Pima Community College - Downtown Campus

Center of Excellence for Applied Technology

Executive Summary

Pima Community College, established in 1969, has been committed to providing affordable, comprehensive educational opportunities that support student success and meet the diverse needs of its students and community. Fifty years later, the need for such opportunities remains vital, with students continuing to be the primary focus. Reflecting Pima CC's vision, the Downtown Campus has been transformed through the development of a Center for Excellence focused on Applied Technologies, addressing the evolving urban context of Tucson and the demands of 21st-century industries.

The Center of Excellence encompasses a collection of academic and technical pathways strategically aligned to pursue excellence in transportation and logistics, advanced manufacturing, and infrastructure. It serves as a catalyst, bringing together partners in education, industry, and the broader community. Central to the design of the Downtown Campus is the student experience, incorporating the diverse ages, profiles, and academic pathways of its learners. This design supports both working learners and learning workers in their pursuit of everything from scaffolded four-year degrees to just-in-time certifications.

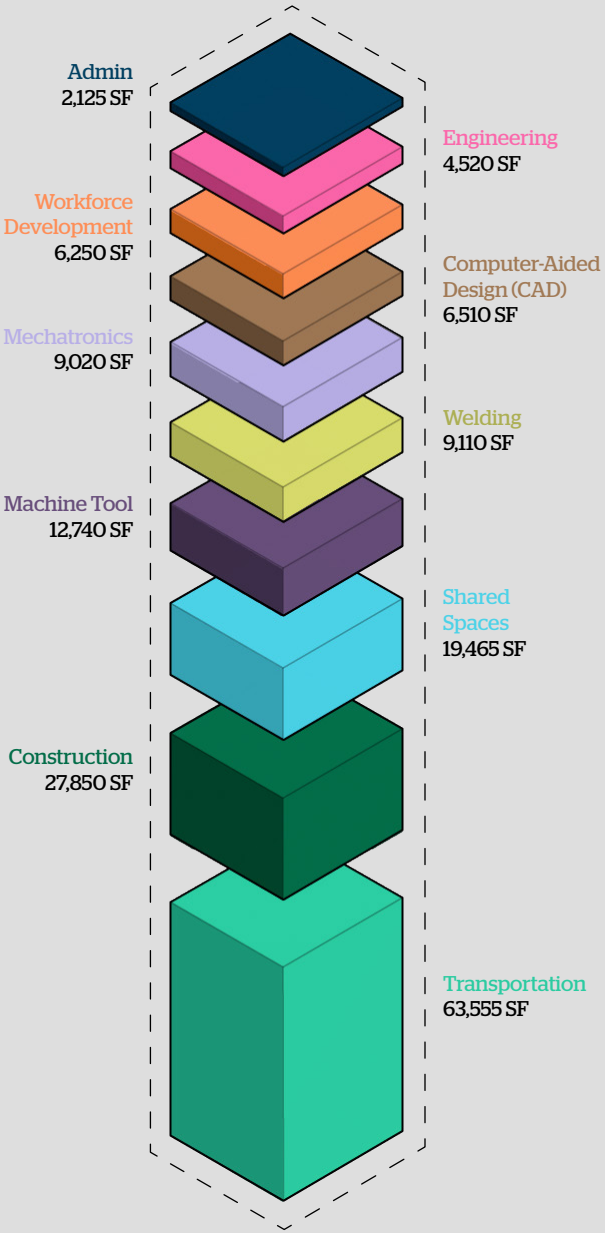
The narrative surrounding Career and Technical Education (CTE) is evolving. Just as industry innovates, so too does education and curriculum. There is a shift towards a more diverse and interdisciplinary curriculum, moving beyond traditional vertical CTE offerings. This approach provides students with exposure to multiple career pathways, simulating real-world collaborative work environments. By preparing students to work with a diverse group of people and in various jobs, CTE facilities mirror the realities of the working world and accommodate career changes that may occur throughout life.

The proposed program includes seven integral pathways to the Center for Excellence, along with support spaces. Each pathway stands alone, yet the design leverages the crossover of places and spaces to accommodate a dynamic workforce and industry. This innovative approach ensures that students are better prepared for the multifaceted and ever-changing working world they will encounter.

"We are looking at what innovation means in career and technical education. How do we prepare and plan for the world of work when we live in an ever-evolving society and industry is changing? I see us preparing students by exposing them to multiple career paths where they find their passion."

Dr. Chaney Mosley, Association for Career and Technical Education (ACTE) President

Total Program Area
Renovation 39,961 SF
New Construction 157,244 SF



Scope of Work and Budget

Phase 1
Transportation Center Building (TCB)
($11,700,000)

43,000 SF including Automotive Technology Lab & three Original Equipment Manufacturer Labs

Phase 2
Advanced Manufacturing Building (AMB)
($34,500,000)

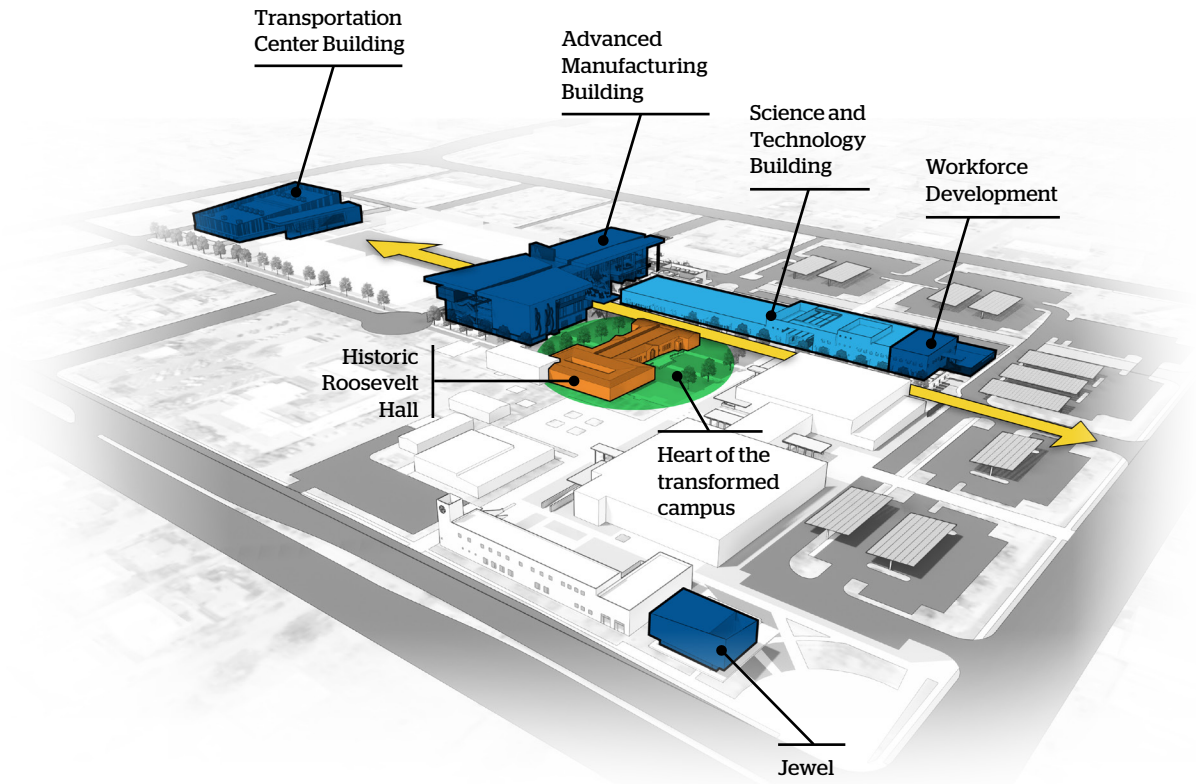
95,000 SF interior conditioned learning space &
35,000 SF outdoor semi-conditioned learning space

Machine Tools, Welding, Automated Industrial Technology, CAD Design, Workforce Development, Flexible Industry Training Lab, Administration, and Industry Event space

Phase 3
Science & Technology Building Renovation (STB)
($4,500,000)

65,000 SF renovation

Building Construction Trades & Workforce Development



A major organizing component was the development of the east-west axis located at the south side of the Science and Technology Building. This spine, or "Applied Learning Promenade", connects all CTE programs celebrating outdoor learning on display, shaded student-centric patios and porches, and defined building entrances.

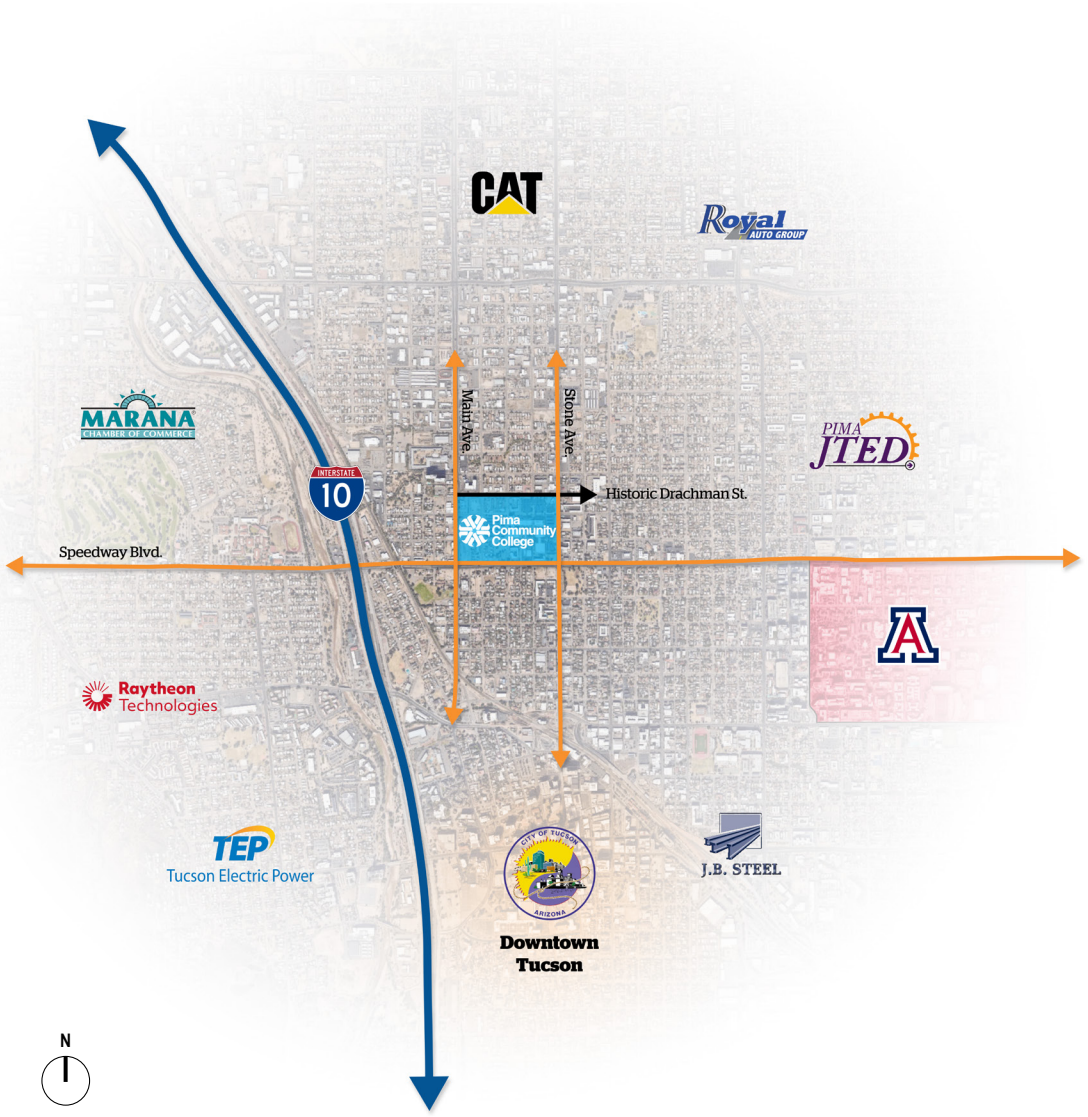
School & Community Research and Engagement

Context

The Educational Environment: Challenges & Opportunities of Industry Partners

The relationship between CTE centers, school districts, nearby universities, and industry partners in their communities is crucial. By involving these business partners in the initial design and approach to curriculum and instruction, we can create tailored programs that prepare students for the real-world experiences they will encounter in their careers or higher education. **This collaboration in curriculum development fosters a mutually beneficial relationship**: school districts and CTE centers gain access to more relevant programming, while industry partners can better prepare their future workforce. Additionally, this partnership leads to valuable **hands-on experiences** outside the classroom, serving as an effective recruiting tool for companies to discover future and existing talent while giving back to their community. The greatest challenge remains a cultural one—aligning students, parents, teachers, counselors, and the broader **community to transition from vocational certifications to CTE pathways**, ultimately supporting the economic development of robust talent pipelines.

Industry partners can enhance CTE programming by making it more **authentic and affordable**. They recognize that financial investments in these facilities strengthen the future talent pipeline. Additionally, they can provide valuable expertise in selecting equipment and machinery for educational spaces. It's essential to ensure that there are designated spaces for industry partners to operate from as well.



"We see CTE and what we do as a regional intersection. It's workforce, economic development, and it's far beyond the classroom and education. It pushes us to look outside our classrooms and look at our workforce and our economic partners and really let them drive what we're doing on our campuses and in our programs."

Jarrett Guy, West-MEC Learning Systems Administrator

School & Community Research and Engagement

Process

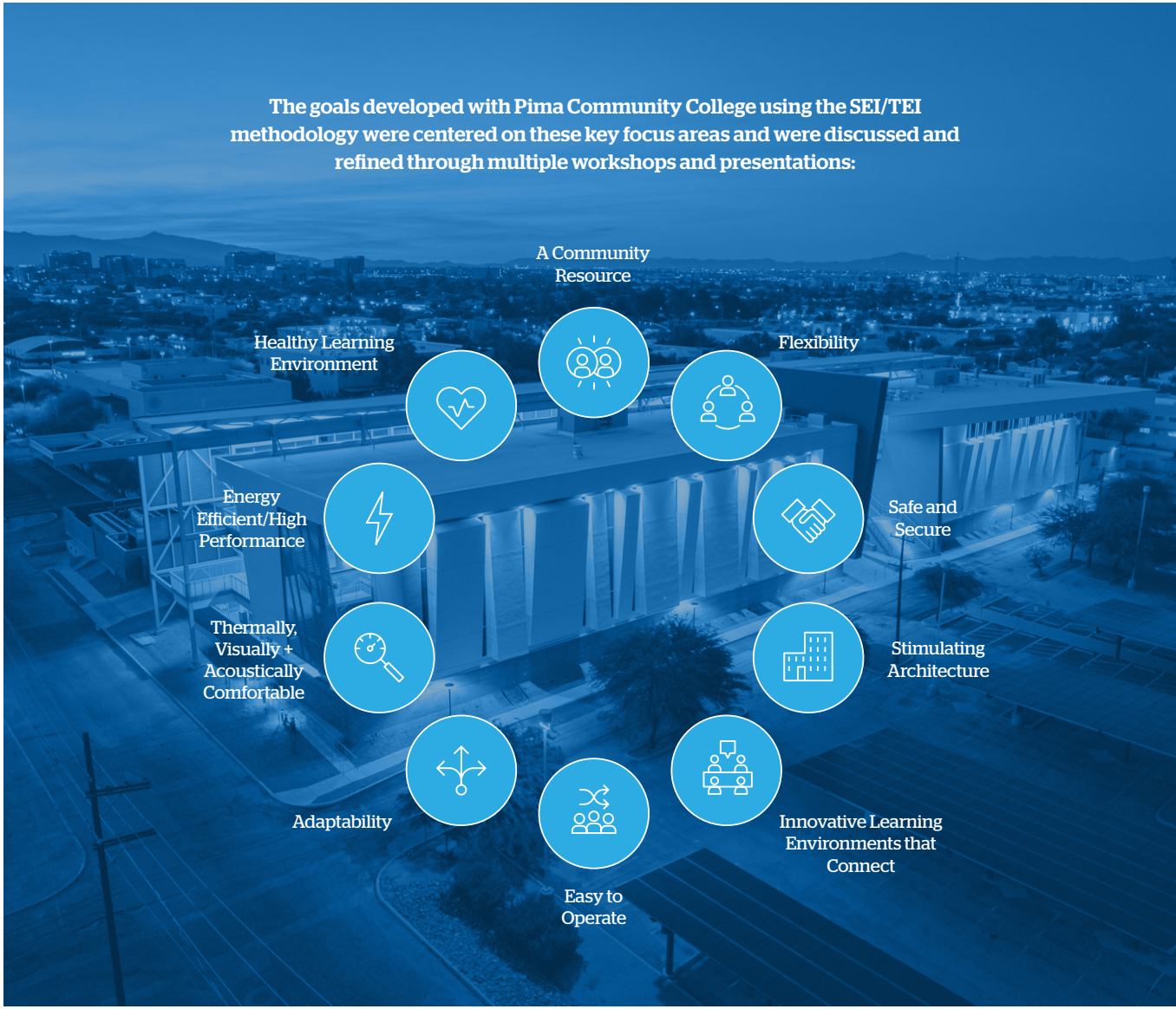
Our Research Driven Approach

We believe it is critically important to connect educational designs to real impacts for students. To achieve this, a third-party developed the **Student Engagement Index (SEI)**, an online survey tool used post-occupancy to understand how innovative design solutions affect students' lives. Additionally, the Teacher's Engagement Index (TEI) was created to gather educators' perspectives on the same research question. The primary research question for both SEI and TEI is:

Can we demonstrate a connection between the design of physical school environments and student academic engagement?

The SEI and TEI are concise, online surveys divided into two sections: one about overall school enrollment and one about a student's or teacher's microenvironments (i.e., the spaces they most frequently use). These questions help researchers understand how educators are utilizing building features designed for alternative teaching methods, which are linked to **increased student engagement**.

Initial findings indicate that the survey instruments are both reliable (they provide consistent results over time) and valid (they accurately measure student engagement related to the built environment). Responses showed a strong correlation with the respective engagement indexes, indicating convergent validity. Ultimately, survey responses revealed a significant **link between the design of the built environment and increased levels of student engagement**.



School & Community Research and Engagement

Exhibits

A demanding project schedule to deliver two new buildings and a renovation through a hard bid process led to an **under budget project**!

Project Kick-off
February 2019

Program Verification
March 2019 - June 2019

TCB Design
April 2019 - August 2019

TCB Construction
October 2019 - February 2021

TCB Completion
February 2021

TCB Bidding
September 2019

AMB Design
October 2019 - July 2020

AMB Bidding
August 2020

AMB Construction
September 2020 - August 2023

Transition to New Facility
September 2022-July 2023

AMB Move-in/ Operational
August 2023

2019 **2020** **2021** **2022** **2023**

Physical Environment

Context

The Super Block

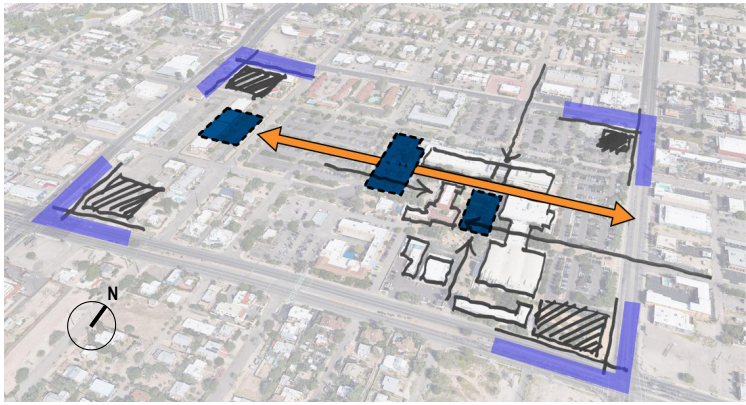
The Downtown Campus is expanding to cover most of the area bounded by Stone Avenue, Speedway Boulevard, Main Avenue, and Drachman Street. To **optimize this growth**, the placement and design of buildings need to be considered in relation to both the external and internal campus environments. Externally, the buildings should **enhance the appearance and location** within the downtown Tucson context. Internally, the design should ensure that buildings are **well-connected and create inviting "in-between spaces."** From this analysis, Guiding Principles were developed to offer a consistent framework, serving as a North Star for the expansion.

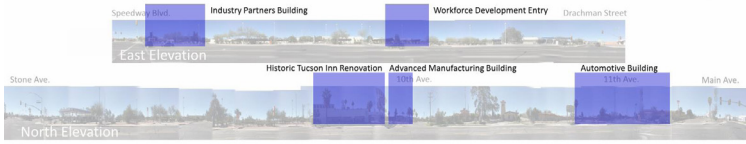
Project Focus

A major organizing component was the development of the east-west axis located at the south side of the Science and Technology Building. This spine, or "**Applied Learning Promenade**", connects all Applied Technologies programs **celebrating outdoor learning on display, shaded student-centric patios and porches, and defined building entrances**. Future development expands north and south of the axis as well as to the west as Pima acquires additional properties along Main Street.

What if...

As the campus continues to expand, it is important to be mindful of how it is perceived by the city. Key elements to consider include height, materials, and color. Additionally, given the **24/7 nature of student life, it's crucial to account for both daytime and nighttime experiences and safety**.





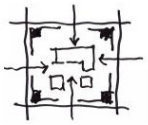
Physical Environment

Context

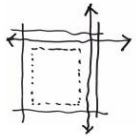
The heart of the Downtown Pima Community College Campus is the historic Roosevelt Hall, the administration building, which is surrounded by an eclectic mix of buildings constructed over the decades, primarily featuring stucco and metal shade structures. This campus is further enriched by the historic hotels along Drachman Street, showcasing a blend of 1950s mid-century modern and Spanish missionary style architecture.

Our project embraces the well-defined **"language of Architecture"** intrinsic to the existing campus. We have carefully developed a complementary vocabulary that honors this architectural heritage while celebrating the future through innovative use of form, color, connections, and materials. This approach ensures a cohesive yet dynamic evolution of the campus, seamlessly integrating the old with the new.

Edges + Entrances



Courtyards + Connections

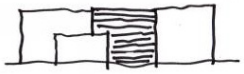


Campus Portals + Vertical Circulation

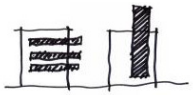
Patio + Pathways

Volumes + Forms

Solids + Voids



Horizontals + Verticals



Punched Openings + Curtainwalls

Light + Shadow

Plaster + Metals + Color

Physical Environment

Response

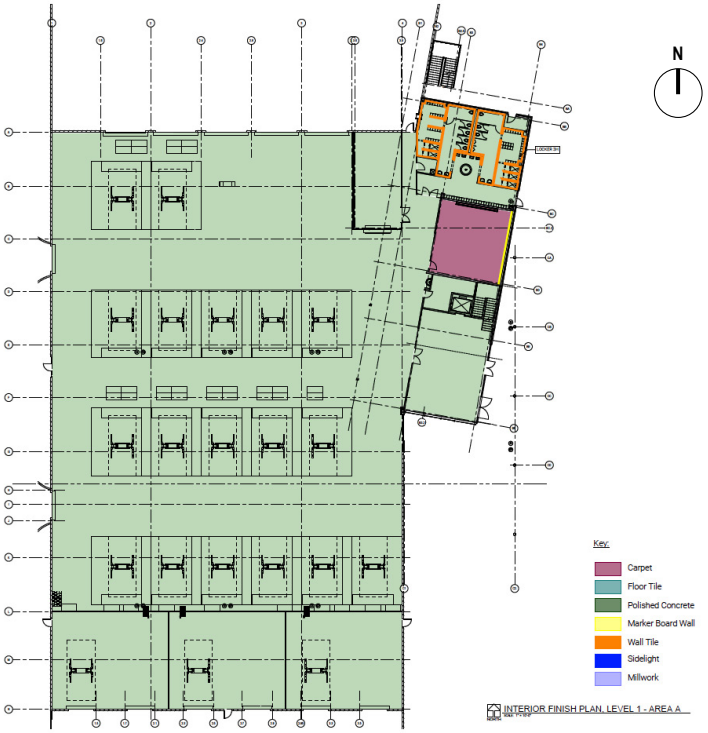
Looking at the Advanced Manufacturing Building through the main breezeway in historic Roosevelt Hall provides a perspective of how far the **campus has transformed itself to meet the needs of students, industry, and community**. The Advanced Manufacturing Building creates a new campus quad with a connection to the breezeway and entrance into the Machine Tool pathway. Despite the new architecture being much more modern, it was critical to **establish connections to the existing historic buildings**.

The Advanced Manufacturing Building creates an intersection between the east-west axis of campus and the gantry crane which integrates all the CTE manufacturing pathways. One of the primary goals was to **preserve views looking west to the Transportation Center Building** while also providing a grand welcoming stair that connects the existing campus to the Student Hub space on the second floor. The **Student Hub is meant to be the heart of the campus** bridging across the east-west axis taking advantage of the views and forming an exciting space for collaboration.

Physical Environment

Exhibits: Transportation Center Building

The Transportation Center Building responds to a larger Tucson context and **creates an iconic structure** that celebrates transportation programs. The Transportation Center Building houses interior spaces organized with a clarity of plan and lots of **transparency to provide visual access** throughout the building. The building structure's volume and orientation was developed to take advantage of **natural ventilation** while providing shade to the adjacent outdoor work bays.



Physical Environment

Exhibits: Advanced Manufacturing Building

The overall site plan reinforces the **interconnectedness of all the pathways** offered by the Center of Excellence for Applied Technologies. Landscaping, patios, and porches are strategically located to take advantage of shade from adjacent buildings and trellises, providing variety throughout the campus.

The building's central circulation space celebrates flexible learning by incorporating classrooms, labs, and outdoor areas that open up and connect to offer **extended spaces for project-based learning and informal interactions**. This intentional design aims to enrich the student experience.

The Advanced Manufacturing Building places larger volume spaces that require **easy access to outdoor learning and lab areas**, as well as weight restrictions, on the ground floor, including Welding and Machine Tools. The second floor focuses on Mechatronics and Contract Education pathways. The third floor houses the CAD pathway and administrative offices. Outdoor spaces feature a rooftop deck on the east side of the building, **enhancing a new courtyard between the historic campus center and providing stunning views** of Mt. Lemon, perfect for industry events and celebrations.

A gantry crane, spanning the length of the building from the third level, connects all spaces, allowing students to see and understand the **connections between various pathways**. This standalone element, capable of transporting materials throughout the facility, creates spaces that truly put "**learning on display**" and offers potential enhancements to the Logistics Program/Pathway.

Level 1
Idea Lab, Welding and Machine Tools

Level 2
Automated Industrial Technology (AIT), Flexible Industry Training Lab (FIT), and Student Hub

Level 3
Computer-Aided Design (CAD), Incubator, Faculty Offices, and Industry Event Space

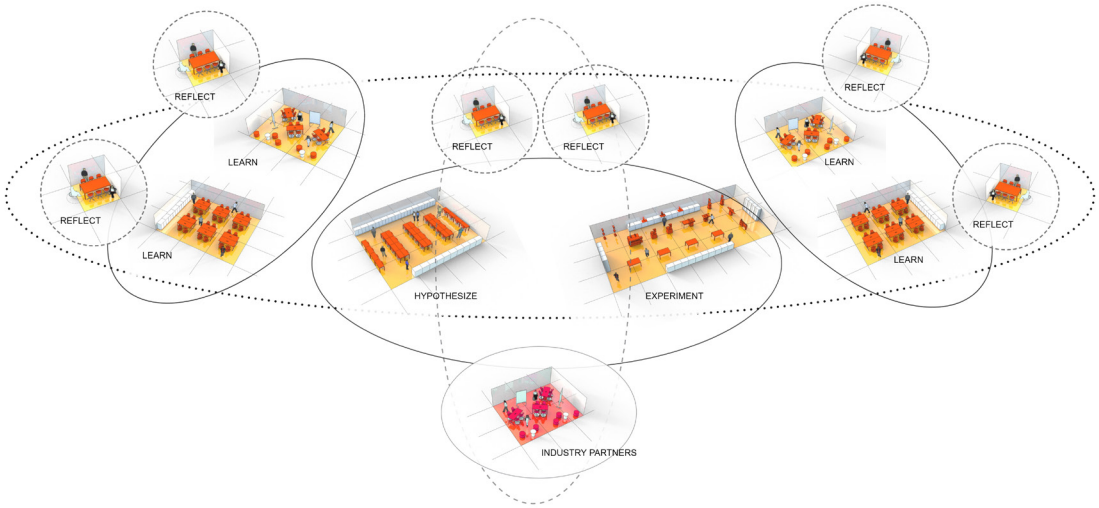
The building's front door is purposely aligned with the east-west campus axis to provide an iconic new entry. By reinforcing this axis, the connection of pathways between the Science and Technology Building and Advanced Manufacturing Building creates the **"Applied Learning Promenade"**. Continuing west, this axis connects directly with the entrance to the Transportation Center Building.

Educational Environment

Context

Pima Community College and its Center of Excellence for Applied Technology are firmly centered on students and the creation of vibrant learning environments to enrich their individual journeys. In developing the four new buildings, our focus was twofold: **to enhance the overall campus experience and to enrich the journey of each student** on their chosen pathway. Pima Community College defines student success as readiness for both college and career, where students possess the necessary knowledge, skills, academic foundation, and behaviors to excel in college-level courses or to enter the workforce with confidence and opportunity for advancement.

As a leading institution in our community, Pima Community College serves as a **driving force for personal growth, economic prosperity, and cultural enrichment throughout Southern Arizona**. Their vision is to facilitate life transformations through accessible education, while their mission is to empower learners of all kinds, every single day, toward their unique goals. To achieve this, Pima Community College is committed to **restructuring their educational offerings** around areas of interest, providing clear pathways—both for academic credit and noncredit pursuits—that lead to certifications, industry-recognized credentials, microcredentials, high school equivalency, and other significant milestones. One of Pima Community College's **key objectives is to bolster their completion rates**, aiming to reach 6,000 graduates by the academic year 2024-2025.



The goals developed with Pima Community College using the SEI/TEI methodology impacted not only the students and faculty on campus but also positively effected the larger Tucson community and economy:

Create an **INNOVATIVE** 'Machine of Learning' that functions as an iconic space for interdisciplinary collaboration and incubator for the economic development that also innovates curriculum.

Focus on **LEARNERS FIRST** by elevating the student experience allowing students to 'window-shop their future' amongst state-of-the-art industry leading spaces that provide real world experience.

COLLABORATE with local K-12 districts to bolster interest and passion for CTE pathways that excite students in their future moving forward, with the University of Arizona, industry partners, and community stakeholders to design meeting and event spaces throughout the buildings to promote the CTE pathways that...

CONNECT students to opportunities in a facility that works...

COLLEGIALITY to elevate the talent pipeline.

Provide **FLEXIBLE** industry training space that can be leased to provide *'education on demand'* to fill the need for skilled labor while providing high paying jobs for students and adult learners.

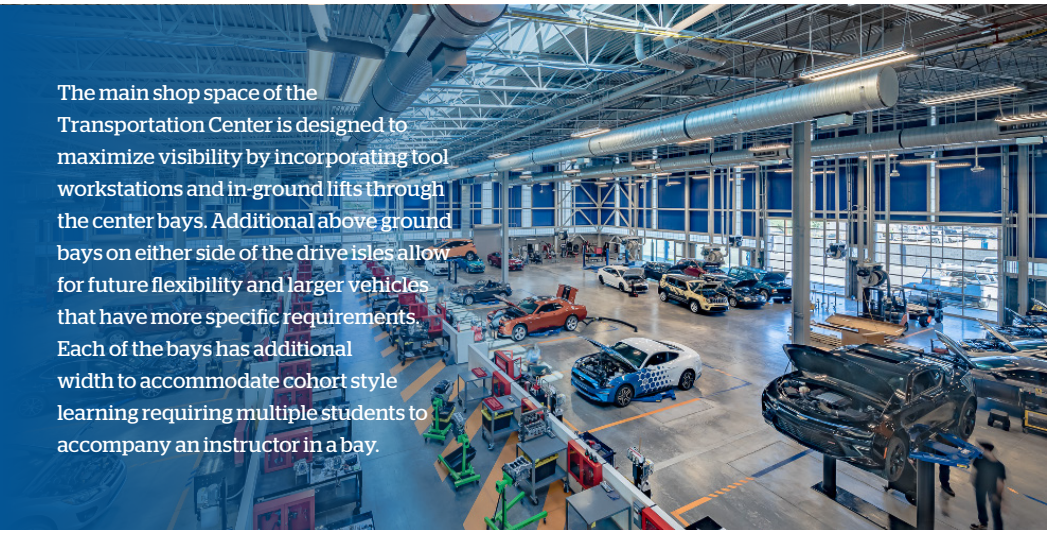
Provide **EQUITABLE** educational opportunities for all students in this economically challenged neighborhood outside of downtown Tucson, while partnering with the city of Tucson to...

REVITALIZE this neighborhood as part of a larger master plan to for the Miracle Mile area.

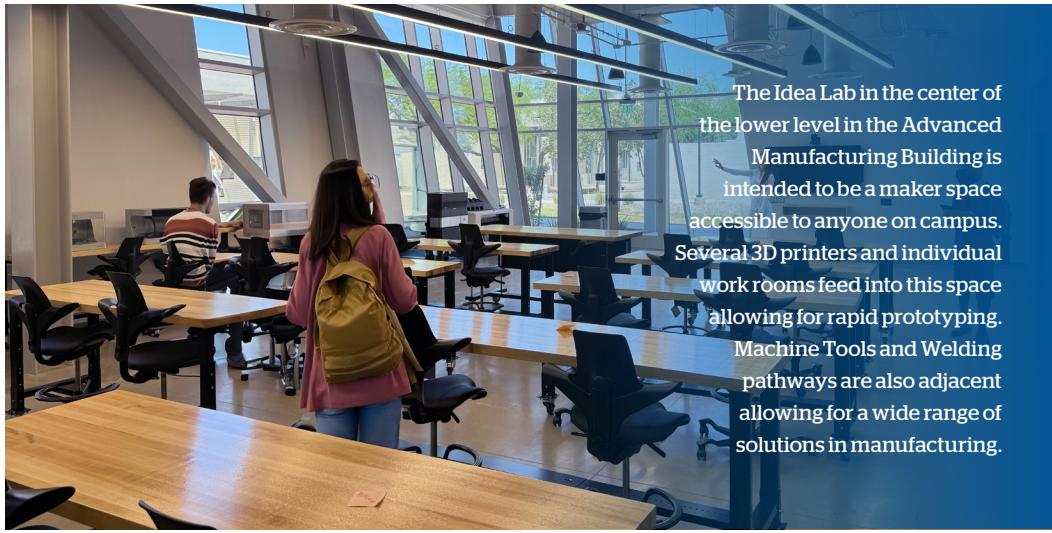
Educational Environment

Response: Classroom and Lab Learning Environments

The learning environment seamlessly **integrates lecture spaces with lab spaces**, enabling faculty to transition from teaching concepts directly to hands-on practice. With no need to traverse different rooms or buildings, students can promptly apply newly acquired knowledge and hone their skills. Additionally, large screens cater to visual learners, enhancing the overall learning experience.

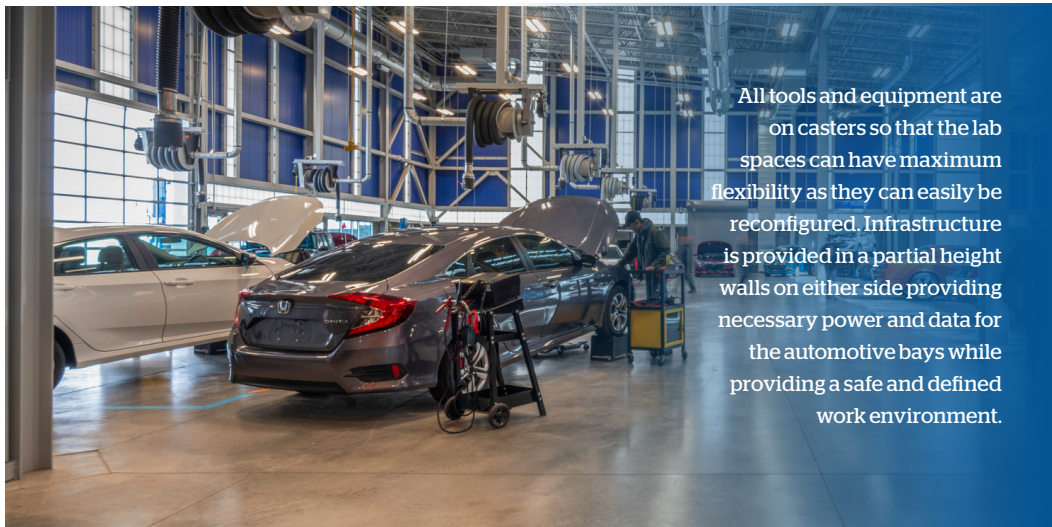


The main shop space of the Transportation Center is designed to maximize visibility by incorporating tool workstations and in-ground lifts through the center bays. Additional above ground bays on either side of the drive isles allow for future flexibility and larger vehicles that have more specific requirements. Each of the bays has additional width to accommodate cohort style learning requiring multiple students to accompany an instructor in a bay.



The Idea Lab in the center of the lower level in the Advanced Manufacturing Building is intended to be a maker space accessible to anyone on campus. Several 3D printers and individual work rooms feed into this space allowing for rapid prototyping. Machine Tools and Welding pathways are also adjacent allowing for a wide range of solutions in manufacturing.

Automated Industry Technology labs occupy the 2nd floor of the Advanced Manufacturing Building. These spaces are meant to be the bridge between heavy and rapid prototyping on the lower level to incubator and design spaces on the 3rd level. These labs form the heart of manufacturing connected to the gantry crane outdoor learning space overlooking the Welding and Construction Trades yards.

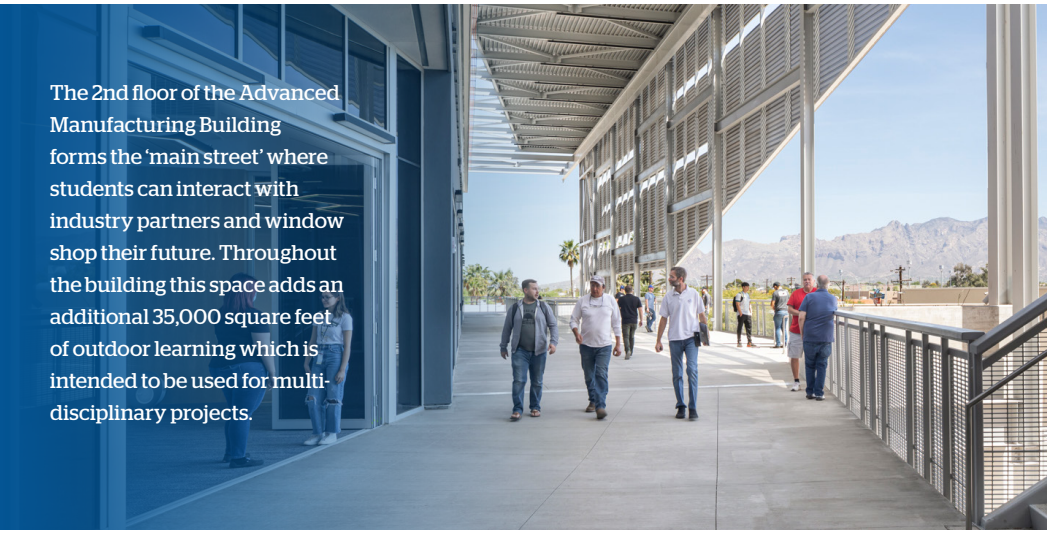


All tools and equipment are on casters so that the lab spaces can have maximum flexibility as they can easily be reconfigured. Infrastructure is provided in a partial height walls on either side providing necessary power and data for the automotive bays while providing a safe and defined work environment.

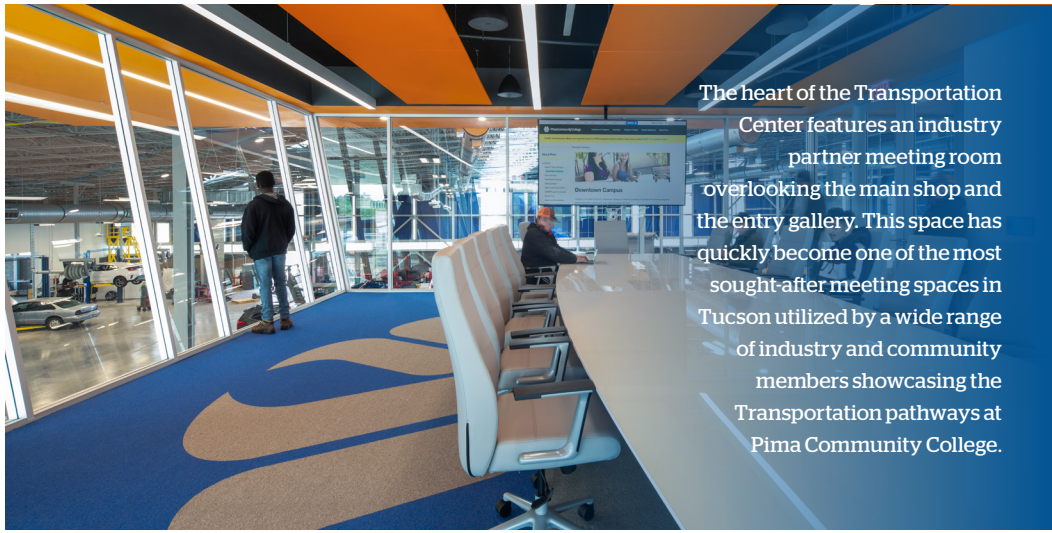
Educational Environment

Collaborative, Industry, Community, and In-Between Spaces

The spaces outside of pathway specific classrooms and labs are just as critical to the student experience. The intention was to create day to day **interaction between multiple pathways** as a primary means to enrich student experience while teaching the not so easy learn to skills such as learning how to communicate, how to work as a team member, how to become a leader, and gaining empathy for different perspectives which normally would not happen in a typical vocational school. In addition, these spaces are **attractive to industry partners** and bring exposure and opportunities to students in day to day life.



The 2nd floor of the Advanced Manufacturing Building forms the 'main street' where students can interact with industry partners and window shop their future. Throughout the building this space adds an additional 35,000 square feet of outdoor learning which is intended to be used for multi-disciplinary projects.



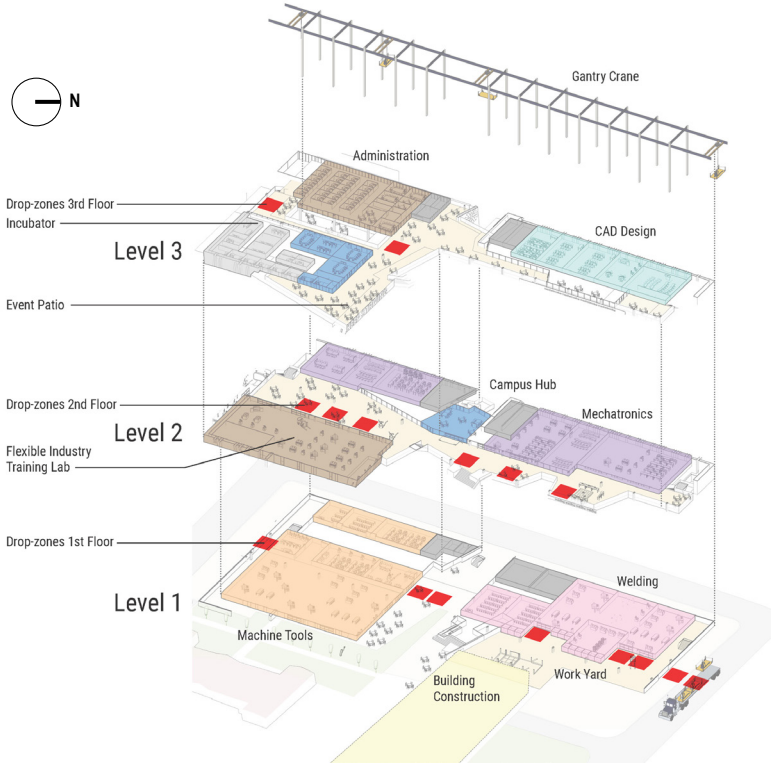
The heart of the Transportation Center features an industry partner meeting room overlooking the main shop and the entry gallery. This space has quickly become one of the most sought-after meeting spaces in Tucson utilized by a wide range of industry and community members showcasing the Transportation pathways at Pima Community College.

The 3rd floor of the Advanced Manufacturing Building features an industry event space with an outdoor terrace overlooking views of Mt. Lemon and all three levels of the outdoor learning spaces within the gantry crane. This space was strategically located on the top floor not only to take advantage of the views but to advertise all the pathways within the building.

The second-floor concourse of the Transportation Center Building features student work areas which overlook the main shop space. This space also adjoins faculty offices and classrooms to encourage a collaborative environment.

Educational Environment

Response: Advanced Manufacturing Building



"**Flexibility**" stands alongside "**Speed**" and "**Convergence**" as one of the fundamental principles embodied by the Advanced Manufacturing Building, enabling the Pima Community College team to excel. This versatile environment accommodates various learning programs, delivery models, equipment types, and events seamlessly.

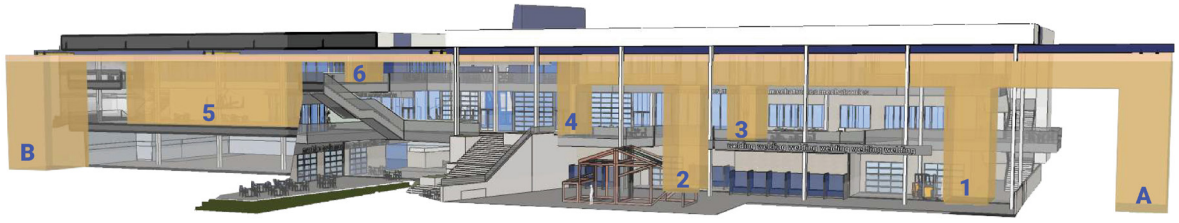
The imperative for **maximum flexibility across all levels led to the installation of a gantry crane**, ensuring access to every part of the Advanced Manufacturing Building. Strategically positioned drop-zones, highlighted in red in the accompanying image, further enhance the building's functionality and accessibility.

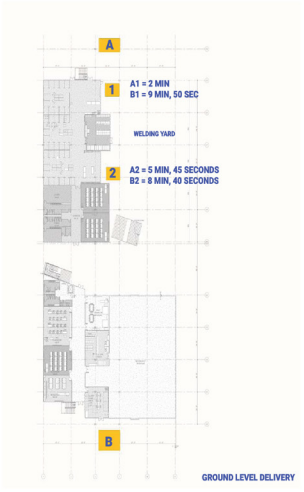
"In a span of two weeks, the building played host to a diverse array of activities, ranging from credit classes in Automation/Robotics, Computer-Aided Design (CAD), Machining, and Welding to specialized training for employees of a global manufacturing firm. It also welcomed middle and high school students for tours, facilitated photoshoots for graduating students, served as a meeting space for industry partners, provided consulting sessions for entrepreneurs, hosted internal college meetings, and organized recognition events for more than 600 students and industry partners. Additionally, it welcomed representatives from colleges across the U.S. exploring the development of similar Centers of Excellence, facilitated meetings with governmental representatives, and even hosted a robotics competition."

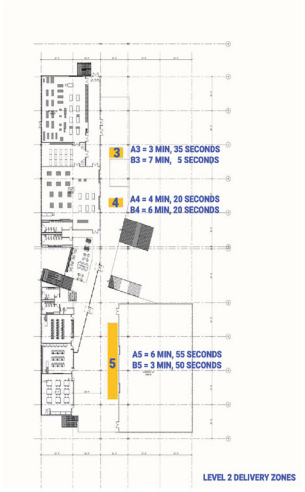
Greg Wilson
Dean of Applied Technology, Pima Community College

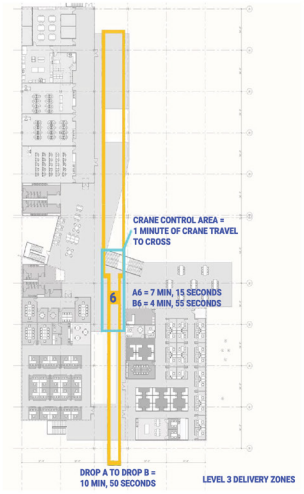
Educational Environment

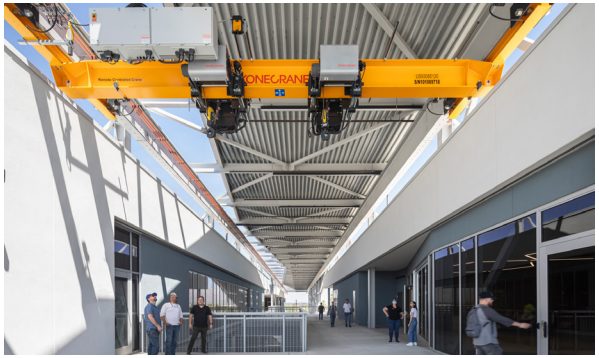
Response: Flexible & Adaptable











The building is bisected on the north-south axis by a gantry crane, that runs the length at the underside of the 3rd floor roof plane and cantilevers past the north and south building boundaries. **The crane will be able to deliver materials directly from flatbed truck to first, second, and third floors**. Utilization of "Smart Crane" technology allows operational control spatially in 3D as well as timing throughout the day to maximize circulation safety. Structurally the floor slabs have been designed for increased capacity in strategic locations allowing complete flexibility for projects and materials to move amongst the pathways.

"Reaching the second floor you'll observe the crane up high over a charismatic walkway that leads your eyes from one end of the building to the other. Small collaboration rooms are sprinkled throughout the building and are a curio cabinet of ideas. This is where things come alive, often looking like a manufacturing floor or assembly line... students remember that their goal is only a few steps away, a shorter distance than they realize."

Carmen Cueva, Director of Advanced Manufacturing and Computer-Aided Design, Pima Community College

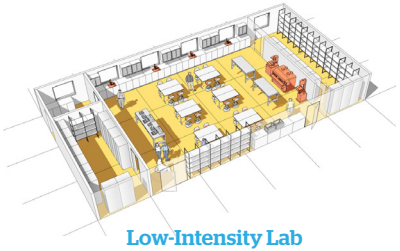
Educational Environment

Exhibits

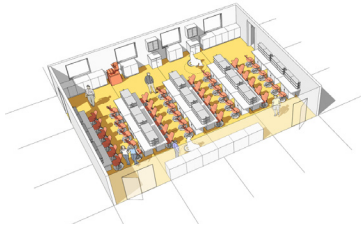
To create facilities that are responsive to changing needs, it's important to consider how spaces can be **designed to include flexible areas and high- and low-density labs** tailored for specific pathway "suites." These pathways should be organized with thoughtful adjacencies and overlaps to maximize utilization and promote true interdisciplinary learning. Equally important is ensuring transparency within the facility, **allowing students to "window shop" their future**. Often, students may not realize that higher education or certain careers are within their reach until they see these opportunities firsthand. By providing equitable access to these career paths, we can profoundly impact students' lives.

CTE Space Types

Learning Studio

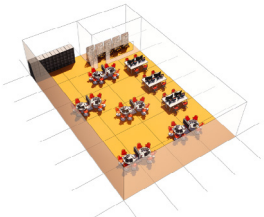


Low-Intensity Lab



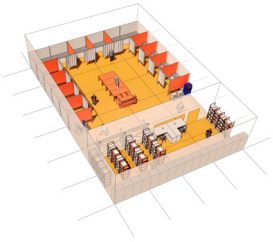
High-Intensity Lab

Specific Pathway Spaces



Idea Lab

Mechatronics Lab



Welding Lab

Pima Community College

Results

Overall Goals

Pima Community College's Center of Excellence in Applied Technology enhances the rapid delivery of learning objectives and **training to meet industry needs**. The project also enables faculty and staff to deliver learning outcomes in previously impossible ways. This improvement is due to the increased size and flexibility of the program labs, which allow for **training multiple audiences in the same spaces** and hosting events that enrich students' learning experiences.

Students and faculty interact with industry partners, college offices, and community members to discuss, plan, and execute ideas that improve the student learning experience. Larger spaces also enable better scheduling and more learning opportunities.

The term "school district" refers to high school partnerships, such as the Joint Technical Education District (JTED), through which Pima serves 6,000 students each year. These students can take advantage of **concurrent enrollment and aligned programs to earn college credit** before graduating high school. This makes their transition to college smoother, as they do not need to start over when they reach Pima.

Results

Unintended & Good Stewardship of Resources

Enrollment since first semester of live classes in the Advanced Manufacturing Building

(compared to previous year)

Fall 2023

+4%
increase in enrollment for the College overall

+12.74%
increase in enrollment for Applied Technology

Spring 2024

+5.58%
increase in enrollment for the College overall

+25.69%
increase in enrollment for Applied Technology

The next closest division was up 8% (Business and IT).

Summer 2024

+8.27%
increase in enrollment for the College overall

+36.79%
increase in enrollment for Applied Technology

The next closest division is up 13% (Health Professions).

Fall 2024

+8.44%
increase in enrollment for the College overall

+27.84%
increase in enrollment for Applied Technology

The next closes division is up 17% (Math).

Achievement of Process and Project

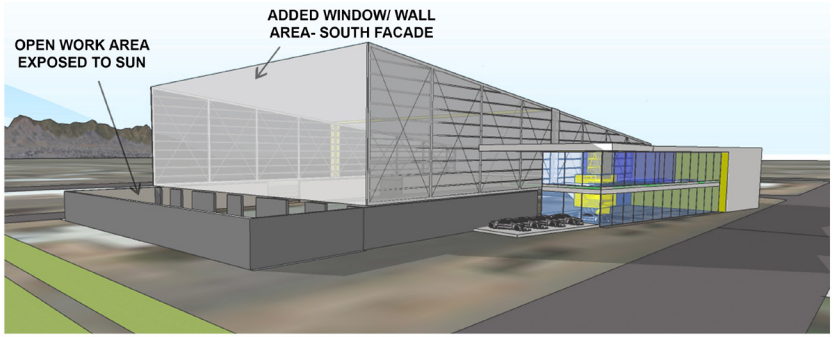
Renovation of historic hotels planned for affordable student housing

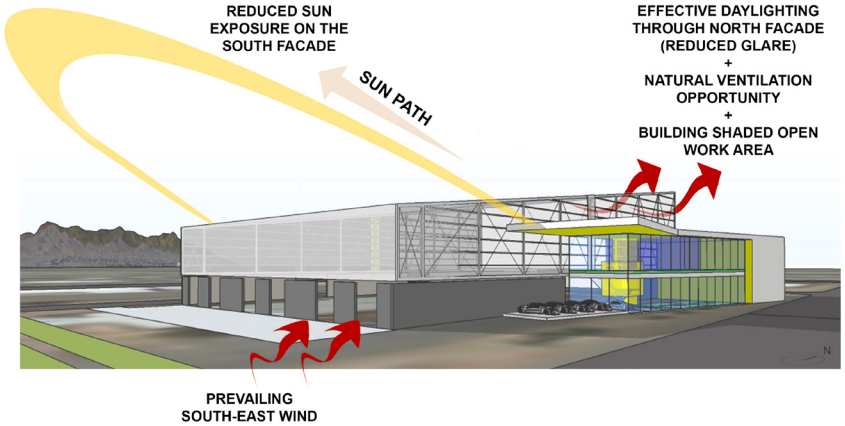
Planned light rail extension and pedestrian/ bike corridor to connect to campus

Numerous new affordable housing and retail projects in neighborhood and surrounding area

Results

Sustainability and Wellness Outcomes



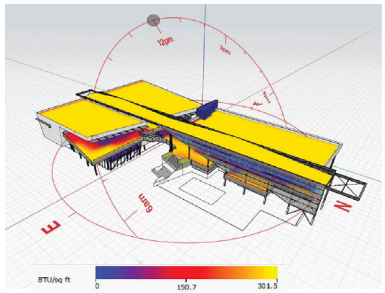


Transportation Center Building

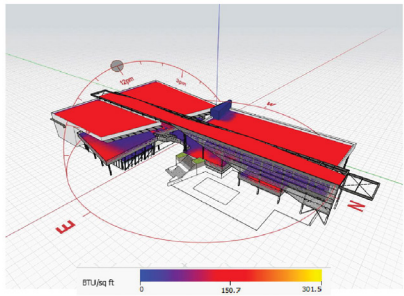
The original concept had the tall end of this shed style building positioned facing south. Our first reaction to this was the large solar heating load and harsh daylighting (with glare issues) on the south facade during the summer due to the near constant exposure to the sun. Simply changing the orientation of the building to position the tall end of the building to the north **reduces that solar heat gain and harsh sunlight into the building**. This change also gives us the opportunity during the development of the design to locate photovoltaic panels on the now south face slope of the roof, provide daylighting from the north facade with reduced glare, and take advantage of the **prevailing south-east winds for natural ventilation** through the higher north end of the building.

Advanced Manufacturing Building

The quantity of new program area and confines of the existing site resulted in long east-west facades. Despite this unideal orientation, direct sunlight penetration has been mitigated by designing a **perforated metal screen wall** on the east side and **deep recessed windows** on the west side. The glazing has been shaded to reduce the heat gain inside the building. The building's exposure to the sun for peak summer and winter months is as follows:

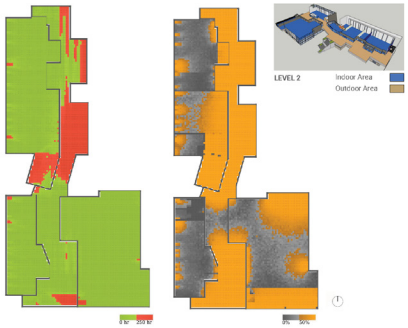


Average Insolation: JULY



Average Insolation: DECEMBER

ANNUAL DAYLIGHT RESULTS LEVEL 2



ANNUAL DAYLIGHT RESULTS LEVEL 3

The red highlighted areas are primarily outdoor spaces which are exposed to direct sun. The perforated metal screen wall protects a majority of the outdoor learning spaces on the east side. **Large cantilever overhangs** protect the north facing industry event space on the third floor.

Results

Sustainability and Wellness Outcomes

The East Elevation faces the heart of the campus creating a new academic quad and a central destination for the east-west axis. **Movement of the gantry crane** activates the facade and puts the collaboration between pathways on display while a perforated metal wall helps to temper morning sun and make outdoor spaces more comfortable.

Since the building opened in August 2023, an interesting trend has emerged. Not only do Pima employees use the building and its three flights of stairs for their walking breaks, but **neighborhood residents also frequently bike, walk, and run through the campus, often accompanied by their children or pets.**

Results

Sustainability and Wellness Outcomes

The West Elevation forms a new public face and entry portal for the campus. A dramatic cantilever with **angular forms, affectionately called 'the french fries'**, protect west facing windows from the Arizona sun while allowing natural light into the interior.

"This is my favorite place because it's an opportunity to improve the quality of life for everyone in Southern Arizona for generations to come."

Carmen Cueva, Director of Advanced Manufacturing and Computer-Aided Design, Pima Community College