

CASE STUDY / **STANLEY SUBSTATION REFURBISHMENT PROJECT**

EXTENDING THE LIFE OF A CRITICAL SUBSTATION

Upgrading critical power system components requires a strategic design plan that considers all connections and customers. Hydro One relied on a phased approach for seamless project execution and uninterrupted service as it refurbished its Stanley Substation.



DETAILED CONSTRUCTION SEQUENCING MINIMIZED OUTAGES

Guided by innovative design and a sequencing plan that employed more than 20 work phases, downtime and restoration times were minimized while providing maximum flexibility to the construction process

PROJECT STATS

CLIENT

Hydro One Networks Inc.

LOCATION

Niagara Falls, Ontario

DESIGN COMPLETION

June 2020

1

NEW 13.8-KV SWITCHGEAR

1

NEW CONTROL HOUSE

1

NEW 115/13.8-KV
75-MVA TRANSFORMER

20+

PHASES IN SEQUENCING PLAN

CHALLENGE

As Ontario's largest electricity transmission and distribution service provider, Hydro One delivers power to a significant residential load in Canada's most populous province. To maintain reliable service to the Niagara Falls area, the electric company needed to make massive updates to its more than 60-year-old Stanley Substation. However, because of its customer load, Hydro One had substantial outage constraints, requiring a phased construction plan that kept at least one transformer energized at all times.

SOLUTION

In 2018, Hydro One hired us to perform engineering and design services for its Stanley Substation

Refurbishment Project. The original 115/13.8-kV substation, placed in-service in 1958, was supplied by two 115-kV circuits. Much of the equipment in the yard and control house had reached the end of its useful life and needed to be replaced to maintain reliable service.

The project scope included the replacement of two 13.8-kV 75-MVA (dual secondary winding) transformers, installation of a new 13.8-kV switchgear within a new precast building, and the large-scale replacement of all 115-kV and 13.8-kV protection in a new control room. Also covered was the replacement of all existing roll-in 13.8-kV switchgear breakers as well as the relocation of the transmission termination lattice structure for both circuits.





Because the substation supplies critical load within southern Ontario, the equipment being replaced required a recall time of eight hours or less. To deliver such critical project updates without interrupting service, we developed a detailed construction sequencing plan for the overall project. This comprehensive plan, which required more than 20 phases and close coordination with Hydro One stakeholders, incorporated company-specific requirements while considering the physical limitations of the site. It also identified circuit transfers, developed by our team, to maintain energization

of transformer and distribution feeders during construction.

RESULTS

Using a laser mobile scanner, our engineering team captured 3D imagery of the Stanley Substation and transmission towers, acquiring accurate data and details of existing assets — many of which had limited or no records. Importing this data into CAD software resulted in a more accurate design, and a streamlined phased delivery approach, with fewer unknowns. When one of the 115/13.8-kV transformers required accelerated replacement partway

through the project, the already developed sequencing plan and available 3D imagery allowed a new plan to be established quickly and effectively. The transformer was replaced safely and on time, reducing the risk of unplanned outages during peak tourist season in Niagara Falls. Phased construction is slated to be completed in 2021.

By modernizing its equipment and improving its connections, Hydro One's Stanley Substation can continue providing reliable service to millions of customers in various diverse locations.



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