

The Definitive Guide to Building Room Additions



**By
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Introduction

Thousands of owners create housing additions each year. It takes a significant amount of courage, effort, and time, not to mention a piece of land and some money. How to build a simple house addition is not a mystery. It's something like putting together Lego blocks or Lincoln Logs, one piece at a time. Many of you already have the basic skills needed to build a house addition. Consider how many people flood places like Menards, Home Depot and Lowe's to buy tools and materials for working around their homes.

If you're considering building your own home addition, keep in mind that it is also possible to build one that is beautiful but, in the long run, is neither decent nor affordable. Decent housing, for example, doesn't have leaks that can cause mold and rot, compromising both your health and your home. Neither is decent housing full of toxic fumes, which can come from paint, carpet, and a host of other common, seemingly innocuous, materials. A decent, affordable home is energy efficient, well ventilated, and comfortable; built from safe, health-preserving materials; and requires a minimum of upkeep or maintenance. It can also be built from forest products and other materials that are sustainable, so that we don't further lay waste to our homeland. Building such a home isn't impossible, but it does take some careful planning.

So, where do you start? Talk to neighbors, contractors, carpenters, building inspectors, and the staff at your local building-supply store. Read the how-to information that comes with many building materials; study this book; Ask questions, work out details and ideas on paper, and gradually the big picture will start to get clearer. Although no single book can answer all the questions you're likely to have on the subject, it's my intent to provide a step-by-step guide that will take you from basic planning and design through the actual construction of a simple, decent, affordable house.

Building is fun because it provides healthy relaxation, exercise, and a great feeling of accomplishment. However, always get adequate assistance when you lift anything heavy, like wall frames for example. Don't take a chance by overexerting yourself. This is where accidents and errors can occur.

Lastly, remember that a building permit is required in most areas. Obtain one from your City Clerk before you start construction. Inquire about local codes covering depth and thickness of footing and foundation walls, the distance a building is permitted from property line, etc. Plumbing and wiring may have to be done by licensed professionals. If a license is not required and you want to do this work yourself, there are many supply companies that provide directions with the products they sell.

Chapter One

How It All Started

I started my career in the construction business at Sparrows Point High School in SE Baltimore County in the fall of 1968.

I was sixteen years old and in the 11th grade. I believe it might have been the only public high school in the country that offered a vocational architecture program.

The class consisted of one hour of math and three hours of drawing for two full years. Most people seem to think that a vocational architecture student spends most of the time drawing pretty pictures, but I can assure you that is not the case!

Eighty percent of drawing time is spent determining how and what you are going to draw. Then there's the question of whether the math will work with the dimensions related to the materials you want to use. Also, how does this material tie in with that material, and so on.

I'll tell you one thing, I could see this was not going to be easy but those grey haired men standing at the front of the class gained my respect real fast!

The class assignment for our senior year was to draw a house. We had until the end of the year to complete the assignment. My project earned a B+ and I received the Vocational Architecture Award in the spring of 1970.

Billy Baker had won the award the previous year. Billy didn't just draw, he created masterpieces! In fact, they hung Billy's (and other top senior drawings) on the wall. No one came right out and said so, but there wasn't a student there that didn't want his drawing on that classroom wall.

I Didn't Like What I Was Doing – I Loved It!!

Our teacher, Mr. LaPhasa, was a big man at six-feet four inches, and two hundred plus pounds. He definitely looked the part of the professional wrestler he had been at one time.

If you were to ask what made Mr. LaPhasa stand out, most student would probably tell you it was his dress code. No one could enter his classroom without wearing a tie. He would say that “professionals should look and act like professionals.” That included wearing ties and washing your hands. Because we were the only ones in the entire school student body that did, we not only looked different but it made us feel special. Those ties were a badge of honor that gave us self-respect, and we carried ourselves just a little bit different.

Discipline in Mr. LaPhasa’s class was compulsory. He expected more from his students and he got it! Being the best you could be was non-negotiable, and after spending half of every school day with him over a period of two years, you knew it had helped shape your character.

The first real goal I ever set for myself involved skipping lunch every day so I could get to his classroom for an extra half hour. I wanted to finish those house plans before graduation in a big way!

When I was in high school I worked for a catering company. In the summer months I had a job as a short-order cook in Ocean City, MD. With that experience on my resume I was able to get a job as an assistant chef at a country club.

The average person might not see a correlation between architecture and cooking, but as you’ll soon see, it all fits together like a glove. You see, cooking and critiquing food allows you to learn about different lifestyles. And that in turn shows you how to design around how people live.

For example, if a couple loves to cook and entertain, you have to know that. If music, exercising, watching a big screen TV, art, or swimming is the most important thing in their life, you can design a home or a room around those wants and needs.

“I don’t believe you go through life by accident. You learn and meet people for a reason and all roads lead to one.” **-Earl Adkins-**

Doug Witamier was a surfing buddy of mine who was a student at Virginia Tech. Doug, who had become familiar with my architect abilities, was always getting on me about going to college.

Finally I enrolled but the whole experience lasted less than two weeks! It was way too boring and I couldn't take it any more than that. The class was just learning how to draw with different pencils and learning to read engineering and architecture scales. But what put the icing on the cake is when the instructor said we wouldn't start drawing until the next semester. "But drawing what," is what I wondered.

After that short-lived experience I got a job with a structural steel company doing placing drawings for the steel. I did bridge work mostly. I started doing some side job drawings for my then brother-in-law's construction company. I worked a couple of years for him.

The Energy Crunch Presented Opportunities

When the first energy problems surfaced under the Carter Administration, the economy suffering double-digit inflation, coupled with very high interest rates, oil shortages, high unemployment, and slow economic growth. As a result, President Carter convinced Congress to create the United States Department of Energy.

Following its recommendations to conserve energy, Carter wore sweaters, installed solar power panels on the roof of the White House, installed a wood stove in the living quarters, ordered the General Services Administration to turn off hot water in some facilities and requested that Christmas decorations remain dark in 1979 and 1980. Nationwide controls were put on thermostats in government and commercial buildings to prevent people from raising temperatures in the winter or lowering them in summer.

I saw an opportunity to start my own company, Enercon, Energy Conservation Company. As far as I knew, I was the first in the country offer energy audits and solar installations.

Clearly, my energy business gave me a solid background in energy application, which I have always used in my designs. This is yet one more example of how different roads can compliment an ultimate goal.

Anyway, I was being bombarded with calls for passive solar greenhouses. I was getting up to 50, or more, calls a week! So after receiving about 1,000 calls I decided I better look into this a little closer.

There wasn't very much information back then. Maybe two or three books on the subject of passive solar design at most. So I researched everything I could find on the subject. As it turned out, it was probably the easiest thing I ever built.

Simply put, it was a four-sided structure with one side made of glass facing south. It was generally made of cedar with stainless steel nails. The glass faced south at a sixty degree angle in order to catch the winter sun at the best possible angle.

The first passive solar greenhouse I built was 16' x 40'. It was big, and for someone who loves growing exotic flowers.

In contrast, I have been to Europe with architecture books in hand, and I've walked the streets of Paris. I've been to Brugge in Belgium, Vienna, Germany, and Luxemburg. If you have a passion for architecture you must visit Europe.

I also visit Las Vegas just to see the new structures going up. Where else in the world (besides Dubai) can you see billion dollar structures?

My favorite place for Caribbean architecture is the Atlantis in the Bahamas. It's a must stay, even if it's only for a long weekend. Their golf course is a work of art and the landscaping would put many big name courses to shame.

Still, I like building green houses and watching things grow. To this very day I still sell green house plans.

That's more or less how I got started in the addition business. I have built two story additions, family rooms, over 25 solariums, home offices, garages, sunrooms, and more. Everything but a real conservatory and a custom home on stilts.

Chapter Two Need To Add Space?

Just about every homeowner has dreamed of having more space in the house at one time or another. For some it is just a dream. For others, it's time for a little home improvement.

There are basically two options when lack of space becomes a big problem: add an addition or buy a new home.

An addition can be the extra space you need for a variety of things: Green House, Solarium, Screen Room, Family Room, Deck Enclosure, Bump Out (small addition) usually for a kitchen addition, Conservatory, Second Story Addition, Florida Room, Sunroom, Three Season Room (patio room), Pool House, Garage, Home Office, In-Law Suite, Extra Bathroom, Master Bedroom, Mudroom, Home Spa, or whatever you can imagine.

Although the idea of a major remodeling project, such as building an addition, may feel overwhelming, in most cases it is far more cost effective than moving — and maintains stability in the family life.

Building an addition is a large undertaking and involves a lot of planning. Even if it is a small addition, it will still involve all the same processes and skill as any major construction project.

Here are some important points to consider as you begin your plans to expand your living space:

Make a list of why you want more space. What do you want that extra space to do?

Look at other homes in your neighborhood that have additions. Take note of what features you like and what ones you find unappealing.

Talk with a local realtor about additions and whether or not they are considered to add value to a home in your area's market.

Consider hiring either an architect or interior designer, or both. Although that may seem extravagant, your space will be better designed and the actual

construction process is likely to go more smoothly — saving you money in the long run.

Figure out how much you are willing to spend on the project. Keep this in mind all through the process. You will need to make concessions along the way, and knowing your bottom line will help you make better choices.

Walk around your property and examine the possibilities from all angles. Take pictures and study them as you begin your plans. You may find inspiration where you least expect it.

Do some preliminary sketches. Try to get as many ideas as possible down. This is a crucial step in determining how much space you will need.

The number one error when building an addition is it was built too small. In many cases the architect kept his eye on the exterior of the structure making sure the roof lines were perfect, but failed to take into consideration the need for a larger floor plan or future needs of the room.

What are your structural considerations? Where are your load-bearing walls? If a bathroom is part of the plan, can you connect to existing water lines to save the extra cost of running pipes?

Give careful thought to your heating and cooling systems.. If your home's current system has been sized properly it may not be able to handle the extra space and you will need an upgrade.

Take the time to consider how the addition will affect your yard.

Visit your local building inspector's office, as any addition, no matter how big or small, will require a building permit.

Give some thought to materials. Do you want the addition to blend smoothly with the rest of your home or do you want it to contrast?

Think of the space both from the “outside in” and the “inside out” — meaning you want the plan to fit the exterior of the home and may concentrate a lot of your efforts there, but don't forget that the space must be functional if it is going to work.

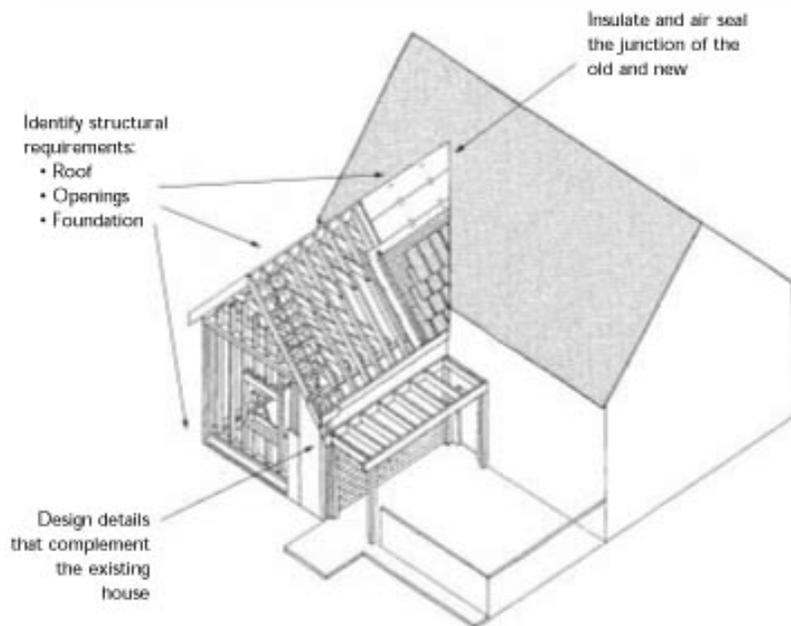
Determine when you want the addition to be constructed then talk to a contractor about your plans.

If you take the time to consider all your options you are sure to have an addition that not only expands your living space, but also enhances your home's overall appeal.

Chapter Three Where To Start

Oftentimes it takes a new addition to accommodate a changing family or special needs. Expand a kitchen, or adding a family room or bath can make your existing home the house of your dreams.

Construction an addition requires careful planning. It is important that you clearly identify the features you want before you decide to go ahead with a project. Many people don't give it a thought, but it's just as important to give your existing structure a thorough inspection before you start so that any existing problems can be corrected.



Because most homeowners are happy with their present location, an addition is a more desirable alternative when extra space is needed than moving to a different house. The size of an addition can vary widely. A simple project may involve a larger entry area. Larger additions can substantially increase the size of your home.

As you plan your addition, here are some important things to consider:

- ▶ **Size and design** —Determine whether rearranging your existing space might give you the changes you want before deciding on a new

addition. It is important to determine what size the addition needs to be and how it will join together with the rest of the house. Homeowners often underestimate how much space items like stairways will require. The addition will be more appealing if the style complements the design and architectural details of your house and neighborhood.

- ▶ **Fixtures** — New fixtures may be required in new construction.
- ▶ **Structural problems** — The addition will often involve structural changes to the existing house, which may involve foundation considerations, roof details or the construction of openings in the existing building. As part of the work, any problems found in the existing building and foundation will have to be repaired.
- ▶ **Moisture** — If you have any moisture problems in your home they will have to be diagnosed and remedied as part of the renovation work. New areas of the building can be effected by old problems..
- ▶ **Plumbing and electrical** — the increased plumbing and electrical needs may exceed your existing services, requiring significant upgrades. Remember to run cables for telephone and computer connections, cable TV and security or home entertainment systems.
- ▶ **Heating and ventilation** — Existing heating and ventilation systems may not have adequate capacity to handle the increased demand.
- ▶ **Finishes** — always pick finishes that match or complement existing finishes and are durable enough to take the wear and tear of daily use.
- ▶ **Zoning and regulations** — new work will have to comply with provincial building codes as well as local bylaws and zoning requirements.

Chapter Four

Essentials of Renovating

Your House is an Interactive System

Your house is an interactive system made up of many components including the basic structure, heating, ventilating and air conditioning (HVAC) equipment, the external environment and the occupants. Each component influences the performance of the entire system. A renovation provides an opportunity to improve how your house performs.

An addition gives you the chance to use up-to-date, energy efficient construction practices. These projects often require changes to HVAC equipment that can improve moisture management and air quality in the house. Some equipment such as a large volume exhaust fan can cause combustion heating appliances to back-draft. Structural changes may give you a chance to improve air tightness and insulation, resulting in increased occupant comfort and house durability.

Assess the Structural Issue

Once you start work on an addition, changes become costly or difficult and can lead to delays in the completion of the project. Thorough planning at the beginning will help you to develop a realistic understanding of the work to be done and the costs involved. Here are some of the likely situations that people encounter. However, it's always wise to consider hiring a qualified professional such as an engineer, architect or professional renovator to assess the structural issues.

- How will the addition meet the needs of everyone in the household, including anyone with special needs, extended family and guests? What size will it have to be to meet current and future needs?
- How will the addition affect spaces in the existing house, especially traffic patterns, access to outdoors and natural lighting?
- What style will complement the design of the existing house? Does it fit into the neighborhood?
- Will there need to be changes in landscaping, or driveway and walkway locations?

Chapter Five Size and Design

How Much Can You Afford For A Home?

No matter who you are, you will probably place a limit on your home design, size, style and home design aesthetics based on a budget. This is also true of builders at the upper end of the home market. Your house design will determine whether it costs \$80 per square foot, or \$200 per.

Actually it's very easy to determine what you can and cannot afford to spend on a house design. You simply call your local bank's mortgage department. By asking you a few financial and family questions, they can calculate, using current interest rates and your current income, how much principal you should be able to borrow for your new house design. This assumes you have given complete and honest answers to their questions.

The whole process should take less than 5 minutes, although there will be no guarantee or commitment, it will generally be very accurate. However, keep in mind that interest rates can change tomorrow, and so can your income.

Be sure your taxes and home insurance have been calculated in the equation. As a rule of thumb, 28% of your gross income before deductions can be spent on house payments, including real estate taxes, home insurance and association fees, if any. (35% maximum for all payments including car and credit card payments.

How Much House Can I Get For My Money?

Once you know how much you can afford, you will need to find out which home design you can get for the amount that you have to spend. This is not as easy. Go shopping for a home similar in house design to what you want and get a feel for their value.

Also call some house contractors to see if you can get some ballpark estimates. You may not get very accurate information because you do not yet have any house design to show anyone, but you do need to know about how much house you can get for the amount that you have. A square foot

price can be misleading as prices can vary from \$50 to \$300 per square foot.

The vast majority of home designs built in the US today are built for less than \$120 per square foot. A nice home design using standard construction methods with stock materials and fixtures should run \$95 to \$120 per square foot in the suburbs of the major metropolitan areas of the Midwest.

This home design estimate assumes you will have a general contractor build your home for you. If you are acting as your own general contractor, deduct at least 15 percent. If you can do a substantial part of the labor on the house yourself, you can cut the cost even more.

More than 40 miles from the downtown areas, house prices begin to drop. Within the downtown areas, expect to pay more. If you plan to build a house or addition in an area prone to earthquakes or hurricanes, expect to pay much more, but at least the land should be cheap.

Construction loans are available from some lending institutions. They are usually good for one year, at which time you would pay it off with a conventional mortgage.

Plan thoroughly before you start so that space, traffic flow and styling meet your current and future needs.

Consider using an architect or professional designer. They can help you work through the problem areas and create a flexible, properly sized design that meets your current and future needs and complements the style, layout and site of your house.

Have complete scale drawings made to determine how the addition will connect to the existing house. These will be required for the building permit and will help you to visualize the project better. Furniture layouts can also be a great help in your planning. If you compromise on your needs you will have to live with the results.

Good design and working drawings are important for maximizing the space and minimizing problems. Insufficient planning can lead to poor results and costly mistakes. If you don't solve the problems during the planning stage, it may force you into crisis problem solving as the project progresses.

Chapter Six

Fixtures

The proper lighting and the ability to control each layer of light is the key to composing a stunning visual environment.

The main goal in lighting is to design a system that is layered and flexible, in order to meet the multi-functional nature of a room or entire home. One light fixture in a room may enable basic visibility, but not be adequate or appropriate for other needs or activities. Task lighting, art collections, entertaining, and television viewing, for example, all benefit from specific lighting solutions. Each of us have unique tastes and we like our furniture, fixtures, carpets, lighting, and wall coverings to complement each other and express who we are. The right lighting can help make it all possible.

To achieve the look and feel you want for your home, hire a formally trained interior designer with lighting design experience, to help develop a lighting plan for your home.

Whether remodeling or building from scratch, a lighting designer--like an architect--will meet with you to learn about your lifestyle and tastes, to get a good idea of what lighting will be appropriate.

You may or may not decide that the kitchen, dining room, bathrooms, library, and master bedroom are areas in the house where lighting should play a prominent role.

Once the lighting plan is finalized, the plans will be transferred to a set of blueprints locating the fixtures, controls and electrical outlets. From this document, the contractors will be able to do the necessary wiring and rough-in of fixtures during the construction stage of the project.

The Technology of Lighting Design

Until prompted, most people do not give much thought to the way rooms are lit. When we do notice lighting, it is often because a room is too dark or bright. Lighting product manufacturers and retailers like Mennards display 100s of lighting scenarios to help homeowners understand how light functions in the home. A key question to ask is "How much light will we need?" The amount of light required for good vision depends on three

factors:

Age

By the age of 55, many people need twice as much light to see as well as we did at age 20. As a person grows older, eyes are also more sensitive to glare--so light should be both plentiful and well shielded.

Type of task

Workspaces, like a kitchen island, for example, need to have lights that provide adequate light levels and are located in such a way that the person at the workstation will not get in the way of the beam and cast shadows on the work surface. Food preparation and recipe reading are tasks that require accuracy (and sometimes speed) so good lighting is essential.

Reflectance

We cannot see light. Instead, what we see is the reflected brightness (luminance), of materials. For instance, if your kitchen counter were going to be stainless steel, the lighting designer would probably not want to put a spotlight directly above it. If that were the case, the light would most likely bounce off the surface and reflect extreme brightness (glare).

Types of Light

- **Here is a quick summary of the three basic lighting techniques.**
 - 1) Ambient lighting provides general, overall illumination. It defines a space and brightens objects and surfaces in the room.
 - 2) Accent lighting is the type of lighting used to highlight specific objects by directing additional light to focus attention to selected objects and surfaces.
 - 3) Task lighting is light we use for detailed work. Generally we illuminate areas where food is prepared, where we read and perform other tasks where both well-diffused and direct light is required.

Light sources

Basic light source choices include incandescent, halogen, and fluorescent--with several variations and options available within each category. Energy efficiency, the amounts of light required, color accuracy and appearance, and cost and maintenance should all be considered.

Fixtures

The intended light distribution, function and purpose will guide your choice of fixtures. The appearance and style of the space need to be taken into consideration, as does the type of activity they will illuminate. Options and possibilities may differ between new construction and remodeling.

Controls

Options for controlling lights range from simple switches to complex systems that handle multiple lighting schemes through pre-programmed timers and settings. If you anticipate the need to change lighting scenes to suit a particular activity or quickly change the mood of a room more advanced controls and fixtures will be required. Although more costly, integrated lighting systems can monitor energy usage, turn lights off when they are not needed, as well as offer a full range of controls for an entire house from a single location.

Lighting Summary for your Home

- Will new fixtures and appliances be needed? What types are suitable? How much space will they use?
- How much and what type of lighting is needed?
- Get measurements for fixtures and appliances from suppliers.
- Familiarize yourself with available products and options.
- Use a professional designer to help plan your fixture and lighting layout.
- Choose lighting and appliances that are energy efficient.
- Larger than expected fixtures or appliances can lead to costly modifications or restrictions on the useable space in your new addition.

- Poor lighting will detract from the look, feel and usability of the new space.
- Inefficient appliances and light fixtures waste energy and will mean higher annual energy costs.

Chapter Seven

Structural Problems

An Example of what Can Happen

I was hired to design and build a sizable room onto a house in the Midwest. I crawled under the house to get a better look at things first-hand following my inspection. What I found, was actually worse than I had initially anticipated.

In the corner of the house I found several of the floor joices showing signs of dry rot (where they sit on the foundation wall). In addition, I could see evidence of undermining below the foundation wall. At the same location where the joices were rotting, I was able to stick my hand above the foundation and could not find any evidence of a plate on which the wall was standing (only saw dust). I think the wall plate had actually rotted away, enabling me to tap on the siding from inside the crawl space. AND, I could see daylight coming through while in the crawl space from the outside. My sense is that poor drainage, combined with the already shoddy foundation has created some significant problems for this corner of the home.

All in all, a pretty disappointing event. Nonetheless, I informed the owners of what I found, and they were obviously shocked. They wanted to build an addition onto the house but I had to break the news to them. The house was not ready to build onto, and actually had a fairly substantial structural flaw.

The good news, is that they agreed to "do whatever it took to remedy the situation" and would be talking to a structural engineer (focusing on those with experience working on older homes).

I remained optimistic. The house was in a great location and had a ton of potential. If we could negotiate around the foundation problems, which it sounded like we had a good chance of doing, we would still likely move forward. Having a structural engineer involved eased my mind to some extent, as they would not likely be satisfied with a temporary cosmetic fix.

Before you move ahead with an addition you must answer the following questions:

- Are there any structural deficiencies in the existing house that will affect the addition?
- Does the addition design maintain a roof profile to provide water drainage and proper structural details? Will the entire roof have to be refinished at the time the addition is built?
- What type of foundation will the new addition need and how will it be tied in to the existing structure?
- Are there unusual loads that will have to be supported?
- Can the existing foundation drainage system be used? Will a new foundation drain system be needed?
- Will structural walls or lintels need to be removed or upgraded?
- How will the need for stairways affect the structure or design of the living space?
- What insulating and air sealing can be done to provide a comfortable, energy efficient space?

- Identify any structural deficiencies before you start. Consult with a structural engineer or architect.
- Repair and renovate structural components so that they are adequate to carry the new loads.
- Plan for good drainage, particularly for intersecting roofs.
- Use accepted foundation construction practices suitable for local soil and water conditions to ensure a well insulated, dry foundation that will carry the loads placed on it by the new structure.
- Hire a professional renovator who will ensure that the addition will meet all applicable building code requirements.
- Choose contractors who are familiar with the type of work you are planning and who use energy efficient and Healthy Housing™ construction practices.

- Unforeseen problems will lead to unexpected costs and delays during construction.

- Structural deficiencies can lead to cracked finishes, floor vibration, bowed or displaced walls, floors or roof structures and possible structural failure.
- Foundation deficiencies can lead to a damp basement or cracks caused by settling or from the pressures of wet or frozen soil.
- Failure to meet building code requirements may lead to unsafe conditions in the building.
- Poor insulation and air sealing will result in higher than necessary energy costs, possible condensation problems and an uncomfortable living space.
- Is there any evidence of moisture problems with the existing building including finishes damaged by moisture, water stains or visible mold growth on any surfaces, blistering or peeling paint, cracked or missing caulking or condensation on windows, walls or ceiling surfaces.

Chapter Eight

Moisture Damage

Moisture causes more than \$1 billion in damage to homes annually, from minor damage like peeling paint to major damage, such as rotting, crumbing floor joists. Moisture can cause serious damage to the structure of your home.

If you learn how to control for moisture you can greatly reduce the cost of moisture damage in your home and eliminate the risk of structural loss. This chapter will help you avoid costly problems associated with excess moisture by helping you identify and correct moisture problems.

Wood Moisture Meter Readings

A wood moisture meter costs anywhere from \$50 to a couple hundred dollars and may prove to be a good investment. They are simple to use and can be purchased in hardware and home improvement centers. You insert the probes into the wood and read the indicator. It will tell you the percent of moisture in the surface.

Make sure to take readings from every corner of a crawl space and from areas commonly prone to having excess moisture, such as the areas around plumbing fixtures in kitchens, laundry rooms, and bathrooms; the sills under sliding glass doors; and places where chimneys, porches, garages, and patios attach to the house. If you do not want to do the inspection yourself, you can hire a building inspector to do the job for you. If you have a moisture control contract with a pest control company, make certain that they take periodic moisture readings.

- Fungi will only decay wood with a moisture content above the fiber saturation point, which is 30 percent by weight for most species used in construction.
- Wood with a moisture content of 20 percent and above is susceptible to decay.
- If the moisture meter reads below 20 percent, the wood is unlikely to decay.

- A moisture meter reading of 20 to 24 percent is in the caution zone.

Look for sources of the excess moisture and correct the problems.

- If the moisture meter reads 25 to 30 percent, decay and damage will most likely be present. Look for sources of the excess moisture, correct problems, and replace decayed wood.

Gutter Management

A gutter system helps protect against excessive moisture, but only if it is properly designed and maintained.

Overhangs should be at least 18 inches wide. Drip edge flashing should be installed at the roof edge.

Gutters should be cleaned, inspected, and repaired regularly.

Downspout to drainpipe systems are preferred for removing rain water from the gutters. Make certain they are clear of debris. Splash blocks are not recommended as they release water too close to the home.

Clay tile or flexible pipe should be used to conduct gutter water underground to a suitable release outlet at least 10 feet downhill and away from the house.

Suitable release sites from downspout drainage systems are storm water drains, dry wells, or surface outlets.

Landscape Planting

Landscaping can add beauty and value to your home as long as you plan ahead to avoid moisture problems.

Landscape plants should not block free air flow through the crawl space vents.

Plants should be placed beyond the drip edge of the roof, and foliage should be at least 5 feet from the foundation.

Finished planting beds and mulches should be lower than the ground level in the crawl space and should slope away from the house.

Keep any organic mulch or ground cover at least 12 inches away from the foundation.

Crawl Space Grading

- Crawl space grade should be higher than outside surface grade.
- Maintain an 18-inch minimum clearance from the bottom of joists to the soil surface, preferably 2 to 3 feet.
- CABO (Council of American Building Officials) Building Code requires that outside surface grade away from the foundation will fall a minimum of 6 inches within the first 10 feet.
- Vent wells should be used if foundation vents are partially or fully below exterior grade.

Sump Pumps

- Install a sump pump only in extreme cases where drainage is too difficult or would cost too much to correct.
- Locate the sump pump at the lowest point in a basement or crawl space.
- Sump water must be discharged into a storm drain, dry well, or a surface outlet.

Insulating Heating and Cooling Ducts

- Insulate exposed heating and cooling ducts (likewise hot and cold water pipes) to at least R-6. This will prevent condensation that could wet the surrounding insulation. Wet insulation holds water next to structural parts of a house, which over time promotes wood decay.
- If you use central air conditioning over long periods of time, check for air leaks at joints in the duct work, which may cause ducts to "sweat."

Repair any leaks.

- Properly sealed ducts should all be insulated to R-6. This amount can be doubled to R-11 if only the outer layer of insulation is backed with a vapor barrier.

Controlling Moisture in the Crawl Space*

- Leave foundation vents fully open year round unless they must be closed in winter to prevent frozen water pipes. A better solution is to insulate water pipes to prevent freezing.
- CABO Building Code specifies ventilation openings of not less than 1 square foot for each 150 square feet of crawl space area. There are exceptions to this rule, however. Ventilation openings may be reduced to 1/1,500 of under-floor area where the ground surface is treated with a vapor barrier and one ventilation opening is within 3 feet of each corner of the building.
- Vents should not be obstructed by duct work, items stored in the crawl space, or landscape plants.
- Cover the crawl space with 6 mil polyethylene to keep soil moisture from vaporizing and reaching the wood substructure.
- Floor insulation should be installed with the vapor barrier against the subfloor.

Other Sources of Moisture

- All dryer vent systems must be vented to the outdoors. Do not vent clothes dryers into basements, crawl spaces, or attics.
- Bathrooms, kitchens, and laundry rooms should be fitted with exhaust fans that vent moisture-laden air to the outside, not into attics or wall voids.
- Kerosene heaters, gas logs, and other combustible appliances should be vented to the outside, too, because they produce water vapor as a

byproduct of combustion.

- Plumbing, both in the living area of the house and underneath in the crawl space or basement, should be inspected regularly for leaks.
- Pipe condensation from air conditioning units away from the foundation, and release it where it will run downhill away from the house.
- The moisture level in the home should fall within 25 to 50 percent. A hygrometer may be used to help monitor the relative humidity in a home. Use ventilation to control relative humidity. If ventilation fails to reduce humidity, a dehumidifier can be used.

Managing Rainwater Without Gutters

- Drip edge flashing should always be installed at the roof edge, even when gutters are used.
- Overhangs should be at least 30 inches wide to protect siding from rainfall and to keep roof water away from the foundation.
- To control back splash, the ground surface underneath the roof edge should be covered with gravel or some other ground cover that will absorb the runoff rain water and reduce the splash.
- Porches, patios, or decks should slope away from the house to promote good drainage.

Flashing

Flashing is sheet metal or plastic that is used to cover joints and openings and protect against water seepage.

Drip edge flashing should be applied to all roof edges and the tops of all exposed windows and doors.

Flashing should be installed wherever roofing meets siding. Siding should be cut short of the roofing shingles by approximately 1 inch, and any cut

wood edges sealed against water entry.

Joints in siding materials should be flashed, or the ends of the wood treated with a water repellent preservative to prevent water entry.

Include flashing underneath all exterior doors and windows.

Flash the top of foundation walls to prevent water from wicking up through the foundation block and wetting the wood in the substructure.

Prefabricated chimneys should have a cap of flashing that extends several inches down on all sides.

Attic Ventilation*

- Soffit vents should be installed in combination with at least one other vent at the top of the roof. A combination continuous soffit and continuous ridge vent is preferred.
- Items stored in the attic should not interfere with cross-ventilation.
- Insulation must extend over the top plate of the wall and be fitted tightly to the top plate. Make certain that attic insulation does not block soffit vents. Use baffles to keep insulation from obstructing ventilation.

Wood and Soil Contact

- Untreated wood siding should never be closer than 6 inches from the soil or mulch surface.
- Untreated wood, such as sills, joists, plates, etc., should be no closer than 8 inches from the surface of the soil or mulch.
- All pressure-treated wood is not the same. When pressure-treated wood is used, choose the proper retention level or exposure condition: above ground, ground contact, wood foundations and all other exposed wood should be built of the appropriate pressure-treated products.

- Wooden stairs and de wood and sealed with a water repellent preservative or semi-transparent oil-based stain.

Before you start building your addition:

- Determine, then eliminate the source of the moisture that is causing the problems. It may be from rain, plumbing leaks or condensation of vapor on cold surfaces.
- Clean up visible mold growth according to CMHC guidelines.
- Insulate and air seal exterior walls and ceilings. Use energy efficient windows to provide warmer inside surface temperatures.
- Repair or replace all deteriorated finishes or structural components
- Provide ventilation and eliminate sources of moisture to control high humidity.
- Maintain caulking, grout and flashings to prevent water access to the building structure.
- Unresolved water damage problems will continue and lead to further deterioration of the building or newly renovated areas.
- Mold growth caused by excess moisture can be a serious source of indoor air quality (IAQ) problems.
- Superficial cleanup or hiding moisture damage behind new finishes will allow deterioration to continue.
- Poor insulation can lead to cold surfaces that are prone to condensation.
- Uncontrolled humidity can lead to condensation, mold growth and deterioration.
- Poorly maintained caulking and flashing can lead to water leaks.

Chapter Nine

Electrical and Plumbing

Wiring Methods

Materials for wiring interior electrical systems in buildings vary depending on:

Rating of Circuit

- 1) Type of occupancy of the building
- 2) Type of electrical system
- 3) National and local regulations
- 4) Conditions in which the wiring must operate

Wiring systems in a home, for example, are simple, with relatively low power requirements, infrequent changes to the building structure and layout, usually with dry, moderate temperature, and non-corrosive environmental conditions. In a light commercial environment, more frequent wiring changes can be expected, large apparatus may be installed, and special conditions of heat or moisture may apply. Heavy industries have more demanding wiring requirements, such as very large currents and power ratings, frequent changes of equipment layout, corrosive, wet or explosive atmospheres.

Early Wiring Methods

The very first interior power wiring systems used conductors that were bare or covered with cloth, which were secured by staples to the framing of the building or on running boards. Where conductors went through walls, they were protected with cloth tape. Splices were done similarly to telegraph connections, and soldered for security. Underground conductors were insulated with wrappings of cloth tape soaked in pitch, and laid in wooden troughs which were then buried. Such wiring systems were unsatisfactory due to the danger of electrocution and fire, and due to the high labor cost for installation.

Knob and Tube

The earliest standardized method of wiring in buildings, in common use from about 1880 to the 1930s, was *knob and tube* wiring: single conductors ran directly through walls and ceilings, with ceramic tubes forming protective channels through joists and ceramic knobs acting to support the weight and tension of the wires. New installations of knob and tube wiring have been forbidden by code in most areas for many years; existing installations are typically permitted to remain, but if the wiring has been damaged it may need to be upgraded to use more modern materials.

Other historical wiring methods

Other methods of securing wiring that are now obsolete include:

Re-use of existing gas pipes for electric lighting. Insulated conductors were pulled into the pipes feeding gas lamps.

Wood moldings with grooves cut for wires. These were eventually prohibited in North American electrical codes by the 1930s, but may still be permitted in other regions.

Modern wiring materials

Modern nonmetallic sheathed cables (NMC), like (US and Canadian) Type NM, consist of two to four thermoplastic insulated wires and a bare wire for grounding (bonding) surrounded by a flexible plastic jacket.

Rubber-like synthetic polymer insulation is used in industrial cables and power cables installed underground because of its superior moisture resistance.

Insulated cables are rated by their allowable operating voltage and their maximum operating temperature at the conductor surface. A cable may carry multiple usage ratings for applications, for example, one rating for dry installations and another when exposed to moisture or oil.

Generally single conductor building wire in small sizes is solid wire, since the wiring is not required to be very flexible. Building wire conductors larger than #10AWG (or about 6 square millimeters) are stranded for flexibility during installation.

Industrial cables for power and control may contain many insulated conductors in an overall jacket, with helical tape steel or aluminum armor, or steel wire armor, and perhaps as well an overall PVC or lead jacket for protection from moisture and physical damage. Cables intended for very flexible service or in marine applications may be protected by woven bronze wires. Signal cables, such as Ethernet cables, that must be run in air-handling spaces (plenums) of office buildings may be required to be fire-resistant and made with Teflon or other materials that produce little toxic fumes or smoke.

Plumbing

Plumbing, from the Latin for lead (plumbum), is the skilled trade of working with pipes and tubing for potable water systems and for drainage of waste. Plumbing originated during the ancient civilizations such as Roman, Persian, Indian, and Chinese civilizations as they developed public baths and needed to provide potable water, and drainage of wastes. A plumber is someone who installs or repairs piping systems, plumbing fixtures and equipment such as water heaters. The plumbing industry is a basic and substantial part of every developed economy due to the need for clean water, and proper collection and transport of wastes.

Plumbing is a system of pipes and fixtures installed in a building for the distribution of potable water and the removal of waterborne wastes. Plumbing is usually distinguished from water and sewage systems, in that a plumbing system serves one building, while water and sewage systems serve a group of buildings or a city. Improvement in plumbing systems was very slow, with virtually no progress made from the time of the Roman system of aqueducts and lead pipes until the 19th century. Eventually the development of separate, underground water and sewage systems eliminated open sewage ditches and cesspools.

Water systems of ancient times relied on gravity for the supply of water, using pipes or channels usually made of clay, lead or stone. Present-day water-supply systems use a network of high-pressure pumps, and pipes are now made of copper, brass, plastic, steel, or other nontoxic material. Present-day drain and vent lines are made of plastic, steel, cast-iron, and lead. Lead is not used in modern water-supply piping.

Traps, Drains, and Vents

A building's waste-disposal system has two parts: the drainage system and the venting system. The drainage portion comprises pipes leading from various fixtures to the building drain and then sewer. It is then connected to a private or municipal sewage disposal system. Every fixture is required to have an internal or external trap; traps prevent sewer gases from entering buildings so long as the water seals are maintained.

The venting system consists of pipes leading from the outdoors, usually via the roof, to various points within the drainage system; by providing the circulation of air within the system, it protects the trap seals of fixtures from siphonage and back pressure. The venting system also serves as an outlet for gases created by bacterial consumption of wastes in the system, and admits oxygen to the sewer which speeds digestion.

What to look for:

- Does the existing plumbing service provide adequate water pressure and drains that flow quickly? Will the addition increase demands on the existing plumbing?
- Is the existing electrical service adequate for the increased number of outlets and circuits that will be needed?
- What are the needs for current and future telephone and computer connections, cable TV, security, home entertainment systems or smart house features?
- What plumbing and electrical code requirements apply to the new addition?
- Repair any plumbing leaks and upgrade the existing service as required.
- Upgrade and repair electrical service and wiring as required.
- Equip outlets near sinks with ground fault circuit interrupters to prevent danger from shock.
- Assess your current and future needs for wiring and connections. Consider upgrades that will improve the resale value by addressing

trends in home offices, home entertainment and smart controls for appliances and mechanical systems.

- Consult with a professional to determine that plumbing and electrical code.
- Inadequate or substandard plumbing will be the cause of ongoing inconvenience and may be a health hazard.
- An undersized electrical service can lead to circuit overloads that are a fire hazard.
- Wiring and controls will have to be installed later limiting the choice of location. Surface mounting of cables can detract from the finished appearance of the job.
- Not meeting codes can cause costly changes during construction and delay completion of your project.

Chapter Ten

Heating and Ventilation

Heating and Ventilation

It should come as no surprise to anyone that a good heating plant is a mandatory part of any habitable structure. What is less well understood is the fact that this heating system is important not only for its inhabitants, but for the structure itself. A good heating system helps reduce the moisture that enters our homes and accumulates as a result of day-to-day living activity.

A home's heating system must also be looked at as a source or potential solution to indoor and outdoor air quality. On the one hand, it is a potential source for toxic gases, such as carbon monoxide, and a contributor to outdoor air pollution. However, with good equipment and proper maintenance, it can filter and clean indoor air while minimizing the impact on the environment.

Saving Energy and Saving Money

America's latest energy crisis comes with a silver lining. We have learned a lot from the past and need not make all the same mistakes again. We can also benefit from some newer and proven technologies that were not previously available. Here is a partial list of what works and what should be avoided:

Proven Systems for Existing Homes:

- Installing and using setback thermostats that allow you automatically increase and decrease the temperature setting during various times of the day and week. The cost is about \$100. The return on the investment is under one year.
- Adding insulation to accessible and poorly insulated attics.
- Using compact florescent light bulbs that fit into existing light fixtures and use less electricity. The cost is \$5+ per bulb. The bulb lasts much longer than regular light bulbs and the payback is in: energy savings, total light bulb purchase prices and less frequent need to replace the

bulbs. Such bulbs are particularly helpful where the lights are left on for a long time and/or the bulbs are difficult to replace.

- Scheduling regular heating/cooling system service insures for the safe and efficient operation of the system. This is particularly important with: heat pumps, gas and oil furnaces. It is also very important to clean and service forced air system ducts.
- If the house is heated with an electric resistance furnace or boiler, investigating conversion to gas, oil or a heat pumps.
- When replacing appliances compare the energy usage of the new appliances and investigate utility rebate programs for energy efficient models.
- Keeping the fireplace damper closed whenever the fireplace is not in use and close the damper again 12 hours after the fire is out.
- Turning down the temperature setting of you water heater to bellow 130F and turning the temperature setting on your gas water heater to the lowest setting during an absence of 3+ days.
Using passive solar techniques to help with summer cooling.
- Wearing sweaters and warm socks!

Proven Systems and Considerations for New Homes

In most areas, today's codes require the construction of energy efficient homes. Such codes have made new homes much more efficient than those built to previous standards. These requirements for tight construction and insulation necessitate interior moisture control systems and ventilation. In addition to building a home to these new standards, energy savings are possible by:

- **Building or buying a smaller houses!** A smaller interior air volume requires less heating and/or less cooling than a larger interior air volume - no matter how much insulation or what type of other systems are used.

- When purchasing land, considering various factors that will impact the energy budget of the house. For example: the availability of natural gas service, solar orientation, summer shading and wind patterns. Also consider the relative cost of travel to work, school and play.
- Using passive solar principles in the design of the house to help heat and cool the structure. Such design principles will most likely not eliminate the need for other heating and/or cooling systems but they can make a very large and positive difference in the energy needs of the structure.
- Purchasing energy efficient appliances.
- Installing and using **setback thermostats** that allow you automatically increase and decrease the temperature setting during various times of the day and week. The cost is about \$100. The return on the investment is under one year.

Things to Avoid:

- Miracle products that are usually accompanied by high pressure sales techniques.
- Installing new windows or siding products for the purpose of reducing heating or cooling costs. There are many good reasons to buy install new windows and siding, saving money on heating and/or cooling bills is not one of them.
- Other expensive insulations retrofits such as blown-in sidewall insulation. Such insulation is relatively expensive in relation to the potential energy savings.

Air-conditioning, heating, and ventilation systems may all be affected when you remodel or redecorate. Changes will be governed either by your local plumbing regulations or a separate mechanical code.

- Both air-conditioning and heating ducts are relatively easy to reroute, as long as you can gain access from a basement, crawl space, garage wall, or unfinished attic. Radiant-heat pipes or other slab-embedded

systems may pose problems; check them out. Registers are usually easy to reposition; the toe space at the base of cabinets is a favorite spot these days for retrofits. (You can also buy hydronic or electric space heaters designed for these areas.) Don't place any cold air returns in the new kitchen.

- Gas heaters must be vented to the outside.
- Ventilation is critical in kitchens and bathrooms. Even if you have natural ventilation, you should consider adding forced ventilation; it is required by code in windowless bathrooms. In a kitchen, a vent hood can add an attractive focal point, and a discreet downdraft system is especially apt for a new kitchen island or peninsula.
- Does the existing heating system have the capacity to handle the increased demand of the addition?
- Does the house have a ventilation system and will it handle the increased demand of the addition?
- Is this an opportunity to install a more energy efficient heating system?
- What energy efficient practices can be used to minimize the additional heating requirements?
- What heating devices are appropriate for the new space? Will any new heating devices that use wood, oil or gas be subject to backdrafting? Will a new, large exhaust fan cause backdrafting of existing or new combustion appliances?
- Upgrade or replace equipment as required to ensure adequate heating, cooling and ventilation for the existing and new areas. Choose energy efficient equipment.
- Consider installing a whole house ventilation system. Choose one that includes heat recovery.
- Build a well insulated and air sealed addition to minimize heating requirements.
- Use a qualified, licensed installer for heating and ventilation work.

- Test for back-draft potential. Avoid the use of large volume exhaust fans that can pull smoke and combustion gases in through a flue. A trained technician can remedy or avoid this health and safety problem.
- An undersized or poorly installed heating system will make the addition difficult to heat in cold and windy weather conditions.
- Improper ventilation can lead to poor indoor air quality, lingering odors and excess humidity.
- Backdrafting of combustion equipment such as fuel burning fireplaces, furnaces, wood stoves and water heaters that use oil, natural gas or propane is a safety hazard and can also lead to smoke damage of your house.

Chapter Eleven

Finishes

Before you start on your addition answer the following questions:

- What types of finishes are needed and preferred for the new addition? How will the finishes blend with the rest of the house?
- What finishes for items such as countertops, floors and walls are durable enough for the intended use?
- What floor finishes are compatible with the floor system?
- What skills are needed to properly install these finishes?
- What finishes and materials will minimize the impact on IAQ?
- Do your research. There are many new and different products on the market. Select finishes that complement the rest of the house.
- Choose the product that is appropriate for the location and best meets the need whether it is for water resistance, durability or cleaning.
- Determine the preparation requirements for each type of finish.
- Use a trained or licensed installer.
- Choose finishes that are low emission and environmentally friendly such as paints that carry the EcoLogo symbol or water-based adhesives.
- Selecting finishes that don't match the rest of the house or intended use will yield poor results. For example, carpeting would not be appropriate to install in a moist basement where it would be damp and support mold growth.
- Improper installation of finishes will void the warranty.
- Ceramic tile or grout can crack because of inadequate subfloor construction. Hardwood flooring can shrink or swell if it is not allowed time to condition to the humidity of the space before installation or if it is installed on basement floors or floors with radiant heat.

- Solvent-based finishes will off-gas and may cause IAQ problems.

Chapter Twelve

Zoning and Regulations

Codes and regulations regulate those sections of the community that impact health, safety, and general welfare. They are also meant to preserve property values, and insure harmonious and compatible uses.

This is accomplished by regulating the use of the land, building/structure height & size, lot coverage, lot requirements (size, yards, courts, and open space), building/structure location, use location (business, industrial, residential, etc).

The intent is to insure good civic design & harmony, adequate parks, other public needs, prevent congestion, and promote sound land use principles to prevent undue crowding, conserve the value of property, and protect the character of each district through out the City. Before you start your projects you must have answers to the following questions:

- What are the local land use restrictions?
- What permits are required?
- Does current liability insurance cover accidents due to the construction work?
- Does existing fire insurance cover the new work during construction?
- Does the mortgage lender need to approve any major addition?
- Check with your local building inspection department for information on permits, inspections, zoning and any other applicable bylaws. These issues may determine the feasibility of your proposed addition.
- Check with your insurance agent and ensure that you have adequate coverage during and after the renovation. Upgrade as needed.
- Secure approval, if needed, from your mortgage lender.
- Building officials may stop your project for non-compliance with codes and regulations. Penalties or fines may be imposed. The work may be delayed or have to be redesigned.

- Lack of or inadequate insurance could lead to financial liability. Even homeowners doing their own work may need to have workers' compensation coverage (if using any casual labor)
- Your mortgage may be foreclosed if a required approval was not given.

Rewards

- A warm, comfortable addition that meets your space requirements, has good lighting and is a well-designed living space is the result of thorough planning and good choices.
- A well thought out and executed addition will increase the value of your house.
- Repairing structural problems, leaks and upgrading services will prolong the life of your house and make the addition look and work better.
- By using low odor and easy-to-clean finishes, you will improve the IAQ of your home.
- A well-insulated addition will provide warmer interior surfaces that will help to prevent condensation and mold growth.

Skills to Do the Job

A homeowner with good construction skills may be able to do some of the work on the renovation such as:

- Demolition, including the removal of fixtures, finishes and non-load bearing walls.
- Caulking or repairing of roof and window leaks.
- Installing insulation and air sealing of the building.
- Painting.

Consider a professional renovator to manage the project and for structural and finish work. If you are doing it yourself, you will still need to hire subcontractors to do the electrical, plumbing, heating, and ventilation work. You may also want to hire other trades people to do roofing, window, door, cabinet and flooring installation, or paint and drywall finishing. Remember to obtain all necessary permits, get written contracts that describe all aspects

of the job, including lien protection. Ensure that workers use safe working practices, are covered by workers' compensation and have their licenses where required. Protect yourself, your family and your home.

Chapter Thirteen Assessment Worksheet

Use the New Addition Assessment Worksheet to consider the existing structure, elements for the new addition and to do the preliminary costing.

New Addition Assessment Worksheet			
Assessment of Existing Structure	Key Considerations	Proposed Changes	Cost
Roof and Walls of Existing Building			
Foundation			
Landscaping			
New Addition			
Design and Permit			
Excavation, Backfill and Compaction			
Foundation Work			
Carpentry Labor			
Building Supplies			
Drywall Installation and Finish			
Electrical			
Plumbing			
Heating			
Ventilation			
Windows and Doors			
Exterior Finishes			
Painting			

Cabinets or Shop Work			
Flooring			
Lighting			
Furnishings			
Waste Disposal			

Chapter Fourteen Costing Your Project

The cost of the renovation work will depend on the condition of the existing structure, local labor and material costs and the extent of the work to be done. Costs of finishes and fixtures vary widely. A good budget checklist will help you to develop a realistic cost for the project before you start.

If the addition is substantial, provide a comfortable budget contingency to allow for unforeseen work that may need to be done. The size of contingency will depend on the nature of the project, but may need to be 20 per cent or more of the initial budget. This applies, regardless of how the project contracting is going to be handled.

If you're thinking about building a home addition, there are a number of factors you should take into consideration when drawing up plans to ensure the most cost-effective design.

Utilities. Inform your service professional about the relocation of utilities. For instance, bringing in plumbing, electricity or a gas or phone line may necessitate wall or structural changes. It will also let him/her know if a subcontractor will be necessary to help complete the project.

Outlets and Switches. There has been something of a design renaissance in light switches. New switches offer a wide array of features like full-range dimming, a delayed fade from on to off, dimmers that remember a range of settings, switches that automatically turn lights on when a person enters a room, central lighting controls that operate lights anywhere in the house and even, hand-held infrared remotes.

Make sure you have enough outlets and switches to run every electrical appliance you have. It's not a bad idea to add extra of each for future appliance additions.

Heating. There are many options to consider with heating. You can simply link the addition to your existing heating system, or you can install a separate system.

Radiant Heating. If you choose radiant in-floor heating, which uses hot water to heat your floors, your service professional may need to enlist a plumber. Electric baseboard heat may require an electrician.

Forced-Air. A forced-air heating system draws the air from the room through ductwork to a furnace, where the air is filtered and heated. Most manufacturers make several sizes of each model. These furnaces come in "up-flow," "down-flow" and "horizontal" models designed to accommodate basement, attic or limited-space installation. A forced-air system can be combined with an air-conditioning unit, a humidifier and an air filter.

Electric Heat. In most areas, electric heat is best reserved for specialized applications, such as heating an added-on room, temporarily warming a bathroom, or heating a home where other more affordable fuels are not available.

Rental Unit. If you're adding a rental unit, you might want new electrical service for the addition to separate your usage from your renter's. Or you might want to add a new sub-panel, a smaller panel that has its own set of circuit breakers leading to household circuits and located in a different part of the house than the main panel.

Adding on a kitchen, bathroom, or study can be a simple and inexpensive way to improve your home and your way of life. Imagine if you and your loved one didn't have to use the bathroom in shifts. If the kids each had their own rooms, maybe they would have nothing to argue about.

Let's recap some of the first steps to adding living space to your home:

1. Determine the location of your property lines

First, locate your property lines and develop a plot plan which would include your home, landscaping and the location of the utilities. This is important information because local codes have restrictions with regard to how close you can build to your neighbor.

2. Develop a design that complements your current floor plan

Next, look at the structure and the floor plan of your home. With the help of a residential designer or architect, develop a plan to provide the most attractive, useful and economical addition to your home.

3. Detail your plans

The last step before work begins is to have detailed descriptions of the materials and the scope of the work to be done. "How much detail should I have?" you ask. The short answer is "More, it is not possible to have too much."

Home Addition Estimates

Homeowners often ask how the bids can vary so much in price when everybody is looking at the same plans. I tell them it's all in the details. Putting them in writing is essential to eliminate confusion about the products to be used and the work to be done, so builders can give accurate bids and buyers can compare them easily.

One bid, for instance, may include door hardware at \$9 per set. That is a real low price, and if all you are concerned about is the lowest bid, this may be what you are looking for. However, if you want the hardware to match what you have in the rest of the house, or you don't want it to fall apart in your hand within the year, you need to see the specific type (brand name, style numbers, etc.) of hardware detailed in your materials list. That way you can see exactly where the bids really differ in order to make more educated choices.

The written scope of work is equally important when considering your construction project. This should outline, again in detail, who is responsible for each portion of the job. For example, will the contractor pay for the building permit or will you? Do you want the workers using your bathroom or would you rather they use an on-site toilet? Do you want lumber delivered on your brand new sod lawn or on the street? These kinds of details defined in writing at the time of bidding will eliminate most of the problems that result in a frustrating and stress-inducing job.

The key word in the last sentence is most. Understanding that there will be strange people ripping and tearing up the home you dearly love is enough to take the blood pressure up a notch. But you've got to keep the final outcome in focus.

All these precautions do take time to research and put in writing, but I guarantee they will save you time and grief in the long run.

Chapter Fifteen Finding the Right Contractor

Choosing a Contractor

Choosing a contractor for your construction project can be a little frightening to some. So here are a few tips on choosing a contractor:

1. Ask to see their license and call the appropriate licensing agency to verify the status and insurance.
2. Ask for and verify references from past customers.
3. Check with the County Consumer Protection, local Chamber of Commerce and the Better Business Bureau.
4. An occupational license is not sufficient in the construction trades.
5. Beware of alleged contractors who ask to be paid in cash or ask for large payments up front.

After You Choose a Contractor:

1. Make sure your contractor obtains a permit and posts it on the front of the property.
2. If the contractor request a final payment before all job finals are signed off on the permit inspection placard, request that he/she obtains all final inspections prior to your final payment. However you must abide by your contract.
3. Make sure your contractor provides you with releases of liens from his subcontractors and suppliers.

Beware of Unlicensed Contractors:

1. the consumer in either a sale of future consumer If you are planning to build a new home, a room addition, add on a second story, begin remodeling on your home, or have work done that requires a building permit, take care to select a qualified person to perform the work.

- Under state and local ordinances, any person you hire under contract (verbal or written) to perform construction on your property must be a licensed contractor. The contractor must be state certified or registered. All printed advertising material such as business cards, newspaper ads and telephone book ads must show his or her state license number.
2. Beware of anyone that asks you to obtain the building permit as an "owner/builder", this may indicate that they themselves are not properly licensed to obtain the permit.
 3. Also beware of people that claim that you will save quite a bit of money by not obtaining a permit. A permit will only lead to compliance with the appropriate building codes, these are only minimum requirements.
 4. Unlicensed contractors do not have insurance coverage. Any injury that occurs on your property will be a claim against your insurance.
 5. If you wish to check on the license of an individual you can call the County Construction Licensing Board. Additionally, you can call the County Building Department.

Did You Know

The law requires that written notice of a buyer's cancellation rights be provided to services or a home solicitation sale.

Whether you're planning an addition for a growing family or simply getting new storm windows, finding a competent and reliable contractor is the first step to a successful and satisfying home improvement project.

Your home may be your most valuable financial asset. That's why it's important to be cautious when you hire someone to work on it. Home improvement and repair and maintenance contractors often advertise in newspapers, the Yellow Pages, and on the radio and TV. However, don't consider an ad an indication of the quality of a contractor's work. Your best bet is a reality check from those in the know: friends, neighbors, or co-workers who have had improvement work done. Get written estimates from

several firms. Ask for explanations for price variations. Don't automatically choose the lowest bidder

Chapter Sixteen

Home Improvement Professionals

Depending on the size and complexity of your project, you may choose to work with a number of different professionals:

General Contractors manage all aspects of your project, including hiring and supervising subcontractors, getting building permits, and scheduling inspections. They also work with architects and designers.

Specialty Contractors install particular products, such as cabinets and bathroom fixtures.

Architects design homes, additions, and major renovations. If your project includes structural changes, you may want to hire an architect who specializes in home remodeling.

Designers have expertise in specific areas of the home, such as kitchens and baths.

Design/Build Contractors provide one stop service. They see your project through from start to finish. Some firms have architects on staff; others use certified designers.

Don't Get Nailed. Not all contractors operate within the law. Here are some tip-offs to potential rip-offs. A less than reputable contractor:

- a. offers exceptionally long guarantees;
- b. solicits door-to-door;
- c. offers you discounts for finding other customers;
- d. just happens to have materials left over from a previous job;
- e. only accepts cash payments;
- f. asks you to get the required building permits;
- g. does not list a business number in the local telephone directory;
- h. tells you your job will be a "demonstration;"
- i. pressures you for an immediate decision;
- j. asks you to pay for the entire job upfront;
- k. suggests that you borrow money from a lender the contractor knows. If l. you're not careful, you could lose your home through a home improvement loan scam.

Hiring a Contractor

Interview each contractor you're considering. Here are some questions to ask:

How long have you been in business? Look for a well-established company and check it out with consumer protection officials. They can tell you if there are unresolved consumer complaints on file. One caveat: No record of complaints against a particular contractor doesn't necessarily mean no previous consumer problems. It may be that problems exist, but have not yet been reported, or that the contractor is doing business under several different names.

How many projects like mine have you completed in the last year? Ask for a list. This will help you determine how familiar the contractor is with your type of project.

Will my project require a permit? Most states and localities require permits for building projects, even for simple jobs like decks. A competent contractor will get all the necessary permits before starting work on your project. Be suspicious if the contractor asks you to get the permit(s). It could mean that the contractor is not licensed or registered, as required by your state or locality.

May I have a list of references? The contractor should be able to give you the names, addresses, and phone numbers of at least three clients who have projects similar to yours. Ask each how long ago the project was completed and if you can see it. Also, tell the contractor that you'd like to visit jobs in progress.

Will you be using subcontractors on this project? If yes, ask to meet them, and make sure they have current insurance coverage and licenses, if required. Also ask them if they were paid on time by this contractor. A "mechanic's lien" could be placed on your home if your contractor fails to pay the subcontractors and suppliers on your project. That means the subcontractors and suppliers could go to court to force you to sell your home to satisfy their unpaid bills from your project. Protect yourself by asking the contractor, and every subcontractor and supplier, for a lien release or lien waiver.

What types of insurance do you carry? Contractors should have personal liability, worker's compensation, and property damage coverage. Ask for copies of insurance certificates, and make sure they're current. Avoid doing business with contractors who don't carry the appropriate insurance. Otherwise, you'll be held liable for any injuries and damages that occur during the project.

Checking References

Talk with some of the remodeler's former customers. They can help you decide if a particular contractor is right for you. You may want to ask:

- 1) Can I visit your home to see the completed job?
- 2) Were you satisfied with the project? Was it completed on time?
- 3) Did the contractor keep you informed about the status of the project, and any problems along the way?
- 4) Were there unexpected costs? If so, what were they?
- 5) Did workers show up on time? Did they clean up after finishing the job?
- 6) Would you recommend the contractor?
- 7) Would you use the contractor again?

Understanding Your Payment Options

You have several payment options for most home improvement and maintenance and repair projects. For example, you can get your own loan or ask the contractor to arrange financing for larger projects. For smaller projects, you may want to pay by check or credit card. Avoid paying cash. Whatever option you choose, be sure you have a reasonable payment schedule and a fair interest rate. Here are some additional tips:

Try to limit your down payment. Some state laws limit the amount of money a contractor can request as a down payment. Contact your state or local consumer agency to find out what the law is in your area.

Try to make payments during the project contingent upon completion of a defined amount of work. These ways, if the work is not proceeding according to schedule, the payments also are delayed.

Don't make the final payment or sign an affidavit of final release until you are satisfied with the work and know that the subcontractors and suppliers

have been paid. Lien laws in your state may allow subcontractors and/or suppliers to file a mechanic's lien against your home to satisfy their unpaid bills. Contact your local consumer agency for an explanation of lien laws where you live.

Some state or local laws limit the amount by which the final bill can exceed the estimate, unless you have approved the increase. Check with your local consumer agency.

If you have a problem with merchandise or services that you charged to a credit card, and you have made a good faith effort to work out the problem with the seller, you have the right to withhold from the card issuer payment for the merchandise or services. You can withhold payment up to the amount of credit outstanding for the purchase, plus any finance or related charges.

The "Home Improvement" Loan Scam

A contractor calls or knocks on your door and offers to install a new roof or remodel your kitchen at a price that sounds reasonable. You tell him you're interested, but can't afford it. He tells you it's no problem - he can arrange financing through a lender he knows. You agree to the project, and the contractor begins work. At some point after the contractor begins, you are asked to sign a lot of papers. The papers may be blank or the lender may rush you to sign before you have time to read what you've been given to sign. You sign the papers. Later, you realize that the papers you signed are a home equity loan. The interest rate, points and fees seem very high. To make matters worse, the work on your home isn't done right or hasn't been completed, and the contractor, who may have been paid by the lender, has little interest in completing the work to your satisfaction.

You can protect yourself from inappropriate lending practices. Here's how.

Don't:

- Agree to a home equity loan if you don't have enough money to make the monthly payments.
- Sign any document you haven't read or any document that has blank spaces to be filled in after you sign.

- Let anyone pressure you into signing any document.
- Deed your property to anyone. First consult an attorney, a knowledgeable family member, or someone else you trust.
- Agree to financing through your contractor without shopping around and comparing loan terms.

Getting a Written Contract

Contract requirements vary by state. Even if your state does not require a written agreement, ask for one. A contract spells out the “who, what, where, when and cost of your project.” The agreement should be clear, concise and complete.

Before you sign a contract, make sure it contains:

1. The contractor's name, address, phone, and license number, if required.
2. The payment schedule for the contractor, subcontractors and suppliers.
3. An estimated start and completion date.
4. The contractor's obligation to obtain all necessary permits.
5. How change orders will be handled. A change order - common on most remodeling jobs - is a written authorization to the contractor to make a change or addition to the work described in the original contract. It could affect the project's cost and schedule. Remodelers often require payment for change orders before work begins.
6. A detailed list of all materials including color, model, size, brand name, and product.
7. Warranties covering materials and workmanship. The names and addresses of the parties honoring the warranties - contractor, distributor or manufacturer - must be identified. The length of the warranty period and any limitations also should be spelled out.

8. What the contractor will and will not do. For example, is site clean-up and trash hauling included in the price? Ask for a "broom clause." It makes the contractor responsible for all clean-up work, including spills and stains. Oral promises also should be added to the written contract.

9. A written statement of your right to cancel the contract within three business days if you signed it in your home or at a location other than the seller's permanent place of business. During the sales transaction, the salesperson (contractor) must give you two copies of a cancellation form (one to keep and one to send back to the company) and a copy of your contract or receipt. The contract or receipt must be dated, show the name and address of the seller, and explain your right to cancel.

Chapter Seventeen

Keeping Records

Keep all paperwork related to your project in one place. This includes copies of the contract, change orders and correspondence with your home improvement professionals. Keep a log or journal of all phone calls, conversations and activities. You also might want to take photographs as the job progresses. These records are especially important if you have problems with your project - during or after construction.

Completing the Job: A Checklist

Before you sign off and make the final payment, use this checklist to make sure the job is complete.

Check that:

- a. All work meets the standards spelled out in the contract.
- b. You have written warranties for materials and workmanship
- c. You have proof that all subcontractors and suppliers have been paid.
- d. The job site has been cleaned up and cleared of excess materials, tools and equipment.
- e. A detailed list of all materials including color, model, size, brand name, and product.
- f. You have inspected and approved the completed work.

Where to Complain

If you have a problem with your home improvement project, first try to resolve it with the contractor. Many disputes can be resolved at this level. Follow any phone conversations with a letter you send by certified mail. Request a return receipt. That's your proof that the company received your letter. Keep a copy for your files.

If you can't get satisfaction, consider contacting the following organizations for further information and help:

State and local consumer protection offices. Your state or local Builders Association and/or Remodeling Council Your local Better Business Bureau. Action line and consumer reporters. Check with your local newspaper, TV, and radio stations for contacts.

Chapter Eighteen

Remodeling vs. Moving

If you want to make changes to your home, there is another option besides remodeling - find a new one. However, more and more American families are deciding to stay right where they are and improve their existing home. Here are some of the reasons:

- Remodeling allows you to customize your home to meet your needs and desires. The only similar, but much more costly alternative is to have a brand new home designed and built.
- Remodeling means that you don't have to give up a familiar neighborhood and schools.
- Remodeling is a more efficient use of your financial resources. According to the American Homeowner Foundation, selling your home and moving typically costs about 8-10% of the value of your current home. And much of this goes into moving expenses, closing costs, and broker commissions - items that have no direct impact on your home's quality.
- Remodeling can be stressful, but few experiences are more stressful than moving on the family as a whole.

While there are many reasons why people choose to remodel, the bottom line is that remodeling makes your home a more enjoyable place to live. Personal satisfaction and pleasure needs to be considered, along with any resale value you hope to gain.

But there is no doubt that, as far as improving the sale of your home, all remodeling projects are not created equal. The general rule of thumb is that any remodeling project that brings your home up to the level of your neighbors' is a worthy investment. But it usually doesn't pay to be the most expensive house on the block. Real estate experts recommend that a remodeling investment should not raise the value of your house to more than 10-15% above the median sales price in your neighborhood.

Remember that potential buyers will compare your home to ones newly

built. Therefore, you'll want to look at the design trends and amenities being built into new homes. Great rooms (open kitchen/family room arrangements), master bed and bath suites, and higher ceilings are a few of the features sought by today's home buyers.

Spend Your Remodeling Dollars Wisely

Remodeling is expensive and there's no doubt about it. A bathroom remodel can quickly reach \$10,000—and that's about where the most basic of kitchen remodels start. Remodeling is an investment so you definitely want to make sure you get the best return on your dollars.

Check Comparables

The first step is to figure out what the market will bear. Get an appraisal of your house as it is and then dig up the sale price of houses in your immediate area that already have the improvements you're thinking of making. If you can complete the project without closing the gap between the current value of your home and its future value, the project is worth thinking about. However, if your house is already at top price for your area, then it's highly doubtful you'll get back any of the money you invest in a remodel.

Remodeling vs. Moving

Next evaluate the cost of remodeling versus the cost of moving. Figure out the cost of a new mortgage versus a cash-out refinance or an equity loan, taking into account both interest rates and fees. What are the costs of moving versus the costs of living through a remodel (increased take-out and hotel stays, for example). And, of course, figure out the average cost of a house with the new features you desire in a neighborhood comparable to the one you're in. Increasingly, people are finding it's cheaper to remodel what they have than to buy or build something comparable.

Consider Resale

While it's seldom a good idea to undertake a major remodel as part of a sprucing-up-to-sell program, it is a good idea to keep the tastes and needs of future owners in mind when you do remodel.

Finally, don't forget to consider neighbors and schools. If you absolutely love your house and your neighborhood, you need to take that into consideration. Resale isn't everything. Even if there's little chance of recouping your investment when you sell, it's OK to spend the money for that new deck or home office as long as you understand that you are investing not in the house, but in your quality of life.

Many homeowners at one point or another are faced with the dilemma of moving vs. remodeling. There are three key questions to ask yourself when trying to reach a decision.

1. How do you feel about your current location in terms of safety, commute, and proximity to friends and family?
2. How do you feel about your current neighborhood?
3. How do you feel about your lot in terms of size, etc.?

If you are comfortable with all of these things, then the decision to remodel is probably the right one for you. Cost is another factor to consider when determining whether to move or remodel.

Shown below are some of the costs associated with moving and remodeling.

Costs to Consider when Moving to a New Home:

- Prep Costs to Move
- Real Estate Commission
- Settlement Costs
- Moving Expenses
- Home Inspection of New Home
- Miscellaneous Decorating of New Home
- Miscellaneous Utility Set-up
- New Home Furnishings
- Your Time

Average Costs of Remodeling Projects:

Kitchen: \$40,000-\$80,000

Bath: \$15,000-\$40,000

Family Room Addition: \$70,000-\$100,000

Master Suite Addition: \$100,000-\$150,000

Deck: \$5,000-\$25,000

Chapter Nineteen

Consider Your Lifestyle

Here is an easy three-step method for determining what should and should not be a part of your addition remodel.

A successful addition remodel depends upon good planning. If the design doesn't suit your particular lifestyle, it won't matter how good it looks or how beautifully crafted it is. It simply won't be comfortable or convenient. The key to creating your dream room is to define your dream. You can start by asking yourself what you hope to accomplish. Do you want more space? Better efficiency? More storage?

The only way to honestly answer this question is to critique a little, dream a lot and plan.

Step One: The Critique

Begin with a blank sheet of paper with two columns. Mark the left column, "What I Would Like," and the right column, "What I Don't Want." The page has no preconceived notions about what the addition should have, only space for a list of items that you either like or dislike. This is your starting point.

With that blank page in hand, visualize the room you want. What features do you like about the room that you want. These could be as simple as the tile on the backsplash or as complex as all of the appliances or cabinetry.

Once you have listed all the good points of your new addition, start your list of what you dislike about the room. This list tends to be longer and may seem easier to complete, but don't be too quick to make that assumption. If you are going to design a functional room that meets your needs, you must know what needs are not being met presently in the current space.

Step Two: Dreaming

OK, so now you have been practical and logical. You have made your objective and not-so-objective analysis of your addition. Now put it all away for a while. Throw your practicality out and bring in your imagination. This is the fun and creative end of the planning - a wonderful opportunity to

dream. Don't worry about budgets or design constraints at this time. Don't even look at the room in question; go ahead and toss the existing floor plan.

All you need for this step are three little words and the freedom to fantasize. Begin with another clean sheet of paper; only this time, divide it into three columns.

Let's assume you want to add on a new kitchen. Your first column will be everything you wish you could have in your kitchen: breakfast nook, walk-in freezer, dishwasher, appliances with cabinet fronts, etc. Include any item you have ever wished for after seeing it in a catalog, magazine or store. List all the items you would buy if money were no object. Don't edit anything from this list.

In the second column, you will list all the features you want in your new kitchen. Perhaps it is a commercial grade range or a marble countertop. This list is for those items you really want, but don't absolutely need. Don't include any item on this list that would cause you to be upset if it were not included in the project. Such items belong in the third column.

The third column is the need column. It is the only practical portion of this exercise. In the need column, list those things that you could not live without, such as a new refrigerator, stove or a sink. This list will be the first source your designer will turn to during the designing of your new kitchen. Make it comprehensive. Don't leave out anything, regardless how small or unimportant it may seem.

In addition to the wishes, wants and needs list, create a "dream book" that contains pictures from magazines that show a design, feature, appliance or other item you would like in your new room. Put notes in the margins detailing exactly what you like in the photo; add paint chips and swatches of floor coverings, wallpaper, fabrics, etc., plus your critique from Step One. This book is where you should keep all your ideas and samples for the project, from tiny notes to yourself to pictorial furniture ideas for the finished room. This is the visual side of the wishes, wants and needs lists.

Step Three: Lifestyle Checklist

You are now well on your way to creating your dream room. Make certain you correct all the current problems in the room, which are now outlined in

your critique, and include those features you need and want, and maybe even some of those you wish you could have. This third step is to make certain that the designs, materials, and features coordinate with your particular lifestyle. The trick of course, is to design a room that matches your needs with the way you and your family really live.

Below are some questions that will help you determine your lifestyle requirements. They are not comprehensive by any means, but they should get you thinking about meeting the needs presented by the way you live in your home.

- How do you prepare a meal? Do you use every pot and pan in the kitchen or do you simply tear open a package and toss the contents into the microwave?
- On an average, how many cooks use the kitchen at one time? You may want to create separate work zones for more efficient use of the space, if you have multiple cooks.
- Would you benefit from a lower counter or island for baking? Do you require a fair amount of counter space for kneading and rolling out piecrusts and pastries?
- Is there a certain style cuisine you prepare that requires storage of cooking equipment, special ingredients such as varying sizes of pasta, or extra room for exotic spices and oils?
- Do you enjoy cooking? Or is your kitchen more a gathering place than a gourmet retreat?
- If it is a gathering spot, is the space convenient and comfortable for family and friends who are not involved in the meal preparation?
- Would a family desk and computer be helpful in this space?
- Would some aspects of universal design such as multiple counter heights and extra wide passageways for wheelchairs be helpful? Think about other safety concerns, always keeping your family's composition and capabilities in mind.
- Do you need additional task lighting or more light in general?
- Do you want an eat-in kitchen? How many would you need to seat? Would you have enough room for all of them?
- Do you entertain? How often? Do you prepare the meals yourself or do you have them catered?

- Have you made an inventory of the types of kitchen items you need to store to determine efficient placement and adequate storage space?

-

Finally, this three-step method is an organized way to begin any remodeling project, whether it's a bath, a kitchen or a whole house.

Chapter Twenty

Look at the Basement

Are you running out of room? Do your kids need a playroom? Do you need a home office? Does your house seem to be busting at the seams? The solution might be right under our house in the unfinished basement.

"Last year, 72 percent of all resident remodeling expenditures were in expanding and improving home living environments," "Many homeowners are interested in expanding, but don't want to spend a lot of money and they often overlook a simple option -- remodeling the basement."

My advice is that when you are deciding if a finished basement is right for you, ask yourself the following questions:

- Do you need extra room in the house for your growing family, for the upcoming holidays or the return of a college student?
- Do your kids need a place to play and be loud?
- Do you need a quiet home office?
- Do you currently have an unfinished basement?
- Would you like a finished basement?
- Do you want usable living space without the inconvenience of traditional basement renovations?

Many homeowners are reluctant to tackle an addition for more living space due to the size or hassle a remodel job may present.

Today's homeowners are demanding products that will help relieve some of the pressure and stress of large remodeling projects.

A simple, easy, premium quality solution is to finish the basement by installing a Basement Finishing System. See <http://www.owenscorning.com>) or <http://www.probasementfinishers.com> for examples, or check your yellow pages for authorized independent franchisees. It provides homeowners with a beautiful, affordable way to create usable living space without the inconvenience of traditional basement renovations.

Homeowners will enjoy the beauty, affordability and long-lasting performance that Basement Finishing System offers, including:

- New living space completed in a fraction of the time of traditional finishing methods
- Faster and easier than framing, drywall and painting with no drywall dust, tape or paint to clean up
- Moisture- and mildew-resistant walls that won't warp or rot
- Pre-finished surface eliminates need for painting or wallpapering, while the panel is puncture- and damage-resistant -- ideal for families with children and pets
- Built-in thermal and sound control capabilities meet model energy codes for basements, and add warmth and privacy
- Long-lasting performance means fewer callbacks with no cracks or nail pops to repair
- Fiberglass panels offer Class I fire resistance for peace of mind

I believe that the Basement Finishing System gives homeowners additional living space, without the traditional complications of basement renovations. "The system is only sold and installed by highly qualified contractors, vested in the long-term success of their business, which only adds to the homeowner's confidence in their new basement.

So, how is it different? Unlike traditional drywall methods, this system is designed especially for basement conditions. Through the use of moisture-durable materials in a "breathable" system assembly, the potential for moisture build-up and mold/mildew growth within the walls is greatly reduced. The panel system and PVC framing also accommodates traditional wiring and panels are easily removed for access to interior foundation walls.

The panel system incorporates specially engineered fiberglass panels and PVC framing. Panels are finished in durable, attractive fabric that adds light to the basement, and trim options are available in fabric, wood grain or white. Because the panels have a pre-finished surface with built-in insulation and sound control capabilities, the system does not require additional insulation, drywall, taping or painting.