



Rapid City Regional Hospital Central Utility Plant

Skyline Engineering worked with Rapid City Regional Hospital and HDR to develop a new Central Utility Plant to replace the existing plant



The new Central Utility Plant is sized to serve 750,000 square feet of medical facility. It will incorporate state of the art mechanical and electrical equipment and distribution techniques. In addition to maximizing energy efficiency, distribution to the existing facility is addressed through the development of a 600 foot underground utility tunnel. Steam, chilled water, medical gas, domestic water, natural gas and electrical services will be distributed through this tunnel which is actually being installed under the old plant while it remains temporarily in service. Water, gas and electrical services along with underground fuel oil storage tanks are also being relocated or replaced.

Project Data

Owner

Rapid City Regional Hospital
Mark Thuringer (605) 719-8003

Location

Rapid City, South Dakota

Building Type

Regional Medical Center
Central Utility Plant

Project Features

23,000 Sq. Ft. Two Story Plant
600 Ft. Utility Distribution Tunnel
Detached Grounds Building

Mechanical Systems / Features

3-500 BHP Steam Boilers
2 -700 Ton Chillers and Towers
1000 GPM Fire Pump
Domestic Water Distribution

Electrical Systems / Features

2-2500 KVA Service Transformers
2 -2000 KW Emergency Generators
1 Branch of Normal Power
5 Branches of Emergency Power

Construction Cost

\$18,000,000 (Estimated)

Completion Date

2009

Mechanical Engineering

A variable primary chilled water distribution system was utilized to maximize production and distribution efficiency of the chilled water plant. All continuous running motors utilize variable frequency drives along with optimized control software to achieve the lowest possible plant operating cost while still delivering 1400 tons of cooling to the facility. Chilled water is currently produced at less than 0.6 KW/ton (including pumps and cooling tower fans) and is continually improving.

High pressure steam is produced using boilers fitted with parallel positioning actuators and continuous combustion gas monitoring to deliver maximum efficiency at all times. Other efficiency measures such as combustion air heat reclaim and boiler stack economizers were used to keep operational cost at a minimum. Plant steam production and fuel consumption is continuously monitored and recorded as required by DENR regulations.

Electrical Engineering

The new power plant features two 2500 KVA primary service entrance transformers so utility company stock can replace a failed transformer quickly with standard stock. In addition, the plant essential electric power is supplied by two 2000 KW, 480 volt generators, one of which was relocated from the existing plant. The generators are tied together on a 6000 amp paralleling emergency switchgear lineup, configured such that one generator serves cooling loads and also provides backup to the new primary emergency generator. In addition, the new plant is configured for a third generator.

New distribution equipment was designed to be installed under the old plant in the new utility tunnel. This project relocates the primary power and system of an operating hospital with the existing plant electrical distribution systems and all loads designed to be swung over to the new tunnel electrical distribution.