the mix throughout the ground cover and around the shrubs and lightly water in, taking care not to wash the fertilizer away from the bed or the root zone of the shrubs.

■ Micronutrients: If the soil is deficient in micro-nutrients, an application of a micronutrient (trace mineral) fertilizer once or twice yearly may be helpful.

**In times of drought:**

■ Do not fertilize. Any new growth will increase the water requirements of the plant.

**When in ill-health:**

■ Never fertilize a declining plant, unless the problem has been diagnosed as a deficiency. The pest or disease must be treated first, and any underlying environmental problem corrected, before the plant is fertilized.

## 3.10.4 WEEDING

The best weed control in ground cover areas is to keep the planting healthy and actively growing so as to establish complete coverage as soon as possible. If there is no ground cover, often a weed control fabric can be laid, and covered with bark mulch or gravel. This should be done using a header board or pavement to keep the bark from spilling onto walkways or streets. The bark or gravel should not be at a higher grade than the surrounding walkway. Shrubs and trees can be planted in holes in the fabric. Fabrics which are available today allow air and water to pass through to the soil. Do not use impermeable plastic sheeting.

A mulch of bark or gravel without weed control fabric can also be used, although weed control will not be as thorough with this method. The high initial cost of the fabric may be justified in many situations by subsequent savings in labor costs, since less hand weeding and /or spraying will be needed. Clear plastic sheeting, however, may be used as a pre-emergent weed control method in warm weather if there is sufficient time.This technique will also kill many soilborne diseases and pests. The area is watered to promote germination and then 1 to 4 mil. clear sheeting is laid and secured, typically by burying the edges in a trench, and/or gluing strips together with heat-resistant glue. Avoid air pockets. The weed seeds and seedlings are cooked by the sun. The sheeting should be left in place for four to six weeks. June and July are the best months for this, but good results may be obtained from May through September, depending on the weather. Another control method before planting is to encourage weed growth by watering, and then rototill or cultivate into the soil before any flowering occurs.

Weeds in ground cover areas can usually be controlled with hand-weeding. It is important to do this frequently enough that weeds do not have a chance to go to seed. If weeds are young when this is done, they can often be left in the planting bed to decompose (common bermudagrass is an exception to this). If there is a persistent problem, this method can be combined with a pre-emergent herbicide which will kill seeds. Consult the manufacturer's recommendations for effectiveness against particular weeds, and for safety with particular ground covers. It is difficult to find post-emergent herbicides which will kill weeds without damaging shrubs and ground cover. In addition,

the look of dead weeds is even less desirable than live ones, so they have to be removed anyway.

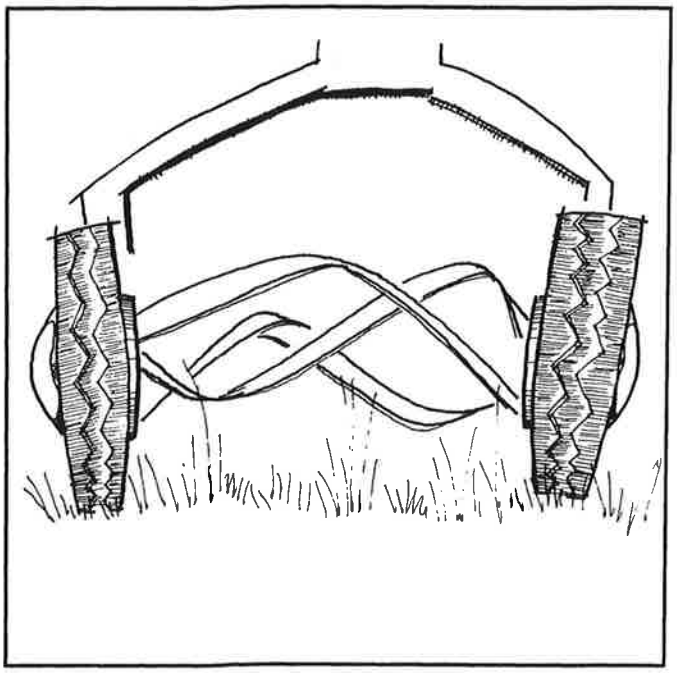
Weeds in pavement can be controlled by weed oil. Safer's Sharpshooter, a non-toxic product, can also be used. Persistent perennial weeds may have to be sprayed with glyphosate (Roundup).

Weed whips can kill ornamental plants by cutting through the cambium layer of the bark. They should be used with care.

## 3.10.5 PEST CONTROL

Healthy shrubs, vines and ground covers will be able to withstand minor insect and disease damage. Routine or preventative insecticide or fungicide applications should not be done unless there is a known severe problem. Where unusually high infestations occur, chemical pesticides may be necessary. Spraying should always be done with protective equipment, and according to the manufacturer's directions. Care should be taken in the disposal of leftover materials and containers.

The concept of integrated pest management should be the guiding principle (See 3.7.2.) This combines good plant selection and maintenance with the least toxic methods of pest control, and uses chemical pesticides as a last resort. Healthy, well maintained plants are much less susceptible to disease. If a plant is in the wrong exposure, in the wrong kind of soil, or is over or under watered or fertilized, diseases are more likely to result. The first line of defense may be to replace the plant with one better suited to the site. Mechanical controls, such as handpicking, water jets, barriers such as Tree Tanglefoot, and biological controls such as Bacillus thurengiensis can often reduce a pest population. Sprays such as dormant oil, sulfur fungicides, pyrethrum and rotenone should be tried as the next line of defense. Only if these fail should stronger pesticides be used. If pesticides must be used regularly over a long period of time in an area, it is best if several different chemicals can be alternated so that the insect population does not become immune to the effects of any one insecticide.



## 3.11 TURF

This chapter describes what kind of environment turf should be restricted to, and details all turf maintenance practices.

### 3.11.1 APPROPRIATE PLACES FOR TURF

Turf is a high maintenance ground cover that requires a great deal of water, fertilizer, and labor in mowing. Its use is therefore best in park areas where people will need a surface to walk, play, and lie on, and in high-visibility public areas. Its use should be eliminated in sidewalk and median strips and other areas where another ground cover or design approach would be more economical and water conserving. No lawn is to be planted in medians. (See 1.3.2.g.) Existing lawn in medians should be removed and replanted with drought tolerant ground covers from the recommended list. (See 2.7.) Many communities and water districts in California have passed regulations limiting turf in new landscape designs to no more than 20 to 25% of the total square footage of landscaped area. When new turf is installed, consideration should be given to the more drought-resistant tall fescue or bermuda grass.

When trees are planted in a lawn, it is best to have an area around the trunk which is mulch rather than turf. A square 3 ft. by 3 ft. or 3-ft.-diameter circle can be edged with a headerboard, railroad ties or other methods. This prevents mower damage to the trunk of the tree, and keeps the lawn from competing with the tree for nutrients when the tree is young. Installing mowing strips is also recommended. It is an excellent labor saving device, as it makes mowing and edging much easier next to buildings and planting beds, and helps keep grass out of other landscaped areas.

### 3.11.2 TURF MAINTENANCE

**Mowing**

Generally mowing at the higher rather than lower end of a grass species' tolerance is preferred, to help shade the roots and soil from the sun. Grass mowed short will usually need more water and fertilizer than the same stand mowed higher. Do not allow the turf to exceed twice the recommended mowing height before cutting it. Cutting only a third of the existing blade is even better. If this practice is followed, the clippings can be left on the lawn without contributing to thatch build-up. Avoid mowing turf when the soil is very wet, since the machinery wheels will cause ruts and compaction. Keep mower blades sharp. Dull blades will tear the grass and cause a brown, burned look to the top of the grass blades.

**Irrigation**

The evapotranspiration rate in the Thousand Oaks area is about 1" to 1/4" a week in the summer, and

3/4" to 1" a week in the cooler months of the dry season. The ability of turf to withstand less water than this varies with the type of grass. The soil should be replenished to a depth of 6" to 8" to promote deep rooting. A soil probe can be helpful in determining the depth and adequacy of watering. It is preferable to water two or three times a week rather than every day. Daily lawn waterings can promote fungus diseases and soil compaction.

As with shrub watering, early morning is preferable to evening watering to prevent fungus diseases. Short multiple cycles can be used on an automatic controller to prevent runoff. Lawns usually should not be valved together with shrub areas, because of different watering needs. In some cases the use of a wetting agent such as Aqua-gro may help a lawn which is browning out despite what seems to be a good watering and maintenance program. This may be helpful if the soil is very compacted, or has poor drainage, or stratified layers (where water will not move downward from one layer to another).

**Fertilizing**

Slow release fertilizer gives a more even supply of nutrients to the lawn, does not burn the turf when applied, and reduces labor costs since it does not need to be applied as often. Milorganite or other sewage sludge products, cottonseed meal, or other organic fertilizers are excellent slow release fertilizers which do not leach large amounts of nitrates into the ground water. They can be applied twice a year, in early spring and early fall. Fertilization can be combined with aeration at these times. Over-fertilizing turf can weaken it and encourage diseases.

**Aeration**

Turf tends to get compacted from frequent waterings and use. Aeration should be done twice a year in problem areas, in early spring and early fall. Manual or piston type aerators can be used for small areas, with roller types for larger areas. If manual types are used, do not use a tool which only pokes holes in the ground. The aerator should remove cores of soil. Fertilization can be done after aeration, and a top dressing of compost or other organic material applied at that time.
In areas of particularly heavy pedestrian traffic, or where light vehicle use may be necessary, a porous pavement system such as "grass-cel" or "Ritter rings" is recommended.

**Thatching**

Thatch is a buildup of dead plant material just above the soil surface. It tends to prevent water and air from infiltrating the soil, and needs to be removed whenever it becomes a problem. When the thatch is 3/4" thick or more, dethatching should be performed in the spring or fall with a vertical power mower. No more than 1/4" of thatch should be left. Usually aeration is done first, then thatching, and then fertilization.

**Weed Control**

When lawns receive proper care, weeds should not be a major problem. Proper mowing height, fertilization, thatch control and aeration, and infrequent deep waterings should enable turf to compete successfully with weeds. If herbicides must be used, they should be chosen for their ability to selectively kill the offending weeds. A specific program should be designed for each problem.

Spraying should be done when there is no wind and no people around, and protective clothing should always be worn. Herbicides should not be applied if the temperature is above 80 degrees, as they may burn the grass. Herbicides can be mixed with a sticker-spreader to help insure proper application. The manufacturer's instructions may advise that the lawn not be watered for a period after application, until the chemical is taken up by the plants. For large areas, a tractor-drawn sprayer can be used more efficiently than a hand sprayer.

**Pest and Disease Control**

Fungus diseases are the most common problem of lawns. Given good cultural practices, they will most frequently occur in lawns planted in heavy shade, or in areas where maturing trees or new buildings have increased the amount of shade. The turf is usually weakened in these areas, and there is usually too much moisture in the soil. There are also some fungus diseases which are encouraged by periods of drought followed by watering. Also, if soil acidity is too high, with pH below 6.0, fungi are encouraged and turf is weakened. Drainage problems will also need to be corrected in order to control fungus diseases. If spraying is necessary, follow the same precautions noted about herbicides.

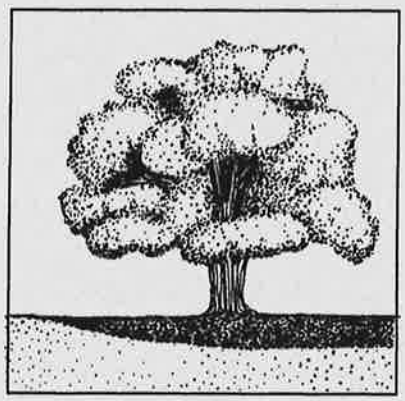
The same precautions should be followed if spraying for insect control is necessary. Significant insect damage in lawns is almost always a sign that cultural practices need to be adjusted.

## 3.11.3 TYPES OF TURF FOR THOUSAND OAKS

The grasses recommended for Thousand Oaks are bermuda grass and tall fescue. Following is a comparison the characteristics of these grasses.

- Drought tolerance
  - hybrid bermuda — highest
  - common bermuda — high
  - tall fescue — moderate
- Heat tolerance
  - hybrid bermuda — high
  - common bermuda — high
  - tall fescue — moderate
- Cold tolerance (winter color persistence)
  - tall fescue — moderate
  - common bermuda — low
  - hybrid bermuda — low (harder than common bermuda to overseed)
- Texture
  - tall fescue — coarse
  - common bermuda — moderately fine
  - hybrid bermuda — fine
- Mowing height adaptation
  - tall fescue — high cut, 1/2" to 2"
  - common bermuda — low cut, 1/2" to 3/4"
  - hybrid bermuda — very low cut, 1/4" to 1/2"
- Nitrogen fertilizer requirement
  - hybrid bermuda — high
  - common bermuda — moderate
  - tall fescue — low to moderate
- Disease incidence
  - hybrid bermuda — low to moderate
  - tall fescue — low to moderate
  - common bermuda — low
- Shade tolerance
  - tall fescue — moderate
  - hybrid bermuda — low
  - common bermuda — low
- Wear resistance
  - hybrid bermuda — high
  - tall fescue — high
  - common bermuda — high
- Overall maintenance cost and effort
  - hybrid bermuda — high
  - tall fescue — low
  - common bermuda — low

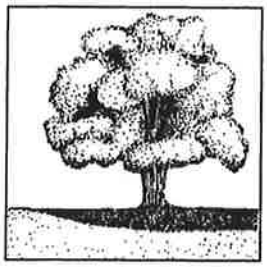
# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN



| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| **VOLUME 4: STREET TREE INVENTORY** | **GREY BOOK** |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

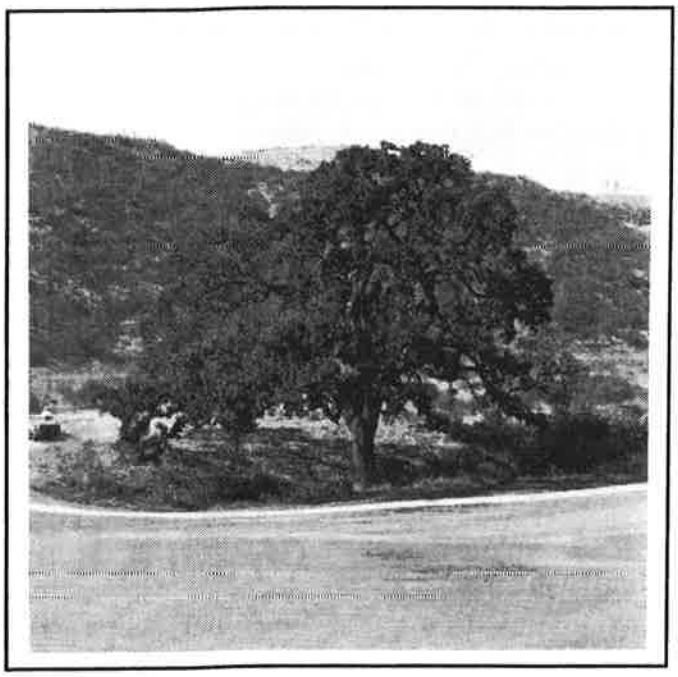
OCTOBER 1989



Volume 4

# STREET TREE INVENTORY

## TABLE OF CONTENTS



## 4.1 INTRODUCTION

This chapter describes what a tree inventory is, and why it is so important to good forest management.

### 4.1.1 THE IMPORTANCE OF THE INVENTORY

The tree inventory is a tree-by-tree portrait of the community forest. It is the foundation upon which all other work on the forest rests. The importance of the inventory is based on the premise that the city needs to have a complete picture of the trees it already has in order to make decisions about changes or additions. The inventory is also a tool used to ensure proper care for existing trees in the forest; without it, management is based on guesswork.

With a complete inventory, the numbers and locations of all trees are at the community forester's fingertips. This information allows the community forester to examine the detailed needs and condition of individual trees. It can be used to find all trees in a particular class, such as those of a certain species or those in need of a five-year maintenance servicing. And the inventory can be used to give an overview of the entire forest to determine, for example, the percent of shading it provides.

The Thousand Oaks tree inventory is to be divided into several parts, with different levels of information to meet the city's various needs. All public trees are to be individually inventoried and assessed for condition and value. This information provides the basis for the day-to-day and year-to-year management.

Special private trees such as oaks and other landmark trees protected by city ordinance but not directly under the care of the city will be inventoried on a more general basis, located by parcel number and recorded as to general condition. More specific information may be added as these trees are inspected in the course of administering the ordinances. This information will be used to assess the general state of the city's oak population, and to help track the response of individual trees to development pressures.

Other private trees will be inventoried only as to approximate numbers, types and sizes as can be determined from aerial photographs. This information can be supplemented by field-observation notes gathered when compiling the inventory or making routine inspections. This part of the inventory is of general use in assessing the tree cover of the entire community.

### 4.1.2 USES OF THE INVENTORY

The city will make regular use of the inventory data to track the progress of both the forest and the forestry program. Some of the

specific items which may be tracked and analyzed with the inventory:

■ **Expenditures of labor and materials.** The actual cost of planting and maintenance activities can be documented and accounted for. When analyzed by tasks performed and quality achieved, accurate projections of future work programs and budgets become possible. The data should also be assessed for possible means of increasing work efficiency.

■ **Condition of trees.** The planting and maintenance requirements of individual trees, neighborhoods and the whole city are readily apparent from the inventory. This allows work priorities to be established and resources allocated based on the needs of the trees. It also allows improvement or decline to be documented over time, testing the effectiveness of the forestry program.

■ **Insect and disease problems.** The inventory will help detect infestations as they occur and reveal their geographic distribution over the city. This allows the community forester to judge the seriousness of a problem and devise strategies for treating infected stock and limiting further spread. With the inventory's information on the location of species in the city, the susceptibility of various areas of the forest to a given pest or disease can also be judged, and preventive actions taken.

■ **Tree removals and replacements.** Since removing and replacing a tree usually is extremely expensive, as well as a point of heightened public concern, being able to predict and plan for the event is essential. By indicating when removal should be considered—that is, the point when the cost of maintaining a declining tree exceeds the tree's benefit to the community—the inventory can help rationalize the removal process and avoid disruptive emergency removals.

■ **Condition of the infrastructure.** Pavement damage, utility conflicts and other issues can be addressed in a timely manner, preferably in conjunction with other tree work.

■ **Risk and liabilities.** The above information allows the community forester to correct problems which could pose a public hazard for which the city might be liable. By documenting that the city exercised reasonable care in servicing a tree, and in detecting and correcting problems, the inventory can provide a valuable defense against claims that do arise.

■ **Citizen complaints and comments.** The inventory will increase the accuracy and response time to citizen concerns or information requests about particular trees. This may often save the time of an actual field visit. The complaints associated with various species will also become evident over the years.

■ **Species performance.** Valuable knowledge about the response of a species to different growing conditions and maintenance treatments can be accumulated in the inventory. Characteristic problems and susceptibilities will be useful when selecting trees for new or replacement plantings. Conversely, as the conditions associated with a particular planting site or area become better known, better species selection will also result.

■ **Age and species composition.** Knowledge of the make-up of the overall city or particular streets and neighborhoods will help avoid or alleviate monocultures and even-aged stands. The achievement of the city's goals in relation to forest composition can be monitored.

■ **Tree and forest values.** The inventory allows each tree to be assigned a monetary value, which can be compared to the costs of installation,

maintenance and removal. These values may be projected over time relative to the tree's growth and decline. They may also be projected over the entire forest, current and future. The result is a means of judging the return in forest value of the city's investment in its community forestry program.

■ **Management simulations.** Using the inventory database, simulations can be developed which show the effect of various management decisions on future forest values. For instance, the impact of various current levels of planting and maintenance (and therefore, budget) on the value of the forest in ten, twenty and thirty years could be predicted. The effect of decisions about species selection and spacing on future canopy coverage of pavement can also be judged.

### 4.1.3 WORK PRODUCTS BASED ON THE INVENTORY

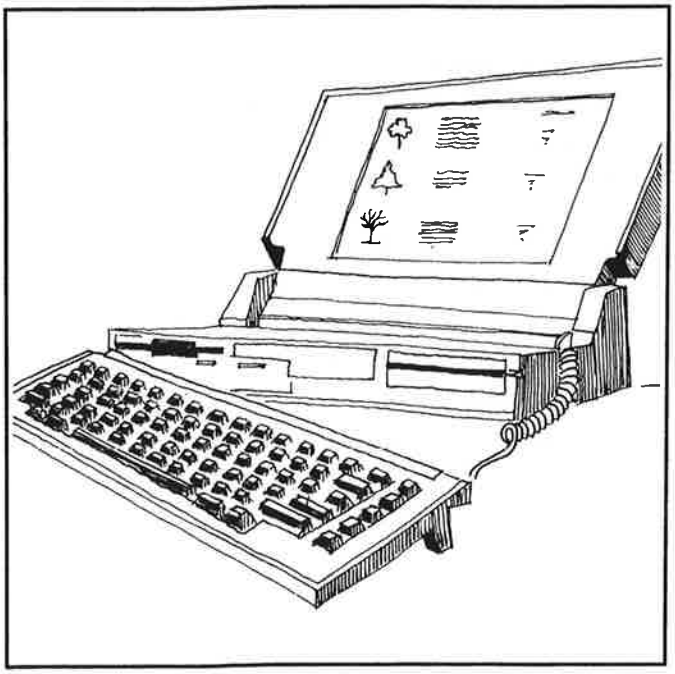
The diverse uses of the inventory will pay off in a series of specific work products used to manage the community forestry program.

■ Daily work schedules will be based on the priorities derived from the inventory, grouped into efficient combinations of tasks and geographical areas.

■ Quarterly analysis and reports will be prepared by the community forester for distribution to other city staff and the appropriate board for trees. These will provide a running account of work performed, problems encountered, future tasks anticipated and any necessary administrative or policy decisions.

■ Annual reports, work programs and budget requests will assess the program's success in meeting city goals and policies and project the effort and resources required for the next fiscal year. This provides the opportunity to use the inventory to best effect in quantifying and prioritizing the city's forestry objectives and in documenting the value created by the city's forestry investment.

■ Master Plan updates and revisions will benefit immensely from the inventory's data on species and age composition, maintenance practices and other information. The data will help in the assessment and adjustment of city policies to achieve the best results in the field.



## 4.2 CONDUCTING THE STREET-TREE INVENTORY

This chapter explains how to conduct the inventory and keep it up-to-date.

### 4.2.1 HOW THE INVENTORY IS CONDUCTED

The street-tree inventory is established by entering detailed information about each tree directly into hand-held computers during site visits to every street tree in the city. While forms could be used in place of computers, entering the data directly into the computer will save duplication of labor and prevent transcribing errors. The scope of work in 4.2.1 describes the standards by which each tree is to be assessed. This scope may be used to guide the city's inventory, whether it is conducted by staff or consultants. The cost of collecting the inventory data is estimated by inventory consultants to be between $1.50 and $2.80 per tree.

The value of this information depends on the arboricultural knowledge of the people collecting data and on the consistency of information gathered by each person. It is therefore very important that each observer follow the data-collection format as thoroughly and objectively as possible.

The information called for is a reasonably complete assessment of the tree and its immediate surroundings. It provides all the data necessary for various management uses of the inventory. If the information is properly collected, it will provide a solid basis for management of the forest, from development of daily work schedules to projection of forest values and budgets far into the future.

### 4.2.2 SCOPE OF WORK

Even though the profession of community forestry is relatively new, a standard format for collecting inventory data is being developed. These recommendations are derived from software developed by two California companies that specialize in inventory collection, Thomas J. Pehrson and Gold Coast Environmental Services Inc. The inventory should include the following information for each tree:

**INVENTORY CHECKLIST**

☐ **Location/address**

☐ **Botanical name**

☐ **Size:** Estimate tree height and spread, using following classes: 0 to 15 ft., 15 to 30 ft., 30 to 45 ft., 45 to 60 ft., 60 ft. or greater.

☐ **Girth:** Measure at 4-1/2 ft. above ground level (DBH). Use the following classes: 0" to 3", 3" to 6", 12" to 18", 24" to 30", 30" to 36", and 36"+.

☐ **Condition**: Infestations, diseases, manmade damage

☐ **Overhead obstructions**
- Overhead utilities: high voltage (primary), or low voltage (secondary, telephone, or cable TV)
- Interference of natural crown spread due to buildings or private trees

☐ **Date of last sidewalk and curb repair**

☐ **Size of tree well:** Record to nearest 6".
- Type and size of growing space: median, sidewalk tree well, etc.

☐ **Presence of underground utilities**

☐ **Vacant sites:** The community forester will determine what constitutes a vacant site. All vacant sites will be described for presence of overhead obstructions and underground utilities.

☐ **Sun and wind exposure**

☐ **Roadway width and type**

☐ **Locational value:** Percentage, based on ASA standards

☐ **Monetary value:** Dollar amount based on species, girth and locational value, using ASA standard formula.

☐ **Landmark tree status or potential:** Based on city criteria.

☐ **Dates of servicing or inventory assessments.**

☐ **Citizen complaints or inquiries.**

☐ **Permits.**

☐ **Appropriate planting and removal dates:** Based on species' life expectancy.

☐ **Notes and comments.**

**MAINTENANCE CLASSIFICATIONS**
All trees will be classified for one or more of the following:

☐ **Routine Prune:** Trees that will need inspection and/or pruning in the next maintenance cycle. Recently pruned trees or those growth habit requires little maintenance receive this designation.

☐ **Corrective Prune:** Trees that have been damaged, improperly pruned, or have developed undesirable growth habits.

☐ **Crown Thinning:** Trees that have not been structurally pruned recently or whose growth habit quickly produces a dense, thick crown.

☐ **Immediate Prune:** Trees that pose potential liability risks from large, excessive deadwood or visible decay.

☐ **Pruning for Clearance:** Trees with low-hanging branches or suckers obstructing traffic (auto, bicycle or pedestrian) or city signs. Vehicle obstruction occurs below 13 ft. in height, pedestrian at 9 ft.

☐ **Removal:** Trees that meet the removal criteria described in 2.2.2. The Tree Removal Evaluation chart in that section can be used in the field.

### 4.2.3 KEEPING THE INVENTORY CURRENT

Once a comprehensive inventory is in place, the responsibility for maintaining its accuracy rests largely on the city's maintenance crews. Every servicing of every tree must be recorded in the inventory, along with pertinent information on the tree's current condition. The work order form (opposite) should be used by city crews to assure accuracy and consistency in documenting each servicing.

It is the responsibility of each maintenance crew foreman to compile these forms and deliver them at the end of each day to the office administrative staff, who will input the new data into the inventory on a weekly basis. All foremen must therefore be trained in the proper use of the forms and the proper assessment of trees. In addition, all information relating to a tree—permits issued, citizen complaints and the like—should be recorded as it is processed by the community forestry office.

It will be necessary to completely update the inventory every ten years in order to thoroughly assess the forest's status. A forest can change drastically in ten years. This ten-year tree census should be planned and budgeted for well in advance.

## WORK ORDER FORM

**Request #:** **Request date:**

**Request Information**

**Name:**
**Address:**
**Phone:**
**Property owner's name:** **Release Signature:**

**Action requested:**

**Remarks:**

**Previous visit dates:**
**Action taken:**

**Assigned to:** **from:**
**Work due date:** **Estimate:**
☐ **Requested action consistent with Master Plan**

**Tree site information**

**Address:** **Tree no:**
**Side:** **Tree condition:**
**Block:** **Species:**
**Pavement condition:** **DBH:**
**Public R.O.W./Private:**

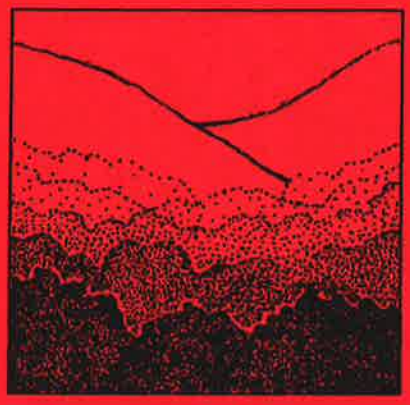
**Action Taken**

**Crew:** **Hours:**
**Materials:** **Equipment:**

☐ **Inputed to inventory** ☐ **Return required by:**

**Route to:**

# CITY OF THOUSAND OAKS
# FORESTRY MASTER PLAN



| | |
|---|---|
| VOLUME 1: PROGRAM & POLICIES | BLUE BOOK |
| VOLUME 2: MANAGEMENT & DESIGN PLAN | GREEN BOOK |
| VOLUME 3: PLANTING & MAINTENANCE MANUAL | YELLOW BOOK |
| VOLUME 4: STREET TREE INVENTORY | GREY BOOK |
| VOLUME 5: COMMUNITY PARTICIPATION & EDUCATION | RED BOOK |

WOLFE MASON ASSOCIATES

OCTOBER 1989

Volume 5

# COMMUNITY PARTICIPATION & EDUCATION

## TABLE OF CONTENTS

## 5.1 INTRODUCTION

The community forest is inextricably linked to the people of Thousand Oaks—the residents, business people, institutional employees and city staff whose collective decisions have a cumulative impact on the viability of the forest. Personally involving as many people as possible in the processes of creating and maintaining the forest increases its visibility to all people in the community, thus ensuring its longterm health and growth.

This volume suggests ways to involve the people of Thousand Oaks in the creation and maintenance of their community forest. The information falls into three major headings: who to involve, how to involve them, and ways to disseminate information about the forest. This volume is primarily intended for use by city staff, but anyone interested in promoting the community forest will find it useful.

### 5.1.1 WHO TO INVOLVE IN THE COMMUNITY FOREST

The entire community benefits from an extensive, healthy, well-designed forest, as envisioned and described in the previous volumes of this plan. Yet without an informed, involved populace, such a forest is difficult to attain. Each individual tree requires proper care to thrive, while the forest as a whole needs longterm planning and support to assure its growth. Community involvement is therefore essential to the life of the forest.

The following paragraphs describe who might be involved in the decisions regarding the community forest.

■ **Residents** of Thousand Oaks are perhaps most emotionally affected by decisions regarding the forest. Those who call the city home are apt to feel somewhat proprietary about its public amenities, of which the community forest is among the most visible elements.

In regards to the forest, residents will be primarily interested in their immediate neighborhood or street. But as the city's commitment to its forest grows, there will also be increasing numbers who are passionately interested in citywide tree issues.

Contact with residents can be individual, as in city-initiated newsletters delivered to all households, or through groups such as homeowners' associations or neighborhood-improvement organizations. The formation of such groups should be encouraged, the better to disseminate information and enlist support for the forest. Organizations also create social bonds that help build community spirit.

■ **Local business** of all kinds, including large corporations with local offices, benefit from the community forest. A community full of trees makes the city a more attractive place to do busi-

ness, helps attract and keep workers, and reduces energy costs, to name a few benefits directly affecting business. Trees planted on or near business sites have a positive impact on the image of the business as well as the city as a whole. Tree-lined commercial districts draw more customers than treeless ones. Corporate campuses with impressive groves to relax in with clients or during lunch are far more memorable than corporations with "standard" corporate landscapes of grass berms and shrubs. Industrial sites are often improved by the screening effects of trees. Shade trees in parking lots and near buildings can greatly reduce cooling costs. It should be noted that the enhanced public image resulting from the private sector's involvement in the community forest is advertising that no money can buy.

The type of involvement depends on the type of business. Developers play a major role in the community forest's growth, of course, but so can other businesses if given the opportunity and inspiration. As with residents, interaction may be between the city and individual business people or groups of businesses. Such groups can be particularly influential in the expansion of the forest, especially when their intent is to make commercial districts more attractive and humane.

■ **Institutions**—schools, hospitals and libraries—offer many opportunities for the community forest. Their grounds provide room to expand the forest, and their strong connections to the community create a natural interest in the forest. Schools and libraries are especially invaluable in their role as community teachers, but will need city support and advice to fully develop this function.

■ **Organizations** Girl Scouts, Boy Scouts, Campfire Girls, 4-H, civic organizations and environmental groups all can be encouraged to play an active role in the creation and maintenance of the forest. These groups will assist with community education as well as participating in the physical needs of the forest. Outreach programs aimed at these groups will ensure their ongoing interest and participation.


## 5.2 INVOLVING THE COMMUNITY

This chapter describes some of the many ways to bring the community into the process of creating and maintaining the forest.

### 5.2.1 TYPES OF PARTICIPATION

The primary avenues for community participation in the forest fall into the following categories:

■ **Selecting trees.** Residents usually have a strong notion of how their neighborhood should look and what its character should be. In addition, having a hand in the design process will result in a more personal connection between residents and their neighborhood, engendering greater pride of place. Citizens should therefore be brought into this process as much as possible through neighborhood meetings to review planting plans for their areas.

■ **Planting trees.** While all work associated with the forest is important, perhaps the most emotionally satisfying job is planting trees. This is where people develop emotional attachments and a lifelong interest in the forest. The more individuals who personally plant a tree in the city, the greater the longterm support for the forest. This axiom is especially applicable to the children of Thousand Oaks. Setting a goal of having each child plant a tree ensures that the ideals of the community forest will be carried into the next generation.

■ **Maintaining trees.** Residents already play a hand in the maintenance of the neighborhood street trees—many people at least water the tree fronting their house, and some go beyond this to include fertilizing, minor pruning and the like. Providing residents with standards for care will result in healthier trees. In addition, residents as well as businesses should be alerted to signs of poor tree health or maintenance. Having all eyes focused on the forest will increase the ability of the forestry staff to engage in "preventive maintenance," possibly saving trees in the early stages of ill-health and eliminating accidents in the making.

■ **Funding tree planting or maintenance.** Providing the mechanism for citizens, including businesses and institutions, to donate money earmarked for this work is an important avenue of participation for people with time- or physical constraints.

■ **Providing land for expansion of the forest.** Landowners with room to spare can be brought into the forestation process without sacrificing property rights. The benefits of trees to the community—and to the planet—provide convincing reasons to join the effort.

■ **Advising the city on forestry decisions.** Advisory committees and commissions

provide a connection between the city bureacracy and citizens, as well as a way for both sides to exchange information and voice concerns. The city forestry staff cannot be expected to handle every decision about every tree in the forest without such help. Encouraging citizen input will give great weight to the term "community forest."

■ **Educating others about the forest.** The community's teachers, biologists, naturalists, historians, artists, landscape architects and horticulturists all have a great deal to offer toward this worthy endeavor.

## 5.2.2 WAYS FOR RESIDENTS TO PARTICIPATE

■ Encourage neighborhood tree associations to ensure a close relationship between residents and their part of the forest. Activities could include planting parties and maintenance workshops, as well as celebratory events, all of which help build ties between neighbors.

■ A participatory process should be used when city staff begin planning for tree plantings or removals in a neighborhood. This process might include community meetings, preference surveys, or design charettes. It is advisable to seek the needs and preferences of residents in the case of neighborhood parks as well.

■ In addition to involving residents in decisions regarding their immediate neighborhood, they should be brought into the citywide planning process as well. The creation of an appropriate board for trees would bring citizens into the tree bureacracy. This appointed, voluntary committee would advise on issues ranging from tree removals to planting and maintenance issues, under the guidance of appropriate city staff. Citizens selected for the board would be expected to thoroughly read this Master Plan and familiarize themselves with city ordinances regarding trees. A tour of the community forest should be arranged for this group at its formation and every year thereafter.

■ Residents interested in planting trees community-wide might form a nonprofit organization based on San Francisco's "Friends of the Urban Forest" or Los Angeles' "Tree People." However, while such groups can play an invaluable role in the community forest, they should not be expected to substitute for city support and forestry resources. If such a group is formed, the city should offer assistance and legitimization by way of seed money, grant-writing assistance, technical advice, meeting space and staff assistance.

■ Ritualize the adoption of the Master Plan with a community-wide event, perhaps in conjuction with the planting of 1,000 oaks to commemorate the city's 25th anniversary.

■ Establish ways for citizens to make donations to the Tree Trust or Tree Endowment Fund for planting and maintenance.

■ Establish a means of allowing citizens to donate street trees marked with commemorative or memorial plaques.

## 5.2.3 GETTING THE PARTICIPATION OF BUSINESS

■ Inform businesses of options for supporting the forest through the Tree Trust or Tree Endowment Fund. A pamphlet describing the benefits of trees could be distributed to the business community.

■ Inform retail businesses of the decision-making

process regarding street trees. Involve those interested in the process as much as possible.

■ Consider setting up an endowment for future maintenance of developer-planted trees. This could be funded through a fee that is based on the type of tree planted, size of planting well, etc. The more carefully the tree is suited to the environmental conditions, the lower the fee.

■ Corporations own 40% of the land in the contiguous 48 states, according to*The New York Times*. Much of this land is needed only for use as a buffer zone, or possible future expansion. Businesses with large reserves of land in Thousand Oaks should be encouraged to join the growing ranks of companies nationwide that are converting portions of their holdings to wildlife habitat. Some ways this can be done:

- Stop mowing lawns, or even convert standard turf to native grasses, which have a higher wildlife value (and require no summer water).
- Create shrubby edges to allow hiding and nesting places for wildlife.
- Include as many indigenous species of plants as possible.
- Include plants that provide sources of food for a variety of creatures. A single oak, for example, can support more than 300 species of insects, which in turn support dozens of species of birds. Acorns from oaks also feed a wide variety of creatures.
- Set up nesting boxes for various birds (owls and other raptors adjust particularly well to these manmade homes). The local Audubon Society is one souce of information for the specifics of this project.

## 5.2.4 THE ROLE OF INSTITUTIONS

**Schools** offer perhaps the greatest opportunity for participation in community forest programs. Our youngest citizens are tomorrow's caretakers of the forest, so concentrating outreach efforts on them will have important longterm benefits.

The outdoor environment of most American schools consists of equal parts asphalt and grass, with a scattering of trees (often in street-tree-like rows), some play or recreation equipment, and lunch tables. This type of schoolyard is usually a sterile place, not conducive to outdoor learning or creative play. The extension of the community forest into the schoolyards of Thousand Oaks can help remedy this situation.

There are many creative ways to bring the community forest to the schools, such as:

■ The oak-woodland ecosystem has particularly high value for both play and learning. Its place in the city's natural and social histories lends itself to a variety of lessons, while the playfulness comes from bringing a bit of the wild into the schoolyard. Oaks combined with appropriate understory plants provide a rich environment for fantasy play, hide and seek, building forts, and all the other kinds of play not generally provided for in standard schoolyards. Elementary schools should include such places on their campuses.

■ Plant groves of fruits, nuts or hardwoods to act as hands-on educational labs as well as sources of revenue for the schools. Such groves would be best suited to high schools or colleges, where classes in the life sciences, agriculture, community forestry and woodworking could all have a hand in care and planting.

■ School groups could help plant heritage oaks in open space or parks. Such efforts could be used both to express community pride and to provide living science lessons and a source of ongoing experiments in wildlife biology, botany, and similar subjects.

■ Involve students of all ages in tree planting, particularly plantings at schools. Personal involvement in the process will reduce the likelihood of vandalism and damage due to carelessness (a likely problem with young children unschooled in the ways of newly planted trees).

■ Elementary-school students can learn about trees in a variety of lessons found in the *California State Environmental Education Guide* (see Resources list, this volume). A sampling of particularly tree-oriented lessons found in this excellent curriculum guide includes "Tree Habitat Survey," "Meet a Tree" and "The Basic Necessities."

■ Use the Master Plan in the classroom. The subject is a natural for civics classes as well as the sciences.

■ Sponsor a workshop bringing together city staff and local teachers to brainstorm other ways to bring the community forest into the classroom.

**Libraries** are the symbols of the community's commitment to lifelong learning. The library should act as the prime repository for books and publications on trees and community forestry, since it is accessible to the entire community. The Center for Oak Tree Studies should be re-established and expanded to include all available resources on the community forest.

In addition to the indoor possibilities, a grove of trees on the grounds of the main library could act as a shady reading and resting spot as well as reflect the bookish contents of the building. Trees with literary associations could be used to create the structure for a Great Books Garden, for example.

**Hospitals** are the community's place for healing. As such, they are appropriate places to represent the overall health of the community as symbolized by the planting of trees. A grove of trees with medicinal value would make an appropriate "outdoor room" for patients, visitors and staff to use. One quarter of prescribed drugs in the U.S. pharmacopea contain plant derivatives; examples of species include *Salix alba* and the native *Rhamnus pershiana*.. Another idea is to distribute flyers in local maternity wards to invite parents to plant a tree (or donate an equivalent sum to the Tree Trust) for each new baby born in the city. Planting a tree as a memorial to a deceased loved one is another possibility.

## 5.2.5 HOW ORGANIZATIONS CAN HELP

**Environmental groups** need no convincing about the benefits of trees. Some tasks that might be carried out with their help:

■ Planting parking lots to reduce the heat-island effect in the city.

■ Replanting native oak woodlands in the area's appropriate open lands.

■ Restoring creeks to their native state through tree planting and, in the case of culverted creeks, replacing concrete ditches with more natural forms of flood control, such as rock gabions or willow wattling.

■ Establishing "Clean Air Groves."

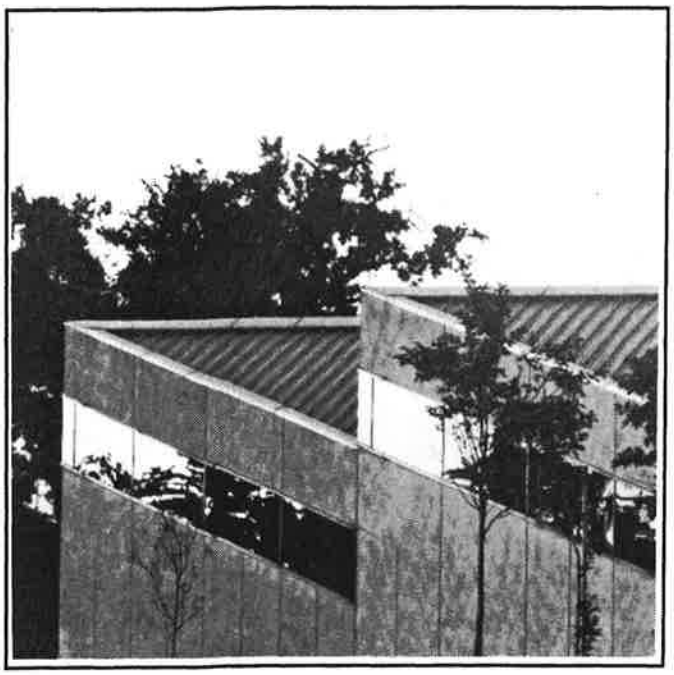
■ Working on the American Forestry Association's Global ReLeaf program with the city (see 2.3.1 for more details on this program).

■ Helping businesses convert company land to wildlife habitat (see 5.3.3).

**Scouting groups.** Young people's organizations

can have a great impact on the community forest. Girl Scouts, for example, celebrate Arbor Day with tree plantings (see appendix for sample). Brownies have an "Adopt a Tree" program. There are numerous Girl Scout patches on ecology that make specific reference to trees, and troops are also free to develop their own patches. Thousand Oaks' troops might consider a Community Forestry patch. Adult leaders of these organizations should be informed of the Master Plan and invited to share their ideas on troop participation with city staff.

**Civic groups**, like other types of organizations listed here, should be encouraged to get involved in tree plantings, as well as educative efforts, fundraising and the like.



## 5.3 SPREADING THE WORD

The city can instigate a number of programs to make the community aware of its forest resource. These actions fall into three broad categories: publicizing city policies (including this Master Plan), soliciting community support and enthusiasm, and educating people about trees and the forest as a whole. This chapter suggests ways to do this, loosely organized in these categories.

### 5.3.1 CITY POLICIES

■ Publicize the Master Plan in newspapers, letters to homes and businesses, and flyers posted at local nurseries.

■ Invite citizens to a community forestry open house, attended by all city staff members involved in the forest's creation and care.

■ Make the Master Plan easily available.

### 5.3.2 COMMUNITY SUPPORT

■ Publish a pamphlet on the steps a citizen needs to take to plant a tree. Include horticultural basics as well as bureaucratic steps. Include a reference to the detailed planting and maintenance information found in Volume 3 of this plan.

■ Establish a Community Forest Day, to be held in late October or early November. This annual community-wide celebration could include information booths, a contest for best food product or craft item using products from community trees, demonstrations, and tree plantings. This would not only be a more personal event than the national Arbor Day, but would also be held at a planting time more appropriate to California—just before the rainy season begins. (Arbor Day could be marked with educational events rather than tree planting.)

■ Organize tree walks or bike hikes. Go beyond species identification to bring the community forest alive.

■ Co-sponsor a photography contest with local camera stores, nurseries or other businesses on the subject of the community forest. Entry fees could support the tree trust.

### 5.3.3 EDUCATION

■ Produce a flyer that describes the benefits of deep-watering street trees, and reminds residents to keep a two-foot circle around the trunk free of other plantings. The flyer should also state that residents who pave the area near their street tree must leave a minimum 4' x 6' planting area. These

maintenance efforts will greatly enhance the health of the city's street trees.

■ Consider publishing a regular newsletter to inform residents about all aspects of the community forest. Columns on home maintenance should be included. Some especially important subjects: the horticultural requirements of native oaks; general pruning techniques, and drought-tolerant landscaping. This could also become a community forum on tree topics.

■ Offer hands-on tree-care workshops, either free or with fees going to the Tree Trust.

■ Enlist the community's realtors to give each new resident a flyer describing the community forest program in general and the specifics of street-tree care. Such a publication should also invite participation and list resources.

## 5.4 A RECIPE FOR A NEIGHBORHOOD PLANTING

The recipe for a successful neighborhood planting program calls for equal parts of city encouragement and citizen enthusiasm. The following recommended mix adapts the experience of San Francisco's Friends of the Urban Forest to the forestry program in Thousand Oaks.

**The City:**

- Promotes and advertises the program, and prioritizes plantings based on neighborhood interest.
- Provides a "coordinator's packet" to assist neighborhood residents willing to organize a planting.
- Mails notices to urge involvement of non-participating residents.
- Guides species selection with neighborhood involvement.
- Approves planting sites, cuts and removes concrete if necessary, augers planting pits.
- Provides trees, stakes, ties and other planting materials and equipment.
- Provides technical supervision and coordination on planting day.
- Gives longterm major maintenance to all street trees.

**The Citizens:**

- Provide a neighborhood coordinator who initiates contact with city and takes charge of project, canvassing door-to-door to sign up at least twenty neighbors who want trees and are willing to participate on planting day.
- Host a neighborhood meeting at which species are selected with the guidance of city staff.
- Involve scout groups, neighborhood associations and others in the planting.
- Turn out on planting day (usually a Saturday) to provide the muscle to put the trees in the ground.
- Host a neighborhood potluck lunch following the planting to celebrate the new trees and renewed community spirit.
- Pledge to match the new street trees with additional private trees on their own property.
- Water the trees as needed and advise the city of any major maintenance needs.
- Encourage other neighborhoods to do plantings.
- Form a volunteer "tree corps" to take part in repeated plantings throughout the city.

### 5.4.1 A STEP-BY-STEP TREE-PLANTING PLAN FOR CITIZENS

The following has been prepared to help neighborhood-improvement groups, business associations and others interested in planting trees in their area. It is based on the literature of citizen participation,

and is intended to help community groups avoid some of the pitfalls associated with volunteer efforts.

Use this information to change the face of your neighborhood, school, retail district, or other treeless part of the city. Community groups that use this checklist will be better equipped to accomplish the task at hand. The checklist sets forth a process based on the following steps:

1. Organize.
2. Locate resources.
3. Fundraising.
4. Design.
5. Plant the trees.
6. Care for the trees.

## STEP ONE: ORGANIZING FOR ACTION

Good intentions do not get trees planted: people do. People are a volunteer group's greatest resource. Adhering to basic organizational tactics will ensure this resource is not squandered. One of the most important things to remember is to inform all parties affected by the potential planting at the beginning of the process, both to elicit support for the project and ferret out opposition so that it may be dealt with it while it is still a manageable issue.

■ Meet with the community forester to discuss your ideas, set goals, and determine the feasibility of the plan.

■ Distribute flyers to anyone who might have an interest in your project: nearby businesses, residents, related community groups, landlords. Don't forget to include groups that might be of help—local scouting organizations or environmental groups, for example. The flyer should include information about upcoming meetings, and possibly a phone number for further information.

■ Find an appropriately sized room for the first meeting. If you've sent out 100 flyers, for example, a home living room may not be big enough. You may want to have interested parties RSVP for the first meeting, especially in the case of neighborhoods where no good-sized room is available.

■ The first meeting should be used to determine goals. If the original organizers have already determined basic goals, the meeting will be used to get community feedback and modify the goals if necessary. Put the final goals in writing to avoid future misunderstanding.

■ Use the first meeting to set the stage for the future: determine what skills participants have, and how they might be used by the group. Set tasks to be accomplished and establish time limits. Some tasks will take more than one person working on them. A few tasks that will need doing: researching tree choices, securing necessary permits, determining labor and equipment needs, pricing materials, producing flyers or doing other clerical work associated with the project. Someone might be appointed to study the Master Plan for ideas. (All groups should use Volume 3 for planting advice.) Involve as many people as possible in the effort, and avoid uneven work loads.

■ The entire group only needs to get together when major decisions need to be made, and at crucial steps in the process. Do not overburden participants with meetings. When information needs to be disseminated, consider a "news briefing" mailed to participants, or a "telephone tree" (each person called then calls one or two more people involved in the project).

■ Accomplish something at each meeting to maintain momentum.

## STEP TWO: LOCATING RESOURCES

■ Begin with the community forester, who can tell you how the city might help.

**Labor:** Your own organization is the heart of your labor force. But to conserve the energy and enthusiasm of your people, some tasks may need farming out, while others may require assistance.

■ If the final goal of your project is beyond the physical means of your participants, invite others to help with this aspect of the work. Groups that might help with the physical labor involved in your planting include scouting organizations, athletic teams, military reserve units, service clubs, high-school organizations, and church groups.

■ Turn workdays into community events that involve everyone. Use flyers and personal invitations to secure support for the planting party. Make it fun—have food and music to sustain workers, and games when the day is done.

**Specialized Equipment:** Backhoes, concrete saws, or other equipment might be necessary for your project.

■ Approach local contractors, labor unions, or trade organizations to donate the skilled labor and equipment needed for such work.

■ If the work can be done by residents but special equipment is needed, look to local rental firms for help.

**Design Assistance:** If your project is sizable or unusual, you may want to seek design assistance.

■ Contact local landscape architects or nearby colleges with landscape design programs. If your project is innovative or complicated, it might attract the help of individual students or an entire class. Designers may find missed opportunities, point out constraints, analyze how people use the area to help determine design, or bring other expertise that will inspire the group to step beyond conventional thinking. Make sure the designer understands the participatory nature of the process to avoid misunderstanding about final decisions.

■ Consult the Master Plan for design guidelines.

## STEP THREE: FUNDRAISING

Before you attempt to raise funds for your project, you need to determine roughly what your expenses will be. Be realistic. Project not only costs for basic materials, but also for emergency expenses that might occur: broken equipment, lost trees due to damage or vandalism, etc.

Start fundraising close to home where personal interest in the project is strongest:

■ Door-to-door canvassing, perhaps in conjunction with T-shirt sales or raffle tickets, can be used.

■ Special fundraising events might include a community potluck or barbeque, car wash, walk-athon or garage sale.

■ Sharing costs can also work, if all parties agree to it.

**Larger Sources:** When projects are large enough to require substantial funds, it is necessary for the group to have nonprofit status to obtain tax-deductible contributions. The most productive approach is to contact businesses which closely identify with your project or the neighborhood you're doing it in.

■ Corporations have been successfully involved in developing and maintaining open spaces through "Adopt a Lot" programs. When possible, work with someone you have a personal connection with in the corporation. Find out who makes decisions about charitable contributions and try to arrange a meeting with that person. Try to get an endowment—an annual commitment for maintenance of your project.

■ Private foundations can be researched at the library. Such groups are generally most interested in providing start-up money rather than ongoing funds. Does your project have environmental importance, or is it oriented toward a group with special needs such as the elderly, children, the poor? If so, you may be able to get grant money. In some cases, the city might provide grant-writing assistance.

■ Community Development Block Grants may be available through the city. They should be coordinated with the community forester and the planning department.

■ Appoint a responsible person or persons with knowledge of accounting to act as treasurer. Appoint an executive committee to authorize expenditures. Set up a bank account that requires two signatures for the release of funds. Keep accurate records of all income and expenditures. Such accountability will go a long way toward securing future funds.


## STEP FOUR: DESIGN

The main requirements for a group planting are low maintenance, safety concerns, and complying with city code and the Master Plan. Volume 2 of the plan includes design guidelines that should be consulted.

■ Consult the Master Plan general guidelines (2.4) and specific guidelines (2.6), and the planting palette (2.7) for design ideas.

■ Consult the Community Forester for ideas and assistance, as well as to flag any problems before they get out of hand.

■ Design should include planning for irrigation (if needed), choosing types of trees and other plantings, and deciding spacing of trees, among other things.

■ After making design decisions, plans must be approved by the Community Forester.


## STEP FIVE: PLANT THE TREES

This step is the payoff. Involve as many people as possible, to spread the joy of planting a living thing and thereby ensure their continued interest in the care of the trees.

■ Arrange sidewalk cuts for the day before the planting, and a dumpster if needed. These jobs will normally be handled by different contractors, although a landscape contractor can be hired to do the entire planting.

■ Order trees and planting stakes. Coordinate delivery so that they arrive the day before the planting.

■ Advertise the planting day well in advance. Send flyers to all homes, and confirm the attendance of "muscle groups" such as high-school football teams, army reserve units, etc.

■ Arrange for food, drinks, music, games. Make sure participants know they may bring their children. Arrange for a couple of adults to supervise

children who aren't involved in the actual planting.

■ Dig the holes. If possible, do this work the day before the planting. Get traffic barriers from the city to mark the holes, since uncovered holes are a legal liability.

**STEP SIX:**
**CARING FOR THE TREES**

■ Coordinate with the city maintenance department.

■ Get all property owners to agree to a watering schedule for the first few crucial years.

■ Use Volume 3's maintenance standards to set standards for the care of your trees, and solve any disputes.

■ Consider organizing a yearly maintenance party to prune, fertilize and weed the base of the trees. This event can be instructional as well.

**NEIGHBORHOOD PLANTING CHECKLIST**

Do you have the following lined up for your planting day?

☐ Planting permits
☐ Door-to-door announcements
☐ Special invitations
☐ Media invitations and press release
☐ Tree planting and care handout
☐ Tree fact sheet
☐ Tree name tags
☐ Tree and amendment delivery
☐ Concrete cuts
☐ Dumpster
☐ Stakes and ties
☐ Picks, shovels and other hand tools
☐ Water source
☐ Pavers and fencing
☐ Groundcovers
☐ Holes dug
☐ Street-closing permit and barriers
☐ Food and drink
☐ Music, live or taped
☐ Camera and tape recorder

## 5.4.2 CONCLUSIONS

The adoption of the Master Plan is an important opportunity to build public awareness and appreciation of the community forest. The undertaking of a comprehensive community forestry program is an important event in the history of Thousand Oaks, and as such should receive ample attention. The city should involve residents fully in the review and implementation of the community forestry plan through a series of public presentations, focusing on the recommendations for specific streets and planning areas. The community forester shall conduct presentations at convenient times and locations to reach residents of all neighborhoods. Each presentation shall focus on particular neighborhoods and the major street running through them. At the same time, the general contents of the Master Plan shall be reviewed, and the means by which the public may participate in its implementation shall be highlighted.