CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category - Check one and indicate New, Existing, or Existing Building Commissioning (EBCx)

☐ Commercial Buildings	☐ New	☐ Existing or	☐ EBCx	
Institutional Buildings:				
☐ Educational Facilities	☐ New	☐ Existing or	☐ EBCx	
☐ Other Institutional	☐ New	☐ Existing or	☐ EBCx	
☐ Health Care Facilities	☒ New	☐ Existing or	☐ EBCx	
Q Industrial Facilities or Processes	New	Existing or	EBCx	
☐ Public Assembly	☐ New	☐ Existing or	☐ EBCx	
Residential (Single and Multi-Family)				

2. Name of building or project: Broadlawns East University Medical Center

City/State: Des Moines, IA

3. Project Description: New Medical Clinic

Project Study/Design Period: 07/2015 (Begin date (mm/yyyy)) j 11/2016 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%0

4. Entrant (ASHRAE member with significant role in project):

a. Name: Scheidecker (Last) Tyson (Fimt) Lee (Middle)

Membership Number: 8124579

Chapter: Iowa

Region: V!

b. Address (Including country): 4125 Westown Parkway Suite 100

West Des Moines (City) Iowa (State) 50266 (Zip) USA (Country)

c. Telephone: Not 515-223-8104 d. Email: tyson@shive-hattery.com

e. Member's Role in Project: Overview of system design and code compliance

f. Member's Signature: Tyson Scheidecker

5. Engineer of Record: Tyson L. Scheidecker

By affixing my signature above, I certify that the information **contained in this application in accurate** to the **best** of my knowledge. **In addition,** I certify that I have diacusaed this entry with the owner and have received permission fxnm the owxier to submit thie project to the ASHRAB **Technology Awards Competition.**

Broadlawns Medical Center East University Medical Clinic - Indoor/Outdoor Room

IMAGE TO THE LEFT:
SHOWING THE INSTALLED HEAT RECOVERY CONDENSING UNIT, HIGH EFFICIENCY GAS UNIT HEATER, GRAVITY RELIEF HOOD OPENING, AND OUTDOOR AIR LOUVER AND DAMPER.

IMAGE TO THE RIGHT:
SHOWING SCHEMATIC OF AIR SIDE COMPONENTS IN THE INDOOR/OUTDOOR ROOM. ALL THREE MOTORIZED DAMPERS AND BOTH UNIT HEATERS OPERATE BASED ON SPACE TEMPERATURE TO ALLOW COOL AIR IN DURING THE SUMMER AND PREVENT FREEZING IN THE WINTER.

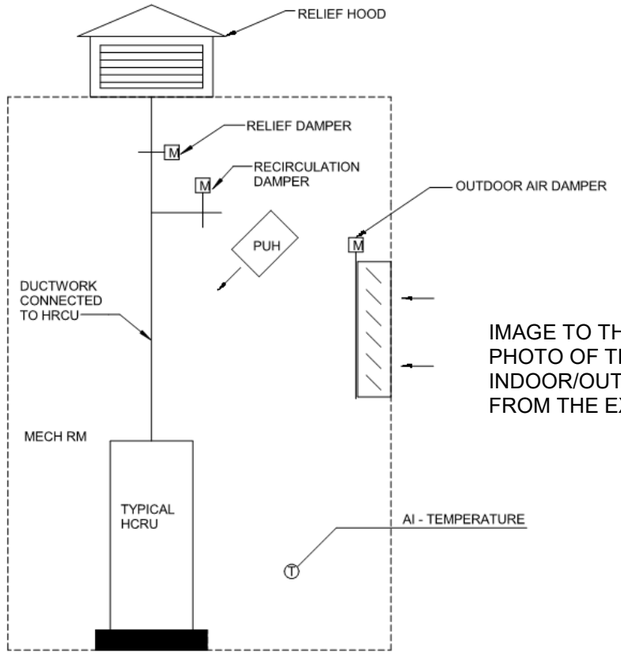


IMAGE TO THE RIGHT:
PHOTO OF THE INDOOR/OUTDOOR ROOM FROM THE EXTERIOR.

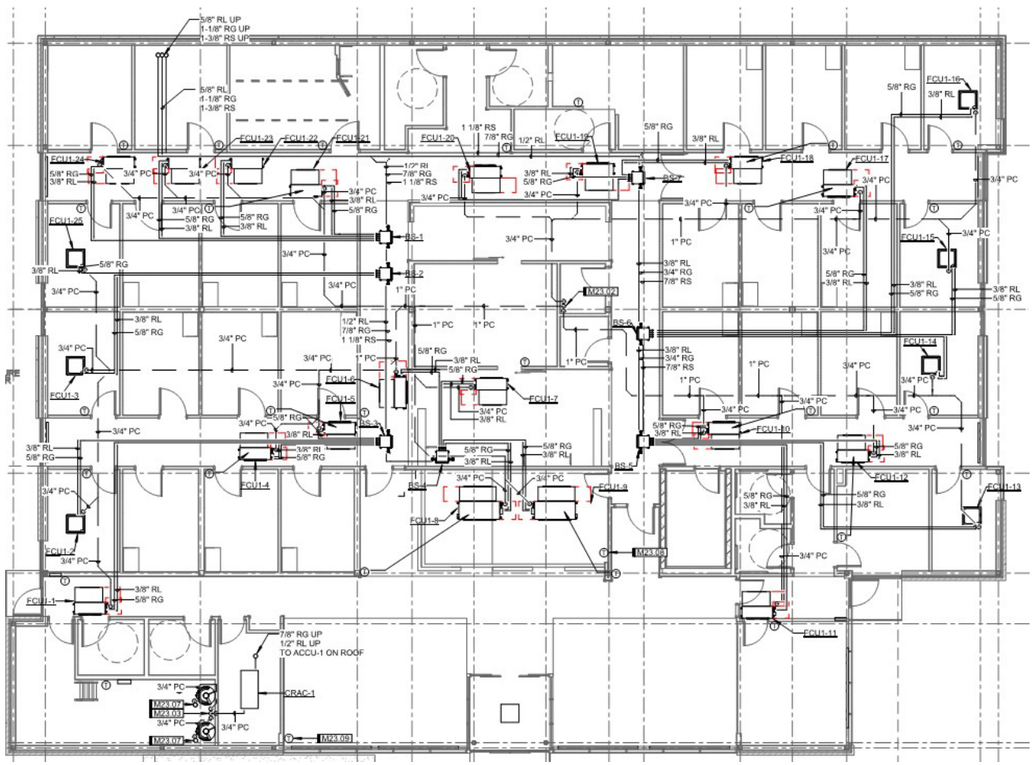
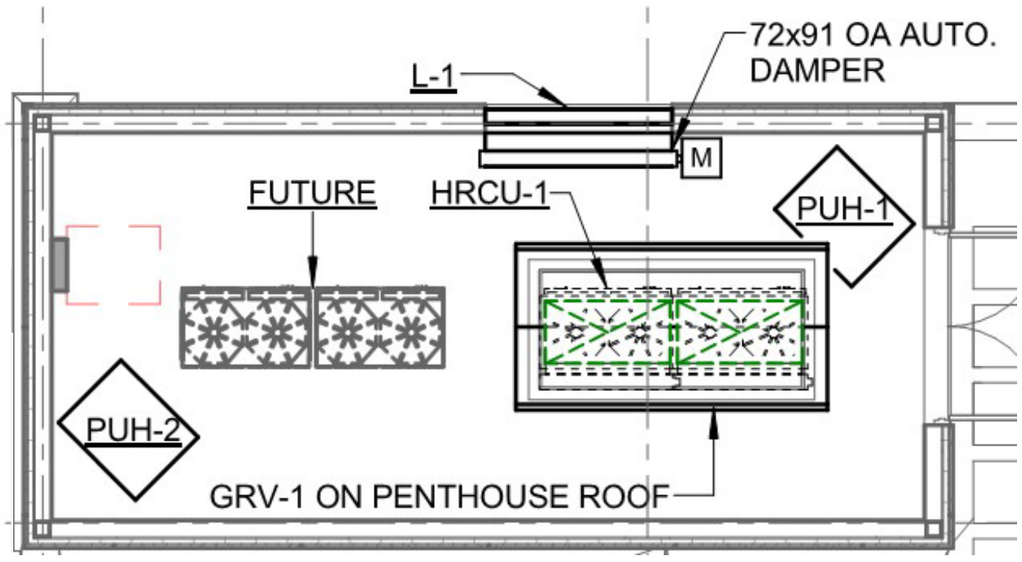


IMAGE TO THE LEFT:
FLOOR PLAN OF THE VRF SYSTEM.

IMAGE TO THE RIGHT:
HRCU SHOWN IN THE INDOOR/OUTDOOR ROOM. SPACE HAS BEEN ALLOCATED FOR A FUTURE HRCU TO ALLOW FOR INCREASED CAPACITY FOR EXPANSION.



Broadlawns Medical Center East University Medical Clinic

Broadlawns Medical Center required a new 10,000 square foot (gross) medical clinic located on East University in Des Moines. The building includes a waiting room, medical exam rooms, offices, nurse stations, a locker room, an x-ray room, and a laboratory.

With a relatively even split of both interior and exterior spaces, with a variety of different uses, it was important to maintain the ability to control spaces individually. While the exterior spaces would require heating in the winter, some of the interior spaces would require cooling. Using a variable refrigerant flow system with heat recovery condensing units would allow simultaneous heating and cooling and allow the system to utilize free heating from the spaces that required cooling. This was paired with a dedicated outdoor energy recovery unit to provide ventilation to the spaces while recovering energy from the exhaust and return air. In standard VRF condensing units, both efficiency and capacity drop significantly during low ambient temperatures. To avoid this issue the heat recovery condensing unit was located in a partially heated indoor/outdoor room to keep the coefficient of performance high even while the outdoor ambient temperature was low and meet the demand of the building under any outdoor conditions.

Energy Efficiency

A dedicated outside air energy recovery unit was installed to provide ventilation air to the occupants. Return and exhaust air energy is transferred to the outside air via an enthalpy wheel. Air tempering is provided with split system DX cooling and natural gas heating. The Clinic is heated and cooled by a variable refrigerant flow (VRF) heat recovery system. The condensing unit is inverter driven that allows for variable capacity and simultaneous heating and cooling to match the requirements of the building, leading to lower energy usage.

The system was modeled to provide a kWh savings of 65,000 per year and a therm savings of 477 per year compared to a code minimum building. This is a 31% savings on electricity and a 33% on gas usage compared to a code minimum building. This resulted in an approximate energy savings of $5,712 per year.

Indoor Air Quality

ASHRAE 62.1 and FGI guidelines for health care were utilized to calculate required outdoor air flow. The outdoor air was directly delivered to spaces from the DOAS. This ensures a constant supply of ventilation air while allowing the fan coil units from the VRF system to cycle only to maintain room temperature.

Innovations

The system allows for simultaneous heating and cooling where the free heat obtained by cooling the interior spaces in the colder months is transferred to the perimeter spaces for heating. VRF systems located outdoors cut out cooling at low ambient temperatures, requiring separate systems for spaces requiring year-round cooling such as server rooms or medical equipment rooms. With the condensing units being located in a semi-heated mechanical room, heated by high-efficiency gas unit heaters, simultaneous heating and cooling is available year round and the system efficiency does not incur a major drop as it typically would with low ambient winter operation.

Operation and Maintenance

A full direct digital control system was implemented and integrated with an internal network to allow remote monitoring and alarm detection. The indoor/outdoor room has the added benefit of not needing to work on the units in an outdoor environment and prevents rain from getting on the unit and ice from forming on it.

Cost Effectiveness

The energy recovery and simultaneous heating and cooling reduces the heating and cooling costs of the building. To attract and keep talented staff, comfort was made a priority in the building by providing ample zones for controlling temperature. Typical multi-zone systems were evaluated for first cost, long term cost, and the ability to expand the building vertically. The lower building height allowed by the VRF system, flexibility of the location of equipment and numerous zones allowed ultimately outweighed the initial higher first cost compared to other multi-zone systems.

Environmental Impact

The project reduced the amount of energy required by providing free heating during simultaneous heating and cooling operation as well as recovering energy in the ventilation air.