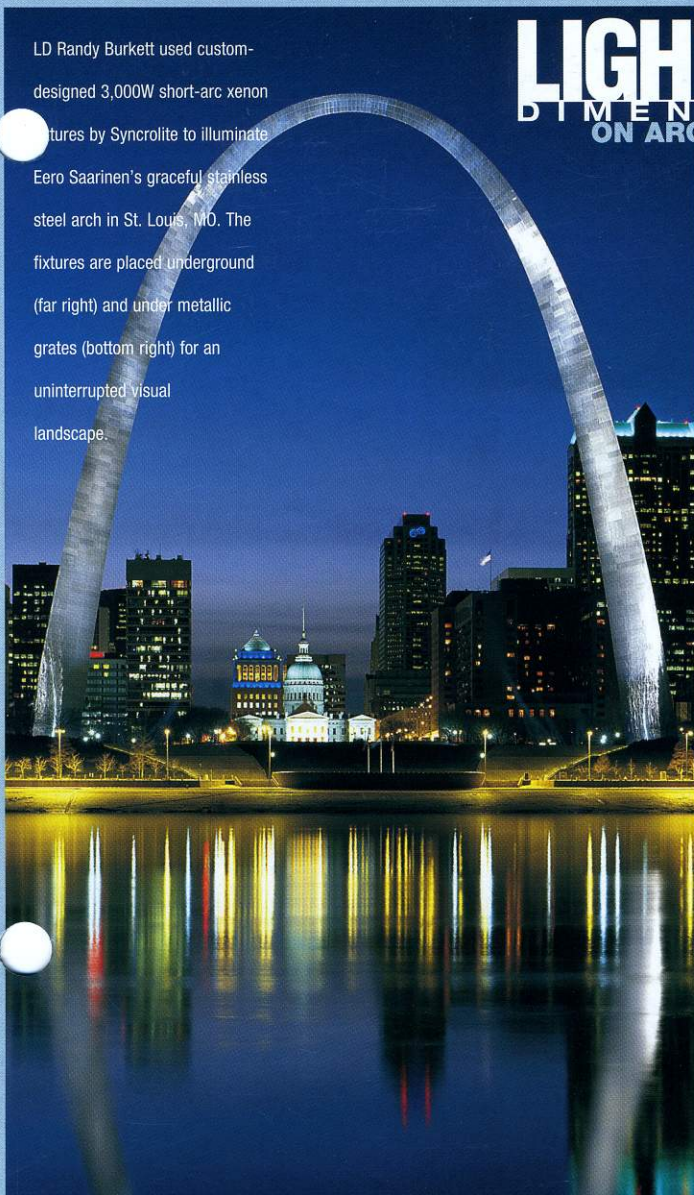


LIGHTING DIMENSIONS ON ARCHITECTURE

LD Randy Burkett used custom-designed 3,000W short-arc xenon fixtures by Syncrolite to illuminate Eero Saarinen's graceful stainless steel arch in St. Louis, MO. The fixtures are placed underground (far right) and under metallic grates (bottom right) for an uninterrupted visual landscape.



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PHOTOS THIS ROW, SUSAN JENNINGS

AN URBAN ICON

RANDY BURKETT LIGHTS THE ST. LOUIS GATEWAY ARCH
BY ELLEN LAMPERT-GRÉAUX



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Arching gracefully alongside the Mississippi River in St. Louis, MO, the Jefferson National Expansion Memorial Gateway Arch reaches 630' (205m) toward the sky. Designed by the late Finnish architect Eero Saarinen and built 1961-1966, this tapered curve of stainless steel has become an unmistakable part of the St. Louis cityscape. Over 35 years after it was constructed, lighting designer Randy Burkett, FIALD, IESNA, LC, has successfully illuminated the arch, using a custom 3,000W short-arc xenon computer-controlled lighting system manufactured by Syncrolite in Dallas, TX.

As a resident of St. Louis for the past 20 years, Randy Burkett, principal of Randy Burkett Lighting Design, was no stranger to the arch. "I think everybody here appreciates it architectural-ly and considers it part of the community fabric," says the designer, who drives past the

arch on his way to and from his office.

In 1947, Saarinen entered and won a design competition among world-class architects to create a gateway to the American west. "St. Louis was the jumping-off point for Lewis and Clark, the Louisiana Purchase, and 19th-century western expansion.

Saarinen's design solution was the arch," says Burkett. Designed in structural expressionist modernist style, the arch seems contemporary even by today's standards. "The architect's work is considered timeless and as fresh now as the day it was built," Burkett adds.

Early schemes to illuminate the arch had all failed. According to Burkett, who has seen archival television footage of prior attempts, "They would have loved to light the arch when it was built but didn't know how." Burkett sees several reasons for this. "First, the technology we have today didn't exist, so it was a harder task," he explains. "Secondly, the brushed stainless steel was shiny and highly reflective when the arch first opened. But it has matured nicely, like a fine wine. It is now a vintage structure with wonderful character. Thirdly, there are layers of bureaucracy involved in working



SUSAN JENNINGS



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The Syncrolite fixtures live in underground bunkers that tunnel on both sides of the arch (top and facing page); they project light 600' (180m) into the air to evenly light the arch (above) without any spill into the night sky.

a national park and lighting a national monument."

Now that the skin of the arch has what Burkett refers to as "a ruddy complexion with more teeth," it could reflect light back to the viewer rather than straight into the sky as it would have in earlier years. This gave Burkett and his design team, including Susan Jennings and Ronald Kurtz, IALD, IESNA, a decided advantage. Yet there were still major challenges to be met.

For one thing, the client (The Gateway Foundation) insisted that the lighting had to be completely invisible during the day, so as not to disturb the original master plan and vision for the site as created by Saarinen and Dan Kiley, a leading landscape architect of the day. "I knew we couldn't stick poles up, or use above-ground holding areas for the lights," confirms Burkett. "Everything needed to be concealed. The options were to use existing things like rooftops or trees, or go underground, which is what we did."

The only elements of the lighting system that can be seen are the high-strength, lightweight-alloy, high-transmission gratings that cover four 2.5x3x18m (8'x10'x60') underground concrete vaults housing the lights. Above each fixture is an independently adjustable circular grating section permitting variable orientation to maximize optical efficiency.

To decide what kind of luminaires would best do the job, Burkett asked, "If there was no limit, what would we do? In fact," he says, "you see the arch differently as it picks up the early morning light or the setting sun." For three months, the lighting designers photographed the arch in dif-

ferent modes: sunlight, daylight, foggy days, sunrise, and sunset, to see how the steel looked in various conditions.

"We also purchased small models of the arch and tested lighting positions with fiber optics to give us an idea of placement," says Burkett. He also orchestrated three full-scale mock-ups and shot over 200 hours of video to decide on the source and reflector systems as well as the tightness and intensity of the beams. These led to the decision that xenon was the right lamp source.

"The stainless steel of the arch is flattered by the cool source," Burkett adds. "There are only a handful of manufacturers who work with xenon sources, and really only two who could handle a permanent outdoor installation. We interviewed them, knowing we couldn't use off-the-shelf products. We needed custom reflectors, onboard electronics, sophisticated optics and controls."

The decision to go with Syncrolite included a sense of patriotism in using an American company to light a national monument; also, Syncrolite is located relatively nearby. Burkett was also impressed with the performance that Syncrolite's standard products give in theme parks: "They have a good service record, and we were able to see how the fixtures weathered."

In addition, the small size of the Ushio short-arc xenon lamps allowed Syncrolite to build a very precise reflector around it. "Precision is required to project 600' (180m) in the air, with no, or very little, light spill into the sky," says Burkett. The end result is 44 custom-designed fixtures that are an amalgam of some of Syncrolite's

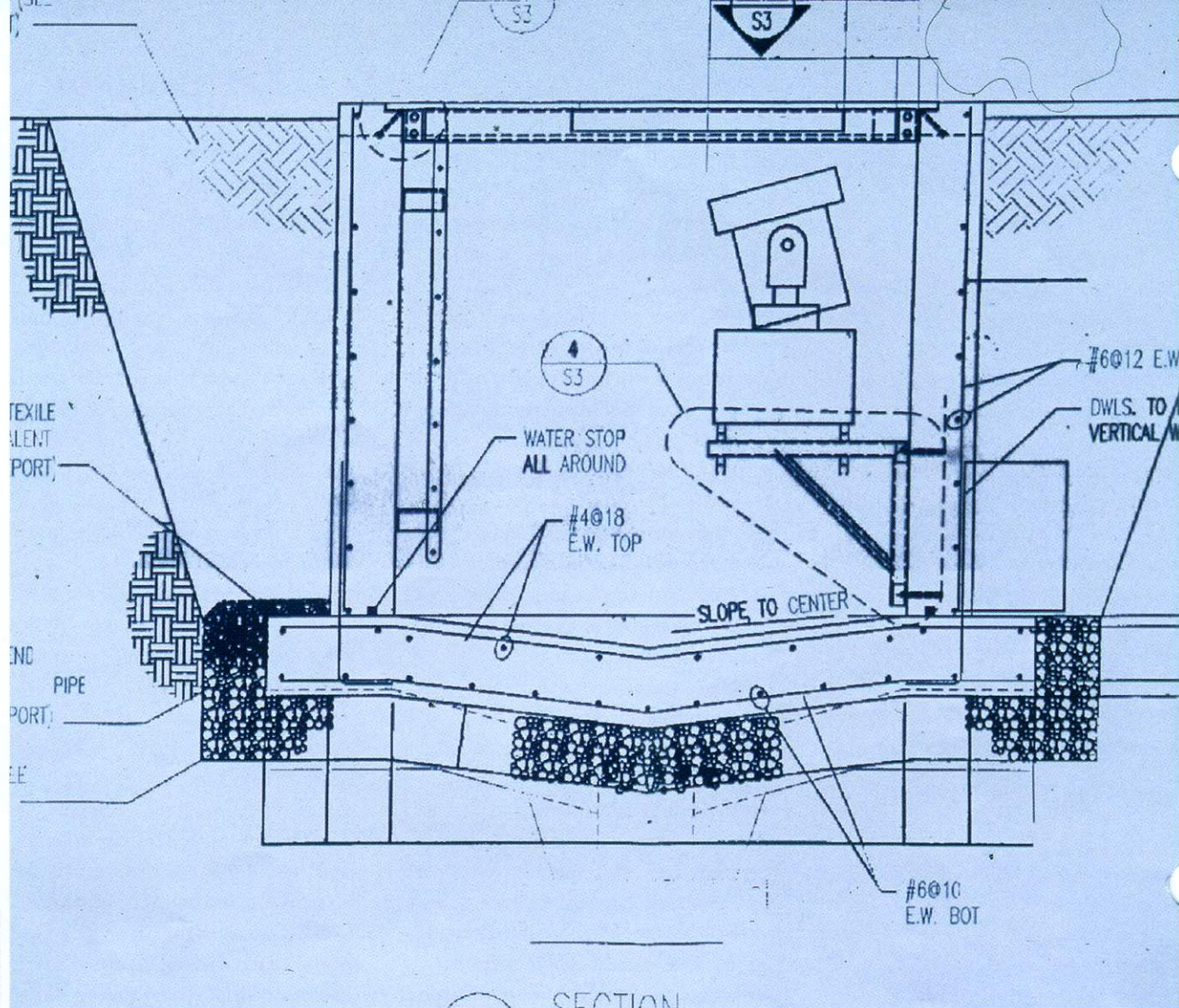
ST3K standard high color temperature 3,000W xenon luminaires that were further refined to illuminate the arch with cool white light.

Each luminaire employs a computer-addressable and adjustable reflector system that permits beam shaping and a mechanical douser to fine-tune intensity. Four special lens types help elongate and soften distributions and minimize spill. The luminaires also have onboard diagnostic chips that send status reports to the centralized computer control system provided by Syncrolite and located in a subterranean control room near the arch.

The fixtures are placed in the underground bunkers, with 24 units on the western side, and 10 units on the eastern side of the arch. The reason for the asymmetrical placement is to create a balance in the light on the arch, given that there is more light from the surrounding park on one side, and just the Mississippi River rolling along in blackness on the other. There are also different sightlines from various incoming highways, and glare from the lights was also a concern.

Power for the luminaires is fed from a pre-existing power vault where a new transformer was installed for the new fixtures. Due to the nature of the site, only underground cables could be used. "We couldn't even trench from above ground," explains Burkett, pointing out another of the challenges in this project. Rather than trenches, all of the cables were run by boring under the earth, even for long runs of 700-800' (210-240m).

✂ Another challenge came from local interest groups such as the Audubon Society and federal fish and wildlife agencies. One main concern was "bird kills" or birds getting disoriented in their migra-



tory paths by the high-intensity light. "Even though the arch is a slender object out by the river, it is in the heart of a busy north-south corridor used by birds at least twice a year, and they need to be able to clearly identify objects," explains Burkett.

There was also the issue of light pollution, as the brief was to light the arch and nothing around it. To meet this requirement, and to cope with too much light for the birds, the system shuts off automatically via computer control if the fog becomes too thick. A ceilometer

(made by Vaisala), a device used at airports, is placed on the roof of the control building; this bounces a laser beam off the clouds to measure the atmospheric density and shuts off the system if there is excessive sky glow.

Owned by the National Park Service, the arch is in a historic place along the Mississippi River; archeologists were concerned about damage to the site. "We had to make sure we didn't disturb ancient burial grounds or old cultural ruins," says Burkett.

Other St. Louis-based companies

on the project were: EDM Engineers, engineer; McGrath, general contractor; and Kaiser Electric, electrical contractor.

Bathed in cool white light, the arch now has an after-dark personality and helps bring people to the riverfront at night. And in 2004, the 200th anniversary of the Louisiana Purchase, the arch will certainly be able to show off its new illumination as part of the big celebrations on the Mississippi River.

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