

# 345-138kV Substation Upgrade Project

## Comprehensive Engineering = Successful Project

**Abstract**—The reliability and age of the existing substation in their northeastern service territory prompted Commonwealth Edison Company (ComEd) to initiate a major substation project to provide an additional source of power into the 138 kV system from the 345 kV system. This involved bisecting an existing 345 kV transmission line and constructing a new 345 kV to 138 kV substation. This paper summarizes engineering solutions to the many challenges involved in a complex transition from old to new facilities.

### Design Considerations

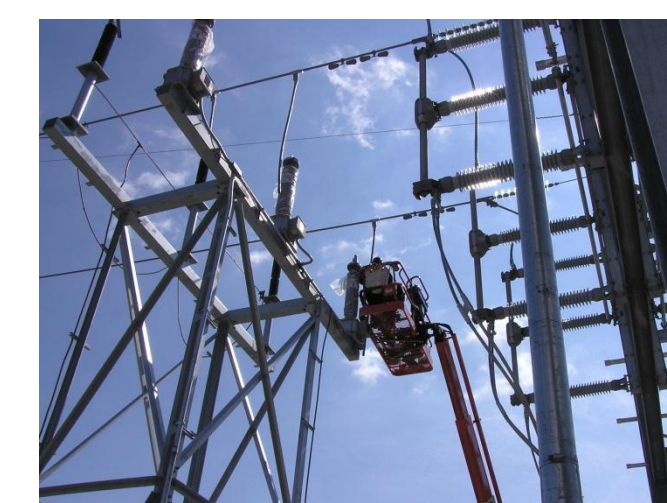
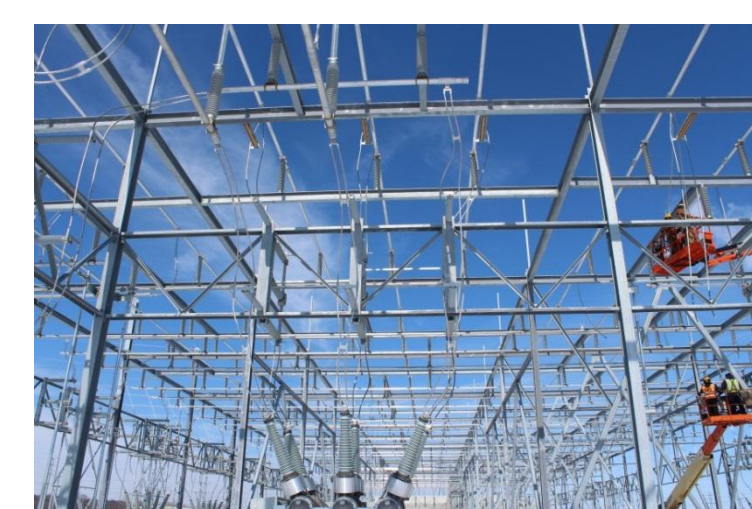
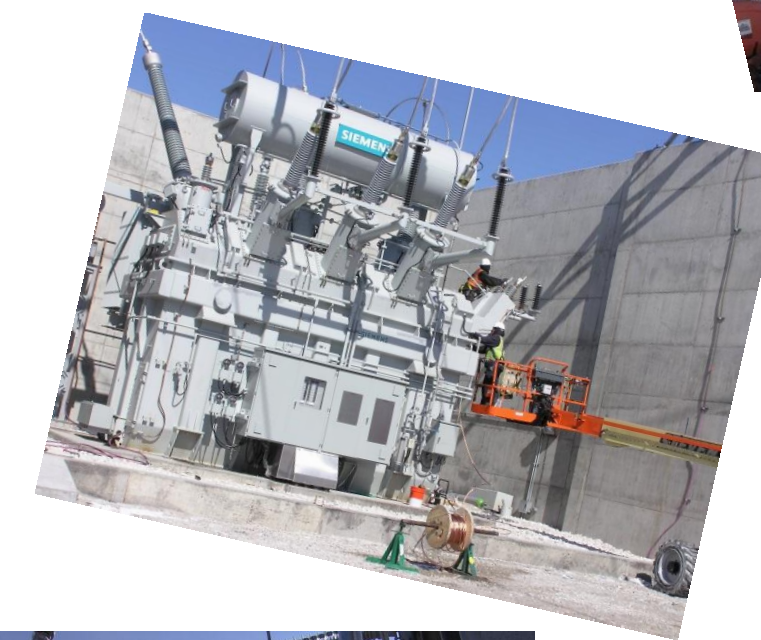
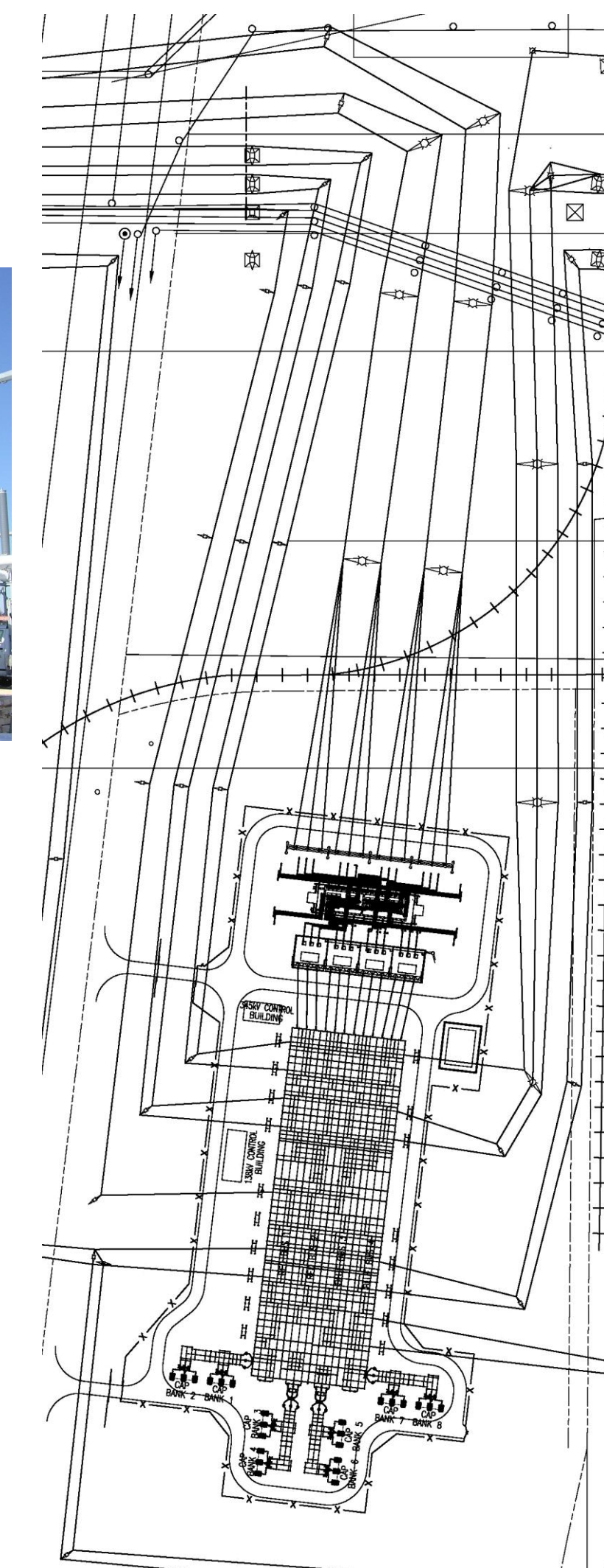
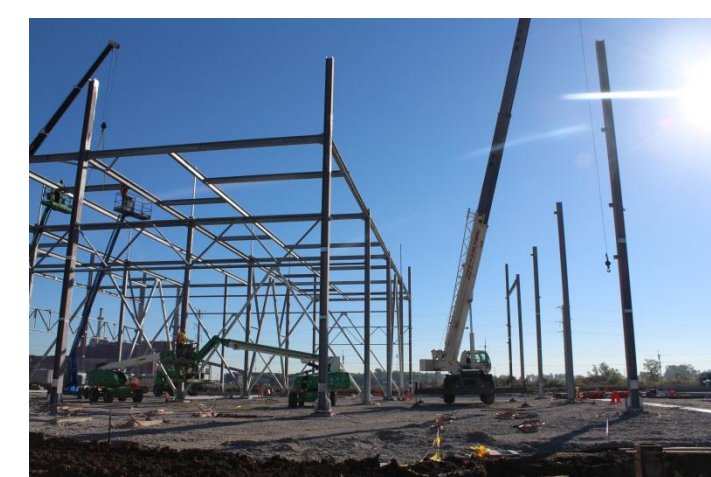
- Flexibility for multiple scenarios.
- No new land or ROW allowed
- Existing contaminated site
- High water level
- Poor soil bearing capacity
- Potential endangered species



### Engineering Solutions in Design

- Multiple general arrangements developed for both the 345kV and 138kV switchyards.
- GIS Building structural steel frame with precast concrete panels.

- Utilized foundations with reinforced concrete filled pipes.
- Designed new 138kV outdoor box structure @ 40% reduction with simplified and standardized details for fabrication & erection.
- Pre-engineered relay & control buildings.



### Engineering Support of Construction

- Supportive relationship with Contractors
- Frequent site walk downs
- Expedited review of submittals
- Rapid response to field inquiries (24 hours)
- Engineered solutions for field conditions



### Conclusion

The project was a massive undertaking. It was one of the largest substation projects at the time for both ComEd and Sargent & Lundy. The project successfully fulfilled the objectives for both the initial phase and at final completion.

- May 2012 – Begin Engineering
- June 2013 – Break Ground
- April 2014 – Energize 345kV
- May 2014 – Ready for Service

**Comprehensive engineering was the key to the success of this project.**



### Statistics

- 0 lost work days/OSHA Reportables
- No environmental incidents
- 58 Work groups during project
- 500 person work crews – 140 at peak
- Graded >72,000 m<sup>2</sup> of land
- > 38,000 m<sup>3</sup> of fill
- > 1,600 displacement piles
- > 45,000 m<sup>3</sup> of concrete
- > 700 metric tons of steel erected
- > 4,000 meters of bus
- 22 – 138kV breakers
- 50 – 138kV disconnect switches
- 66- transmission line towers & foundations
- 12 – Remote sites with relay & communication upgrades