



Once scattered among 25 sites in 40 buildings, the City of Tucson operations are now consolidated and monitored by a single controls system.

Surrounded by the Tucson, Santa Catalina, and Rincon mountain ranges and situated on the far northern reaches of the Sonoran Desert, Tucson is one of the oldest towns in the United States. The metropolitan area encompasses more than 500 square miles of wide open spaces and nearly one million citizens. The City's government administers and assists more than 60 departments and divisions—from the Attorney's Office to the Reid Park Zoo.

When it began to update its older building controls, the City specifically wanted a BACnet solution to provide system interoperability and open up future building additions and upgrades to competitive bidding. The City of Tucson turned to Climatec, Alerton's Arizona dealer, to carry out the retrofit.

City of Tucson properties include 25 sites in 40 buildings occupying about one million square feet, mostly office space. At the time of



Seamless integration to York chillers at Udall Recreation Center using Alerton BTI global controllers.

the refitting, the City's biggest issue was that its building automation system (BAS) was based on one vendor's proprietary solution, which meant there was no competitive pricing when the City needed to

implement any changes. Tucson was growing and the unregulated fees determined by a single vendor were exacting a heavy toll from a thinly stretched city budget.

The complexity and proprietary nature of the system required the facilities staff to make several call-outs for even the most basic maintenance tasks to keep numerous tenants comfortable. The existing BAS was being asked to perform beyond its original purpose—a single convention center—and monitor the operations of more and more buildings. This diminished its ability to effectively oversee energy management and control systems (EMCS) or accommodate any future growth.

The biggest challenge was updating the City's older, proprietary system to an open protocol solution. The City required a vendor who could retain as much of the original wire, cables, and conduits as possible to avoid the staggering costs of installing a completely new system—without sacrificing system performance or incurring prohibitive costs.

"Climatec won the contract because we were the only vendor who could viably integrate a new, open protocol solution with a large amount of existing, aging, proprietary equipment," said Alan Muhs, Climatec. "A complete swap out of so much equipment was not an option."

Part of upgrading the City's building controls was simplifying the system's communications equipment. The existing proprietary hardware and software entailed a complex duo of separate

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components, including Johnson Controls (JC) DSC-8500 controllers connected to a JC/85/40 CPU and one JC Metasys workstation that connected via dial-up. But even linking so many elements together could not centralize and monitor all of the City's buildings from a single workstation.

At the time of the City of Tucson's upgrade and consolidation project, BACnet technology was fairly new and unique. Climatec faced skepticism from competitors and consulting engineers outside the project who didn't believe interoperability was possible—let alone with such a wide variety of multi-vendor equipment. City of Tucson personnel were familiar with Alerton products through Climatec's prior installations at Honeywell Engine Systems and Texas Instruments, which City decision-makers toured during the selection process. With few examples at the time to illustrate the possibilities, Climatec and the City of Tucson proceeded, relying almost solely on their confidence in Alerton solutions and the new but growing promise of BACnet.

Climatec installed a BACnet solution to give the City of Tucson interoperable building controls. With an open protocol communications standard, the City could enjoy competitive pricing whenever it needed to add a building to the system.

The project included global controllers, variable air volume (VAV) controllers, air handling units, chillers, boilers, and BACtalk operator and laptop workstations.

Upgrading the dual communication networks necessitated two different approaches. In the buildings deploying the JCI DSC-8500 hardware, the renovation was fairly straightforward. Climatec reused as much of the existing cable, wire and conduits as possible, replacing only incompatible temperature sensors, relays, and power supplies with Alerton-compatible devices. The buildings were then connected to the City of Tucson's Ethernet wide area network (WAN) using Alerton global controllers, BACtalk Integrators (BTIs).

The METASYS-fitted building posed more of a challenge.

City of Tucson project specifications dictated that the METASYS equipment be reused to save money. Though newer technology than the DSC-8500 hardware, METASYS was still proprietary and would require an N2 driver—not yet released to the market—to work in the upgraded system. When the N2 driver finally became available, Climatec installed a Tridium JACE controller for network management,

supervisory control logic and, for the first time, an entirely interoperable interface between BACnet and the city's WAN.

Climatec established two desktop workstations and four laptop workstations all running BACnet/IP over the City of Tucson's WAN. Facilities managers can connect to the WAN at any point to monitor and control the entire system. A full graphic display package with floor plans and system diagrams was installed in each computer.

Before upgrading, the building controls for the City of Tucson were 100% proprietary and subject to the fees of one vendor when changes were needed. With the renovation to an open protocol BAS, additions to the campus are now 95% competitively bid and the City can choose the best solutions from any vendor with an open solution.

Alerton and Climatec's open solutions successfully and effectively integrated much of the original, proprietary hardware without sacrificing performance or functionality—saving the City more than \$1,000,000 in new equipment costs. The solution simplified operations thereby reducing the number of maintenance call-outs made by the facilities staff.

The new interoperability of its BAS gives the City of Tucson centralized, single seat monitoring and control over all its buildings. BACnet-based laptop workstations mean facilities staff can connect to the City's WAN from any point to oversee and adjust operations as needed.

BACtalk's graphical displays allow the facilities staff at-a-glance views of the entire system as well as individual components and their performance. The ability to monitor and override functions from a single workstation provides easy maintenance and simplifies training since new operators can see equipment on the screen without having detailed knowledge of each component. BACtalk's graphical programming eliminates the need for City facilities staff to retain specialized programming skills for proprietary systems.

Project Scope

- 2 BACtalk operator workstations
- 4 BACtalk laptop workstations
- 20 BTI global controllers
- 600 Alerton VAV/field controllers
- 500 Johnson Controls Metasys field controllers
- 16 Tridium JACE controllers
- 40 CV AHUs
- 30 VAV AHUs
- 20 chillers
- 18 boilers

