
Framing for the new event space, looking northwest.

OLD SCHOOL BUILDING, NEW SCHOOL STEEL

NEW ELECTRICAL INDUSTRY TRAINING CENTER IN LONG ISLAND CITY, N.Y., TURNED OLD WAREHOUSE EYE-CATCHING ATELIER.

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A PROJECT IN Long Island City, N.Y., transformed a generic warehouse space into an eye-catching, new-school atelier, replete with tastefully exposed structural steel and salvage chic accents. The Electrical Industry Training Center (EITC) was, to some extent, an effort at rebranding through architecture, an argument that light industry deserves a place next to boutique retailers and coffee shops in the city's up-and-coming neighborhoods. The project was also an illustration of how an existing heavy concrete structure can be altered and expanded through creative steel design.

Spearheaded by the Educational and Cultural Trust Fund of the Electrical Industry and designed by the architects at international design firm Gensler, the EITC was a multifaceted project. Renovation of the existing space included addition of an open-air atrium, an expressive architectural stair, and, less glamorously, installation of new HVAC ducts and a subgrade concrete retention tank. The building was expanded as well. A new floor level was constructed for hosting events, complemented by a decorative screen wall and a steel beacon tower.

Originally built in the mid-1950s, the existing concrete structure covers 30,000 square feet and had three levels prior to expansion. At its base, a spread footing foundation system bears on a subgrade layer of existing soil. Reinforced concrete columns support concrete waffle slabs at the second and third tenant levels, as well as the original roof. Column bays typically measure 30 feet by 30 feet.

A RENOVATION

Most of the work during the renovation process centered on the building's northeast corner. The atrium was built here, fronting the EITC's main entrance and adding a dash of spatial-dimensional drama. The atrium space was created by removing a rectangular portion of the existing waffle slab at the second tenant level and original roof and highlighted by a recessed notch in the floor plate. Shoring of the remaining waffle slab was required during this process. The resulting openings were then reframed with W14 steel beams framing into new steel columns.

Inside the building and directly adjacent to the atrium, the new architectural stair was installed. The stairs' punched steel stringers and mesh handrails are of a piece with the EITC's unostentatious industrial cool. To accommodate the new stair, existing openings were widened and reframed with heavy W14 and Hollow Structural Section (HSS) members designed to span between supports without the benefits of a braced top flange (HSS sections were used in locations where torsional rigidity was required). These members frame into new steel columns that were installed along the perimeter of the new opening. Elements of this framing system also function as support for the stair's stringers. North-south-spanning W12 beams run underneath the stringers at the second and third tenant levels, framing into the foundation wall and grouted solid into place.

Installation of the new HVAC ducts required the team to cut a large new opening in the structural slab at the existing roof level. The opening was framed by new steel spanning between existing concrete columns and connected to these existing columns via expansion bolts. The beams were preloaded for dead load by jacking before the opening was made.

A new cast-in-place concrete retention tank was built at the southeast corner of the structural profile in the sidewalk vault. A safeguard against flooding stormwater, the tank was designed with 1-foot-thick reinforced concrete walls all around and can hold up to 16,000 gallons at capacity. To allow for manhole access to the tank, an opening was cut through a pan in the waffle slab. Eight-inch-thick reinforced concrete curbs were poured on either side of the opening to provide stiffness.

AN EXPANSION

As much work as the design and construction team put into the renovation, the expansion effort demanded much more. Before the expansion could be properly undertaken, the structural engineers at Shmerykowsky Consulting Engineers first had to ensure that the existing structure could bear the load of an additional floor. Working from limited original drawings, the structural team began a sort of reverse engineering process. Consultation of the building's original

Screen wall framing, looking southeast.

Framing for the new event space, looking north.

column schedule and certificate of occupancy seemed to indicate that all levels of the building, up to and including the existing roof level, had first been designed to handle live loads up to 200 pounds per square foot (psf). The team made sure that this information was plausible during the course of its field observations. Live loads of 200 psf are typical for an industrial space, but far in excess of the 50 psf called for in commercial spaces like the EITC. This meant that the existing structure had capacity to spare for the proposed new usage. After incorporating this data, the structural team was able to conclude that the building's existing capacity was more than adequate to support an additional floor.

The new level, designed as an event space, was framed with structural steel as opposed to the reinforced concrete of the existing floors. New steel columns were located directly above the existing concrete columns below and secured to the waffle slab with expansion anchors, creating an efficient and optimized flow of forces. The developers at the Educational and Cultural Trust Fund of the Electrical Industry wanted the planned event space to have an expansive, open quality. To obviate the need for intrusive intermediate columns, the team chose to install W30 girders spanning approximately 60 feet across at the new roof level. The additional floor's lateral load resisting system is provided by braced frames along with supplementary moment frames.

Because the new level does not cover the entire footprint of the existing building, the architects designed a decorative screen wall to occupy the remaining space around the structure's perimeter, lending it a consistent and appealing visual profile. The screen wall is composed of an iterated series of perforated metal panels. On the building's eastern side, it is braced by diagonal W8 members. These

View of the new architectural stair from the ground floor. Underside of the concrete waffle slab is visible on the right.

diagonal members were designed to terminate above the existing concrete columns so that their vertical reactions would be transmitted into the columns below. If the diagonal members had been designed to terminate above the existing waffle slab alone, reinforcement of the slab may have been required. Elsewhere, the presence of new mechanical equipment at the original roof level compelled the structural team to develop an alternative bracing system using W8 steel members connected horizontally to, first, an intermediate W10

Steel beacon tower with stair bulkhead and superbrace.

column and, then, to another W10 column that is a component of the new level's framing system.

The steel beacon tower, located near the building's southwest corner, presented perhaps the most interesting challenge for the structural team. The rectangular structure reaches 60 feet from bottom to top and is made up of three steel vertical X-braced frames running north-south spaced 12 feet, 6 inches apart and two vertical steel chevron frames running east-west spaced 12 feet apart. X-braced frames would have been an ideal lateral support system in the short-spanning direction, but matters were complicated by the presence of an interfloor stair bulkhead rising in the midst of the tower. X-braced framing would only work for the westernmost side of the structure, which was not interrupted by the bulkhead. The team was forced to consider other ways to deal with the structure's lateral forces. After experimenting briefly with the idea of a moment framing system, the engineers decided to go a different way.

Superbrace framing system for the steel beacon tower.

They designed what they called an external "superbrace." This superbrace consisted first of a diagonal W10 brace running from the southwestern W12 tower column down to one of the W12 columns supporting the decorative screen wall. From there, another W10 brace kicks back to the existing roof slab and lands above one of the building's existing concrete columns. The unobtrusive structural support system for the steel beacon tower serves to maximize its aesthetic impact.

We don't usually associate aesthetic impact with industrial design. And while the EITC is a training center and not a machine shop, there's no reason that light industrial facilities in the area can't follow its example. The EITC shows that smart and contextually conscious design can help to anchor industry in rapidly changing New York City neighborhoods. Hopefully, it will have many imitators.

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