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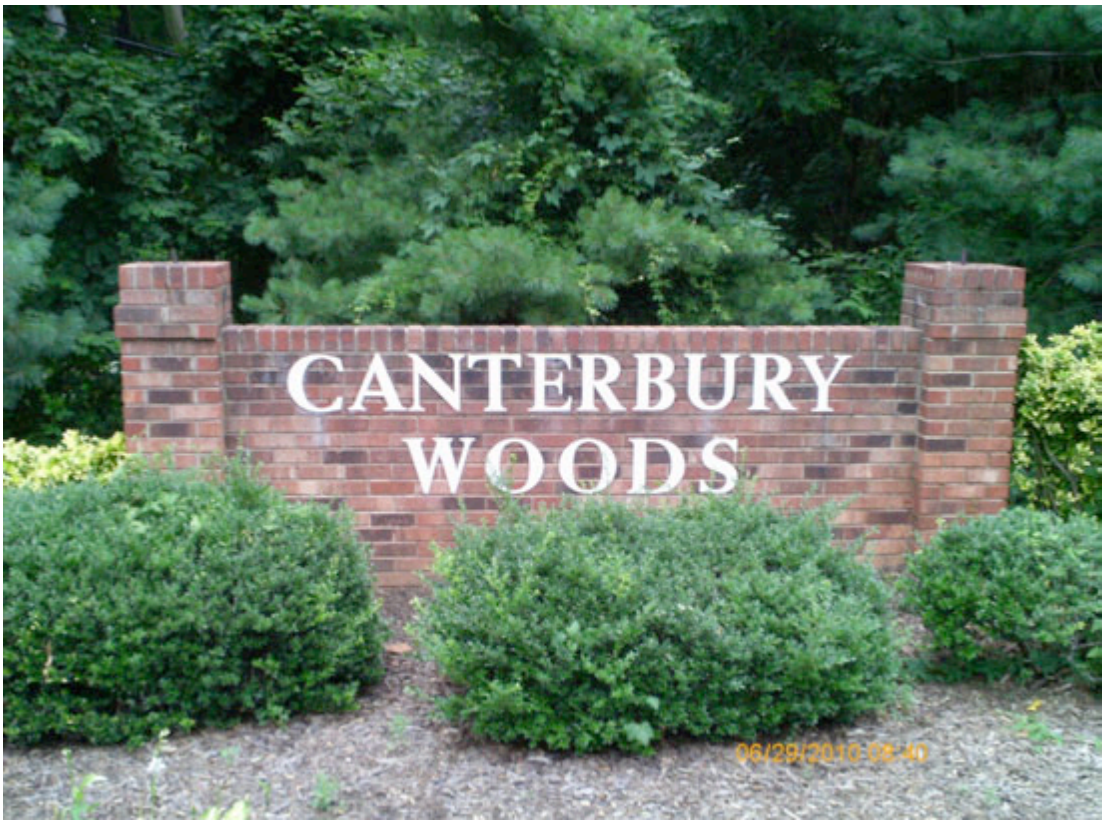
Summary of Home Energy Assessments for Canterbury Woods Community Association



Virginia Sustainable Building Network

HOME PERFORMANCE WITH ENERGY STAR

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Summary

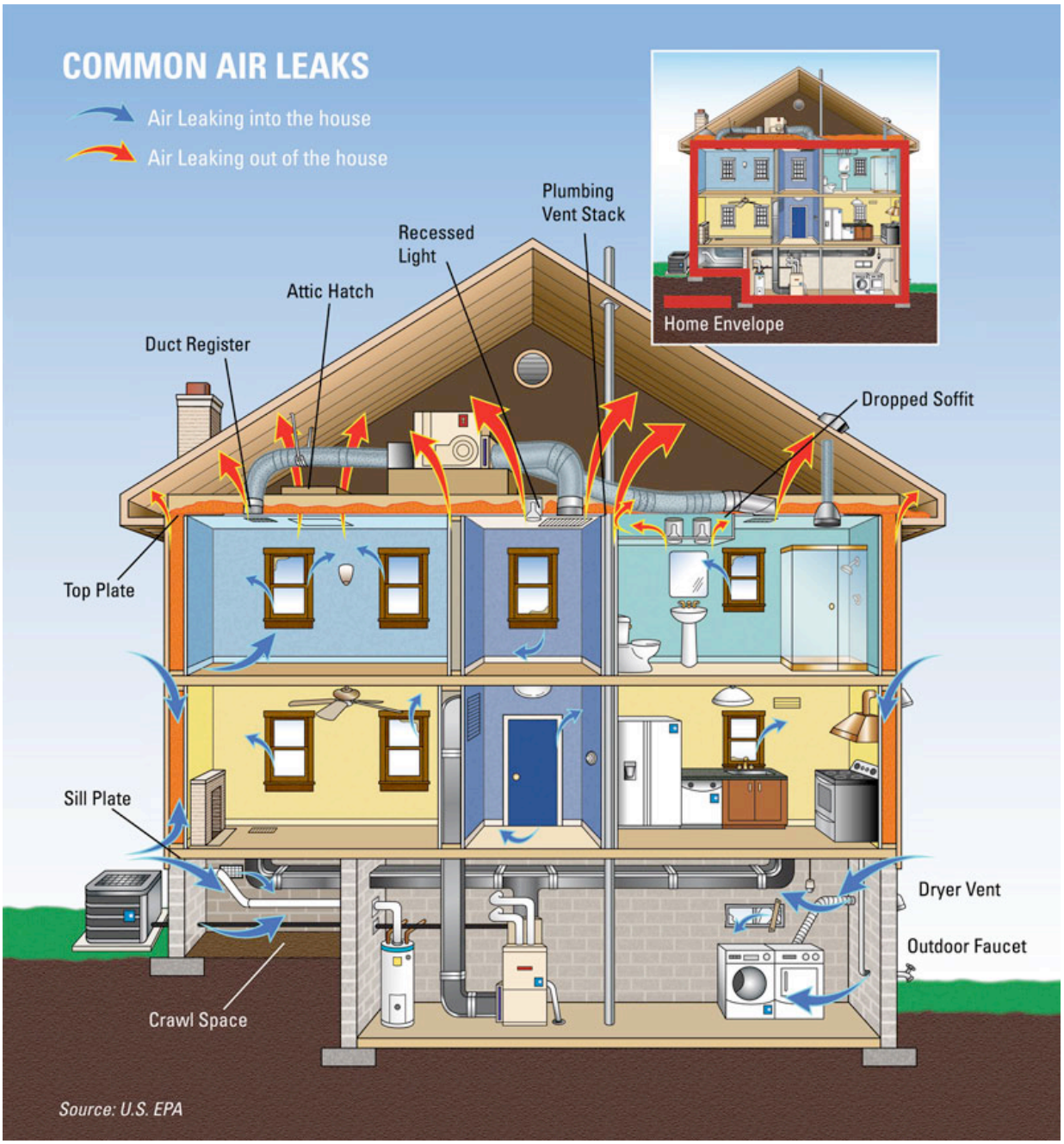
Overall, Canterbury Woods homes are typical for the age and construction methods used during the late 1960's and early 1970's. The homes are built on a block foundation with framed walls. Our inspection of six homes in the community illustrated why it is important to look at the sum of the parts as opposed to each individual part. We found instances in each home where repairs were made to fix damage, however, the originating problem was not fixed and damage has resurfaced. Home performance is the re-engineering of existing homes. Research, technology, new means/methods and accreditations are now verging mainstream applications to evaluate and address homes as a system. Quite simply, home performance applications solve problems by:

- √ Maximizes energy efficiency
- √ Minimizes wasteful spending
- √ Decreases moisture problems
- √ Decreases health problems
- √ Maximizes home durability
- √ Protects the environment

Each of the homes inspected have very low levels of insulation and little to no air sealing at the 2nd floor ceiling/attic floor interface. The composite insulation value of the attics is between R-5 and R-7. The recommended insulation for the Northern Virginia area is R-49. Insulation is not an air barrier so particular attention is required to sealing up all of the penetrations prior to insulating. This includes the attic access, duct and flue trunk penetrations, plumbing pipe penetrations, and electrical penetrations (recessed lights especially).

1. Air Sealing:

Air infiltration in homes can amount to as much as 30-40% of heating and cooling losses. Air infiltrates through the exterior envelope making it more difficult to maintain the conditioned air inside the envelope. This occurs through a loss of heat in the cooler months and a gain in humidity in the warmer months. Humid air takes more energy to cool and dehumidify. Leakage generally occurs at a *thermal bypass*. A thermal bypass is a design or building flaw which allows heat to enter or leave the building and increases the cost of heating and cooling your home. A bypass compromises the thermal properties of your insulating and sheathing materials. In many cases, a bypass can interfere with the insulation of a wall or building system, causing higher energy use, moisture-related material destruction, and decreased comfort for those living in your home. A comprehensive air sealing effort will eliminate the majority of the existing leaks. An increase in the tightness of the envelope requires increased fresh air ventilation and use of bathroom fans regularly to extract excess moisture. Air sealing should start in the attic to prevent conditioned air from escaping, and then progress to lower levels in the home to prevent unconditioned exterior air from entering. *Additional fresh air ventilation provisions may be required upon completion of air sealing*.



2. Combustion Safety:

A comprehensive home energy assessment in accordance with Home Performance with Energy Star and BPI standards addresses health and safety 1st and foremost. Combustion safety testing evaluates the operating condition of any carbon monoxide producing appliances in the home to ensure existing problems are not amplified as a home is made tighter and more efficient…the saying goes "build tight, ventilate right". In Canterbury Woods, the six homes we tested all had at least one atmospherically vented gas appliance that must be considered when implementing home sealing and insulating. An accredited home performance contractor should be with this type of work scope to test the before and after conditions to ensure home occupants' health and

safety. Newer high efficiency furnaces and hot water heaters are directly vented to the exterior. By venting the combustion gases to the exterior through a direct vent and obtaining combustion air through a separate vent, combustion backdrafting concerns are minimized.

3. Building Durability:

Moisture problems are the pre-eminent problems in buildings today. A well sealed and insulated home with the right ventilation measures allow natural humidity in the home to be sufficient for normal comfort. The more visible problems originate with bulk moisture – a leaky roof or poorly graded yard that introduce higher amounts of moisture into the home, creating high humidity levels, not to mention the physical damage caused. Often overlooked are smaller moisture generators that cause the same problems on a smaller scale and mitigation is often a simple solution. Usually the moisture comes from steam in the bathroom and cooking. The visibility of the concentrated moisture starts with the mold growing around bathtub edges and travels to the attic spaces above through poorly sealed penetrations in the walls. Lower temperatures in the winter increase the amount of moisture that condenses on roof sheathing (primarily). Keeping home humidity levels below 50% relative humidity will keep the mold spores in a dormant state and help your home last longer with fewer repairs.

4. Efficient Systems:

Older furnaces and hot water heaters are the top users of fossil fuels and electricity in homes. Windows, refrigeration, lighting, dishwashers, washing machines are large contributors to energy usage and are other good places to evaluate when considering consumption reduction measures. We do not advocate removing equipment in good operating condition, rather we recommend including their replacement in short and long term goals.

5. Common Problems for Specific Style Homes:

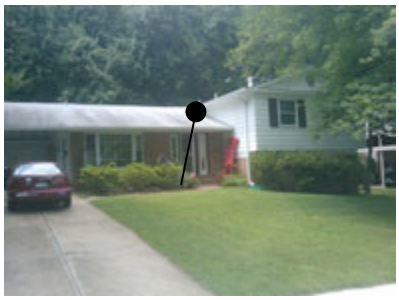
There are a few problems that come with specific style homes: In addition to the common problems listed above, look for these specific conditions at your own home to determine if you should explore additional recommendations.

Cantilevered (overhanging) floors:

Two problems exist in these situations. The overhang is poorly insulated with pockets for air movement. Air will penetrate the home through the voids and the rooms above the overhang seem colder or warmer than the other rooms in the house. To aggravate this situation, the ducts that turn 90° twice create a resistance path to the conditioned air coming through the ducts. Duct leakage can also contribute to the temperature differences.

Attic Knee Walls:

The lack of an air barrier here allows air to flow freely through the insulation. Dirty insulation is an indication of air movement (the insulation is acting as a filter). Below these areas, the framing cavity is also open to allow air movement below this room to the attic (which is considered to be outside).



Small Hidden Attics:

Small hidden attics should be addressed on a case by case basis. The picture below on the left shows a space that is accessible, but will require additional time to work on. The picture below on the right is a small inaccessible attic. No major leakage was detected in this location and the work was performed just a few years ago. Our recommendation on this would be to leave it as is.

No Basement (slab on grade):

Uninsulated slabs account for up to 20% of the heat loss in a home. If the slab is on grade, the heat flows through the slab and escapes at the edges. Walk out basements have this problem as well. These rooms will often feel cold in the wintertime. Slabs can be insulated from the outside, but can be expensive and tricky to deal with aesthetically. Each case should be evaluated separately.