



Carilion New River Valley Medical Center

Radford, Virginia

Carilion New River Valley Medical Center Designed for Tomorrow's Treatments

Poised below the brow of a ridge in the foothills of western Virginia, a new medical facility demonstrates the changes in the field of health care. The Carilion New River Valley Medical Center near Radford, Virginia, embodies trends toward regionalization, extended outpatient care, and advanced diagnostic tools. This facility replaces an older hospital in the center of the city of Radford.

In earlier times, the size of a health care facility was gauged on the number of inpatient beds. The replacement here has 97 beds, where the old facility had 175. Yet the new facility, at 249,000 square feet, is some 100,000 square feet larger than the previous facility. This does not include a 49,000 square-foot medical office building, which is also incorporated in the structure. This comparison symbolizes the new world of patient care, where hospital stays are shorter, many treatments are managed on an outpatient basis, and the space needs for diagnostic and therapy tools have expanded.

Facility Serves a Wider Area

The new facility, a unit of the Carilion Health System headquartered in Roanoke, has increased capabilities

New Medical Center Reflects Changing Patient Needs



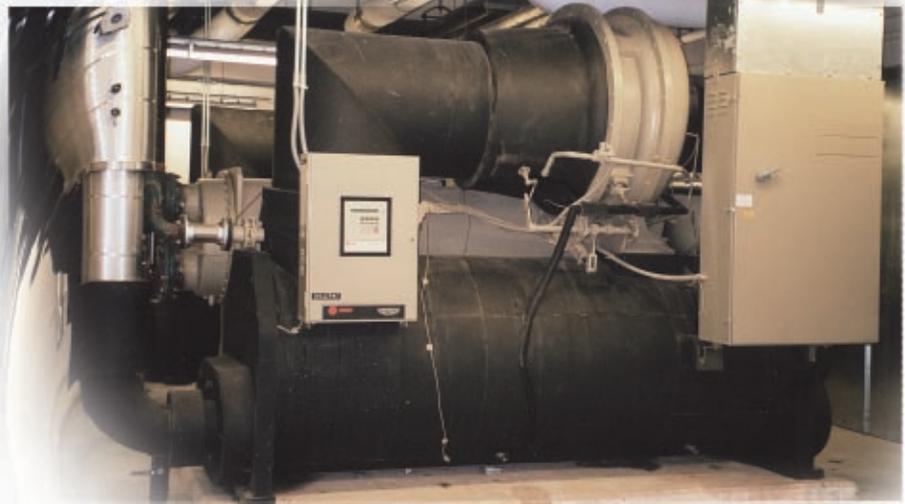


Hospitals are always changing, evolving.

for patient care. It serves a wider geographic area as the primary care center than the earlier facility. Plans for the new facility began with a functional space study in 1995. Bill Copening is the manager of engineering and maintenance at the facility. Pointing at various early building designs, he tells how the entire building concept evolved to meet changes in the health care field as well as to take advantage of the large hillside site. "Hospitals are always changing, evolving. We were starting with a clean sheet and could design for the future."

Using extensive input from the Carilion group, the architect, HKS from Dallas, finalized a function-driven design for the building in 1997. The design takes advantage of the scenic hillside location with five functional wings looking out on the valley below. The wings are connected by common service, administrative and diagnostic facilities.

The center includes a wide range of facilities including laboratories, an emergency care center, hydrotherapy pools, and cardiac rehabilitation services. Support services include a large cafeteria, a community daycare center, management and administrative offices. Additionally, the facility includes the medical office building, which is leased to participating medical practices and is administered independently. The medical office area shares in many of the facility services including parking, building comfort systems, and utilities.



Remote Mechanical Plant Chosen

The engineering firm of Hayes, Seay, Mattern & Mattern (HSMM) designed the mechanical plant for the facility. A key feature of the system is the remote mechanical plant for emergency generation, water-cooled chillers, cooling towers, and boilers. The freestanding plant is approximately 150 feet from the main building. This approach was chosen to reduce the acoustic impact on patient care areas and to simplify future campus expansion. It also turned out to be a lower cost method than including the mechanical plant in the main medical center building.

According to Calvin Witt, principal associate at HSMM, "Chilled water cooling for new facilities is driven by Virginia hospital regulations, which require high ventilation levels." The system installed in the New River Valley facility features two Trane Model CVHF CenTraVac™ centrifugal chillers rated at 600 tons each. The engineer also considered gas-fired absorption for this application, but ultimately went with an electric centrifugal system because of favorable electric rates and the size of the load. The chillers are installed in a decoupled loop arrangement to simplify control and promote system efficiency.

Witt notes that the chillers operate at .578 kW/ton at full load and .53 kW/ton at APLV. The units are nearly fully loaded at summer peak hours. The system is operated to deliver chilled

Centrifugal chillers are installed in a decoupled loop arrangement to simplify control and promote efficiency.

water at 42°F, and down to 39°F when the outdoor temperature goes above 90°F. The condenser water from the towers is typically 85°F. The mechanical plant was designed to allow installation of additional chiller capacity as needed by future expansion of the medical campus.



The modular characteristics of the Trane T-Series Climate Changer rooftop air handlers make them ideal for healthcare applications.



The theme at the Carilion New River Valley Medical Center is responsiveness to patient needs.

The comfort conditioning requirements for the new building were not only rigorous, but also varied for the different use areas. Copening cites differing temperature and ventilation requirements for operating rooms, meeting areas, and patient rooms. These varying requirements led the engineer to specify rooftop air handlers to serve most of the facility.

Modular Feature of Air Handler Attractive

The rooftop equipment chosen was Trane T-Series Climate Changer™ modular air handlers. A total of 18 were installed, 17 on the roof and one at ground level. According to Bill Bailey, sales engineer at the Trane

Roanoke commercial sales office, the owner and engineer had specified a range of features for the various air handlers. The modular characteristics of the T-Series™ made them ideal for the application. Among the special features were both humidifier and sound attenuator modules, low noise fans, and final filter modules.

A unique aspect of the air handler installation was their placement on grids that elevated them three feet above the roof. The purpose of the grids was both to reduce the acoustic impact of the air handlers and to avoid problems with drainage on the facility's relatively flat roof. The air handlers were shipped in sections and assembled on the roof during the summer of 1998. In addition to the 18 modular air handlers, two special

AEX heat exchange air handlers were installed to support the make-up air requirements for the medical center office building.



Detached mechanical plant reduces total facility cost and reduces impact of future service or plant expansion activities.

The conditioned airflow from the air handlers is distributed through a dual duct VAV system with approximately 440 Trane VariTrane™ shutoff with hot water reheat variable air volume (VAV) boxes throughout the medical center. The VAV system is designed to permit a high level of flexibility both in location and in control capabilities for future building configurations. Facility manager Copening notes, "It's important to be ready for change. We know that's going to happen."

Medical Offices Use Fan-Coils

Copenig indicates that the inclusion of the medical office building with the medical center is somewhat unusual. "More commonly, this type facility is a few blocks away." He notes that the advantage here is that the practitioners' clinical offices are co-located where many of the services

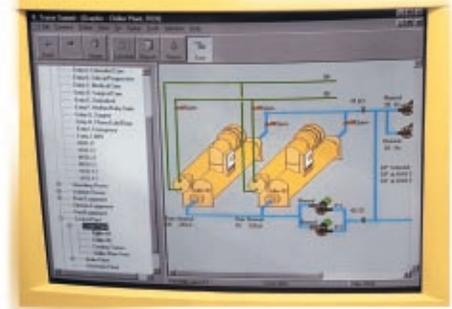


Responsiveness to patient needs.

are delivered, "It's a convenience for the doctors and for the patients." The medical office building uses UniTrane™ fan-coil units for room comfort conditioning. These horizontal concealed units are supplied with chilled and hot water from the same mechanical plant as the rest of the facility. The reason for the use of fan-coils for this area is to allow individual room control for the various tenants.

According to Copening, construction of the facility was completed on an ambitious 20-month schedule. Harris General and Mechanical Contractors from Radford (now a division of Comfort Systems USA) installed the mechanical and control systems. The entire facility was complete on March 20, 1999, and went into full operation immediately.

The control system for the entire facility is a Trane Tracer Summit™ building management system. Tracer Summit controls the chiller plant and the comfort system for the entire facility. The control system also coordinates the operation of the building comfort system in the event the facility needs to switch to on-site emergency generation, following preset priorities for critical systems. The Carilion facility features a direct digital control (DDC) design that allows precise balancing and control of the air handler and VAV system.



DDC Control System Allows Fine Tuning

According to Bill Upthegrove, senior engineer at the Trane Roanoke commercial sales office, this control capability has already demonstrated its value. After startup, analysis of performance with the Tracer Summit system showed opportunities for improvement by reducing chilled water temperatures and adjusting airflows. Upthegrove points out, "The DDC capability here allowed us to increase chilled water effectiveness and improve control levels all the way down to the VAV level. The only way you could do this is with a completely integrated DDC control system."

The theme at the Carilion New River Valley Medical Center is responsiveness to patient needs. Today's medical center is a reflection on how those needs have changed. The design of the facility reflects the expectation that those changes will continue in the future. As medical needs of patients change, so can the systems that serve them. As Bill Copening says, "It's important to be ready for change."



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