



Substation Delivers Reliable Power to Tier 3 Data Center

S&C Featured Solution: Turnkey Engineering Services

Location: Northeastern Illinois

CUSTOMER CHALLENGE

A major international trading company needed a reliable power system to keep its new Tier 3 data center running smoothly. Tier 3 data centers provide 99.982% availability through multiple power and cooling paths, redundancy, and fault tolerance. The facility's future load of 200 MVA challenged engineers to develop a highly reliable distribution system, on limited real estate.

An engineering firm proposed building a 34-kV distribution system to support the data center. When S&C was hired to review the design, they found it was not compatible with the facility's power reliability and redundancy needs . . . it was also costly. A more innovative and practical solution was needed.

S&C SOLUTION

S&C presented a new design that ensured reliability and redundancy, while considering space constraints. S&C proposed a compact 138-kV/13.8-kV substation that provided redundant power sources using two independent energized buses. Each bus could accommodate up to four 25-MVA transformers.

Not only did S&C's design provide more reliable power and allow data center expansion, it was less costly. And, its small footprint fit the company's small 150 × 350-foot lot, located at one end of the site.



Compact substation with dual buses (construction phase) designed for Tier 3 data center.

S&C delivered the turnkey engineering services and power infrastructure needed for successful Tier 3 data center operations.



S&C provided substation engineering, procurement, and construction services as well as commissioning. For redundancy, S&C fed two 138-kV utility power lines to the two buses, connected by a normally open bus tie breaker. S&C then completed site preparation and below-grade installations, including foundations and firewalls. They installed a control building with relay panels, two 25-MVA transformers, two 138-kV circuit breakers, a 138-kV tie breaker, and two disconnect switches for tie breaker isolation. S&C implemented a reliable protection scheme using microprocessor-based relays. And, they designed and deployed the SCADA system.

To accommodate the final configuration of eight 25-MVA transformers, S&C installed both 138-kV buses at once with eight 138-kV motor-operated disconnects, one for each transformer. S&C also installed the foundation and firewalls for the next six transformers. This approach saved the customer significant time and money, and they sought assistance again from S&C for the next two project phases. Each phase required adding another pair of 25-MVA transformers with circuit breakers, without any interruption of data center operations. S&C also conducted NETA and functional testing.

VALUED OUTCOME

S&C exceeded the customer's expectations, providing their Tier 3 data center with redundant power sources for maximum reliability and enabling expansion. S&C completed the first three project phases on time and within budget. S&C is now working on the final phase, which involves installing the last pairs of transformers and circuit breakers . . . this will allow the data center to run at full capacity.

To minimize the risks of equipment failure and costly outages, the customer is taking advantage of S&C's Asset Management Program. It includes on-site equipment testing, emergency services, and maintenance, during which the data center can run using the redundant power system engineered by S&C. One bus can undergo maintenance, testing, or repair while the second bus is energized . . . so reliable power is always available.



Tier 3 data center with 18-foot firewalls for transformers.



“Because S&C understands data center power requirements from the ground up, we delivered a practical yet innovative solution.”

—S&C Senior Project Engineer