

CCI Team Provides New Fire Alarm System for Penn Station



CODE CONSULTANTS, INC.

The Fire Protection & Life Safety Experts

Code Consultation

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Fire Alarm Design

Mass Notification Design

Fire Sprinkler Design

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In 2007, Amtrak awarded a contract to **Code Consultants Inc. (CCI)** to design a state-of-the-art fire alarm system for Penn Station with the capability for mass notification in the event of a non-fire emergency. Located under Madison Square Garden in midtown Manhattan, Penn Station has approximately 500,000 people pass through its doors each day.

The project, which reached substantial completion on May 31, is a prime example of how **CCI's** teamwork with the owner and contractors can successfully complete a project. **CCI** and the owner and contractors were able to carry out renovation work while meeting the project's tight deadlines, in one of the busiest rail stations in the world, without disrupting its day-to-day operations.

Continued on next page...

A portion of the project required that the fire alarm and mass notification system designed for the Amtrak component of Penn Station to be interconnected with the existing fire alarm systems in the New Jersey Transit and Long Island Rail Road portions of Penn Station. The Amtrak fire alarm and mass notification system consists of 3 main control panels to provide redundancy, 53 subpanels, and over 2,600 field devices. The system uses a combination of smoke detection, heat detection, and manual pull stations to complement the fire sprinkler systems in the facility.



In addition, fiber-optic linear heat detection was used on the passenger train platforms. Fiber-optic linear heat detection is fairly new technology for the U.S. but has been effectively used in Europe for a number of years. Occupant notification is accomplished through a combination of audible and visual devices in the subterranean tunnels and speaker/visual notification appliances in the public and employee areas.

As a condition of funding, the project needed to be completed in less than two years, which required a very aggressive project schedule. Amtrak solicited bidders and awarded the contract to a New York-based electrical contractor, and a New Jersey-based distributor for the specified fire alarm equipment. As a result of **CCI's** expertise in the project's design phase, **CCI** was contracted to provide on-site observation and technical support services for the project.

At the outset, many thought this monumental task could not be accomplished within the boundaries of the aggressive schedule. Amtrak, **CCI**, and the contractors worked as a team with a common goal of completing the project successfully, on schedule and without disrupting the facility's operations. Amtrak coordinated access to areas within Penn Station, and **CCI's** presence on site resolved

technical design and installation issues that arose during construction as they were identified without delay. The team delivered the project on schedule and without disrupting the facility's operation.

Installing life safety systems in a facility that never closes, and has over 500,000 people a day traveling through it, was extremely challenging. In addition, the work was scheduled and performed around facility work schedules and train schedules, while obtaining access to over 550 rooms throughout the facility.



Some of the more challenging aspects included working in the facility's high-voltage substations and on train platforms without shutting down the overhead high-voltage catenary lines, and installing approximately 3,000 feet of fiber-optic linear detection cable on each train platform without splicing the cable. As an example, the detection equipment in the substations was reconfigured to be located in areas that would not require the shutdown of the substation while still adhering to the project's design criteria. To adapt to the fact that it was not practical to shut down the overhead catenary lines, nonmetallic fiberglass conduit was used on the train platforms to eliminate the risk of electrical contact with the high-voltage lines.

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Installing the fiber-optic linear heat detection cabling on the train platforms proved to be one of the more challenging aspects of the installation. The fiber-optic cabling had to be installed continuously throughout each platform, and the work had to be accomplished overnight when the train platforms were not in use. Additionally, scheduling of the work on the platforms had to be coordinated with scheduled outages/shutdown of the train platforms and the associated tracks. This required workers to install the fiber-optic cabling on each platform during a single work period.

To accomplish this, a series of assemblies consisting of a six-inch piece of fiberglass conduit along with additional electrical components were designed and assembled. These assemblies were used to install the cable, while subsequently becoming the cable-support system once the installation was complete. The assemblies were installed approximately five feet apart along the edge of the platforms. The support system's unique design provided the means to install the fiber-optic linear heat detection cable throughout a platform in a single work period, while allowing the cabling to be open to the environment so that the cables' heat detection characteristics were not affected.

The project's success is a testament to the value of including **CCI's** design professionals throughout the design and construction phase of such a highly challenging project. Most importantly, the rail passengers who travel through New York's Penn Station are safer because of a state-of-the-art fire detection and emergency notification system that will be useful for many years to come.

