

# HOME ORIENTATION

## A Factsheet from Austin's Green Building Program

Information on how the direction your home faces, particularly the direction the windows face, can affect your comfort, and heating and cooling costs.

### Which way's the right way?

Properly positioning your house on your site can save you money on your utility bills and make your house more comfortable year-round. Orientation is a critical component of energy efficiency and the ability of a building to properly mediate the summer and winter sun heat loads which penetrate through a building's skin (the outer shell of the building), especially in smaller buildings such as houses. This differs from larger buildings like office buildings which are more dominated by internal loads like lights, business machines, and large numbers of people. This fact sheet will cover three areas: compass direction, views and other site amenities, and building configuration.

### Compass Direction

Here in Texas, and in any climate where the sun and its heat play a dominant role in human comfort, the direction your house is oriented (which side faces which direction) is the most effective difference you can make in keeping your cooling costs down. This can prove difficult in pre-plotted subdivisions or tighter urban lots, where your house's orientation may be inflexible because of a tradition to face the street. The optimal orientation corresponds to the cardinal directions of the compass, due north, due south, due east, and due west.

The north and south exposures are the easiest to deal with here in Central Texas. The north side can be considered the cool side as the sun spends very little time in the northern sky. The south side can be considered the sunny side, since during the course of the day the sun spends more time in the southern sky. But, here in Central Texas, because of our southern latitude, the sun is almost straight up in the sky at solar noon in summer which means that a southern wall can be very well shaded from the sun with a very slight overhang. The advantage here being that in winter, when the sun is lower in the sky, these slight overhangs allow sun penetration deep into a house to provide some passive solar heating. Bear in mind though, that the sun spends very little time directly in the south. It spends most of its time climbing up to its peak (in the southeastern sky) and descending (in the southwestern sky). This means that although an overhang as small as 3 inches may shade a southern orientation at solar noon, it will do little to reduce solar gain throughout the rest of the day. Here in Central Texas, on a one story building, overhangs of 2 feet are the minimum for effective shading.

The east side of a house oriented to the cardinal compass directions will take a lot of the sun's morning heat. Since the sun spends much of its morning climbing through the east, east southeast, and south southeastern sky, this sunlight penalty can be very large to you and your checkbook. Minimal window area on the east side is recommended, even overhangs on this east side will only work minimally because the sun is so low in the sky during the morning hours.

The west side of a house oriented in the cardinal compass direction will bear the brunt of the sun's heat. In this case, minimize not only the window area, but also the total wall area facing west. Here in Central Texas, the overheated period (the time when your air conditioner will run the most, and the time to avoid going outside and doing strenuous activities) occurs between 2pm and 5pm. If you listen to the weather report you'll notice that the temperature usually climbs throughout the day and reaches its peak at the start of the evening rush hour (its usually only 98 at 2pm and the temperature doesn't break the century mark until 4:30 or 5pm). Since the ambient heat of the day has built up (air temperature), the sun's added heat will compound this. For this reason, the western exposure of a house should be devoid of all windows, or if windows are required by the dictates of the site or design, this exposure should be buffered with porches, trees, trellises, sunshades, carports, out buildings, or other means.

ENERGY

Most houses cannot match these cardinal directions straight on because of site set-backs (unbuildable areas surrounding most any plotted site). For these conditions, it is best to determine the worst exposure (that is, which side or sides of the house get the most west southwest and western exposure) and minimize windows on these sides. ***One important question to ask your builder is whether or not the air conditioner is sized for each individual house in the subdivision and its particular orientation or if they just size the worst case scenario and then put that system in every house.*** It is far better for your comfort and your checkbook if they size each house's air conditioning individually. This will ensure the system will perform optimally for your house's orientation. It is still best to avoid purchasing a home with a lot of western exposure, even if the air conditioning system is sized specifically for it, since this home will consume more energy to keep cool than one with less western exposure and/or minimal windows.

### **Views and Other Site Amenities**

You may have your eye on a lot with a beautiful view of a field or the lake. If this view is to the west or west southwest you will have to resign yourself to paying for that view should you decide to have lots of windows to capture it. Often, lots with good views have a higher price tag associated with them, and building a house on that lot will have a higher price tag over the long term because of its energy consumption. This is not to say that a lot with a view to the west or west southwest is a bad lot. You just need to consider that building to capture this view will cost more unless your house's exposure can be tempered. For example, existing tall trees can create shade while allowing you to enjoy the view through them or a deep porch will shade that side of the house. Also consider a viewing porch with a solid house wall behind, this will allow you to use the view from the porch and without any compromise of comfort and energy use.

Trees are another site amenity not to be overlooked. Deciduous trees are a particularly great site asset as they can be used to shade a house in summer with their leaves and allow winter sun in when the trees lose their leaves in the fall. Bear in mind though, that some deciduous trees like Live Oaks and Post Oaks don't lose their leaves during the fall, the old leaves only fall off when new leaves push them off the next spring. A tree or stand of trees to the west would be optimal here in Central Texas, to screen the house from the hot western sun. Your house's design could also be constricted by trees on the site, but keep in mind that a tall mature tree in good health is equivalent to 2-3 tons of air conditioning system capacity because of the shade it will provide and cooling by evapotranspiration.

### **House Configuration**

Your house can be designed to shield the worst orientation. Placing the detached or unconditioned garage on the west or southwest side can be a large help. Also a carport or porch can shield your western side. There are some sites which will prohibit this, remember that placing a garage or carport means a driveway must be able to reach it. Often a porch or trellis is easier since these architectural devices don't have the same access requirements. Again, avoid a cookie cutter houses where the orientation is ignored.

Your house could also be built into the side of a hill to avoid an unfavorable exposure, or shielded by a hill or outcropping. Indigenous people used this technique, called earth sheltering, to mediate temperatures in dwellings while maximizing solar gain. When dealing with these conditions, pay careful attention to water flow around and away from your house.

***Finding a house or lot with a favorable exposure may take some looking and question-asking. Bring your old Boy/Girl Scouts compass along to verify the exact orientation, and draw a sketch if it helps you remember.*** If you are planning a new house, be sure to do an extensive site planning exercise, decide what's important to you and your site (views, low energy bills, open space preservation) and use this exercise to guide your building's design to keep your utility bills low. On some lots, vehicular access is the factor which may dictate house placement. If you turn the question around, why would you pay more in utility bills to park your car where it was easiest for the builder to put it? Don't let the driveway force the design, let the proper orientation be the prevailing factor, vehicular access is secondary to the house itself.