

## **Giving New Life to Old Structures, Part I**

By John Gower

In my articles to date I have been primarily talking about the process of developing un-serviced rural land and building a home or cottage from scratch. A big province like British Columbia has many as-yet undeveloped corners, and this is still a real possibility, even though many areas are reaching the saturation point for new development.

But what if, on the other hand, your search for the perfect property yields a fully developed parcel with an existing dwelling already in place? Whether it's a small 60s-era cottage at the lake, or a grand old country farmhouse, or a 1900s-era log cabin, buying an established property may seem like a great opportunity to start enjoying life in the country without the wait and hassle of developing from scratch.



If you are lucky and have chosen carefully and wisely, the home will fit you nicely, be in good condition, and require nothing in the way of immediate maintenance or repair. Most of the time, however, this is not the case. Either there will be some functional item like wiring, plumbing, or the foundation is substandard and needs upgrading, or the layout or aesthetics of the home doesn't fit your lifestyle, or perhaps the home is just too small for your needs. Sooner or later, maybe sooner than you think, you may be thrust into the world of renovating and/or adding on.

In this article, I want to impart some of the things I've learned in the dozen years I've been re-designing and renovating older homes. The work is often dirty, unglamorous, and physically demanding, but it is essential if these dwellings are going to continue serving us well and last for their full lifespan. It is also an opportunity to transform decrepit old eyesores into homes of outstanding beauty, charm, and fully modern functionality.

The process of home improvement has many aspects, but a good way to look at it is through the lens of an ancient maxim of the profession of Architecture which says: "Well-building hath three conditions: commodity, firmness, and delight." This maxim refers to the three dimensions that architects and designers try to bring into balance and harmony in the design of a new building, namely: comfort and functionality, structural solidity, and aesthetic appearance. These same dimensions are quite relevant to renovations, which we undertake to:

**COMMODITY** - Make the spaces better accommodate our lifestyle needs. Kitchen and bathroom upgrades are a common example of work of this sort, as are new additions and the opening up of walls between rooms.

**FIRMNESS** - Remedy structural faults or deficiencies and bring mechanical services up to acceptable standards for comfort and safety.

**DELIGHT** - Make the home cozier, more personal, and a better reflection of our personal aesthetic. This can mean anything from a fresh coat of paint to a full-bore gutting and reconstruction with all new finishes, windows, appliances, and so forth.

In most cases, because they involve matters of safety and the long-term stability of the structure, issues of firmness are at the top of the list when prioritizing work to be done. Sometimes this is all that is required to make the home livable. More commonly, the upgrading of structure, wiring, or plumbing will be done at the same time as a larger renovation or addition. Given the potential for renovations to create a mess and disrupt your life, it makes a lot of sense to do them all at once.

Nevertheless, in this and the subsequent article, I want to look principally at this issue of firmness. For our purposes, it comes down to two questions: How do you find out what you need to do? What parts of an older home or cabin most commonly need attention to bring them up to basic standards for safety and functionality?

## **The Home Inspection**

All houses, even very well built and well-maintained houses, will eventually require upgrading. Sometimes the work required is obvious and minor - perhaps a perimeter drain to dry a wet basement, a new electrical panel, and a coat of paint and it's again good for another fifty years. Sometimes, though, the problems are less easy to see and more grave in their implications for the safety and longevity of the home. It is ideal, therefore, to begin any thought of renovations with a thorough and in-depth home inspection or structural assessment. The results of this should inform all decisions you will make.

Of course, it would be preferable if this had taken place before you purchased the property and you are already well aware of any major deficiencies. These days, it is very common to make an offer to purchase a home conditional upon a satisfactory inspection report, and you can find professional home inspection services in most communities. Owing to their familiarity with all aspects of the building system as well as the fact that most carry liability insurance, home inspectors are my first choice for this initial assessment, although architects, engineers, building designers, contractors, or even knowledgeable homeowners each have their areas of expertise and can also provide this service to some level.

Before beginning the inspection, first of all identify your overall objectives. Is it your intention only to make the home safer and do basic maintenance, or is the work going to go further? This step is important because your objectives can determine what information you collect during the inspection. If you plan to tear down part of the building, for example, you need not worry about any deficiencies in that part, unless they point to instabilities in the underlying soil. If, on the other hand, you plan to build a second storey on an existing structure, the condition of the foundation and main floor walls is going to be of great concern and should receive close attention. When long-term goals are as yet unknown, it's good to be on the safe side and collect as much information as you can about everything.

A good, systematic way to approach a home inspection or assessment is to basically follow the course of construction, beginning with a thorough check of footings and foundation, then working your way up through the framing of floors and walls to the roof, followed by windows, doors and an examination of the various systems - mechanical, electrical, and so on - that are crucial for comfort and convenience, and ending with the condition of surfaces and finishes.

Once the assessment has been completed, the dwelling's deficiencies have been noted and prioritized, and a plan of action has been laid out, it will be time to tackle the actual repairs. Just as with the inspection, in

most cases such work will also retrace the usual construction sequence. To illustrate the inspection process, what follows is a basic overview of the procedure and some of the common problems that might be encountered during a home inspection. In the next issue we will look at some of the basic actions you can take to remedy them.

## Foundation

Firstly, to ensure that the house is on a solid base, you will need to inspect the parts of the dwelling that are in contact with the ground. The most common kinds of problems one encounters with foundations in older homes are related either to insufficient bearing capacity, structural failure, too-shallow footings, or ground water infiltration, often in combination.

Problems with inadequate bearing capacity will most often manifest themselves in obvious cracking of the walls themselves, or by uneven settlement of all or parts of the foundation. These are usually caused by spread footings that are inadequately sized or even absent (quite common in older homes), by soils with little compressive strength, or by active groundwater. A bit of careful digging around at the base of the walls will show whether there is indeed a footing, as well as how wide and how far below the exterior grade it is.



Structural failure is usually the result of the decomposition of the concrete if it's a concrete foundation, or of the mortar, if it is built of stone. This failure occurs when the initial concrete mix was incorrect and where there is continuous exposure of the wall to moisture and freezing. While it may be possible to repair the wall in place, it's often better to remove and replace the stone or concrete with a new, properly designed foundation wall.

Groundwater infiltration is by far the most common problem with older homes and leads to damp, unusable basements and the growth of harmful moulds. Watch for moisture on the surface of the foundation wall or floor, or a powdery efflorescence or stain where past leakage has evaporated. Fortunately, this problem can usually be alleviated quite simply by installing a proper drain tile and gravel around the outside perimeter of the foundation to intercept groundwater and direct it away.

## Framing

Once you've identified how to make the foundation solid and level again, next look at the floors. Are they level? Do they tend to sag in the middle of a room? If so, look for joists that have been cut for plumbing and heating pipes, a commonly seen practice which greatly weakens the floor. Otherwise, it

may be the case that they are just too small for the span, necessitating both additional joists or intermediate posts and beams below.

Fortunately, main floor members are usually quite easy to access and can often be installed without disturbing the floor above. Second floor problems though, are harder to deal with, since inspecting and then repairing the floor structure usually requires removing the main floor ceiling. This sort of investigation should probably be undertaken as part of a more major renovation.

Your next focus should be on the walls. Check for them for straightness and plumb, and look for any deflection in headers over windows and large openings. Be on the lookout for mold along baseboard areas, which may indicate that either condensation is occurring or moisture is getting into the wall cavity from a broken flashing, windowsill, or even from a hole in the roof.

## Roof

Roof problems can be categorized as belonging to one of three types: worn-out roofing that no longer provides effective protection for the home, failure of the flashing at penetrations through the roof membrane, or inadequacy in the roof structure itself.

The simplest to remedy is roofing materials that have outlived their lifespan. Asphalt shingles ó by far the most common material ó will last anywhere from 15 to 40 years depending on the thickness and quality of the shingle, the quality of the installation, the amount of direct sunlight the roof receives, and whether moss or other organic materials have been allowed to build up on the roof. As they age, the lower shingle edges will curl to the extent where they break off, or they will become brittle and susceptible to wind and will ultimately fail. Wood shingles and shakes fail in less obvious ways, usually through rot or by splitting and falling out. Metal roofing generally becomes loose at the lower edges over time, or the fasteners pop up, leading to lifting, bending, or even tearing.



A failure of the roof flashing is a potentially more serious issue, as considerably more water may be involved. If leaks have been occurring for some time, it is quite common to find rot in the sheathing, particularly around the openings, and, in bad cases, an infestation of carpenter ants. Both of these conditions have serious structural implications, and will likely require the replacement of sections of the roof sheathing, or even some of the rafters

Just by looking at the building from the outside, one can often see structural problems. The most common giveaways are a sagging ridge or concavity in the flat roof surface. A sagging ridge usually indicates that either the top of the supporting walls is spreading apart or else there is a failure in the connection between the rafters and collar ties. Either will require significant work to remedy. Concavity, on the other hand, indicates that the rafters are too light to support the roof loads and have become permanently bowed over time. It may be possible to force these deflections back out using crossties but the best solution would be to replace the rafters with appropriate-sized members.

Finally, you should also examine any eaves troughs or roof leaders to ensure that they are still watertight and well connected to the fascia and wall, sloped to drain, and that the leaders carry the runoff well away from the foundation.

## **Masonry**

Most older homes will have a masonry chimney that likely once served a wood cook stove or heater and may now be used to vent a heating appliance or gas water heater. The number one concern here is with safety. Cracks in the flue liner and around old thimbles, as well as obstructions in the flue itself, all have the potential to cause poisonous carbon monoxide (CO) gases to infiltrate into the living areas of the home - a potentially lethal situation.

Another hazard is chimney fire, quite common where there is creosote buildup combined with structural weakness in the chimney and liner. A qualified chimney sweep is a good person to call on for an assessment of the state of the inner workings. The condition of flashings and the chimney cap and any need for repointing of the masonry should also be checked.



Chimneys, because they are usually constructed on separate footings from the rest of the house, are also a frequent source of problems when there has been differential settling. This can lead to heaving of the adjacent floor surface as joists or flooring are caught and lifted by the masonry. Add this one to your list of structural repairs.

## **Insulation**

Unless they have been retrofitted, most homes built before the 1950's are likely to be inadequately insulated. This is especially true of vacation-type cabins and cottages, many of which were intended for use only in the summer months. Attics are usually the easiest places to see into; by removing the gable vents or

an access hatch, it is usually possible to see the depth and condition of the insulation and to determine whether the roof assembly is properly vented.

Walls are more difficult but you can look for gaps around door and window jambs, remove switch plates, even drill small holes into the wall cavity behind the baseboards in order to get a sense of what, if anything, is insulating the walls. Take note of places where you can easily increase the amount such as attics, and in floors over unheated spaces. Walls, unless you are planning to do a full scale gutting of the building, are much harder to insulate and require specialized equipment to blow in the new insulation. While you are at it, check doors and windows for leaks and the need for weather-stripping.

## **Windows and Doors**

The condition of the windows is very important to the looks and live ability of a home. It is crucial for energy performance as well. On newer homes, check that the seals on all thermopane units are intact and that weather stripping is in place and in good condition. Older, single-pane windows should be inspected for cracks and for the condition of the glazing putty which seals them to the sash. Try all windows through their full range of motion to ensure hinges and latches are in working order. Finally, you should inspect the outer sills for leaks as these can lead to rot and carpenter ants inside the wall. Doors, too, should be checked for weather tightness and the lock mechanisms checked for security.



## **Heating appliances**

As with the chimney, there is a very real danger of carbon monoxide from a damaged or improperly functioning gas or oil furnace. A qualified person should carefully check the condition of the fan belts, ductwork, filters, and most importantly, the heat exchanger. Consider also whether the ducts require cleaning.

## **Plumbing System**

Begin your investigation of the plumbing system at the point where the supply enters your house. Is the supply line large enough to deliver the water you needed? Then, move on to the hot and cold water lines. Many older homes use iron or galvanized water pipes, and these should be identified for early replacement. Check the condition of the hot water tank and all visible drain and sewer lines, looking for leaks, proper slopes for drainage, and adequate venting. Finally, inspect the fixtures, looking for cracks in the porcelain and dripping taps.

## Electrical System

A thorough home inspection will cover the whole electrical system, from the heavy-duty service connecting it to the hydro pole outside, to the condition of every individual circuit, outlet, and fixture inside. You should note the age and condition of the wiring, the condition and number of circuits in the main breaker panel, and whether all switches, plugs, and lights are properly grounded. Ground fault receptacles should be tested. Observe too, which outlets and fixtures are controlled together on each circuit; note which rooms are inadequately serviced with outlets and record these. If you are planning an extensive renovation, it may be possible to address all of the deficiencies of the electrical system at one time.

Renovation is quite a likely scenario if you are purchasing property with a dwelling already in place. We have seen a partial list of the work that might be required to bring a home up to basic standards. In the next issue I will discuss some of the implications of making such repairs, as well as the more subtle process of renovating or adding on for reasons of commodity or delight.



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