



## MONTH 1 - THE ENERGY CONSERVATION OPPORTUNITY: Infrastructure Enhancement-Chilled Water System Application

### ORIGINAL BASIS OF DESIGN - 1966

Original design intent – Health care facility central chilled water plant serving 300,000 sq ft, with the ability to grow the hospital to 700,000 sq ft.

Chillers	Capacity	Months online	Hours of operation	% of buildings with A/C	Remarks
Steam absorption	600 tons	May 1 – Oct. 15	24 hrs/day	60% (180,000 sq ft)	100% redundancy
Steam absorption	600 tons	May 1 – Oct. 15	24 hrs/day	60% (180,000 sq ft)	Standby chiller

Cooling towers	Capacity	Months online	Hours of operation	Fill and basin	Remarks
Draw-through type	600 tons	May 1 – Oct. 15	24 hrs/day	Wood / no heater	100% redundancy
Draw-through type	600 tons	May 1 – Oct. 15	24 hrs/day	Wood / no heater	Standby chiller
Chilled water temperatures, gpm, and pump head			Chilled water temperatures, gpm, and pump head		
45°F CHWS, 55° CHWR, 1,400 gpm, and 120 feet head			85° CWS, 95° CWR, 2,160 gpm, and 140 feet head		

### CURRENT BASIS OF DESIGN - 2010

Current design intent – Health care facility central chilled water plant serving 600,000 sq ft and 100% of the hospital is air conditioned. Twenty percent of hospital air conditioning is provided by AHUs with direct expansion (DX) coils which equate to approximately 300 tons cooling.

Chillers	Capacity	Months online	Hours of operation	% of buildings with A/C	Remarks
Steam absorption	600 tons	May 1 – Oct. 15	24 hrs/day	100%	SAM-1
Steam absorption	600 tons	May 1 – Oct. 15	24 hrs/day	100%	SAM-2 standby chiller
Electric centrifugal	1,000 tons	May 1 – Oct. 15	24 hrs/day	100%	CC-3 primary chiller

Cooling towers	Capacity	Months online	Hours of operation	Fill and basin	Remarks
Draw-through type	600 tons	May 1 – Oct. 15	24 hrs/day	PVC & no heater	CT-1 tower
Draw-through type	600 tons	May 1 – Oct. 15	24 hrs/day	PVC & no heater	CT-2 standby tower
Draw-through type	500 tons	May 1 – Oct. 15	24 hrs/day	PVC & no heater	CT-3A tower
Draw-through type	500 tons	May 1 – Oct. 15	24 hrs/day	PVC & no heater	CT-3B tower
Chilled water temperatures, gpm and pump head			Condenser water temperatures, gpm and pump head		
45° CHWS, 55° CHWR, 2,400 gpm, and 120-ft head			85° CHWS, 95° CHWR, 3,000 gpm, and 140-ft head		

### ENERGY CONSERVATION OPPORTUNITIES

**ECM-1:** Phase out DX cooling with new CHW coils connected to the central chiller plant. Goal: Improve 1.4 kW/ton to CHW plant's 0.8 kW/ton (accounting for chiller, pumps, and cooling tower energy).

**ECM-2:** Add 300-ton waterside economizer plate-and-frame heat exchangers and add cooling tower basin heaters to two of the four cooling towers (100% redundancy in tower basin). Goal: Use a waterside economizer to operate the central plant 365/24/7 instead of the DX systems.

**ECM-3:** Complete an hydraulic modeling survey of the CHW systems to reduce excessive pump head and motor hp energy currently at 0.3 hp/ton. Goal: Achieve 0.5 hp/ton on the CHW system.

**ECM-4:** Survey the condenser water pumps to reduce excessive pump head and associated motor hp energy.

**ECM-5:** Complete a CHW system survey to inventory the number of CHW coils with three-way valves. Goal: Convert the entire CHW system to more energy efficient, variable flow pumping.

**ECM-6:** Complete an automatic control survey of the CHW and condenser water systems to identify the optimum central chiller plant management strategy. Goal: Reduce electrical and steam energy consumption and associated demand.



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