



The 'El' Goes Wireless

Aldridge Electric designs CTA system

CHICAGO. The Cubs, the Sox, the Loop and let's not forget the Chicago Transit Authority (CTA), owner of the nation's second largest transportation system. And now, the CTA has another moniker to its title—the Red and Blue Line wireless communication project.

"This project represents the first design and installation of a multicarrier, multitechnology, wireless coverage system deployed within a U.S. rail mass transit system," said Warren Aldridge, executive vice president, Aldridge Electric Inc., Chicago.

Aldridge Electric served as electrician on this ground-breaking project. It included the installation of a state-of-the-art wireless telecommunication system in the CTA rapid transit subway tunnels, underground stations and station passageways. This means riders and workers in the subway system could stay connected through cellular phone, text messaging and Internet.

The completed system will also enhance the existing two-way radio system and improve subway communication options for CTA, the Chicago Police Department and Chicago Fire Department and Emergency Medical Service personnel.

Red and blue

The Red and Blue Lines are at the heart of the subway system that is referred to by Chicagoans as the "El"—short for elevated train. The El is a light rail electric line, which runs above and under ground, snaking around the city.

CTA's 1,188 rapid transit cars operate on 222 miles of track, serving 144 stations in Chicago, surrounding suburbs and two ma-

nor airports. The lines are designated by colors: Red, Blue, Orange, Yellow, Green, Blue, Purple, Brown and Pink.

The Red and Blue Lines comprise approximately 23 miles of double-track tunnels running 50 feet under the Chicago Loop. The space is confined, with little room for equipment staging or material receiving. Except for the train platforms, there is inadequate lighting in the train tunnels to conduct construction operations.

Daily ridership on the Red Line is 45,000 on a typical weekday and more than 1.1 million riders per month. Blue Line figures are lower, averaging 25,500 riders per day and 584,000 per month. Somehow, the electrical contractors had to work around it all.

Design-build parameters

Aldridge Electric was selected through a competitive bidding process for the \$11.2 million contract, which called for the design, analysis, implementation, testing and maintenance of a complete and operational wireless telecommunications system.

The Red and Blue Line wireless communication is a redundant system that includes two complete loops of fiber optics and base station radios for emergency communications. Prior to this project, in 2001, the Aldridge "transit team" installed 20 miles of 12-duct fiber optic on the Blue Line from O'Hare International Airport to the Jackson Street Subway Station downtown.

Work began in spring 2003 and was completed in July 2005. During construction, radio transmitters, receivers and antennae were installed and interconnected with the existing fiber optic cables to enable voice and data connection services.

The sites were connected using radiating antenna cable called

Founded in 1952, Aldridge remains a privately owned company headquartered out of Libertyville, Ill. Ken Aldridge, son of the founder, is chief executive officer. What started as a one-man operation has evolved into a 600-employee company with \$175 million annual revenue that has been named among the largest electrical contractors in the Midwest.



Left: Electricians work on fiber optics installation. **Center:** The Aldridge team used a cable car to transport supplies. **Right:** The logistics of working near electrified rail is a challenge.

Radiax. The commercial service comprised 47 fiber optic repeater groups and 188 dual-band cell repeaters over 3,000 dual-band antennas through the subway, stations and equipment rooms.

The system connects back to a common base station off the CTA right of way, which is made up of nine communication huts for the head end equipment and cell-provider base stations. All systems were supplied with battery backup units and redundant service feeds off the existing CTA power grid.

Throughout the 11.4 miles of the double tunnel subway (22.8 miles total), the Aldridge Electric team installed more than 47,000 feet of Radiax in the Red Line and an additional 45,000 feet in the Blue Line during two weekend track closures lasting 15 hours.

To accommodate the goals of the project and meet its commitments to CTA riders, Aldridge Electric completed the project in four phases that were divided by line and tunnel segment.

Safety first challenge

“To ensure worker safety while working in close proximity to moving trains, Aldridge developed a rigorous—and documented—construction safety process and training plan that included regular employee safety meetings, on-site safety and quality inspections and the use of special flaggers to warn and coordinate the approach of oncoming trains,” said O’Brien Mills, director of safety, Aldridge Electric. “In accordance with CTA policy, project personnel on the job also participated in the eight-hour CTA Rail Safety Training course.”

Transporting and properly staging the massive amounts of equipment, lighting, tools, materials and other supplies needed on the job site—and the logistics required to get materials there in the right sequence in the construction process—was also a challenge.

With these constraints, the Aldridge team assembled all the material at a location close to the staging site and also brought in one day’s worth of material at a time. Prior to each shift, equipment and portable lighting was loaded onto specially designed cable train cars and the workers jumped right on board and rode it to the job site.

The Aldridge Electric team had pledged to comply with the CTA’s promise to the public for no service interruptions. To overcome these issues, the team designed the system to be assembled in stages. Workers and materials were “staged” and placed on side tracks along the elevated sections of the Blue and Red Lines.

Tag team

The most challenging part of the project was installation of almost 100,000 linear feet of Radiax along miles of train tunnel. Aldridge Electric crews installed the cable on the tunnel walls as the cable train car moved constantly along the track.

Each cable car accommodated five to six workers, lighting and

equipment. As the train moved, workers completed one of a sequence of tasks in the installation process. When the lead worker completed his task, he rotated to the back of the car and began the process anew.

Further expanding on this installation is the subsequent CTA project of which Aldridge Electric has become an instrumental member. Through a competitive bidding process, Aldridge Electric has been awarded a \$31 million contract to upgrade the communications system on several CTA rail transit lines.

The two-year project includes installation of fiber optic cable at a number of CTA rail stations, operations facilities and along the tracks. In addition, Aldridge Electric will furnish and install equipment for communications, data acquisition and public announcement devices.

“Fiber optic technology increases the capacity to transport key information,” said Warren Aldridge, vice president and division manager for Aldridge Electric. “As a result, the communication system’s ability to carry more information, more reliably, with clearer audio and video reception will improve.”

To complete the project, the Aldridge Electric team will install fiber optics on the Yellow and Purple Lines; communication capability will also be upgraded along the Orange Line and Loop elevated route.

Being instrumental in past, present and future improvements to the CTA rapid transit system is something Aldridge Electric takes pride in. Their comprehensive expertise in challenging projects has made them an asset to not only the CTA, but to the contracting community as well.

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PHOTOS COURTESY OF ALDRIDGE ELECTRIC

PROJECT PARTNERS

Aldridge Electric—General contractor and electrical contractor

Powerware Technologies Inc. (Formerly Allgon Telecom Ltd.)—Equipment supplier and systems integrator

Quantum Crossings—DBE electrical subcontractor

KEY SUPPLIERS

Motorola—Base station radios

Radiax—Radiating cable