

## Sundial Bridge, New Glass Creation in Redding, California Shines a Light on Contemporary Architecture

Rarely do architects have the opportunity to create landmarks significant enough to redefine a city's perception of itself. When the residents of Redding, California, set out to salute the majestic surroundings of the region's sweeping mountain vistas and rushing river, they reached halfway across the world to find the right architect for the challenge.

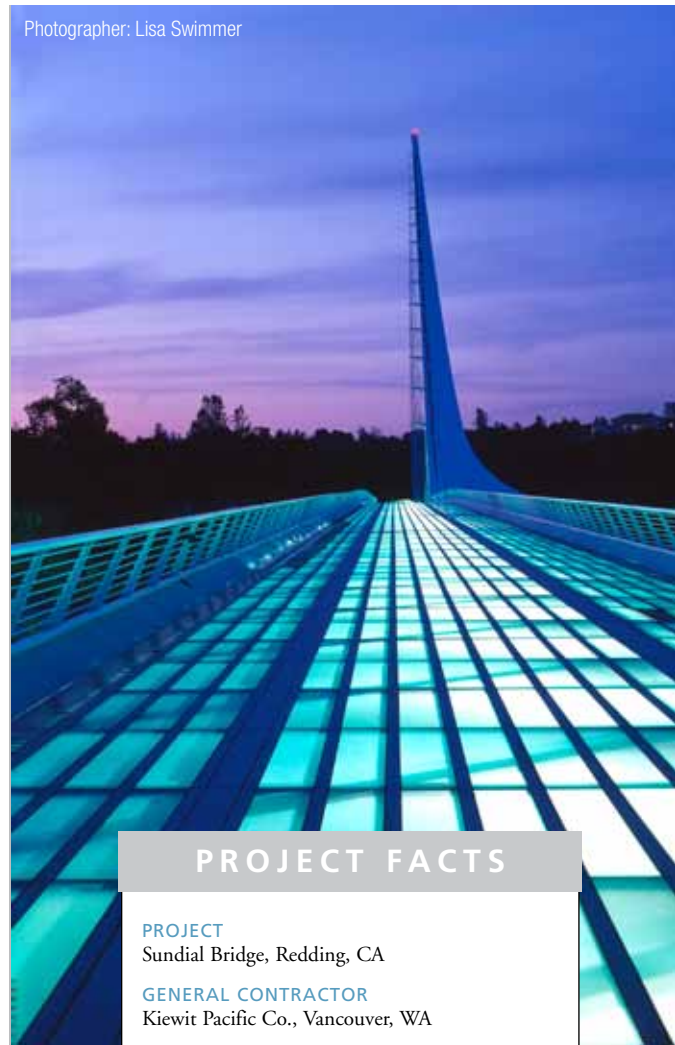
The result is the latest architectural masterpiece by renowned Spanish architect Santiago Calatrava. The new Sundial Bridge, crossing the Sacramento River in the center of Redding, is a breathtaking glass pedestrian bridge as stunning as the scenery it was designed to complement. The bridge opened on July 4, 2004 and links the north and south campuses of Turtle Bay Exploration Park. It also serves as a downtown entrance for Redding's extensive Sacramento River Trail System. The Sundial moniker is derived from the way the bridge supports act as a giant sundial. The pylon at the north end of the bridge casts a shadow onto a grassy plaza and marks the hours of the day with a shadow that moves approximately one foot each minute.

Eight years in the making, the harp-shaped footbridge is suspended by steel cables from a single 217-foot tall pylon and spans more than 700 feet across the Sacramento River. The bridge is 23 feet wide and weighs more than three million pounds. Since the Sacramento River has always been a "sensitive salmon-spawning habitat," the design mandated that no section of the bridge make contact with the water.

Glass bridges are rare treats in the world of architecture, rewarding pedestrians with a lighter-than-air experience. The glazing of Sundial Bridge enables visitors to tread on glass panels lit by sunlight during the day and by 210 lights by night. Because of its size and unusual use of material, the project offered some significant glazing challenges. The laminating experts at Oldcastle Glass in Fremont, California, took the massive project in stride. "The shear volume of glass, 158 tons, and intricate requirements of this job were matched with an extremely tight deadline," recalls Barry Adams, general manager at Oldcastle Glass.

Since the bridge is designed to support the weight of an ambulance for emergency purposes, a complex glazing system had to be created to provide the necessary structural strength. The glazed deck consists of 2,245 nonskid, laminated glass panels made with Solutia® Inc.'s Saflex® protective polyvinyl butyral (pnb) interlayer. The Saflex interlayer is bonded with heat and pres-

Photographer: Lisa Swimmer



### PROJECT FACTS

#### PROJECT

Sundial Bridge, Redding, CA

#### GENERAL CONTRACTOR

Kiewit Pacific Co., Vancouver, WA

#### ARCHITECT

Santiago Calatrava, Zurich, Switzerland

#### PROJECT MANAGER

Omni Means, Redding/Roseville, CA

#### LAMINATOR

Oldcastle Glass, Fremont, CA

Prelco Inc., Rivière-du-Loup, Quebec, Canada

#### INTERLAYER MANUFACTURER

Solutia Inc., St. Louis, MO

#### PROJECT COMPLETION & OPENING DATE

July 4, 2004



As the world's leading interlayer, Saflex is found in nearly 50 percent of laminated architectural and automotive glazing applications globally. In fact, Saflex interlayer is used to protect some of the world's most precious treasures, including the US Constitution, the Mona Lisa, and the Louvre. When it comes to critical applications where safety, security, sustainability and acoustic performance are a primary concern, automotive designers and architects' first choice is Saflex interlayer.

sure between two panes of glass to create a glass "sandwich."

The "sandwich" consists of two 3/4-inch tempered panels laminated with a 60-gauge Saflex interlayer. Each 13 x 59 5/8-inch panel had to then be carefully laminated a second time. The second lamination process required a 90-gauge interlayer and a 1/2-inch sandblasted glass panel, which had to be perfectly centered over the tempered panels.

"We had to be accurate within 1/16 inch with the off-set sandblasted panels for the steel caps to fit properly around the finished laminate," says Brian Frea, manager of laminated products at Oldcastle Glass. "Since each finished glass panel weighs 144 pounds, this was the most challenging part of the job."

The laminated glass deck is semi-translucent, which helps reduce the bridge's daytime shadow on the river. At night, the laminated glass deck is illuminated from underneath with 1/3 of the lights facing downstream, 1/3 facing upstream and the rest facing upward. By using laminated glass, the architect was able to meet both the aesthetic needs of the bridge's design while providing the necessary safety requirements of a structure that will be a destination for many years to come.



## 'Hot' Architect

Santiago Calatrava, whose work is known worldwide, was responsible for the Sundial Bridge's distinctive design, his first freestanding bridge in the United States. Other projects he has designed include the new transportation terminal at New York City's World Trade Center site, an addition to Milwaukee's soaring new art museum, and several projects at the 2004 Olympic Games in Athens, Greece, including the main sports complex.

Calatrava was born in Valencia, Spain and was educated as an artist. He next studied architecture at the Escuela Técnica Superior de Arquitectura de Valencia and became an architect in 1974. From 1975 to 1981, Calatrava studied civil engineering at the ETH in Zurich, Switzerland, and earned his doctorate. Calatrava founded a practice in Zurich and

later opened an office in Paris. His diverse background as an artist, architect, and engineer has earned him international recognition for his architectural projects, and his work that ranges from sculptures to bridges have been widely exhibited and publicized.

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