

2018 PROJECT OF THE YEAR

HISTORIC CATEGORY

The Edison Battery Building

WEST ORANGE, NJ
SUBMITTED BY SIKA CORPORATION



The Edison Battery Building

The Edison Storage Battery Complex is located on a single city block in the town of West Orange, New Jersey. These factory buildings are the last surviving structures of Thomas Edison's

industrial complex and were the defining buildings in the town from the 1880s to 1970s. This industrial complex comprised of four buildings became the epicenter of industrial development at the turn of the century. It is also remembered as the mainstay for Thomas Alva Edison's activities as one of the greatest American inventors and marketer of his self-created new technologies and inventions.



Fig. 1: Edison's industrial empire in West Orange, NJ (Credit: The New York Times, Dec. 21, 2017)

HISTORY

Thomas Edison moved to West Orange in 1886. The following year, Edison built a new laboratory complex on what he believed would be a perfect site for an industrial complex. From 1906 to 1914, Edison built a one-million square foot (92,900 square meter) industrial complex (Fig. 1). Of the many buildings, the Battery Building was made entirely of reinforced Portland cement and steel. Few people in our industry would know how much Thomas Edison believed in concrete as a building material. Concrete structures became the material of his choice for all buildings

that were built as a part of his industrial empire. In his words for concrete as a building material,

“Wood will rot, stone will chip and crumble, bricks disintegrate, but a cement and iron structure is apparently indestructible. Look at some of the old Roman Baths. They are still as solid as when they were built.”

- Thomas Edison



Fig. 2: Inside the Edison Battery Building (Credit: The New York Times, Dec. 21, 2017)



Fig. 3: From an iconic structure to a dilapidated building



Fig. 4: Existing building façade prior to repairs

The complex has 14 ft (4.3 m) and 16 ft (4.9 m) ceiling heights with thousands of openings consisting of “oversized” multi-panel industrial windows. The pinkish-tan structure is utilitarian in nature, made of unadorned reinforced concrete with column and beam construction. The lack of ornamentation reinforces the mass and solidity of the building. The longest façade stretches 635 ft (194 m) and the columns are evenly spaced at 15 ft (4.6 m) on center.

The Edison Battery Building was a manufacturing facility for alkaline storage batteries for light delivery vehicles, automobiles, railroad signals, industrial applications and mining equipment (Fig. 2). Edison practiced what he preached. It is a well-known historical fact that Thomas Edison preferred direct current over the more popular electric current. The Battery Building, prior to renovations starting in 2016, had elevators and lighting running off the original direct current system.

The Battery Building ceased operation in 1965. Today, the Battery Building is on the National Register of Historic Places, the New Jersey Register of Historic Places, and designated locally by the Township of West Orange as a historic site.

PROBLEMS THAT PROMOTED REPAIRS

Weathering over the last 100 years had taken its toll on the Edison Battery Building, and being vacant for the last decade did not help the cause (Fig. 3). From spalling concrete, corrosion due to the lack of concrete cover over reinforcing steel, cracking, leaking joints, and unsuccessful concrete repair attempts over the years, the 130,000 sf (12,075 sm) concrete façade of this iconic structure was in a dilapidated condition (Fig. 4), a direct result of an aging structure and lack of adequate maintenance of the building. The building, however, was in good structural condition.

RESTORATION OBJECTIVE

The Edison Battery Building was to be repurposed to a boutique residential building, including luxury lofts with a fitness lobby, swimming pool and sky lounge overlooking the NYC skyline with the following objectives:

- the building had to be restored to its original look;
- the look should be contemporary and historical; and
- the look should appear fresh and new as it would when built the first time.

The Edison Battery Building restoration project was part of the complete Edison Village Downtown Redevelopment project, developed over a ten-year period. This redevelopment plan was originally adopted in 2003. The scope of the entire project was to redevelop Block 66, Lots 1, 5 and 7 (the “Edison Battery Building”) and to construct:

- 334 residential rental units;
- 16,000 sf (1485 sm) of retail space;
- approximately 31,700 sf (2945 sm) of amenity support space;
- parking structure containing approximately 635 parking spaces; and
- public infrastructure (e.g. roads, utilities, sidewalks).

RESTORATION PROGRAM

Concrete Spall Repairs

Hand-Applied Repairs

Repair areas that were 1 in (25 mm) or less in thickness used a single component, hand-applied non-sag mortar. The repair area was mechanically prepared with a chipping hammer and saw cuts completed to define the repair perimeter (Fig. 5). A Concrete Surface Profile (CSP) 5-6 was achieved to make sure that adequate preparation was performed for the repair material to bond to the parent concrete.

Additionally, a bonding agent was used to supplement the mechanical bond, and the reinforcing steel was protected with the same material. A total of 2,500 sf (232 sm) of the façade was repaired using this technique.

Form and Pour Repairs

Deeper spalls were repaired with the form and pour technique, and were primarily performed to repair the window sills (Fig. 6). Concrete preparation was completed in accordance with the guidelines of the International Concrete Repair Institute. Prior to forming up the area, the steel was cleaned and primed and the concrete was coated with a reinforcement protection coating. A form and pour, flowable concrete mix was poured in the forms which were stripped after seven days. In very few cases where the depth of the concrete was very deep, rebar splicing was done to make sure that the repair areas were tied to the original spiral bar. A total of 7,500 sf (697 sm) of the façade was repaired with this technique.

Crack Repairs

Cracks on the building were initially identified for repair with epoxy. However, after determining that most of the cracks were non-moving, cracks were saw cut into rectangular joints and repaired with the same non-sag mortar used for spall repairs. This procedure would ensure that the crack repair lines would not show through the final finish on the façade. Some cracks were repaired with gravity fed resin or crack injection.

Leveling Coat

The concrete façade had to be leveled to prepare the surface with a parging material. A factory proportioned polymer modified material was used to parge the entire 130,000 sf (12,075 sm) of the façade (Fig. 7). The leveling material was instrumental in getting the concrete to a finish on which a waterproofing acrylic coating could be successfully used.

Façade Coating

After the leveling coat, a waterproofing coating was installed for aesthetics and protection (Fig. 8). A coating with crack bridging was selected to coat the entire building façade. To meet the requirements of the historical commission, a textured base coat was selected to cover the blemishes and maintain some of the look of the old concrete. No less than twenty color samples were installed on the building as mock-ups for approval by the historical commission. The selected final color, Capitol Tan, also happened to be the first color that was installed as a sample.



Fig. 5: Hand-applied repair



Fig. 6: Form and pour repair



Fig. 7: Section of the building that received a parge coat



Fig. 8: Finished exterior with the iconic Edison water tower in the background

Window Replacement

A specialty contractor was contracted to duplicate the large 10 x 4 ft (3 x 1.2 m) and 8 x 4 ft (2.4 x 1.2 m) windows that defined the façade of the structure. An exact replica in design that could meet the new energy standards was the target of the project team. New extrusions were created to match the original as approved by the West Orange Historical Preservation committee. This target was achieved and a total of 2450 windows were replaced (Fig.9). The perimeter caulk color had to be matched to the original construction. A single component silicone factory tinted custom green color was used to caulk all perimeter joints.

Roof Replacement

A Thermoplastic Polyolefin (TPO) single-ply roofing system was selected to replace the existing roof (Fig. 10). The roofing scope of the work totaled 70,000 sf (6500 sm).

REPAIR PROCESS EXECUTION

For quality assurance, a third-party oversight consulting firm was engaged to keep track of progress and make recommendations to the project team on unforeseen conditions during repair. This control helped deliver quality repairs with recommendations that were adequate for non-standard details. This iconic structure was restored in 30 months and completed on time and on budget (Fig. 11).



Fig. 9: New windows on building



Fig. 10: Roof of the Edison Battery Building before construction



Fig. 11: The Edison Battery Building before repairs (a) and after repairs (b)

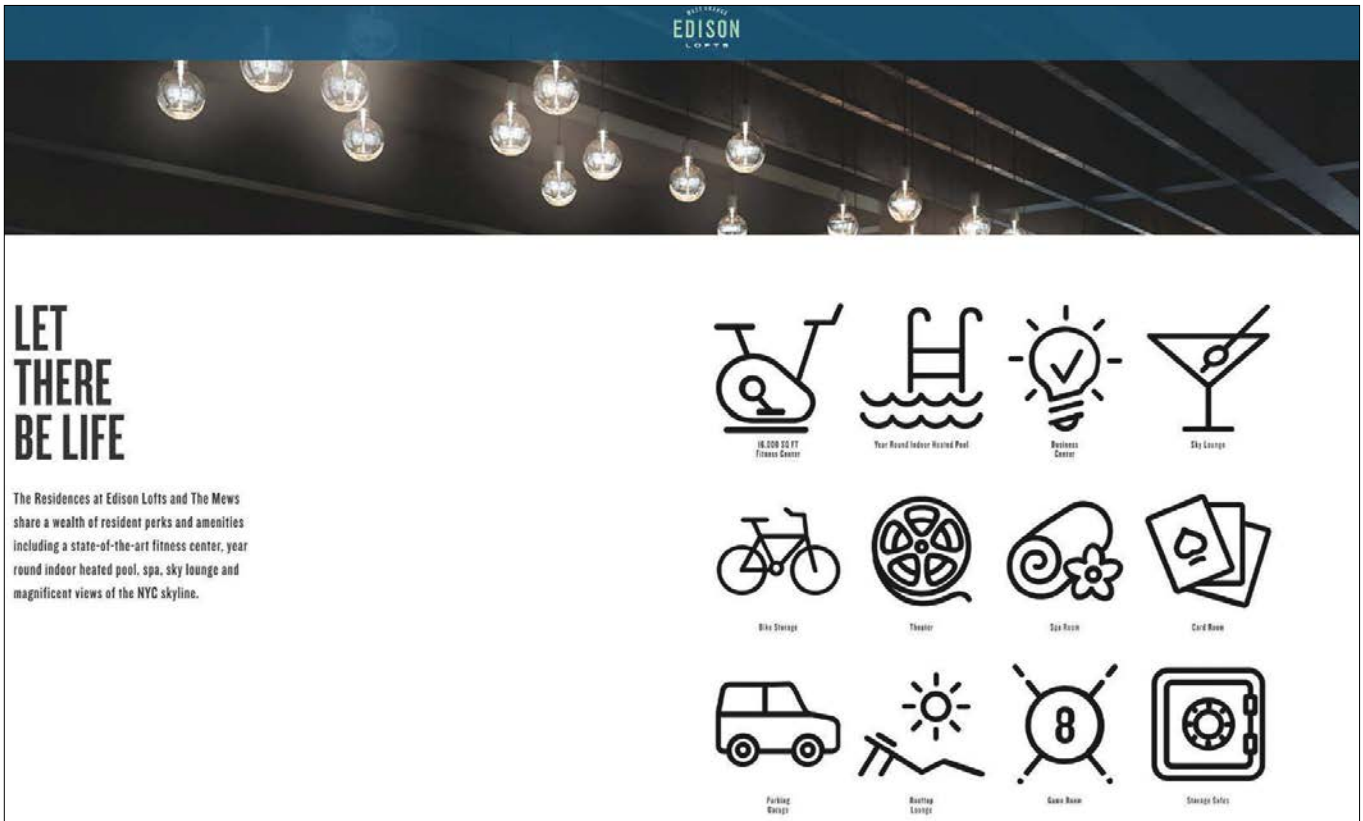


Fig. 12: From a structure that defined human civilization in the 1900s, to a residence building that will define the living space in the 21st century (Credit: edisonlofts.com)

CONCLUSION

We are living in times where an exponential rise of direct current batteries is being observed in many machines that we operate on a daily basis. What Thomas Edison believed a century ago is starting to come to some form of reality in a full circle. Not only that, the choice of his construction material also proved to be accurate. He believed in concrete and with minimal maintenance, the structure that he built is now being repurposed for a state-of-the-art housing project (Fig. 12)—sustainability and preservation at its best. Thomas Edison may have discovered sustainability and the relevance of concrete repair before our times.

The concrete repair industry stands tall and proud of being able to restore and repurpose an iconic structure built by an American legend. Sustainability continues to be a trend-setting word in today's world and what the concrete repair industry is able to achieve, few other industries would be able to match the impact that this industry is able to deliver, time and again. ■

Acknowledgements

Information in this article has been obtained from the following sources:

1. U.S. Department of the Interior National Park Service & Condos
2. New York Times article by Ronda Raysen, published April 15, 2016

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