

Cesar Chavez Library

Location: Laveen, AZ

Architect: Line and Space, LLC

OVERVIEW

The Cesar Chavez Library is integrated into a park made of mounded earth adjacent to a large constructed lake—a remnant from mid-20th century water attitudes. Unlike climates that will have rain every week, the desert is a unique circumstance that requires special consideration of water as well as energy conservation. The limitations imposed by the site, and these values, developed the innovations to be discussed in later measures.



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WISDOM & FEEDBACK LOOPS

JURY COMMENTS

Full project profile:

[www.aiaopten.org/hpb/
overview.cfm?ProjectID=1060](http://www.aiaopten.org/hpb/overview.cfm?ProjectID=1060)

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The library, shown at night in this photograph, borders an artificial lake and is built into the topography of the land.

Photo: Bill Timmerman

Cesar Chavez Library

Location: Laveen, AZ

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Sustainable Design Intent & Innovation

The desert environment presented several challenges that created opportunities for green building strategies.

- Extensive overhangs protect the building from solar heat gain and glare.
- Window walls provide daylighting and views to the outdoors.
- Roof-top rainwater collection provides water for irrigation, and low-flow fixtures indoors limit potable water use.
- To lessen cooling needs, the building was built into the site and bermed with excavated earth.



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Large overhangs protect the building from glare and solar heat gain, as shown in this photo.

Photo: Bill Timmerman

Cesar Chavez Library

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Regional/Community Design & Connectivity

If the park acts as the backyard for an urban community, the library serves as its living room. With spaces for all ages, including a children's area, a teen lounge to support the two nearby schools, and a 75-seat meeting space for the public, the library is able to accommodate many of the community's activities.

The library's location near public transportation and two schools makes it possible to reduce automobile use. A carpool program and bike racks both provide incentives for alternate transportation options.

The library uses 188 of the park's existing parking spaces, requiring only 52 new spaces to be provided. These added spaces are shared by the park and the library.



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JURY COMMENTS

Use other transport
options: 30%

Parking spaces per
person: 0.73

Bicycle racks, nearby public transportation, and a carpool program encourage patrons of the library, shown in this photo, to use alternate transportation.

Photo: Bill Timmerman

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Land Use & Site Ecology

The library was carefully built into the landscape, and construction was completed with little impact on the surrounding land. Much of the existing landscaping was preserved, and drought-tolerant plants native to the Sonoran Desert were added.



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JURY COMMENTS

The building is long and narrow to allow for maximum daylighting, and curves away from the lake, as shown in this drawing.

Rendering: Line and Space, LLC

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Bioclimatic Design

The earth berms provide thermal mass used to moderate the building's temperature, minimizing heating and cooling use, while providing privacy and noise barriers. Large overhangs extend the usability of outdoor spaces by providing shade, creating a zone of thermal and visual transition. Overhangs also shade window walls that provide natural light to the interior of the library. The building is also designed with seasonal sun angles in mind, so the overhangs protect the building from the sun at all of the appropriate times.



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Earth berms, shown in this photo, provide thermal mass that helps regulate temperatures inside the building. Collected rainwater is used for irrigation.

Photo: Bill Timmerman

Cesar Chavez Library

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Architect: Line and Space, LLC

Light & Air

Within the stack and reading areas, an open layout coupled with north and south window walls provide daylight to more than 75% of the space and views to the outdoors. Task lighting is provided in locations where higher lighting levels may be necessary.

The building is split into zones for heating and cooling, each with its own thermostat and controls. Ventilation is provided through the mechanical system even when the cooling is turned off, and supply air is filtered and monitored for carbon dioxide. The exhaust air from the building is used to temper an outdoor patio, making it usable for more of the year.



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JURY COMMENTS

Percent of building
area that is daylit: 75%

Percent of building that
can be ventilated or
cooled with operable
windows: 0%

Banks of windows, shown in this photo, provide daylighting for a reading room. Large overhangs prevent glare and unwanted solar heat gain.

Photo: Bill Timmerman

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Water Cycle

The responsible management of water, a scarce resource in the desert, is critical.

An integral gutter collects rainwater from the 37,000-ft² roof; the water is stored in the adjacent lake and used for irrigating the 40-acre park. This quantity of water is equal to the amount used for flushing toilets within the building for a year.

Water from patio and foundation drains is piped to trees surrounding the library, and condensate from rooftop mechanical units is used to irrigate the vegetated island of the new parking lot. A high-efficiency, automatic irrigation system distributes harvested water to drought-tolerant trees and shrubs. The irrigation controller allows for seasonal programming, lowering water use by over 50%.

Low-flow toilets, waterless urinals, and faucets with sensors reduce indoor water use by 30%, compared with a conventional building.



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JURY COMMENTS

Precipitation managed
on site: 100%

Total water used indoors:
1,233,379 gal/yr

Total water used
outdoors: 732,663 gal/yr

Percent of total water from
reclaimed sources: 37%

Percent wastewater
reused on-site: 0%

Calculated annual potable
water use: 77.9 gal/sf/yr

Rainwater is harvested off the roof through a large gutter, as shown in this photo. After it has been collected, this water is used for irrigation.

Photo: Bill Timmerman

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Energy Flows & Energy Future

Strategies for reducing electrical demand include:

Earth Berms: Continuous earth berms along the west and east add thermal mass to over half the Library's wall area, reducing solar gain and overall conductive loads through the building. This results in less mechanical heating and cooling that would normally need to be provided.

Windows and Overhangs: Proper placement of windows and use of protective overhangs reduces the amount of solar radiant load through glass and provides natural daylight to interior spaces. This reduces the amount of conventional lighting fixtures that would normally be used.

Economizers: Mechanical units are equipped with economizers that take advantage of the cool desert mornings and winters, to conserve electricity.

Water Heating: Heating only the water in the staff areas significantly decreases the amount of water heated.

Lighting: Natural daylighting is supplemented with controllable high efficiency point of use lighting where needed for specific tasks.



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ENERGY PERFORMANCE

Ratings

EPA: 79

HERS:

Percent total energy savings: 18

	Base Case	Design Case
Total energy (Btu/sf/yr)	53,039	43,623
Electricity (Btu/sf/yr)	53,039	43,623
Natural gas (Btu/sf/yr)		
Other: (Btu/sf/yr)		

Heating (Btu/sf/yr)	2,544	2,124
Cooling (Btu/sf/yr)	21,395	14,587

Cooling capacity (sf/ton)	304	490
Lighting load connected (W/sf)	1.5	1.47
Lighting load after controls (W/sf)		1.3
Plug load (W/sf)		.75

Peak electricity demand (W/sf)	138.7	115.3
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Percent on-site renewable energy: 0

Percent grid-supplied renewable energy: 0

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Materials & Construction

Materials such as concrete masonry, steel, and aluminum were selected for their clean appearance, durability, low maintenance needs, recyclability, and local availability.

The library has implemented an ongoing recycling program for staff and patrons.



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JURY COMMENTS

Many of the materials used in the building, including the concrete shown in this photo, contained recycled content.

Photo: Les Wallach

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Long Life, Loose Fit

The open-plan design coupled with the use of durable, low-maintenance materials allows for long-term flexibility and adaptability, which could increase the service life of the project. The minimal use of interior partitions in public areas will simplify modifications to shelving and furnishing layouts as the library grows and changes to accommodate future needs.



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Open-plan rooms, like the one shown in this photo of the book stacks, allow for flexibility in the future.

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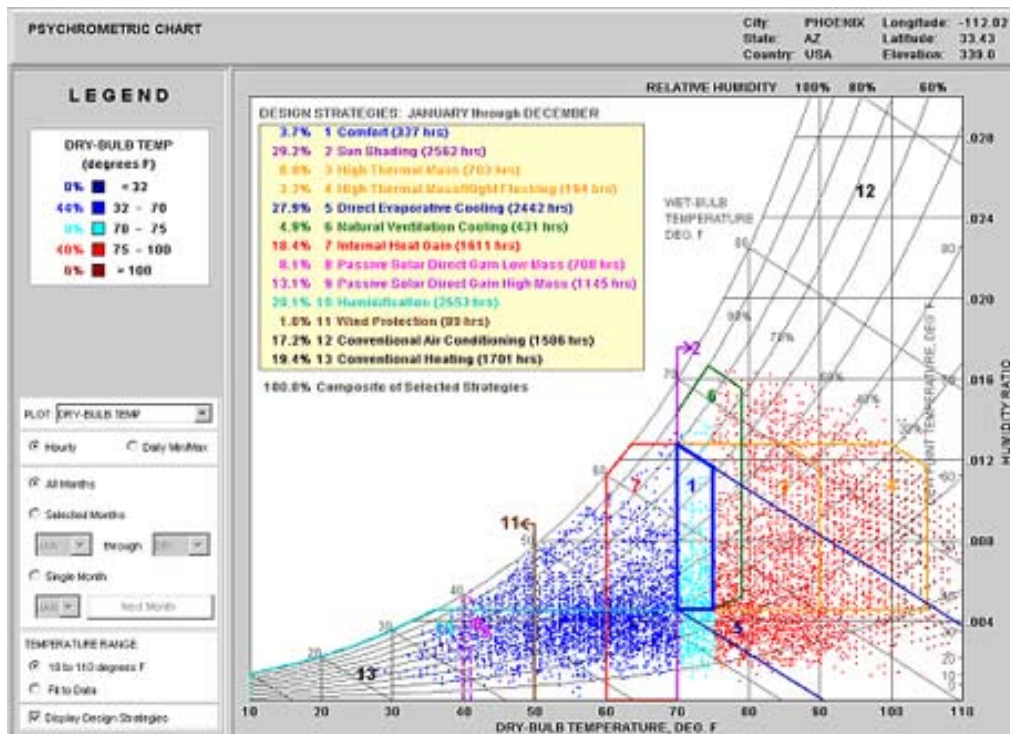
WISDOM & FEEDBACK LOOPS

JURY COMMENTS

Collective Wisdom & Feedback Loops

The library is the result of successful collaboration between the client, the City of Phoenix, and the project team. During design, meetings were held with the community, including at the adjacent Cesar Chavez High School, to foster a sense of pride and ownership of the library.

Early computer models allowed the project team to study the placement and integration of windows, overhangs, and walls with the solar angles on the site. The City of Phoenix engaged a commissioning agent to review the design of the library and verify that systems were working as designed after construction. An energy-management system allows for local and remote monitoring by City staff. The library has been very successful for the City of Phoenix and is the third busiest library within the City's system.



This psychrometric chart shows the thermal comfort zones for the building.

Rendering: Line and Space, LLC

Jury Comments

"This was a difficult context and it was a design/build project." – **Marvin Malecha**

"This abutted a park and existing waterway. Lawn and water in the desert can be inappropriate, but this was existing—the architects have contributed to the maintenance of park environment." – **Glenn Murcutt**

"Socially, the use was a strength there. They really addressed community issues through the architecture." – **Rebecca Henn**

"We saw leadership on the part of the city here, given the selection of this site for this building—it's in a place where it can help solve a problem. There's a 37,000 square foot roofscape that is a part of irrigating a 40-acre park. We felt this showed strong vision to solve multiple problems at once. This is an oasis—a living room for a densely developed area." – **Susan Rodriguez**

Primary Design Team Members

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