A **FEDERAL COURTHOUSE** SETS A PRECEDENT FOR SUSTAINABILITY



BY K.J. FIELDS

PRESIDING INFLUENCE

AS A FOUNDATION OF AMERICAN DEMOCRACY, the court system commands a unique respect while remaining open to all who seek justice. The project team for the Alfred A. Arraj U.S. Courthouse in Denver worked to carefully balance elements of traditional dignity with a welcoming presence, but this was only the beginning of a design direction that ultimately served the public's best interest.

When the U.S. General Services Administration set an initial design program for the courthouse in 1995, information about green design was slowly emerging. As the agency waited for congressional funding and design progressed, a small organization called the U.S. Green Building Council launched its first green-building rating system. The GSA became intrigued and decided to use these guidelines on the $75 million Alfred A. Arraj U.S. Courthouse as a case study.

"We're a public agency, and it made good sense to use public funds in a way that enhanced overall functionality and saved energy," says Curtis Berg, team leader of the Project Management Studio in Property Development for GSA Region 8. "We needed to know if it was feasible from a cost perspective, so the courthouse became a sustainable pilot project for GSA."

After the project team identified a range of sustainable measures and ran a series of life-cycle cost analyses, the building received a $3.75 million funding increase to cover the additional features.

PHOTOS ABOVE BY GREG HURSLEY; ALL PHOTOS COURTESY OF HOK, ST. LOUIS


PHOTO BY GREG HURSLEY

CAPTURING CONTEXT

Cutting a crisp, clean form among Denver's downtown architectural landscape, the 320,000-square-foot (29728-m^2) courthouse is set in a four-block federal complex with some classical buildings adjacent to modern high-rise commercial offices. HOK, St. Louis, and Anderson Mason Dale Architects, Denver, scaled the project to bridge these two areas. A 2-story entry pavilion houses the Special Proceedings Courtroom and Jury Assembly. This pavilion connects to a 10-story tower that provides four magistrate courtrooms, 10 district courtrooms and clerks' offices.

Sustainability begins with a genuine understanding of the site, according to Gyo Obata, design principal at HOK. "Denver receives a tremendous amount of sunlight, so we oriented the main wing to the south to control energy and maximize daylight. We also added a plaza that interprets the quality of the natural surroundings and a water feature to reflect the Rocky Mountains," Obata explains.

The plaza is lined with native sandstone set in a sand bed to control water runoff. With the area's semi-arid climate, a limited number of drought-tolerant plants were selected for landscaping.

CREATING CONTENT

The building's curtainwall controls solar heat gain and energy loss with high-performance triple-pane, low-E glazing. The higher floor-to-floor heights required for the courtrooms permitted taller windows to deliver natural light to 75 percent of the building interior. Office floor plates are 11-feet (3-m) high. A combination of clear glazing at the top section of the curtainwall and internal light shelves transmit high levels of light deep into the space.

Designers also brought daylight into the courtrooms in an unobtrusive way. The public corridors align along the curtainwall, and light shelves in this space bounce natural light through high glass panels into adjacent courtrooms.

In addition to its aesthetic qualities, the daylight reduces the need for artificial light. Lighting control systems shut down staggered sections of electrical light when sufficient daylight is available. Occupancy sensors automatically shut off lights and HVAC systems in unoccupied areas.

An underfloor air-distribution system in the courtrooms uses displacement ventilation to increase occupant comfort. Because the courtrooms average 16 feet (5 m) in height, the underfloor system is an economical way to heat and cool only the occupied space of the open volume. The major source of air conditioning is an evaporative cooling system, which reduces the need to purchase chilled water from the district.


PHOTO BY JIM MAGUIRE


PHOTO BY GREG HURSLEY

The Alfred A. Arraj U.S. Courthouse's main wing is oriented to the south to control energy and maximize Denver's sunlight. The building's curtainwall controls solar heat gain and energy loss with high-performance triple-pane, low-E glazing.


PHOTO BY JIM MAGUIRE

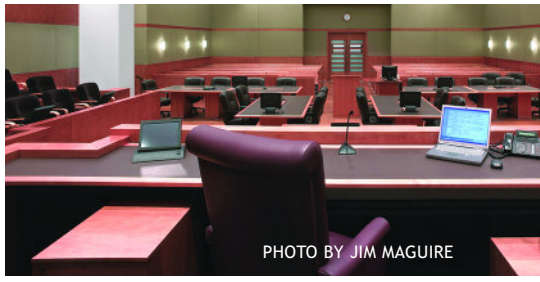


PHOTO BY JIM MAGUIRE

WITH THE SUSTAINABLE FEATURES WORKING IN CONCERT, ENERGY MODELS PREDICT THE BUILDING WILL PERFORM 46 PERCENT BETTER THAN THE FACILITIES STANDARDS FOR THE PUBLIC BUILDINGS SERVICE CODE.

The access floor also stores electrical wiring, computer cabling and telecommunications, which transform each courtroom into a flexible space. With the exception of the judge's bench and jury box, all furniture components can be moved to suit the judge's preferences or needs of a particular case.

Cork, a renewable resource, was selected as flooring in courtrooms for its low static and acoustical properties. Maple wood paneling from certified forests grace the courtrooms and lobby.

Roof-mounted photovoltaic panels produce electricity for the building; excess energy is fed back into the utility grid.

With the sustainable features working in concert, energy models predict the building will perform 46 percent better than the Facilities Standards for the Public Buildings Service Code. Berg currently is collecting data to determine the building's actual performance.

"The systems make the building function efficiently, and the materials and daylight give the space an open and 'honest' quality, which is very inviting to the public," says Roger Johnson, director of construction administration for Anderson Mason Dale Architects.

CLOSING ARGUMENTS

The Alfred A. Arraj U.S. Courthouse opened in October 2002. Designed for a 100-year life with minimal maintenance, the facility will serve the changing requirements of future generations. In fact, the team strategically designed the courtroom wing to accommodate an anticipated expansion in 40 to 50 years.

Collectively, the sustainable features demonstrate a less than 15-year payback, which offsets the green design costs in a reasonable timeframe. As a result, GSA decided all its new buildings must work toward the goal of a LEED Silver certification and, at minimum, become LEED Certified.

Although the project team did not pursue LEED certification during the courthouse's construction, GSA is

PHOTO BY JIM MAGUIRE

PHOTO BY GREG HURSLEY

GREEN MATERIALS AND SOURCES

- **CEILINGS** / Ultima, Ceramaguard and Dune tiles with Silhouette and Prelude suspension systems from **Armstrong Ceilings**, Lancaster, Pa., www.armstrong.com; New Dimensions tiles from **Wall Technology Inc.**, Ladysmith, Wis., www.walltechnology.com; Radians and Illusions from **Ceilings Plus**, Los Angeles, www.ceilingsplus.com; and Celline from **Environmental Interiors**, Hudson, N.H., www.environmentalinteriors.com / CIRCLE NO. 85
- **RUBBER FLOORING** / Everlast from **Dodge-Regupol Inc.**, Lancaster, www.regupol.com/ CIRCLE NO. 86
- **CARPET** / City Streets from **InterfaceFlor Commercial**, LaGrange, Ga., www.interfaceflorcommercial.com / CIRCLE NO. 87
- **CORK FLOORING** / **Expanko Cork Co. Inc.**, Parkesburg, Pa., www.expanko.com / CIRCLE NO. 88
- **ACCESS FLOORING** / **Interface Access Flooring** / Grand Rapids, Mich., (616) 977-8600 / CIRCLE NO. 89
- **SCIENTIFIC CERTIFICATION SYSTEMS FLOORSCORE-CERTIFIED VINYL TILE** / Excelon Stonetex from **Armstrong Flooring**, Lancaster, www.armstrong.com / CIRCLE NO. 90
- **GYPSUM BOARD AND EXTERIOR SHEATHING** (Dens-Glass Gold Fireguard) / **GP**, Atlanta, www.gp.com / CIRCLE NO. 91
- **STEEL-STUD FRAMING** / **Dietrich Metal Framing**, Pittsburgh, www.dietrichindustries.com / CIRCLE NO. 92
- **ALUMINUM COLUMN COVERS AND FIN TUBES AT WINDOWS** / **Fry Reglet**, Alhambra, Calif., www.fryreglet.com / CIRCLE NO. 93
- **ALUMINUM LOUVERS AT WINDOWS** / **C/S Group**, Cranford, N.J., www.c-sgroup.com / CIRCLE NO. 94
- **ROOF INSULATION** / **Firestone Building Products Co.**, Mississauga, Ontario, Canada, www.firestonebpco.ca / CIRCLE NO. 95

TOUR THIS BUILDING
DURING THE GREENBUILD INTERNATIONAL CONFERENCE & EXPO ON FRIDAY, NOV. 17!

collecting all the necessary data now and may submit the courthouse for LEED-NC (New Construction) or LEED-EB (Existing Building) certification at the end of the year. On current projects, GSA presents information to USGBC during the design phase as part of the official submission and follows up with final information during the construction phase. Berg says collecting the information as the project progresses results in a much smoother process.

"Sustainability was evolving as we designed the project. Even in the span of those two years, so many new technological developments occurred," Berg notes. "Hopefully, projects can gain from those advancements in lower initial costs and greater long-term savings."

K.J. Fields is a freelance writer based in Portland, Ore.


PHOTO BY GREG HURSLEY

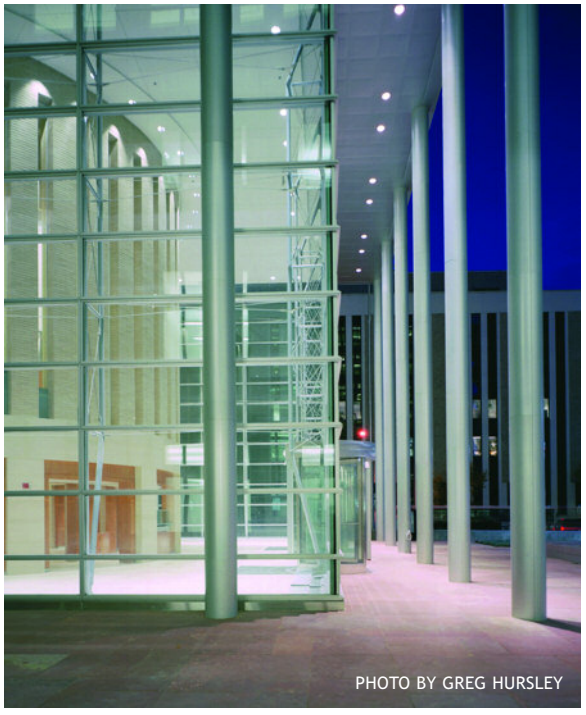
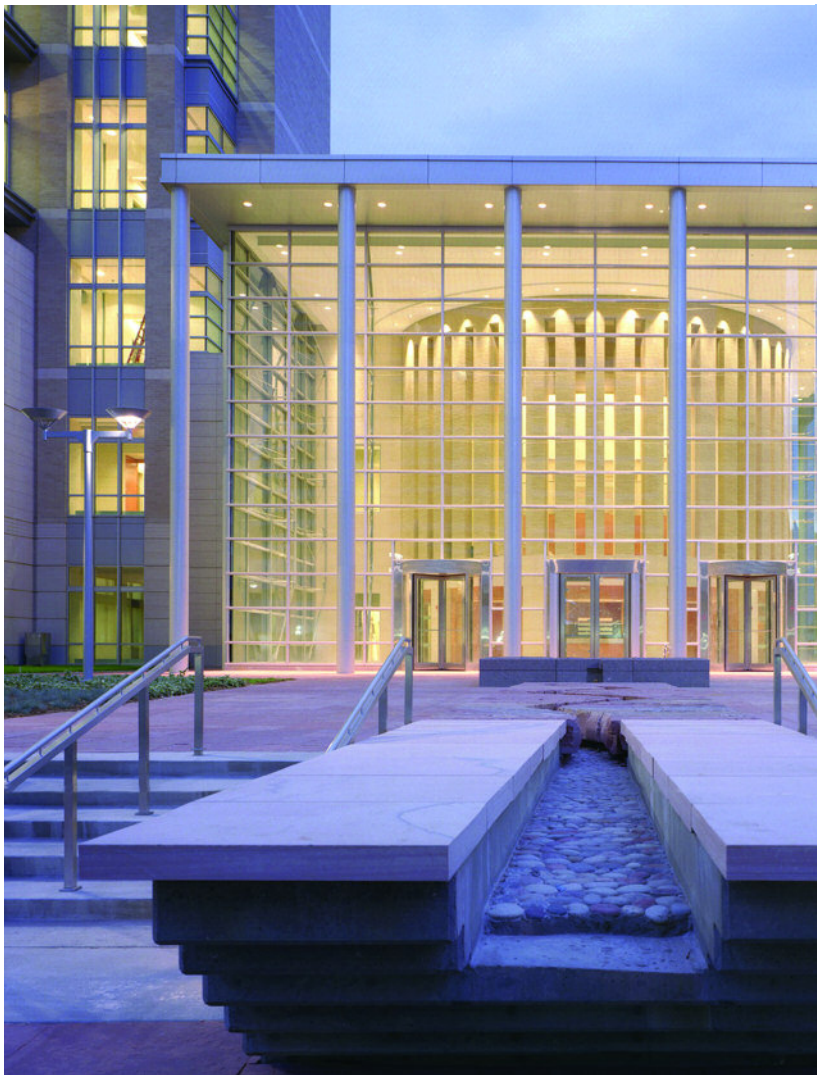


PHOTO BY GREG HURSLEY



"WE'RE A PUBLIC AGENCY, AND IT MADE GOOD SENSE TO USE PUBLIC FUNDS IN A WAY THAT ENHANCED OVERALL FUNCTIONALITY AND SAVED ENERGY."

— Curtis Berg, team leader, GSA Region 8

 (continued from page 30)

PROJECT TEAM

ALFRED A. ARRAJ U.S. COURTHOUSE /DENVER

Owners representative—General Services Administration, Rocky Mountain Region, Denver Federal Center, www.gsa.gov, and Colorado Property Management Center, Denver, www.colorado.gov

PHOTO BY GREG HURSLEY

As a result of this project, GSA decided all its new buildings must work toward the goal of a LEED Silver certification and, at minimum, become LEED Certified.

Design architect
HOK,
St. Louis, www.hok.com
- Gyo Obata, design principal
- Hans Hecker, project manager
- Mark Husser, senior project designer
- Robert Schwartz, courts planner
- Robert Edmonds, project architect

Architect of record
ANDERSON MASON DALE ARCHITECTS,
Denver, www.amdarchitects.com
- John Anderson, principal
- Curt Dale (deceased), managing principal
- Ron Mason, associate design principal
- Ted Halsey, project director
- Tom Rafferty, project manager

Landscape architect
CIVITAS INC.,
Denver, www.civitasinc.com
- Eric Anderson, principal
- Todd Mead, project manager

Mechanical/electrical/telecommunications
THE RMH GROUP INC.,
Lakewood, Colo., www.rmhgroup.com
- Steve Bickmore, mechanical engineer
- Don Ackerman, electrical engineer
- Gary Leffingwell, sustainable contract
- Mark Rudiger, lighting

Structural/civil engineers
MARTIN/MARTIN INC.,
Lakewood, www.martinmartin.com
- Charles Keyes, structural principal in charge
- Ralph Rempel, structural engineer/ blast design
- Bill O'Neal, structural engineer
- Duane Jansen, civil principal in charge
- Bryant Walters, civil engineer

Sustainable design consultant
ARCHITECTURAL ENERGY CORP.,
Boulder, Colo., www.archenergy.com
- Michael J. Holtz, principal consultant
- Peter Jacobs, project manager
- Neall Digert, sustainable contact

Geotechnical
CTL THOMPSON INC.,
Centennial, Colo., www.ctlt.com
- Ronald M. McOmber, principal
- Nan-Ping Hsieh, geotechnical project manager
- Mick Schneider, environmental project manager

Curtainwall consultant
CURTAIN WALL DESIGN & CONSULTING INC.,
Dallas, www.cdc-usa.com
- Charles Clift, principal
- John Gustafson, managering principal

Mechanical/electrical engineering for computational fluid dynamic studies
OVE ARUP & PARTNERS,
New York, www.arup.com
- Mahadev Raman, principal
- Nigel Tonks, associate

General contractor
PCL CONSTRUCTION SERVICES INC.,
Denver, www.pcl.com

Commissioning agent
E CUBE INC., Boulder, www.ecube.com

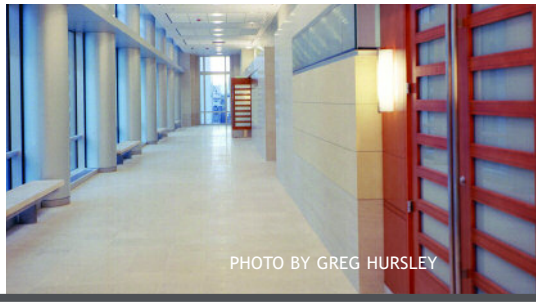


PHOTO BY GREG HURSLEY

THE ALFRED A. ARRAJ U.S. COURTHOUSE OPENED IN OCTOBER 2002. DESIGNED FOR A 100-YEAR LIFE WITH MINIMAL MAINTENANCE, THE FACILITY WILL SERVE THE CHANGING REQUIREMENTS OF FUTURE GENERATIONS.