

Hot, Humid Climate Region 40+% Energy Savings



Bob Vila Demonstration Home Punta Gorda, FL

Developer/Owner:	Mercedes Homes
Location:	Punta Gorda, Florida
Building Type:	Single Family Detached
Building Size:	2,413 sq ft
	4 bedrooms, 2 baths
Price:	\$419,800
Status:	1 completed
SWA Contact:	William Zoeller

CARB partnered on a demonstration home that was featured in Season 16 of the nationally syndicated television show *Bob Vila's Home Again*. In August 2004, Hurricane Charley destroyed the 40-year-old home of a Punta Gorda, FL couple. Home improvement guru, Bob Vila, teamed up with the nonprofit Federal Alliance for Safe Homes (FLASH®), Mercedes Homes, Building America's Consortium for Advanced Residential Buildings (CARB), the Federal Emergency Management Agency (FEMA), and others to build the couple a new home.

Built by Florida production builder Mercedes Homes, this new home is not only more resistant to the howling winds that took the roof off their old house and flung it into a nearby canal, it also features innovative ways to save energy. A participant in the Building America Program since 2000, Mercedes has worked with CARB extensively to improve the energy-efficiency and hurricane-resistance of their homes. This home achieved 48% whole-house source energy savings over the Building America Benchmark (comparable to mid-1990s construction).

With technical assistance and design support from CARB, Mercedes redesigned their homes to withstand the severe weather conditions faced in the Florida coastal climate. Incorporating Mercedes' hurricane resistant design package, this demonstration home was constructed of cast-in-place concrete with a structural system designed for integrity. The home features 6" concrete walls, impact resistant windows, wind-driven rain resistant soffits and roofing, and other hurricane resistant specifications.

With support from a number of manufacturing partners, CARB helped the design team showcase simple ways to reduce energy consumption in the home. Not only is this home capable of withstanding the severe impacts of the environment, the energy saving measures reduce the impact the home has on the environment.



"Hurricanes don't just endanger homes, they threaten homeowners. This project is a great demonstration of what we can do to lessen the damage and better protect our families."

- Leslie Chapman-Henderson, quote from FLASH News

ENERGY EFFICIENT FEATURES

- PGT aluminum frame IG low-e impact resistant windows (U-0.45, SHGC-0.35)
- Blown fiberglass insulation (R-30) for ceiling
- 6" poured-in-place concrete exterior walls w/ 3/4" rigid polyisocyanurate (R-5)
- Elevated slab-on-grade foundation
- Air-source heat pump (SEER 14 / 8.6 HSPF)
- 40 gal electric tank water heater (EF 0.91)
- Foamed over, buried ducts
- Supply-only ventilation
- 100% compact fluorescent lighting
- Energy Star® Appliances

GREEN BUILDING FEATURES

- Storm-resistant landscaping

<http://www.mercedeshomes.com/>



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Punta Gorda, FL

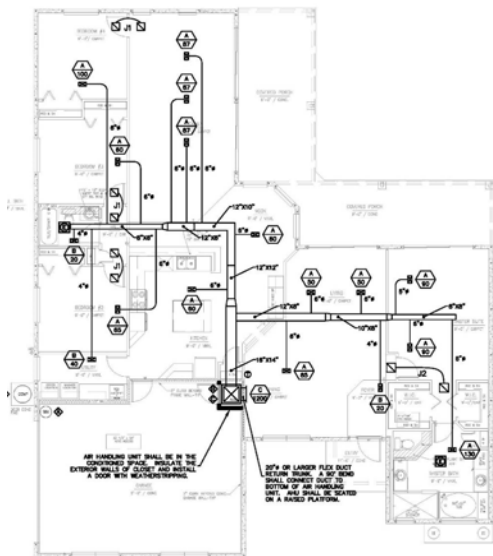
Engineered HVAC System

CARB designed the heating, ventilation, and air conditioning (HVAC) system for this home. In addition to downsizing the ductwork, there were a number of benefits to a well-designed HVAC system.

First, a properly sized system presented an opportunity for cost-shifting. Smaller equipment costs the builder less money, which was then invested in other improvements, such as upgraded windows and increased insulation.

Second, the engineered HVAC system was designed for the home's heating and cooling loads. This ensures optimal run-time of the equipment and improved comfort conditions. Oversized cooling equipment cycles on and off more frequently. A right-sized air conditioning unit runs for longer periods of time, which provides better control of the humidity in the living space and improves occupant comfort.

Lastly, a duct system that has been properly designed and installed can improve comfort and energy savings. By designing the duct layout in advance, the system was coordinated with the floor plan of the home. Each run was laid out to minimize bends and junctions and reduce material waste. Each duct run was sized to provide the appropriate amount of airflow to each room. Again, the ducts are smaller, which facilitates the foamed over, buried ducts strategy. Tightly sealing the ducts ensures that the conditioned air reaches the living space, rather than being lost to the vented attic.



Foamed Over, Buried Ducts

CARB has done extensive research on practical approaches to improving the energy-efficiency of a home's air distribution system. CARB has found the best location for ductwork is within the conditioned envelope. Unfortunately, coordinating the ductwork with the floor plan can be challenging and costly. Although using soffits and chases to conceal ductwork can be a practical solution, it can create complications in plan integration and can add significant cost.

In a single-story home, such as this prototype, the ductwork is typically hung from the trusses in the attic. The large temperature difference between the hot attic air and the cold conditioned supply air can result in a considerable amount of wasted energy. In addition, any air leakage from the ducts is lost to the attic.

To minimize the duct losses both from poor insulation and leaky duct connections, CARB recommended covering the ducts with a 1-inch layer of two pound, bio-based, polyurethane, spray foam insulation. With an insulating value of R-7 per inch, the foam increases the surface temperature of the ducts enough to prevent condensation. This is critical in avoiding mold and mildew problems. The foam also expands, which provides the added benefit of excellent duct sealing.

Once the ducts are sealed with foam, they can be buried deep under the attic insulation without raising concerns over moisture problems. The depth of the attic insulation will add a significant insulating value, which could not be achieved with the standard insulation wrap found on flexible ductwork. To attain the highest R-value on the ducts, it is important to have the system installed correctly. The ducts must lay flat against the attic "floor". Otherwise, it is difficult and costly to properly cover them with blown-in insulation. More importantly, the foam must fully cover the ductwork. This was not done during the first inspection and had to be fixed.



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