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## Justice Facility Chiller Replacement Construction Management Project

This month's Facility File will focus on the B2B February test for an institutional justice facility HVAC application. It would be very beneficial for the justice facility project manager to read chapter 9 (Justice Facilities) in the *2015 ASHRAE Handbook —HVAC Application* to be knowledgeable of ASHRAE's guidelines when preparing to authorize the designing of a chiller replacement.

The facility's operation and maintenance group should also read chapters 36 through 43 of the 2015 handbook to assist in preparing the chiller plant operation and management design guidelines. This information, combined with the facility's own knowledge of operating a justice facility, will assist the design team in understanding intricacies of owning, operating, and managing this chiller and cooling tower infrastructure central plant. It is also recommended that the owner-design team read chapter 59 of the same ASHRAE handbook titled HVAC Security, as well as have a security consultant on board to contribute to a safer building and HVAC design.

With all these design guidelines from ASHRAE, the engineer should meet with the owner's O&M staff to discuss specific building standards that need to be applied to this project. If the central plant operation is to be outsourced, the design team would need to know this in advance to adjust their contract specifications pertaining O&M, training, preventive maintenance workorder system, and energy operating budget.

In the design phase of the project the facility's O&M staff will want to contribute information to the design team's writ-

ing of the contract specification, and more specifically, to the following activities: service contracts, parts inventory, and as-built drawings requirements. Reviewing the design documents, this O&M staff will want to be assured that equipment serviceability is adequate and safe (e.g., how does a direct-fire gas chiller operate?).

For a building program (as well as a business plan) to continue to successfully manage a central chiller plant, it is imperative that the program includes an O&M budget in addition to the program's construction budget. The equipment life of a chiller is approximately 20 to 25 years, but it can last much longer if proactively maintained over the life of this central plant.

For this Facility File referencing the February B2B, the project delivery method is construction management (CM) with a guaranteed maximum price (GMP), so the CM and his in-house engineering and estimator will be involved in the design phase and will be able to contribute to the contract documents. In the construction phase, the O&M staff will want to revisit the issues noted above that occurred in the design phase. Next comes the startup, water balancing, and commissioning phases, and the O&M staff will want to be proactive in following along with the CM's mechanical-electrical in-house coordinator and the subcontractor's startup personnel, and they will want to receive equipment training from the chiller manufacturer's startup technician and system training using the O&M manuals and contract drawings (that will eventually become the as-built drawings).

Once the startup has been completed and the ATC subcontractor and justice facility's 3rd-party Cx and TAB consultant have completed the water balancing work, the HVAC subcontractor shall go through an automatic control system initial dry-run demonstration using the commissioning functional performance test (FPT) prior to the CM and his subcontractors demonstrating the system to the Cx and TAB consultant. The ATC subcontractor should also begin collecting system performance by trending pertinent HVAC system and equipment data by trending the following:

- outdoor air dry bulb and wet bulb temperature
- condenser water supply and return temperature
- chilled water supply and return temperature
- flue gas temperature
- alarms
- chiller control points

Taking the same approach as the design engineering, the O&M personnel should use a series of computer-generated touchscreen project checklists that allows his staff to confirm that the following facility files have been collected. This process should start at the beginning of construction and not at project closeout, so that the facility files can be inputted into a CMMS system. Touchscreen O&M checklists should include:

- equipment shop drawings
- O&M manuals, parts list, and lubricants
- troubleshooting tips
- seasonal startup and shutdown instructions

The O&M staff should review the contractor-produced piping and sheet metal-flue piping field fabrication/field coordination drawings prior to fabrication. Touchscreen service checklists should include:

- location of shutoff valves, ATC valves, and balancing valves
- strainers
- equipment and control devices
- access for servicing equipment

The training process should include specific HVAC system and equipment training but also emergency and security plan training due to the HVAC security (e.g., natural gas leak). The water balancing of the chillers, cooling towers, and terminal units, along with the final TAB report, should be included in the preventive maintenance work order system to routinely assure continuous energy conservation performance in sync with the annual operating consumption budget. In addition, the hydraulic modeling of the entire system should be updated after the final TAB report. This will require the TAB subcontractor to provide the water balancing reports along with the associated system flow diagrams, noting quantities and pressures for rebalancing if necessary as part of the project closeout documents. Touchscreen checklists should include:

- equipment training
- system training
- seasonal start-up and shut down procedures
- emergency plan
- automatic controls
- energy management