FOCUS

By Darlene Bremer

Brown-Heim Challenged by Basilica Project

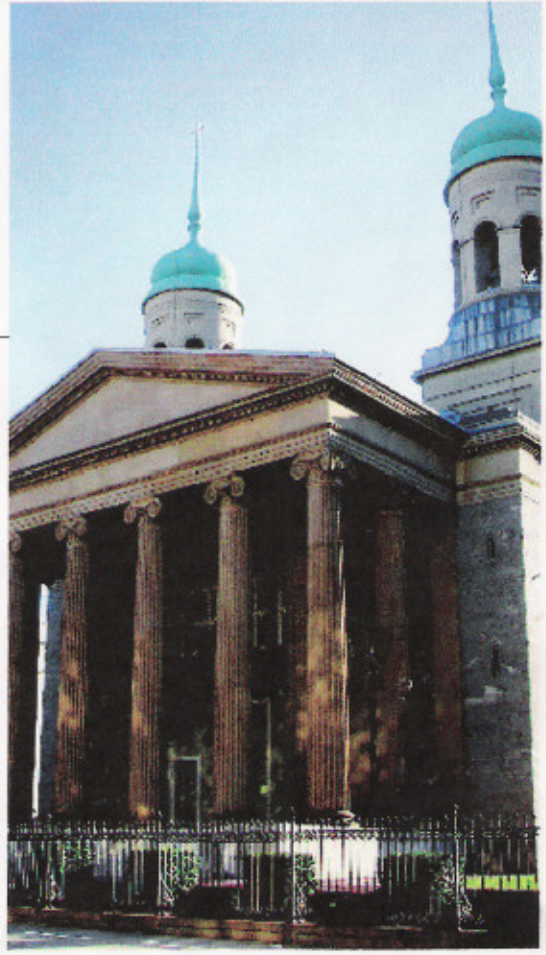
First U.S. Cathedral designated a national Historic Landmark

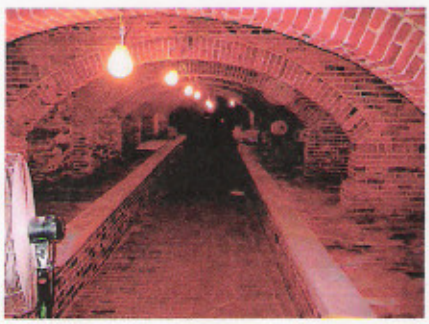
AS THE FIRST ROMAN CATHOLIC cathedral in the U.S., the Basilica of the Assumption in Baltimore is a major landmark in the nation's and city's history and a major monument in American architecture. It is generally considered the architectural masterpiece of Benjamin Henry Latrobe, the first professional architect to practice in the U.S., and the designer of the U.S. Capitol building. The cathedral, with an approximate 30,000 sq. ft. footprint, consists of a basement (undercroft), lower and upper balconies, and one main level, which reaches 80 ft. from the floor to the top of its dome.

The original construction of the Basilica occurred in two major campaigns: 1806 to 1810 and 1817 to 1821, with the towers being completed in 1834. At the time it was the only Roman Catholic cathedral in the country and it rivaled the U.S. Capitol in size, scale, and architectural sophistication. Unlike the Capitol however, the Basilica never suffered from fire or other major damage, so that today it retains much of its original, Latrobe-designed, building fabric, including the exterior walls, dome, and planar interior surfaces.

Of course the Basilica has undergone various renovations and at least 14 redecoration campaigns over the past 200 years, but it was time, according to the Archdiocese of Baltimore, to update the building with the latest in power distribution, lighting, and fire alarm and life safety systems. Early in the process, the Archdiocese chose Baltimore-based Henry H. Lewis Contractors, LLC to be the general contractor and to oversee the renovations, based on the plans and drawings of John G. Waite Associates, Albany, N.Y., which specializes in restoring historic buildings. In 2004, Lewis issued contract drawings and invited a few electrical contractors in the area to submit bids, including Brown-Heim, Inc., based on their industry experience and ability to provide design-build services. "The complexity and difficulty of the project required an electrical contractor that could design-build the entire electrical distribution and lighting systems and that could upgrade the fire alarm and back-up power systems without any documentation from the previous renovations," observed Jim Cornelius, president of Brown-Heim.

Brown-Heim submitted its final bid in March 2004, along with updated drawings of the electrical and low-voltage systems and was awarded the contract in May, based on its low bid, its experience in design-build projects, and its area reputation. "We have worked with Lewis on a number of differ-





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ent projects in the Baltimore area over the past 20 years, including hospitals, universities, and corporate facilities," added Cornelius.

According to Brown-Heim's project manager, Tom Fidler, the entire project had to be design-built because of the restrictions placed on it by the building's historical designation and the lack of layout drawings for any of the feeder, branch, lighting, fire alarm, or dimming control circuits. "All the design-build work is being performed by our designers, in conjunction with the architect, and with input from the field electricians, who have the on-site knowledge and expertise to determine what can actually be accomplished to fulfill the owner's requirements," he said. In addition, the original plans have had be modified to allow devices to be relocated on plaster or brick surfaces only, which were then cut and channeled. "The original plans called for some devices to be located on the stone walls, which could not be channeled without extensive damage and repair," Fidler added. And, finally, the access and floor boxes had to be placed out of site in non-public areas so that they would not impinge on the cathedral's architectural vision.

Making it Work

The $20 million renovation of the Basilica of the Assumption began in 2001 with the initial architectural design and is scheduled to be completed in August 2006. Brown-Heim's contract is worth about $1.4 million and the company has an average of eight, and a peak of 10, electricians working on-site. The company is responsible for the complete renovation and upgrades to the Basilica's power distribution, lighting, and fire alarm systems. Although also responsible for the church's security and audio/visual systems, Brown-Heim is only installing the necessary outlet boxes and raceways; a separate security contractor, HP Electronics, Inc., Baltimore, will install the cable and actual devices.

The power distribution system is a new 120/208 volt, 3-phase, four wire service from the local utility's underground vault, which was then subdivided into one 400 amp service for power, one 800 amp service for power and lighting, one 400 amp service for the fire pump, and a 100 amp service for the Sexton's Lodge, which lies adjacent to the Basilica. The wiring from the vault for all the


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various services was run to six new distribution panels to feed the branch circuits, panelboards, dimmer panels, and the HVAC equipment. A new underground vault for the mechanical and electrical services was built adjacent to the existing basement on the north side of the building to house the HVAC equipment, the utility vault, and the pumps and air handling units.

The lighting, the most expensive aspect of the project, consists of a complete new interior and exterior lighting and dimming control system with both modern and replicated historic fixtures, furnished by Shepherd Electric Supply of Baltimore. Old fixtures had to be removed, along with the wiring, and new PVC-coated metal clad (MC) cable was installed. "The MC cable was chosen because it had the greatest flexibility to allow the electricians to work with the building's extensive number of bends," said Fidler. About 900 new fixtures were installed, and two of the original fixtures are being refurbished because of their historical significance. Twelve dimming controls are required as almost 90 percent of the circuits are designed to be dimmable.

The outside lighting, which work only began on in September 2005, will be designed to fulfill the Archdiocese's vision of having the Basilica lit at night to draw attention to its status as a prominent historical landmark. The plan calls for the dome, as well as for the two sides that are visible to the public from its site on a hill, to be lit with floodlights. "We will be working closely with ARC Lighting Systems, Inc., Sarasota, Fla., to design the exterior lighting system. The company was chosen because it specializes in controlled accent lighting for special projects such as museums, churches, and government buildings," explained Cornelius.

Back-up power for the Basilica is a 40 kVA UPS system that is designed to provide emergency and exit lighting in case of a power outage. "It's a relatively simple system," said Fidler, "but if it senses a loss of utility power, it automatically switches to batteries with no interruption of service and, upon restoration of utility power, the system goes into recharge mode."

The fire alarm system is a state-of-the-art, completely addressable system with smoke detection and a digital communicator for local monitoring and to alert the fire department in case of device activation. The system consists of 35 horn strobes and a total of 45 smoke detectors, duct detectors, and pulls stations. All of the wiring is terminated at a new main fire alarm control panel in the newly constructed underground vault. Two graphic annunciators (one in the main lobby and one in the adjacent Archbishop's residence) are also part of the system. Brown-Heim, along with Baltimore-based Fireline Corporation, designed the system to provide the necessary protection for the occupants and for the Basilica itself.

Rising to the Challenge

One of the project's biggest challenges was the Basilica's complicated architectural features, which limited the pathways Brown-Heim had to route conduit. To overcome this space challenge, the company placed many of its conduits and raceways underground, shared utility trenches with the other trades, and channeled and cut the brick and plaster walls in order to conceal raceways. "At several locations, the removal of plaster and brick from the cutting was so extensive that the walls now have to be rebuilt," Fidler said. In addition, there was no way to extend conduits 80 ft. to the roof of the main dome for electrical services, but after exploring behind existing walls, old Greenfield conduits that extended upwards were found. "We pulled the old wires out and were able to reuse these conduits to get the necessary wiring from the main level to the top of the dome," recalled Fidler.

The type of original masonry construction used, the complex architectural vaults, the inverted arches, and the lack of wall footings continues to make the renovation of the Basilica of the Assumption a very difficult and unique project. "The age and history of the cathedral is of extreme importance to the city and we will continue to work with the architect to discuss current installation problems and find new and creative ways to find spaces behind which to conceal the new electrical systems so as to accommodate the limitations of its architectural design," concluded Cornelius. EC

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BROWN-HEIM, INC. WAS FOUNDED in 1933 by Edward Brown and Arthur Heim to focus on specializing in the conversion of DC-based power into AC power distribution systems. During World War II, the company specialized in refitting cargo ships with new power distribution systems. "For the past 50 years, Brown-Heim has primarily been a commercial and institutional design-build contractor focused on providing power distribution, lighting, fire alarm, and telecommunications systems in healthcare and research/lab facilities, and office buildings throughout the Baltimore metropolitan area," said Cornelius. The company's goal is to perform quality work for its customers and to establish long-term partnerships. Today, Brown-Heim averages $20 million a year in sales, has about 15 office staff providing design, engineering, estimating, and administrative support, and has about a 120 field electricians.