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Project: Green Buildings & Rating Systems

## Green Buildings: Cranberry Ridge Home in Freeport, Maine

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### Overview

Cranberry Ridge is a 3200 square foot single family home in Freeport, ME. It was completed in the fall of 2006 and was one of the first homes to be awarded a LEED Platinum rating under the LEED For Homes pilot program. This house was the first LEED project for builder Tim Wright and his company, Wright-Ryan Construction. In this paper I will start by giving an overview of LEED For Homes. I will then look at the categories of LEED credits and examine what features the Cranberry Ridge home employs.



As my interest lies more in residential than commercial structures, I chose this building because it was one of just a few homes to achieve LEED's highest rating. Unfortunately, however, my attempts to contact the parties involved in the design and construction were unsuccessful. I attempted to contact the builders, the LEED consultants, and the real estate agency that sold the building. The only response that I received, however, was from the real estate agent, who responded with a question of her own, and then did not respond to my answer. As such, I am limited to what information I have been able to find regarding this house. Fortunately, Wright-Ryan Construction posted updates of their progress online throughout the project and has kept these postings available, providing some insight into the building process.

### LEED For Homes

LEED For Homes rates houses in eight categories: Innovation and Design Process, Location and Linkages, Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, and Awareness and Education. Points can be awarded in any or all of these categories, and there are certain prerequisites for certification that

must be met in some of the categories. Minimum baseline levels of certification are 45 points for Certified, 60 points for Silver, 75 points for Gold, and 90 points for Platinum. The maximum number of available points is 136.

While these point values are the standard amounts, the Home Size Adjustment works to compensate for homes of above or below average size. As a smaller home will almost always use less energy than a similarly equipped larger home, the Home Size Adjustment lowers the required points for certification for small homes and increases it for large homes. Based on the number of bedrooms and the total square footage of the house, the minimum levels may be adjusted up or down by up to 10 points.

The Cranberry Ridge home received points in each of the eight LEED for Homes categories, accruing a total of 95 points. It appears that it should have lost 6 points based on its size (a 3200 square foot residence with 4 bedrooms) as part of the Home Size Adjustment. It seems as if this would have raised the threshold for Platinum certification to 96, however, leaving them one point short. As the house does have a platinum rating, however, something must be off in these numbers. It may be that a fifth room was claimed as a bedroom, thus reducing their adjustment to 3 points.

### Innovation and Design Process (ID)

The Innovation and Design Process category is broken into three subcategories: Integrated Project Planning, Durability Management Process, and Innovative or Regional Design. For the Cranberry Ridge home, there were three principle groups that worked together on the design process: Richard Renner Architects, Wright-Ryan Construction, and Fore Solutions (LEED AP project consultants). These three parties worked closely from early on in the design process to form a cohesive plan that brought together the different systems and requirements that were necessary to make the project successful.

The 90 tube solar thermal system required particular attention to deal with the weather extremes that are found in coastal Maine. In designing a solar thermal system that is capable of providing heat and hot water in the winter, the result is a system that may excessively heat water in the summer. To deal with this, the system was designed with what amounts to a heat-overflow system, redirecting excess hot water into pipes embedded in the concrete slab beneath

the garage. The earth beneath the slab acts as a heat sink, drawing away the excess heat from the hot water system.

### Sustainable Sites (SS)

The Sustainable Sites category is broken into six subcategories, covering things such as landscaping, erosion control, and surface water management. The Cranberry Ridge home incorporated many of the concepts from this category into its design. Efforts were made to minimize the footprint of the building, leaving between 40% and 50% of the site undisturbed. These parts of the site were marked off to prevent parking and other activities from taking place on them. Porous surfaces were used for both the driveway (gravel) and the walkways (concrete pavers) so as to reduce surface runoff and erosion. Silt-fencing was also installed around the site to further reduce erosion during construction. Drought resistant and native plants were used in the landscaping to reduce the need for watering, and the plants were sourced from local cooperatives to reduce the need for transportation.

### Water Efficiency (WE)

I was unfortunately not able to find much information on the water systems in this building. The only mention of indoor water systems was a brief note that the kitchen fixtures used “40% less water” (less than average, I can only assume). In terms of outdoor water usage, drought tolerant landscaping plans were used and grassed surfaces were kept to a minimum to eliminate the need for outdoor irrigation.

### Energy and Atmosphere (EA)

With 38 available points, the Energy and Atmosphere category is the largest in LEED for Homes. This category includes areas such as insulation, windows, hot water, lighting, and renewable energy. The Cranberry Ridge home utilizes many features that fall under this category. Both photovoltaic and solar thermal systems are used in this building. The 2.4 kilowatt photovoltaic system is tied into the grid, allowing energy to be drawn when needed and poured back into the grid when excess power is being generated. Once this system had been installed, it was used to power much of the remainder of the construction. Heat recovery units have been installed on the air handling system to use the temperature of the waste air to preheat

or pre-cool the incoming air, thus reducing the energy needed to bring it to the desired temperature.

Insulation for this building was sourced from WarmTech Solutions, a local company that specializes in installing Nu-Wool cellulose insulation. Nu-Wool cellulose insulation is made from recycled newspaper with a borate binder, providing a tight barrier that is resistant to mold, mildew, pests, and fire. After the installation, a blower door test was performed to determine the quality of the building envelope. The building received a test rating of .12 Air Changes per Hour at an indoor/outdoor pressure differential of 50 Pascals, earning the maximum of 2 LEED points. As this was done before all trim work was finished, the final result may be slightly better. In addition to high-quality insulation, high efficiency windows were sourced from Thermotech, a Canadian company specializing in high performance windows.

### Materials and Resources (MR)

Materials and Resources covers three categories: Materials Efficient Framing, Environmentally Preferable Products, and Waste Management. A maximum of 16 points are available in this credit category. Wright-Ryan utilized an efficient framing design to reduce framing materials by 20%, spacing joists, rafters, and wall studs at 24” on center, rather than the standard 16”.



Both interior and exterior framing were done with Forest Stewardship Council certified lumber. Siding and exterior trim were purchased from a local supplier and were harvested within 500 miles of the construction site. Cabinets and interior trim were done with a combination of Dakota-Burl (composites made from renewable materials) and FSC certified wood.

Recycled materials were used in construction, and all recyclable waste materials were separated from the general construction waste. 83% of waste material was recycled, including waste wood and drywall, earning all three available Waste Management points. Environmentally friendly products were used in much of the construction, including locally produced materials (such as Maine granite countertops), low VOC finishes, materials containing post-consumer recycled content, and sustainably harvested lumber.

### Indoor Environmental Quality (EQ)

The Indoor Environmental Quality category offers a maximum of 21 points towards LEED certification. This category covers ventilation and contaminant control, moisture control, and protection from exhaust fumes from vehicles and internal combustion sources, such as a wood stove or fireplace. The Cranberry Ridge home earned 15 of these 21 points. Carpeting was avoided in this building to reduce airborne particulates, and low-VOC finishes were used on the wood floors. Natural-fiber floor mats were used at the entrances to reduce the amount of particulates that were brought into the house.

### Awareness and Education (AE)

The Awareness and Education category offers 3 LEED points for educating and training the owners and occupants of the building on the proper use and maintenance of its systems. In this case, an “owner’s manual” was provided with explanations of the various systems and instructions for their use.

In addition, this project contributed much to the public knowledge of LEED and green building design through one unintended method: its failure to sell quickly. The house was completed in the Fall of 2006 and went on the market in October of that year for a cost of \$990,000. The sale of the house was taken over by Legacy Properties in March of 2007, and the price was raised to \$1.1 million. In October of 2007, the price was reduced to \$895,000. The house finally sold in April of 2008, though I was not able to obtain a final price. By virtue of spending so much time on the market, this house was seen by numerous groups and individuals, both perspective buyers and those who were simply interested in seeing a green building. As such, it proved to be a useful educational tool for the community at large.

### What else could have been done?

As a platinum certified LEED home, the builders, architects and consultants certainly went to great efforts to reduce the environmental footprint of their building. On-site energy production, a tight building envelope, heat recovery systems and efficient use of materials all contributed to minimalizing the impact of the structure. The two main areas in which I see room for improvement (in terms of sustainability) are the building size and location. At 3200 square feet, this is not a small house. While this size may be necessary for a large family, for a house

that is doing so much to reduce its impact, its size is a detriment. In addition, the location of the house is such that walking to and from most destinations is not an option. It was built on a greenfield site near the edge of Wolf Neck Woods State Park. While I cannot really fault them for this, as I would certainly appreciate its location, it does slightly deduct from its overall environmental claim.

All in all, this seems like a well designed and well implemented project. I was unable to contact the current occupants, however, and so I do not know how the systems have actually performed. As it appears that the builder has a strong interest in green construction, however, I imagine that they aimed for a high quality product. Regardless of the details, however, it appears to have been a valuable experience for the primary builders and their subcontractors, who now have the skills to move on and implement these features in future building projects.

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