



The Port Authority of New York and New Jersey, owner of the World Trade Center, awarded E-J Electric Installation Co. a \$28 million contract to install cameras and turnstiles in the New York City complex following the 1993 bombing.

Towering security

E-J Electric helped tighten security at the World Trade Center after the bombing.

By Amy Florence Fischbach,
Staff Writer

A terrorist bomb exploded underneath the World Trade Center on Feb. 26, 1993, ripping out a three-story high crater, shutting down most of the electrical power and causing \$500 million in structural damage.

The bombing, the first international terrorist attack on U.S. soil, claimed the lives of six people, injured more than 1,000 and forever changed the level of security at the landmark complex.

"Because of the bombing, they were looking for something that had the security of a nuclear facility," said E-J President Tony Mann. "But it's also a commercial office building that needs to be responsive to its tenants. The system provides an operating office building with the highest level of security."

E-J Electric Installation Co., the country's oldest independent electrical contractor, won a \$28 million contract in 1996 to tighten security at the World Trade Center. The Long Island City, N.Y.-based contractor installed 2 million feet of fiber-optic cable, hundreds of security cameras, access control and 110 turnstiles, including systems integration. The parking garage also became restricted after a terrorist drove a van, containing a bomb, into the underground parking garage in 1993.

"There's no public parking down there anymore after the bombing," said E-J Vice President Jim Usher, who has been on the project since October 1996. "It's for the Port Authority and the tenants. We're much more concerned with below grade in terms of security than we are up here."

The World Trade Center sits on top of the largest indoor mall in New York City as well as a major regional transportation hub.

"Thousands of people come through here every day," Usher said. "There's another whole city below this complex."

To control the flow of people, a total of 110 turnstiles, which were hand built on the job, restrict access to the World Trade Center complex, Usher said.

"This used to be unlimited access," Usher said. "Now there are turnstiles that go all the way around in a circle. Where there isn't a turnstile, there's a glass rail."

The 55,000 tenants in the World Trade Center complex have a special, permanent identification card that they lay on top of a scanner, while visitors are issued a temporary, swipe-through card. While a tenant can use a card for an entire year, some visitors only get a card that's good for 20 minutes.

"If a visitor is just here to see someone, they're good for a day and that is it," Usher said. "If you're a courier or a pizza delivery guy, you would only get a pass that would be good for 20 minutes. You would have to go through the turnstile, go upstairs and deliver the pizza. Once you come back out, you can't come back in."

Regardless of how often they visit the complex,



Above: The World Trade Center buildings surround the Austin J. Tobin Plaza, which is under constant surveillance. **Below:** Augustine Calabro (left), former general foreman for the World Trade Center, supervised his team during the security wiring project after the bombing.



delivery persons have to keep getting new cards, Usher said.

“Some of these poor guys come up with 10 orders between 11 and 2 to deliver pizzas and they have to keep getting new passes,” he said.

Visitors also only have access to certain buildings in the complex.

“If you came to visit your brother on the 100th floor, you can only go in Tower 1 if that is where your brother is,” said Augustine Calabro, former general foreman for the World Trade Center. “You couldn’t go in Tower 2. It’s simple, but elaborate.”

SMILE, YOU’RE ON CAMERA

Hidden cameras in the ceilings and light fixtures record anything and everything that goes on in the World Trade Center complex.

“Up here in the ceiling, in the domes, there are all hidden cameras,” Usher said. “The lobbies are covered by closed-circuit television.”

When visitors approach the desk to request a badge, they have to show a photo I.D. and give their name. The operators will then call the tenant and request permission to issue a visitor’s badge. At that time, a video camera, strategically placed on the desk, takes a photo of the visitor.

“Visitors are being photographed and their images are permanently stored,” Usher said. “We can track every card—what turnstile it went through and what time it went through, so if there is a problem, we can go back and pull their image back up from storage and print it. We have no idea when anybody leaves here, but we know when they enter.”

The buildings surround a five-acre plaza, which has hidden security cameras. Cameras on the rooftop also monitor every street that borders the property.

“This entire complex and plaza are under closed-circuit television and constant surveillance, day and night,” Usher said. “There’s cameras all over the place inside and out.”

Hundreds of cameras videotape the activity both inside and outside of the complex. The videotapes are then archived for reference.

“We hold them for awhile just in case a crime is committed or for whatever reason we need to go back,” Usher said.

The security operators can videotape the entire plaza or simply zoom in on a suspicious individual.

“If they wanted to, they could zoom right in,” Usher said.

WORLD TRADE CENTER STATS

- The bombing claimed the lives of six people, injured more than 1,000 and caused \$500 million in damage. After the bombing, the owner tightened security. Now, more than 300 security guards secure the complex, hundreds of cameras provide surveillance and 300 doors are monitored and secured.
- A tenant I.D. and visitor pass program is in place at the complex. An electronic access-control system using proximity photo I.D. cards for building tenant/employees helps streamline tenant and visitor access. Visitors receive photo I.D. swipe cards for turnstile access.
- Current standard tenant power capacity is 6W up to 10W per usable square foot depending on location. The World Trade Center’s electricity supply is segmented for greater reliability and safety. Eight dedicated 13,800-V feeders divide into 23 building substations. On-floor electrical distribution is routed via at least two electrical closets per floor, each with separate high- and low-voltage bus ducts for tenant-dedicated use.
- Four generators on the roof of 5 World Trade Center (8,800 kW capacity) provide standby power to tenants throughout the complex.
- The World Trade Center has multi-mode fiber-optic cables that loop through both towers and the plaza buildings and are accessible to every floor.
- 55,000 people work in the World Trade Center Complex.
- More than 1.2 million cubic yards of earth and rock were excavated for the

World Trade Center.

- More than 200,000 tons of steel was used in the construction of the complex.
- The 425,000 cubic yards of concrete used in building the World Trade Center is enough to build a 5-foot wide sidewalk from New York City to Washington, D.C.
- 3,500 workers were on the site daily during peak periods of construction.
- There are 43,600 windows in the Twin Towers.
- The World Trade Center’s refrigeration plant is the largest in the world with 60,000 tons of cooling capacity.
- There are 239 elevators and 71 escalators in the four buildings operated by the Port Authority at the complex. The Sky Lobby express elevators are capable of carrying 55 people, a 10,000-pound capacity. Express elevators can travel at speeds of up to 27 feet per second.
- The complex is situated on a 16-acre site and consists of seven buildings with 12 million square feet. All are constructed around the five-acre Austin J. Tobin Plaza.
- The World Trade Center sits atop the largest indoor mall in New York City and a major regional transportation hub.

Source: Port Authority of New York and New Jersey Web site and Jim Usher and Augustine Calabro of E-J Electric Installation Co.



The World Trade Center had to provide both security and convenience for its tenants and visitors, which became a challenge in fast-paced New York City.



Jim Usher, vice president, said E-J Electric now has a maintenance contract at the building after doing the security wiring, fire-alarm systems and back-up power.

Americans want both security and convenience, which poses a challenge in New York, Usher said. Rather than simply jumping on an elevator and going to their desired floor of the World Trade Center, visitors have to wait in line, get a visitor's badge and swipe it through the turnstile.

"New Yorkers are such fast-paced people," Usher said. "Then you add to the fact that they're paying more rent per square foot than anywhere in the world. They would say, 'Wait a minute. My visitor had to wait in line for two minutes. I'm paying millions of dollars in rent.' So it's trying to design a security system that's user friendly, tenant-friendly, yet still gives some security. That's the key."

TWIN TOWERS

To ensure top security and reliability, the 1,380-foot, 110-story Twin Towers both have command centers.

"It's totally redundant security," Usher said. "The theory is that if you had a bomb and you took one of the command centers out, everything is totally redundant so the other command center would pick up. If the computers fail, they automatically switch over to other computers at another location."

Tower 1 and Tower 2 are identical buildings, from the international flags in the lobby to the security systems.

"If you put blinders on somebody and put them here, they should not know if they were in Tower 1 or Tower 2," Usher said. "They're supposed to be mirror images."

The security system was designed as a redundant loop, Calabro said.

"You had a network that went up one building from Source A and returned to Source B," Calabro said. "At any time, if the network was interrupted, you would not lose the system because it could be fed simultaneously from both sides."

E-J installed miles of fiber-optic cable for the redundant security system.

"This is the largest installation of fiber-optic cable in the world, Usher said. "More fiber has run through this complex in the last two years than any other system."

The contractor worked all four towers at one time from the B6 level to the 110th floor to install the cabling for the security system.

"We peaked at about 60 electricians," Calabro said. "We had smaller crews with more supervision because the men were spread throughout the complex."

The World Trade Center, which was built in the early 1970s, is spread out across 16 acres. Because of the large scope of the retrofit project, it became a challenge for the electricians to move their equipment, Calabro said.

"Getting from point A to point B was a job in itself," Calabro said. "We went to Nextels to improve communication."

The team also had to work nights to finish the job.

"Most of the work we had to do was in occupied tenant spaces where we had to run up the risers," Calabro said. "Tenants don't want anyone disturbing their normal operation, so a lot of the work had to be done off hours. We had a lot of late nights and night crews."

While E-J put in the new security system, the old one had to be up and running, Calabro said.

"There were a lot of switchovers and transitions," Calabro said. "The existing security system had to enter people in and out of the building."

While they were working on the security, E-J picked up some other jobs, such as working on the fire-alarm system and setting generators on the top of Tower 5 to feed the Twin Towers with emergency power.

"The Trade Center was never designed for the amount of emergency power necessary for all those trading floors they have there," Calabro said. "Tenants would come in and need emergency power, and it was not available."

To solve that problem, E-J Electric set four generators on the roof of Tower 5, which was nine stories, as opposed to the 110-story Towers 1 and 2. E-J then ran high-voltage feeder cable to Towers 1, 2, 4 and 5, installed three substations and distributed power to the tenants.

"We pulled 6,000 feet of high-voltage feeder cable from the roof of Tower 5, through the building, down through the concourse, through the parking garages and to the roof of Tower 1 and 2," Calabro said.

Calabro said E-J is fortunate to have a maintenance contract along with some other jobs for the World Trade Center.

"Security was the original contract that got us in the building and then we were fortunate enough to get these other jobs," Calabro said. "The generator job is up to about \$6.5 million right now."

Calabro, who is now supervising the work at Madam Tussad's wax museum in Times Square, said he is proud to have worked with the security on the World Trade Center.

"I would like to believe that it was an important job in the company," he said. "We have been there for four years. That's a challenge in itself. Contractors come and go in that building."

Usher said E-J plans to continue to take on projects at the World Trade Center.

"We have a maintenance contract, so we'll be here forever," he said. "It's going to keep growing and changing."