

## WELCOME TO KIMMSWICK-1, OUR DEMONSTRATION OF DESIGNING AND BUILDING AN "IN-FILL HOME" IN AN EXISTING SUBDIVISION

The following information is provided as a Road Map for your tour of Kimmswick-1. If you have questions, please ask us – answering your questions can be educational for both of us. **Please start this tour at the Front Walk Mail Box.** This information should enable you to see the whole house and garden in sequence. We hope you will enjoy your tour; feel free to ask questions about all you see and read as you go through the home. Our objective is to share our research and disseminate as much information as possible to encourage and support "Green Building" in small and medium scale homes.

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**Choice of Location and Site:** When we initiated Kimmswick-1 in late 2006 we knew there were a number of "High Performance Homes" in Greater St. Louis. Of the surrounding counties, Jefferson County was the last to receive the attention of the major home developers. We felt this was our opportunity to influence future development in an area just beginning to be discovered. Kimmswick has area wide name recognition with a good country food restaurant, numerous antique shops and community facilities. The site we chose, "The Parc at Kimmswick," is on a 75 site subdivision that was 80% filled. Sites were available that allowed us to use orientation to accommodate passive solar design, and provide for the future addition of photovoltaic collectors on the roof.

**Low Maintenance "Rain Garden:"** The basins on both sides of the walk are used to collect and hold all reasonable amounts of rainfall on the site. The average depth of the depressions is slightly over 6 inches and, combined with the actual Rain Garden located in the back yard, can retain more than a 1 inch rainfall. All the plants used on this site are "native" and "drought resistant," with deep roots to help absorb heavier rainfalls. The designer is Cynthia Collins of Hartke Nursery in Olivette, Missouri. *Ask for a copy of a full color brochure for more information on rain gardens.*

**Front Walk** to the home and the rear driveway are constructed of concrete with a high content of fly-ash, a waste product from the combustion of coal in power plants. The fly-ash gives the finished concrete a reflective white color. The technical term for this surface is "high albedo." The use of high albedo materials reduces the amount of heat collected by these surfaces during the hot summer months.

**Motion Detecting Entry Lights** are intended to welcome visitors while conserving electricity. The photovoltaic solar lights along the front walk define the way to the home and require no utility-purchased electricity.

**"Pure Power"** provided by AmerenUE from Wind Farms is used to minimize the home's "Carbon Footprint." Pure Power is the description used by the utility company to indicate that they are buying energy for use in our home that is not from the usual AmerenUE sources of coal, gas or nuclear energy.

**Exterior Walls** are constructed of concrete reinforced with steel bars (rebar). This construction runs from the footing to the roof of the house. The Insulated Concrete Form (ICF) construction utilizes approximately 2 inches of insulation on both sides of the concrete as the "forms." The rebar reinforced concrete provides structural strength for maximum resistance to high winds and earthquakes. This construction has been found to be very successful in resisting the hurricane velocity winds experienced on the coast regions of Florida, Mississippi, and Louisiana. In addition, the mass of the concrete keeps

noise out of the home, and the “thermal mass” (energy storage capacity of the heavy concrete) slows the rate of temperature change with the varying weather conditions experienced in the our region.

**Exterior Wall Siding** is constructed of cement and cellulose fiber rather than the usual vinyl plastic. The siding has a high recycled content and comes with a 50 year warranty. Because of the environmental problems caused by the production, use, and ultimate scrapping of vinyl, we try to use more environmentally friendly materials.

**Windows** are manufactured by Marvin Windows. The frames are made of glass fiber that is extremely stable, and has the same rate of expansion and contraction as glass. Because of this, the seals are less likely to leak with aging than frames made of other materials that expand at a different rate than glass. The windows are double pane and double-coated with materials that reflect summer sunlight and retain the long wave radiation from the heated interior of the home in the winter. They are Argon gas-filled for a lower conduction heat loss.

**Front Door “Walk-Off” Mats** are designed for outdoor use and secured in place to prevent slipping. Similar mats are installed at all entries. The mats can be removed for a thorough cleaning if necessary.

**Air-Lock Entry** provides a buffer zone between extremes in outdoor climate and the conditioned indoor environment. The tiled entry floor is easily maintained. A storage bin with seating is provided for those who prefer to take off their shoes when indoors. “Footsies” are available for anyone who wishes to use them.

**Red Oak Flooring** from the Missouri Ozark Forests is used throughout the home and finished with a low volatile organic content (voc) urethane.

**Lighting System** throughout the home is fluorescent with occupancy sensor switches located in those places where lights may not be switched off.

**American with Disabilities Act (ADA) – “Universal Design.”** The Accessibility Guidelines are followed for door and hall widths, lever rather than knob door handles and wheel chair spacing. We installed, per their recommendation, a higher toilet seat in the Master Bathroom, and lowered switches and thermostat for easier wheelchair access. A wheel chair can roll from the street to the first floor of the home without a step. A ramp can be provided for access from the garage. *Ask to see the architect’s drawing for the ramp.*

**As you exit from the inner air lock entry door**, the **dining room** entry is located on the left. Daylighting and ventilation are provided by windows on the north and east sides. The first door on the left opens to a **lavatory**. The second door on the left opens to a **stacked washer-dryer**. To the right, there is a multiple use room and the Master Bedroom and Bath. The first door on the right opens to stairs to the basement. Directly ahead of the corridor is the family room.

**Master Bedroom and Bath** are equipped with privacy shades opening from the top down as well as the bottom up. Windows provide day lighting and natural ventilation from the north and west sides. A walk-in closet and ceiling fan are provided. The air circulation created by Ceiling Fans can contribute major energy savings during the hot months of the year reducing the need for heat pump cooling.

**Master Bathroom** is designed for wheel chair access with a 5 foot clearance around the raised toilet seat. A hand rail is also provided. The tiled shower is large enough to accommodate a wheel chair or

bench. Flow rate for the Shower = 2.0 gallons per minute (gpm); Faucets = 0.5 gpm; Toilet = 1.6 gpf (gallons per flush).

**Half Bath/Lavatory** is located in the corridor to the left of the entrance. The faucet flow rate is 0.5 gpm.

**Laundry Room** design accommodates a stacked washer and electric dryer (there is no natural gas available in the subdivision) and is Energy Star Plus approved with a “modified energy factor” (mef) of 2.0 and a “water factor” (wf) of 5.21. The “mef” and “wf” numbers represent the amount of energy and water used for a “standard washing machine load.” This qualifies the laundry system for a “Very Efficient Clothes Washer” designation by the LEED Guidelines. The front loading washing machine is located below the dryer.

**Kitchen**, accessible from either the Family Room or Dining Room, has all “Energy Star” appliances for models that can be certified. The Kitchen counters are made of Quartz (Engineered Stone), the material that received top recommendations in the August 2007 issue of “Consumer Reports” magazine. The Kitchen is Energy Star efficient. It has a refrigerator with lower drawer freezer and ice-maker, an electric slide-in range, a microwave oven, and an automatic dishwasher and food waste disposer. All of the kitchen appliances are from Sears with on-site service from the company.

**Family Room** is located on the back (South) side of the home facing the Rain Garden. The roof extension over the large windows on the South side prevents direct sunlight from entering the room during the summer months when the sun is highest in the sky. The room is designed for day lighting with windows on the South and East side and French Doors accessing a small porch that can be used for cooking or enjoying the spring air and view. A ceiling fan is provided for comfort. The comfort conditioning system has been designed to provide transfer of the slightly warmer air coming from the sun heated south to the rest of the home, reducing the amount of electric energy required to maintain comfort during the winter.

**Two Car Garage** is accessible from the paved alley and is equipped with quiet belt-driven insulated power-operated overhead doors with Teflon coated rollers designed to minimize the noise of operation. Each door is separately remote controlled. The entrance to the Family Room, Laundry, and Kitchen from the garage is through an automatically closing fire-rated door. A ramp can be used to enable wheel chair access from the garage. *An architectural drawing is available along with commercial sources that sell these ramps.*

**Upstairs Bedrooms and Bath** are designed with windows on adjacent sides of the bedrooms providing cross ventilation and day lighted closets. The bathroom has two low flow (0.5 gallons per minute) lavatories, and a combination tub and water-saving shower head.

**Partial Basement with Adjacent Crawl Space** that includes a comfort conditioned storage area. In addition, two Safety Code “Egress Windows” are provided to allow direct exit from the basement. There is ample space for two additional rooms in the conditioned basement area. Also, there is provision for a future bathroom. *One possible arrangement is available and shown on a sketch provided by our architect, Greg Polanik; if interested, request a copy.*

**Basement** also contains a 200 Amp Electric Panel and Photovoltaic Solar connecting Panel. The Water Service Entrance, Energy Recovery Ventilator (ERV), Ground Source Heat Pump (with a connection for preheating the water entering the Water Heater) and a 60 Gallon Electric Water Heater. All meet LEED certification guidelines.

**Energy Recovery Ventilator** is a means of providing outside air ventilation into a tightly built home without wasting the energy put into conditioning the air in the home. The ERV exhausts about 90 cubic feet of air per minute while taking in the same amount of outside (fresh) air. In this home the air to be exhausted is taken from the bathrooms while the replacement air is delivered to the return air intake of the Heat Pump used to condition the home. About 60% of the energy in the air being exhausted is transferred to the incoming air. This ERV recovers both the sensible (dry) and latent (wet) heat.

**Ground Source Heat Pump (GSHP)** operates by using the earth rather than the outdoor air as a source of energy. Ground temperatures in the St. Louis area, as observed in Missouri caves, is a constant 51 degrees F. Outside air temperatures fluctuate in the St. Louis area between 5 and 100 degrees. Ground source energy is taken from the earth with piping immersed into three 150 feet wells.

A Heat Pump's operating efficiency is based on the temperature difference between the home's comfort temperature and the source of energy, (generally referred to as "heat sink"). For example, an "air to air" heat pump will be attempting to take heat from air for heating from outside air that could be as low as 5 degrees F. In the summer months the air to air heat pump will be attempting to cool the home by discharging heat into air with temperatures as high as 100 degrees F. Compare these temperature extremes with ground source temperatures that remain at 51 degrees F summer and winter! The difference in the Energy Efficiency Ratio (EER) or the Coefficient of Performance (COP) between the air to air and the air to ground heat pumps will average about double in favor of the Ground Source Heat Pump.

**As an added feature, the hot gases coming off the Ground Source Heat Pump during the summer months can be used to preheat the water going into the Electric Water Heater** – this reduces the amount of utility energy consumed by increasing the efficiency of the Heat Pump by about 60%.

**Electric Water Heater** is Energy Star and meets the criteria of the LEED-Homes Guidelines as a "Conventional High Efficiency Unit." The unit is well insulated and guaranteed for 12 years. The Energy Factor (EF) is 0.93 for the 60 gallon capacity heater.

**Roof Mounted Photovoltaic Cells** of the future have been anticipated with the addition of an electric switch box mounted on the basement wall, counterclockwise about 5 feet from the Main Electrical Panel. The other end of the wiring terminates in a switch box in the attic adjacent to the upper South facing roof. This is the South upper roof with the extreme 9 in 12 slope. This slope provides the optimum angle for the annual receipt of energy from the sun's rays. The pre-wiring is provided to minimize the future cost of installing the solar panels since it will not be necessary to damage walls, ceilings and floors to run connecting wiring to the solar meter located in the basement.

We hope you have enjoyed your Tour of Kimmswick-1. Thank you for giving us the opportunity to contrast the features of the Kimmswick-1 Energy Efficient 5-Star Plus and LEED Certified Home with conventional tract-built subdivision homes. The Mission of Applied Energy Solutions is to share information and methods by which home builders can provide a better future for all of our children and grandchildren through conserving our natural resources.

**We encourage all home builders to feel free to use our experience and expertise to build these energy and environmentally "green" features into their homes.**