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“Creating a Sustainable Environment to Preserve Access to Humanities, Innovation, and STEM Education Collections at WPI”:

The importance of planning ahead and remaining flexible

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WPI

Worcester Polytechnic Institute's "Creating a Sustainable Environment to Preserve Access to Humanities, Innovation, and STEM Education Collections at WPI" project established environmental systems and controls appropriate for preserving fragile materials of historical significance held by the Curation, Preservation, and Archives (CPA) department in the Gordon Library. Environmental improvements included installing a dedicated HVAC and humidification system and creating an envelope for collections storage, work, and consultation areas. The library partnered with WPI's Department of Facilities to manage the construction project.

In October 2013, WPI engaged in a design-build contract with William F. Lynch Company to develop final construction drawings for the dedicated HVAC system. As Lynch worked through finalizing the design, some issues were identified. Asbestos was found in the ceiling tiles in one of CPA's large storage areas (GL 012), requiring abatement prior to the start of any work. Abatement was scheduled for the winter holiday break when the Gordon Library was closed to minimize impact and students and staff. Also, the proposed footprint for a mechanical room included in the grant proposal was identified as too small to contain the scoped HVAC unit. Changes required demolition of an interior wall (GL025) and repositioning of an emergency exit. Initial plans to abandon or re-purpose existing ductwork in place were also adjusted to address differences in original building systems drawings and current layouts. Design changes impacted both the scope of collections to be relocated and the extensiveness of ceiling work in public consultation, storage, and work spaces.

Abatement and demolition took place in early January 2014, ahead of the start of Spring 2014 classes. HVAC-related prep work also started in January, with more than 30 new masonry cuts being made in existing interior walls and major electrical conduits for the space re-routed. CPA staff coordinated the safe relocation of approximately 2000 linear feet of artwork, rare books, objects, and manuscript collections to temporary and, later, permanent storage areas, as construction was completed in each space. A new storefront was installed in February, creating an envelope for the CPA wing.

Installation of Storefront

To support contractors' revised workflows and timelines, the Fellman Dickens Reading Room closed from January 16 to March 7. CPA responded to patron requests during this time by embracing a flexible research approach. CPA staff used available study spaces throughout the Gordon Library and also continued to respond to phone and email requests. This allowed the department to continue to provide services to 184 students, faculty, staff, and scholars, including historians working on publications and two seven-week courses utilizing primary sources.

The installation of exterior components of the HVAC system experienced a number of challenges. The unusually cold winter weather delayed the pouring of the concrete pads for the condensing unit until the end of March. When the custom Munters HVAC unit was delivered in April, the condensing unit was discovered to be damaged, preventing its installation. A replacement unit arrived in May and was assembled, installed, and connected to the prepared ductwork and electrical feeds. Temperature and humidity sensors for the seven zones within the CPA wing were installed and tested. Commissioning, testing and balancing were completed by mid-June 2014.

Installation of Munters HVAC unit

A meeting to hand-off the operations of the HVAC system was held on June 24, 2014. Representatives of Munters and William F. Lynch Company described to WPI Facilities and CPA staff the normal temperature and relative humidity set points, who to contact if the system performs outside the range, and how to request periodic reports on the temperature and relative humidity levels for preservation reporting purposes. The new unit was also connected to the campus building management system (BMS).

In response to a several events during the summer months related to the electrical load, adjustments were made to slow the system's fan speed to avoid overloading the electrical system. The balancing contractor, Tekon – Technical Consultants, Inc. of Rochester, NH returned on September 16 to rebalance and recommission the air flows.

Despite a number of staffing changes during the grant period, including as the retirement of WPI Archivist Margaret Anderson, the reorganization of the department, and the departure of the Dean of Library Services Tracey Leger-Hornby, the work was completed on schedule with existing Library staff, students, and additional temporary staff.

Completing hook up of new ductwork

The goals of improving environmental conditions and providing enhanced ability to respond to seasonal changes in the temperature and relative humidity have been clearly demonstrated by both anecdotal and factual evidence (see charts 1 and 2 below).

Due to unanticipated abatement issues and additional demolition, construction, expenses, and logistics, the overall cost of the project was higher than originally budgeted. WPI Facilities and Gordon Library absorbed the additional costs of the project to ensure its completion. As part of cost-saving measures, upgrades to the existing fire suppression system

in the original scope of work are currently postponed until additional funding can be secured. In response to the delay in improving the fire-suppression system for the area, CPA has partnered with WPI's Fire Protection Engineering department to engage a student project to consider the state of the library's existing fire detection and suppression systems, examine state-of-the-art systems appropriate for archival repositories, and conduct a cost-benefit analysis of possible improvements. The student's findings and recommendations will be shared with Gordon Library and WPI Facilities leadership as part of identifying possible ways forward for addressing fire suppression needs.

Any visitor who passes through the new storefront to the department immediately notices the difference in the environment. Library staff has supplemented this perceptible experience with several blog posts on the project, and discussion of the impact of the improved environmental conditions is incorporated into outreach presentations for classes and meeting groups such as the Student Alumni Society's History Tribe, Pickwickians (a regional group of Dickensian scholars), and the attendees of the **Risk Assessment and Mitigation Training** workshop presented by COSTEP MA (Coordinated Statewide Emergency Preparedness). A reception to celebrate the one-year commissioning of the system is being planned for August 2015.

Opening reception for student curated exhibit

The primary impact of the project is on the collections themselves. However, the long-term preservation of the collections entrusted to CPA will serve staff, students, faculty, administration, and visiting scholars for generations. In the three month period following the completion of the grant project, over 135 readers using the Fellman Dickens Reading Room benefited from the improved environmental conditions. The Gladwin Gallery in the CPA wing has already hosted two exhibit openings attended by at least 100 visitors. The tangible difference in environment from outside the wing is a frequent opportunity for a "teaching moment" about collections care.

CPA's Special Collections Curator (formerly Preservation Librarian) continues to monitor the temperature and RH by gathering data with Onset Corporation's HOBO UB12 dataloggers. A comparison of data from before the beginning of project in 2012 with the five month period following the commissioning of the system clearly shows the improvement in conditions. While the temperature range for the more recent data demonstrates more stable temperatures and less fluctuation, the change in the standard deviation for relative humidity is particularly dramatic (see Charts 1 and 2).

The staff of CPA will continue to work with WPI Facilities to reduce the fluctuations in RH. In addition, the Library has requested to participate in the Massachusetts Board of Library Commissioners Environmental Monitoring Program. Planned for August 2015, this additional

assessment will help identify opportunities to further refine settings and plan any additional work if necessary.

CHART 1: Temperature

Room	Time period	TEMPERATURE maximum	TEMPERATURE minimum	TEMPERATURE average	TEMPERATURE Standard Deviation
GL 012	2014 Jul-Nov	76.88	67.22	69.74	1.48
	2012 Jul-Nov	83.22	63.97	74.08	3.79
GL 022	2014 Jul-Nov	76.88	67.73	70.35	1.24
	2012 Jul-Nov	78.98	61.91	69.88	3.61
GL 023	2014 Jul-Nov	76.88	67.73	71.26	1.51
	2012 Jul-Nov	77.92	65.34	68.62	1.58

CHART 2: Relative Humidity

Room	Time period	RELATIVE HUMIDITY maximum	RELATIVE HUMIDITY minimum	RELATIVE HUMIDITY average	RELATIVE HUMIDITY Standard Deviation
GL 012	2014 Jul-Nov	52.47	27.55	44.28	4.60
	2012 Jul-Nov	74.8	15	41.53	19.15
GL 022	2014 Jul-Nov	51.72	27.55	41.75	4.78
	2012 Jul-Nov	82.59	15	52.64	17.41
GL 023	2014 Jul-Nov	52.14	27.55	41.89	4.89
	2012 Jul-Nov	69.44	15	51.05	12.63

WPI has committed to the long-term maintenance of the system as part of a comprehensive approach to the optimal method to preserving its history through establishment of a sustainable environment, proper housing, and security for the CPA wing. The working relationship between WPI Facilities and CPA staff has been greatly enhanced through work on this project. The responsiveness of WPI Facilities to issues and concerns continues to be both quick and thorough.

As CPA evolves into a “collaboratory” for student projects learning about care of cultural heritage collections, this project provides the opportunity to demonstrate mechanical methods of proper environment that students can actually feel, as well as providing data to consider.

The project has demonstrated CPA’s positive commitment to preservation, which will continue to be leveraged in building records collection partnerships with other WPI divisions and demonstrates capacity and responsibility.