Mega Homes Require Thought, Planning

Large House Projects Present Challenges and Opportunities, Offer Grand Return on Investment

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Most Americans are happy to live in an average-size house, which is around 2,300 square feet for a single-family home, according to the U.S. Census Bureau. Others prefer to have a little more elbow room, and for them, a 10,000-square-foot home or larger may be just the right size. And chances are good these homeowners are willing to pay whatever it takes to ensure they are comfortable in their plus-size dwellings.

Working on these mega homes is a great opportunity for HVAC contractors, but there can also be many challenges in this line of work. As Dan Foley, president, Foley Mechanical Inc., Lorton, Virginia, noted, these projects often involve difficult clients, demanding general contractors, and exacting architects. "You have to be prepared to deal with issues, surprises, and problems, and handle them in a professional manner."

Technicians from Foley Mechanical install ½-inch PEX-a tubing in an application in Washington, District of Columbia.

Ceilings often get crowded once piping for geothermal, radiant, air distribution, and plumbing systems are installed. *(Courtesy of William Jannone & Sons Inc.)*

For this private residence in Bethesda, Maryland, Foley Mechanical technicians install geothermal manifolds in a concrete vault.

Foley Mechanical's lead technician, Dragon Vucelja, prepares a geothermal manifold for installation in a mega home.

Planning Required

Working in metro Washington, District of Columbia, Foley has plenty of experience designing HVAC systems for mega homes, which he defines as 10,000 square feet or larger. This area emerged relatively unscathed from the financial crisis and economic downturn, and with the federal government fueling the local economy, it boasts some of the priciest real estate in the country. Not surprisingly, approximately 40 percent of Foley's annual revenue comes from designing and installing systems for these outsized homes, usually in partnership with five or six local architects.

Designing systems for mega homes is not for every contractor, as it requires a very different approach than the process used for tract homes. "The main difference is that you can get in trouble in a hurry," said Foley. "If I screw up a change-out, the worst-case scenario is that I go back and redo the job, and it's maybe $5,000 or $10,000. It pinches, but it won't put me out of business. Some of our contracts for mega homes run over $2 million. A mistake on these projects can put me out of business."

That is why the planning process is so important, said Gregory Jannone, president, William Jannone & Sons Inc., Bound Brook, New Jersey, who has been working on mega homes for more than 20 years. "There's a lot that goes on before you ever install a piece of equipment in one of these homes. The planning process can take months because these projects require many meetings and discussions and are very paperwork-intensive. All aspects of the mechanical systems are discussed, and layouts are all drawn out, sometimes in 3-D to make sure there is ample room for placement of all equipment."

That last point is especially important, because even though the house may be huge, that does not mean the architect has left a lot of space for the mechanical systems. Jannone noted that it is often a challenge to not only make sure the equipment fits, but to make sure it is easily accessible for proper service and maintenance. "On some jobs, they want us to put all the piping and ductwork in the ceiling,

and it really doesn't fit. So we often have to alter or reinforce the steel because the architect does not want to lower the ceiling 2 inches due to aesthetics and millwork."

Sometimes the failure to plan rests on the shoulders of the general contractor, and that can cause problems, as well. "Many times, the general contractor doesn't look ahead or plan the job very well. When that happens, it is difficult to keep the project on schedule because we are constantly reacting instead of planning," said Paul DeHart, president, Bolster–DeHart Inc., Pittsburgh. That is why it is necessary to add extra man-hours to these types of jobs, he said, because there is a lot of time spent in meetings or waiting on decisions to be made by the homeowner and/or architect.

Jannone agrees, noting these projects take a lot of time, with some homes not being completed for two to three years. "These don't move at the pace of a typical tract house — they're not going to be done in three months. There are down times while waiting for decisions to be made, and, overall, there's just a lot more labor involved because you can't move at a fast pace. For example, we can talk about where we're going to put a thermostat on a wall for four hours."

That is why it is so important to understand how much time these projects require and build it into the contract, said Foley. "The costs of doing business can change — insurance, fuel, materials can all increase substantially over time. I build escalation clauses into my contracts to allow for re-pricing of unfinished work if the timeline increases beyond the budgeted amount. It is also important to read the general contractor's subcontractor agreements and contracts, and remove unfavorable clauses such as pay-when-paid clauses. We submit billing on an American Institute of Architects (AIA) form on the 25th of each month and expect payment by the 10th of the following month."

Out of Sight

HVAC systems for mega homes can run anywhere from $500,000 to more than $2 million, and for that price homeowners expect to be extremely comfortable. "I never lose sight that our number one goal is to provide comfort, and our number two goal is reliability," said Foley. "Efficiency is important, but it is meaningless unless the systems function reliably without breakdown and the homeowner is comfortable. That is why we typically build in redundant systems to prevent leaving a client without heating, cooling, or domestic hot water."

Most owners of mega homes would also rather not see their HVAC equipment, said Jannone, which is one of the reasons why geothermal systems are becoming so popular. "A lot of homeowners like the efficiency of geothermal systems, but they also like the fact that there are no condensing units. In fact, not seeing the equipment is one of the driving forces on a lot of these jobs. If the job calls for condensing units, they're often put down in pits with grates over them, so you can't see them when you look at the house."

Regardless of the type of systems selected, it is good practice to commission them after installation. To ensure the equipment operates as designed, DeHart's installers use startup sheets to test for gas leaks, static pressure, temperature rise, temperature drop, refrigerant pressures, and subcooling. "We also review the systems, thermostats, basic maintenance, and zoning."

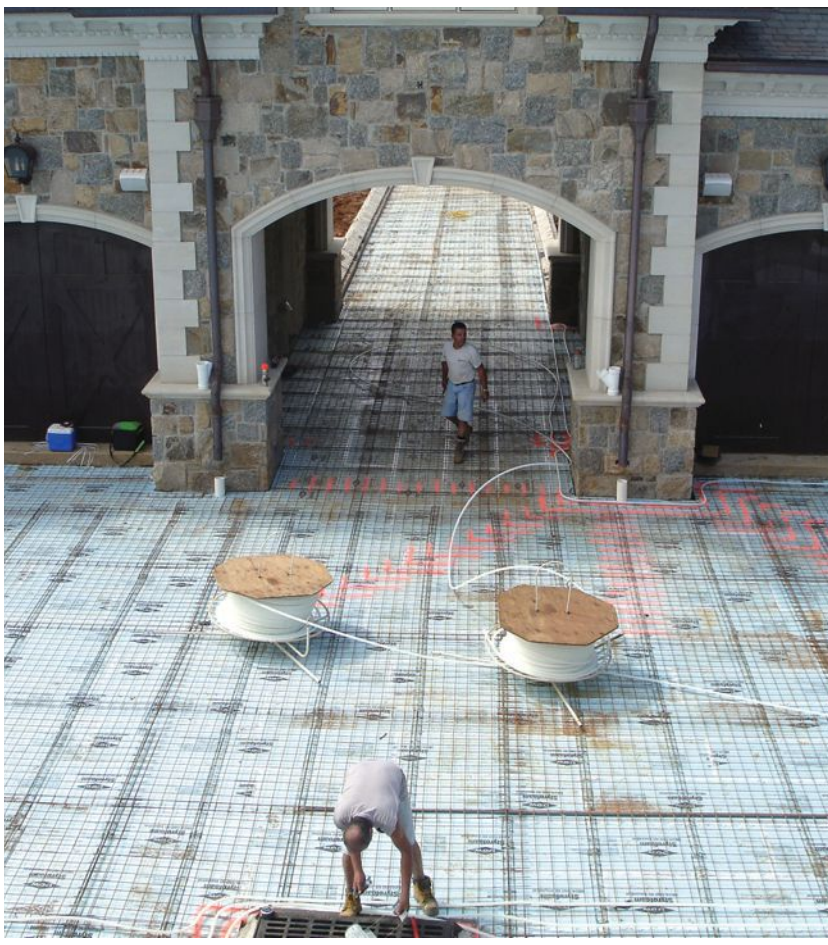
Jannone starts the commissioning process by flushing and cleaning the piping systems with specialized fluids, then filling them with the appropriate heat-transfer medium (e.g. water, ethanol, or propylene glycol). That is followed by a thorough cleaning of all equipment, including the ductwork, and having an independent, certified company balance both the air and water sides to system design parameters. "We record all the information and follow all manufacturers' startup procedures for the equipment. Finally, we provide as-built documentation of all piping, ducting, wiring, and equipment for the systems installed."

To document the commissioning process, Foley uses reports developed by National Comfort Institute, which have been modified for his company's particular needs. "All of our mega projects have commissioning reports, which we compare with the design documents. These jobs must be commissioned in order to guarantee we deliver a comfortable, efficient system per contract documents."

Designing HVAC systems for mega homes is not for the faint of heart, as projects can last for years, and staying on top of labor costs, change orders, and cash flow can be difficult. That being said, Foley does not hesitate to recommend this type of work.

"These jobs are definitely a challenge and that is what I enjoy most about them."

Lead technician Harvey Youker of Foley Mechanical connects ½-inch PEX tubing to a manifold on a new home in Warrenton, Virginia.



Above: Mega homes often include the installation of a snow-melting system. **Left:** A grand home deserves a grand snow-melting system beneath its driveway. *(Photos courtesy of William Jannone & Sons Inc.)*