

## Case Study

### Drop-In Cooling Plant Upgrade with Hybrid Dry Cooler

The Challenge: Without shutting down the cooling system, double the cooling capacity of the outdoor cooling plant, install in the same footprint of the existing plant, meet strict acoustical requirements for adjacent condominium's, and have zero down time for the 24x7 data center.

Existing System Description: the existing mechanical system for this project involved a single condenser water loop supporting approximately 100 tons of cooling. The existing dry coolers had been retrofitted with centrifugal fans on variable speed drives and enclosed with an air silencer baffle . The capacity of the existing data center had exceeded the capacity of the outdoor cooling plant. There was no additional space on the site for an expanded cooling plant.

New System Description: Hybrid dry coolers. These units utilize direct evaporative cooling of the intake air prior to air cooling the fin coil heat exchanger. The Jaeggi units are new to the United States and this is the first installation in the Northwest. The small size of these units along with their low water consumption were key to their selection.

Existing sound traps will be removed



Condominiums are beyond the trees



Outside of sound enclosure in mechanical yard. This was replaced by sound baffled air intakes.

Variable speed controller for fans on dry cooler. This was removed from equipment yard.



Underside of sound traps

Inside of existing sound enclosure

Dry coolers retro fitted with centrifugal fans

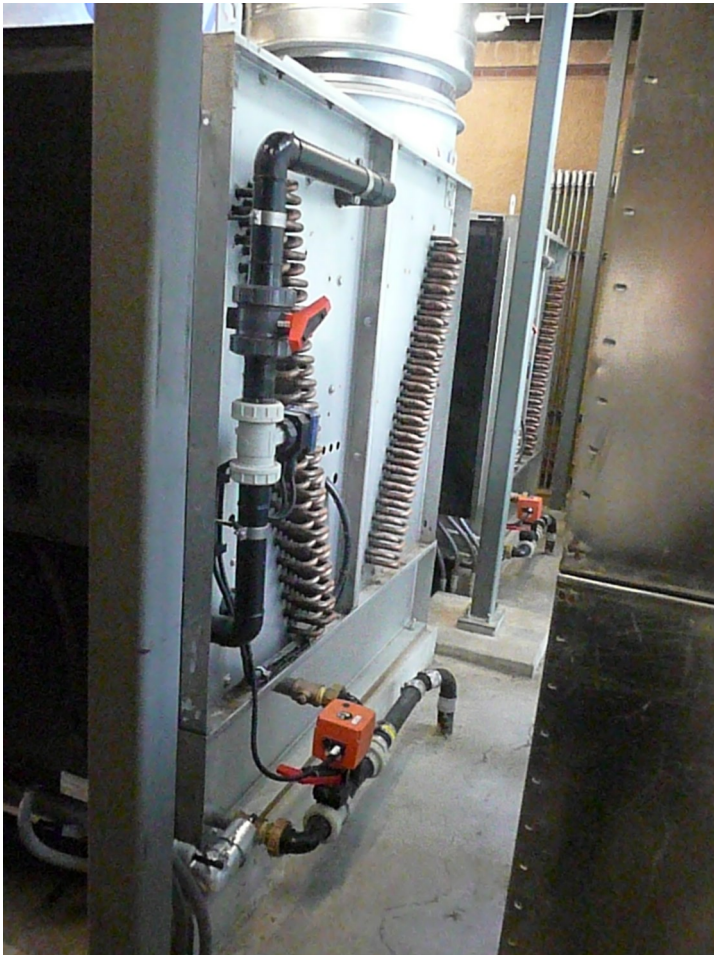
Note: The existing acoustical enclosure created a "lid" that re-circulated a high percentage of the discharge air from the dry coolers. This raised the temperature in this space and limited the heat transfer reducing the installed system capacity.





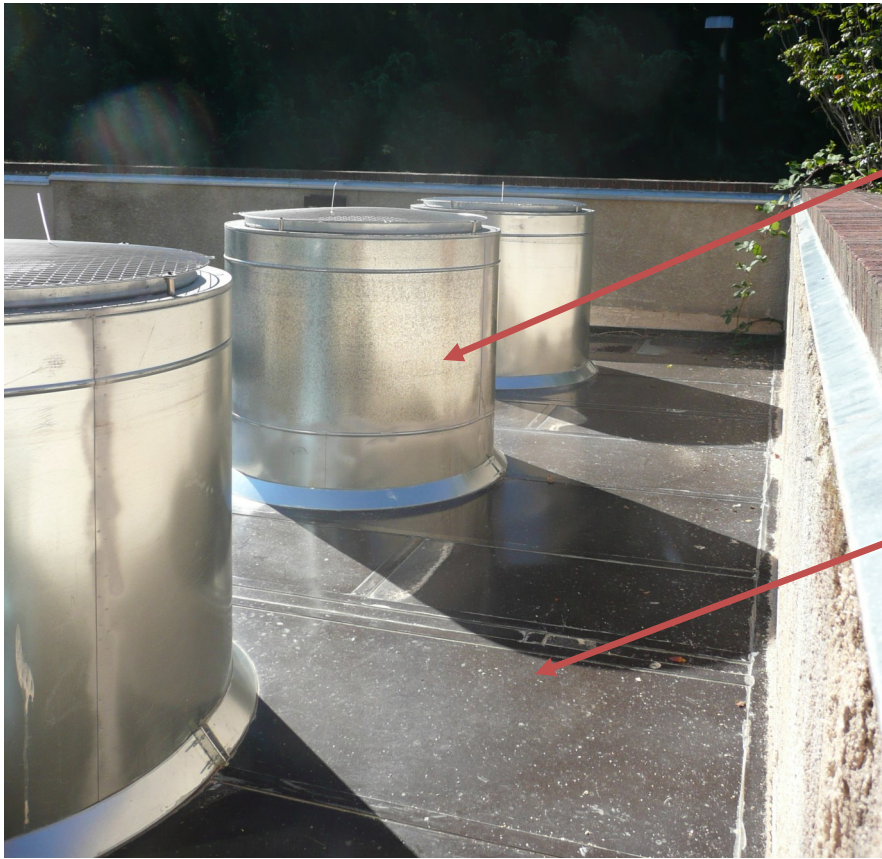
In order for the data center to stay operational for the replacement of the cooling plant, a temporary plant had to be installed. Taking advantage of the modular design of our system, two of the three units were installed for the temporary plant allowing redundancy and the capacity to remove the existing dry cooler plant. The Jaeggi hybrid dry coolers were very compact, and had no vapor plum, this combined with their extremely quiet operation made them an ideal choice for the project.





The new hybrid dry coolers are enclosed in a sound wall with intake air baffles. The two doors into the sound enclosure provide good access for maintenance. The fan discharge is routed through a cylindrical silencer out through the enclosure. This venting removes any short circuiting of cooling air. The coils for the closed loop heat exchanger (seen on the lower picture) are cooled after the air passes through a micro-channel fin with direct evaporative cooling, reducing the air temperature to within a few degrees of the outdoor wet bulb temperature. On a hot day this results in cooling with air that is below 80 degrees compared to air that is over 100 degrees.





Exterior view of the conical duct silencers

Acoustical roof panels provide sound barrier and protect the inside of the sound enclosure from the weather.



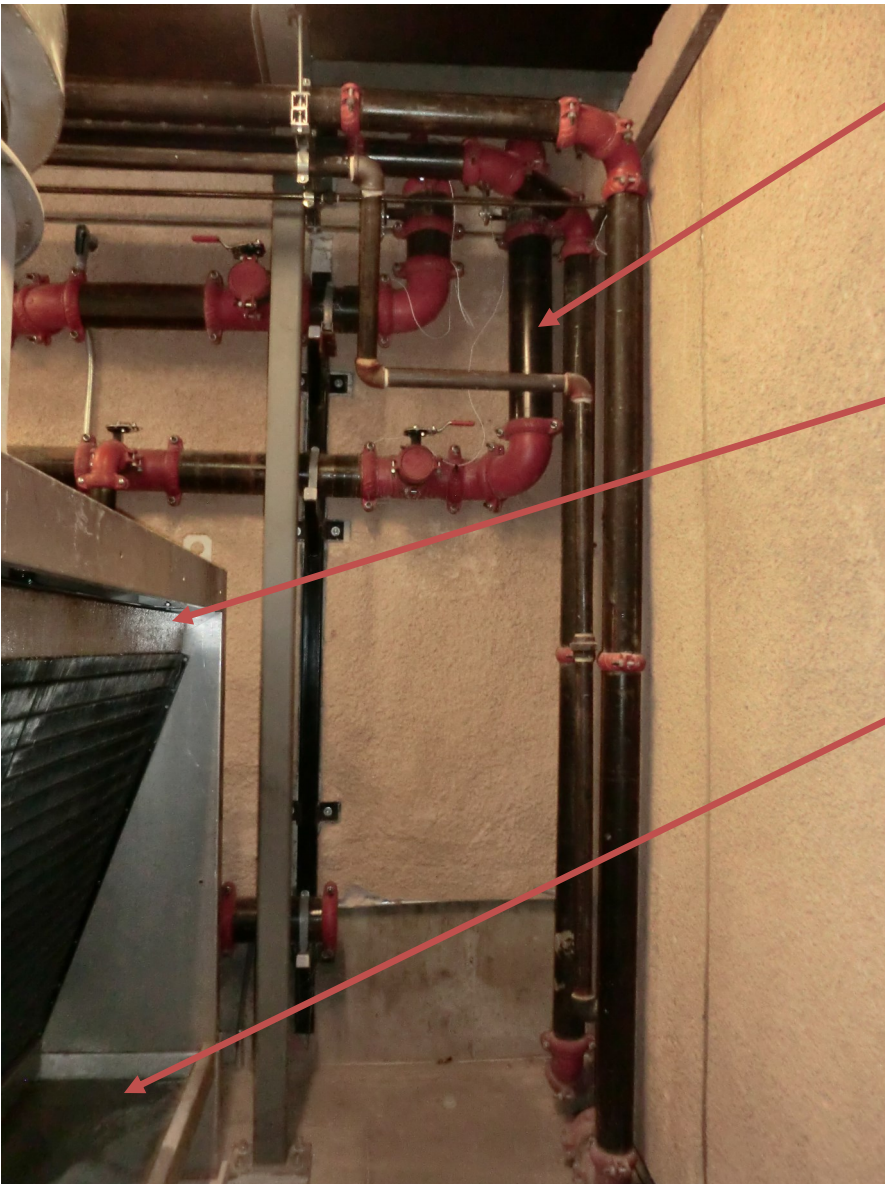
Dedicated Allen Bradley PLCs operate each hybrid dry cooler. Discrete components are used to allow easy field maintenance. Each of the 3 dry coolers are independent in operation. There is a global control to ensure the overall system operates as efficiently as possible.





Existing remote generator radiator was not part of this project but had to remain in the equipment yard and required re-piping.

Intake air silencers with expanded metal covers.



Condenser water piping supporting 100 tons of water cooled A/C units with water side economizers

Flooded channel wets micro-fin coils allowing the hybrid dry cooler to support large loads in a small foot print.

Sump for evaporative water. For this design dual water source supply was used for a higher level of dependability.





Variable speed drives mounted at the pumps allow for efficient operation and control of the pumps.

Vertical in-line pumps were used to maximize the available space.

Condenser water piping and the coil side of the hybrid dry coolers.



Hunt Engineering provided complete engineering services for this project. Initial cooling capacity studies were followed with preliminary designs and budgeting costs. Once the project was funded we provided prime design services and the mechanical and electrical engineering services in-house. Working closely with our structural engineer Visser Engineering and Michael Yantis Acoustical Engineer the final design was completed. Hunt Engineering facilitated bidding and furnished construction administration which included attending weekly construction meetings, reviewing critical procedures and site observations.

### **Successful Conclusion:**

Upon completion of the project, the exterior look was relatively the same, but the capacity had been doubled and N+1 redundancy achieved. The acoustical requirements for the adjacent condominiums was met and no vapor plume is released from the hybrid cooler exhaust. The project was successfully phased with no disruption to the interior cooling for this 24/7 operation.