Arizona State University Student Health Services

Project Overview

Arizona State University Student Health Services - Photo Credit: Bill Timmerman

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The 34,000-square-foot Arizona State University Health Services Building (ASU HSB) is an adaptive reuse project that transformed the existing sterile and inefficient health clinic into a clearly organized, efficient, and welcoming facility. The design imbues the new facility with a sense of health and wellness that leverages Tempe's natural environment and contributes to a more cohesive pedestrian-oriented campus. The renovated facility, the new wing, and the entrance pavilion energize the surrounding campus by engaging the historic Palm Walk—the campus's main pedestrian spine.

The project entailed the demolition of approximately 15,000 square feet of inefficient single-story facility, the renovation of 14,000 square feet of existing two-story structure containing administrative support, labs, wellness programs, and the addition of a new 20,000-square-foot two-story wing containing campus health clinics. In terms of both energy and campus engagement, the design transformed the existing under performing health facility into an engaging and vibrant facility that is one of the best energy performers on campus as evidenced by ASU's Campus Metabolism, an interactive web tool tracking real-time resource use. The LEED-Platinum building's energy performance is 49% below ASHRAE 90.1-2007, exceeding the current target of the 2030 Challenge.

Location:
451 East University Drive
Tempe Arizona 85287
United States
Project Owner:
Arizona State University
Submitting Architect:
Lake|Flato Architects
Joint Venture or Associate Architect:
orcutt | winslow
Project Completion Date:

May, 2012
Project Site:
Previously Developed Land
Project Type:
Education – College/University (campus-level)
Health Care – Clinic
Health Care – Outpatient – General
Project Site Context/Setting:
Urban
Other Building Description:
Both new and renovation
New:
58.0%
Renovation:
42.0%
Building or Project Gross Floor Area:
34,318 square feet
BOMA Floor area method used?:
Yes
Hours of Operation:
Monday - Friday 8 a.m.-6 p.m., Saturday 10:00 a.m.-2:00 p.m.
Total project cost at time of completion, land excluded:
$7,600,000.00

Design & Innovation

Adaptive reuse of the existing Health Services Building - Photo Credit: Bill Timmerman

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During the initial sustainability charrette the design team, owner, user groups, student representatives, and consultants established the goal of meeting the 2012 target for the 2030 Challenge. Through an integrated process, a series of incremental efforts including the elimination of thermal bridging, increased thermal barriers, high-efficiency mechanical systems, strategically located and high-performance glazing, and effective daylighting contribute to the building's 49% energy reduction below ASHRAE 90.1-2007, exceeding the current target of the 2030 Challenge.

The design also takes a "big picture" approach to sustainable design through its approach to campus and biophilic design. First, the design team reconsidered the planning concept approved by the university and recommended an alternative concept that reduced program by

12% and project footprint by 20%, preserving 5,000 square feet of green space for wellness programming. Second, from material selection, access to daylight, and the use of programmed landscape space, the design reinforces the relationship between occupants and the natural environment. The project's biophilic design significantly contributes to the owner's primary goal of deinstitutionalizing the facility and fostering a sense of health and wellness within a welcoming environment that would change the students' perception of a "health clinic" and encourage the adoption of "healthy lifestyles."

Regional/Community Design

Regional + Community Design - Photo Credit: Lake|Flato Architects

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The project engages and activates the historic Palm Walk, the campus's pedestrian main street, resulting in a more vibrant and cohesive campus fabric. Whereas the disjointed existing building provided little order for the Palm Walk, the transformed facility's main entry pavilion directly engages the pedestrian core, welcoming students under shady porches and a vine-planted trellis.

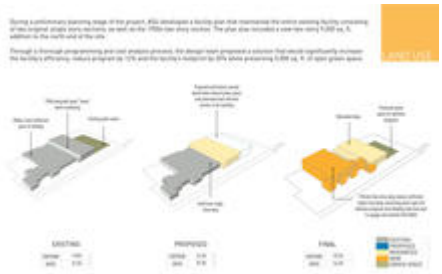
The new entry pavilion is located at the intersection of a pedestrian bridge, the Palm Walk, residential core, and the campus's main city street with several bus stops and light rail nearby. As a result, the site has become a campus portal where pedestrians transition from bus, car, light rail, and bicycle at the pedestrian core. The site is reinforced with secure bike and skateboard racks, serving over 17% of the facility's occupants.

The design replaces 10,000 square feet of turf grass with native landscaping that strengthens the Palm Walk and provides small landscaped courts serving as reflective spaces and outdoor waiting areas. The landscaping creates a sense of privacy for both the interior and exterior clinic waiting areas. The design team was able to convince ASU to rethink their initial proposed concept in order to preserve 5,000 square feet of open green space for wellness programs.

Metrics

Estimated percent of occupants using public transit, cycling or walking:
80%

Land Use & Site Ecology



Land Use Diagram - Photo Credit: Lake|Flato Architects

Land Use + Site Ecology - Photo Credit: Bill Timmerman

Site Ecology Strategies Diagram - Photo Credit: Lake|Flato Architects

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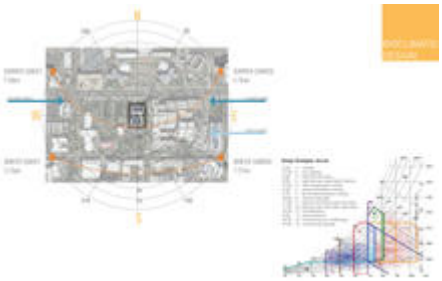
The built facility represents a significant departure from the university's original approach to the building's phasing and expansion. At the project's inception, the university proposed maintaining the entire existing facility and adding a new two-story, 9,000-square-foot addition to the north end of the site on existing open green space. Through a thorough programming and cost analysis process, the design team recommended renovating the 1950s 14,500-square-foot two-story wing, deconstructing the oldest and least efficient single-story part of the facility, and constructing a new 20,000-square-foot two-story addition in its place. The solution significantly increased the facility's efficiency, reduced program by 12% and the facility's footprint by 20% while preserving 5,000 square feet of open green space. Additionally, the revised concept enabled the renovated facility's main entrance to be located on the historic Palm Walk, the campus's main pedestrian spine, resulting in a more accessible facility and vibrant pedestrian campus. The revised concept also facilitated the removal of approximately 10,000 square feet of turf grass, replaced by native landscaping irrigated by rainwater harvested from the facility's roofs and stored in sub-grade cisterns.

Bioclimatic Design



The climate and its psychrometric chart were carefully studied to develop passive design solutions - Photo Credit: Lake|Flato Architects and Climate Consultant

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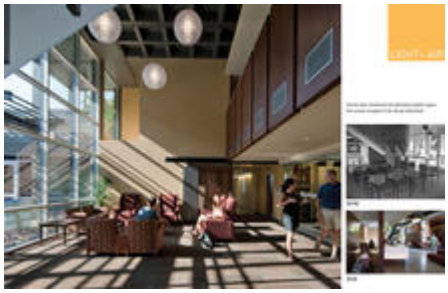
The team performed thorough site and climate analyses in order to provide appropriate passive solutions to drive down the building's thermal loads. In response, clinics and offices are located along the south and west, allowing the design to minimize glazing along these challenging orientations. The use of vertical sunshades on the south and west provides privacy within the examination rooms while minimizing thermal loads.

The facility's new entrance, main public identity, and interior public spaces are located on the east side of the building, leveraging the campus's main pedestrian spine. The design minimizes glazing facing due east, strategically locating glazing on the south or tight to the north side of the waiting room bays. The strategy takes advantage of self-shading by the adjacent bays and relies on broad roof overhangs to protect south facing glass. The strategic glazing provides generous daylighting and direct access to exterior waiting gardens. The east-facing exterior walls include rigid insulation and green screens for additional layers of thermal protection.

The project offers several outdoor spaces that are thoughtfully shaded and sheltered from Tempe's intense sun. These spaces are well-utilized and loved by building users, effectively leveraging Tempe's often beautiful but sometimes harsh climate.

Light & Air



Interior were transformed into welcoming, biophilic spaces that connect occupants to the natural environment. - Photo Credit: Bill Timmerman

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The design imbues the new facility with a sense of health and wellness that leverages Tempe's natural environment by creating meaningful and useful connections to the outdoors. Working off the existing lobby, the interior public circulation is located along the east side, parallel to the Palm Walk. A series of two-story bays punctuate the linear circulation, providing intimate and private waiting areas for patients. These lower-scaled bays frame and provide easy access to a series of native landscaped courts that serve as exterior waiting areas. Similarly, a tall steel trellis which will be covered with vines in the next couple years on the north side of the entry pavilion also serves as an exterior waiting area while controlling direct sun penetration from the east orientation. Strategic glazing location and self-shading along the east elevation provide generous daylight within the entire public circulation zone and waiting areas.

The building is mechanically ventilated and conditioned with multiple-zone recirculating systems, and outdoor air intake ventilation rates that exceed ASHRAE 62.1-2007 requirements by 30%. The project minimizes exposure to environmental tobacco smoke by prohibiting smoking within the building and within 25 feet of all entries, outdoor air intakes, and operable windows.

Metrics

Daylighting at levels that allow lights to be off during daylight hours:
40%
Views to the Outdoors:
40%
Within 15 feet of an operable window:
0%

Water Cycle

Rain chains with cisterns collect 138 cubic feet of stormwater and supply irrigation for adjacent native landscaping. All of stormwater is managed on campus between the site adjacent to Health Services and the alumni lawn. - Photo Credit: Bill Timmerman

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ASU’s campus is Arizona’s largest public arboretum, dedicated in 1990 and committed to proper water management and conservation while educating visitors about the complex ecological systems on earth. The Health Services Building bolsters the campus’s water conservation goals by minimizing indoor and outdoor water consumption through technology and refined practices.

Indoor potable water usage has been reduced by 29% from the calculated baseline through the use of 0.5-gpm fixtures. Additionally, landscape and irrigation strategies including appropriate species selection reduce potable irrigation water consumption by 76%.

Finally, the project supports ASU’s campus-wide goal of managing all stormwater on campus. The existing alumni lawn was leveraged to aid in stormwater management instead of adding new infrastructure to the project. All stormwater is managed on site or on the alumni lawn adjacent to the Health Services Building. Rain chains attached to subsurface cisterns account for 138 cubic feet of rainwater harvested from the lower roofs, which is used to irrigate the project’s native landscaping. The cisterns utilize pieces of recycled concrete slab from the existing building.

Metrics

Percent reduction of regulated potable water:
29%
Is potable water used for irrigation:
Yes
Percent of rainwater from maximum anticipated 24 hour, 2-year storm event that can be managed onsite:
100%

Energy Flows & Energy Future

The project team employed passive strategies to minimize energy loads before active strategies were considered. Massing and orientation were carefully considered as described in the bioclimatic design narrative. Throughout the new wing, 1.5 inches of exterior rigid insulation were added to R-19 cavity walls to provide a continuous thermal break, protecting the building envelope from the extreme Arizona sun. The renovation of the existing wing included the replacement of single-glazed windows with new thermally broken, low-e, insulated glazing.

The project’s lighting design uses occupancy sensors and T-8 fixtures, yielding an overall building lighting power density 21% more efficient than required by ASHRAE 90.1-2007.

The campus’s district natural gas cogeneration system provides heating and cooling to the project through a variable air volume system. These strategies and systems result in a predicted energy use intensity that outperforms the current 2030 Challenge target before renewable systems were considered.

This project contributes to ASU’s campus-wide solarization program and offsets 39% of its

total energy costs through an on-site 69-kilowatt photovoltaic array. Renewable energy certificates offset 35% of the building’s remaining electricity consumption.

To ensure all equipment was installed as designed and to educate facilities personnel, a commissioning agent performed enhanced services from early design through post-occupancy.

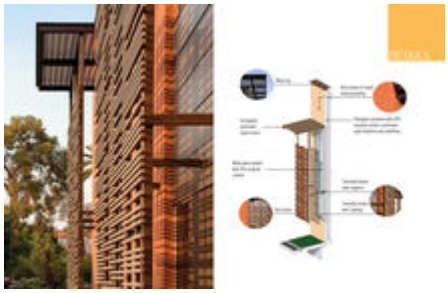
Metrics

Total pEUI:
36 kBtu/sf/yr
Net pEUI:
25 kBtu/sf/yr
Percent Reduction from National Median EUI for Building Type (predicted):
73%
Home Energy Rating (HERS) Index:
0
Lighting Power Density:
0.88 watts/sf
Upload Energy Data Attachment:
Energy Modeling Report - Edited.pdf

Materials & Construction

Materials & Construction diagram - Photo Credit: Lake|Flato Architects and orcutt|wilson

Interior materials were selected to reinforce the building’s sense of wellness and health - Photo Credit: Bill Timmerman



Building envelope detail showing passive systems selection - Photo Credit: Bill Timmerman

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The first priority was to do more with less. Recycling the original Health Services Building allowed the team to reuse 76% of the existing structure. The team also eliminated extraneous finishes, exposing systems that celebrate the building while minimizing maintenance.

On the exterior, the design uses regional materials appropriate for the harsh Tempe environment and native to the campus: Brick, natural metal panel, exposed weathered steel, and stained concrete. Overhangs and screens of recycled composite wood are incorporated to protect glazing and preserve the building envelope. The screens act as armatures for vines and create a “living” building, becoming lusher over time while mitigating the thermal loads.

Materials were also selected to reinforce the building’s sense of wellness and health. The interior palette employs natural materials, such as stained FSC certified wood screens and ceilings panels, natural earthen plaster, oiled steel plate, and ground fly-ash concrete with local earth-toned aggregate. The material selection creates calming, biophilic spaces that deinstitutionalize the facility and draw students to its wellness programs.

The student group GreenLight Solutions is currently working with the design and construction team, collecting comprehensive data on each building product to calculate the project’s carbon footprint using the Athena Sustainable Materials Institute’s EcoCalculator.

Long Life, Loose Fit

The ASU Health Services Building is the beneficiary of “Long Life, Loose Fit” strategies by preserving portions of the existing building that were deemed to have “good bones.” The design process was initiated with an analysis of the existing building, its systems and program relative to efficiency. The outcome involved deconstructing the programmatically inefficient, single- story wing and its outdated mechanical systems and inflexible structural system. The 1950s cast-in-place concrete two-story structure provided “good bones” that could be recycled for the new facility.

For the new wing, a simple public linear circulation pattern extends the existing main lobby and clearly organizes the renovated facility. Planned for anticipated changes in healthcare trends, program zoning facilitates future growth. The circulation pattern and clinic layout can easily be extended or added onto allowing the building to grow and adapt.
Mechanical ductwork and systems are exposed in the building’s interior as much as possible

not only for pedagogy, but for ease of accessibility for maintenance and future modifications.

Collective Wisdom & Feedback Loops

ASU's interactive web tool Campus Metabolism displays real-time energy use of buildings on campus. The Student Health Services Building has consistently been a top performer compared to other projects on campus. - Photo Credit: cm.asu.edu

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ASU utilizes an interactive website called Campus Metabolism (cm.asu.edu) that enables the public to view the current resource use of numerous buildings on campus, including the Health Services Building. ASU is currently installing sensors on campus buildings and tracking energy, including chilled water, electricity, and hot water/steam. In the near future, Campus Metabolism plans to display water and waste, as well as other important resource information. The Health Services Building's energy performance can be viewed in real-time and compared to other projects on campus on this website. Per square foot, the Health Services Building is consistently one of the top performers on campus.

Historical data for performance can also be viewed on this website, which proved to be a valuable diagnostic tool for this project. The team noticed a spike in heating energy last July and was able to troubleshoot and find a steam leak in the building, an issue that may not have been identified without this tool.

Qualitative post-occupancy data has also been collected through an occupant survey. The survey gathered building user responses from staff and students on their satisfaction with temperature, ventilation, humidity, lighting levels, and other characteristics of the project.

Other Information

Cost and Payback Analysis:

A thorough study of the original health services building was conducted to leverage existing infrastructure while creating a long-life project with minimal operations and maintenance

needs. The study identified infrastructure systems in good condition that could be salvaged or upgraded and used in the new project to reduce expenditures. This evaluation used life-cycle valuation as well as initial-cost valuation, allowing for total cost of ownership assessments.

The contractor and subcontractors began their participation in the project in early design meetings and the sustainability charrette, which was critical to the successful implementation of ecological goals and minimized the need for value engineering. The contractor had a watchful eye on team members in the field to ensure design intentions were met, and as challenges arose, their team brought thoughtful solutions to the table that never compromised the integrity of the design nor sustainability.

The project's sustainability performance supports ASU's campus-wide carbon neutrality plan, which is employing a variety of funding mechanisms, such as energy performance contracts, power service agreements for solarization, public/private partnerships, and donor investments. The Health Services Building was able to leverage this innovative mix of funding mechanisms to contribute to ASU's progress toward campus-wide carbon neutrality.

Process and Results:

Funding for the Health Services Building renovation and expansion were garnered through a $40-per-semester fee promoted through the "It's About Time" campaign and voted upon by the student body to expand university-wide health services and education. The campaign led to the repurposing of Tempe's existing Health Services Building. In response, ASU students, physicians, and staff were continuously involved in the project from pre-design through post-occupancy evaluation. A diverse committee participated in the project's sustainability charrette and design meetings. The project design and evolution were also shared with the entire university community through an interactive website. During construction, a real-time video feed of the building's construction provided access to the project and continuous updates.

One challenge in this project was maintaining healthcare service in the existing building during the time of construction. This was addressed by phasing the project so there was never a time when students couldn't be served during the process.

The contractor and their subcontractors were engaged early in the design process to inform constructability and systems' integration. BIM coordination meetings started during design development between the design team, contractor, and subcontractors to continuously update the cost model while identifying conflicts during the documentation and minimizing field conflicts.

The contractor also assisted in the collection of additional data for the building carbon footprint project with ASU students.

A rigorous review process has been established to regularly assess the project's actual performance against design-phase assumptions. Enhanced commissioning, measurement and verification, and qualitative post-occupancy evaluation have been used to anticipate operational issues and optimize the building's performance. These processes identified several opportunities to improve thermal comfort and operability, such as solar control issues on the east side of the facility, obstructed VAV box controls and heater access panels, and incorrectly installed heater flow switches.

Rating System(s) Results:

Rating System:
LEED for New Construction and Major Renovations 2009
Rating Date:
2014
Score or Rating
Result:
Platinum

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Additional Images

ASU Student Health Services Building Site Plan - Photo Credit: Lake|Flato Architects

ASU Student Health Services Building Elevations - Photo Credit: Lake|Flato Architects

Context plan showing how the project connects to its place, region, and neighborhood - Photo Credit: Lake|Flato Architects

Floor plans - Photo Credit: Lake|Flato Architects

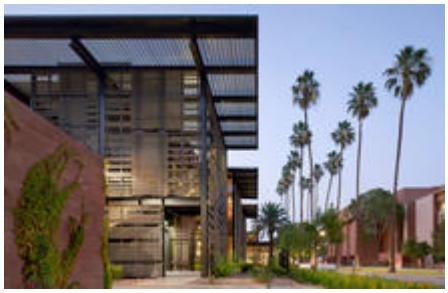

Photo Credit: Bill Timmerman

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Project Team and Contact Information

Primary Submission Contact:

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Project Team:

Role on Team	First Name	Last Name	Company	Location
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