Debating Crawl Spaces

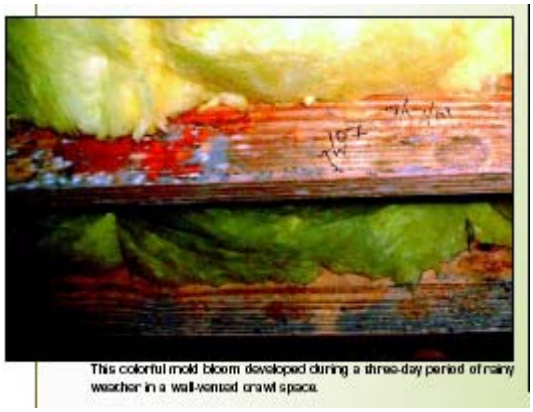
Crawl Spaces

A new perspective

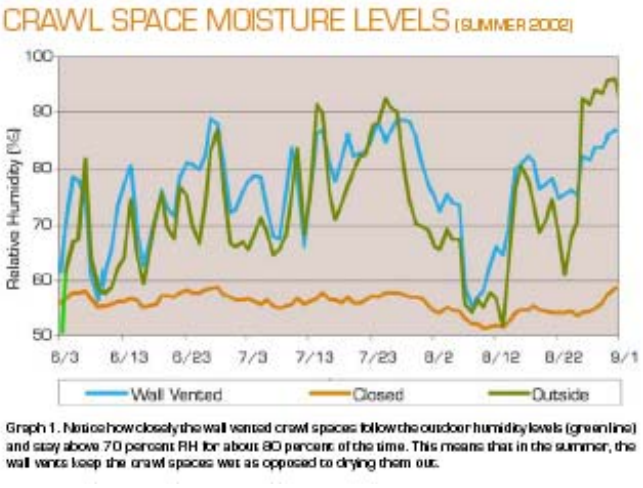
> "Though homeowners rarely think about that small space under their houses, builders should give crawlspaces careful consideration. Some of the most common – and damaging – building problems stem from moisture in crawlspaces." ("Consider the Crawlspace," 2002)

The use of vented crawlspaces in residential construction continues to be a popular mode of construction. However, little attention has been paid to the potential problems associated with this building practice. Throughout the Southeast many crawlspaces develop severe mold and mildew problems. This can create health risks when the spores are able to enter the building envelope. (Zoeller and Crosbie, 2005) In dryer regions, crawlspaces allow cold air to come in contact with the building envelope during the winter months creating increased energy costs. In addition, during the summer months moist, cold air condenses quickly when it comes in contact with cold surfaces such as rim joints. (Andrews, 2003)

The use of vented crawl spaces derives from pre-World War II theories of construction. (Andrews, 2003) Based on these theories the Residential Building Code calls for ventilated crawl spaces, allowing very few exceptions. (IRC Section R408.1) Proponents of ventilation argue that vents allow exterior air to pass through crawl spaces and evaporate moisture. However, modern research shows that vented crawl spaces actually produce the opposite affects. In humid regions of the country external air is often more humid than the crawl space, in affect allowing far more moisture to enter the space than would exist in a space not vented. In addition, vented cralw spaces are a liability in dryer climates. During the winter months heated air within the building envelope rises and escapes into the upper areas of the house creating a pressure cycle that literally sucks cold air up from the crawl space. This cycle not only increases energy costs but the cold air brings along with it the added danger of dust, mold spores, and moisture from beneath the house.



This colorful mold bloom developed during a three-day period of rainy weather in a wall-vented crawl space.



Graph 1. Notice how closely the wall vented crawl spaces follow the outdoor humidity levels (green line) and stay above 70 percent RH for about 80 percent of the time. This means that in the summer, the wall vents keep the crawl spaces wet as opposed to drying them out.

For these reasons and others including cost of construction, many experts have been discussing alternative options for vented crawlspaces. The most common choice is to close the crawl space. In practice this means treating the crawl space as a sort of miniature basement. The US Department of Energy states,

If you have or will have an unventilated crawl space, then your best approach is to seal and insulate the foundation walls rather than the subfloor. The advantages of insulating the crawl space are as follows:

> *1. You can avoid the problems associated with ventilating a crawl space.*
>
> *2. Less insulation is required (around 400 square feet for a 1,000-square-foot crawl space with 3-foot walls.)*
>
> *3. Piping and ductwork are within the conditioned volume of the house so they don't require insulation for energy efficiency or protection against freezing.*
>
> *4.Air sealing between the house and the crawl space is less critical.*

(http://www.eere.energy.gov/consumer/your_home/insulation_airsealing/index.cfm/mytopic=11480)

A Stego Industries Publication,
Written by Paul Miller

The US Department of Energy and the authors of "To Vent or not to vent" agree that a key to sucessfully designing an unvented crawl space involves sealing the floor from moisture. Depending on your water table this may involve several solutions. In the case of a high water table it might be best to consider the use of waterproofing and a thin slab of concrete. Generally this is not necessary and the use of a plastic barrier will suffice. Many older articles simply recommend the use of 6 mil poly, however as Crosbie and Zoeller write, "The typical 6 mil polyethylene easily can be ripped by crawling on it, and the edges and seams are difficult to seal to the walls." (Zoeller and Crosbie, 2005) For this reason a better choice would be the use of a polyolefin plastic barrier with an extremely low permeance. Most experts agree that the permeance level should be as close to 0.01 perms as possible. A low permeance, long lasting barrier is paramount in keeping the crawl space as dry as possible thus keeping the humidity low and reducing the chances for mold and mildew.

Although many building inspectors will expect to see vents, there are several options to gain approval. The 2000 International building Code allows the use of unvented crawl spaces, see section 1202.3.2 #4. According to the US Department of Energy many builders have gotten permission by arguing that the crawl space is actually a very short basement. One could also simply print up the many articles readily available that convincingly argue the fact that vented crawl spaces are not as useful as once thought. In short, modern research has shown that the use of modern polyolefin barriers and insulation can create a valuable alternative to vented crawl spaces.

A well built crawl space will not only reduce energy costs but promote good health!

Bibliography

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