

# **BUILDING THE FUTURE TODAY**

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Trio Publications/Wichita, KS  
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The Basics

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Your home is supposed to provide you with protection and shelter, a place to raise your family, and a calm/stable space away from our crazy world. Many homes built today do not provide us with these things, because they are poorly constructed, poorly designed, and many times are built only to impress our peers. They do not take advantage of their location or their orientation to the sun, and many homes may also ignore some other basic functions that the home is supposed to provide.

Home: "1. A place where one lives; residence. 2. A house. 3. A dwelling place together with the family that lives there. 4. A place of origin."

--The American Heritage Dictionary

There are many elements that are combined to create a home. These elements range from the most minuscule item, such as a doorknob, to the all-encompassing house plan itself. These elements can be combined to make a successful home, or to create a disjointed structure with no flow or sense of harmony.

A successful home will combine all the elements of its construction with a defining purpose. The occupants, and their life-style define that purpose. Their life-style is defined by their personalities. The successful home is built to compliment those personalities.

Homes come in many shapes and sizes

There are seven basic principles, which should guide the design of any home:

- Build to suit your needs**
- Build within your budget**
- Build to last**
- Build to preserve the environment**
- Build for energy efficiency**
- Build a healthy home**
- Build a safe home**

These principles lead to questions that help to define the purpose of the home. For each of these principles, you must examine your feelings, needs, and requirements in a home. These questions will lead you to produce a list of items that you want to incorporate into your home, as well as a list of things that you want to avoid in your home. Through this self-analysis process, you will discover your true home needs.



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### Build to Suit Your Needs

Building a home to suit your needs. This is a simple principle, but do people really take a good look at their current needs, and future needs when they build a home? If you analyze your present and future needs, you can have a home that will better accommodate you, your family, and your budget.

How much home do you need today?  
How much home will you need in 5 or 10 years?  
How will the rooms in your home be used?  
Who will use those rooms?  
What areas should be next to each other?  
What areas should be separated from one another?  
What architectural features do you want in your home?  
What conveniences do you want in your home?  
Is your home suited for its surroundings?  
What external influences do you want the home to enhance, or hide?

These are just a few of many questions you should ask yourself if you plan to build a home. There is a more complete list of questions in Appendix A, in the back of this book. There is also an electronic version (Microsoft Excel®) on our web site, [www.futurehometoday.com](http://www.futurehometoday.com). Use this form to as you go through the process of planning your next home.

How much home do  
you really need?  
How much home can  
you afford?

When it comes to a home, bigger isn't necessarily better. We all would like to have more home at some point in our lives, but how much home do we really need? Do you really need 4 bedrooms, and 3 baths today? What will the situation be 5 or 10 years from now? Many people get caught in the trap of wanting more home than they actually need or can afford. This is human nature. Many homes built today have only simple finishes, and offer an



atmosphere that lacks warmth, because they are designed with maximum size, and not comfort in mind. Often, this lack of detail is a result of budget constraints. Since the 1950's, the average family size has decreased, while the square footage per person in a home has almost tripled. Do we need all of this space, and can we use this space more efficiently?

How much space do we really need in a home? Are the formal dining and living rooms necessary with our life-styles today? How many people do you know who have these rooms, and rarely or never use them?

It is important to identify your home needs. Start by creating a list of rooms in your ideal home, and call this your "Needs List". You can divide this list into two halves, the "must have" side, and the "would like to have" side. On the "must have" side, list the rooms you absolutely cannot do without, such as the kitchen, family room, laundry room, etc. If you plan to work out of your home, a home office is probably a necessity. On the "would like to have" side, list the rooms you would like if your budget allows. These might be a home theater, guest bedroom, screened porch, greenhouse, etc.

This exercise will help you to understand what you really need in a home, and what you can add if there is enough money in your budget. This may also make you think about how the rooms in your home will be used. Many people visualize their future home, and how they would like to use the home. The problem is that most people have a difficult time separating their actual needs from the fantasy of their ideal home. The fantasy is fine, but you have to be able to pay for the fantasy.

Create a "Needs List" to help define the spaces in your future home

Our New House	
Need	Want
Kitchen	Home Office
Family Dining Room	Guest Bedroom
Family Room	Basement
Master Bedroom	
Screened Porch	
Children Bedroom	

Look at how often you entertain friends or family as an example. How often do you really expect to have a group of friends or family over to your home, with a group of 15 people or more? Will you have this number of people over more than three or four times in any given year, during times when you cannot use outdoor areas? Most people will say no to this question, yet they visualize

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a large living area with the ability to accommodate groups of people.

Unfortunately, there is a cost involved with having this large living area for entertaining. Square footage costs money. Can you afford to invest the extra funds into your home for this purpose? You must realize that you will be entertaining people for less than 1% of the time you spend at home. Would you be better designing your living space so that you could rearrange some furniture in order to accommodate groups or parties? There are many possibilities.

We need to rethink how our homes are designed and built. We need to cast off the shackles of tradition, take a clean look at our real needs, and build our homes to suit those needs. Only this will make our homes more livable, comfortable, and affordable.

In homes, there are public and private spaces. Public spaces are those where the family spends the most time, such as the family room, kitchen, dining room, etc. A home also needs private spaces. Private spaces are those that are not normally used by everyone in the family, such as the parent's bedroom, or bathroom. People need private spaces to escape, and to be alone. We all need solitude from time to time, in order to allow our minds to settle, and to allow us

Comfortable, public areas are very important to any home



reflect upon the days events. The private space does not have to be totally separated from the rest of the home; it only needs to be a room that is separated from the normal flow of traffic and noise. This allows the normal activities of the home to continue without intruding upon another family member's quiet time.

You should also look at your family situation today, and what it will be in 5, 10, or 15 years. Have you chosen the town where you want to raise your children? If your children are older, and about to enter high school or college, you may

not need a large home in a few years. You may be able to deal with a smaller home for a short time in anticipation of your children leaving for college, or starting their own homes. If your children are young or newborn, the nursery today may become the den of tomorrow. Think about the future, and how you might best utilize the space available. This process will often lead you to a

home design, which is optimized to your current family situation, yet can be adapted as your family changes.

The style of homes has changed somewhat in the past 50 years. Many of today's designs will have the kitchen open to the dining/family room. No longer is it a sequestered area used exclusively for preparing the family meals. The kitchen has even become the focal point of many modern homes. How often have your attended holiday gatherings where most of the guests are congregating in the kitchen? The downside to this design is that the kitchen needs to be kept in a fairly clean state on a consistent basis. It can be designed with a dividing counter set higher than the sink, which can help to hide dishes not yet cleaned. An integrated breakfast bar can also provide an eating area for some or all of the family, helping to combine the family dining area with the kitchen. The breakfast bar can also serve double duty as a buffet serving area when entertaining family or friends.

Kitchens today are large and open to other living areas



Another consideration is comfort. What makes a home comfortable? There are many things that help to make a home comfortable. The size of the spaces can create a comfortable feeling. The furnishings in a home can greatly affect the comfort of the home, even the finish materials (floors, wall coverings, trim/woodwork, etc.) add to the comfort of a room.

What naturally feels more comfortable, a large room, or a small room? Most people will say the small room. For some reason, people like smaller, more confining spaces when they desire solitude. Smaller rooms create that cozy feeling. Adding a small private space off of a large family room or the master bedroom can be easy and efficient. Alcoves and window seats are examples of small, cozy spaces. These spaces can be designed or arranged to provide some separation from the rest of the family area, without being too removed from the activities of the home. These spaces can also add impact and interest to a room. What about making the space under the stairs larger, or more useful? There are many places where you can find spaces for this type of function, include one or several in your home design.

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The materials used in the construction of the home can also add to how comfortable the home feels. Generally, natural materials create a more comfortable feeling. Examples are natural wood trim, or hardwood flooring. If your budget allows, incorporating wood into the interior of your home will be a plus. This not only will increase the value of your home, but it will also add to the comfort and beauty of the home. The materials used to finish your walls also affect the comfort level of your home. Finishes that are too smooth, and lack softness are not very inviting, where as materials that have an irregular texture, create shadows, and have depth will help to make the home feel more comfortable. This is a basic, but important characteristic to understand.

Furnishings are another factor in creating a comfortable room. Large, solid, over-stuffed furniture will be more comfortable than delicate, fancy furniture. Most people are attracted to large, soft pieces of furniture. Furniture that incorporates the richness and beauty of natural wood is a bonus, because they can help to tie the furniture into the rest of a room. The types of furniture you choose will even influence how guests will act in your home. If you have delicate, fancy furniture in your home, your guests may feel uncomfortable, because it is not comfortable to sit in, and the furniture does not allow your guests to relax. Large, soft furniture will be much more relaxing and inviting. This can greatly improve how your guests feel in your home. The color and texture of the furniture add to the effect.

Combining the formal and informal living spaces is efficient and cost effective

Can you make rooms serve a double duty? Having spaces that you can use for two or more functions creates a more efficient design, and allows you to splurge on other items in your home. Floor space costs money. By making the square footage of your home more efficient, you can use the money initially saved to upgrade the finishes in your home, or to add additional rooms to your



home. Many people purchase homes that are simply finished on the interior, because they were buying square footage, and could not afford to add more expensive interior finishes to the home. Take the formal dining room for instance. Most people rarely use a formal dining room. How much money does a room you rarely use cost? Can you eliminate the formal dining room from your house plan, and upgrade the size and quality of the family

dining area? By improving the quality of the family dining area, you can make it serve the dual function of formal, and casual dining areas, while improving the overall comfort and quality of the home. This is an example of how you can reduce the size of your home, while increasing its quality, comfort, efficiency, and cost efficiency.

What kind of life-style does your family have? Do you like deep solitude, lots of interaction, or something in-between? Do you require peace and quiet to unwind after a hectic day? These things should be considered when deciding what type and style of the home you intend to build. A home must be able to function with all of the occupants, and their activities. The life-style of your family is tied closely with your needs list for a home. A home can be designed to compliment your life-style, or can be inadvertently designed to hinder your life-style.

A well designed room can serve the family and accomodate groups

If you do entertain often, you might consider designing your home with an emphasis on the public spaces, while minimizing the size of the private spaces. This can be accomplished by making the public spaces larger, adjacent to one another, and possibly separated by furniture that can be easily rearranged when



needed. You could also design your home with an emphasis on the private spaces. Here you can spend the majority of your budget on the bedrooms and baths, while minimizing the more public kitchen and family room. Most people want a balance somewhere in-between these two extremes.

Many homes built today are open in design, and they also try to combine interior and exterior spaces into a larger living area. A deck/patio or screened porch can be placed next to one or more of the public family areas. This allows the family to move between these areas in times of moderate weather, and greatly expands the size of the home when entertaining during moderate weather. This type of arrangement expands the living area of the home, and is common today. These outdoor spaces are also important if you have children.

If you have small children, you will want areas where they can play (both

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inside and outside), yet still be within earshot or sight. An open design with an adjacent outdoor space, and a secure back yard is an ideal configuration. This allows the children to play indoors and out, while staying in close proximity to you. This arrangement can also help to increase the safety and security of your children. If your children are teenagers, you may still want the same features, with the addition of some spaces for study and privacy. A basement family room can serve both of these purposes.

As you age, your mobility will decrease. You may also find the need to have a disabled person live with you at some time. You can design your home so that it is easier for a person with a mobility problem, yourself or a relative, to move within. Reducing elevation changes inside the home is a good place to start. As you age, it becomes more difficult to climb up and down stairs. Reducing or eliminating stairs in the home will improve ease of movement. Would you want to have to climb stairs in order to move about your home or do laundry if you had a mobility problem? You may want to design the home so that there are no elevation changes between outdoor areas, such as a patio or garage, and the main living area. These changes will offer easier access into or out of the home for a person with a disability. Hallways of the home should be wide enough to accommodate the use of a wheelchair or walker, and rooms such as closets and bathrooms should be wide enough to allow a wheelchair to be turned around within them.

Mult-level homes create problems for people with mobility issues

A ranch design is the most adaptable as you age. Even though a ranch design is more spread out, its single level makes mobility much easier than any other home design. Another option is the use of pocket doors instead of hinged

doors in key areas, such as bathrooms, toilet enclosures, or closets. In these limited space areas, hinged doors are difficult for an able bodied person to use, let alone a disabled person. Many new homeowners actually remove hinged doors from these areas, because they are so difficult to open and close. Pocket doors, on the other hand, can slide out of the way for easy access, while still offering privacy. These considerations can be designed into your home before construction begins. Moving walls, and changing doors, after the initial construction of the home is completed can be expensive. Counter heights



can be another concern for disabled people. People in wheelchairs cannot easily use standard height counters in kitchens and baths, because they are too high, and do not have any legroom beneath them. Counters in kitchens and baths can be changed to accommodate life-style changes more easily moving than walls, and changing doors.

### **Build Within Your Budget**

When considering the task of building a home, you need to consider the budget. The budget is the amount of money you can spend on a home while allowing for the other bills of everyday life, and for unexpected circumstances. The initial cost of the home, the interest on the home loan, municipal taxes, and insurance will determine the monthly expense of the home. Your banker or a mortgage company can determine the size of the home loan for which you qualify.

The quality of your interior finishes will greatly affect your building cost

How much home can you really afford? How many people do you know who have purchased more house than they can afford? They have a beautiful facade with no furnishings. This is commonly called “house poor”. These people are constantly worried how they will pay their monthly bills, which causes stress, anxiety, and is in general, unhealthy. Money, or lack of money, is one of the leading causes of the breakdown of the family unit today. Another concern is the job market. With all of the mergers, and takeovers of large companies in recent times, your job situation can dramatically change in a short period of time. These changes can also cause cash flow problems.

Buying or building well within your means will give you advantages over your peers. By building smaller, your building costs will be reduced. With your building costs reduced, your payments will be lower, allowing you more money for investments, or the ability to pay off your home loan in a shorter period of time. You may also have more money with which to send your children to college, travel, or even be able to retire early. These lower expenses can also be valuable in times of financial stress, which most people



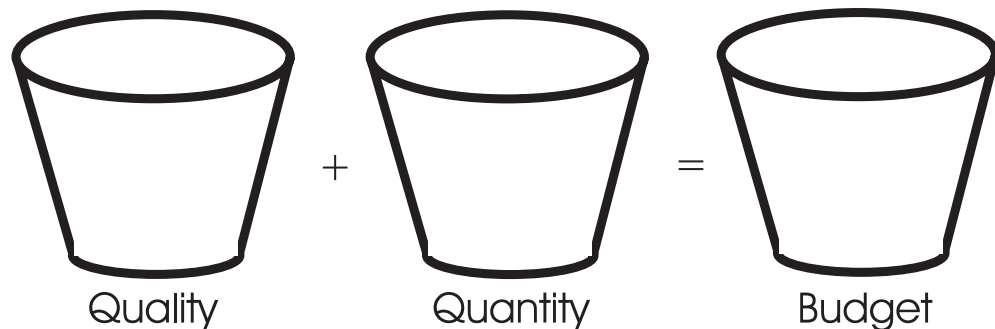
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experience at some point during their lives. Many people experience this at several occasions during their lives. Owing less money every month may mean the difference between survival and bankruptcy. Keeping your expenses well within your current means has several advantages.

Do not borrow the maximum amount of money for which you qualify. Lenders use a mathematical formula to determine how much home for which you can qualify to purchase. This formula takes into account your history of debt payments, your current income, and your current debt load. These formulas are supposed to keep the lender, and the borrower safe from financial problems (overstretching your finances). Many times, this process does not work too well, because either the borrower is not completely truthful about their finances, or the lender is too eager to establish a new loan. In either case, the borrower can get into a position where they cannot effectively make their home payments, which causes financial stress. Keeping the cost of your home lower will normally prove the wiser choice.

Once you have determined a budget, you now must make some other choices. These choices involve the quantity and quality of space in your future home. Which of these is more important to you? Higher quality construction will increase your cost, where as a larger home (more quantity), will also increase your cost. You only have so much money to spend; you must decide how you will divide up your resources on these two options.

The balance between cost, quality, and quantity is easy to visualize. If you



Everyone has a budget when building a new home, it is important not to overspend

have three buckets: one labeled budget, one quality, and one quantity. Assume the size of all three buckets are the same, and the budget bucket is filled with sand, equal to your building budget (the sand is the money in your budget). You now have to decide at what ratio you want to add sand to the quality and quantity buckets, or at what ratio to invest in your future home. You can add more sand to the quantity bucket and less to the quality bucket. If you increase quantity, you have to sacrifice the quality of your home. You will not be able to have higher quality finishes, and materials such as hardwood floors. You will have to settle for less expensive options such as carpeting or vinyl flooring. Will this home feel comfortable to you? Will you be happy with what you have

purchased, and be able to live with your choice for the next 10 years? Will the components used in the construction of your home last as long as you expect them to, or as long as they should?

You can choose to add more to the quality bucket than to the quantity bucket. If you increase quality, you will need to build a smaller, more efficient home. You will be able to finish the home in any style or texture you desire. There can be wood trim on windows and doors, as well as hardwood floors. You could also have the kitchen of your dreams. You however, may not be able to have other specialized rooms, such as a home office or sunroom. A more efficient floor plan compliments the choice of higher quality.

The balance between quality and quantity must fit your desires, needs, and budget. If you can eliminate wasted space, and have rooms serve double duty, you will have more of the budget available for quality, while still satisfying your quantity needs.

### **Build to Last**

How long should a house last? How long will you stay in your current location? Can you recoup the investment of building a higher quality home if you do need to sell at some point in the future? Many homes today are not built with the building life span as a factor. Building a home to last longer costs more money, because of higher quality workmanship, and more expensive, longer lasting materials utilized in the construction. Most builders will not spend extra money on increasing building life span, because of the increased costs that can mean fewer home sales. Homes may be built to meet the local building codes, but this does not mean that there will not be foundation problems, water problems, or maintenance required shortly after construction is complete.

Today, many homes are built with short-term materials used in key locations. Roofing materials can be of moderate quality, and may not be installed to manufacturer specifications, voiding the warranty. Exterior siding materials may only last only 20 years.

Masonry construction can last many years



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Composite wood siding is an example of such a short-lived product. This material is inexpensive, and an effective exterior siding material, but problems will occur if proper maintenance is not performed to prevent deterioration of the siding. If not well maintained, this type of siding can swell from water absorption, crack, bulge, and begin to fall apart. Composite wood siding is even used on expensive homes in order to save on construction costs. Better materials cost more money, and may require that some other features of the home be sacrificed in order to maintain the home budget.

Lack of maintenance will shorten the life of any building material

What causes homes to have short lives? The two main culprits of building deterioration are water and sunshine. With all other things being equal,



material quality and workmanship, water is the most damaging element with sunshine being the second most damaging. Additional problems are caused by drastic temperature variations as the seasons change, or damage from insects.

Water, or moisture, causes most building materials to decay, rot, or fall apart. Designing a home to remove water from around a building will greatly increase its life span. How is this accomplished? You have to start from the ground

up. A well-drained, and adequate foundation is the key element. Providing adequate drainage will help to keep the foundation from settling. If the foundation settles, stresses are placed on the entire structure, which can damage a building or create new points of entry for water into the structure, causing additional problems. Above ground, it is essential to use good quality building materials, and to design the home to eliminate or reduce the areas for water intrusion into the structure, in order to increase the life span of a building.

Sunshine is damaging to our skin, and to the skin covering most buildings. The intense heat, and ultra violet rays of the sun cause all paint materials to slowly fail. These paints will fail at different rates depending upon their chemical nature, quality, and application quality. Sunshine also damages, and destroys varnishes and stains. All of these coating materials are designed to protect the exterior sheathing materials of a building from the elements.

Once the paint fails, water is allowed to permeate the material, and sunshine is allowed to directly strike the finish material, both of these will shorten the life span of the finish material, and the building.

How long should a home last? A good target might be 150 years or longer. The potential increase in building cost depends on the construction materials, construction method, and craftsmanship used in the building. In some instances, the increase in building cost can be quite small. Building to last makes sense, not only on a personal level, but also on an environmental level. Too many homes are built to last only 50 years. This is a terrible waste of our natural resources. Many of these resources are of finite supply or cannot be replaced in the near future. By wasting these resources, we limit the choices we will have in the future for ourselves, our children, and their children.

Can you recoup your investment if you do build to last? This depends mainly on how long you plan to live in your home. If you live in your home for 20 years, and your extra investment in long lasting materials was kept to a reasonable amount, you should be able to have a positive return on your investment in your home. This is possible because longer lasting materials will usually require considerably less maintenance than cheaper, shorter-lived materials. The less maintenance that you have to perform on your home, the less money you spend on a yearly basis for upkeep. These are called the "life cycle costs" of a material. Less expensive materials will generally require more frequent maintenance, reducing the benefit of the initial cost over time. More expensive materials will generally last longer, and require less maintenance, offsetting their higher initial cost over time. Exterior maintenance of your home can be expensive. How much does it cost to get a quality paint job on the exterior of a home? Call a local painter; you may be shocked at the price you are quoted. If you use better materials that do not need painting as often, and invested that amount into the construction of your home, you should end up on the winning side of the bargain. Again, this is only if you plan to live in your home for an extended period.

Quality building practices and maintenance will improve longevity



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**\*\*Don't be mistaken, when you sell your home, only a few buyers will consider the extra quality you have invested in your home. Also, most Realtors will not be very interested in listing your home if the selling price is higher than other homes in the area, regardless of quality. Most homes are sold using square footage, and the location as the general indicators of value.\*\***

### **Build to Preserve the Environment**

We need to change our building practices so that they become more environmentally friendly. This is often called "sustainable architecture" or "building green". Improving upon existing building methods or utilizing alternative building methods such as insulated concrete forms, and utilizing alternative building materials can accomplish this goal. We need to build using resources, which are replaceable in our lifetimes. The areas where we can have the greatest impact are in the use of resource efficient building materials, and in the reduction of the waste created during the construction process. Much of the waste generated during the building process can be recycled into some useful form.

Reducing the waste generated during home construction is important to our environment

There are several alternatives in the area of resource efficient building materials. One option is to modify existing building methods so that they become more resource, and energy efficient. An example of this in wood framed homes is to utilize an advanced framing method. This reduces the quantity of wood used in construction, and increases the depth of the walls, allowing for

additional insulation.

Other examples involve alternative building materials, such as insulated concrete forms or straw bales. This subject is covered more thoroughly in chapter 4.

How much pollution and waste do our current building methods produce? If you examine the building methods used in most homes today, you would find excessive



amounts of waste. This waste, for the most part, goes straight to our local landfills. The most common building method for residential homes today is with wood, and is called stick-framing. 95% of all homes built in the United States are stick-framed, and 10 to 15 percent of all the wood purchased for

building these homes is discarded as waste. This waste consists of dimensional lumber cutoffs, plywood, and OSB (oriented strand board) pieces. This waste can be recycled in several different ways. It can be collected and shredded into mulch for use in gardening or public parks, used as fuel for various purposes, or used to manufacture additional products. Many building practices also utilize resources that cannot easily be replaced. An example of this is the harvesting of old growth forests to provide wood for new homes. Alternative building materials, which are more abundant, and more energy efficient, can be utilized to reduce this issue.

About 15 percent of all drywall purchased for construction is also discarded. Drywall waste is generally in the form of small pieces or odd shapes. This waste can also be recycled. Drywall is made mainly of gypsum, a natural mineral, with an alkaline base. If it is ground into a powder, it can be used in gardening or farming as a soil conditioner.

These are just two examples of construction waste, and possible uses for that waste, there are many more possible uses. With current construction methods, almost every part of the construction process creates some amount of waste. Could using different construction methods decrease this waste? Could we increase the amount of recycled material that

is used in home construction? You may be able to find a contractor with a recycling program for their building waste. Some builders promote the use of waste construction material by local residents for what ever their needs might be (crafts, projects, etc.) Contractors often find they have a win-win situation when they recycle, because they

are seen in a favorable way by environmentally conscious homebuyers, and the construction waste is put to good use. The builder also benefits from not having to pay to have as much waste material hauled to the local landfill. Some cities have developed programs with builders to help accomplish most of these goals. An example is the green builder program of Denver, Colorado. This program is designed to raise public awareness of environmental issues, and to use market pressures to change construction industry practices. This can be an effective method to implement change in the building industry. Builders who participate have an opportunity to attract more customers, and



Straw bale homes are an example of sustainable architecture

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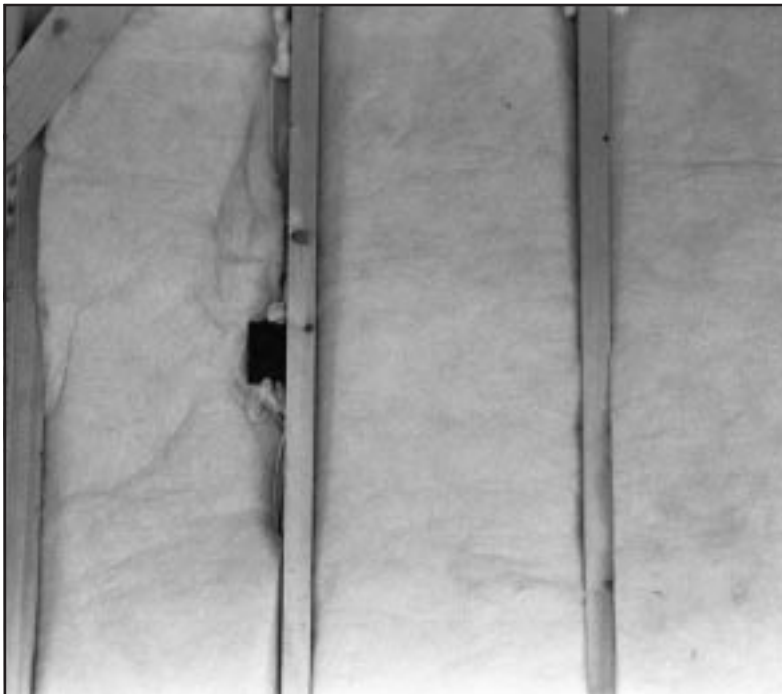
the city gets more efficient and environmentally friendly homes.

### Build for Energy Efficiency

Can we improve the energy efficiency of our homes? How much will this cost? What are the advantages, and disadvantages of building energy efficient homes? Many of the construction methods used today are not very energy efficient. They are efficient from a construction efficiency standpoint, but they are inefficient in their ability to conserve resources and energy.

Fiberglass is the standard insulation material used in most homes

There are several ways to achieve better energy efficiency in a home. The most common improvement is to increase insulation in the exterior walls, roof, and floor. Increasing the insulation in a home slows the transfer of heat out of, or into the home, much the same as when you put on your coat on a winter day.



There are also alternative insulation materials available, some of which are more efficient than standard fiberglass insulation. Sealing the shell of the home with an air infiltration barrier to prevent air movement within, and through the walls will also increase energy efficiency. An air infiltration barrier reduces the amount of outside air infiltrating into the home, and reduces the heat loss, or heat gain associated with this process. A large portion of the heat energy in a home is lost through air infiltration.

Proper design can also increase energy efficiency. Placing windows on the south side of the building can help with solar heat gain in the winter, while designing the roof overhang to

block direct sunlight in the summer reduces heat gain when you want it least. The type of windows used is also important in conserving energy, or allowing natural heat gain. Limiting the number of windows on the north side of your home will save energy. Designing the home with entry door air-locks will dramatically reduce air infiltration into the home, and improve energy efficiency. Designing your home to take advantage of natural cooling can also reduce energy usage. If you can eliminate the need to run your air conditioning for 2 additional months in a year, how much energy will you save? Using efficient mechanical systems (heating and cooling system, hot water heater, etc.) can also greatly improve energy efficiency. The largest portion of your

utility bill is spent to power these mechanical systems. Additionally, you can reduce energy usage by purchasing more energy efficient appliances for your home. Lighting systems comprise only a small portion of a standard utility bill, but the use of energy efficient lighting fixtures can also help reduce energy costs. Compact fluorescent fixtures are about four times more efficient than standard incandescent bulbs.

There have been improvements in insulating materials and techniques in the past decade; however, the efficiency of the end result is still far below what is achievable. The R-value of the walls in most homes may not exceed R-15 at best. The R-value is calculated in the middle of a wall cavity where there is the most insulation, or the point in the wall with the highest insulation value. The R-value at a stud location within the wall may only be R-6. This means that about 15% (or more) of your wall has only an R-6 rating, and not an R-15 rating (R-values are explained in more depth in chapter 5). This does not take into account the air infiltration associated with stick-framed walls. These ratings are far below what is achievable with other building materials. These alternative building methods and materials may increase the initial cost of the home, but they will also increase energy efficiency of the home. Again, if you plan to live in the home for an extended period of time, you should more than recoup the additional construction costs, have a better home, and conserve natural resources.

### Build a Healthy Home

Building practices today produce tighter, and more energy efficient homes than were constructed 20 or 30 years ago. A tighter home allows the indoor air to be exchanged less often, or fewer times per day than homes built in the past. More synthetic building materials are also being used in our homes. Many of these materials emit or off-gas or release chemicals into the home. All of these factors can combine to make the air inside a modern home polluted, and unhealthy. The U.S. Environmental Protection Agency reports that indoor air can be two to five times as polluted as the air outside the home. Most people, some much more than others, are effected by the chemicals off-gassed by building materials, by chemicals we use daily in our homes, and by things that grow and collect in our homes.

Many building materials

Wood flooring will not hide or trap indoor contaminants as opposed to other floor coverings



## Building the Future Today

Ceramic tile is another healthy flooring option



emit, off-gas, or release a variety of chemicals into the home. One of the most common chemicals released into the home is formaldehyde. Formaldehyde is a colorless, strong smelling gas, and is used in a variety of building materials, as a component of some adhesives. The most common sources of formaldehyde emissions in the home are cabinets, furniture, some types of plywood, and particleboard. Exposure to formaldehyde affects people in different ways, and to different degrees. For most of us, this chemical will have no noticeable effect, although the chemical smell may be strong. Some symptoms experienced by chemically sensitive people are watery eyes, irritated throat, nausea,

skin rashes, headaches, dizziness, etc. Formaldehyde is just one example of an unsafe chemical present in most homes. There are other chemicals present in our homes, most of which are released by the occupants. Cooking, cleaning chemicals, pesticides, and paints are just some examples of products that can release volatile organic compounds (VOCs) into the atmosphere of a home. These chemicals can be irritating, and even harmful to our health.

People spend about 90 percent of their time indoors (work or home). People who are the most susceptible to chemical exposure spend even more time indoors:

small children, people with asthma, pregnant mothers, elderly, and people with illnesses. As new homes are built to be more energy efficient, built to allow less frequent exchanges of the air inside the home with the air outside, they also trap many of the chemicals we use in our homes. Children may be more susceptible to these chemicals than adults, and the effects can be life long.

Other things in our homes that may cause health problems are biological. These include microorganisms such as dust mites, plant allergens such as pollen, and molds or mildew. Many people are allergic to the feces of dust mites, which are present in every home. Specifically, dust mites live in our bedding, and feed on the dried skin that falls off of our bodies. Breathing these contaminants can cause allergic reactions in some people, and cause additional problems for people with asthma.

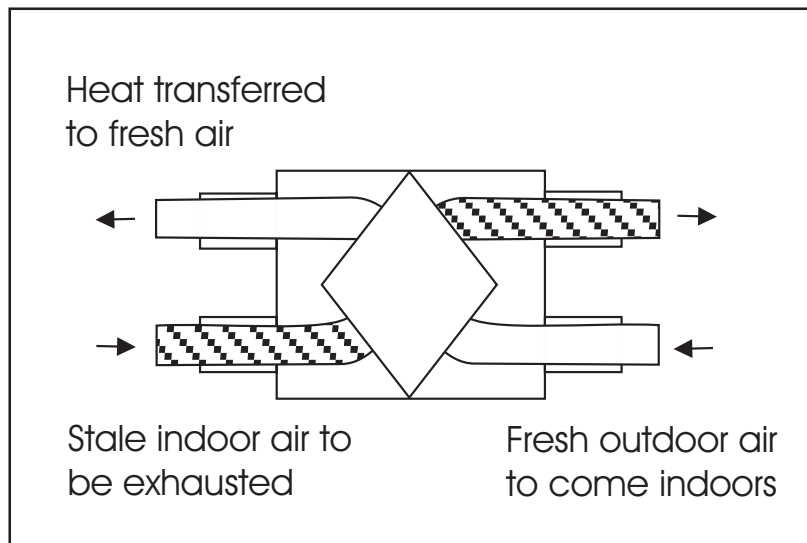
You can compromise and remove the largest sources of chemical emissions from your home without greatly increasing your building costs. The three areas where you can have the most impact on improving the air quality in your home are your choices in floor coverings, cabinetry, and the heating, ventilation, and air conditioning (HVAC) system.

The cabinets in your home are a source of formaldehyde. Most cabinetry uses hardwood plywood, most of which is manufactured with urea formaldehyde resins. These resins off-gas formaldehyde into the air of the home as they age. You can reduce the chemicals released into your home by selecting cabinetry constructed with hardwoods or plywood that do not use urea formaldehyde resins. The finish applied to the cabinets may also be a source of off-gassing solvents. Selecting clear, water based finishes will reduce this problem.

The flooring or floor coverings used in your home are another factor. Some flooring materials can emit volatile organic compounds (VOCs) into the home, while other flooring materials can trap unwanted contaminants inside the home. VOCs emitted by flooring materials can be a result of the materials used to make the flooring product, or the adhesives used to secure the product to the floor. Most carpeting emits VOCs.

A air-to-air heat recovery ventilator can help keep the air in your home fresher and healthier

Biological contamination is another source of irritation and illness associated with flooring materials, especially carpeting and area rugs. These products are a wonderful breeding ground for all sorts of contaminants. These contaminants can be dust mite dander, dirt, dust, hair, chemicals, etc. Breathing these organisms or contaminants is unhealthy. There is no way to keep things from growing or collecting in your carpeting, so the best choice may be to eliminate or limit the areas in your home where these contaminants can collect. Consider vinyl flooring, hardwood flooring, or ceramic tile as options. Hardwood or tile flooring is much easier to keep clean than any type of carpeting or area rug.



When we create more airtight homes, and we reduce the number of times in a given day that we allow the air to be exchanged, we create new problems. We trap in our homes the chemicals, dirt, dust, and biological contamination released or growing in our more efficient homes. We effectively create indoor air pollution. This, of course is also unhealthy. Now we have created the need

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to remove contaminated, stale air from our homes without removing the conditioning of that air (heating or cooling). This is most effectively accomplished with an air-to-air heat recovery ventilator (HRV), which can be attached to your home HVAC system. The heat recovery ventilator removes stale, contaminated air from your home, and replaces it with clean air from the outdoors, while retaining 80% or more of the indoor air conditioning.

Another device that is helpful in maintaining good indoor air quality is an efficient filtration system on your HVAC system. The standard filter on most heating systems does very little to remove anything but large particles of dust, and lint from the air in your home. There are several different types of high performance filters available; electronic filters or media filters (a highly efficient paper filter) are examples. These more efficient filters are designed to remove more debris from the air that passes through them. These can also help to remove some of the irritating substances from your indoor air. High efficiency filters can be up to 30 times more effective than a standard furnace filter. If you do choose to have carpeting or rugs in your home, you can reduce the effects of the microorganisms and dust stirred up during vacuuming by utilizing an efficient HVAC filter. An efficient furnace filter can capture the debris stirred up as you vacuum your home if you run your HVAC system on fan only mode. This circulates the air in your home, drawing the particles into the filter system, and removing them from the air. Assuming you have a high efficiency filter system, this will give you cleaner air in your home, and potentially fewer health problems for your family.

A paper media filter can greatly improve the air quality in your home



High efficiency filters can be up to 30 times more effective than a standard furnace filter. If you do choose to have carpeting or rugs in your home, you can reduce the effects of the microorganisms and dust stirred up during vacuuming by utilizing an efficient HVAC filter. An efficient furnace filter can capture the debris stirred up as you vacuum your home if you run your HVAC system on fan only mode. This circulates the air in your home, drawing the particles into the filter system, and removing them from the air. Assuming you have a high efficiency filter system, this will give you cleaner air in your home, and potentially fewer health problems for your family.

Vacuuming your home picks up things in your carpeting and on your flooring, throwing them into the air (most vacuum bags only capture the large particles). This debris, stirred

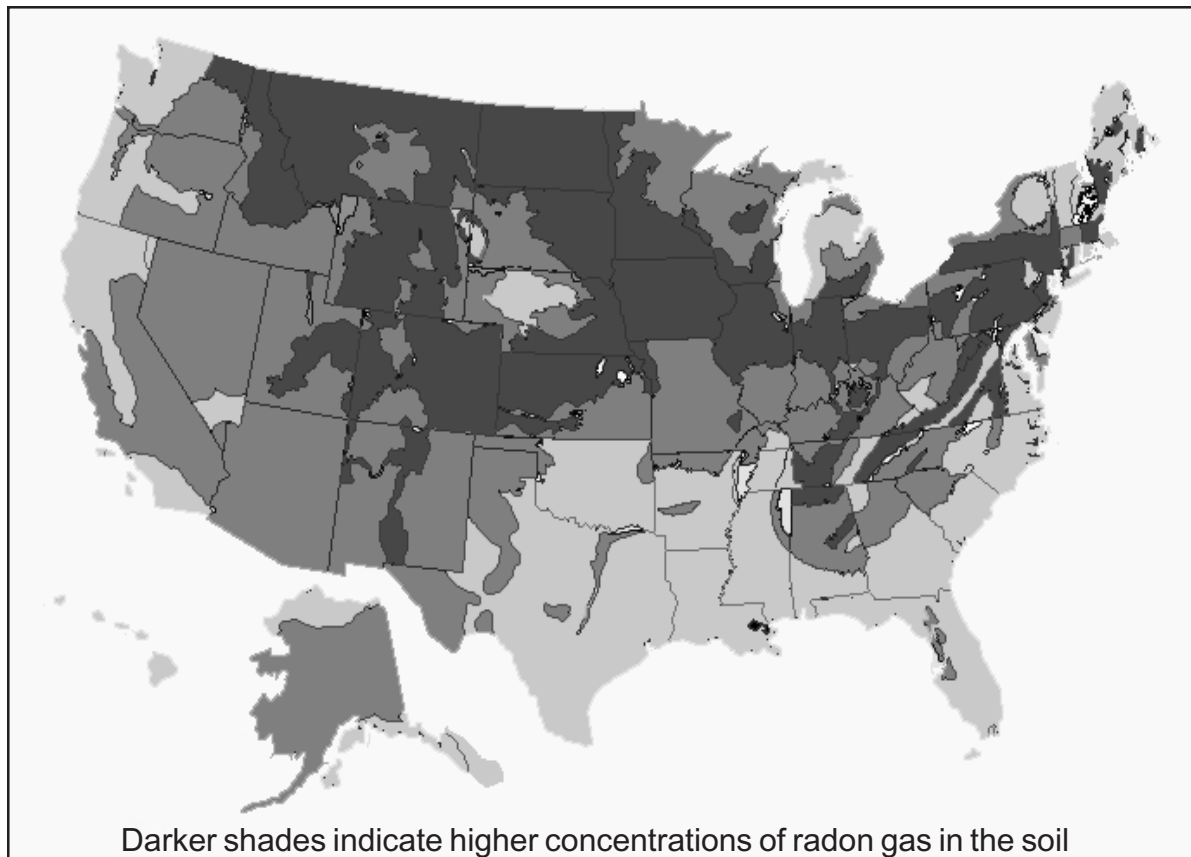
up during vacuuming, can be irritating to some people. Another option that can be incorporated into your home is a whole house vacuum system. This type of vacuum system allows you to clean your flooring as with any other type of vacuum, but it has the advantage collecting all of the debris in a central location, while venting the exhaust to the outdoors. This greatly reduces the amount of contaminants (dust, dirt, dust mite dander, and allergens) being thrown into the air inside your home. Removing these contaminants to outside the home can have a healthy return for your family, especially if any family

members have allergies.

Radon gas is a health hazard for many homeowners. Radon is a naturally occurring radioactive gas, which is present in the ground and water in some parts of the United States. Radon is produced as Uranium (a natural radioactive mineral) breaks down, and is a leading cause of lung cancer in this country. Radon gas seeps into basements and living areas through small cracks in the foundation of the home. This allows the gas to collect in the living areas where the occupants breathe it. Complicating this problem, radon is colorless, odorless, and you cannot know if you will have a radon problem until after your home is constructed.

Precautions can be taken to eliminate the gas after the home is built. During the construction process of the basement or foundation, a relatively inexpensive piping system can be installed in the foundation of the home (\$500 to \$1000 extra cost). This piping cannot easily be installed after construction is completed. The system is not used until the home is finished, and can be tested for radon gas accumulation. If radon is found, a small electric blower motor is installed in the piping system to vent the gas harmlessly to the outdoors.

Radon gas in homes is considered a leading cause of lung cancer



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Another source of indoor air pollution comes from the chemicals we use in our homes on a daily basis. Take a look in the cabinet where you store your cleaning chemicals. Many of these chemicals are highly toxic when released into the air, and can be fatal if consumed internally. How healthy do you think it is for your family when you release these chemicals into the atmosphere of your home? One way to reduce these chemical emissions in your home is to use less toxic cleaning supplies. There are alternative-cleaning supplies available. There are also several books available, which reveal the



Common cleaners are one source of indoor air pollution

nature of the chemicals you use today, and what the alternative products are. Switching to other cleaners may improve the health of your family.

Yet another substance in our homes that we consume every day is water. How clean is the water coming from the faucets in your home? Could this water be cleaner and healthier? Yes it can. Most municipally supplied water is considered healthy to consume, but may contain heavy metals (iron is common), fine debris, chemicals (e.g. chlorine, fluoride, etc.), and in some occasions, biological contaminates. These are all present after the municipality has treated the water. Water sources in rural areas will

generally not be as clean, or may be nearly undrinkable. There are several mechanical systems available for cleaning and softening your water. Water softeners are common and effective, having the ability to remove most of the minerals in your water. Softening the water allows soaps to work better, making you, your clothes, and your dishes cleaner. Water filtration systems are also widely available and effective. These systems have the ability to filter out dirt, metals, and biological contaminates, or have the ability to produce very pure water by a reverse osmosis process. Cost and quantity of water produced are your only barriers.

Careful selection of building materials, furnishings, and chemicals used in a home can greatly affect the indoor air quality of the home, and thus influence the health of the occupants. Reducing the products that emit chemicals into your home can be accomplished by careful selection of the building materials. Building a healthy home will increase your construction costs, but this increased cost will be dependent upon the extent to which you address off-gassing and contamination issues. Normally, you will only increase your

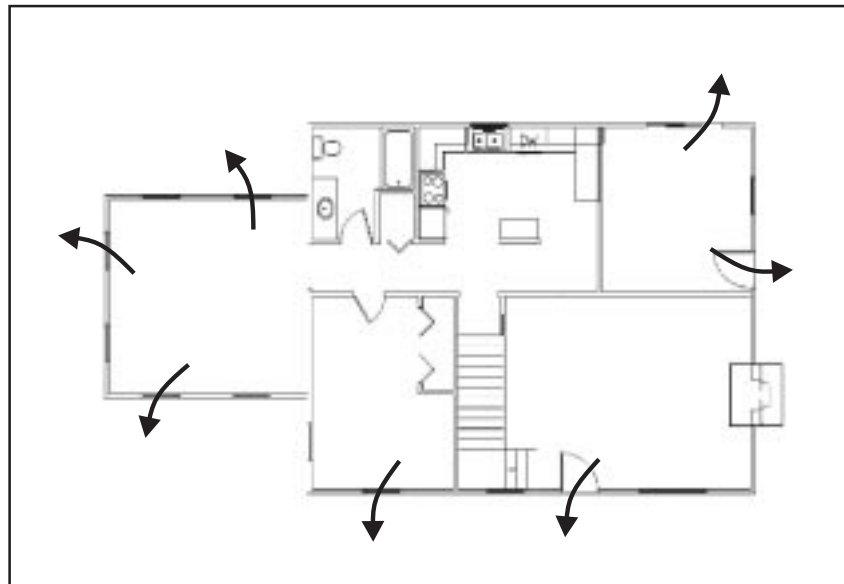
costs by only 3 to 5 percent. If extreme measures are required, your costs might increase 20 to 30 percent.

### Build a Safe Home

Most homes are built to provide safety for the occupants. Depending on your location, extra measures may be needed to provide protection for your family from severe weather, or other circumstances.

There are several circumstances, which can threaten a home and its occupants, such as fire. Designing your home so that you have multiple access routes, or escape routes is a prudent measure. This is especially true if you have small children, or a person with reduced mobility living with you. In general, a single story ranch design will be easier to get into or out of than a multistory building. A multistory building can make escape or rescue much more difficult. If you decide upon a multiple story building, there are some measures, which can be taken to improve safety. Rope ladders in 2nd or 3rd story rooms can make escape possible in case of emergency. Designing the home with the roofs of lower rooms adjoining upstairs bedrooms can also provide optional escape routes. Daylight windows in basement living quarters are a good idea, and are required by most building codes. These provide an escape route from the basement if the stairs are not passable.

Smoke detectors should be included in multiple locations in every home. Multiple smoke detectors spread throughout your home will give your family the most warning in case of fire, and installing smoke detectors that connect to the electrical system of the home will increase their reliability (you never have to worry about replacing the batteries). You can also include a carbon monoxide (CO) detector in your home for added safety. Carbon monoxide is an invisible, silent killer, created by the burning of fossil fuels. Fossil fuels are gasoline, natural gas, propane, and other combustible materials like wood in your fireplace. If you have a leak in the flue for your furnace or fireplace, carbon monoxide can enter your home, make you sick or even kill you and your family. Combination smoke detectors, and carbon monoxide detectors are available to guard against both hazards.



Multiple exit routes from a home are important in an emergency

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An alarm system that monitors for intruders and fire will make your home safer



A sprinkler system is another option for providing added safety to your home. Sprinklers are designed to protect your largest investment, your home. In some cases, they can also protect your family. Sprinkler systems are available with sprinkler heads (the fixture in the ceiling of each room that sprays water), which are unobtrusive. This allows the sprinkler system to be present, yet not

detract from the aesthetic qualities of your home. Many insurance companies also offer discounts for homes with sprinkler systems.

Another aspect of safety is protection from intruders or burglars. One way to add additional protection for your family is a security system. Today, there are security systems available at a reasonable cost, and with a number of options. Most burglars will avoid a home with a security system, and move on to unprotected properties. Security systems are designed to monitor your home during the day, the night, or if you are not

at home. This is done by the use of motion detectors, and contact switches on all doors and windows. Most security systems will also notify you if an exterior door is opened at any time. This allows you to know if a family member is exiting or entering the home, and also allows you to be aware of the presence of an intruder. You may then be able to evade and escape, or confront the individual. Security systems will normally include monitoring of smoke detectors, so if there is a fire, the alarm system automatically alerts the fire department. A security system may also increase the value of your home.

Another safety issue is the potential for severe weather experienced in several parts of the United States, which can destroy your home, or kill you and your family.

One example of severe weather is tornados, which are prevalent in the central United States, but can also occur in the south and southeast as well. Building an in-residence tornado shelter or safe room into your home is a very good idea if you live in these areas. A safe room is built from concrete, steel, or reinforced masonry, and should have a steel door. The room needs to be just large enough to hold all the members of your family for a short period of time. You should allow about 5 square feet for each person expected to seek shelter. Safe rooms are designed and built specifically to withstand the 300-mile per hour winds of the largest tornados, as well as flying objects carried by the winds at

high speed. It is important that your safe room be located so that your family will have easy and quick access to its protection. Safe rooms can also offer protection from intruders. Your family can take shelter in the safe room, and wait for the intruders to leave, or for the police to arrive. These rooms can also be equipped with a telephone, or a panic button for the alarm system. You might want to add a safe room to your “Needs List”.

In general, no home can be built to withstand a direct assault from a large tornado. Large tornados have winds in excess 300 miles per hour. You can have additional bracing added to help your home withstand the high winds of a near miss by a tornado. Virtually any building hit directly by a tornado will be completely destroyed. A basement will offer some protection from a tornado, however you should probably plan to build a safe room in your home for good measure. Surviving a tornado is your goal; your home can be replaced.

Flooding is a more difficult problem to overcome. Flooding will usually occur in river flood plains or coastal areas, and is caused by excess rainfall, or hurricanes, which can produce extremely heavy rainfall and very high tides. The only way to protect your home from inland flooding is to elevate the home well above the expected flood level. In recent times, many people have lost their homes to higher than expected flooding. You can build your home on stilts or on top of an earthen mound to keep it above the high water.

If you live in an area where hurricanes are probable, there is virtually no way to protect your home. Hurricanes can have high winds, in excess of 200 miles per hour, and very high tides called a storm surge. The storm surge is the most deadly part of a hurricane. You can build a safe room in your home to protect you from the high winds of a hurricane, but you cannot reasonably build your home to withstand a 20 ft. storm surge (20 feet above normal high tide). The storm surge washes over the land, and washes the land out from under the buildings, or covers the buildings. A storm surge can also travel many miles inland causing severe flooding. The government expects half of all future hurricane related deaths to come from inland flooding. A storm of this severity may only happen in the area where you live, once in 50

A safe room can protect your family from severe weather or intruders



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or 100 years. The problem is that you do not know how bad a hurricane will be until it is upon you, and then it is too late to escape. You can build a safe room in your home, at or above ground level to protect your family from flooding, and you should allow about 10 square feet per person in the room. Be sure that you build your safe room above expected 100 year flood levels, drowning in your safe room would not be considered safe.

Earthquakes are an entirely different problem. An earthquake is caused when the tectonic plates of the earth slide past one another, causing the ground to shift and shake violently. When the ground shakes, so does your house. In earthquake prone areas, there are special building code requirements designed to prevent your home from falling in on top of you. The building codes will normally require heavy foundations with extensive steel reinforcement. Above ground, additional steel reinforcements are added to the structure to allow it to withstand the shaking of an earthquake. Again, surviving the earthquake is the goal; your home can be replaced.

You can find more information about safety, and safe rooms at the FEMA (Federal Emergency Management Agency) web site at [www.fema.gov](http://www.fema.gov).

The items covered in this chapter are only general goals for your home. Each basic element has several sub-elements. Considering these issues as you design and build your home will help you achieve the end result you desire. Considering these things in the design and construction of your home will make it much safer, healthier, and more livable. In the back of this book, you will find a list of web sites containing information about manufacturers of products for your home. You can also find additional and updated material at [www.futurehomestoday.com](http://www.futurehomestoday.com).