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STRUCTURE & SITE

Updates & Information from Klepper, Hahn & Hyatt

KHH Courthouse Project Wins Copper in Architecture Award

The Copper Development Association (CDA) has honored a downtown Syracuse project designed by Klepper, Hahn & Hyatt with a 2009 North American Copper in Architecture Award for Restoration/Renovation. The Onondaga County Courthouse Building Envelope Restoration included, as one of its features, the replacement of the large central dome and four smaller satellite domes, all constructed of copper.

The annual awards are held in collaboration with the Canadian Copper and Brass Development Association. Twelve projects across the continent were recognized in two categories, restoration and new construction. Only four were selected in the renovation category: two in the U.S. and two in Canada.

The Onondaga County Courthouse, designed by renowned architect Archimedes Russell, is a symmetrical four-story building modeled after Italian Renaissance prototypes. It opened January 1, 1907, and was listed on the National Register of Historic Places in 1980 as part of the Montgomery Street-Columbus Circle Historic District.

Roofing elements of the Courthouse are varied and unique. In addition to the five copper-clad domes, there are two arched clay tile domes and low-sloped bituminous membrane roofs. The copper work is the dominant architecturally defining feature. To mark the Courthouse's centennial, the county legislature approved the restoration of the entire building envelope.

The roofing restoration portion of the project encompassed approximately 43,000 square feet. Many of the building overhangs and smaller domed copper roof areas have flat copper surfaces, and the original design was replicated.



Onondaga County Courthouse dome restoration in progress

KHH researched the existing construction, studying what was in place and why failures had occurred. The firm established the performance requirements for the project, working closely with the general contractor, Hueber-Breuer Construction Company, and the roofing contractor, Henderson Johnson Company.

Henderson Johnson retained the services of Canadian sheet metal contractor Heather & Little of Markham, Ontario. There followed a highly collaborative effort to replicate the features and improve the detailing and performance of the copper roof elements. In mid-construction, members of the design and construction team made a factory tour in Canada where they observed parts, processes, and progress.

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The interests and expertise of the design team complemented the expertise and abilities of the fabricator to produce outstanding results. Methods were employed that had not been available to the original builders, including mechanized stamping of the floral patterns and spun metal for the round objects and surfaces. Some of the domes were factory annealed and formed, precurved in the shop. Larger pieces were shop fabricated and structured. Every effort was made to match the existing forms and elements.

For longevity, the thickness of the copper was increased by 20 percent. In all, more than 35,000 pounds of 20-ounce clear copper were used.

Due to the antiquity of the copper dome on the Courthouse, the CDA requested samples for national research studies on patination. County officials granted permission to furnish samples from each of the octants of the main dome to ship to Philadelphia. This will help to advance the knowledge and the applications of copper for future use.

The Copper in Architecture Award was presented to the KHH design and construction team during a presentation ceremony and luncheon on November 19th at the firm's office in East Syracuse.

School Building Condition Survey? Call Your Structural Engineer!

For more information about our School Building Visual Structural Review Services, please call us at 315-446-9201.

Once every five years, the New York State Education Department requires all school districts to have Building Condition Surveys completed for their student-occupied buildings. This will happen again in 2010.

Despite the work being fully aidable (up to 24 cents per square foot in the past, with 2010 figures yet to be determined), many school districts choose the lowest price services, which doesn't always lead to the best service. Several of our senior engineers have extensive experience in structural building condition surveys. Many conditions that we have identified might have led to a serious structural situation, had they not been detected and corrected. These include:

- A tall exterior masonry wall of a gymnasium, grossly inadequate to resist wind loading;
- A long earth-retaining concrete basement wall in a mechanical room, with horizontal cracks and bowing inward, evidencing flexural failure;

- Broken open-web steel roof joists in a location subject to snow drifting;
- Badly deteriorated steel floor framing in a crawlspace under a cafeteria.

Beyond the basics of structural building review, we have developed expertise in some applications that can supplement the basic services:

- Facade review, to identify and quantify maintenance and repair needs, and help avert any catastrophic or dangerous exterior masonry condition;
- Use of our infrared thermal camera to detect areas of heat loss from buildings which, in some cases, can be addressed with minimal expense;
- Structural review of elements beyond strictly building structural elements, including bleachers, grandstands, gymnasium athletic equipment and their supports, retaining walls, pedestrian bridges, storage buildings, storage



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platforms and mezzanines, and similar facilities.

Based on some of the structural problems we have observed, we believe it is critical that professionals who are experienced in structural building reviews are included in the teams that provide Building Condition

Surveys. We have found that the most difficult areas to observe - the far corners of the crawlspaces, or the barely accessible spaces over ceilings - are the areas most likely to reveal problems. We believe that such assignments are where the engineer's professional obligation to protect the public is a most useful perspective to maintain.



Structural Details Reduce Energy Loss

This fall Klepper, Hahn & Hyatt was able to execute some innovative structural details on projects that represent a breakthrough in reducing energy loss through building envelopes.

Figure 2 shows one example of several projects where KHH detailed rigid vertical foundation insulation extending continuously down to the exterior wall footing, between the cast-in-place concrete foundation wall and an exterior masonry wythe that supports brick above grade. This creates an uninterrupted layer of thermal insulation, is compliant with the New York State Energy Conservation Construction Code prescriptive requirements, seems to pose no buildability problems, and eliminates the need for a tricky insulation detail at the edge of the concrete slab on grade, when the insulation plane is on the inside face of the foundation wall. It appears to work as well on a jobsite as it did on paper in the office!



Figure 1 - Fiberglass Reinforced Plastic Angle

Figure 1 shows a Fiberglass Reinforced Plastic (FRP) angle used in a hung masonry lintel, to provide a thermal break in the thermal steel bridging that normally occurs across continuous plates or angles in this detail. The fabrication was done by Raulli Ironworks, working for Streeter Associates on the Elmira City School District Southside Elementary School classroom addition. This is the first of three small school projects using this detailing system that will be built this year.



Figure 2 - Rigid Vertical Foundation Insulation



BES Upstate NY Projects Show Range and Impact of Services

When Klepper, Hahn & Hyatt added roofing and waterproofing components to its services in 2004, they were a natural extension of the firm’s structural engineering discipline and decades of work on all types of facades.

KHH has been part of an evolutionary trend in building construction. Traditionally,



Sherburne Library

architects acted as the prime designers of the building envelope. As the role of the architect has grown more complex, more technical aspects of the building envelope assembly have been increasingly delegated to firms specializing in this type of work. Since the envelope is the shell that fastens to the building’s structural skeleton, structural engineers are a natural fit as building envelope specialists.



Boldt Castle Yacht House

KHH Building Envelope Systems approaches renovation projects with a careful methodology. Staff members seek long-term solutions to problems, often involving a kind of detective work using original blueprints or bits and pieces of material to establish the means of a building’s original construction. For historic buildings, often less is more. If a building’s original materials served the purpose for decades or even centuries, there is no need to plaster it

over with all kinds of modern materials. Mortars are now manufactured that replicate those of the 1700s and 1800s, for instance, and work better with the construction and facade materials from those eras.

KHH personnel also visit many construction and manufacturing sites to ascertain types of materials available, their applications, and other methods of fabrication. They participate in ongoing education, and have active memberships in such professional organizations as ASTM International, originally known as the American Society for Testing and Materials.

All of this has led to KHH’s involvement in a broad range of building envelope projects across upstate New York, including projects on a number of iconic buildings in the Syracuse area. These include envelope restorations for Crouse College at Syracuse University, the old Onondaga County Courthouse, and the National Grid Syracuse Office Complex A, known locally as the NiMo building. In addition, there are buildings ranging from historic to contemporary where KHH has resolved or is working on envelope issues.

Older and historic buildings have evolved into a niche for the firm. In addition to those mentioned above, others dot the New York landscape. The firm conducted a facade and roofing study at the Oneida Mansion House in Oneida in order to undertake repair and reconstruction of the roof and gutter system. At the Boldt Castle Yacht House in Alexandria Bay, KHH has submitted a study of the cedar shake shingle roofing and a structural analysis to determine load capacity.



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The Sherburne Library in Sherburne, New York, was built circa 1911, with additions in 1938 and 2001. It is experiencing roof leaks around the parapets, some issues with the clay tile roofing, and facade deterioration. Another firm recommended that the library discard and replace all the original tile. KHH found that the tile is in fairly good condition, and prescribed specific repairs and some replacements to remediate the water infiltration problems.

Another KHH project for a building listed on the National Register of Historic Places involved the New York State Armory in



State Armory in Poughkeepsie

Poughkeepsie. The Romanesque structure was designed by state architect Isaac G. Perry and constructed in 1891. KHH provided stabilization of the masonry facade, including stone repair and repointing, main entry repair, gutter replacement on the south wall, and window restoration. The rehabilitation was done with the exact same materials used in the original construction, including custom-matching the Rosendale mortar. The wood windows were salvaged, rather than being replaced.

At Colgate University in Hamilton, KHH has been at the center of an entire campus restoration program. There are a number of historic stone buildings that are significant to

the origins of the university, on a campus which has been deemed one of the most beautiful in North America. The work has involved roofing and facade restoration, much of it on rubble stone masonry walls that require a natural hydraulic lime mortar to maintain their integrity. East Hall, West Hall, Alumni Hall and Spear House are a handful of the many campus structures that have undergone restoration.

From across the decades to the present day, KHH is employing its engineering expertise and meticulous project approach for contemporary solutions.

A team approach that included personnel from all KHH disciplines was used for the Monroe County Civic Center Garage, which involved three acres of plaza waterproofing. The entire team, from project manager to drafters, understood the scope, recognized the objectives, and met the document production deadline in a very compressed time frame. FRA, a multi-service consulting firm, is the prime for this project.

A specialized and highly complex project



The Center of Excellence Rain Screen Facade

involved the rain screen facade for the Syracuse University Center of Excellence in downtown Syracuse. KHH designed an attachment system for this complicated



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custom facade to address a number of design issues, including corrosion (both galvanic and wind-driven salt spray from nearby roads), temperature change and deflection of the building structure. Other issues included wind loading and the dead weight of the system itself.

From the concrete of Syracuse University's Carrier Dome, to the Vitrolite and molded glass of the NiMo Building, to the 100-year-

old clay tile domes of the Onondaga County Courthouse, KHH has been instrumental in the preservation of our Central New York landmarks and influencing the design of our present and future buildings.



Onondaga County Courthouse viewed from Warren Street



NEW AND NOTEWORTHY

Jim D'Aloisio Presents at Greenbuild

KHH Principal Jim D'Aloisio, P.E., SECB, LEED AP, presented an abbreviated version of his presentation, *Structures, Building Envelopes and the Planet*, at Greenbuild in Phoenix, Arizona in November. Greenbuild is the U.S. Green Building Council's annual meeting for sustainable design enthusiasts, attracting thousands of people globally to share information and lessons learned.

Cathy Savage Earns HR Certification

Cathy Savage, SPHR, has earned her certification as a Senior Professional in Human Resources. The certification is awarded by the HR Certification Institute, an affiliate of the Society for Human Resources Management. To become certified, an applicant must pass a rigorous comprehensive examination.



Cathy Savage



Klepper, Hahn & Hyatt held its second annual Halloween Luncheon and Costume Contest on October 30. A buffet lunch was followed by costume awards and the requisite group photo.



Klepper, Hahn & Hyatt

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