CASE STUDY:

# ASU Polytechnic Academic Complex

Mesa, Arizona

## Made in the Shade: Formerly an air force base, Arizona State University's new classroom and lab complex proves that even for buildings, it's cool to wear shades.

*By Scott Blair*

The harbingers of a desert dust storm–the brittle smell of creosote, the telltale orange glow in the sky–usually send people scrambling for cover. Not at Arizona State University's (ASU) Polytechnic Academic campus. Here, the structures shield students and faculty from monsoon storms by virtue of their strategic placement. It's just one example of how the Tempe, Arizona, office of RSP Architects and Lake | Flato of San Antonio designed a complex of five new sustainable buildings at ASU's satellite campus to achieve synergy within its desert environment.

Photo © Bill Timmerman

ASU Polytechnic Academic Complex. Mesa, Arizona

Slide show

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Located in Mesa, about 30 miles southeast of downtown Phoenix, the site of the 245,000-square-foot project didn't start out that way. The Polytechnic campus was formed in 1996 with 1,000 students and faculty occupying a smattering of repurposed, decades-old buildings that had been abandoned when Williams Air Force Base closed in 1993. By 2006, the school had grown to over 6,500 students and expected to reach 10,000 students with 40 degree-granting programs before the end of the decade. The campus required expansion, but also needed to establish its own identity.

In July of that year, the design team began working with the Phoenix office of DPR Construction on programming and planning the $75.3 million classroom and laboratory complex to house the schools of technology and innovation, agribusiness, and teacher education and leadership. The team also took on a master plan to tie the new structures to the existing campus.

"We tried to bring back a sense of place and a quality of delight in working and living in the desert," says Ted Flato, FAIA, principal in charge with Lake | Flato.

Since 2005, all new state-funded buildings in Arizona are required to achieve LEED-Silver certification. "That was the driving force for a lot of the design decisions," says Lew Laws, project manager with DPR. The project recently received gold certification, with 42 points attained.

Working with the campus's newly adopted desert arboretum theme, the team designed a collection of structures that interact with the surrounding landscape and emphasize the region's indoor-outdoor way of life. "Right off the bat we settled on harder, more durable, desert-tough materials," says Beau Dromiack, AIA, senior associate with RSP. Eschewing materials such as stucco or EIFS that could under-perform in a harsh environment, the designers instead chose an exterior skin of locally

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## KEY PARAMETERS

LOCATION: Mesa, AZ (Sonoran Desert)

GROSS AREA: 245,000 ft$^2$ (22,760 m$^2$)

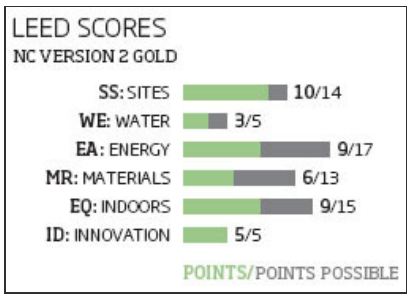
COST: $75.7 million ($78.5 million including landscape)

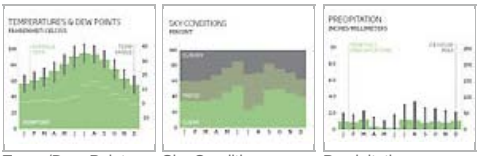
COMPLETED: August 2008

ANNUAL PURCHASED ENERGY USE (BASED ON SIMULATION): 43.4 kBtu/ft$^2$ (492.5 MJ/m$^2$), 29% reduction from base case

ANNUAL CARBON FOOTPRINT (PREDICTED): 24.2 lbs. $CO_2$/ft$^2$ (118.3 kg $CO_2$/m$^2$)

PROGRAM: Classrooms, labs



Temp./Dew Points | Sky Conditions | Precipitation

## TEAM

OWNER: Arizona State University
ARCHITECT: Lake | Flato Architects; RSP Architects (architect of record)
LANDSCAPE: Ten Eyck Landscape Architects
ACOUSTICAL: McKay, Conant, Brook; Jeremiah Associates (audio, visual, data consultant)
ENGINEERS: Energy Systems Design (MEP); Wood/Patel (civil); Paragon Structural Design (structural); Speedie & Associates (geotechnical)
ENERGY CONSULTANT: Green Ideas (LEED consultant)
COMMISSIONING AGENT: Engineering Economics
GENERAL CONTRACTOR: DPR Construction

## SOURCES

PAINT: Frazee Paint; Sherwin-Williams
CARPET: Shaw Industries
RESTROOM PARTITION: Bobrick Washroom Equipment
WOOD DOORS: VT Industries
EXTERIOR STEEL DOORS AND FRAMES: Ingersoll Rand
GLASS: Viracon

sourced, ground-face concrete block, glass and weathered, corrugated steel.

The steel-framed buildings sit on a total of 217 caissons, each 4-feet-wide and 16-feet-deep. Laws says the design was guided early on by the involvement of Phoenix-based steel subcontractor Schuff Steel, who encouraged the team to utilize steel that was readily available in the correct shapes and sizes. This enabled them to complete erection of 1,900 tons of structural steel in just two months.

Splitting the buildings up instead of having one monolithic structure was in part a practical decision to work around existing site utilities and infrastructure, but it had other benefits. “By having smaller, more articulated buildings, you get the feeling of a larger campus core,” Dromiack says.

The buildings are grouped into three pods along an east-west axis. Each pod includes an L-shaped building with an open-air atrium down the center of its long axis. The three-story structures contain class-rooms, offices, and wet/dry laboratories.

Each grouping also contains an auxiliary building. A two-story, 12,000- square-foot lecture hall and office building contributes to the west pod, while a two-story performing-arts studio and black-box theater occupy the easternmost. The center pod’s single-story auxiliary building repurposes the air-force base’s former movie theater. Under a separate construction con-tract, DPR and RSP are scheduled to complete its conversion into a 450-seat classroom/auditorium this month, Laws says.

Each pod has its own three-story iconic tower representing the front door of the building, which faces a landscaped pedestrian mall on the north side. Each tower is distinguished by a different exterior skin, which helps increase way finding. “You get this really beautiful rhythm of buildings soldiering along the main student pedestrian way,” Dromiack says. To alleviate the heat-island effect common in Phoenix, the pedestrian mall is surfaced with stabilized, decomposed granite rather than concrete.

Flato says that the interaction between buildings and outdoor spaces was inspired by the narrow streets and bazaars of Marrakesh, which are commonly flanked by tall buildings that keep pedestrians in shade. In the same way, a variety of courtyards and arcades linked by a network of portals are shaded by the structures, along with painted-metal panels, perforated weathered metal screens, locally sourced wire-mesh planting trellises, and Galvalume panels.

During an early design charrette with the user group, the team calculated how to reduce the square footage of the air-conditioned areas without losing program requirements. Flato says rightsizing is one of the most important things an architect can do to make a building more sustainable. “We were able to build less air-conditioned space and use less energy because the project accommodates the program more efficiently,” he adds. Hallways to labs and classrooms are outside and exposed to extreme desert heat, making air circulation key. Massive fans and portals halfway up the three-story atriums create vortexes of air movement, while catwalks taking the place of second- and third-floor hall-ways allow for additional airflow. Exterior hallways allow many classrooms to have windows on both sides to maximize balanced daylighting. Metal screens prevent harsh sunlight from penetrating even the most west-facing windows.

The buildings are served by 11 variable-air volume air handlers with chilled water supplied by two 600-ton high efficiency centrifugal chillers. Energy analysis determined

SOLAR INTERIOR SHADES: Nysan Solar Control GreenScreen

that the project would achieve 32.1 percent improvement over a minimally compliant ASHRAE 90.1-2004 building, giving the team seven LEED points.

Another point was picked up through the use of enhanced commissioning by San Antonio-based Engineering Economics. “They started with us about the same time the structural steel was being built up—long before any systems were going in,” Laws says. “Throughout the project they were a huge help for us and our mechanical contractor, especially over the last few months with the final test and balance, and start-up commissioning. It paid for itself many times over.”

An abundance of poorly drained areas of asphalt that exacerbated flooding during heavy rains plagued the original site. The scope of the project was expanded to include an enlarged master plan including drainage on the adjacent sites as well as this one by creating an open, desert-landscaped mall. “That turned into the desert wash that you see there today,” Dromiack says. “By excavating and turning that into a drainage system, it allowed us to provide stormwater management and a nice amenity for the center of the campus.”

Crews crushed and recycled 3,500 tons of existing asphalt onsite as underlayment. This saved up to 400 dump truck trips, which it would have taken to bring that much fill out to the site, Laws said. Concrete from old sidewalks was also recycled as masonry for seat walls and retaining walls around an outdoor amphitheater. During construction, approximately 91 percent of construction waste was recycled, contributing to the LEED credits.

Existing plant growth was refurbished and enhanced with 30 mature, drought-resistant ironwood, palo verde, and mesquite trees that were donated to the campus. A LEED innovation credit was achieved by having 68 percent vegetated open space compared to the building’s footprint. In fact, the design team was still working on the landscaping more than a year after the initial project was completed, extending the pedestrian mall throughout the rest of the campus.

*Scott Blair, a resident of Phoenix, is the senior regional editor for Southwest Contractor magazine, and is the Southwest bureau chief for Engineering News-Record.*