Xcel Energy 414 Building Plaza Renovation

Edited by Kelly M. Page

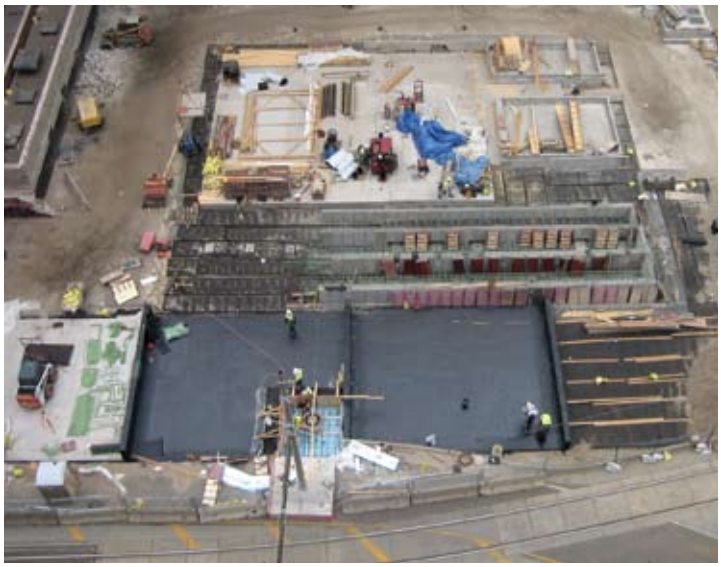
The Xcel Energy 414 Building Plaza is home to Xcel Energy's corporate headquarters in Minneapolis, MN, and a large underground transformer substation that serves the majority of downtown Minneapolis. It is located below ground, beneath the pedestrian plaza. Each day, thousands of downtown workers and visitors use the exterior plaza, which is adjacent to several bus routes and the Hiawatha Light Rail Transit (LRT) line. Xcel Energy recognized the need to maintain protection of the underground transformer station and, at the same time, update the exterior plaza functionality and appearance.

A Complex and Difficult Renovation Project

The Xcel Energy Plaza was a complex, time-consuming project, requiring the owner to jump over several hurdles. The plaza area needed to remain in operation during the entire project. Four 110,000 volt transformers that served downtown needed to remain in constant operation. Xcel Energy wanted a state-of-the-art waterproofing system, protected with decorative pavers and plantings to make a welcoming and comfortable space for the public. The project team solved several problems during the renovation, including:

- Keeping a tight and hectic schedule to accomplish the repair within one construction season;
- Removing the existing plaza using expansive chemical demolition techniques. The vibration, noise, and dust generated had to be kept to a minimum, so the contractor drilled a series of holes and inserted a special expanding chemical grout to break up the existing plaza construction. Removal was found to be much more problematic than expected, as the planned-for lightweight concrete topping was instead found to be normalweight high-strength concrete. Some of the concrete was discovered to be over 3 ft (0.9 m) thick instead of the expected 1 ft (0.3 m);
- Keeping the underground transformers in constant operation during the repair. Each transformer was covered with a removable but massive concrete slab, measuring 2 ft (0.6 m) thick and weighing more than 18 tons (16,330 kg). Only one of the four transformers could be shut down at any one time. Special handling and protection methods were needed during all construction work to avoid electrocution and disruption to the power feeding downtown;
- Protecting, rerouting, and maintaining several utility and communication lines crossing the plaza during the repair. A heavily-corroded water pipeline was replaced;
- Keeping all transportation services intact during the repair. The exterior plaza is used by thousands of business commuters each day, and is served by several bus routes and the LRT. During the repair, one of the LRT poles needed to be temporarily moved, and one of the two tracks stabilized to avoid shutting down or undermining its support. An innovative temporary power pole support system was designed to keep the trains running, and soil stabilization techniques allowed a nearly vertical cut in the soil near the tracks; and

Work began with the demolition of the old plaza. As so often happens on restoration projects, several concealed problems were found. The designer used this information to revise the design to accommodate the site conditions



Waterproofing work began on the transformer vault portion of the plaza. Below the plaza is the key electrical transformer station for downtown Minneapolis businesses

Once demolition was completed, waterproofing operations began. Careful planning and coordination allowed work to move forward with few glitches

One side of the plaza is bordered by the new LRT system, which also includes a passenger stop. To complicate the waterproofing work, portions of the electrical power poles had to be temporarily rerouted and the roadbed stabilized, all with minimal disruption to the LRT

A high-performance waterproofing system comprised of multiple layers of hot-applied rubberized asphalt membrane and fabric reinforcing was applied

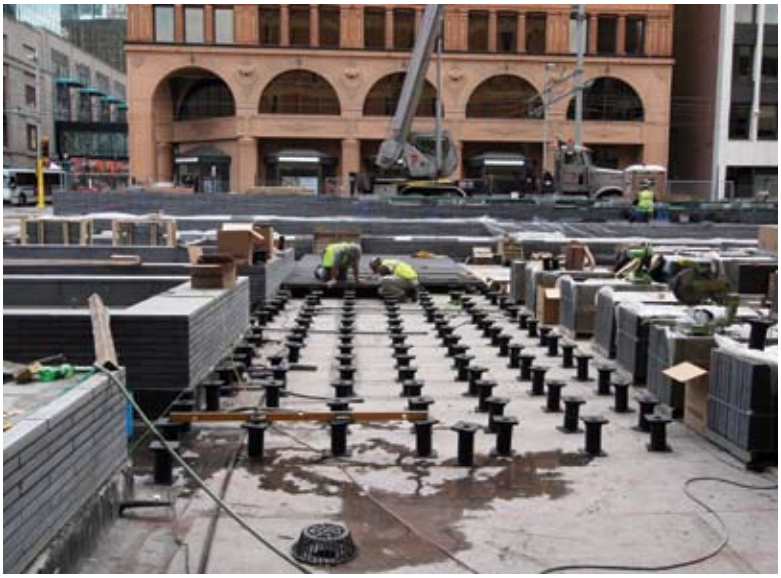
- Installing a two-layer, flexible waterproofing system to protect the vital transformer station below. Xcel Energy wanted a state-of-the-art system to protect the electrical services, with a long service life lasting 50 years or more. A multi-layer, hot-applied, reinforced rubberized asphalt system was selected. The waterproofing was protected with cast stone pavers on a pedestal support system, new diversion and screen walls, and decorative planters and walkways.

The restoration engineering firm, the owner, architect, landscape architect, and contractors worked together to sequence the work to provide the necessary renovation while keeping Xcel Energy's neighbors happy and costs minimized.

A project of this scope required protection of the existing transformer station, the one funnel for all of the electric power to downtown Minneapolis. Any disruption would have costly repercussions for businesses and workers.

A Successful Renovation

After years of water leakage and deterioration, protecting the vital electrical transformers saved downtown Minneapolis from a possible major disruption. During the repair, several unexpected



To allow future maintenance and inspection of the waterproofing systems, a pedestal system was installed for the new granite pavers

A goal of the plaza reconstruction was to protect the vulnerable transformers below, but also to create a welcoming space for pedestrians. Several new landscape planters were installed as a result

conditions were found, yet the project team charged on and kept the project moving ahead. Any major work in a downtown environment impacts the building neighbors, and Xcel Energy, its consultants, and its contractors all worked together to successfully complete the work on time and within the approximate $3 million budget.

This project demonstrates that engineers, using their design and analytical skills, and by taking the initiative to work closely and responsively with the owner and contractor, can design and implement difficult repairs, resulting in a beautiful and economically successful renovation.

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Owner
Xcel Energy
Minneapolis, MN

Project Engineer/Designer
Buildings Consulting Group
Minneapolis, MN

Repair Contractor
Greiner Construction
Minneapolis, MN

Materials Suppliers/ Manufacturers
Gehrke & Associates
Minneapolis, MN

The completed plaza before landscaping was installed