



Trees and Parking Lots

TREE CITY USA®
BULLETIN

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Along with our marriage to the automobile has come its unpleasant relative — the parking lot. Approximately 10 percent of the surface in urban areas is dedicated to this storage space for cars, and its impact on the character of a community is significant. But with creative landscaping and the use of trees, there is no reason why parking lots cannot offer multiple benefits instead of visual blight.

Sometime in the 1920s, the automobile worked its way firmly into the fabric of American life. It became the very focal point of urban family life, with one classic study finding that most people said they were more willing to mortgage their homes and deplete their life savings than to give up their cars.

Today, the car has evolved from a mere means of enjoyment and personal freedom to an absolute necessity for work and play. More than 256 million cars now prowl our streets and byways, more than double the number present in the latter part of the 20th century. Millions more are added each year by foreign and domestic factories. More than

90 percent of all U.S. households have a car, with most owning more than one.

With this magnitude of national obsession, it is not surprising that there are few things more challenging than trying to separate Americans from their cars. This fact of life has confounded mass transit planners, frustrated national park managers, and definitely not escaped the notice of merchants and others who need to attract customers.

Parking lots are here to stay. The mention of closing one, converting it to another use, or even reducing the number of stalls is a clarion call to battle with merchants, faculty, workers, or others who use the lot. Still, is it necessary for so much of our community to be a barren sea of asphalt?

In the pages that follow, a case is made for sharing parking lots with trees. When this is done, parking lots become multifaceted for any business, institution, or community. Parking lots with trees can attract business, enhance the workplace, and uplift the quality of life in your community.



Arbor Day Foundation
100 Arbor Avenue • Nebraska City, NE 68410

Designing with Trees

Ideally, when a new parking lot is being designed, trees can be incorporated right from the start. In this way, existing trees can be protected and new trees can be placed to be functional as well as aesthetic. Importantly, the soil in planting zones can be protected from the application of soil sterilants and mechanical compaction that are often part of the engineering techniques used before laying asphalt or sometimes even concrete.

Some other considerations are given on the pages that follow.

WHAT TREES CAN DO

- ✓ Provide shade for comfort when walking and after returning to the parked car.
- ✓ Cool the air to help counter the urban “heat island” effect that contributes to smog (See *Bulletin No. 21*).
- ✓ Help muffle noise, provide visual screens, and contribute to surrounding property values.
- ✓ Help purify the air by absorbing exhaust gases and giving off pure oxygen.
- ✓ Break up the massive expanses that usually dominate at parking sites, providing a sense of scale that makes people feel more comfortable.
- ✓ Provide beauty instead of ugliness and variety instead of monotony.
- ✓ Control speed and direct traffic flow.
- ✓ Provide reference points for entrances and exits and help visitors locate parked cars, bus stops, etc.
- ✓ Safely separate vehicle traffic and pedestrians.
- ✓ Attract and please customers and clients by providing a pleasant transition from the roadway into the store or business area.
- ✓ Reduce or slow surface runoff of water.

A DIFFERENT POINT OF VIEW

There are two ways of looking at parking lots. One is that they are simply places to store cars. The other is that parking lots can be more than this, and they don't have to be eyesores. Clearly the first step toward aesthetic parking lots is attitude.

Below are statements from two publications used to provide guidance to downtown merchants on how to develop parking lots. The left column presents the traditional approach that leads to mediocrity — or worse. The right

column reflects an entirely different attitude and the one that is necessary before parking lots can be improved. The statements on the right are from *Carscape: A Parking Handbook*, a report that resulted from a design contest in Columbus, Indiana, conducted to find a better way to use parking space.

The statements address the question, “What is the acme of parking design?”

A TRADITIONAL VIEW

- “A superblock bounded on all sides by primary and secondary roadways.”
- The model can be found at “the regional shopping mall with surface parking supplies.”
- “Minimum number of restraints in the path of the driver.”
- “Parking rows oriented toward the retail generator so there is direct visual contact [with] the destination.”

DOING THE JOB BETTER

- “Design surface parking that fits into the context [of the community] and further enhances it.”
- “Reduce the apparent size of parking lots ... [to the human scale with] ... landscaping elements and ... screens or fences ... to break the larger area into smaller sections.”
- “Existing trees should be retained unless a strong case can be made for removal or replacement.”
- “A parking lot [can] be more than asphalt and minimal landscaping. Provide an oasis in the downtown, not an eyesore.”

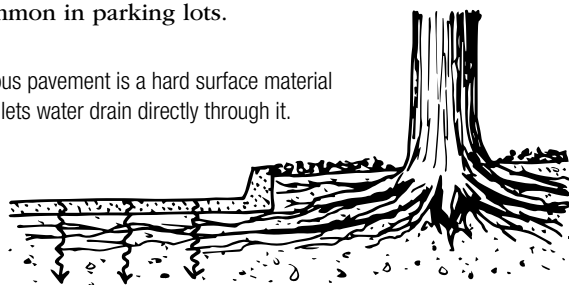
Remember the Roots

Roots are a tree's lifeline. They must receive the right amount of water (not too much and not too little), adequate aeration, and growing space free of compaction.

1. PREVENT DROUGHT STRESS

In dry regions of the country, porous pavement may make it possible for tree roots to find at least some inhabitable space under massive areas of parking lot surface. This specially engineered material allows rainwater to penetrate. This not only benefits nearby trees and shrubs, but also prevents puddles and reduces the need for expensive runoff detention basins that are increasingly required as part of new developments. This system, using an underlying bed of stone, also helps filter out organic and metallic contaminants common in parking lots.

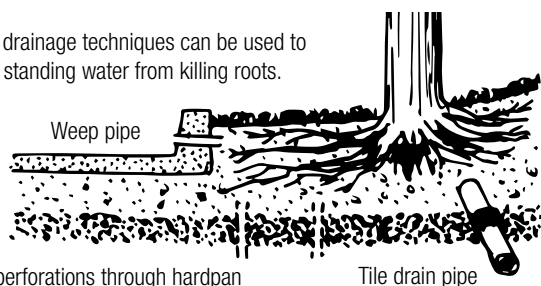
Porous pavement is a hard surface material that lets water drain directly through it.



2. PREVENT DROWNING

In moist areas of the country, roots can be subjected to excessive water from grade changes or installation of retaining walls. In fact, in some cities more trees are killed by too much water than too little. This can be prevented with weep pipes in walls, drilled perforations through shallow hardpans or compacted layers, and drain tile systems.

Various drainage techniques can be used to prevent standing water from killing roots.



3. PREVENT COMPACTION

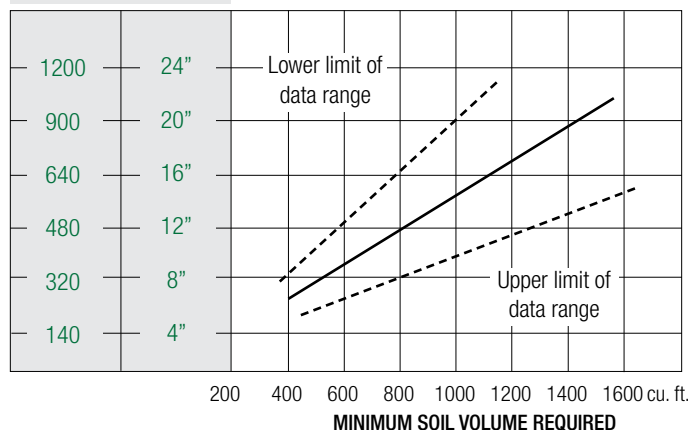
Within root zones and beyond to allow for root expansion, use C-U Structural Soil or Silva Cells to provide weight-bearing surface while at the same time allowing space for healthy root growth.

4. ENSURE ADEQUATE SOIL SPACE

Growing a tree without providing enough space for its roots is like asking someone to get into a shoe that is much too small. In creating this chart, landscape architect James Urban combined data from numerous studies of the relationship between soil volume and tree health. As shown in the chart above, most trees will need at least 400 cubic feet of soil.

ULTIMATE TREE SIZE

Crown Projection (sq. ft.)	Diameter Breast Height (inches)	Adequate soil volume needed for roots can be approximated from the size the tree will be at maturity. <i>Courtesy of James Urban</i>
1200	24"	Adequate soil volume needed for roots can be approximated from the size the tree will be at maturity. <i>Courtesy of James Urban</i>
900	20"	
640	16"	
480	12"	
320	8"	
140	4"	



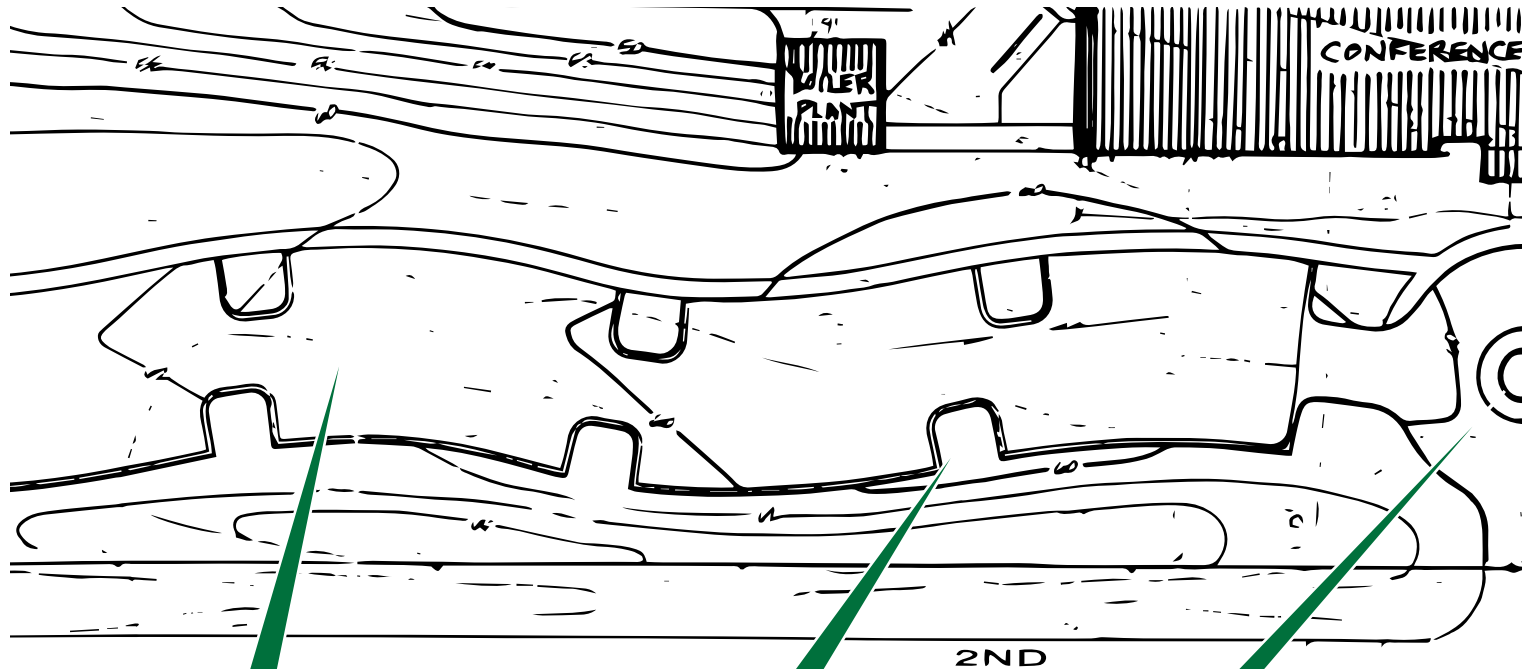
WHAT TO PLANT

Consult a local arborist, forester, nursery, or horticulture professional to select species and cultivars best suited to local climatic conditions. Selection should also be made based on these traits:

- ✓ Able to thrive in the existing soil or soil that can be amended to reasonable specifications.
- ✓ Strong wood, not prone to breakage in wind or ice storms.
- ✓ Fruitless or otherwise free of parts that fall and could damage vehicles, clog drains, or make pavement slippery.
- ✓ Tolerant to excessive heat, deicing salt, and air pollution.
- ✓ Free of unacceptable levels of disease or insect pests, including aphids that coat objects with sticky "honeydew."
- ✓ Fits the site aesthetically and serves an intended function (shade, screen, focal point, etc.)

Making a Good Design Better

Sometimes small design adjustments and the careful arrangement of trees can make a big difference. Below are the actual plans used in building the Arbor Day Foundation's Lied Lodge & Conference Center in Nebraska City, Nebraska. At the top is how the first-draft plan appeared for the parking area. Below is the same space as it was modified by landscape architect Ron Stupp and urban forestry consultant Steve Clark.



CURVATURE OF PARKING LOT

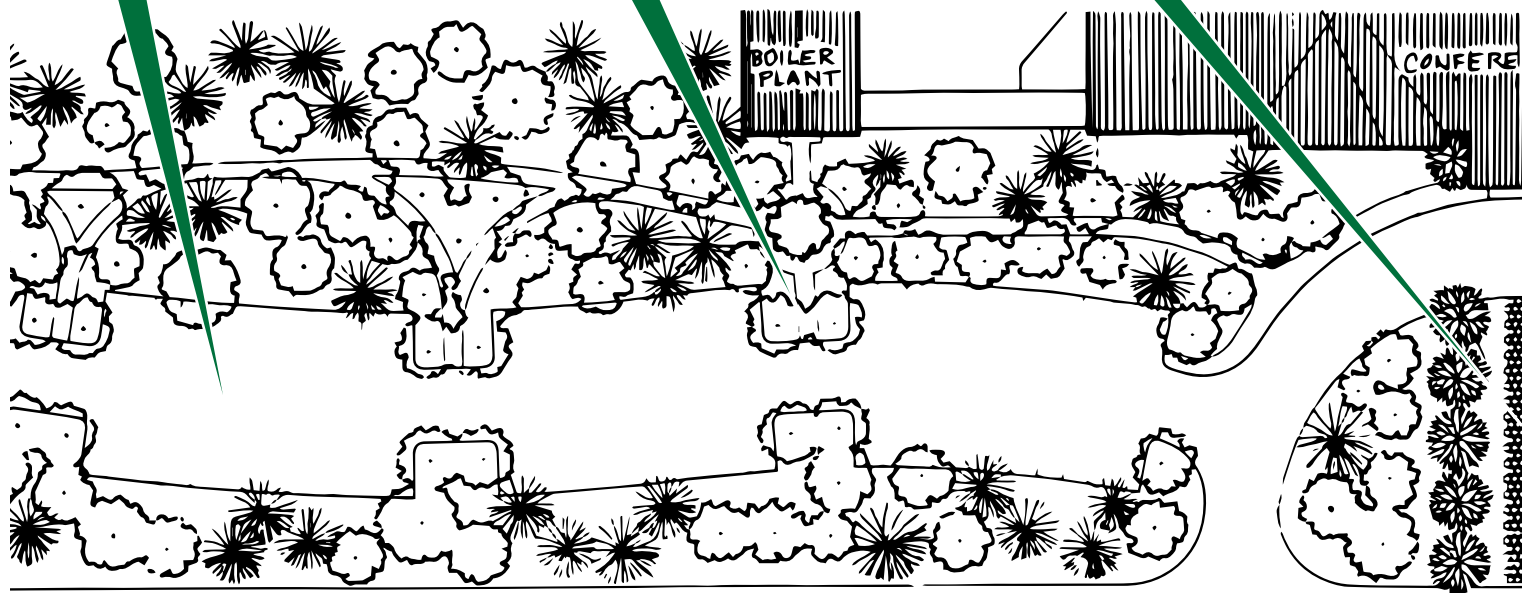
breaks up monotony and presents a more informal, relaxed appearance. This feature is retained in the new design.

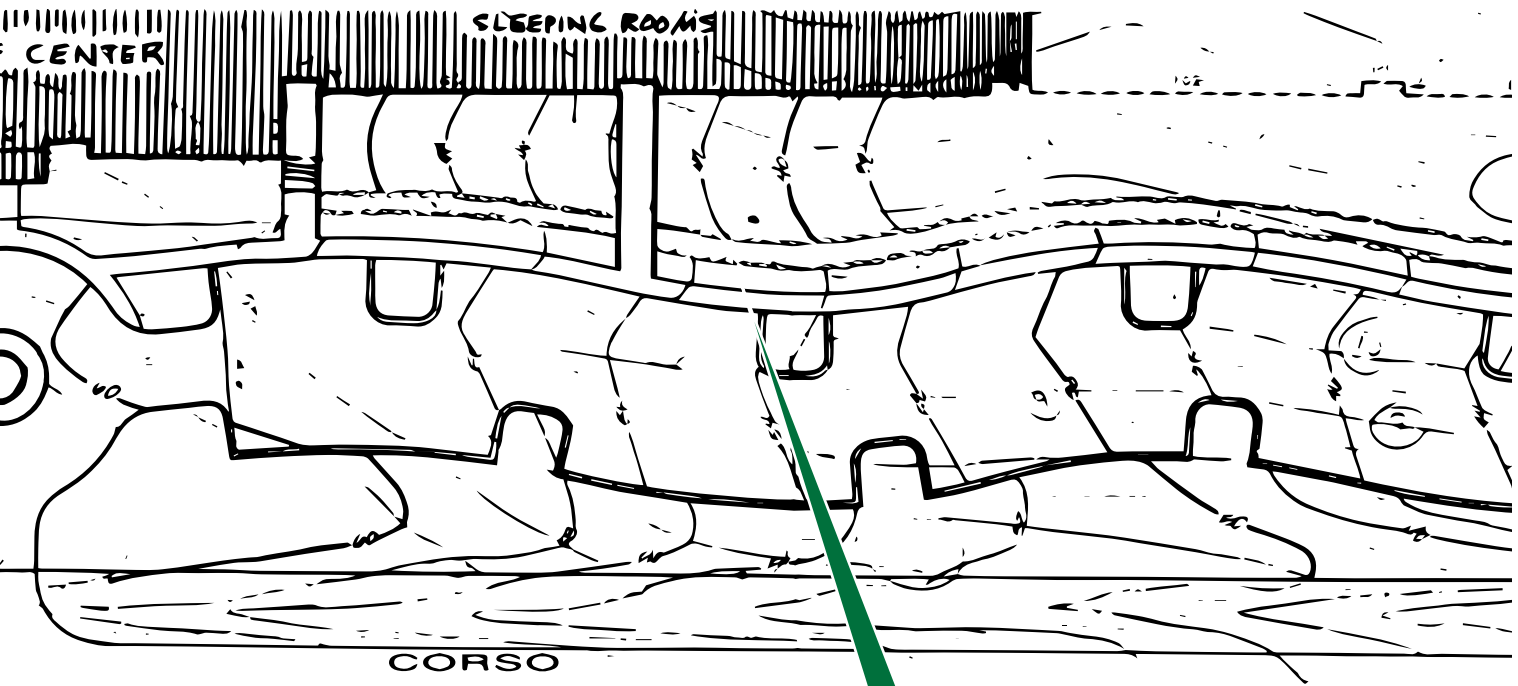
PENINSULAS

visually reduce a large lot to smaller spaces that are more on a human scale. By widening the peninsulas slightly, two trees can be planted instead of one. By placing the peninsulas opposite each other, the canopy will form a bridge. The result is more shade and beauty and a safe way for squirrels to travel.

THE ENTRANCE

is redesigned to add more trees and a pleasant walkway to the street. There, a crosswalk takes pedestrians to a park across the street.



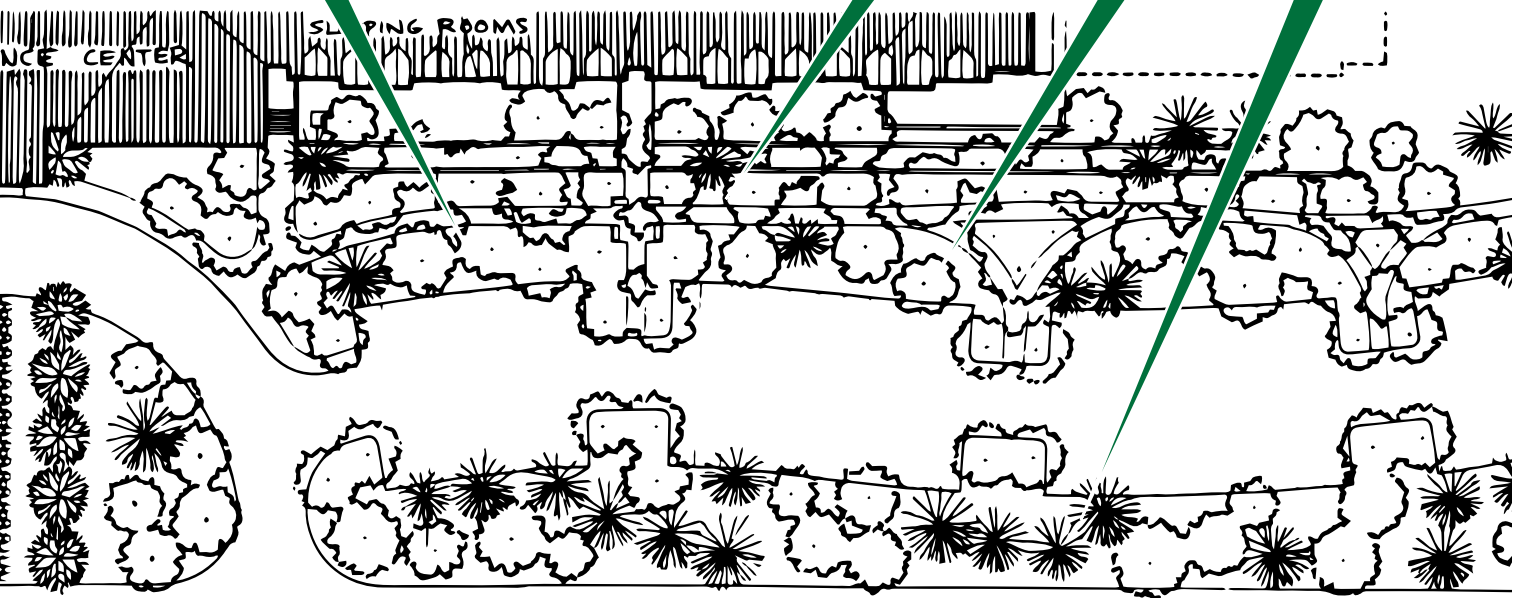


UNDULATING EARTH MOUNDS (berms) are added to offer a sense of visual separation between the parking lot and the road and between the parking lot and sidewalks.

THE WALK is tucked away under the cool, shady trees, instead of an unshaded sidewalk where bumpers overhang.

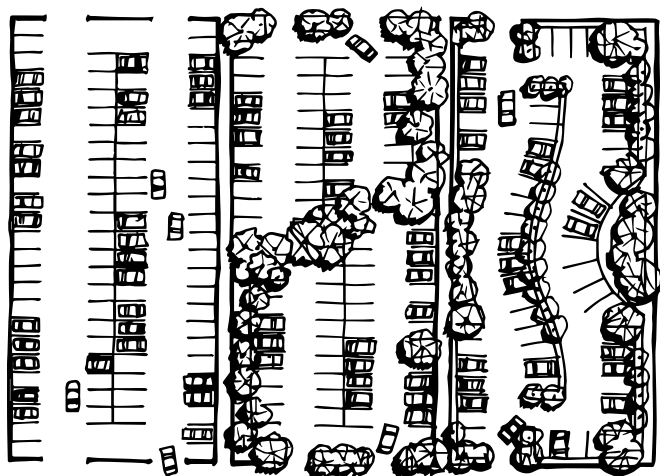
DECIDUOUS TREES on the south side of the building allow sunlight to penetrate during the winter near sidewalks and sleeping rooms.

EVERGREENS are used to screen the lot from the street.



More Design Tips

1. BREAK UP THE MASS AND MONOTONY.



A. Uninspired, uninspiring, and hot.

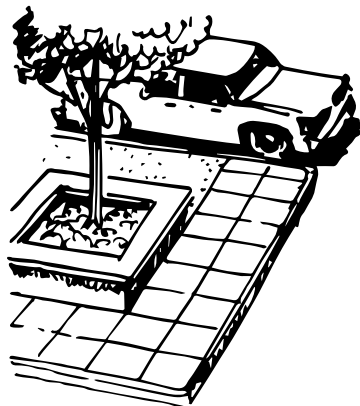
B. The designer has broken the lot into smaller units, slowed the traffic, and provided a shady pedestrian route through the lot.

C. Here curves are used to slow traffic and convert boring, straight lines into a more pleasing, naturalistic pattern.

2. MAKE PARKING LOTS FOR PEOPLE, TOO.

“Rather than hiding ugly, single-use spaces, transform them into ‘positive spaces’ that enhance the human scale of a community.”

— Catherine G. Miller in *Carscape*



A. Use raised-end islands for simple benches shaded by trees. A vandal-resistant water fountain helps, too.

B. Provide shaded walkways on parking lot islands and around the perimeters.

3. USE TREE-COVERED MOUNDS & DEPRESSIONS.

These will screen parking lots, reduce noise, and add height to the vegetation (obtaining more shade).



4. USE NARROW TREES IN NARROW SPACES.

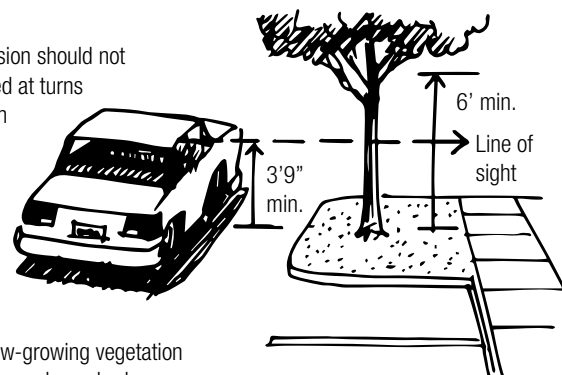
In narrow spaces, use cultivars of desirable species that have been developed by nurseries for columnar crown form.



5. USE SPECIES THAT ALLOW FOR GOOD VISIBILITY AND SECURITY.

To overcome common objections to having trees in parking lots, select appropriate species and place them carefully so they do not interfere with essential visibility or security.

A. Driver vision should not be obstructed at turns or pedestrian crossings.



B. Select low-growing vegetation around signs, such as shrubs.

C. Trees and lighting can be compatible. High light standards and low trees or low, human-scale lights beneath tall trees provide the benefits of trees and the security of lights.

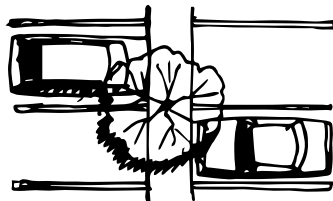


6. PROTECT TREES FROM CARS.

To prevent bumper damage, trees should be planted at least 3.5' behind a curb or traffic barrier. Signs should prohibit backing into stalls because rear overhang is usually longer. On narrower islands, plant trees at stall junctions.

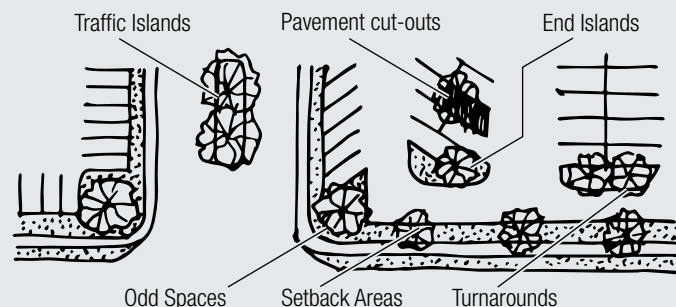


Ideal minimum island width



Place tree at stall junctions on narrower islands

FINDING ROOM FOR TREES



Although it is better to design new parking lots with vegetation in mind, existing lots can often benefit from the addition of trees. If the decision is to plant, there are usually spaces available.

Space can sometimes be created for trees by reducing the size of parking stalls. Space found in this way has been called “impansion” (as opposed to “expansion”) and is usually used to park more cars. It could instead be used for beautification, which would make the existing spaces more attractive and probably more valuable.

Impansion takes advantage of the shrinking size of cars. That is, small cars need less space than big cars and can use 90-degree stalls instead of angled stalls. For example, stalls may be 9' by 18' for standard-size cars and placed at a 60-degree angle. Compacts, on the other hand, need only 7.5' by 15' at a 90-degree angle. As much as 10-25 percent of a lot can be freed for trees in this way, depending on the percent allocated between compacts and standard-size cars. If fuel costs create a trend toward smaller cars, this could be a significant way to find space for landscaping in older lots.

7. PROTECT CARS FROM TREES.

Visual inspections by an arborist several times a year will prevent hazardous conditions from going unnoticed. They will also provide a check for insect and disease problems that can be corrected if noticed early.

8. PLAN FOR SNOW REMOVAL.

Using tree space for snow storage invites damage to valuable trees. It also deposits road salts and other chemicals over root zones. Better to haul snow away, pile it on open areas of turf, or temporarily dedicate some parking stalls to this use.



A WORD ABOUT ORDINANCES

In some communities, the question of trees in parking lots is addressed in an ordinance, frequently within the section on zoning. Typically, these ordinances simply require a minimum setback from the street and some visual screening. Some go a step further and specify a percentage of any new lot that must be landscaped, usually 5-15 percent. Sometimes there is not even reference to trees being part of the landscaping requirement.

At minimum, parking lot ordinances should include a requirement for appropriate trees to be part of parking lot development, including planting and long-term maintenance. In his model energy conservation landscape ordinance, John H. Parker of Florida International University went even further. In this ordinance, the objective is the shading of cars and heat-absorbing pavement. Parker's model has a requirement of a 50 percent canopy cover of the parking lot area after a 10-year growth period. To meet this requirement, large trees would need to be included as well as small ones and shrubs, all working together to provide functional as well as aesthetic benefits for the community.

Chicago's 'Green Alleys'

Rain runoff from parking lots and streets not only requires expensive drainage and holding facilities, but it is also a major contributor to the pollution of lakes and waterways. Oil, grease, gasoline, and residues from tire wear all add to the pollutants that drain from where cars are parked.

Alleys in large cities similarly contribute major pollution. Chicago is a good example. The city has inventoried about 13,000 alleys stretching for 1,900 miles and covering the soil with 3,500 acres of impermeable surface. Chicago is also a good example of determination to convert its alleys into stormwater filters instead of major sources of pollution.

Starting in 2007, Chicago began its gradual conversion process. Traditional asphalt surfaces are being replaced with permeable concrete or permeable asphalt, some of it using recycled materials as an added bonus. The material is placed over a bed of stones, and sometimes microbes are added that have been found to thrive on oil and other waste materials. In addition, the surface material is a light color, helping it to reflect more sunlight in the hot summer months, thereby reducing the notorious heat island effect that contributes to higher energy consumption for air conditioners.

The Chicago Department of Transportation worked with researchers to develop the materials and techniques used in this innovative project. The environmentally friendly engineering has received widespread publicity and may well serve as a model for similar projects in cities nationwide.

SAMPLE ORDINANCE

Similar to the ordinance described on page 7, the city of Sacramento, California, has a long-standing ordinance that requires developers to plant and maintain trees throughout surface parking lots. The ordinance is written to "ensure that within 15 years after establishment of the parking lot, at least 50 percent of the parking area will be shaded." Sacramento County also has a Parking Lot Tree Shading Zoning Code that is worth reviewing when considering legal measures.

Trees, sod, and rocks combine to not only make this a more appealing parking lot, they also reduce storm runoff and help filter pollutants.



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