

General Description:

- **Location:**
Detroit, Michigan
- **Profile:**
Energy Substation Facility
- **Project:**
Building Envelope Evaluation & Wall Analysis

Services Provided:

- Building Evaluation
- Roof Evaluation
- In-Depth Exploratory Analysis
- Recommendations

Challenge:

- Preservation of the facility's construction - over seventy years old
- Needed to know what was happening behind brick facade
- Many different substrates and personnel needed to be involved

Solution:

- Provided comprehensive budgets and recommendations for implementing restoration procedures
- Performed exploratory openings in order to analyze conditions within walls
- Maintained clear lines of communication between contractors, site personnel, and the owner

DTE Energy - Detroit Edison Chandler Substation

Detroit Edison, a part of DTE Energy, had been experiencing significant corrosion, efflorescence on the masonry, and staining from

had progressively worsened. StructureTec was consulted because of high technical expertise demonstrated in working with DTE on older structures.

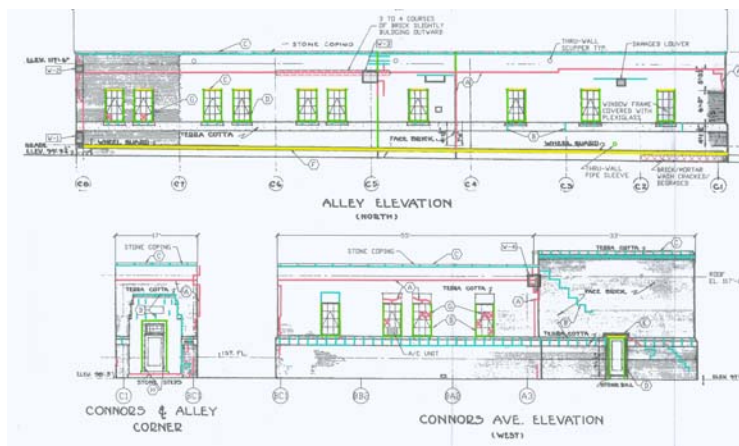


Overview of partially exposed steel column and roof beam exhibiting minor surface rust and corrosion.

StructureTec conducted a preliminary visual survey and determined that an exploratory analysis with wall openings was necessary to accurately determine the extent of the problem and develop recommendations for remediation. The first challenge was in coordinating a restoration contractor able to perform the wall openings. StructureTec worked with Detroit Edison to

rust at their Chandler Substation for many years. The building, constructed in 1929, had been a seven-story structure. In 1959, the top five floors were removed to create a one-story structure. The original design and construction had been established with durability and longevity as primary goals. These significant problems had existed for many years, however, and Detroit Edison had become concerned about the structural integrity of the building. Moisture ingress had also been an ongoing problem which

establish an approved contractor and requirements for repairing the openings. Another challenge arose in coordinating site personnel to conduct the work without disrupting operations. StructureTec found that although the masonry construction for the exterior walls was relatively sound, distress and degradation, including damaged



Schematic of Chandler Substation.



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FEATURES

Scientific approach to problem-solving

Research included exploratory openings in the wall

Boroscope technology behind the exterior wythe allowed actual observation of hidden conditions

Evaluation of structural steel - extent of corrosion and section loss

BENEFITS

Eliminated the cause of the problem, not just effect

Enabled the owner to address the specific areas requiring attention

Allowed the owner to pinpoint the true integrity of the wall conditions and address the root of the problem

Confirmed structural integrity and requirements for reinforcements



Rust and corrosion evident on steel guardrail along the base of wall.

cluded removing the cracked/distressed masonry units. The underlying structural steel needed reconditioning with blast cleaning and

masonry units and cracked/open mortar joints, had occurred on each wall elevation. Various repairs with different techniques had been attempted on these areas of distress in the past. With the wall openings, StructureTec discovered that this distress directly correlated to areas where embedded, corroded steel was present in the wall. The masonry joints had degraded, allowing moisture ingress. This confirmed moisture ingress had slowly rusted the embedded steel. The rust caused the steel to expand, pushing on the masonry and, over the years, creating unsound masonry conditions. The basement walls showed staining, indicating water seepage and subbasement flooding. The drains in both areas were clogged and inoperative. The leaks were caused by a variety of problems including cracks in the concrete slabs and abandoned cable sleeves through the below-grade walls. The roof showed minor distress from aging but was in otherwise good condition. The recommendations for the building in-



Wall opening allows embedded steel flange and splice plate to be observed.

applying a rust preventative coating to the steel columns and beams. The deteriorated steel required reinforcement or replacement with new sections. Steel lintels and plates were also enhanced with galvanized steel. Upon steel restoration completion, installation of new masonry units were redesigned to minimize direct contact with structural steel elements. The remaining degraded mortar joints required tuckpointing. Application of a new, clear, breathable water repellent sealer to the masonry units was essential. In the basement, concrete slabs and cable sleeve penetrations were designated for repair. The roof required maintenance to repair areas of minor distress, ensuring its continued watertight integrity. In conclusion, Detroit Edison was able to have a clear understanding of the conditions and problems on their facility as well as detailed requirements for remediation, ensuring Detroit Edison that the completed plan would yield the highest return on investment. ■

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