Chapter 3

Site Selection and Planning

Recommendations	First Cost	% Estimated Savings on Utility Bill		
		Heating	Cooling	Water
1. Save shade trees.	N/S	—	0-30	0-30
2. Lay out subdivision or site so that major glass areas will face north or south.	N	10-50	5-20	—
3. Plan site to receive spring, summer and autumn breezes.	N	—	5-20	—
4. Create landscape design that shades walls, windows, air conditioner condenser, and adjacent areas.	S	—	10-25	—
5. Plant deciduous trees on south side of home (North and Central Florida) and evergreen or deciduous trees on other sides.	S	—	0-30	0-30
6. Use native plants that minimize need for pest control, fertilization and water.	S	—	—	20-50
7. Use vegetative ground covers, and minimize concrete and asphalt.	R/N	—	0-5	—
8. Plan site to retain rain runoff to minimize watering requirements.	N	—	—	0-30
Maximum Combined Total	H	50	55	50

Cost Codes:
R = reduced
N = negligible
S = small (<$0.25/ft² of floor area)
M = medium (>$0.25 and <$1.00/ft² of floor area)
H = high (>$1.00/ft² of floor area)

Marketing Energy-Efficient Sites

You have a great opportunity to impress potential home buyers simply by building on basic knowledge of the sun, breezes and trees. These are subjects most people know something about — but have not really *thought* about in terms of their being essential elements in a well-planned, energy-efficient home site. Here are some sales presentations you can use to promote efficient site planning.

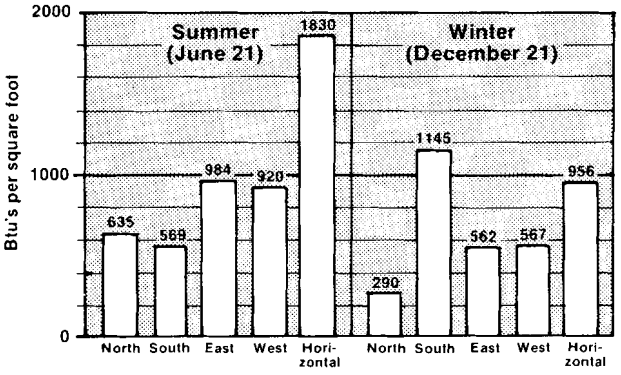
- "Did you ever have dinner in a dining room or screened porch on the west side of a house? Do you remember trying to shade yourself from the hot sun pouring in through the window and radiating from the wall?"

Just try to shade yourself from afternoon sun streaming through west-facing windows!

Many of your clients will identify with this situation. Even if they don't, the next item will still be convincing.

- "You know that the hot afternoon sun from the west is low and strikes your home directly. The morning sun also does this from the east. It so happens that in early summer about twice as much sun will strike the east or west walls and windows of a house as will strike the north or south walls and windows. In winter, however, the south side receives twice as much sun as the east or west!"

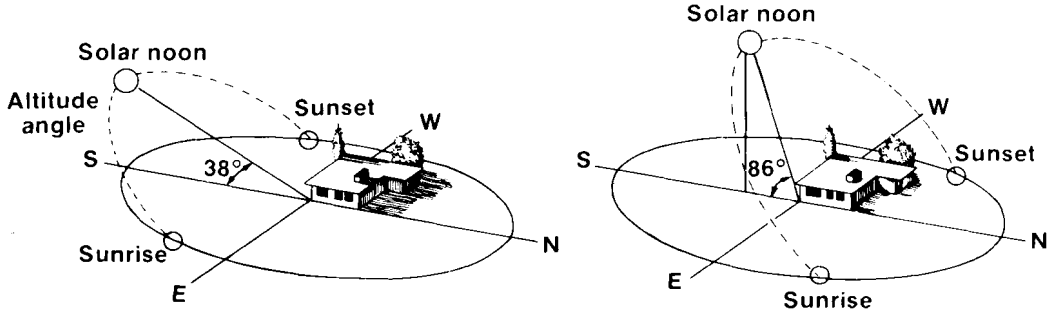
Show buyers a drawing patterned after the one below and then tell them the good things you've done to minimize problems in their houses.



The amount of heat from the sun can vary significantly with orientation.

- "We have developed this site (development) so that most house designs can fit on it with all (most) glass shaded in summer but still receive some sun during winter. (We have also situated it for breezes from the ocean, golf course, field.) You will be much more comfortable and, depending on the home, you may save 5-20% on cooling costs."

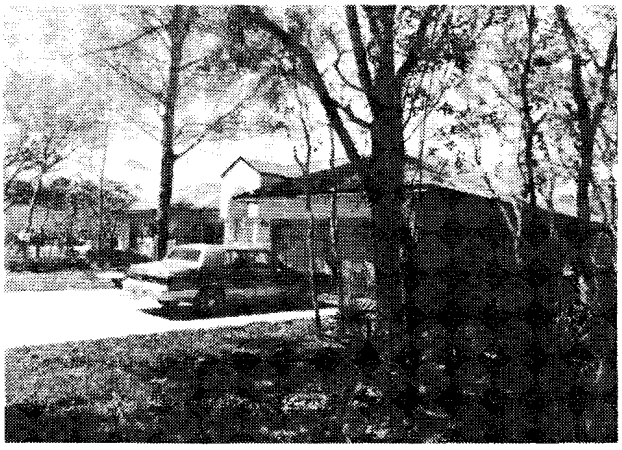
The following diagrams show the orientation and height of the sun during different times of the year. Make enlarged copies and show them to your clients. They will be impressed by your having considered the sun's path in planning the site and home design.



Winter sun is lower and more southerly than summer sun.

If you are fortunate enough to be building on a wooded site and have saved the trees, the site will usually speak for itself. However, the client may not think of the following benefits:

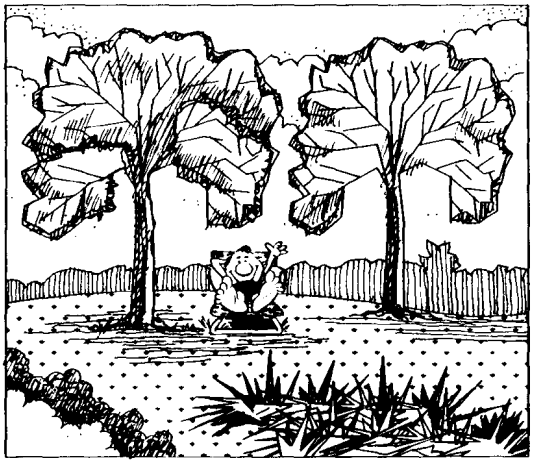
- Trees of that size cost hundreds or thousands of dollars (depending on the trees) to purchase and plant.
- Those trees will not only create nicely shaded areas outside but will lower air conditioning bills by shading the house.



Trees shade and beautify a site.

- Many people have lived in places where they had to water their lawn extensively. The shade provided by trees may greatly reduce watering needs.
- A study shows that a single mature tree gets rid of as much heat on a home site as would require removal by two residential-size central air conditioners if the site were enclosed. Trees keep surroundings cool, and cooler surroundings reduce air conditioning requirements.

Highlight the landscaping you have added. Tell how you have chosen and located native plants for minimal pest problems, watering and maintenance — so your clients can save money and spend their time enjoying their home.



By using native plants, home owners can spend more time enjoying their homes.

If you are developing each home site in a subdivision in a similar fashion — leaving trees and using native plants — point out that the subdivision should appreciate nicely in value because of the landscape not needing continuous costly attention. Emphasize that the increase in a house's value is based more on its location than on the house itself. Also, research shows that neighborhoods with tree-shaded streets can be 10°F cooler in summer than nearby unshaded neighborhoods. Thus, the entire subdivision will be a more attractive and comfortable place to live.

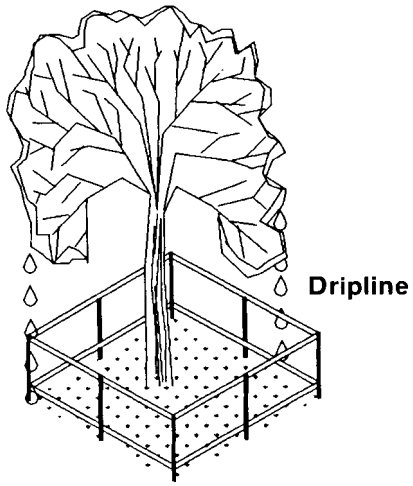
1. Save trees

"The average added value for homes with trees was 5% to 10%, but some homes showed an added value of up to 20%." This statement, the result of a Massachusetts study, appears in *Tree Protection Manual for Builders and Developers*. Much of the tree protection material in this section has been taken from that manual.

It is always more economical to prevent tree damage than to remedy it. Trees are damaged during home construction by accidental cutting, mechanical equipment, grade changes, excavation and chemical substances.

Cutting Trees. To avoid accidental cutting of trees that are to be retained, clearly mark the trees to be cut with paint at eye level and on the ground. The paint marks on the ground will be visible if unmarked trees are felled. Make sure there is a clear understanding of which trees are to be cut, and that they will not damage the remaining trees when they fall. Preferably, be on site during the clearing, since the trees you are saving may bring you thousands of dollars. You often may find a logger or firewood dealer who will pay you for the cleared trees. This is far more profitable and environmentally sound than burning the wood. Consult the Florida Division of Forestry or the Florida Energy Extension Service for advice.

Mechanical Damage. Mechanical damage can occur from trucks, bulldozers or other heavy equipment, carelessness with tools, girdling with guy wires, soil compaction, and improper cutting of roots. You should have a clear, contractual understanding of what recourse you will have if equipment operators damage trees. Protect your financial investment by constructing barricades around the trees at their dripline. Make sure the barriers are high enough and conspicuous enough to be seen by equipment operators. In some instances, barricades may go around a group of trees. To remove brush and weeds around a tree, use hand tools to avoid damage. When laying cables or piping, avoid trenching too close to the trunk.



Placing dripline barricades around trees prevents damage during construction.

Grade Changes. Grade changes frequently result in root damage and death of a tree within one or two years. The extent of injury from filling depends on the species, age, and condition of the tree, the depth and type of fill, the drainage and several other minor factors. Trees in weak condition at the time the fill is made are more susceptible to serious injury than vigorous trees.

Tree wells can be used to save trees during a grade change.

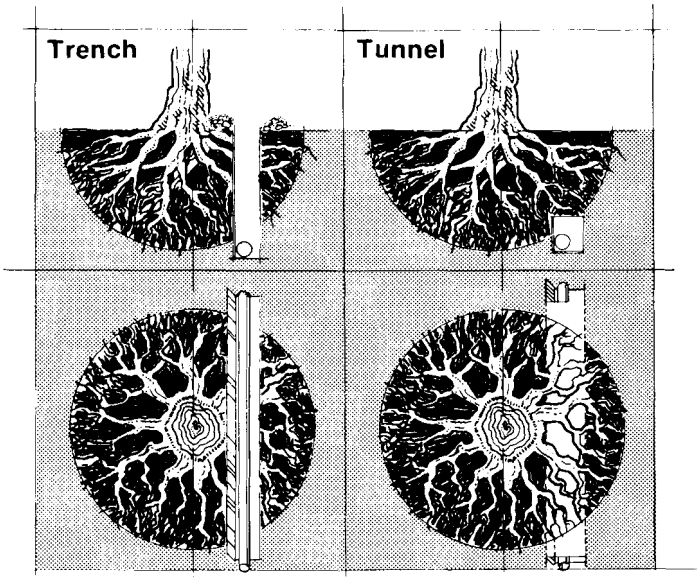
A light fill of porous or gravelly material up to 6 inches in depth will *usually* do little harm. Heavier or more impervious fills such as clay and marl will harm the tree. Also, fill may raise the water table or cause surface drainage to puddle over the roots. It often has proved advantageous to install an aeration system before the fill is added, to maintain a normal balance of air and water around roots. This increases the likelihood of the tree surviving.

The basic steps in constructing an aeration system include preparing the ground, installing tile for drainage and aeration, constructing a drywell, and filling.

Consult with a tree expert or the Florida Division of Forestry for more information regarding construction of an aeration system.

To minimize damage to the roots during excavations:

- Cut roots cleanly and retrim after excavation.
- Treat cuts in larger roots (1/4 inch and up) with wound dressings.
- Refill the excavation as soon as possible or construct retaining walls.



Many roots are destroyed by trenching. Better way is to tunnel under the base of the tree.

- Avoid leaving air pockets when refilling the excavation.
- Mix peat moss with fill soil to promote new growth.
- Top-prune to aid in maintaining tree vigor.

An improper excavation can drastically reduce a tree's chance for survival. Wilted or faded foliage, premature dropping of foliage, undersized leaves, excessive sprouting along the main stem and branches, and dying twigs and branches are some of the easily seen external symptoms of root injury.

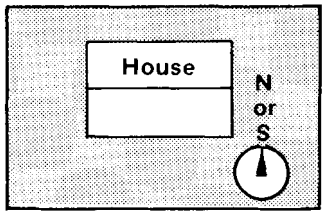
Chemical Damage. Chemical injury can be avoided by keeping the soil within the dripline undisturbed and free from building materials and harmful runoffs. Toxics from paints, oils, thinners, solvents, asphalt, cement grout and treated lumber can harm trees. Therefore do not use areas near trees as dump or storage areas. Do not use herbicides or pesticides, or fertilizers containing herbicides, near any of the vegetation you are trying to preserve.

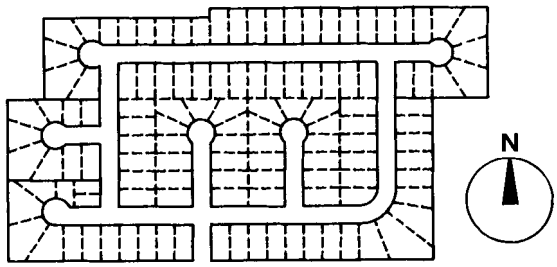
Tree Moving. A preferred alternative to clearing small trees is to move them. You may want to move a tree from one part of a lot (e.g., where the foundation will go) to another (e.g., the back yard), or to another site. Or you may want to move it temporarily to a nursery to be cared for until site construction is completed. By using a tree-spade, a tree up to about 20 feet high can be moved economically. You can save considerably on landscaping costs while still providing decent-size trees.

2. Lay out site so major glass areas face north or south

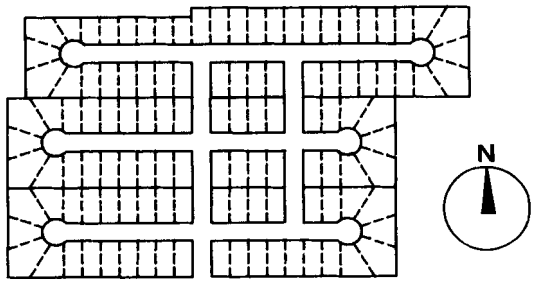
Plan your subdivision or site to minimize a home's exposure to the east and west. In other words, try to select a site where the longer sides of your house and its glass areas will face north or south.

Single-Family Lots. Single-family homes in general have longer fronts and backs and narrower sides, so lots facing north or south are preferred. However, this is partly dependent on the house plan. Chapter 4 give examples of home designs for all four major orientations.



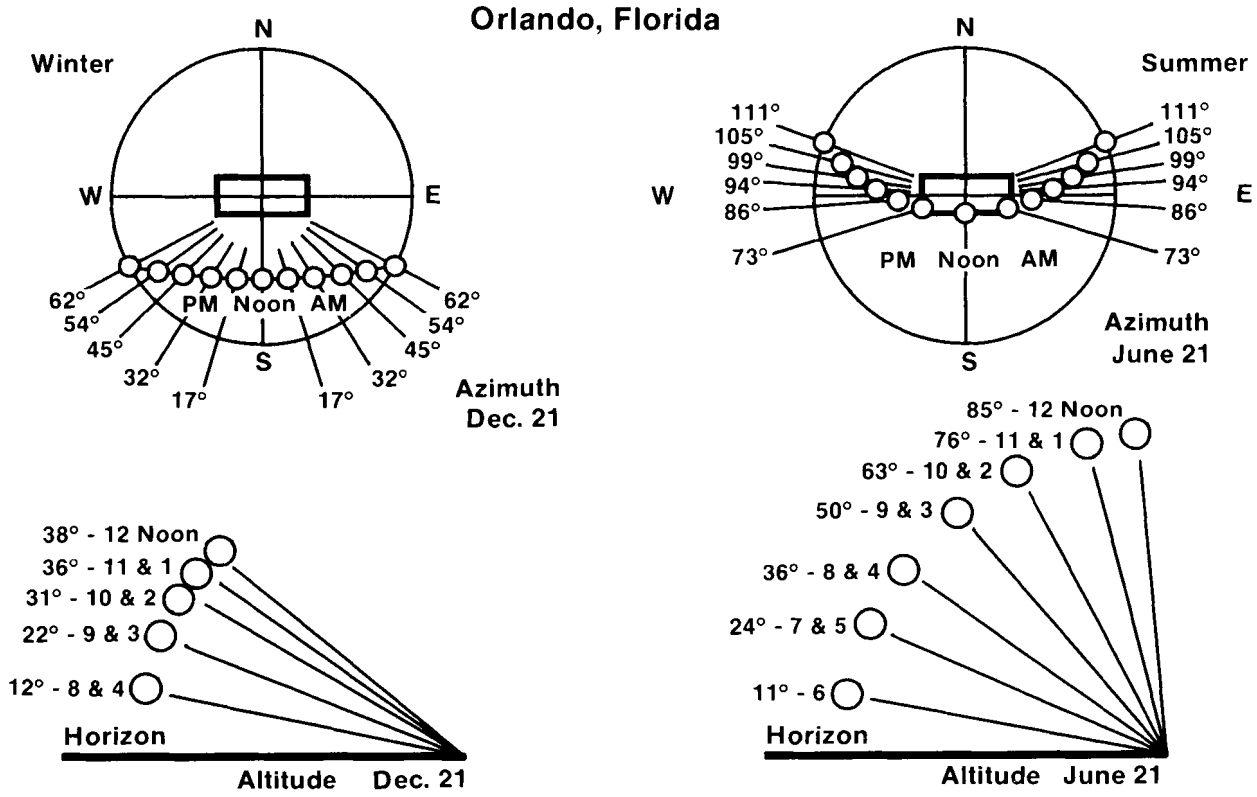


Typical subdivision.
(23.13 acres, 115 lots, 4.96 units/acre)



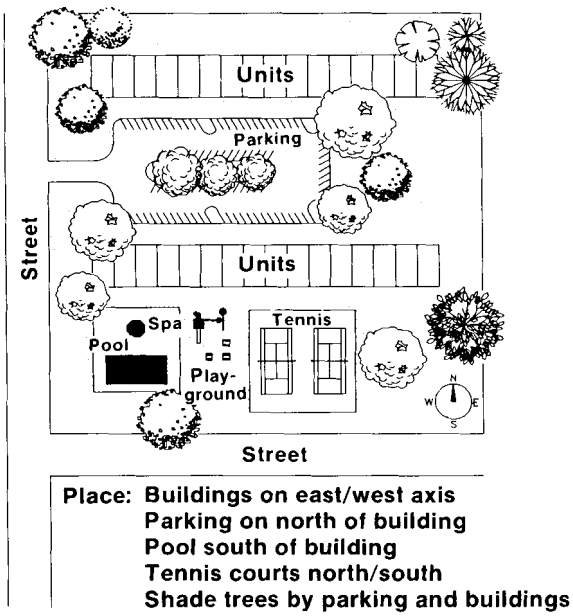
Florida oriented subdivision.
(23.13 acres, 119 lots, 5.14 units/acre)

Plan subdivision layout for predominantly north- and south-facing sites.



Sun angles from south (azimuth) and horizon (altitude) for Orlando, Fl.

Multifamily Lots. Most multifamily developments have many units with sides that lack windows. Since the sides with windows are generally the front and back, a north- or south-facing lot is also strongly preferred. Even if the street side of the site faces a different direction, multifamily lots are usually large enough for locating units on an east-west axis.



Multifamily site layout.

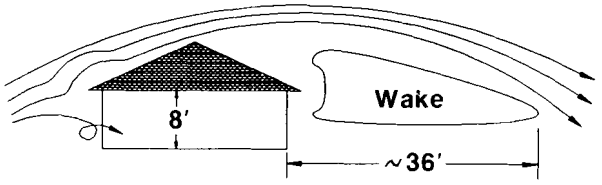
Zero Lot Line Sites. Due to increasing land costs and the strong market advantages of detached houses, zero-lot-line subdivisions have become common in Florida. One side of the house is on the lot boundary and has no windows, so all glass is on the front, back and opposite side. The home owner gets a larger side yard than is normal with the conventional house on a small lot (many of which are only 50 feet wide). It is desirable to orient the glassless side to the west, with the front and back facing north and south and a screen porch on the east. Some zero-lot-line house plans feature little front or back glass but a significant amount on the one side. With these, an east or west front is preferred. Natural ventilation can be enhanced by using a double zero Z-lot site plan that permits windows openings where breezes will not be significantly blocked by adjacent structures. Chapter 4 provides design examples for zero-lot-line sites.

3. Plan the site for natural ventilation

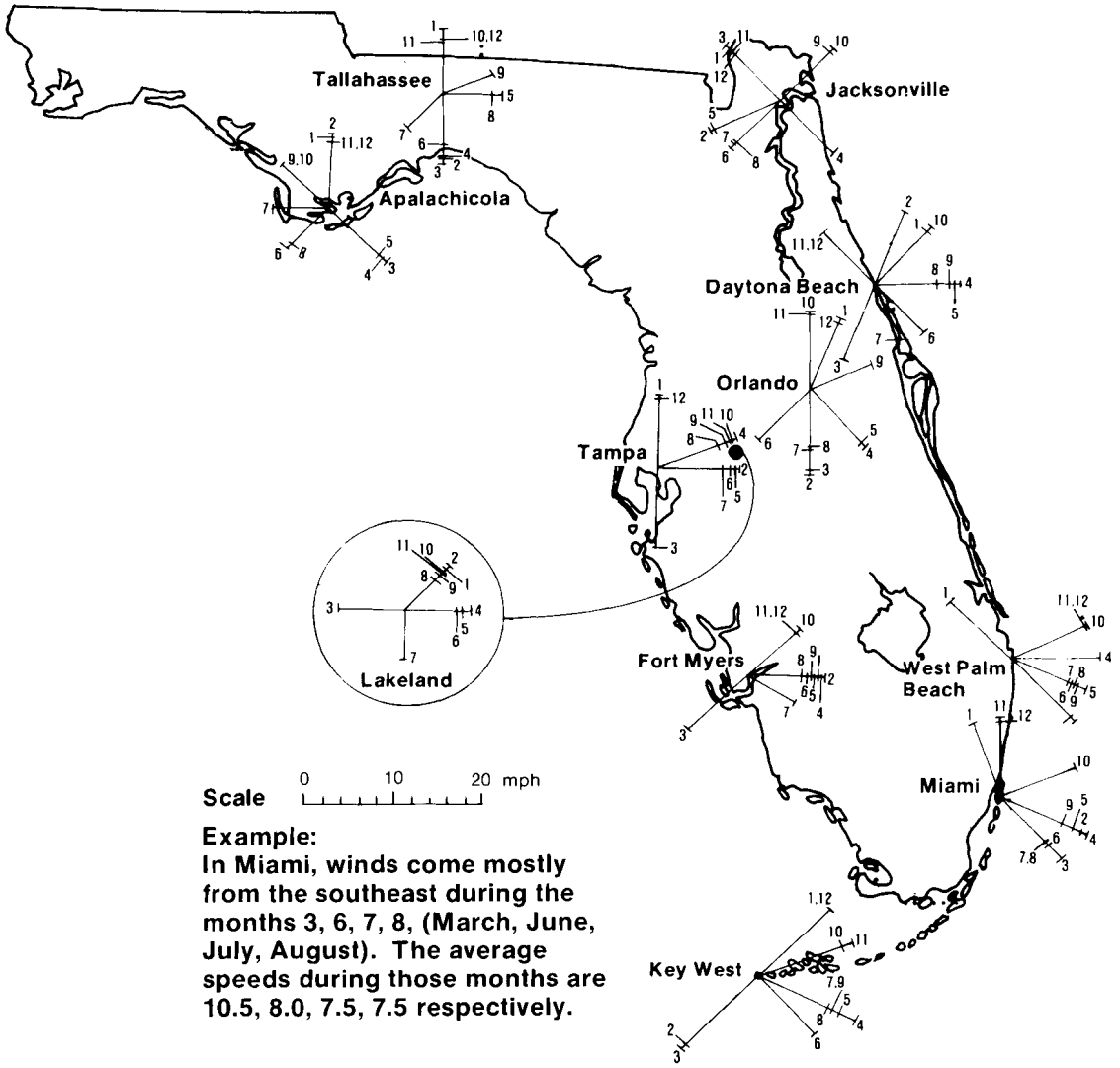
Consider the direction from which breezes will be blowing in spring, summer and autumn. Careful site planning and house design can make use of those

breezes for cooling. Look at the drawing below, which shows the predominant wind direction each month for various cities. Wind direction is indicated from outside the city towards its center. The length of each line indicates the average wind speed for that month, based on the scale provided. If breezes shift from the average, consider that April-June and September-November generally are ventilation months in Central and North Florida. In South Florida, March-May and October-December are ventilation months. During mid-summer, air conditioning is used extensively throughout the state.

Wind conditions at any individual site may differ considerably from those on the drawing due to local geography. A body of water, open field, or golf course adjacent to a lot may be a source of breeze. In general, heavily wooded sites will produce good shade but will limit breezes; however, the energy savings from tree shade usually will outweigh the difference in breeze. Fences, tall hedges and buildings can also limit breezes. Coastal locations are almost always windier than inland regions. As stated earlier, a standard subdivision can be set up preferably for south and north window openings. However, breezes from the east or west may be disturbed

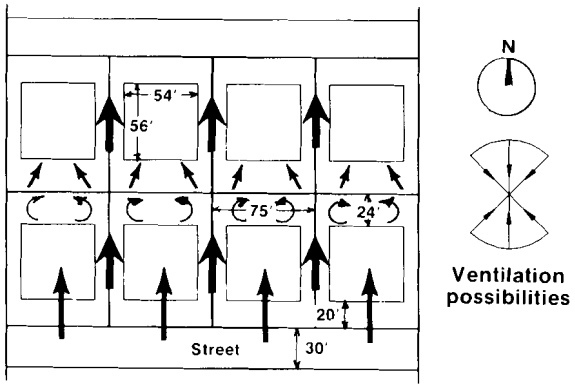


Wake of a typical house.

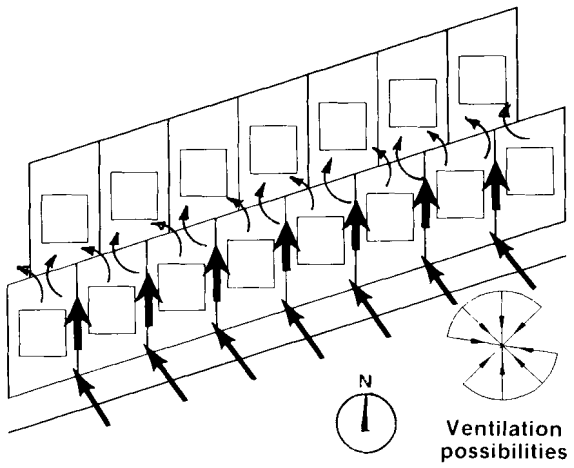


Example:
In Miami, winds come mostly from the southeast during the months 3, 6, 7, 8, (March, June, July, August). The average speeds during those months are 10.5, 8.0, 7.5, 7.5 respectively.

Florida wind roses.



Standard subdivisions can permit enough room for southerly and northerly ventilation breezes.



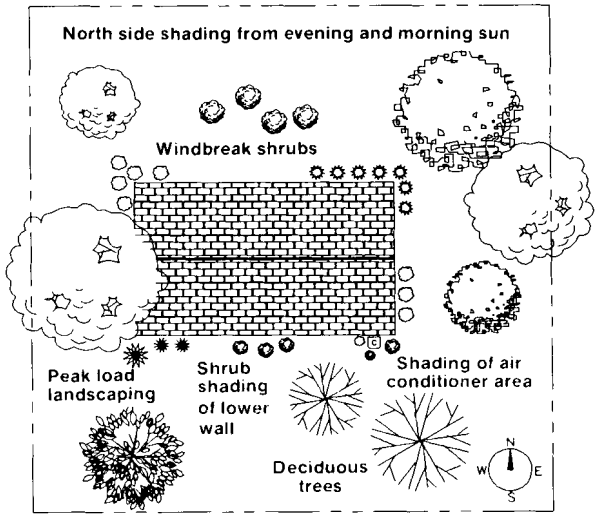
Curved or slanted streets can provide greater ventilation possiblitities.

by adjacent homes. As a general rule, the breeze disturbance in tract housing is a wake in the wind force that is four to five times the eave height. Curved streets and staggered lots can assist in preventing wind disturbance. House designs may have to be carefully selected to maintain property easements.

In high-density subdivisions, house and street layout is very important as adjacent buildings frequently block breezes.

4. Landscape for conservation

Trees and Shrubs. Use trees and tall shrubs to shade east, west, northeast and northwest sides of the house. Citrus trees, wax myrtle, Spanish bayonet, shining sumac, southern red cedar and youpon holly are good choices. In North and Central Florida, use full, tall-canopied deciduous trees (trees leafless during winter) on the south side. Try Florida elms, southern red maples or sweet gum. Use foundation plantings to shade lower wall areas, to keep the ground next to the house cool, and to block re-radiation from adjacent hot surfaces. Use trees to shade the air conditioner condenser.



Energy-efficient landscape design.

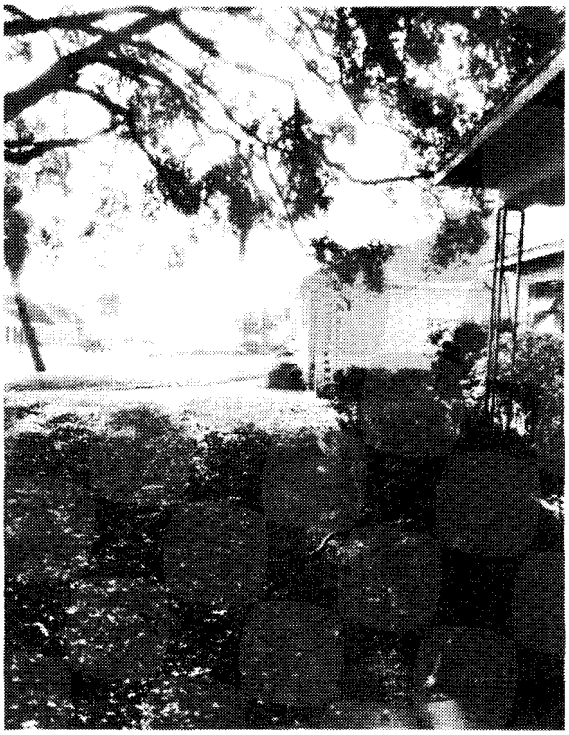
Leave natural vegetation on the site.

Trees intended to shade east, west and north walls should be planted between 7 and 20 feet from the house (small trees 7 feet, large trees 20 feet). Plant trees even closer on south sides.

Select native plants that are correct for your area. The advantage of appropriately selected native plants is that they can minimize the need for pest control, water, and fertilizer and maintenance.

Grass and Ground Covers. Proper selection of grasses and ground covers will save money and

energy. Base your selection on the expected use of the area. Foot traffic and play call for a user-tolerant turf grass. If foot traffic is not expected, you have many choices. First, think of leaving the natural vegetation on the land. This landscape saves you clearing expense, will require no maintenance (including no mowing), and can be a selling point to a client. For large clear areas, there are alternatives to grass: small-leaf confederate jasmine, bugleweed, ajuga, juniper, dwarf lantana, golden creeper, gopher-apple and dwarf lily turf. Some ground covers (e.g., ferns, partridgeberry, creeping liriope) will grow much better than grass in heavily shaded areas, and others can be much easier to maintain on slopes or in hard-to-get-at locations. Also consider using mulches as ground cover.



Ground covers such as ivy and ferns grow better than grass in heavy shade.

Water Retention. Many Florida home sites have sandy soil, which is quickly penetrated by water. However, sites which slope towards roads, driveways or sidewalks can have significant runoff even if the soil is sandy. Whenever it is possible, grade lots to retain water by having the lowest area in the center of the yard. The water so saved can be used by the vegetation. Preventing runoff also conserves fertilizers and pesticides and reduces water pollution.

Some Florida sites (including Tallahassee and other inland areas) have clay soils. Water penetrates clay soils slowly. and runoff can be a problem with even the slightest slope. Design your landscape to avoid water retention very close to the house and, also, to prevent runoff from the site. Plant appropriate vegetation in the low areas.

To keep areas cool and prevent excessive runoff, use paving or concrete sparingly. Where possible, use pervious path/deck materials such as stones or wood. In planning multiple sites or a subdivision, there are many methods of retaining water. Consult with the National Xeriscape Council and your water management district for water-saving ideas.

Irrigation. Irrigation water can be provided by using a gray-water system (also called water re-use). The water drained from showers, faucets, washing machines and sinks is used for irrigation. Consult with your building department to find out what ordinances and codes may exist in your area.

Environmental Impact. Performing all of the tree preservation and landscaping techniques described here will minimize the environmental impact of your project. Make your local government aware of your efforts, and see if they will respond by lowering your impact fees or giving you preferred zoning.

Summary

By choosing sites that will least expose the house to summer sun and make it most accessible to spring and autumn breezes, energy bills can be lowered. Saving mature trees can help keep homes cool. Landscaping should be designed to shade the house, to preserve natural vegetation, and to reduce watering requirements.

For further information

"Tree Protection Manual for Builders and Developers," Florida Department of Forestry, 1986.

"Troubled Waters," June Fletcher, *Builder*, August 1987.

Florida Native Plant Society, 1133 W. Morse Blvd., Winter Park, FL 32789, (407) 647-8839

Institute of Food and Agricultural Services/Energy Programs, Rolfs Hall, Room 220, University of Florida, Gainesville, FL 32611, (904) 392-5240.

Resetting America: Energy, Ecology & Community, Gary Coates, editor, Brick House Publishing Co.,1981.