IDEAS² awards

THE DESIGN AND CONSTRUCTION INDUSTRY recognizes the importance of teamwork, coordination, and collaboration in fostering successful construction projects today more than ever before. In support of this trend, AISC is proud to present the results of its annual IDEAS² awards competition. This program is designed to recognize all team members responsible for excellence and innovation in a project's use of structural steel.

From left: Zimmerman, Klemens, Walls, Long, Theel, Tofighi, Schneider

Awards for each winning project were presented to the project team members involved in the design and construction of the structural framing system, including the architect, structural engineer of record, general contractor, detailer, fabricator, erector and owner.

New buildings, as well as renovation, retrofit, or expansion projects, were eligible. The projects also had to display, at a minimum, the following characteristics:

- A significant portion of the framing system must be wide-flange or hollow structural steel sections;
- Projects must have been completed between January 1, 2008 and December 31, 2010;
- Projects must be located in North America;
- Previous AISC IDEAS² or EAE award-winning projects were not eligible.

A panel of design and construction industry professionals judged the entries in three categories, according to their constructed values in U.S. dollars:

- ✓ Less than $15 million
- ✓ $15 million to $75 million
- ✓ Greater than $75 million

The judges considered each project's use of structural steel from both an architectural and structural engineering perspective, with an emphasis on:

- Creative solutions to the project's program requirements;
- Applications of innovative design approaches in areas such as connections, gravity systems, lateral load resisting systems, fire protection, and blast;
- The aesthetic and visual impact of the project, particularly in the coordination of structural steel elements with other materials;
- Innovative uses of architecturally exposed structural steel;
- Advances in the use of structural steel, either technically or in the architectural expression;
- The use of innovative design and construction methods such as 3D building models; interoperability; early integration of specialty contractors such as steel fabricators; alternative methods of project delivery; or other productivity enhancers.

Both national and merit honors were awarded. The jury also selected one project for the Presidential Award of Excellence in recognition of distinguished structural engineering.

2011 IDEAS² Awards Jury ➤

Presidential Award of Excellence in Engineering

OTTAWA STREET POWER STATION, LANSING, MICH.

Constructed in 1939, the Ottawa Street Power Station along Lansing, Michigan's Grand River was decommissioned in 1992 and sat idle for more than a decade. Its resurrection for use as a national headquarters by Lansing, Mich.-based Accident Fund Insurance Fund of America began in 2007. Converting the abandoned vintage power station into prime office space relied on a detailed erection plan and flawless execution.

Imagine building a 10-story steel-framed office building inside an existing masonry structure, all the while having to both preserve and support the heavy shell. Then add the complication that much of the existing steel had to be removed before the new framing and floors could be installed. These were just some of the challenges facing the project team.

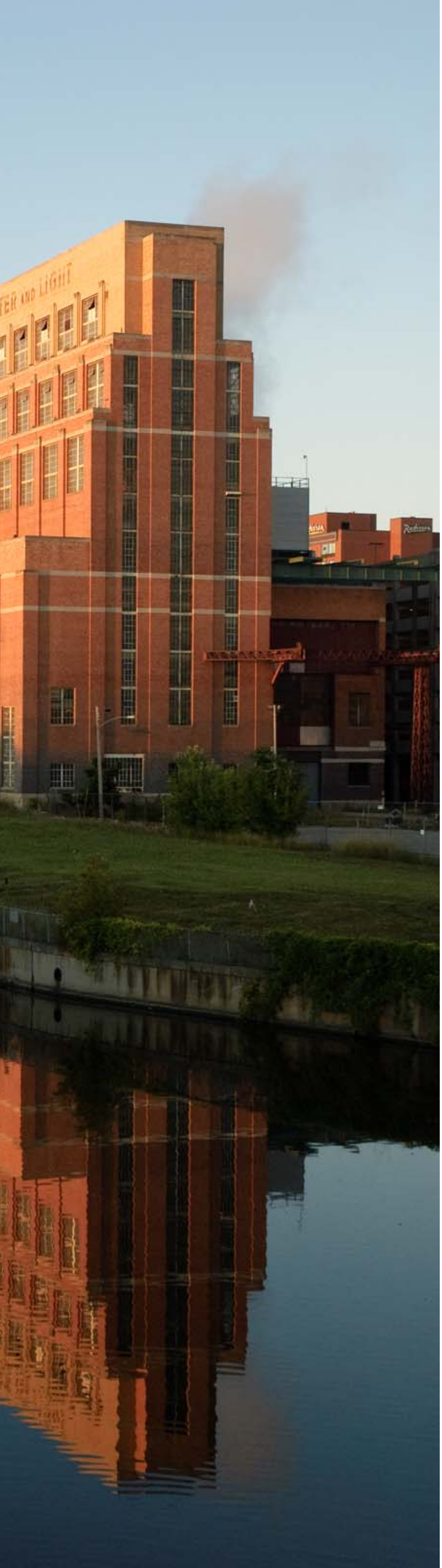
The team's collaborative solution was much like building a ship in a bottle. The construction manager, Christman Company, turned to Douglas Steel and Ruby + Associates to provide design and construction expertise in evaluating design alternatives to convert the power plant into a modern, energy-efficient 10-story office building without disturbing the historical exterior. This team began in the spring of 2008, and completed the main structural steel erection ahead of schedule, even with a late start due to site delays.

The existing building consisted of two primary areas: a 10-story tower and the original turbine hall. Working within the confines of an existing structure posed major access obstacles. Douglas Steel developed an innovative technique that enabled erection of the internal structure without disturbing the building exterior. The process involved installing two temporary 14-ft by 40-ft roof hatches at the top of the 10-story tower, hoisting all of the steel through these roof hatches, and setting the new steel from the ground up. That meant that all steel would be set "in the blind"—the crane operator would not see the piece being lowered into position, nor would he see the ironworker setting the piece. This required a detailed erection plan with a reliable communication system between the ironworkers and the crane operator. To capitalize on this effort, Ruby carefully analyzed the tower structure to maximize "first pass" demolition, giving the trades a safe working environment while minimizing obstruction.

To maneuver the steel in the turbine hall, Douglas Steel took advantage of the existing crane way. The original overhead crane was to remain in the structure as a historic artifact, but it had not been operated for more than 25 years. Douglas' creative solution consisted of installing a new custom overhead crane for the duration of the project which used the existing crane runway and original rails. In the turbine hall, new steel for the fourth floor was attached to the original and architecturally exposed crane girders. The third floor steel was then hung from the bottom of the fourth floor steel.

Initially Arup, the structural engineer of record (EOR), used documents from the original 1939 construction of the power plant to create a Revit model of the structure. Engineers then deleted and added members to the model as required.

> "Rehabilitating a public landmark is always noble, **always complex**, and this project redefines both."
> —Wesley Walls



When the framing design was completed, the EOR provided a CIS/2 version of the model so the fabricator could import it into its SDS/2 modeling software. Douglas and Ruby provided ongoing value engineering suggestions to help minimize fabrication and erection costs, such as changing the 4-in.-diameter rod bracing to HSS sections.

In preparing for fabrication, Douglas Steel used both the historical documents and the building model to locate where each new member attached to either an existing column or member. Each location was laid out on the existing steel, photographed and measured. The fabricator developed a method to use the existing riveted steel end connection as part of the new design. Because of variance in existing column-to-column dimensions, the member could be up to 1 in. longer, which required designing the connection for the maximum eccentricity.

This process of evaluating each connection condition was used for approximately 2,000 beams. The bracing connections were attached to existing columns, which consisted of built-up shapes riveted together. Ruby helped to design these unconventional connections along with complex gravity connections that mated new framing to the original.

Ruby also performed a structural analysis for the renovation using a finite element model, and provided floor-by-floor sequencing, to maximize internal demolition while still achieving stability. Ruby's largest challenge was to balance the systematic removal of the 10-story structure's interior with ever-changing load paths, levels of acceptable stress, and overall lateral deflections on the fragile brick façade.

Through that analysis, Ruby identified which existing steel members had to be retained as reconstruction occurred, and when those members could be "surgically removed" as reconstruction progressed from the ground up. With careful analysis and planning, structural stability was maintained during demolition and reconstruction without the need for additional bracing.

The team carefully coordinated structural steel elements with other materials to preserve the aesthetic and visual impact of the project:

- Exposed interior steel beams and columns demonstrate the original industrial structure.
- Design incorporates the historic structure by leaving exposed historic brick masonry and by holding back the new ceilings from the exterior walls allowing the full height of the windows to be viewed from each floor.
- Original turbine hall overhead crane, rails, structural steel girders, and bearing support points remain as an esthetically exposed feature.

The Ottawa Street Power Station is now registered on the National Park Service's National Register of Historic Places. The project is expecting to be LEED certified. Construction waste management has achieved nearly 100% waste diversion, by weight (7,000 tons), including 800 tons of steel and 600 tons of concrete. About 75% of the building's existing brick and 95% of its existing masonry was cleaned and reused.

Owner
Accident Fund Holdings Inc., Lansing, Mich.

Construction Manager and Developer
The Christman Company, Lansing, Mich.

Architect of Record
HOK, St. Louis

Architect
Quinn Evans Architect, Ann Arbor, Mich.

Structural Engineer of Record
ARUP, Chicago (AISC Member)

Construction Engineer
Ruby + Associates, Inc., Farmington Hills, Mich. (AISC Member)

Steel Detailer, Fabricator, and Erector
Douglas Steel Fabricating Corporation, Lansing, Mich. (AISC and IMPACT Member)

Structural Software
SDS/2, RAM, RISA-3D, SAP2000, Revit Structure