2017 NC State Construction Conference

Performance Contracting Case Study

Len Hoey, PEM
Utility Savings Initiative
Department of Environmental Quality

The Project

North Carolina Museum of Art

What is Performance Contracting

- An Energy Service Company (ESCO) proposes and designs a package of energy cost reduction measures, installs or implements those cost reduction measures, and guarantees the savings of the cost reductions (Design Build)
- The Governmental Unit pays for the package over time using the stream of revenue provided by the energy reduction measures

What is Success

- Project meets Governmental Unit's expectations
- Project profitable for ESCO
- Actual savings cover total costs over time

Project Specifics

- Parties
  - Department of Administration – Museum of Art
  - ESCO – Trane Comfort Solutions
  - Financing – Sun Trust Bank

*This was the first PC performed by a State Governmental Unit in NC

Project Specifics

- By the Numbers
  - Total Square feet – 2 buildings, 164,670
  - Project cost – $4,966,763
  - Interest rate – 3.608%
  - Term – 12 years
  - Savings
    - Guaranteed $ first 9 years – $5,095,884
    - Actual $ first 9 years – $5,269,646

Project Specifics

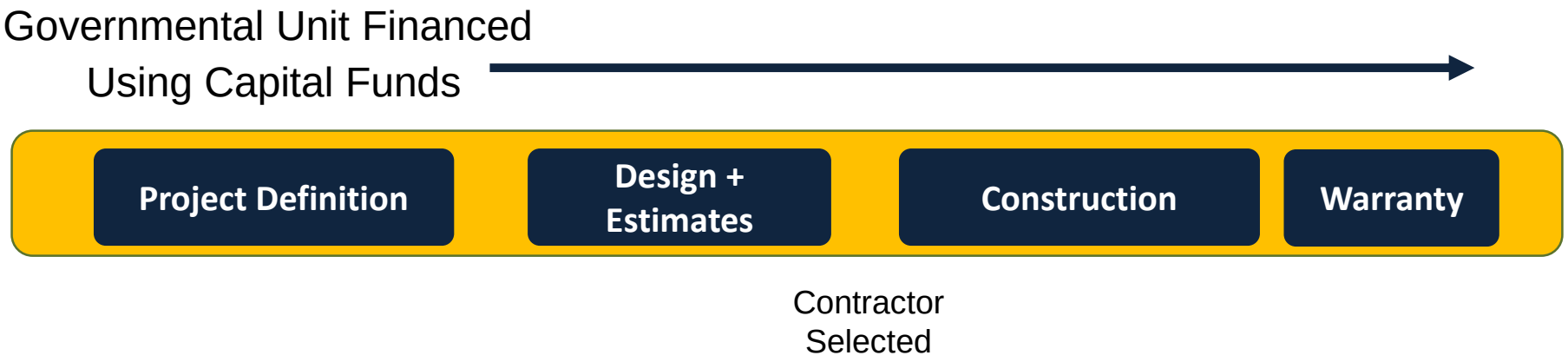
- Key Dates
  - ESCO Selection
    - RFP Release – September 17, 2004
    - Proposals Due – November 4, 2004
  - Design (IGA)
    - Preliminary Award – December 23, 2004

Project Specifics

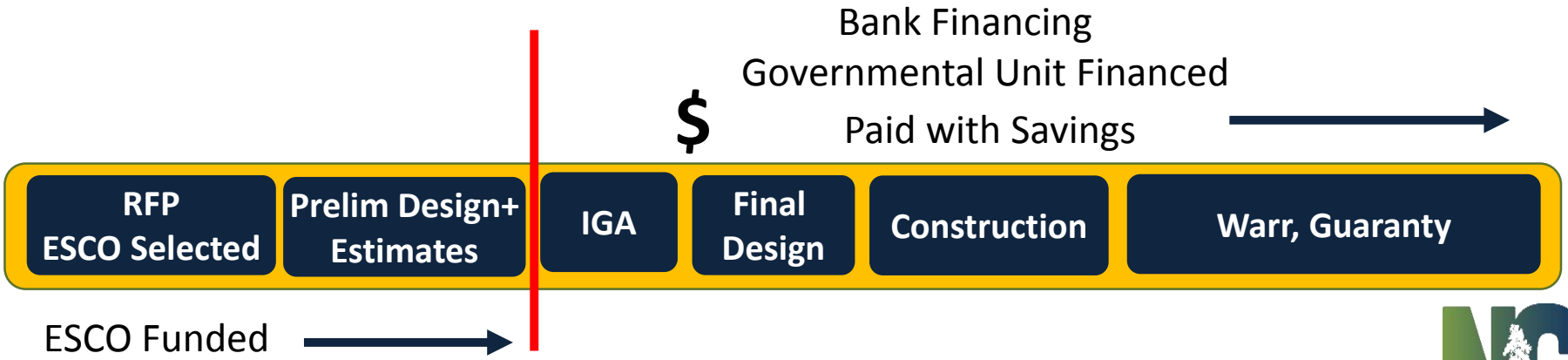
- Key Dates (cont.)
  - Construction
    - Contract Signed – August 19, 2005
    - Construction Complete – January 31, 2007
  - Guarantee Period
    - 1st Year M&V – January 31, 2008

Just under 2 ½ years

Traditional Design-Bid Build



Design Build with Guarantee



Project Challenges

- Occupants
  - *The Artwork* not People
  - 24/7
    - Cannot use temperature/humidity setbacks
  - Humidity control critical
    - The museum was experiencing fluctuations between 30 percent humidity in the winter and up to 60 percent in the summer

Temperature and humidity fluctuations are the enemy of the art world.

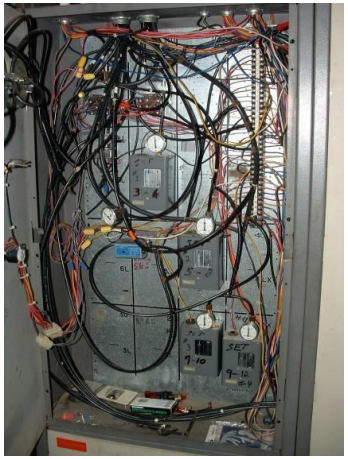
Project Challenges

- A 2004 General Conservation/Facilities Survey (grant funded) pointed out that the old HVAC system was not maintaining relative humidity nor adequately filtering airborne particulates, and the building pressure was negative. And, there was a lack of regular maintenance. Huge daily and seasonal fluctuations in relative humidity were jeopardizing the collection and hygrothermographs were not recording those changes accurately. This had resulted in documented damage to the collection. For example, very low humidity in the winter had resulted in new and extended splits in art works made of wood.

Project Challenges

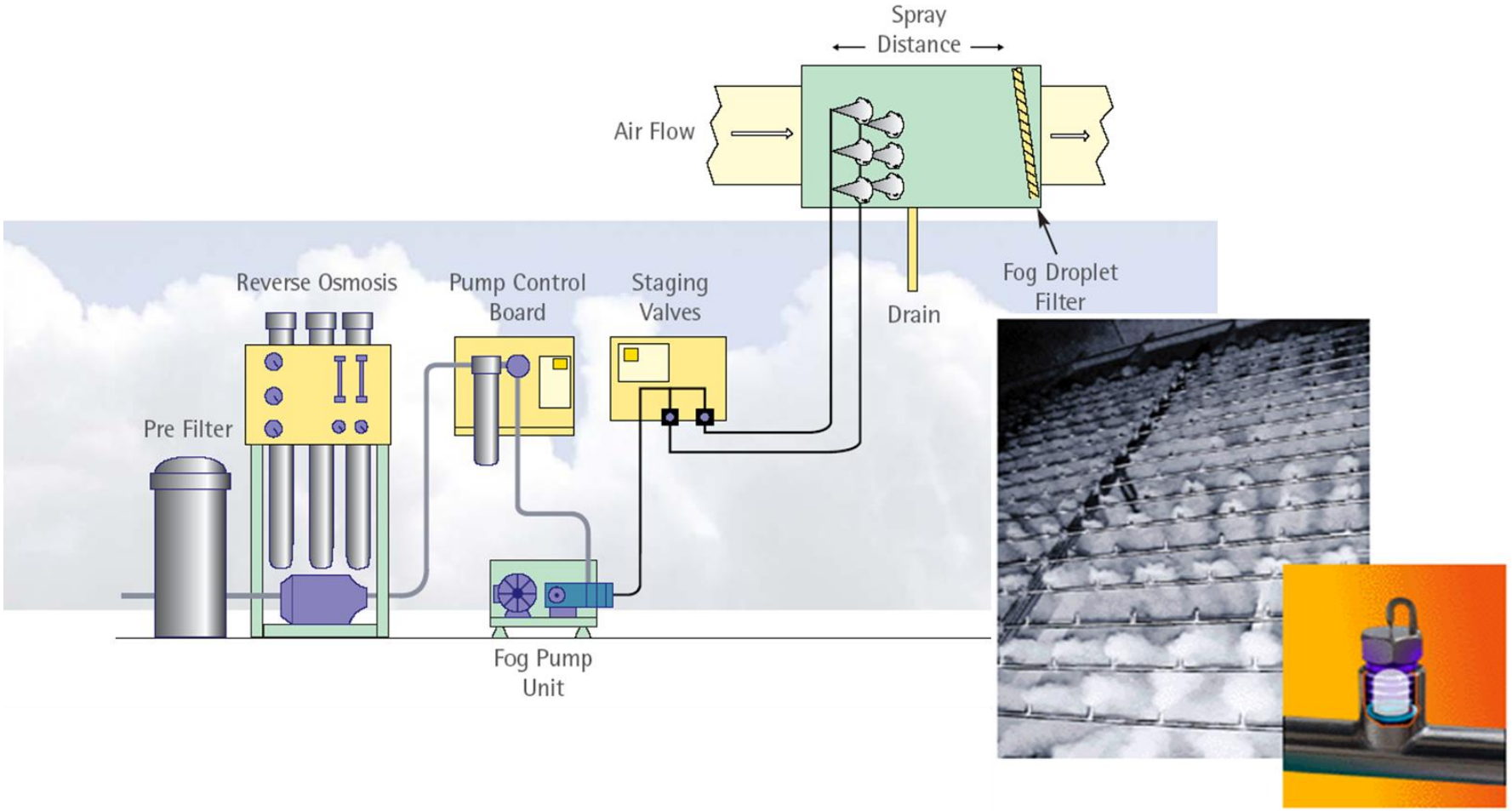
- Following the recommendations of the General Survey, and an additional survey by an independent engineer, the Museum established performance targets to follow for the Performance Contract. Required Standards for Mechanical Systems (HVAC) necessary to ensure the Long-Term Preservation of the Art Collections of the NCMA.

Project Challenges



Department of Environmental Quality

Project Results



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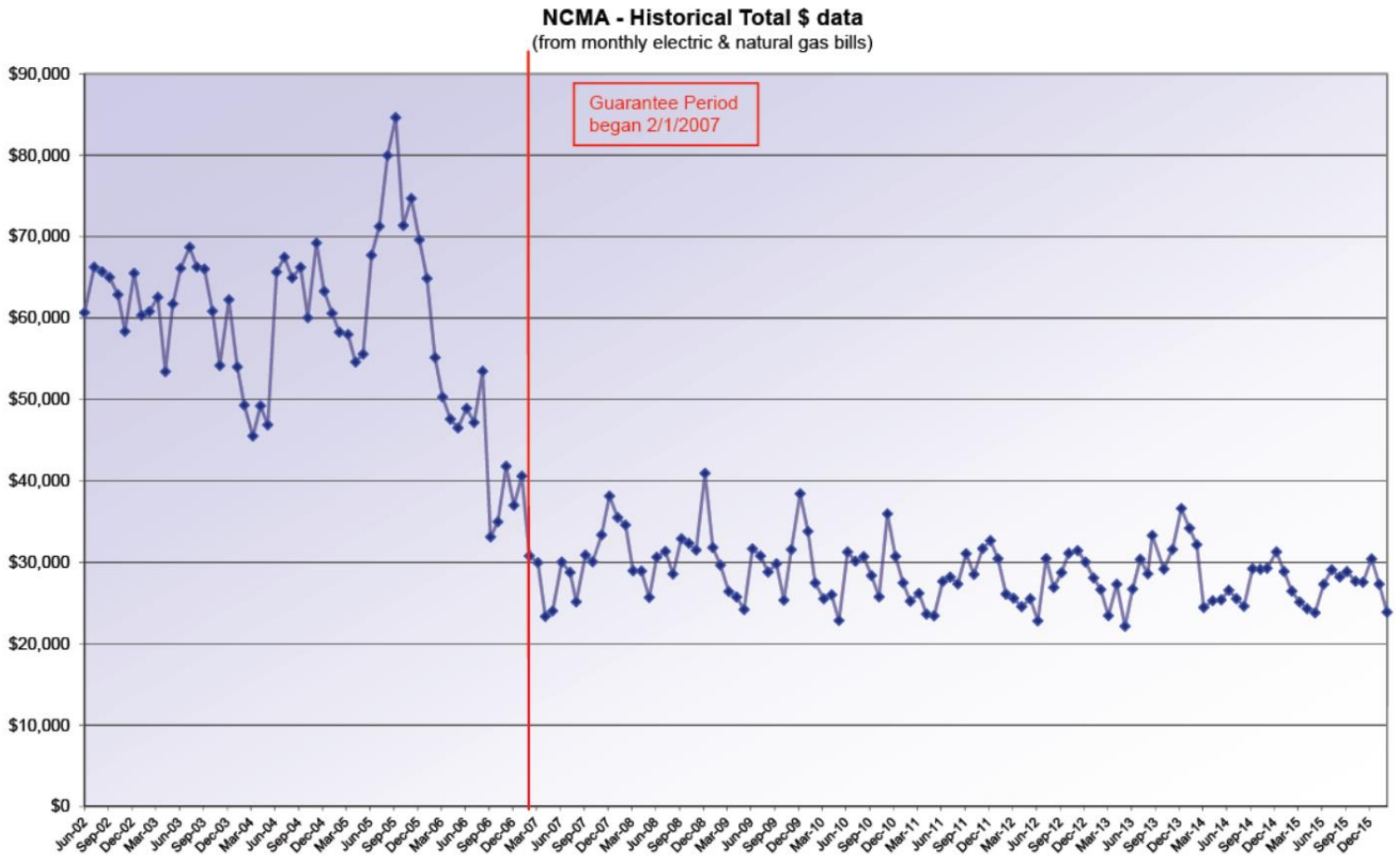
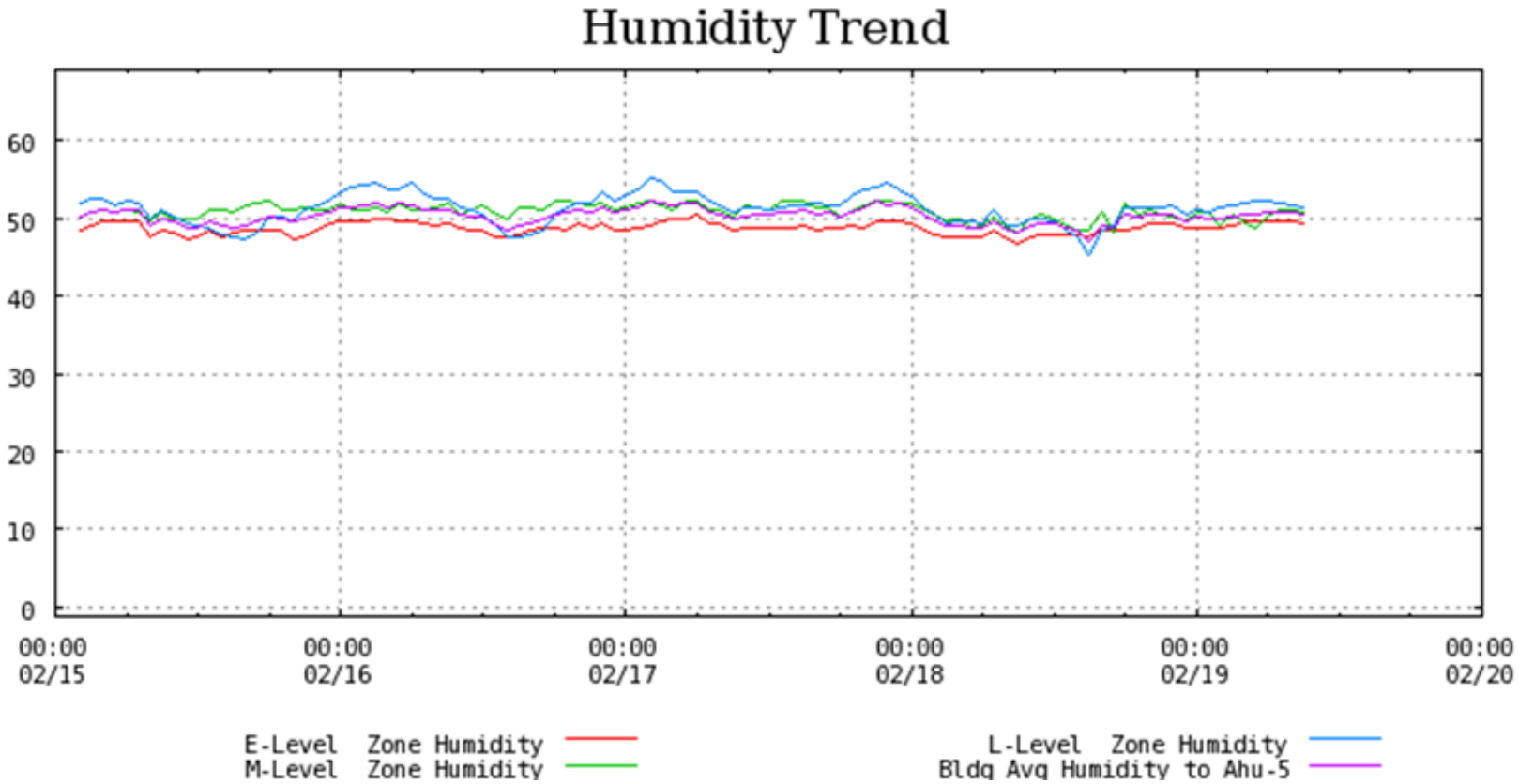
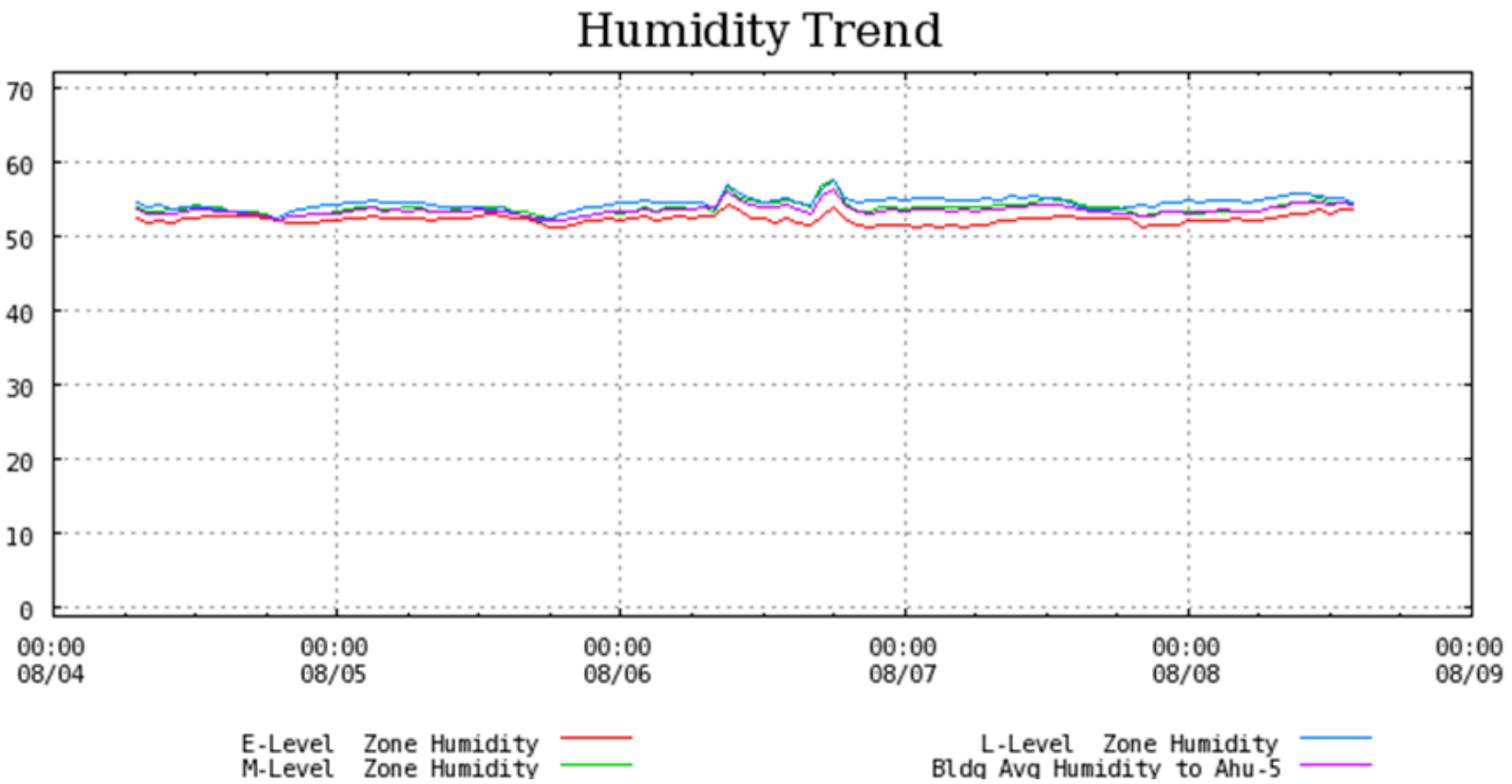
Project Results



Project Results (Winter)



Project Results (Summer)



Project Intangibles

- The Performance Contract implemented the survey recommendations. We now have an HVAC system that meets museum standards for relative humidity and airborne particulate filtration and is regularly maintained. Digital controls and computer system allow for desk top and remote monitoring, and precise control.
- Improvements to the Conservation Lab included a new chemical fume hood, removal of steam pipes (which posed a hazard if burst), and reestablishment of positive pressure in the lab (necessary to prevent diesel fumes and dust from entering the lab from the loading dock).
- Tim Gasper, Brady Trane, offered classes for us to better understand the installed HVAC system and general principles of HVAC control.

Project Intangibles

- More stable environmental history which translates to easier acquisition of borrowed art work, less concern for lenders
- One air handler that maintains the humidity requirements instead of many points of steam injection throughout the building
- New computer control system = easier to monitor site remotely = less down time

Project Intangibles

- Newer equipment = less maintenance = less down time
- More stable environment. Before project there were huge swings in temp and humidity
- Air handler fans are variable speed now, before they were one speed (high) which means the equipment is quieter and you don’t have the rushing air noise in the supply duct/vents

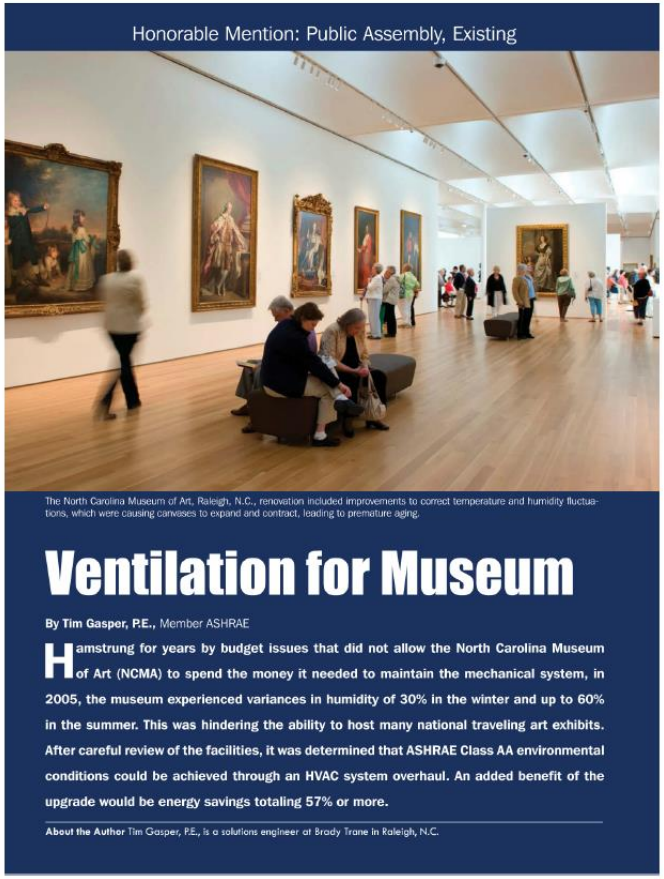
Project Summary

- First State PC Project – Success!!
  - Energy, dollars, building environment
  - Exceeded 60% savings
  - No setback/setup!!
  - Exceeds ASHRAE's highest classification
  - ASHRAE-AA
  - High quality equipment + redundancy

Project Summary

- Unique PC benefits
  - Guaranteed results – measured & verified
    - Not for one year (normal warranty) but for term of contract (12 years)
  - Sustainable – ongoing maintenance & training
  - No additional general appropriations required

Project Recognition ASHRAE Technology Award


Honorable Mention: Public Assembly, Existing

The North Carolina Museum of Art, Raleigh, N.C., renovation included improvements to correct temperature and humidity fluctuations, which were causing canvases to expand and contract, leading to premature aging.

Ventilation for Museum

By Tim Gasper, P.E., Member ASHRAE

Hamstrung for years by budget issues that did not allow the North Carolina Museum of Art (NCMA) to spend the money it needed to maintain the mechanical system, in 2005, the museum experienced variances in humidity of 30% in the winter and up to 60% in the summer. This was hindering the ability to host many national traveling art exhibits. After careful review of the facilities, it was determined that ASHRAE Class AA environmental conditions could be achieved through an HVAC system overhaul. An added benefit of the upgrade would be energy savings totaling 57% or more.

About the Author Tim Gasper, P.E., is a solutions engineer at Brady Trane in Raleigh, N.C.

2010 1st Place
SE Regional Award

2012 Honorable Mention
International Competition


2012
ASHRAE Technology Award

Honorable Mention

Timothy Gasper
Brady Energy Services
Morrisville, North Carolina

Designers: Edmondson Engineers, PA

Category V - Public Assembly - Existing
North Carolina Museum of Art
Raleigh, North Carolina

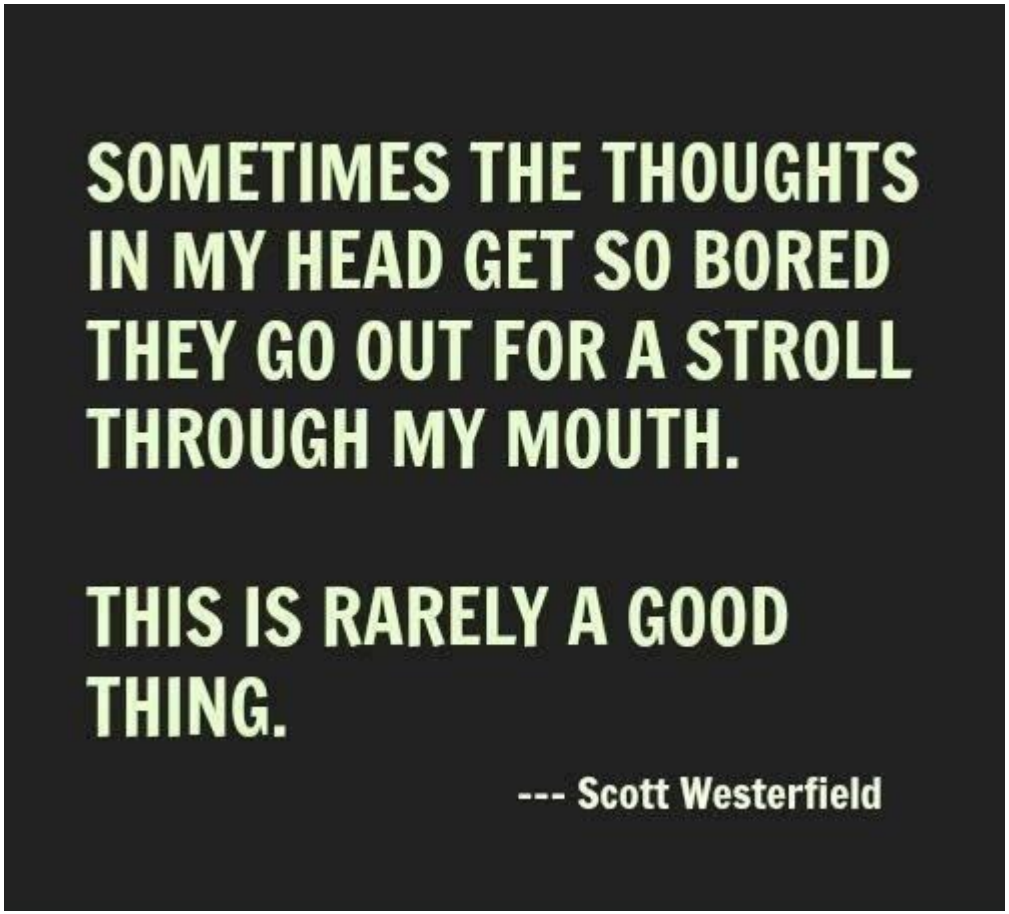
In recognition of outstanding achievement in the design and operation of energy-efficient buildings

ASHRAE

Secretary

President

A Final Thought



Contact Information for USI

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