



Recent projects featuring Simpson Gumpertz & Heger's structural and building enclosure rehabilitation capabilities.

Pennsylvania State Capitol Building | Harrisburg, PA
Building enclosure and structural rehabilitation reaches deep to mitigate water issues.

When historical murals in the Pennsylvania State Capitol's rotunda showed signs of water damage, SGH determined the cause and recommended building enclosure and structural repairs. The 1906 Beaux Art Italian Renaissance style building features a terra-cotta dome surrounded by a colonnaded peristyle deck that had leaked for years. SGH measured moisture content of the brick masonry and displacement of the coping stones. We also performed finite element and hygrothermal analyses. SGH concluded that the deck coating was deteriorated, the masonry substrate was saturated, and the structure itself was damaged due to freeze-thaw cycles. We advised the client to remove the wet underlying masonry and reset the granite pavers, balustrades, and coping. We also specified and monitored installation of concealed concrete beams and curbs; a flat-seam copper roof; and custom stainless steel and grouted anchors that tied granite to the masonry substrate.



In collaboration with Perfido Weiskopf Wagstaff + Goettel Architects / Noble Preservation Services, Inc. (architects) and Masonry Preservation Services, Inc. (contractor).

Craig Station | Craig, CO
Regularly scheduled inspection and repair of pipelines avoids emergency shutdowns and unnecessary expense.

To reduce the likelihood of unanticipated shutdowns, SGH led a failure risk assessment program for Tri-State Generation and Transmission Association's 1.5 miles of buried pipelines. In operation, the 9 ft diameter prestressed concrete pipes convey cooling water to condenser heat exchangers. During regularly scheduled outages, SGH evaluated the interior of the pipes, looking for signs of damage. We identified sections with a higher risk of failure, prioritized repairs, and monitored construction. For the rehabilitation phase, we designed internally bonded carbon-fiber-reinforced polymer (CFRP) repairs that eliminated the need for excavation and external access. We also conducted laboratory testing to verify that the installed materials met specification. SGH's combination of investigation, rehabilitation, and in-house material science services allowed the owner to fast-track inspection, risk analysis, and repairs at times when maintenance was most cost effective.



Hollywood Palladium | Los Angeles, CA
Integrated building technology capabilities enhance renovation and conservation of iconic theater.

As part of a major renovation of the Hollywood Palladium, SGH provided extensive building enclosure rehabilitation services. Constructed in 1940, the celebrated Streamline Moderne style venue has hosted big band, swing, and rock & roll greats along with Emmy, Grammy, and Country Music Awards events. It was important, therefore, to preserve the structure's appearance while providing a durable, watertight roof and enclosure. SGH designed the replacement roof, storefront window system, traffic-bearing waterproofing system, and stucco-and-concrete exterior cladding. We also consulted on the use of anti-graffiti coatings and paint types. We monitored construction of the roofing, waterproofing, and wall systems.



The project received the following awards:

- 2009 Preservation Design Award, California Preservation Foundation
- 2009 Preservation Award, Los Angeles Conservancy
- 2009 Sarnafil Consultant Project of the Year, third place

In collaboration with The Robert Green Company (developer).

The Essex and Sussex | Spring Lake, NJ
Owner initiative and comprehensive rehabilitation protect seaside elegance.

The condominium association at the Essex and Sussex asked SGH to address mounting damage from water penetration throughout their building. The luxury residence had been a landmark oceanfront hotel from 1914 until the 1980s. Start-and-stop conversion projects in the 1990s left the building open to the oceanfront conditions. Other projects included refinished interior and exterior walls, additional balconies and terrace decks, and new windows and doors. SGH inspected the building and found widespread corrosion of structural steel components. Causes of the corrosion included exposure to the elements during stalled reconstruction and poor-quality renovation, much of which had simply masked the underlying deterioration. We developed integrated plans for structural and building enclosure rehabilitation and monitored construction. The owners' prompt action mitigated further damage and established demonstrable remedial costs. Our expert testimony and repair mockups facilitated a favorable settlement for the condominium owners.



Pedestrian/Equestrian Bridge, Bradley Palmer State Park | Topsfield, MA
Responsive structural rehabilitation accelerates park improvement with affordable solution.

Built in the early 1900s, the pedestrian/equestrian bridge at Bradley Palmer State Park was aging: the center pier was deteriorating and wood components were decayed. SGH investigated the structure, determined it was unsafe, and managed the rehabilitation. Stone masonry abutments and the weakened stone masonry center pier supported the two-span steel-beam structure that crossed the Ipswich River. SGH designed a repair to encase the pier in a reinforced concrete jacket and upgrade the wood decking and railing to meet present-day code. We provided construction administration services, including documentation reviews and site observations. We also managed permitting, underwater investigation, and structural inspection. Our rehabilitation plan minimized environmental and recreational impact by protecting riverbanks and aquatic life without disrupting visitors as they navigated the river. The plan also accommodated budget and scheduling constraints, which enabled the Massachusetts Department of Conservation and Recreation to make other necessary park improvements.



In collaboration with T Ford Company (general contractor) and SGH subconsultants C&C Consulting Engineers (bridge inspection), Childs Engineering (underwater inspection), and Epsilon Associates (environmental engineering).

Ames Building | Boston, MA
Integrated structural and building enclosure rehabilitation services expedite adaptive reuse of historic building into boutique hotel.

SGH contributed to a complete renovation of the 120-year-old Ames Building, investigating and designing repairs for architectural, structural, and building enclosure elements. One of the country's tallest buildings with load-bearing masonry walls, it features semicircular arches, carved stone, and architectural massing that exemplify the Richardsonian Romanesque style. SGH developed structural modifications to meet the new use and current codes. Our designs addressed in-filling a ten-story lightwell, converting an elevator hoistway to mechanical shaft, and installing nearly 70 tons of equipment on a 2,400 sq ft roof. We also designed repairs for facade spalling, water penetration, mortar deterioration, and roofing failures. SGH used structural analysis software and lab testing to develop techniques that strengthened the foundation, upper columns, and sidewalk vaults. We also specified materials and techniques that enabled masons to salvage and match the original facade and embellishments.



The project received the following awards:

- 2010 Preservation Achievement Award for Significant Rehabilitation/Restoration, Boston Preservation Alliance
- 2009 Preservation Award, Bostonian Society

In collaboration with Cambridge Seven Associates (design architect for core and shell), ADD Inc. (interior architect), and The Walsh Company (construction manager and owner/developer representative).

TECHNICAL BRIEF

Enclosure Modernization for Building Survival |
by James Parker, SE

There is much in the media about sustainability initiatives for buildings. New designs are achieving ever-increasing levels of energy efficiency. A large part of these improvements has come from advanced enclosure design.



[more \(PDF\)](#)

NEWS & NOTES

Click [here](#) for more SGH news.

- SGH's Washington, DC office has moved to 1828 L Street NW, Suite 950, Washington, DC 20036. Click [here](#) for more information.

- Holger Schulze Ehring recently joined SGH as a Vice President and Senior Project Manager in the New York office. Mr. Schulze Ehring will focus on collaborating with architects, developers, and contractors to design specialized and complex structures — including museums, transportation hubs, and bridges — as well as structural glazing, sculptures, architecturally featured staircases, canopies, cable structures, and movable structures.

- *Building Design + Construction* interviewed Jason Der Ananian (Senior Staff II) for the article "Optimizing Moisture Protection and Air Barrier Systems" in its October 2011 issue. Click [here](#) to read the article.

- *STRUCTURE* magazine published the article "Marrying Steel to Concrete. A Case Study in Detailing" by Ben Mohr (Senior Staff I) and Stephen Harris (Principal) in its November 2011 issue. Click [here](#) to read the article.

- Amy L. Hackney (Senior Project Manager) presented "Waterproofing and Drainage for Vegetative Roofing Over Critical Spaces" at CitiesAlive, the 9th Annual Green Roof & Wall Conference, in Philadelphia, PA.

- The Boston Harbor Islands Pavilion captured the Grand Honor Award at the 2011 Build New England Awards gala, sponsored by The Associated General Contractors of America. SGH provided structural design and construction administration services for this project.

- Scott Silvester (Senior Project Manager) and Charlie Russo (Senior Principal) co-presented "Extending the Useful Life of a Cooling Tower at a Nuclear Power Plant" at the ACI Fall 2011 Convention in Cincinnati.

- The Historic Structure Report for the William C. Masson Residence in Calabasas, California, received a California State Governor's Historic Preservation Award for 2011, sponsored by the State Office of Historic Preservation and California State Parks. SGH provided structural engineering and building enclosure condition assessment for this project.

- *ENR New York* named Levitt Pavilion at SteelStacks in Bethlehem, Pennsylvania, a 2011 Best Project in the Best Small Project (Under \$10 Million) category. SGH provided structural engineering for the project. Click [here](#) to read the accompanying article.

UPCOMING EVENTS

SGH staff will be presenting at the following events:

Webinar: Avoid Wall Flashing Leaks: Material Options for Through-Wall Flashing | Construction Specifications Institute (CSI)
16 February 2012
Click [here](#) for more information.

Design and Installation of Buried Pipes | American Society of Civil Engineers (ASCE)
16-17 February 2012
New York, NY
Click [here](#) for more information.

2012 Wood Solutions Fair | WoodWorks
29 February 2012 in [Long Beach, CA](#)
13 March 2012 in [Portland, OR](#)
15 March 2012 in [Seattle, WA](#)

High Performance Buildings Conference | ASHRAE
12-13 March 2012
San Diego, CA
Click [here](#) for more information.

Wood in the 21st Century: Design and Preservation of Contemporary & Historic Architecture | American Institute of Architects (AIA)
24-25 March 2012
Cambridge, MA
Click [here](#) for more information.

2012 Structures Congress | Structural Engineering Institute (SEI) of ASCE
29-31 March 2012
Chicago, IL
Glenn Bell, CEO of SGH, will be a keynote speaker on 31 March 2012. Click [here](#) for more information.

BEST3: High Performance Buildings - Combining Field Experience with Innovation | National Institute of Building Sciences' Building Enclosure Technology and Environment Council
2-4 April 2012
Atlanta, GA
Click [here](#) for more information.

ABOUT SGH

Simpson Gumpertz & Heger (SGH) is a national engineering firm that designs, investigates, and rehabilitates structures and building enclosures. Our award-winning work encompasses building, nuclear, transportation, water/wastewater, and science/defense projects throughout the United States and in more than thirty other countries.

For more information, please visit www.sgh.com.

Named #1 Best Firm to Work For among large structural engineering and 2011 Best A/E/C Employer among large firms by PSMJ.





TECHNICAL BRIEF

Modernizing Building Enclosures for Sustainability | By James C. Parker, SE

There is much in the media about sustainability initiatives for buildings. New designs are achieving ever-increasing levels of energy efficiency. A large part of these improvements has come from advanced enclosure design. High-performance enclosures reduce heating and cooling loads on a building's mechanical systems. They also reduce energy requirements for lighting while still controlling solar heat gain and glare.

While the A/E/C industry is witnessing great energy improvement for new construction, existing commercial and industrial buildings account for half our nation's total energy use. The process of tearing down these buildings and replacing them with energy-efficient structures consumes an enormous amount of energy and generates an enormous amount of waste. The environmental damage of "tear down and replace" hinders sustainability.



Richard Bolling Federal Building, Kansas City, MO - modernization of a circa 1960s, eighteen-story federal office building.

Bringing sustainability to existing buildings

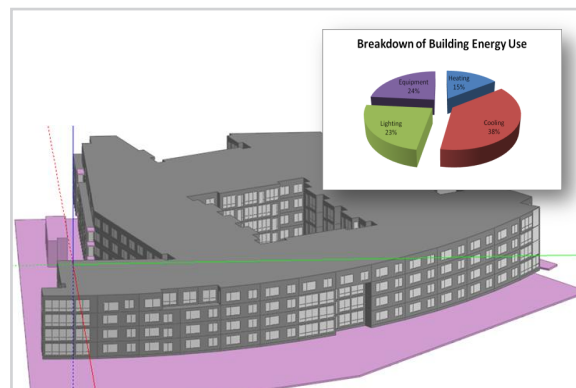
It is not uncommon to retrofit buildings with high-efficiency lighting, sophisticated controls, and energy-efficient equipment. Comprehensive modernization can go further and include a high-performance building enclosure; however, this is less common.

Looking at energy savings alone can make the value of enclosure modernization one-dimensional, giving owners an impression of a protracted return on investment. However, enclosure modernization can add value by improving occupant comfort and productivity, building appearance and appeal, and durability of waterproofing and cladding materials. It also allows continuous occupancy during construction. These additional considerations can close the "pay-back" gap on a full energy modernization.

Steps to successful building enclosure modernization

To achieve the highest return on investment in your modernization project, take a holistic approach and integrate all opportunities to achieve sustainability. You will reduce energy consumption, ease construction, and lower maintenance demands if you set measurable goals, establish your baseline, and consider multiple options well before you begin design and construction.

- *Include a high-performance enclosure in your basis of design.* From the start, specify sustainability goals for the building enclosure. These may include any combination of the following:
 - Energy efficiency
 - Enhanced appearance/image
 - Extension of useful life of materials
 - Improved blast resistance, seismic performance, and hurricane safety
 - Increased occupant comfort
 - Reduced ongoing and deferred maintenance
 - Daylighting



204-unit condominium building, Washington, DC - whole building energy simulations, HVAC diagnostics, and building energy code and standard compliance.

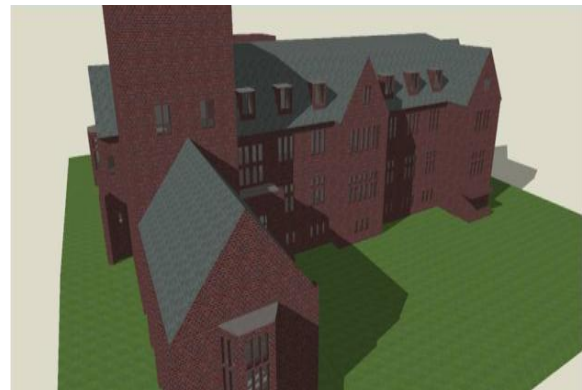
TECHNICAL BRIEF continued – Modernizing Building Enclosures for Sustainability

- *Establish a baseline.*
Investigate current conditions and establish the baseline performance of your existing enclosure systems and materials, including air barriers, thermal insulation, ventilation systems, and waterproofing. These metrics provide a benchmark against which to compare your results. This step requires a combination of investigative expertise and rehabilitation experience to create a realistic picture of risk-reward.
- *Evaluate your options.*
Develop a spectrum of options and analyze their financial impact. There will be a suitable strategy for each of your goals. For example, you might decide to replace, refurbish in-kind, or re-skin (with overcladding, double walls, or alternate wall systems). Of course, depending on the cost-to-benefit ratio, you may decide that a goal is not worth addressing.
- *Design and detail.*
Develop a comprehensive set of plans and contract documents for the most appropriate procurement method, such as design-bid-build, design-build, or integrated project delivery.
- *Stay involved during construction.*
Proactively engage in construction administration, testing, and monitoring. Be responsive to contractor questions and issues that arise during construction.
- *Validate performance.*
After construction, perform in situ testing and data logging to validate improvements. This phase can involve monitoring progress on energy usage, occupant satisfaction, and other goals.

Improving the energy efficiency of our existing building stock - by upgrading their enclosures - is far more sustainable than tearing down and replacing buildings, even with the most state-of-the-art construction. Upgrading a building enclosure's performance and suitability translates to lower energy consumption and improved occupant comfort, productivity, and safety. Understanding your baseline conditions and exploring comprehensive and holistic strategies for enclosure modernization can be a key contributor to a sustainable future.



University of Massachusetts Medical Center, Worcester, MA - investigation of stone cladding and modernization of nine-story building.



St. Paul's School, Schoolhouse, Concord, NH - whole building energy analysis for window replacement project.

James Parker, SE, is a senior principal with Simpson Gumpertz & Heger (SGH). James has extensive experience in both structural engineering and building enclosure structures. His work includes new structural design, investigation and retrofit of existing buildings, and design of high-performance building facade structures. With SGH since 1985, he has particular expertise in the interaction and connections between building enclosures and structures, fast-track design/build projects, and structural retrofits in high seismic zones. James can be reached at jcparker@sgh.com or 949-930-2157.