ARCHITECTURAL PRESERVATION AT BOSTON COLLEGE CAMPUS: A SYSTEMATIC APPROACH

Wendall Kalsow, AIA, LEED Green Associate
Principal, McGinley Kalsow & Associates

Ivan Myjer
Principal, Building and Monument Conservation

Evan Kopelson, AIC
Partner, Vertical Access LLC / TPAS LLC
NEW! MANAGING CEUs AND CFM® MAINTENANCE POINTS

You are eligible to receive Continuing Education Units (CEUs) and Certified Facility Manager® (CFM) maintenance points for attending sessions at Facility Fusion.

To receive CEU points you must pay the $12 processing fee, collect the code provided during the session, log onto ceu.experient-inc.com/ffn111 and pass a five-question assessment developed by the speaker. CEUs can only be earned upon successful completion of the assessment.

To receive 20 CFM maintenance points you must place your registration confirmation notice into your maintenance records. No assessment is needed if you only want to earn CFM maintenance points.

Sessions labeled Health, Safety and Welfare and Sustainable Design meet the AIA standards. All AIA members will have to self-report LUs to AIA for attending these sessions.
The CEU session code for this presentation is H6F

Take the session assessment and log your CEU’s online at [ceu.experient-inc.com/ffn111](http://ceu.experient-inc.com/ffn111)
NO MORE PAPER!

Facility Fusion Evaluations are now online!

It’s Simple!

Evaluate sessions at the registration kiosks or online at

ceu.experient-inc.com/ffn111
Meet Our Presenter(s):

Wendall Kalsow leads McGinley Kalsow & Associates’ award-winning architectural and preservation practice. He has extensive experience in the restoration and adaptive reuse of historic structures, including many National Register Properties and National Historic Landmarks. Kalsow’s projects include the restoration of Gasson Hall at Boston College, West Hall at Tufts University, Gate of Heaven Church in South Boston, Merrimac Town Hall and Governor Bellingham Cary House. Kalsow served on the Massachusetts Historical Commission committee developing amendments to the Massachusetts Building Code that encourages and facilitates the preservation and rehabilitation of historic buildings. He holds a National Architectural Registration Certificate and is registered in Massachusetts, Connecticut and Rhode Island.
Meet Our Presenter(s):

Ivan Myjer is the founder of Building and Monument Conservation, a firm that consults on the conservation and restoration of historic masonry buildings and provides hands-on work for the conservation of outdoor sculptures, monuments and grave markers. Prior to starting this firm, Ivan was the Director of the Conservation Center at Historic New England (formerly SPNEA), and prior to that, Director of Restoration for the stone program at the Cathedral of St. John the Divine in New York City. Ivan's projects include the restoration of Gasson Hall at Boston College, the Massachusetts State House, the Chapel at Princeton University and the Cooper Union Foundation Building.
Meet Our Presenter(s):

Evan Kopelson is a partner with Vertical Access, an inspection and preservation consultancy that provides hands-on investigations using lightweight rigging systems to gain access to a variety of structures. He is also a partner with TPAS LLC, which was created to further the development of the Tablet PC Annotation System that VA has been using for many years as part of its investigation and documentation work. Evan’s professional experience has focused on the preservation of historic buildings. This work includes conducting field investigations, writing conditions reports and performing construction administration services. Evan helps to manage Vertical Access’ field projects and building investigations. He is a professional associate of the American Institute for Conservation of Historic and Artistic Works.
Boston College Design Competition Winning Vision

Gasson Hall was designed by the Boston-based firm of Maginnis and Walsh, who were among the pioneers of the Collegiate Gothic style of campus architecture. Maginnis and Walsh won the commission to design Gasson Hall when Boston College decided to build a new campus and move from its original location on Harrison Avenue in Boston. The firm went on to design all of the early buildings on the Middle Campus including Bapst/Burns Library, St. Mary’s Hall and Devlin Hall.
Gasson Hall was the first building constructed on the new Chestnut Hill campus. Completed in 1913, the main building was originally known a “Recitation Hall,” then the “Tower Building,” and finally Gasson Hall.
Historic Photo of Gasson Hall Under Construction: Gasson Hall was built with massive load-bearing walls constructed from Brighton Puddingstone, the distinctive looking bedrock of Boston, Roxbury and Brighton. Commonly called Roxbury Puddingstone, its name is derived from its resemblance to an English Christmas pudding studded with candied fruit and nuts. The original Maginnis and Walsh drawings refer to the wall as Brighton Stone indicating that it was most likely quarried on site as the foundation for Gasson Hall was excavated.
Gasson Hall 2006:
All of the decorative trim on Gasson Hall is cast stone, a material that was brand new in 1909-1913 when the building was being constructed. Cast stone is a refined form of concrete that is manufactured in masonry units that are intended to resemble natural stones such as Indiana Limestone and Milford Pink Granite. Cast stone, because it could be easily cast in multiples from molds, was significantly less expensive to produce than carved natural stone.
Close-up of Tower Turrets:
When Gasson Hall was finished all of the upper cast stone trim did resemble limestone and all of the units at the base of the building resembled granite. Over time the appearance of the cast stone changed dramatically as the original surfaces weathered away, exposing the dark aggregate inside the units.
Hands-on Investigation of Gasson Hall:
In July of 2006 Boston College hired McGinley Kalsow & Associates to assess the conditions of the masonry and design repairs to Gasson Hall. The first step was the hands-on investigation of the building to document existing conditions. Vertical Access technicians used industrial rope access techniques to perform the up-close examination of the tower.
Hands-on Investigation of Other Buildings at Boston College:
The hands-on investigation of Gasson Hall served as a model for work at other buildings in the central campus area of Boston College. In 2007, four additional buildings were surveyed: Bapst Library, St. Mary’s Hall, Devlin Hall and Lyons Hall. In some areas, industrial rope access was used and in some areas aerial platforms were used.
Close up of Tooled Finish on Cast Stone:
In addition to altering the color and texture of units, the weathering also erased the distinctive parallel line finish that was cast into the original units to make them resemble hand carved stone.
Close ups of Deteriorated Units: Over the century the weathering process not only produced cosmetic changes, it also undermined the structural integrity of units.
Cast Stone Unit Cracked by Rusting Pin:
The original units contained steel reinforcement and were attached with steel pins and rods. Over time, water permeated the open mortar joints and corroded the steel pins which in turn expanded and cracked the cast stone.
Documentation of Existing Conditions Using TPAS:

Elevation drawings are documented using condition codes drawn from pre-defined block libraries.
Documentation of Existing Conditions Using TPAS:
Photographs of conditions are automatically hyperlinked to the condition codes.
Documentation of Existing Conditions Using TPAS:

Quantities such as crack length and area of soiling are automatically calculated using TPAS, and then extracted into a spreadsheet for budgeting, cost estimating and scoping.
Another tool used in the investigation of the Gasson Hall tower was live-feed video. VA technicians surveying the exterior used a hand-held video camera connected to a monitor to review conditions with the entire project team. In this way, the team could gain an understanding of the issues affecting the deterioration of the materials, structural condition and ultimately the restoration of the building.
After the extent of the damage was discovered, Cores were taken from deteriorated cast stone units to be sent to a laboratory to determine the causes of the deterioration. The core drilling process revealed that even units that appeared intact from the outside had already begun to delaminate ½ to ¾ inches from the surface. This hidden condition was the early stage of eventual unit failure.
Photographs Taken Through a Microscope of the Cast Stone: The laboratory analysis determined that the cast stone was deteriorating because, unlike modern engineered concrete products, early cast stone was not air entrained to prevent freeze-thaw damage nor were the water-to-cement ratios carefully monitored. Microscopy slides allow an analysis of ratios of air voids, and determine the extent of micro-fracturing.
Phase I

BOSTON COLLEGE
John Romeo, Director of Capital Construction
Jake Mycofsky, Construction Project Manager

ARCHITECT
McGinley Kalsow & Associates Inc.
Somerville, Massachusetts

GENERAL CONTRACTOR
Phoenix Bay State
Construction Company, Inc
Boston, Massachusetts

STONE CONSERVATOR
Building and Monument Conservation
Arlington, Massachusetts

STRUCTURAL ENGINEER
LeMessurier Associates
Boston, Massachusetts

DOCUMENTATION
Vertical Access LLC
Ithaca, NY

ROOFING CONTRACTOR
Murphy Specialty
Boston, Massachusetts

CAST STONE FABRICATOR
Beton Prefabrique
Alma, Quebec, Canada
Contract Drawings:
Restoring a 100-year old gothic tower required comparing the original Maginnis and Walsh drawings to what was constructed and then producing elevations and section drawings that represented what had actually been built.
Cast Stone Shop Drawings for Individual Units:
Every stone was measured and drawn. There are about 400 shapes on the tower phase of the project out of a total of 2,400 units.
Photographic Documentation of the Placement of Each Unit:
The contractor then created his own photographic elevations on which the location and position of each unit was noted.
Partially Disassembled Tower:
In November of 2006, the decision was made to undertake a major comprehensive repair of the tower, replacing most of the cast stone and cleaning and repointing the puddingstone. Construction started after Commencement in 2007 and 40 feet of the tower needed to be removed.
Original Steel Beams at the Top of the Tower:
The steel roof beams at the top of the tower needed to be removed so that the backup or supporting masonry could be re-built.
Original Unit of Cast Stone at the Fabrication Plant: Individual units were removed, photographed and sent to the cast stone fabrication plant in Canada.
Cast Stone Fabricator’s Shop Tickets:
Shop Tickets were drawn that showed the location and type of reinforcement as well as any modification to the original jointing. In this case, four units were combined to make one larger unit that would require less work to set.
Rubber Molds with Wood Sides:
The original weathered units were repaired to restore the original tooled finish and then rubber molds were made that captured all of the intricate details.
Rubber Mold with Wood Sides:
The rubber molds were combined with wood forms to create a final mold that was durable and be able to stand up to multiple castings.
Stainless Steel Reinforcing:
Stainless steel reinforcing was used to provide a much higher level of corrosion resistance than either galvanized or epoxy-coated reinforcing would have provided.
Finished Unit:
This is a typical piece of cast stone as it arrived at Gasson Hall. Note the smooth surface without any exposed aggregate and the off-white limestone color.
Cast Stone Installation:
2,400 pieces of cast stone were all lifted by crane and placed in position. Typically, stones were anchored to the backup stone masonry with stainless steel straps and pins. The weight of a stone ranged from 60 pounds to over 4,000 pounds.
View of Tower Crane:
To lift and place cast stone pieces, a tower crane was erected on-site and utilized for the duration of the project.

FACTS AND FIGURES
Manufacturer: Linden Comansa
Type: Freestanding, Counter Weighted, Flat Top, Tower Crane
Dimensions: 200’ high, with a 136’ long boom, 360° swing
Lifting Capacity: 5000 lbs
Counterweight: 245,000 lbs
On Site: June 25, 2007 through Oct 20, 2008
Leased by: Julian Crane and Equipment Co, Watertown, MA
Rebuilding of one of the Tower’s Turrets:
At the four pinnacles, large stainless steel re-bars tie all the pieces together.
Original Weathered Cast Stone Unit:
Incredible effort and craftsmanship was demonstrated in replicating the appearance of the cast stone as it originally appeared in 1913. This is the original cast stone boss and cornice.
New Cast Stone Unit:
This is a new cast stone boss and cornice unit that was re-sculpted to recreate missing details.
Missing Finials:
Just above the cornice line, two of the four original six foot tall finials were missing.
Replacement Finial:
Eight new replacement finials were cast using one of the surviving finials as the pattern.
Original Weathered Cast Stone Engaged Capital:
Original, weathered cast stone at the corner of the tower under the cornice.
New cast stone replacement unit:
New replacement unit. Note contrast between tooled and smooth finishes. The tooled surfaces were designed by Maginnis and Walsh to add texture to the surface.
Completed Reassembled Turret with a Detail of the Finial in Front of the Parapet:
Completed pinnacle on the left with a detail of the six foot tall finial on the right.
South Elevation Before Replacement of the Second and Third Floor Windows:
Phase I also included the restoration and repair of the walls at the second and third floor setback on the south elevation as well as the replacement of the windows above the Honors Library.
Close-up of the South Elevation Side Wall at the Roof Setback:
The replacement limestone-colored cast stone and the restoration of the original window muntin pattern has resulted in a dramatic change in the appearance of the building.
South Elevation Center Gable:
South elevation center gable with the completed cast stone and window replacement.
Setting of the Final Unit at the Top of the Tower:
On August 29, 2008 the last stones of Phase I were set at the top of the Tower.
The Rebuilt Tower:
The rebuilt top of the tower, looking toward Commonwealth Avenue.
The Men Who Worked on Phase I Celebrating on August 29th:
Boston College was fortunate to have a great crew of skilled masons and roofers to work on this project. The crew at times included seven foremen all working closely to ensure that the various components of the cast stone, pudding stone, roofs and windows all fit together properly.
Father Leahy, Pat Keating, Mary Nardone and John Romeo Lead the Topping Off Ceremony, Held on August 29, 2008.
International Union of Bricklayers and Allied Craftworkers

2008 CRAFT AWARD
Presented to
McGinley Kalsow & Associates, Inc.
For
Best Restoration/Rehabilitation/Maintenance
Gasson Hall Tower Restoration
Chestnut Hill, Massachusetts

James Boland, President
International Union of Bricklayers and Allied Craftworkers
Best School, Co-Winner
Restoration of Boston College’s Gasson Hall Tower
Chestnut Hill, Mass.

Repairing and restoring Gasson Hall Tower on Boston College’s historic Chestnut Hill, Mass., campus was no small feat. The 96-year-old hall was the first building constructed on the campus, and its 175-ft tall (53 m) tower has become a landmark in the community. After nearly 100 years of exposure, the original cast stone was weathered and starting to fail. Architects relied on the versatility of precast concrete to faithfully replicate the details of the tower, replacing the original cast stone with new matching cast stone. The walls were constructed of local puddingstone, while all of the original trim and ornamental details were fabricated from cast stone tinted to resemble limestone.

To compensate for the loss of detail due to weathering, each unit was refreshed by hand to simulate natural stone tooling, prior to making a mold from that unit. To improve durability and long-term performance, a new anchoring system was engineered and some small units were combined to create larger units with false joints.

Because the work site was restricted and the geometry of the tower complex, each unit was numbered to identify its location in the wall and each stone was delivered to the job site in the sequence that it would be set.

Mold and pattern making took 11 months, and production of the nearly 3300 units took about a year, with the more than 450 unique shapes. The units were installed as they were cured, and installation took 14 months.

"For many years precast concrete has expanded its technical capabilities, increased its structural capacities, and improved durability and performance characteristics," says the architect, Wendell Kalloni of McGinley Kalloni & Associates in Somerville, Mass. "This project advances the aesthetic frontier of precast and cast stone and demonstrates its potential role in significant historic preservation projects."

JUDGES’ COMMENTS

This project was cited because of its really unusual nature. It’s a precast concrete solution to replace what was a cast stone product, and it really provided an example of how an architect can use precast concrete to really re-create an authentic gothic structure. The thoroughness of the detail and the cleverness of the connections and the effective form reuse were considered remarkable.

Architects relied on the versatility of precast concrete to faithfully replicate the details of the tower.
Gasson Hall Exterior Restoration

Phase II

BOSTON COLLEGE
John Romeo, Director of Capital Construction
Tom Runyon, Construction Project Manager

ARCHITECT
McGinley Kalsow & Associates Inc.
Somerville, Massachusetts

GENERAL CONTRACTOR
Shawmut Design and Construction
Boston, Massachusetts

MASONRY CONTRACTOR:
Grande Masonry
Providence, Rhode Island

STONE CONSERVATOR:
Building and Monument Conservation
Arlington, Massachusetts

STRUCTURAL ENGINEER
LeMessurier Associates
Boston, Massachusetts

ROOFING CONTRACTOR
Murphy Specialty
Boston, Massachusetts

CAST STONE FABRICATOR
Beton Prefabrique
Alma, Quebec, Canada
Probes for Preparation of Phase II:

In August, probes were made in the lower sections of the building to document conditions in preparation for Phases II. Phase II will address the masonry deterioration and window replacement on the lower facades. Unlike the tower, which is solid masonry construction, portions of the lower façade are steel framed.
## Statistics

<table>
<thead>
<tr>
<th></th>
<th>Phase I</th>
<th>Phase II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cast stone Demolition Pieces</td>
<td>2,411</td>
<td>6,793</td>
</tr>
<tr>
<td>Cast Stone Installation Pieces</td>
<td>2,254</td>
<td>6,058</td>
</tr>
<tr>
<td>Cast Stone Volume</td>
<td>9,860 cf</td>
<td>15,015 cf</td>
</tr>
<tr>
<td>Cast Stone Weight</td>
<td>1,479,000 lbs</td>
<td>2,252,250 lbs</td>
</tr>
<tr>
<td>Area of puddingstone Pointing</td>
<td>5,363 sf</td>
<td>15,338 sf</td>
</tr>
<tr>
<td>Quantity of Windows</td>
<td>41</td>
<td>296</td>
</tr>
<tr>
<td>Number of Subcontractors</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Duration</td>
<td>18 months</td>
<td>15 months*</td>
</tr>
</tbody>
</table>

* Plus 4 months for preconstruction work including selective stone removal & cast stone fabrication
Deteriorated Cast Stone on the Lower North Elevation:
The same type of deterioration that was addressed during the tower phase of the project is also evident on the lower sections of the building.
Deteriorated Coping Stones in the Next Phase:
The balance of the coping stones which are deteriorating from freeze-thaw damage will require replacement.
Existing South Entrance:
In addition to masonry, windows, and roofing replacement, the current phase will dramatically improve accessibility to the building, making four entrances fully accessible.
Existing Entry on East Elevation:
In the current phase, the entire entry portico will be rebuilt, replacing deteriorated cast stone.
Lighting Mock Up:
The exterior lighting on Gasson Hall will be improved and upgraded using more energy efficient fixtures.
Historic preservation and full accessibility for buildings can sometimes be competing goals. It is easy to achieve one goal, but it can be a challenge to successfully achieve both goals. This photograph shows the front of Gasson Hall as it looked in 1913 with the grade halfway between ground floor and the first floor. One had to go up or down about six feet to enter the building.
Existing North Elevation Stairs:
The existing north elevation stairs.
Proposed Design of North Elevation with Accessible Entrances:
A view of the proposed revisions to the front entry. Viewed from Linden Lane, the only noticeable changes will be the handrails going to the ground level entrances.
Perimeter Drain:
Excavation has been performed around Gasson Hall, and a new perimeter drain has been installed.
The East and West Porticos:
The Porticos we disassembled and sent to BPDL in Canada for replication.
Fraco lifts Provide access to Phase II work:
Grande Masonry and Shawmut construction installed operable Fraco lifts that allows easy access to the entire elevation.
Coping Stones are set:
The original coping stones were not set in alignment with the gable bands. Small modifications to the new stones allow them to be set in alignment with the bands as they were originally intended.
East Window Tracery:
The upper tracery band on the East Elevation has been replaced, and the lower bands will be refinished with full face dutchmen.
Bay Window Restoration:
The East Elevation bay windows have been restored and aligned.
The CEU session code for this presentation is

H6F

Take the session assessment and log your CEU’s online at

ceu.experient-inc.com/ffn111
NO MORE PAPER!
Facility Fusion Evaluations are now online!
It’s Simple!
Evaluate sessions at the registration kiosks
or online at
ceu.experient-inc.com/ffn111
IFMA

Credentials

Open doors to new possibilities!

Facility Management Professional
Build your career on a solid foundation.

Sustainability Facility Professional
Establish sustainable FM knowledge and business practices.

Certified Facility Manager
Earn recognition for your expertise.

Visit www.ifma.org/credentials.

IFMA FACILITY FUSION
Conference & Expo
March 23-25, 2011
The Westin Boston Waterfront | Boston, Mass., USA

Where ideas, best practices and solutions come together.
Thank You!

For attending this educational offering at IFMA’s Facility Fusion.