White Paper

For The Homeowner: How to Treat a Crawl Space

A common situation in homes is a half-height basement referred to as a crawl space. Crawl spaces are typically built to either save money (by not digging to the depth of a full basement) or because of geographic restraints such as the water table, ledge, rocks etc. The decision is made at the commencement of construction to only dig a few feet to install the foundation.

Building a crawl space is more desirable than building a house on a slab where the first floor is built directly on the dirt. Added insulation and other factors make the crawl space preferable to the slab.

Crawl spaces are dug out and a footing is installed and the joists (the structural members for the floor and wall framing) are installed directly on the footing and the dirt is left exposed. The dirt that is left exposed welcomes dampness, insects, vermin, rodents which may eventually get into the living space above. The oversight of the builder of not putting down a concrete barrier is very common.

The dirt crawl space under the home creates a unique environment for humidity, dampness, encroachment of insects and rodents and for possibly creating structural damage to the framing members underneath the home. The sill plate that rests directly on the foundation wall and the joists that hold the floor up are especially vulnerable. Deterioration of these areas is very common in a dirt crawl space. Entrance by vermin and enhanced insect and rodent activity is also very common.

The Solution

The oversight of not putting a concrete floor in the crawl space area is the dilemma in a post-construction setting. To get concrete into this area after the house is built is very difficult and problematic. The most effective solution is to completely encapsulate and seal off the dirt from below in order to mimic the existence of a concrete floor. The best way to encapsulate is with an impenetrable vapor barrier (i.e. plastic) that is sealed to the foundation walls and sealed on any overlaps of the vapor barrier creating, in essence, a replacement concrete floor. It is important that the plastic be impenetrable with a minimum thickness of 16 mil. Before installing the vapor barrier, it is strongly recommended that the homeowner install a sealed pump with a perimeter system around the crawl space area. This will further prevent any water from coming over the vapor barrier.

There are also other methods that are currently available on the market. One of these methods is a spray Concrete Replacement that can be installed directly over the dirt. These replacements must be installed very carefully and must have a sub-floor waterproofing system installed around the perimeter (i.e. French Drain, low-pressure system draining into a pump). The other unfavorable issue with this type of solution is that water commonly gets in on the walls and will drip down onto the floor creating a moist environment.

Today's building codes call for crawl spaces to have ventilation. The problem with ventilation in a crawl space area is that if it is humid outside, the crawl space also becomes humid, creating damage to the structural members and inviting dampness and decay to the framing members of the home. The humidity also invites insects and rodents to infiltrate the crawl space area.

The ventilation of a crawl space area after encapsulation is another issue that needs to be addressed. The recommendation of sealing off all vents to the outside is very important. In addition to this, a mechanical form of ventilation (i.e. a fan) is highly encouraged. This ventilation system should include vents to the upstairs (to draw the warmer air from the living space down into the crawl space) in conjunction with ventilating the damp, humid air out of the basement and not allowing the warm, humid air to come in through ventilation on the sides of the home. Dryer air from upstairs will also help to dry out the crawl space area. Essential air-exchanging systems such as the Bon Aire by Basement Technologies, Inc or Humidex and other such devices are extremely helpful in equalizing the humidity in the crawl space.

Dehumidifiers installed in the crawl space can also help control the humidity. Basement Technologies. Air Mop 2 can be drained into the sump or have a condensate pump to pump directly to the outside. It will handle up to 3000 square feet of a full basement or approximately 5000 to 6000 square feet of a crawl space. It has a large volume capacity of up to 100 pints per day and offers low temperature operation down to 40 degrees F with an automatic humidity control.

Another option is to install a sub-membrane depressurization system that will suck the humidity out from underneath the vapor barrier. It is common for dampness (even with a sub-floor drain) to occur underneath the vapor barrier. Suction of this area is important - to ventilate the damp, moist air out from underneath the vapor barrier to the outside. Basement Technologies, Inc Humid Evac is a perfect solution for this humidity and dampness issue under the vapor barrier.

Radon entry into a home is another very common occurrence with dirt crawl spaces. The added benefit of the encapsulation system is that radon entry can be controlled very easily when installing a sub-membrane depressurization system. These systems are similar to the Humid Evac system by Basement Technologies, Inc., however, there are guidelines

and rules pertaining to where the radon gas needs to be vented. Typically, it will be vented approximately two feet above the upper most window and at least ten feet away

from any adjacent window. Adhering to guidelines, regulations and required licenses are necessary for contractors to install these systems. If a home has a dirt crawl space, it is very important to do radon testing annually in the lowest habitable portion of the home. Any radon level above 4.0 pico Curies per liter (pCi/L) requires mitigation. The encapsulation system previously described, in conjunction with a radon system, will mitigate the radon entry into the home and also reduce moisture under the vapor barrier, stabilizing the humidity in the crawl space itself.

The Whole House Effect and the Dirt Crawl Space

Due to the nature of homes built with chimneys, roofs, soffit vents and ridge vents and the fact that heat rises, there is a mechanic called *The Whole House Effect*. All of the air in the crawl space will tend to migrate into the upper portions of the home, due to *The Whole House Effect.* If the crawl space is damp, musty and humid, this air will make its way into the living area, creating damage to the upper portions of the floor. It is important for homes with a dirt crawl space to address this issue.

Reversing *The Whole House Effect* via the encapsulation method with Basement Technologies Bon Aire or Humid Evac in the crawl space is a very important solution. Reversing this flow, some say, wastes heating and cooling costs. The truth is that reversing the air flow in the lowest part of the home is more cost effective than letting the air go up into the higher portions of the home to the attic, through the roof area, chimney and vents etc. - creating a healthy climate down into the lowest portion of the home.

There are usually no additional costs for this warm or cool air usually expelled to the upper portions of the home. Simply reversing the *Whole House Effect* will not add any operational costs to the maintenance and upkeep of the home.