

around the HOUSE

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Achieving Clean Indoor Air

The original concept of the plans in the “smart home” is the idea of combining Universal Design and environmentally-friendly building features. This addresses the entire home environment and its building systems.

Now included as a Universal Design feature, clean indoor air is the common denominator that connects

Universal Design in housing is clearly sustainable as far as the actual space planning goes as it will put less of a burden on family caregivers, and people are able to stay in their homes longer and more independently since the residences are created for general accessibility.

Poor Air at Home

Respiratory disabilities in the U.S. have the highest rate among chil-

we are exposed to two to five times more pollution indoors than outdoors. A few of the largest indoor air problems are odors or contaminants; problems with a poorly designed heating, venting and air conditioning system; and people themselves. Since people with physical disabilities may spend 80–90% of their time indoors, air pollutants in sealed environments have significant effects on their health.

What Makes Good Air?

The concept of a tighter building envelope (for energy savings, and in an effort to keep outdoor air contaminants out) can also be at odds with our desire for clean indoor air. It may also keep contaminants *in* the house, without proper ventilation design.

The characteristics of good indoor air are:

- Temperature: 72–78° F
- Humidity: 40–60% relative humidity
- Air velocity: 20–30 fpm in ducts
- Dilution ventilation: 20 cfm per person

Some of the shower and toilet areas in my home designs are called “wet rooms.” These have floor drains in the accessible shower and in the area between the shower and toilet.

Wheelchairs will naturally carry water out of the shower in these areas, and people using wheelchairs will probably be in the area longer than an ambulatory person. Proper ventilation and product selection is vital to mitigate high rates of humidity and eliminate mold growth.

The Right Tools

The bathroom should have a minimum of eight air changes per hour



This Universally Designed home includes clean air HVAC technology and a “wet room” that doubles as a hurricane safe room. Design by Charles Schwab.

traditional Universal Design and what is known as “green housing.” Green building is also called sustainable building.

Sustainability basically means building and designing with materials and methods that do not use up natural resources, causing a burden on future generations. The two terms are interconnected but not truly the same.

dren under 18 and the fourth highest among adults. Senior citizens and people with physical disabilities may also have weakened immune systems and could be more vulnerable to mold. For this reason moisture and humidity levels must be controlled.

The air quality in our homes can be a cause for concern. The Environmental Protection Agency (EPA) estimates



This “wet room” is designed with additional floor drains and moisture venting.

A dust-free and clean air system comes from a geothermal system that provides in-floor heating and cooling.

and maybe even ten in the wetroom area. It is important to consult a qualified mechanical/plumbing engineer or contractor at all times. A kitchen should have a minimum of 15 air changes per hour; laundry and basements should have a minimum of six air changes per hour.

Another tool for controlling indoor air quality is a well designed HVAC system. I like to specify radiant in-floor heating/cooling systems as they do not move air or dust and other irritants. This has major benefits for those with asthma or who have environmental



hypersensitivity by providing clean indoor air and heat/cooling

that can be connected to a geothermal heat pump or solar hot water heater.

If a forced-air system is used, the filters should always be high quality and well filtered to eliminate gaps that may allow unfiltered air flow. It is also a good idea to include a radon emissions detail that can be obtained from EPA.

Safe Rooms

Radon is at high levels throughout the country, especially in the Midwest. An odorless colorless gas, it can increase the chances of lung cancer. It radiates up through foundation walls and through cracks at the edge of slabs. Radon is classified as a class A carcinogen known to cause cancer in humans. Some other class A carcinogens are arsenic and asbestos.

People with extreme indoor air hypersensitivity may consider installing an “Andair” bacteria and gas filtering system. This is also a good system for a storm or fallout safe room.

These units are often specified by the U.S. Army for biological and nuclear fallout protection. They come from Switzerland. You may be surprised

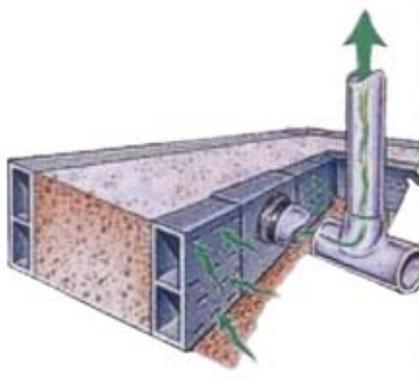
how many people are building safe rooms. Larger accessible bathrooms double nicely as safe rooms since they are larger by nature because of their wheelchair-use design. (See “Riding the Storm Out,” December 2010).

The Objective

The goal is to build Universal Design homes for use by everyone of all abilities while including clean indoor air and an overall energy efficient environment. By incorporating more green building products, you will have a truly universal designed “smart home.”

The home plan book Universal Designed “Smart” Homes for the 21st Century, 102 home plans you can order and build is available at a \$5 discount to PN readers by using coupon code Vethomes.

Contact: universaldesignonline.com. ■



This foundation form system drains water from both sides of the footing while venting radon.