

# Baltimore Design School

Baltimore, MD

Submitted by Sika Corporation

It is an extremely rewarding experience when a vision for the restoration of an abandoned building becomes reality as a critical component for the restoration of a depressed local community. This vacated factory was so decrepit that the HBO series *The Wire* used the building as a setting symbolic of post-industrial urban decay. But with a

creative and energetic project team, along with a grant from Adobe and creative financing, this structure has been resuscitated into a state-of-the-art public school for training future designers. As it is now known, the Baltimore Design School is a pinnacle of sustainability from the structure itself to its immediate impact on the community and for what will be the perpetual results of its curriculum for multitudes of graduates.

The Baltimore Design School is a first-of-its-kind, combined public middle and high school dedicated to students interested in architecture, graphic design, and fashion. It is located in the North Central Historic District, and is the first arts and entertainment district in the city listed on the National Park Service's National Register of Historic Places. The school was founded a few years ago but now proudly resides in its new 110,000 ft<sup>2</sup> (10,210 m<sup>2</sup>) home.

**THE HISTORY OF THIS STRUCTURE**

The four-story structure, constructed in 1914, was the machine shop for a global supplier of bottle



*The abandoned factory before renovations and the completed school after renovations*

2014 Project of the Year

caps before housing a clothing manufacturer. The Crown Cork and Seal Company machine shop was designed in 1914 by Baltimore Architect Otto G. Simonson and built by the West Construction Company. Constructed of reinforced concrete, the



*Workers in the original factory*



*Inside of factory before restoration*



*Spalling ceiling*

building was the first in Baltimore to use a “beam-less floor system,” also known as flat-slab construction, that did not require structural beams to span between columns.

If there were LEED points in the 1920s, this structure was one that would have been recognized for its creative use of natural light and HVAC systems. Expansive industrial steel-sash windows totaled over 60% of the surface area of the building’s exterior skin. The ventilation system did not rely on the large windows to provide a consistent flow of fresh air, as air from the surrounding area was very dusty and harmful to the delicate machinery inside the building. The facility used an extremely innovative mechanical system that provided clean, tempered air throughout the building. The clean air passed over a series of pipes that were heated with hot water in the colder months and chilled with cold water in the warmer months with the aid of applying a geothermal process by means of groundwater. This HVAC system was claimed to be able to keep the building interior at a consistent 70°F (21°C) year-round. The conditioned air was then forced by another set of fans through the hollow structural columns and distributed through various openings in the columns.

## **TROUBLING TIMES**

A private developer purchased the building in the 1980s and it was eventually abandoned and left to sit vacant for a quarter of a century. It appeared as though the owner just decided to lock the place up without notice. Coffee cups were left on tables, while clothing and sewing supplies were arranged as if a worker had just stepped away for lunch. Navigating the property was a visit to a devastated past era. Reality set in with the project team as to just how large a task they were about to embark upon.

## **CONDITION ASSESSMENT**

Once the decision was made regarding the site selection, a design and construction team was assembled to perform condition assessments of what would be required to make this grand vision a practical reality. Unoccupied and lacking maintenance for over a quarter of a century, the building was in extreme disrepair. Due to the lack of concrete cover, lower-quality concrete, and advanced carbonation, corrosion had spread throughout the exterior reinforced elements and interior columns. Ceilings and spandrel beams were especially heavily damaged from accelerated corrosion. Testing revealed that the concrete was 2000 psi (13.8 MPa) in compressive strength, low for today’s standards but consistent with building codes of that era. The steel reinforcement was smooth and uncommonly placed diagonally to column alignment. The severe corrosion diminished the capacity

of the reinforcement, making it necessary to use structural strengthening in addition to the repair and protection work.

### SITE PREPARATION

The internal state of the building looked like a junkyard, as it was left in place for over two decades with everything still inside. A massive cleanout operation had to be performed to remove equipment, furniture, and everything else imaginable from a suddenly deserted factory—not to mention the litter from many uninvited guests over the years. Abatement had to be performed to ensure protection for all the construction workers and staff.

### REPAIR STRATEGY

Upon completion of the assessment, it was clear that an extensive and multifaceted approach would be required to meet the complex challenges induced by decades of neglect. The following was the agreed and employed strategy of the design and construction team.

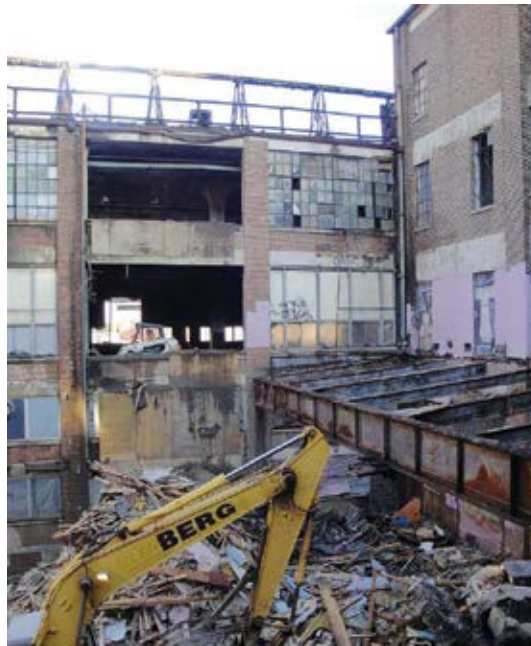
### STRUCTURAL AND NONSTRUCTURAL CRACK REPAIR

Cracks that were not corrected as a result of the extensive spall repair techniques were individually classified into two categories: structural and non-structural. The structural cracks were welded by means of low pressure injection with high-modulus, low-viscosity epoxy resin. Nonstructural cracks that were primarily a concern for worsening through freezing-and-thawing cycles were addressed by rout and seal with low-modulus polyurethane sealant for adhesion, flexibility, and overcoating benefits.

### CONCRETE REPAIRS

All major methods of concrete repair techniques were incorporated into the overall strategy. This included hand-applied, machine-applied, form-and-pour, and form-and-pump applications. The method of installation was selected based on the orientation, the size of the repair, and the predicted productivity of the technique. Materials were selected based on the ability to bond to the original concrete, resist corrosion with minimum cover, and provide the workability benefits associated with the application method.

1. Any surviving smooth reinforcing steel in the repairs was thoroughly cleaned and coated with a corrosion-resistant primer that also increased adhesion with the repair material. However, much of the reinforcement throughout the structure was terminally corroded and had to be replaced with new reinforcing steel or complemented with additional strengthening. New reinforcement was required for all the spandrel beam repairs.



*Clearing the courtyard*



*Hand-applied mortar*



*Close-up of spandrel beam repair*



Carbon-fiber plates

- 
2. The hand-applied method was chosen for both the smaller, more isolated repairs on columns and ceilings, and for the more complicated architectural features, such as with the exterior arches.
3. Machine-applied repair mortar was used to repair some large ceiling sections. This method was selected to greatly improve production while providing a very dense material.
4. Flowable repair mortars and concretes were predominately used in larger surface area repairs to the columns varying from shallower to deeper thicknesses.
5. Prepackaged self-consolidating concrete was used to repair the vast volume of spandrel beams at all the windows. The limited width and depth of the repair, combined with the quantity and size of the required reinforcement, plus the expansive length of spandrel beams, dictated special consideration to the application and material. Working time, flow, segregation concern, and consolidation in addition to adhesion, durability, and shrinkage properties all had to converge for a successful installation. This required the expertise in pumping supplied by the installing subcontractor

and a material specifically designed to meet the stringent characteristics.

### STRUCTURAL STRENGTHENING

Roof slabs of the building had extreme section loss requiring new reinforcement. Supplemental reinforcement was also used to bring slabs back to their safe load-bearing capacity. Carbon-fiber plates were installed for strengthening these areas along with strengthening locations of new cutouts for conduits, pipes, ducts, and vents and for the new HVAC system.

### JOINT SEALING

1. For all joint sealing of concrete and masonry surfaces, a low-modulus polyurethane sealant was selected.
2. A silicone sealant was applied to all glass substrate-related connections.

### CORROSION MITIGATION

As the destructive nature of the carbonation-induced corrosion was on display to great extent all throughout the interior and exterior of the structure, strategic effort had to be employed to avoid overlooking the future challenge from the covert corrosion that had yet to reveal itself. Therefore, a penetrating surface-applied corrosion inhibitor was sprayed to the underside of the roof slab, all exterior surfaces, and all interior areas within 4 ft (1.2 m) of the exterior.

### PROTECTIVE AND ARCHITECTURAL COATINGS

Careful deliberation was given to the selection of an interior coating. Historic consideration and the impact of maintaining the original feel of the building were factors suggesting not coating the concrete and brick. Conversely, the effects of continued dusting and the awareness of the results of unhindered carbonation demanded a coating. Research and site-applied samples forged consensus to use a clear, breathable, anti-carbonation coating that would halt the carbonation process, bind up and seal in the dust, and preserve the historic appearance.

This acrylic coating also blocks wind-driven rain and has outstanding ultraviolet light resistance, so the project architect had several special color samples produced and installed for the protection of all the exterior concrete.

### FINANCING OF THE PROJECT

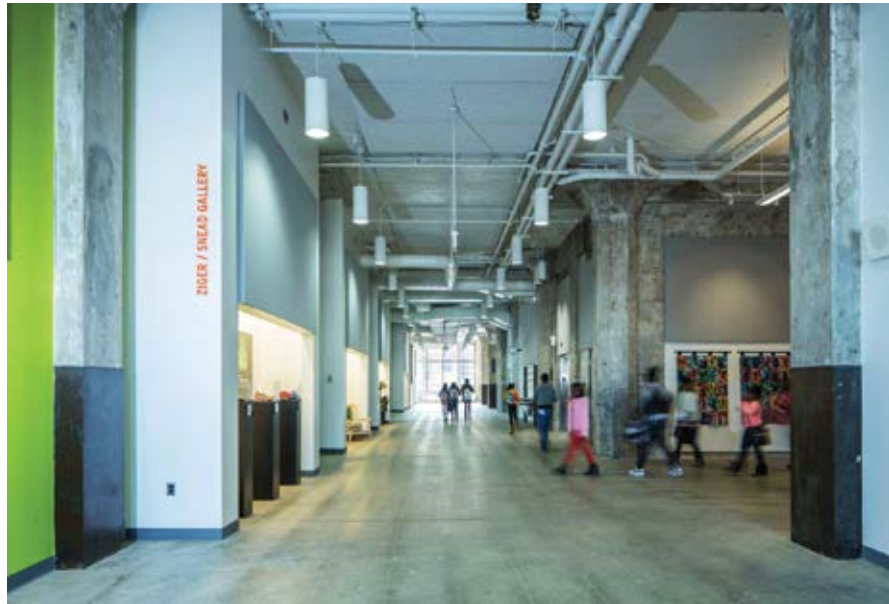
Just as compelling as the restoration of the building is the financial structuring that allowed this project to be brought to fruition. In a city struggling to maintain even the basic infrastructure of its public schools, the \$26.85 million renovation was made possible by a unique public/private partnership involving a private developer, the Baltimore Design

School Board, and the Baltimore City Public Schools. It was funded through a combination of bonds, tax credits, and loans guaranteed by the school system. At the end of a 20-year lease term, the school system will take over the facility.

**ARCHITECTURAL ACHIEVEMENT**

The transformation of the building from blight to a state-of-the-art teaching facility within the confines of the budget demonstrates the power of design with the help of advanced methods of concrete repair, protection, and structural strengthening. The exterior of the building’s historic fabric was successfully integrated with modern features. The interior slabs, columns, and walls remain exposed to view and are complimented with current decor. The vast, open environment supports the creative, design-focused curriculum of the school.

**Acknowledgments:** The Lebow Clothing Factory. *Description by Seawall Development.*



Completed hallways



Completed classroom



Completed cafeteria

**Baltimore Design School**

**OWNER**

**Baltimore City Public Schools**  
Baltimore, MD

**PROJECT ENGINEER/DESIGNER**

**Ziger/Snead LLP Architects**  
Baltimore, MD

**REPAIR CONTRACTORS**

**Southway Builders, Inc.**  
Baltimore, MD

**Michael J. Young Concrete**

Stewartstown, PA

**ProDec Finishes, Inc.**

Timonium, MD

**Eastern Waterproofing & Restoration**

Jessup, MD

**MATERIAL SUPPLIER/MANUFACTURER**

**Sika Corporation**  
Lyndhurst, NJ



Baltimore Design School Founder and Chair State Sen. Catherine Pugh, Governor Martin O’Malley, Mayor Stephanie Rawlings-Blake, and Principal Nathan Burns surrounded by officials, supporters, and students to celebrate the official opening of the new Baltimore Design School on Monday, Aug. 26, 2013