



Case Study – Hill-Stead Museum

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



Consistent Temperature and Humidity Levels Preserve the Past at Hill-Stead Museum

Project Objectives


Hill-Stead Museum, a National Historic Landmark in Farmington, CT, was built in 1901 as a private home and now houses an extensive collection of Chippendale furniture, photographs, letters, books, textiles and Impressionist paintings – many of them by Monet. Outmoded 1930s furnaces and cooling units produced an inadequate indoor environment for the museum's fragile contents. An updated climate control system was needed to help preserve the historic building and conserve its valuable collections. The retrofit had to be completed without affecting the historic integrity of the building.

Solution

Carrier designed a year-round HVAC system, using a model 30GT air-cooled chiller that provides cooling water for the entire museum and administration area, along with Carrier air handling units and fan coils. Comfort, humidity and air quality are monitored and controlled by a Carrier Comfort Network® (CCN) digital system. The new system provides Hill-Stead with its first climate-controlled collections storage area, and positions the museum to qualify for accreditation by the American Association of Museums, which requires high standards for collection care and preservation. The new system delivers temperatures within 65 – 74°F, 30 – 60% relative humidity with 95% efficiency filtration.

The new Carrier system brought harmful climate fluctuations under control to preserve the historic structure and its valuable contents.

System Comparison

	Old System	
Temp Range	50-78°F	65-74°F
Relative Humidity Range	30-85%	30-60%
Filtration Efficiency	30%	95%



Case Study – Hill-Stead Museum *continued*

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“The improvements enhance the museum in its role as a major tourist attraction in the central Connecticut region. With the new climate control systems, Hill-Stead Museum is positioned to optimally preserve this historic building and care for, conserve and display its diverse collections.”

Linda Steigleder,
director,
Hill-Stead Museum

Project Synopsis

Hill-Stead Museum was designed by one of the first licensed female architects in the United States, Theodate Pope, as a retirement home for her parents. The 36-room colonial revival home was completed in 1901, and is still home to the Popes' magnificent collection of French and American Impressionist paintings, Chinese porcelains, Japanese woodblock prints, and furnishings, all arranged in their original setting.

Although the home has been a museum since 1946, its 1930s-vintage furnaces and cooling units were inadequate for preserving the National Historic Landmark and its contents. In 1995, the museum's Board of Governors engaged Landmark Facilities Group to assess the building's environmental conditions. Temperature and relative humidity were found to fluctuate substantially, with extremes of 50 – 78°F and 30 – 85%, respectively, with woefully inadequate filtration efficiency of 30%. Landmark concluded that the single most important preservation goal for the collection was to stabilize the climate in the house. The Board turned to Carrier for systems expertise, and a preservation solution for Hill-Stead.

Carrier designed the museum's new system using a self-contained model 30GT air-cooled chiller with a cooling capacity of 35 tons (420,000 Btu/hr.), Carrier air handling units and fan coils. The entire system is controlled by the Carrier Comfort Network® (CCN) digital electronic system, to monitor and control comfort, humidity and air quality in the museum and administration office. The new system provides a temperature and humidity control range of 65 – 74°F, 30 – 60% relative humidity and 95% efficiency filtration.

Since older parts of the museum were not insulated, humidity sensors were placed within the walls to monitor any moisture build-up. Enhanced air filtration is achieved by integrating multi-filter air handling equipment with the building control system. The museum staff is able to monitor and control the system through a single PC interface. The system also has remote monitoring capability.

“The challenge presented by this project was to take a 19th century structure and introduce 21st century technology without affecting the historic integrity of the building,” said Brian Kronenberger, vice president of Kronenberger & Sons Restoration, Inc., experts in historic preservation. This challenge was met by minimizing wall penetrations, locating piping in closets and executing all work mindful of the historic fabrication. The new system met the challenge and provides Hill-Stead with its first climate-controlled collections storage area, enabling the rotation of fragile objects not appropriate for continuous display. Modern climate control allows the museum to continue to include the collection in tours and workshops while protecting the condition of the objects for scholarly study and posterity.

Project Summary

Location: Farmington, CT

Building Age: 100 years

Project Type: Retrofit

Building Type/Size: Wood-frame construction/Three-story, 33,000 sq. ft.

Building Usage: Museum; administration offices; collection of historical materials

Objectives: Precise control of climate, humidity, air filtration to preserve building and contents; provide occupant comfort

Major Decision Drivers: Preservation capability and staff ability to control climate

Design Considerations: Introduce 21st century technology without affecting historic integrity of the building

Total Cooling (tons): 35

HVAC Equipment: Model 30GT air-cooled reciprocating chiller; six model 39 L-series air handling units; 14 model 42VB cabinet fan coils; one BH fan coil unit

Unique Features: System monitored and controlled through a single PC interface; remote monitoring capability

Project Cost Range: \$100,000 to \$500,000

Installation Date: July 2000

Consulting Engineer: New England Mechanical Services

Contractor: New England Mechanical Services

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