

# The 1st LEED Platinum Daikin VRV High-Rise

**General Contractor:**

Donohoe Construction Company

**Architect:** Shalom Baranes Associates

**Engineer:** Allen and Shariff Corporation

**Contract Amount:** \$4,850,000

**Start Date:** 11/10/2011

**Scheduled Completion Date:** 2/13/2013

**Actual Completion Date:** 12/15/2012



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## Challenge

Shapiro & Duncan's scope of work for this 255-unit apartment building, which was constructed to become the first Daikin VRV high-rise multi-family building in North America to achieve LEED Platinum certification, includes:

- Three-dimensional building information modeling (BIM) coordination for mechanical, plumbing, electrical and sprinkler systems;
- Installation of ASI controls by our Controls Department; and

Installation of mechanical equipment and systems including AAON rooftop units; 256 Daikin variable refrigerant air handling units (AHUs) requiring more than five miles of refrigerant pipe; exhaust fans manufactured by S&P, TPI, Aerovent and Broan; and Markel electric heaters.

Two main challenges had to be overcome in completing this scope of work. First, mechanical system and controls had to be designed to provide the owner with the ability to track and bill tenants for HVAC usage independent of the rest of their electrical consumption.

Second, from an engineering standpoint, the BIM process and our fabrication capabilities were critically important in finding a way to route the nearly five miles of refrigerant piping in a confined ceiling space along with outside air ducts, sprinkler piping, electrical wiring and coaxial/fiber optic cable.

At the same time, all of the mechanical, plumbing, sprinkler and electrical equipment – including air handler, hot water heater and hot water expansion tank – had to be closely coordinated and fitted into each apartment mechanical closet.

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## *SOLUTION: PREFABRICATION AND BIM*



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### **Solution**

Close coordination with all of the building trades would be essential in putting Shapiro & Duncan's engineering plan into action and making everything happen on time and within budget.

When it came to sequencing installation of equipment in the 253 mechanical closets, our 51,000-square-foot fabrication shop in Landover, MD rose to the challenge by building full scale mockups of each of two differently-sized mechanical closets. Creating these replica mechanical closets in a controlled environment allowed us to establish an organized order of installation among all of the trades (plumbing, electrical and drywall/finishing), which in turn resulted in labor savings for all trades and for our client. Pre-fabricated items included refrigerant pipe racks and specialty fittings; condensing unit roof supports; and the more than 250 apartment air handling unit (AHU) stands.

All of the refrigerant piping was fabricated and tested at the fabrication shop, then brought out to the job site in finished 18 foot racks which could be raised to the deck and quickly connected. By not having to build the piping system on the job site, Shapiro & Duncan was able to maintain a tight installation schedule and keep all the other trades moving.

BIM coordination was another key element of our solution. Using our BIM process kept fabrication of piping racks straight and level, allowing us to overlay dimensions on the virtual background and run clash reports. Working out these potential problems by pointing, clicking and dragging is a lot easier than cutting and re-piping on the job site. By minimizing rework in the field, our BIM process streamlined and sped up installation – ultimately saving on labor cost and material waste.

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## Result

Thanks to the coordination enabled by Shapiro & Duncan's BIM process and fabrication shop, a completely functioning turnkey project was delivered two months ahead of schedule. At all stages of the project, our team was able to meet or exceed completion dates and timelines. In addition, 2400 14<sup>th</sup> St. N.W. will achieve certification as the first Daikin VRV high-rise multi-family LEED Platinum building in North America.

The project has become a showcase for the results of our BIM process and fabrication capabilities, with numerous clients and competitors stopping by the building to see the results of our expertise first-hand. According to Andy Beal, sales engineer with Havtech (equipment supplier on this project), "Shapiro & Duncan is the US Marine Corps of HVAC. When the shooting starts, dust is flying and everyone is running away, they grab their tools and head into the chaos. When it comes to pulling off challenging projects with tight deadlines and tight budgets, Shapiro & Duncan has the firepower in their people and facilities, at all levels, to get the job done."