

SHEREN

PLUMBING & HEATING

ENERGY SERVICES

DESIGN BUILD

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Sheren Plumbing and Heating, Inc.

Case Study

Customer: Shanty Creek,

www.shantycreek.com



The Challenge:

Shanty Creek's mechanical systems throughout the entire facility (estimated at 179,000 square-feet) were outdated and beyond repair. For example, the existing steam and chiller systems could not run heating and cooling systems simultaneously. This multifunction capability was needed to manage comfort among the many meeting rooms and hotel rooms.

Shanty Creek's systems were also malfunctioning, with multiple leaks and operating issues. Furthermore, as part of an overall resort renovation effort, resort owners faced tight budget constraints for facility system updates. Following were Sheren Plumbing and Heating, Inc.'s (Sheren) objectives in tackling the Shanty Creek challenge.

The Objectives:

- Develop a modernized system tailored to the unique heating and cooling needs of Shanty Creek
- Enable Shanty Creek to heat and cool different areas of the complex at the same time (a zoned approach)
- Increase comfort and system control while decreasing utility, operation and maintenance costs
- Update plumbing and modernize fixtures throughout the 300 hotel rooms
- Create a pricing and packaging strategy that enabled Shanty Creek to get a much-needed, modernized system within tight budget constraints
- Support Shanty Creek's effort in exceeding resort customers' expectations
 - Provide an environment that is consistent with the Shanty Creek branding efforts
 - Support Shanty Creek's effort in attracting commercial and tourism business and in increasing repeat business

The Solution:

Sheren's solution covered each of the above objectives. Following is a high-level description of the individual elements that comprised Sheren's complex solution. Sheren also provided five additional options for consideration.

Boiler Room Scope – Specified and Installed Equipment Includes:

- Eight 500,000 BTU Lochinvar Knight Boilers with 93% Annual Fuel Utilization Efficiency (AFUE) rating and modulating system adjust to changing loads
- Piping in a reverse return system with grove lock pipe

- For all pipes 2 inches and over, Sheren uses grove lock sch 10 pipe. For pipes 1 ½ inches and under, Sheren uses type M copper.
- One pump for each boiler and an expansion tank sized for the system (for the high-temp loop)
 - Sheren insulates the high-temp loop in the boiler room with arm flex. The heat exchanger for the outdoor pool and unit heaters for the shipping area branch from the high-temp loop.
- An ejection system to the heat pump loop, keeping the heat pump loop from dipping below 60 degrees
- Two heat exchangers, keeping the heat pump loop temperature from rising above 90 degrees
- One 4-inch water main from the meter to the heat exchanger, using well water with a temperature controlled modulating valve
 - For the gas piping 2 inches and smaller, Sheren uses sch 40 iron pipe threaded. For piping 2 ½ inches and larger, Sheren uses sch 40 iron pipe welded.
- Regulators for the elevated pressure system
 - Sheren also rerouted the gas line to the rooftops.
 - Sheren also recommended phase protection for the main pumps.

Partial Plumbing Scope Elements – Specified and Installed Equipment Includes:

- Four Superstor indirect water heaters installed off of the heat loop
 - Sheren's design produces 2,548 gallons of hot water for the first hour at 140 degrees for the rooms. This system also offers inline tempering valves to adjust the room's hot water to 105 degrees while maintaining all other areas at 140 degrees.
- One Superstor indirect water heater installed off of the heat loop for the laundry requirements
 - Sheren's design provides 637 gallons of hot water for the first hour at 140 degrees. This system can be expanded, if needed.
- Fire caulking all new penetration leaving the boiler room

Heat Pumps Lodge Rooms – Specified and Installed Equipment Includes:

- Installing vertical stack heat pumps to replace fan coil units and piping in the lodge rooms
 - Separate vertical stack heat pumps are located in the closets of each of the 90 rooms. The return air is pulled from the front of the heat pump. The supply air hooks to the existing duct with metal insulated duct and the supply grill is replaced.
 - Ninety heat pump thermostats, one for each room.
 - Piping for the heat pump loop is PVC
- Leveraging the existing exhaust system
- Replacing the exhaust grills in each room's bathroom
- Ensuring windows are operable to meet ventilation code
- Fire caulking from room-to-room and room-to-hall on all pipes installed by Sheren



Heat Pumps for Halls in Lodge – Specified and Installed Equipment Includes:

- Demolition of the fan coil unit and piping in the halls as needed to make room for the new console heat pumps
- Six console heat pumps in the hall piped for the loop with PVC
- Six heat pump thermostats, one for each unit

Heat Pumps Bellaire Room – Specified and Installed Equipment Includes:

- Demolition of the fan coil unit duct work and piping to install the new system
- Three new heat pumps in the ceilings with energy recovery ventilators for each system for the ventilation air
 - Sheren designed three zones so each area for independent operation via separate thermostats on each system.
 - Minimal duct work minimizes the ceiling disruption.

Roof Top Unit Dining Room and Lobby – Specified and Installed Equipment Includes:

- Four Carrier 10 ton roof top units gas heat and electric cooling with economizer and CO₂ sensors to control the fresh air
- Duct work (exposed spiral pipe) and a thermostat on each unit, providing four zones in this area
- Painting and re-routing gas lines to the roof



Heat Pump Summit Conference Rooms – Specified and Installed Equipment Includes:

- Demolition of the fan coil unit and piping to install the new system
- Nine heat pumps and duct work with a thermostat for the six conference rooms, providing each room with its own zone
- Energy recovery ventilators and heat pumps for the fresh air



Heat Pumps for Each of These Rooms/Areas:

- Business Center
- Lower Level Hall and Bath
- Bellaire Hall and Bath
- Founders Room
- Bath and Stairs Adjacent to the Lobby
- Bath and Hall Next to Summit Conference
- Summit Lobby
- Spa Area
- Health Club
- Nautilus and Weight Rooms

Specified and Installed Equipment for Each of the Rooms/Areas Previously Listed Includes:

- Demolition of the fan coil unit and piping for new system installation
- One heat pump, duct work with a thermostat to create a dedicated zone
 - Piping for loop water is PVC.

Spa Tub – Specified and Installed Equipment Includes:

- Demolition of steam heat exchanger
- One spa tub electric heater

Steam Room – Specified and Installed Equipment Includes:

- Demolition of steam piping
- One electric steam unit

Kitchen Make up Air – Specified and Installed Equipment Includes:

- One make-up air unit to balance the negative in this area
- Balancing the hood to meet the health department code and adding make-up air to balance the kitchen

Kitchen Steam Needs – Specified and Installed Equipment Includes:

- One steam boiler for the dishwasher and two kettles

Outdoor Swimming Pool – Specified and Installed Equipment Includes:

- Demolition of steam piping
- Hooking heat exchanger to the 180 degree loop to heat the pool

Indoor Swimming Pool – Specified and Installed Equipment Includes:

- Demolition of steam piping and adding a make-up air unit to prepare for new equipment
- One gas pool boiler and hooking it to pool piping
- One make-up air unit hook to existing duct work



Basic Temperature Control System – Specified and Installed Equipment Includes:

- Monitoring and controlling boilers and loop temperature
 - All heat pumps have dedicated thermostats.
 - Roof top units have dedicated thermostats and a CO₂ sensor to control the fresh air on the economizer.
 - The Energy Recovery Ventilator (ERV) operates when the system's fans run in the meeting rooms.

Five Additional System Design Options Proposed to Shanty Creek:

1. Installation of heat pumps in the Summit rooms and halls to replace the electric heat and through-the-wall air conditioners
 - This upgrade provides an approximate five-year payback and greatly impacts the comfort in this area.
2. Installation of Variable Frequency Drive (VFD) on all pumps above 5-hp with solenoid valves and all heat pumps

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3. Installation of an ERV unit on the four 10-ton roof top units
4. Employ the new ozone-friendly refrigerant, instead of R 22 units
5. Installation of an Energy Management System (EMS) system that allows the system to be monitored on-site or remotely via secure Internet access

The Results:

Sheren's Shanty Creek project started in mid-August 2007. Project completion is targeted for winter 2008. A key project milestone is December 2007 for meeting room completion. Achieving this milestone deadline will allow Shanty Creek to showcase updated business venues to increase reservations for the spring and summer seasons.

As a result of Sheren's system design, installation and pricing, Shanty Creek will:

- Save \$324,000 annually on operation costs due to more efficient equipment;
- Save \$10,800 annually on utility costs by combining electrical rates; and

Note: Shanty Creek has four electrical meters ranging in electricity costs from \$0.08 per KWh to \$0.11 per KWh. Sheren has combined these rates to calculate annual savings.

- Avoid costly, ongoing maintenance of the previously outdated system at approximately \$50,000 per year.