

Nashville, Tennessee

WOODLAND GROVE POCKET NEIGHBORHOOD



CHALLENGE

Selecting an HVAC system for high-performance homes between 1,100 and 1,800 in square footage

SOLUTION

Mitsubishi Electric Zoned Comfort Solutions®

RESULT

Energy-efficient homes with optimal comfort year-round

Woodland Grove is a pocket neighborhood developed by Paragon Group (Paragon), a Nashville-based home builder that specializes in energy-efficient, high-quality homes. The owners of Paragon were inspired to build the neighborhood and its 16 Craftsman-style cottages after reading *Pocket Neighborhoods: Creating Small Scale Community in a Large Scale World* by Ross Chapin.

In contrast to neighborhoods where proximity rarely equals familiarity, pocket neighborhoods encourage residents to mingle and cultivate a feeling of shared community. The social cohesion in neighborhoods like Woodland Grove is intentional and facilitated through design, as Adam Trapani, quality manager, Paragon, describes, “The houses in Woodland Grove are in a pocket and arranged in a ‘U’ shape so that they face each other and a central community courtyard. Architecturally, we design the houses so that they are very social in the front and very private in the rear. The homes have front porches

and the communal space includes elements like walking paths and nice gardens.

The communal space has no motorized vehicles because we placed parking in the rear on a lot built of pervious concrete that pipes rainwater to the garden within the courtyard. For privacy, bedrooms are located toward the back of the house. So, people have their privacy, but they also have opportunities to socialize with their neighbors. And the concept works! It’s been fun to watch neighbors wave as they walk their dogs and find new friends every time someone buys one of the homes.”

HIGH-PERFORMANCE IN THE POCKET

Paragon built and maintains its reputation by constructing high-performance homes. Accordingly, the Woodland Grove homes include low-E windows, spray-foam insulation, a monolithic slab and compact, fully-insulated ductwork. “We mostly do speculative homes and communities.



Energy efficiency is big for us and impacts our selection of mechanical systems, the kind of insulation we use and other design elements,” said Trapani. “We build very tight building envelopes that typically clock in at less than two air changes per hour. All of our attics are encapsulated and conditioned. We prefer to build on a monolithic slab so that we don’t have any of the common moisture problems that you have with basements and crawlspaces in the South. All of our exterior walls and roof decks are spray foamed.”

For highly-efficient heating and cooling, Paragon selected Mitsubishi Electric Zoned Comfort Solutions®.

“At Woodland Grove, we have three basic home designs and floor plans. Working with our mechanical contractor, who we have a great relationship with, we divided the designs into three different categories of mechanical need, noted Trapani. “We agreed that one of those categories was best suited for the Mitsubishi Electric system.”

Mark Gray, vice president of South Nashville Heating & Cooling, Paragon’s mechanical contractor, designed the HVAC systems and ductwork for the Woodland Grove homes. He calculated room-by-room loads, cubic-feet-per-minute (cfm) requirements, and air-distribution requirements per Manual J®, Manual S®, Manual T® and Manual D®

published by Air Conditioning Contractors of America (ACCA). Recognized with Diamond Contractor® Elite status, South Nashville Heating & Cooling has in-house installers and provided all installation work in addition to the design. Gray and his team recommended a combination of variable-capacity ducted and split-ductless systems for the cottage.

“The way the framing worked out, along with the square footage and the loads on each floor, there was no way to make a conventional zoning system work and have an air handler in the attic that served both floors,” said Gray. “We recommended a Mitsubishi Electric system. A lot of Paragon’s houses are ideal for the mini-split option because they have an open main floor with a live-in kitchen. Upstairs, they might have two or three bedrooms and a couple of bathrooms. It’s a perfect application for a hybrid approach where you’ve got two ductless air handlers for the main floor and kitchen area, and a ducted system in the attic to condition the second level. Also, we get really good pricing on Mitsubishi Electric units for Paragon’s projects so the cost difference with a conventional system is only in the range of \$700 to \$800. When you consider the value of the efficiency you get with a Mitsubishi Electric system, that difference isn’t much.”

Efficient in terms of energy usage, design and space optimization, the equipment specified per cottage included the MSZ Wall-Mounted Indoor Unit, the SEZ Horizontal-Ducted Indoor Unit and the MXZ Outdoor Unit with Hyper-Heating INVERTER® (H2i®) technology. “With these systems, you can take on all of the challenges you would have

“As far as the homeowners are concerned, it’s been nothing but positive: comfort, ease of use and for these all-electric houses, low utility bills. Everybody is happy.”

— Adam Trapani,
Paragon Group

with a conventional system in the South, like short cycling and humidity issues, and have greater efficiency for a similar price,” said Trapani. “You get a variable-speed blower and a variable-speed inverter (compressor) plus they’re easier to install, which shortens our build cycle and they take up less space. Instead of using trusses we can use I-joists. We’re saving on lumber and we’re not taking up room that other contractors like plumbers and electricians are fighting for.”

INSULATED AND COMPACT DUCTWORK

The compact ductwork utilized by the low-static, SEZ Horizontal-Ducted Indoor Unit is fully insulated per Paragon's requirements. "Most of our duct systems have two percent leakage at the most. We use 251 2-inch duct tape on all of our joints and seams and then apply water-based mastic sealant. Then we insulate with 3-inch R8 insulation and 337 3-inch foil-chrome tape which we paint over with mastic sealant, so it never breaks free from the vapor barrier," noted Gray.

Additionally, minimizing ductwork reduced time and installation costs. "The installation was very easy. With a house like this, the Mitsubishi Electric system cut down on a lot of labor," said Gray. "Everything was done in two to three days. For downstairs, all we had to do was run copper for the ductless air handlers and the duct system for the SEZ is very small. It's 5 feet of 10-inch trunk line and 5 feet of 8-inch trunk line with 10-foot branch lines."

COMFORT FOR ALL SEASONS

The ducted and split-ductless indoor units selected to condition the Woodland Grove homes are connected to MXZ outdoor units equipped with H2i technology, which enables the heat pumps to provide energy-efficient comfort all year without auxiliary systems.

"In Nashville, design conditions are 70°F indoor and 15°F outdoor for heating," noted Gray. "The H2i models maintain 100 percent capacity down to 5°F, so no backup heat was needed."

Allison Murray, one of the Woodland Grove homeowners, said, "We have two Mitsubishi Electric units downstairs. When we first moved in it was pretty hot outside, but the house stayed cool. It's been use and for these all-electric houses, low utility bills. Everybody is happy. Here in the United States, people aren't necessarily used to seeing wall-mounted indoor units. During our sales process we have to help homebuyers understand that the 'weird thing' on the wall is a very good thing. Once you see the light bulb go off and they understand the benefits, they're totally on board."



PROJECT TEAM

Builder:

Paragon Group, Nashville, Tennessee

Mechanical Contractor:

South Nashville Heating and Cooling, Nashville, Tennessee

EQUIPMENT

- ▶ (1) MXZ M-Series H2i® Outdoor Heat Pump
- ▶ (2) MSZ Wall-Mounted Indoor Units
- ▶ (1) SEZ Horizontal-Ducted Indoor Unit
- ▶ (1) MHK-1 Controller