



Toth & Associates Restores Power to 1,500 People 18 Days ahead of Schedule

Power Line Systems Optimizes Design to Ensure Safe and Reliable Service

HUNDREDS OF PEOPLE PLUNGED INTO DARKNESS

People living in developed countries depend on a safe, reliable electrical transmission system for a comfortable standard of living. Should they unexpectedly lose power for extended periods, their way of life is completely disrupted. Though thunderstorms, tornadoes, and other severe weather incidents have always caused temporary blackouts, climate change has made these events more frequent – and more of a threat to transmission systems. On June 29, 2023, a storm with winds reaching 120 miles per hour blew through west-central Illinois, destroying 120 transmission poles over nearly 6.5 miles. In one brief but powerful event, over 1,500 people from the small towns of Elvaston and Powellton lost power.

In this one event, Prairie Power Incorporated lost a significant portion of its service area. Not only did they have to quickly restore power to their members, they had to create a new design for the transmission line. Since they built the previous line 60 years ago it has become outdated, and Prairie Power could not simply replicate the original design. Shortly after the winds died down, officials at Prairie Power contacted Toth & Associates, an engineering firm that counts electric utility engineering as one of its specialties, to put together a plan to rebuild the transmission area.

TIGHT DEADLINE, STRICT STANDARDS OF QUALITY

Toth & Associates and Prairie Power quickly collaborated with the Western Illinois Electric Cooperative, the area's supporting distribution utility, as well as their eventual construction partner, L.E. Myers Co. To minimize the already considerable inconvenience to the affected people, the group set August 18 as the deadline for re-energizing the area.

Though the clock was ticking, the team could not cut corners. They would begin by creating an initial design at the office, though limited pole and material availability due to the short notice required them to respot, respan, and realign the line on an hourly basis. Once the initial design was complete and the teams finished an initial survey of the site, workers would need to place temporary stakes in the proposed areas for the poles. Teams would then analyze the stake placement multiple times, taking measurements and making field adjustments to account for real-world conditions. Lastly, the team would use the observations and surveys to make final checks and further adjustments to ensure the line design was safe and reliable. Only then could pole and line installation begin. The team needed accurate and flexible design capabilities to finish the meticulous design process within the deadline.

REVISING AND OPTIMIZING IN A DIGITAL DESIGN

Since Toth is a longtime user of PLS-CADD[®] from Power Line Systems, a Bentley Systems company, they used it to manage the project and overcome the daunting challenges. They first used PLS-CADD and its automated design functions to quickly develop an initial design, which Prairie Power sent out for construction bid minutes after completion. Next, after gathering geographical information along the project area, the design team adjusted the digital model to align more accurately with the final selected centerline, while also factoring in distribution structures along the alignment.

Workers then placed stakes in the proposed locations of new poles. At the same time, they collected further site data to make additional adjustments. The next day, the design team made a final inspection of the stakes. By using PLS-CADD

PROJECT SUMMARY ORGANIZATION

Toth & Associates

SOLUTION

Transmission and Distribution

LOCATION

Elvaston to Powellton, Illinois, United States

PROJECT OBJECTIVES

- ◆ To quickly rebuild 6.5 miles of storm-destroyed transmission lines and restore power to 1,500 people.
- ◆ To streamline design updates and optimization based on field reports and material availability.

PROJECT PLAYBOOK

Power Line Systems

FAST FACTS

- ◆ A storm with winds reaching 120 miles per hour blew through west-central Illinois destroying 120 transmission poles over nearly 6.5 miles.
- ◆ Since Prairie Power built the previous line 60 years ago, it was outdated and the electric utility could not simply replicate the original design.
- ◆ Though 1,500 people needed power restored as soon as possible, the design still had to meet strict safety and reliability standards.

ROI

- ◆ Rapid design and clear communications helped the team restore power to all members 30 days after the storm and 18 days ahead of schedule.

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“This case study is a compelling example of how a committed team, cutting-edge technology, and effective coordination can overcome significant challenges and achieve remarkable results. The Prairie Power Incorporated transmission line restoration project demonstrates what can be accomplished when expertise, innovation, determination, and the right tools come together to serve a community in need.”

– Luke Snow, PE Engineering Manager, Toth & Associates

in the field during this inspection, they fine-tuned guy lead lengths and structures shifts while executing clearance reviews and foundation checks. The application enabled them to import detailed field data and export precise staking points in person. Back in the office, the teams rigorously optimized the design using PLS-CADD's ability to automatically check for the effects of expected future wind, ice, temperature, and wire tension, ensuring that the line would deliver reliable power while meeting high safety and efficiency standards. Once all collaborators approved the design, the construction team used it to begin replacing the poles and line.

RAPID RESULTS WHILE MEETING STANDARDS

By using PLS-CADD, Toth & Associates and their collaborators rapidly developed plans for a safe and efficient replacement for the electrical line. Despite the emerging supply and delivery constraints that forced the design team to repeatedly respot, respan, and realign the design with the materials

available on short-term notice, the application helped them create a solid initial design by 4:45 p.m. the day after the storm. Using the digital model as a construction guide, the construction team addressed any questions or concerns that arose. Though the team discovered that some of the stakes had been moved by others without prior approval, Toth & Associates and L.E. Meyers used the model to assess the impact of deviations from the planned alignment and rectified the situation without falling behind schedule.

The initial project deadline of August 18 was considered extremely aggressive but necessary for restoring power to residents. However, by using PLS-CADD to rapidly create, test, and refine the design, then using that design to guide construction, the teams were able to finish reconstruction and restore power by July 31, 30 days after the storm and 18 days ahead of schedule. Though all stakeholders faced a worst-case scenario, their teamwork, determination, and skillful use of digital design successfully served a community in need and contributed to an electrical grid that is not only reliable, but resilient.



Since building the previous line 60 years ago, it had become outdated and Prairie Power could not replicate the original design.



Despite having to respot, respan, and realign the design due to supply constraints, PLS-CADD helped the design team create an initial design for bidding just one day after the storm.