

FUJITSU

CASE STUDY

AIRSTAGE™

Robert E. Lee Hotel
Lexington, VA

Project Name

Robert E. Lee Hotel

Location

Lexington, VA

Completion Date

Summer 2014

The Team**Owner**

Ugo Benincasa

Architect

Harrell+Company Architects
Fairfax, VA

Mechanical Contractor

Natural Bridge Heating & AC
Glasgow, VA

HVAC Distributor

Virginia Air Distributors
Roanoke, VA

Robert E. Lee Hotel

The owners of the Robert E. Lee Hotel spent years planning and preparing to renovate the building into a luxury hotel. They chose Fujitsu Airstage VRF for their building due to its energy efficiency, small-space requirements, and lower installed cost compared to comparable technologies.

The six-story Robert E. Lee Hotel was originally constructed in 1926. To this day, it remains the tallest building in the small mountain town of Lexington, Virginia. The building continued to function as a hotel until the late 20th-century when it was converted to apartments and fell into disrepair. The recent and major renovation of the building restores the hotel to its glory days. The 49,000 SF building includes 39 guest rooms, a conference center, a restaurant, retail space, and three penthouse condos. All of the spaces are being served by over 120 tons of Fujitsu Airstage equipment.

Design Challenge

The historic nature of the building provided many challenges to the designers of the Robert E. Lee Hotel. The building did not have an existing HVAC system except



Guest room corridors are served by a slim duct unit at both ends. They are installed with an Auto Louver Grille Kit and a large filter grill to provide filtration and service access.



for a few window AC units. The owners of the hotel intended to keep the historic façade of the building intact which ruled out the use of PTACs which would require large exterior penetrations. In addition, the guest rooms are smaller than the rooms of most new hotels. This precluded the use of any equipment that would take up valuable square footage. However, the floor-to-floor height of the guest room areas was less than nine



18 Systems: 19 Outdoor Units, 80 Indoor Units

feet and would greatly limit the vertical height of the indoor units.

Why Fujitsu Was Chosen

During the planning phase, the building owner explored several options for the HVAC system. Ultimately, the choice came between VRF and a Water-Source Heat Pump (WSHP) system. After receiving several quotes, the VRF was found to be significantly less expensive. Total installed costs came to about \$1 million for the VRF heat pump system. The quoted installed cost for the WSHP system was approximately \$1.7 million.

service access. In addition, due to a market-leading static pressure of 0.36" WG, the units utilized short stretches of ductwork to serve the main area of the guest rooms. High static ducted units were used in open areas such as the conference center and kitchen. In the restaurant, slim duct units were installed underneath bench seating and a floor mounted unit was installed behind the bar. The outdoor units were installed on the upper roof and on various lower roofs. Finally, System Controller was installed so that the hotel staff could control all of the Fujitsu equipment from the front desk.



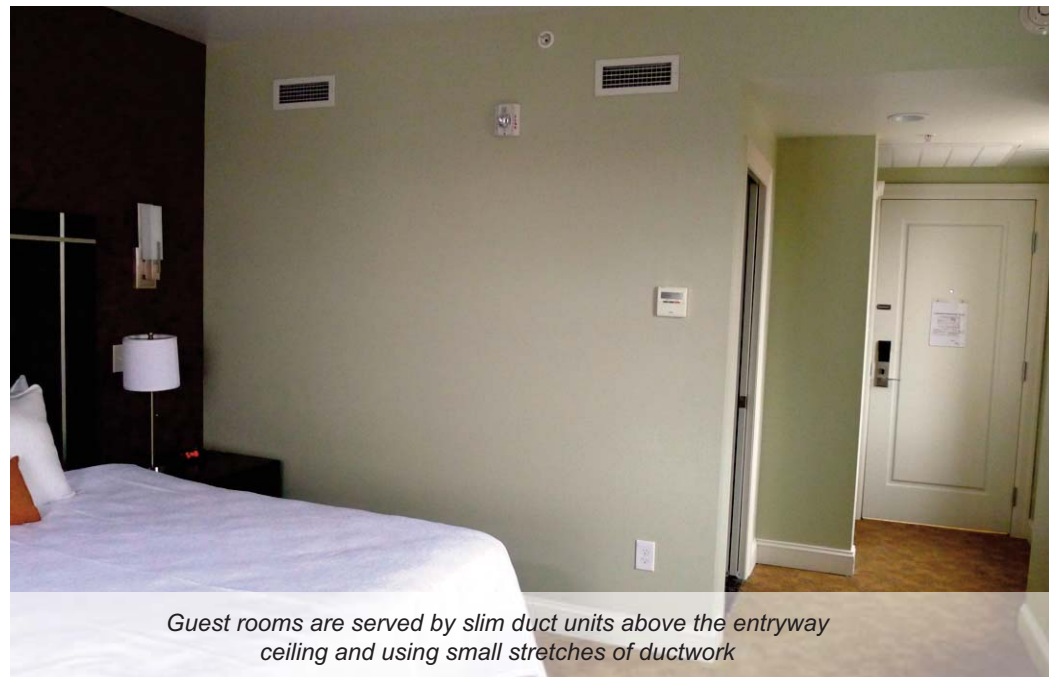
The outdoor units were installed on the upper roof and on various lower roofs. Mostly 6-ton outdoor units were used.



The building owners decided to go

The Results

Due to the challenges of the historic renovation, the designers of the hotel knew they needed a unique solution. Using Fujitsu Airstage equipment, they were able to solve all of the design challenges. The guest rooms are served by Slim Duct Units located above the ceiling inside the entrance to the rooms. The extremely short height of units allowed for less than a foot of above-ceiling space. A large filter grill was installed beneath the unit to serve as both filtration and



Guest rooms are served by slim duct units above the entryway ceiling and using small stretches of ductwork

forward with heat pump VRF. Without the ability to simultaneously heat and cool, the VRF was carefully designed to avoid any comfort issues.

The following are an example of the steps that were taken:

- The total HVAC tonnage was split into many small VRF systems – mostly using 6-ton outdoor units.
- The heat pump VRF systems served zones with similar exterior exposure, especially on the guest room floors.
- The building renovation included major improvements to the building envelope that help avoid drastic temperature swings.
- The set point temperature in the guest rooms was limited to a 6°F range. This avoided any individual guests from inadvertently switching the mode of the entire system.

Thanks to careful design and operation, the VRF heat pump systems provides superb comfort to the occupants. Common areas of the building are controlled from the front desk while the guests have individual control of their rooms. The guests and the building owners

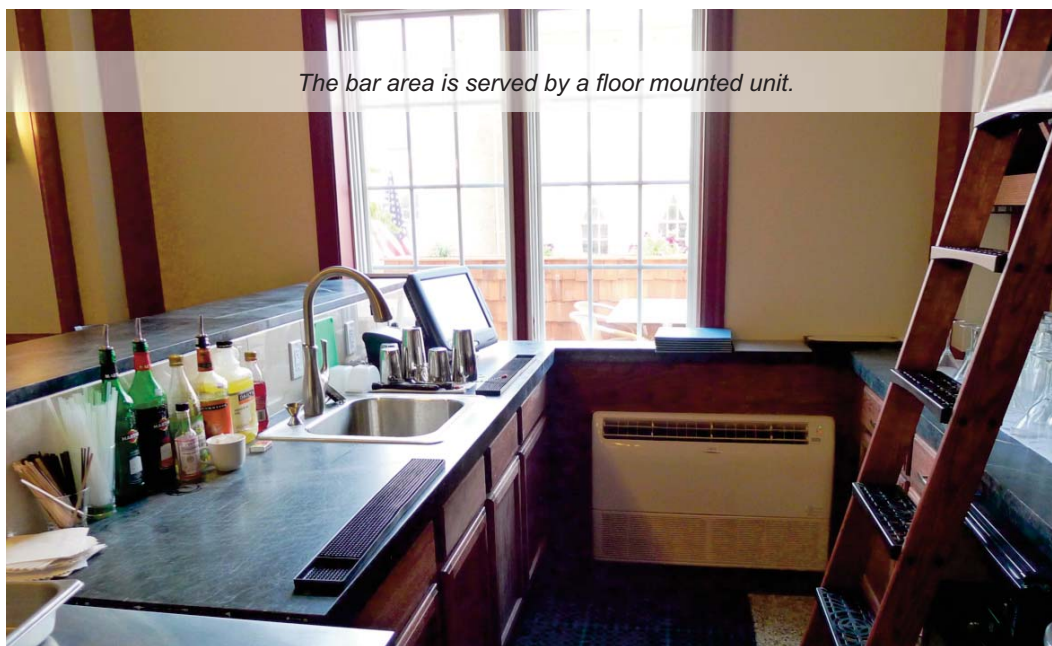
could not be happier with the results of the renovation.



Slim duct units are installed underneath bench seating in the restaurant.



The kitchen is served by two high static ducted units and significant quantities of makeup air.



The bar area is served by a floor mounted unit.

“This was a very challenging job, however it was very rewarding to be a part of such an undertaking. This job could not have gone as smooth as it did without all of the support we had from everyone involved.”

- Donnie Shanks, Owner of Natural Bridge Heating & AC



The front desk and lobby are served by a high static ducted unit.

“In the hospitality industry, 90% of complaints are related to heating and cooling. So far, we have had zero complaints from our guests.”

- Leo Decanini, Building Owner and Manager

Airstage Equipment List Series: V-II
(14) AOUA72RLBV V-II Heat pump Outdoor Unit
(3) AOUA96RLBV V-II Heat pump Outdoor Unit
(1) AOUA168RLBVG
(44) ARUL9RLAV Slim Compact Duct Indoor Unit
(10) ARUL12RLAV Slim Compact Duct Indoor Unit
(6) ARUL18RLAV Slim Compact Duct Indoor Unit
(1) ABUA24RLAV Floor/Ceiling Mount Indoor Unit
(6) ARUM24RLAV Medium Static Pressure Duct Indoor Unit
(1) ARUM30RLAV Medium Static Pressure Duct Indoor Unit
(5) ARUH36RLAV High Static Pressure Duct Indoor Unit
(3) ARUM36RLAV Medium Static Pressure Duct Indoor Unit
(4) ARUH60RLAV High Static Pressure Duct Indoor Unit
(79) UTY-RNKU Wired Remote Controllers
(1) UTY-APGX System Controller
(2) UTY-VSGX Signal Amplifier
(59) UTR-BP090X Separation Tube Assembly
(2) UTR-BP180X Separation Tube Assembly
(1) UTR-CP567X Outdoor Unit Branch Kit



- ISO9001
- ISO14001

Fujitsu General America, Inc.

353 Route 46 West
Fairfield, NJ 07004
Toll Free: (888) 888-3424
Local: (973) 575-0380

www.airstagevrf.com
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