

State of Missouri Department of Natural Resources Lewis & Clark State Office Building

Jefferson City, Missouri

Building Type:	Office low-rise
Recognition Status:	LEED for New Construction v2.0/2.1 Platinum
Date Completed:	March 2005
Gross Square Footage:	120,000 sq. ft. (11,000 sq. m.); 4 stories
Total Project Cost:	US\$18.5 million
Energy Cost Savings:	US\$85,000 – 92,000/yr (53-55% reduction) projected
Site Energy Use:	42 kBtu/sq. ft./yr (130 kWh/sq. m./yr) projected
Indoor Potable Water Use:	223,270 gallons/yr (845,170 liters/yr) projected
Outdoor Potable Water Use:	0 gallons/yr (0 liters/yr) projected
Occupancy:	400 employees
DOE Climate Zone:	Zone 3 (5300 HDD, 1200 CDD)



South façade / © BNIM Architects

PROJECT OVERVIEW

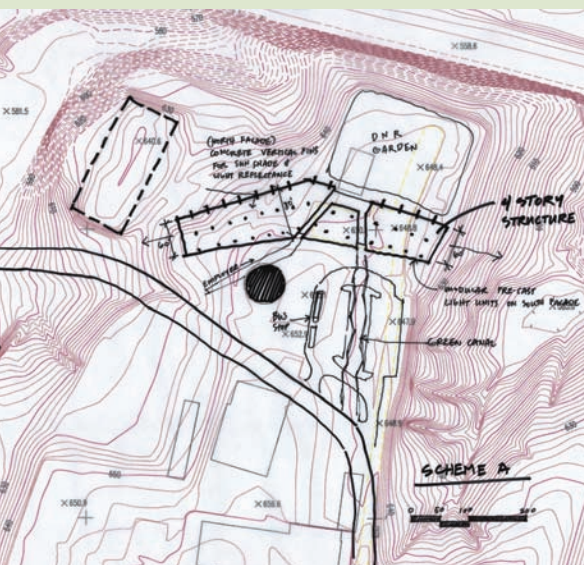
The Lewis and Clark State Office Building, located in Jefferson City, Missouri, houses more than 380 employees of the Missouri Department of Natural Resources. The project, spearheaded by department staff and supported as part of the City's urban redevelopment program, is intended to serve as a financial and educational model for future government projects in Missouri. Surpassing expectations, the project became the first Leadership in Energy and Environmental Design (LEED) Platinum-rated state government building in the United States.

THE BOTTOM LINE

The design team for the Lewis and Clark State Office Building was not only tasked with creating a building that reflected the mission and programmatic needs of the Department of Natural Resources, but it was also given an added challenge: to achieve the highest level of sustainability with no increase in cost over the legislature-approved building budget. The pioneering green design team surpassed expectations—it delivered the US\$18.5 million building on time and on budget, and also helped reduce building energy use by 53-55 percent. In addition, 1,009,050 gallons (3,819,670 liters) of water have been saved since the building opened in March 2005. The resulting LEED Platinum facility exemplifies the results of the integrated design process and provides a benchmark for future state office buildings by showcasing affordable, cost-effective design strategies that are respectful of occupant needs and protect the environment.

TRUE STEWARDSHIP

The mission of the Missouri Department of Natural Resources is to preserve, protect, restore, and enhance Missouri's natural and energy resources. Site selection for the new building reflects two department concerns: proper stewardship of the State's natural lands and the Governor's initiative to revitalize Missouri's urban centers. The building is located on the grounds of the previous Missouri State Penitentiary atop a bluff overlooking the Missouri River. A central, four-story atrium provides employees a vast view of the Missouri River valley, creating a link between the building and Missouri's natural resources.



Schematic site plan
© Rocky Mountain Institute

“It is rare when employees are actually able to see and feel the mission of its organization.”

— Dan Walker
Project Manager
Lewis & Clark State Office Building

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Interior fabric lightshelves / © Scott Myers

The site has been rehabilitated to enhance native ecosystems, effectively manage stormwater, and reduce reliance on the City's potable water supply. Native drought-tolerant plants reduce the need for irrigation water; bioswales and detention basins filter site stormwater. Additionally, a 50,000-gallon (189,000-liter) underground cistern collects and filters roof run-off using sand and UV filtering systems, providing 95 percent of the building's greywater needs. Waterless urinals and low-flow fixtures also reduce

the building's water use. As a result, the project is expected to require zero potable water for outdoor use and to reduce indoor water consumption by more than 30 percent as compared to the baseline building. These reduction efforts are fitting for a site that will house the Water Protection and Soil Conservation Division for the state of Missouri. Through the thoughtful reclamation of a highly-damaged site, the new landscape is beginning to resemble what Lewis and Clark would have discovered 200 years ago.

PASSIVE DESIGN IN PRACTICE

The building form of the Lewis and Clark State Office Building was critical to achieving the 53 to 55 percent reduction in energy. The south façade concrete structural system was designed to handle building loads as well as to control heat gain and glare through vertical fins, horizontal overhangs, and lightshelves. The exterior overhangs and lightshelves block heat and glare from the high summer sun, while permitting solar heat gain from low sun angles in the cold winter season. On the interior of the building, the high ceilings allow for reflective-fabric lightshelves to effectively distribute sunlight deep into the building.

Extensive energy and daylight modeling early on helped to optimize the building's orientation, aspect ratio, and envelope configurations. The building is oriented with its long axis running east-west to minimize glare and summer heat gain. A narrow floorplate maximizes daylighting and divides the building into two main office wings connected by a central four-story atrium. Life-cycle analyses helped prove that investing in higher performance glazing was more cost-



Detail of concrete overhangs and fins
© Rocky Mountain Institute

effective in the long term due to reduced mechanical costs. As a result of these early efforts, the perimeter reheat system was eliminated and that budget was instead reinvested in the building envelope.

Other load-reducing strategies include ceiling-mounted motion and light sensors that automatically turn lights out when space is not being used and adjust electric light levels according to daylight intensity; local controls for the underfloor air distribution system that allow employees to adjust air flow direction and fan speed for optimum thermal comfort at personal workstations; operable windows; and a chilled-water thermal storage tank which helps extend the free-cooling season. Lastly, a roof-mounted photovoltaic system supplies 2.51 percent of the building's total energy needs with renewable energy.

“This building, Lewis & Clark, has become the national benchmark proving that you don't need to pay a premium.”

— Bob Berkebile, FAIA, BNIM Architects

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A “SHOW-ME” SHOWCASE SHOWDOWN!

Materials for the new building were chosen to prioritize reuse and recycling. Outdoor pavement and street furniture incorporated reused bricks from local demolitions; concrete containing fly-ash was used for structural components. At least 50 percent of the total material used (by cost) was post-industrial and post-consumer recycled content. Recycled materials included concrete, ferrous and non-ferrous metals, copper wire, glass, aluminum, brick, cardboard, and plastic. Seventy-five percent of materials used (also by cost) were manufactured within a 500-mile (800-kilometer) radius, with preference given to products from Missouri manufacturers. Wood from the only federally certified sustainable forest in Missouri was harvested for the central atrium flooring. From demolition to operation, natural capital and local resources were showcased to the maximum extent possible.

Minimizing the construction waste stream and reducing embodied energy were also important goals for the project. Fifty percent of the total construction and demolition waste – almost 8,800-cubic-yards (6,700-cubic-meters) of material – was diverted from landfill disposal.

“We were able to save about 56 percent of total energy, making the project the lowest operating cost for any state office building in Missouri.”

— *Greg Franta, FAIA*
Rocky Mountain Institute



Interior atrium / © Rocky Mountain Institute

PROJECT TEAM

Owner:

State of Missouri

Tenant:

Missouri Department of Natural Resources

Architect:

BNIM Architects

Mechanical Engineer:

Smith and Boucher and FSC

Mechanical Consultant:

Rumsey Engineers

Lighting Design:

Clanton & Associates

Daylighting Design:

ENSAR, now part of Rocky Mountain Institute

Structural Engineer:

Structural Engineering Association

Civil Engineering:

SK Design Group, Inc.

Landscape Architect:

Conservation Design Forum

Code Consultant:

FP&C Consultants

Commissioning Agent:

Sys-tek

Contractor:

Professional Contractors and Engineers of Columbia, Missouri

SOURCES

Charles Bruzchalski,

*Senior Project Manager,
Facilities Management,
Design, and Construction*

*Greg Franta, FAIA,
Rocky Mountain Institute*

*Dan A. Walker, Project Manager,
Missouri Department of
Natural Resources*