

Presidential candidate Bush can breathe easy

At least in his gov's mansion, thanks to state-of-the-art IAQ

AUSTIN, TX—If hvac industry members are looking for a presidential candidate with an appreciation for indoor air quality (IAQ), they need look no further than Texas Governor George W. Bush.

After seeing what some of the industry's best consulting engineers, mechanical contractors, and high-tech equipment did to reverse IAQ problems in the 143-year-old Texas Governor's Mansion during a recent renovation, the governor and Mrs. Bush are now staunch air quality advocates.

"We all notice a significant difference in the quality of the air now that the hvac retrofit has been completed," said Texas Governor's Mansion administrator Anne DeBois, who has served under four Texas governors.

Previously the 9,000-sq-ft, 27-room historic mansion suffered high levels of mold and mildew counts during Texas' hot and humid summer months that were not only unhealthy for inhabitants, state workers, and thousands of annual tourists, but also responsible for unappealing musty odors. Volz & Associates Inc. (Austin, TX) which spearheaded the renovation project that also included roof replacement and



Outdoor air is supplied to the Texas Governor's Mansion by a Dectron® dehumidifier via a 75 ft-long underground PVC duct.

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(Austin, TX); and mechanical contractor TDIndustries (Dallas, TX).

While both consultants conceived the solutions, it was Harris's

security updates, put together a hvac team that had to resolve many issues, such as:

- Ascertain how to increase outside air, dehumidify and purify it, while getting it into the air distribution system amidst great space limitations;
- Decide how to add humidity in dry winter months;
- Update the existing equipment and air distribution system;
- Ensure that the high profile project was foolproof; and
- Ensure all the above work met with the historical building guidelines outlined by the Texas Historical Commission and the architect.

The IAQ problems were solved by consultants William Holder, senior vice president of Assured Indoor Air Quality (Dallas, TX); Bill Harris, P.E., president of HMG & Associates

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firm that performed the design work. Holder, who is an IAQ consultant, developed the design criteria and performed the function of the commissioning authority.

“This was perhaps one of the most challenging and complicated design jobs I’ve had in my 26 years in the hvac business,” said Harris, whose firm has provided mechanical and electrical consulting on projects ranging from large 15,000-sq-ft residences to 300,000-sq-ft, \$50 million commercial buildings.

RIGHT DEHUMIDIFIER, FILTRATION SYSTEM

The existing hvac system consisted of a 20-year-old double-duct, variable air volume (vav) design with 15 zones. Equipment consisted of two 30-ton chillers (one as a backup), one 300,000-Btu hot water boiler, and one built-up air-handling unit.

Although less than 10% of the system’s total 10,000 cfm consisted of untreated outside air, that introduction of air during the air conditioning season helped produce mold-mildew growth that propagated throughout the years.

The project started with a complete cleaning to rid building surfaces and ductwork of mold, mildew, dust, and other contaminants.

To eliminate the source of biological contaminants, Harris and Holder realized a commercial dehumidifier combined with air purification was vital to the redesign. They specified a make-up air Dry-O-Tron® dehumidifier Model RK-100 by Dectron Internationale (Montreal, PQ, Canada), which the manufacturer said has a moisture-removing capacity of 137 lb/hr.

Equally important to the air quality, however, is a multiple-stage, gas-phase filtration system, custom designed to remove outdoor air particulates and chemical contaminants produced by automotive exhaust. The air purification systems were factory-installed inside the dehumidifier, but supplied by indoor air purification specialist Circul-Aire (Montreal).

GOING UNDERGROUND

To arrive at an outdoor air specification that would comply with ASHRAE standards and reverse the building’s pre-existing negative pressure (due to the inherent leakiness of 19th-century building techniques), a 20-cfm/person calculation was specified for a capacity of 250 people.

Typically the building has less than 50 people inside at once, but like most gubernatorial mansions, the site is a frequent gathering spot for large events that can attract as many as 250 guests. “We started with the ASHRAE standard, but our final numbers appeared to be enough to also satisfy our goal of reversing the building’s negative pressure,” recalled Harris.

The difficulty of adding a 12-ft-long by 7-ft-wide by 6-ft-high packaged dehumidifier was difficult in the limited mechanical room space of the mansion’s 6-ft-tall crawl space. A rooftop placement wouldn’t have complied with historical landmark criteria—plus, Harris doubted whether the roof was strong enough to support such a large unit.

Instead, the unit (which was custom-painted white at the factory to match surrounding support buildings) was installed 75 ft away in a walled-off area of the mansion grounds.

Connecting the RK-100 to the air distribution system inside the house is a 75-ft-long, 24-in.-round, PVC underground duct. It was important to pitch the duct toward the building and outfit it with a moisture trap in the event any moisture entered the duct, according to Harris.

GETTING AT THE ROOT(S)

For mechanical contractor TDIndustries, the trenching for the underground duct was difficult because tree roots, stones, bricks, forgotten foundations, and other buried objects had to be circumvented to comply with historic landmark criteria.

On several occasions, an arborist and/or archeologist was called to the site to consult with TDIndustries’ crew. Consequently, instead of a straight duct run, the contractor had to use several custom-made PVC elbows ranging from 30 to 35 degrees to avoid various historical debris. “We had to call the appointed consultants (the Texas Historical Commission) on three separate occasions because our trenching ran into roots or an old foundation,” said Ronnie Swingler, project manager for TD Industries, considered one of the nation’s largest employee-owned mechanical contractors.

While Sam Houston, a former governor and one of Texas’s most famous statesmen, most likely suffered from the seasonably hot, humid summers, his 21st-century successors and current governor George W. Bush will breathe easier in the new millennium. •