Golden West College Math and Science Building

Huntington Beach, CA

Executive Summary

Fueled by discovery. Powered by exploratory learning. STEM education is transforming typical teacher-centered learning spaces by encouraging curriculums focused on interdisciplinary problem solving. The new Math and Science Building creates engaging and flexible spaces geared to the latest pedagogical concepts in STEM (Science, Technology, Engineering, Math) education. The guiding principle for the building design is based on the scientific concept of gaining understanding of the physical or material world through observation and experimentation, that leads to discovery.

Project goals:

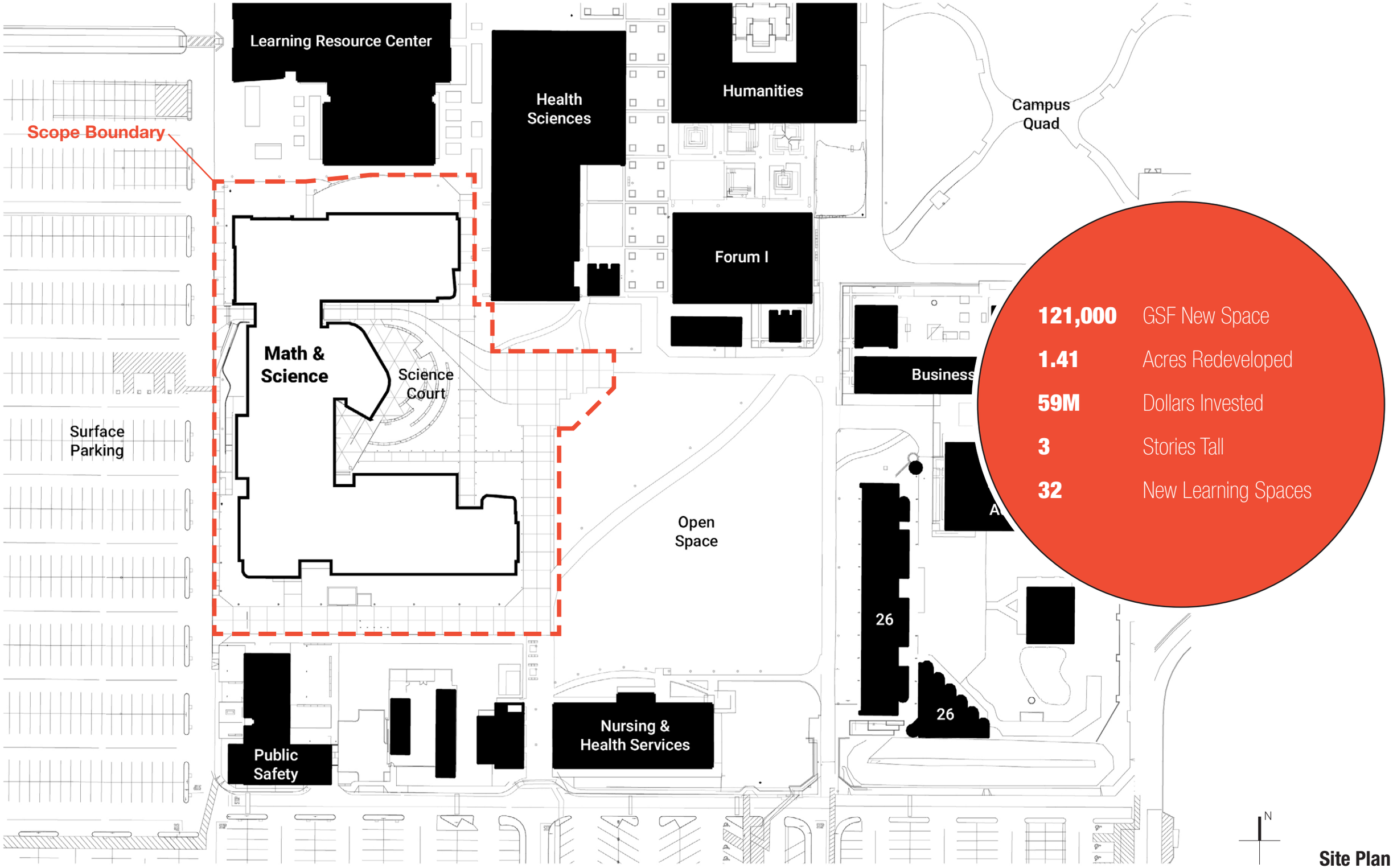
- Improving the educational experience for students and faculty
- Creating a “buzz” for the Math and Science programs
- Providing safe lab spaces for students and faculty to work
- Designing a building that instills a sense of pride for the college
- Creating spaces for students to socialize and collaborate

The three-story building is located along the southwestern edge of the campus and presents a fresh face to the local community along a major city boulevard. Functioning as the new home for the college’s mathematics and science programs, the building consolidates the STEM programs into one facility, providing a much-needed expansion of laboratory, classroom, office and support spaces tailored to the specialized needs of each discipline.

The facility is noteworthy for the transformative impacts on the:

- Enhanced social behaviors of students
- Positive psychological effect on faculty/staff
- Emerging campus environment
- Community perception and workforce relationships

Scope of Work & Budget



Site Plan

School & Community Engagement

Structure

To ensure diverse input from the college community, campus leadership implemented a three-level committee system to keep communication flowing and provide feedback opportunities for stakeholders at all levels that **shaped the design**.

The **Executive Leadership** team included campus leaders to guide the overall vision:

- College President
- Vice-Presidents
- Campus Directors (Maintenance, Operations, Technology, etc.)

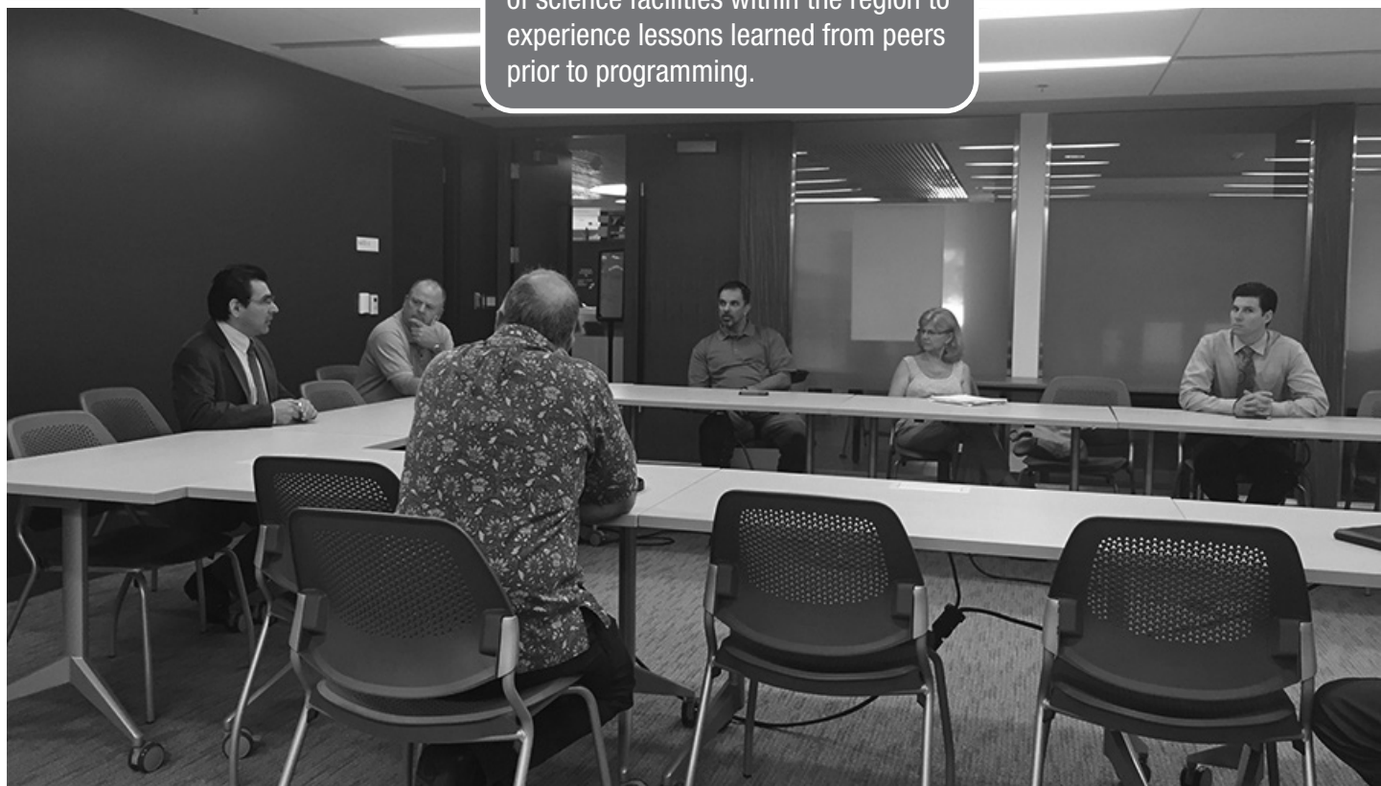
The **Departmental Leadership** team included the program experts to guide functional requirements:

- Dean of Math/Science
- Chairpersons of Mathematics, Physical Sciences, and Biological Sciences

The **Building User** team included future occupants to provide detailed functional expertise:

- Science Faculty
- Technical Staff
- Students

Designers led building users on tours of science facilities within the region to experience lessons learned from peers prior to programming.



School & Community Engagement

Strategy
An eco-charette workshop brought stakeholders together with building designers and engineers to explore sustainable design strategies that would be appropriate for the facility. Interactive exercises with image maps and flashcards helped identify **high-performance strategies that were important to the campus leaders and building users**.

As a result, goals relating to energy performance, water use, indoor air quality, and the like were vetted and established as a group before design solutions were developed. These “metrics for success” are listed in the adjacent table.

Energy	Water	Indoor Environmental Quality	Waste	Durability	Culture
Sun shading of windows	Greywater reuse from building	Access to outdoors with nanawalls	Recycling bins	Ease of cleaning maintenance	Building as a learning tool
Large slow moving fans	Permeable paving	Access to natural light and views	Landfill/compost/ recyclables bins	Concrete floors	Demonstration garden/court-yards
Thermal mass for pas-sive heating/cooling	Condensate recovery from AHUs	Natural ventilation	Construction waste manage-ment, 95%	Durable finish materials	Water conser-vation signs in building
Radiant flooring	Bioswales	Operable windows	More durable materials	Enhanced commissioning	Local materials
Natural ventilation		Mechanized shading-glare control		Easily accessed equipment	Photovoltaics used in landscap-ing as a design element
Operable windows	Native/adaptive/ drought tolerant landscaping	Walk off mats for pollutant source control		LED lighting	Active indoor environment
Motion sensors	Soil erosion prevention	Access to views		Non reflective Building materi-als	Energy consump-tion dashboard
Cool roof	Rain gardens	Skylights		Measurement and verification	Water bottle filling stations
Submetering for plug loads, lighting and process loads	Dual flush toilets	LOW VOC materials		Rooftop garden	Bike racks
Efficient appliances and fixtures	Drip irrigation	Indoor planting			Plug load eduction
Exterior insulation	Soil building	High MERV filtration			Sustainability kiosks
Interactive monitoring system	iSave water fixtures	Lighting controls			Outdoor living lab on roof
Projector-light-window shade control	Rain water harvesting	Indoor environmental quality survey			
Low-e glazing					
LED lighting					
Solatubes/skylights					

School & Community Engagement

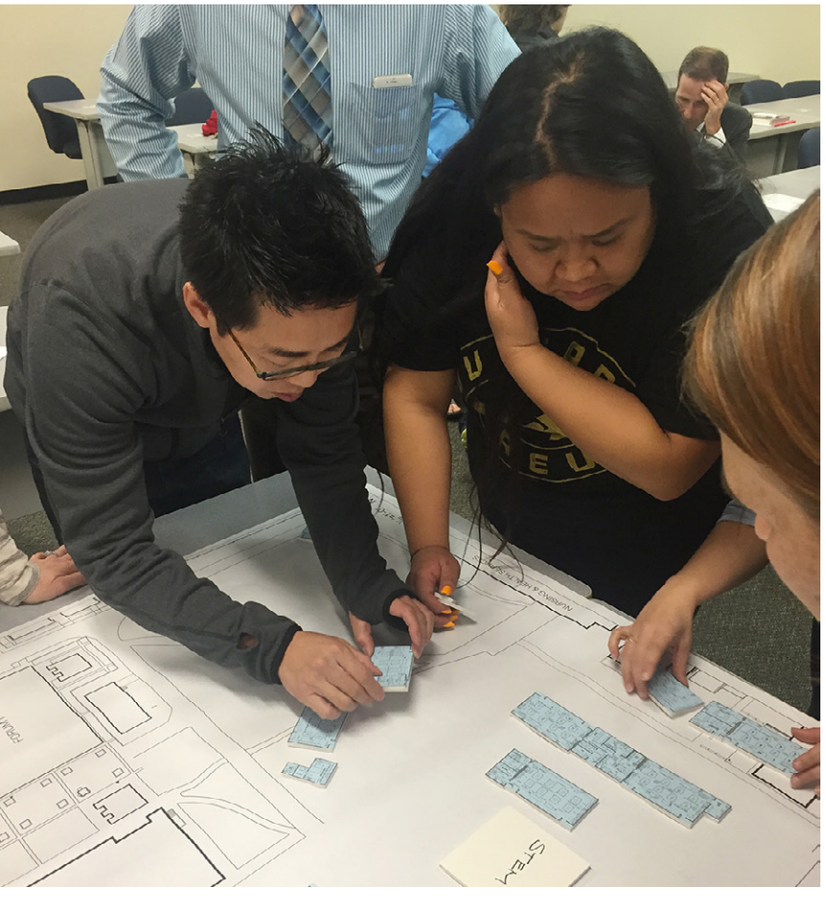
Exploration
Numerous workshops were held to explore a wide range of design topics. Detailed lab programming sessions dove into the details of layout and equipment storage with the laboratory planner where staff lab technicians worked out flow patterns and equipment operations. **Hands-on** space adjacency exercises were conducted to develop a functioning building diagram where faculty and staff used foam program blocks to “build” the ideal building diagram assisted by the architects.

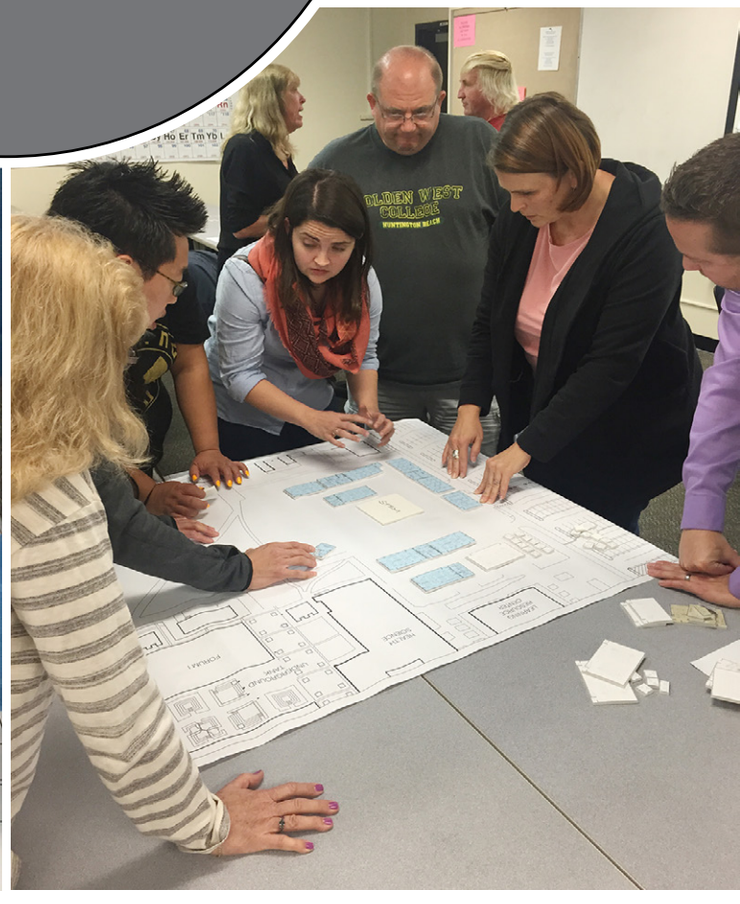
Student interviews were held to assess spatial amenities they valued. It was revealed that informal study space was a must while views out of teaching spaces were not as important (to the dismay of the designers).

Throughout the conceptualization phase of the design process presentations were made in response to session outcomes and an open, unfiltered feedback loop helped shape a design solution that truly **reflects the functional needs and cultural values** of the stakeholders.

“The team was focused and paid attention to budget while working with the users to get them what they needed. They were great listeners and the results speak for themselves.”

-Janet Houlihan, Vice President
Student Life & Administrative Services





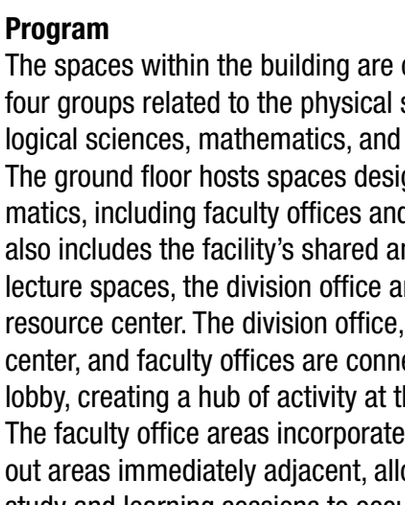
Hub
The division office, STEM resource center, and faculty offices are connected to the lobby creating a hub of activity at the main entry.

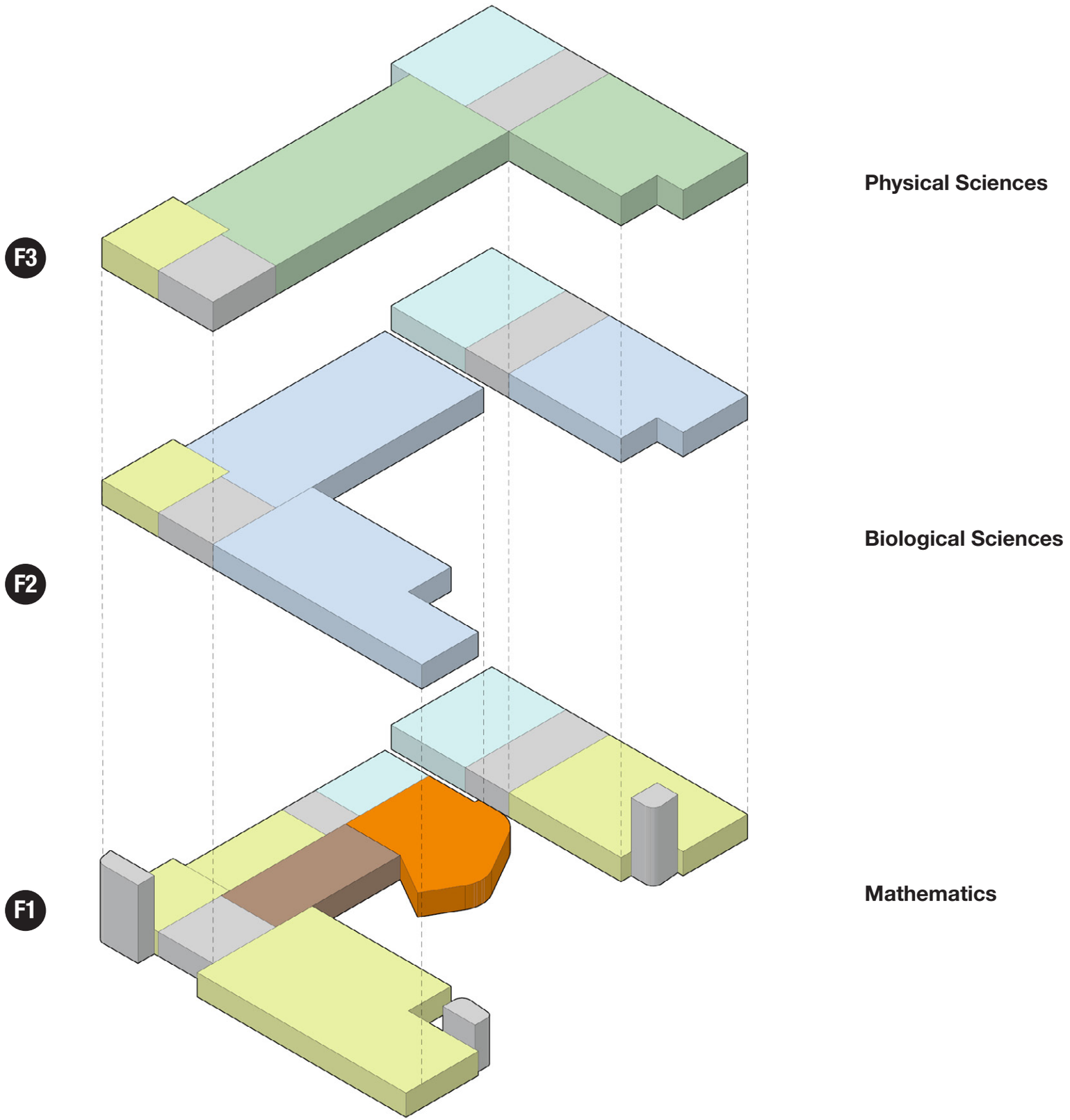
Main Lobby and Student Commons

Educational Environment

Program

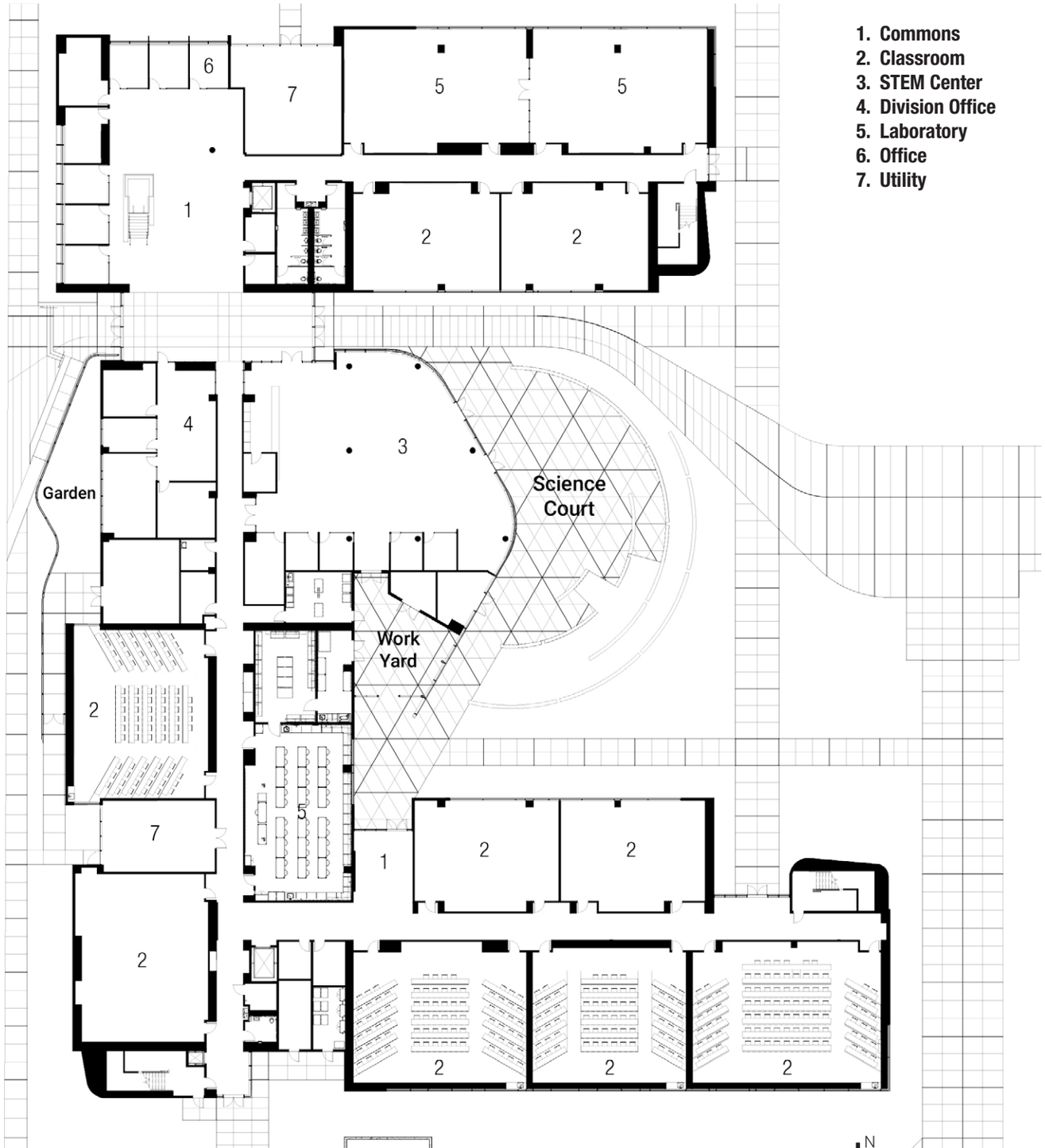
The spaces within the building are organized into four groups related to the physical sciences, the biological sciences, mathematics, and shared amenities. The ground floor hosts spaces designated for mathematics, including faculty offices and computer labs. It also includes the facility's shared amenities such as lecture spaces, the division office and the new STEM resource center. The division office, STEM resource center, and faculty offices are connected to the main lobby, creating a hub of activity at the primary entry. The faculty office areas incorporate informal breakout areas immediately adjacent, allowing impromptu study and learning sessions to occur out in the open. The second and third floors of the building include spaces designated for the biological and physical sciences including faculty offices, laboratories and prep rooms.





Program Diagram

Educational Environment



First Floor Plan

1. Commons
2. Classroom
3. STEM Center
4. Division Office
5. Laboratory
6. Office
7. Utility

Educational Environment

The Social Impact

Each common space is **multi-functional** and provides opportunities for social engagement and mentorship. Areas along corridors throughout the building expand and contract to provide spatial variety and play host to small-scale study groups or retreat areas for casual socialization. Common “sticky spaces” keep students on campus and promote relationship building that help them grow academically and socially. This further the curricular goal of **promoting connectivity** and integrating all STEM disciplines, enabling academic and interdisciplinary innovation. Informal post-occupancy discussions have revealed that these spaces are consistently filled with students and is helping increase retention rates.

1. Corridor
2. Commons/Study Room

Educational Environment

1. Commons
2. Classroom
3. STEM Center
4. Division Office
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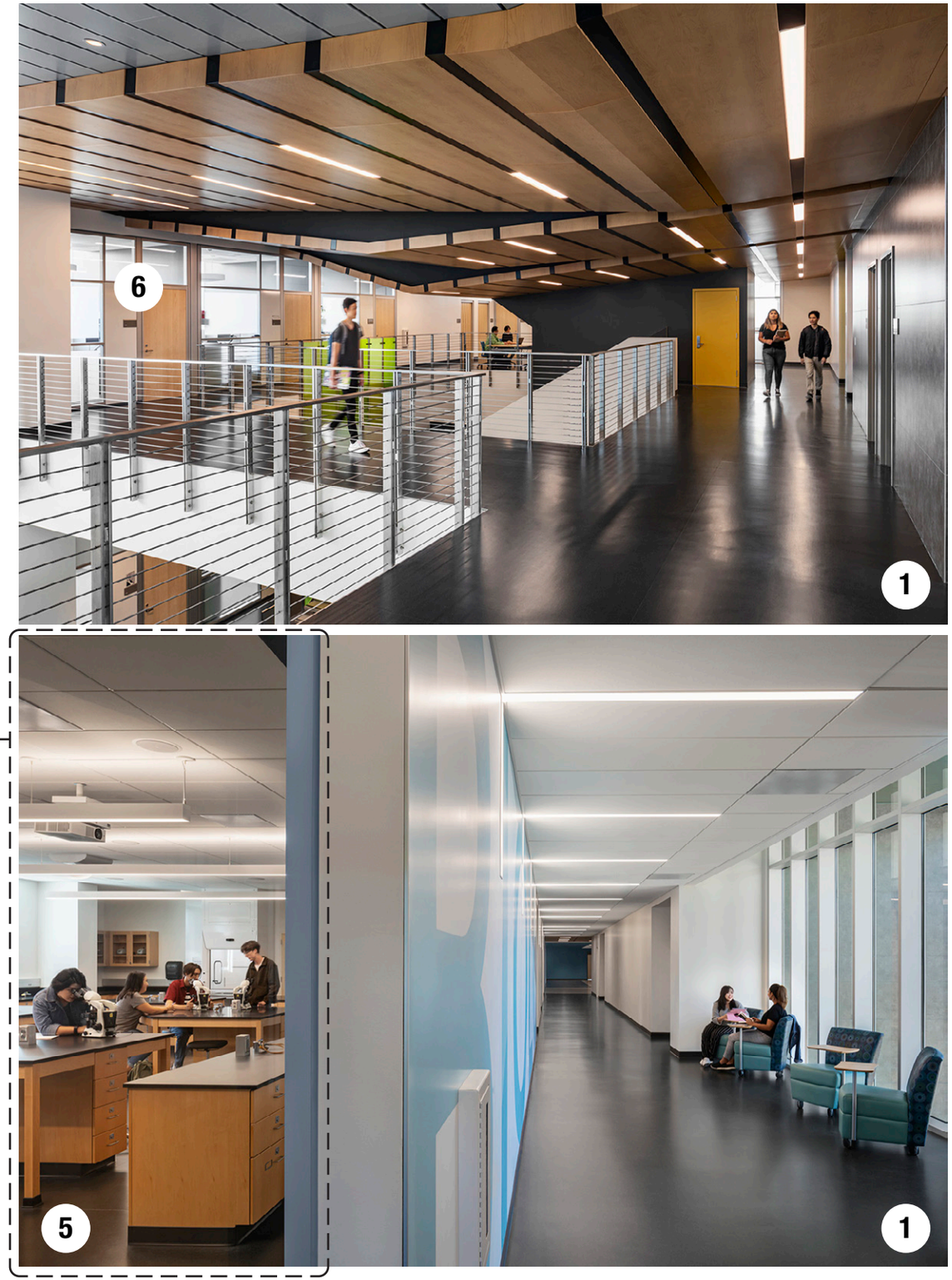
7. Utility

“Peek-a-boo window”



Second Floor Plan

Educational Environment

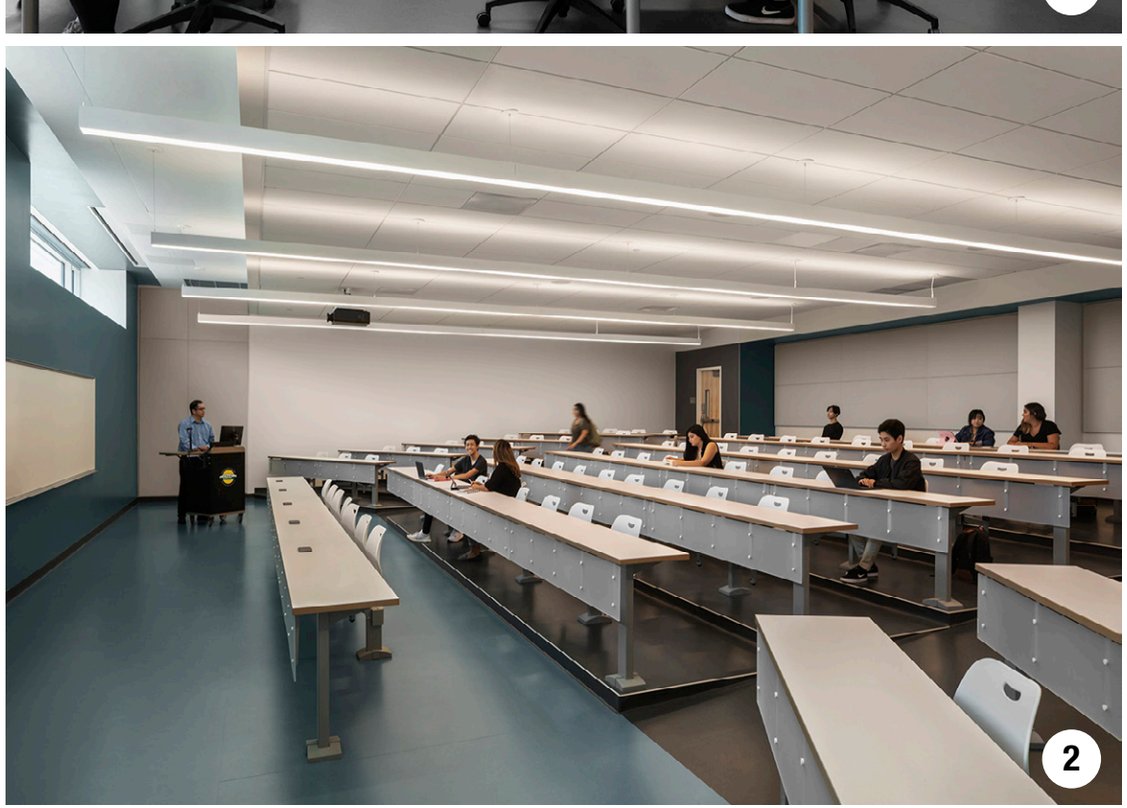
1. Corridor
2. Commons/Study Room

The Social Impact

Smashing barriers and accommodating the various ways students learn is the hallmark of STEM curriculums. STEM activities that were once taught in isolation now overlap in ways where the lines between them are blurred and flexibility is maximized. This **connectedness** considers more than just the building's layout, but also how every space is designed so that students passing through can see fellow classmates experimenting, studying, or engaging with one another.

Educational Environment

1. Commons
2. Classroom
3. STEM Center
4. Division Office
5. Laboratory
6. Office
7. Utility



Third Floor Plan

Educational Environment

The Psychological Impact

The original campus buildings, designed by brutalist architect William Pereira in 1965, used stout geometric forms made of concrete and exterior cement plaster. Building structures use concrete frames and coffered floor slabs that are expressed on the building exteriors. Glazing systems take the form of window walls that occur in limited locations and lack visual connection with the campus landscape and outdoor spaces. Views and exposure to natural daylight from the spaces within are scarce in the teaching spaces, resulting in building users feeling oppressed and disconnected from the outdoors. By contrast, the new building provides natural light and views to the lush campus landscape from every teaching space. Teachers and students catch glimpses of the outdoors continuously throughout the day creating **feelings of connectedness** that were missing in the old facilities. The daylight provides brighter, evenly lit spaces that is healthy for learning and psychologically beneficial for everybody.

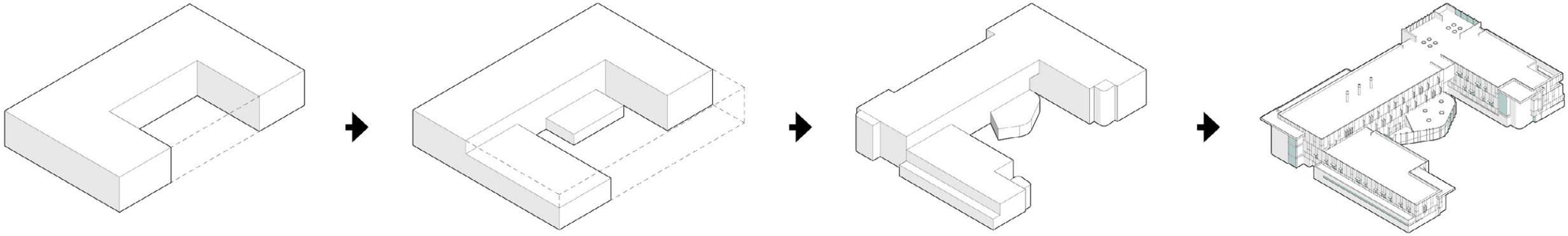
1. Organic Chemistry Lab
2. Anatomy Lab

"I wanted to thank you and your team for our lovely new building. I was an outspoken member of the chemistry department with many ideas, and I wanted to thank you for a job well done, with even small details given their due. My new lab space brings much joy."

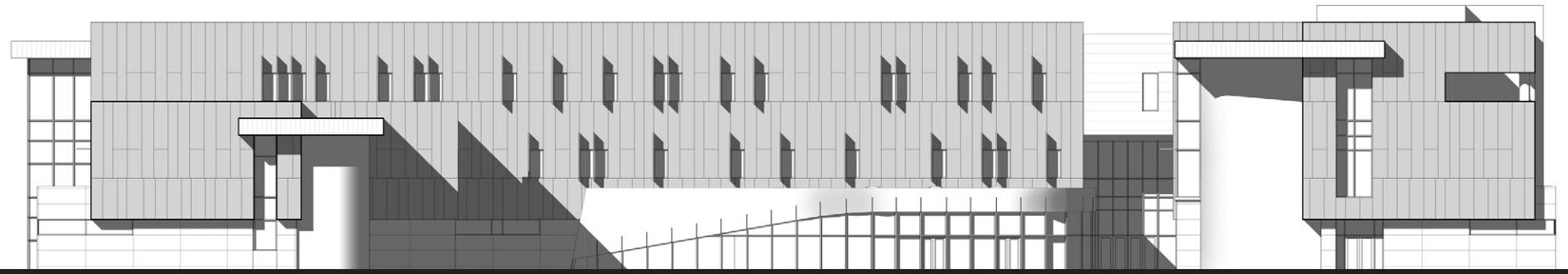
-Dr. Katherine Green
Chemistry Professor

Physical Environment

The building is organized in a “C” shape configuration with an open courtyard space at its center that is anchored by the STEM Center and provides an outdoor plaza space for students to study and socialize. Although it is primarily a three-story building, the mass of the facility shrinks to two stories along the southern leg allowing daylight to enter the courtyard in the morning hours while the three-story mass of the building along the west shades the court in the afternoon. Simple rectangular volumes offset by subtle curving elements define the architecture, **making it visually compatible with existing campus buildings**.



Courtyard Typology **Sculpted for Light** **Refined Massing** **Articulated Envelope**



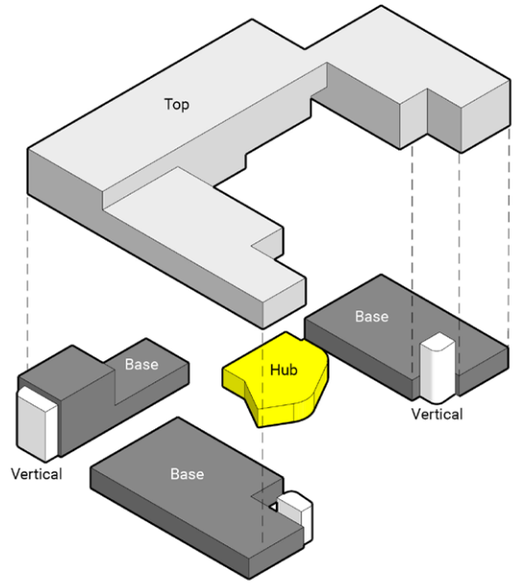
Anchor
The building is organized in a “c-shape” with an open courtyard space that is anchored by the STEM Center.

Science Court

Physical Environment

Impact on the Campus Environment

The building site falls between two newer facilities, the Learning Resource Center and the Allied Health Building, which are visually unrelated to one another. **A concept of "visual bridging"** was developed to create harmony among the three newest buildings along the west of edge of campus. Extracting the "DNA" of the existing buildings provided the architectural vocabulary for the Math/ Science Building. A blending of massing and material applications that works like a gradient between the three facilities results in visual harmony and resolves the visual disparity that had started to develop.



Top (Metal Panels)

Hub (Perforated Shroud)

Vertical (Stucco)

Base (Porcelain Tile)

Physical Environment

Implemented Sustainable Elements

1. Shading Devices
2. Cool Roof
3. High-Performance Glazing
4. Exterior Insulation
5. LED Lighting Systems
6. Condensate Recovery
7. Bioswales
8. Native Landscaping
9. Drip Irrigation
10. Natural Light and View
11. Skylights
12. Lighting Controls
13. Walk-Off Mat
14. Durable Finish Materials
15. Back Racks
16. Active Learning Courtyard

Results of the Process

Community Impact
The new Math/Science Building has had a positive impact on the community at many levels. Once taught in isolation in various facilities across campus, the science and mathematics programs now cohabitate and are experiencing new levels of **cross-discipline collaboration** that is indicative of a STEM community due to the scale and organizational model of the facility.

Outside of campus, the **perception of the college** within the local community has been elevated as well. Serving as the backdrop to a weekly swap meet held in the adjacent parking lot, the science programs are no longer hidden within the campus core and the transparency of the facility has brought the campus' offerings in the sciences to prominence.

The building was designed to **foster connections** with local industry and is best illustrated through the development of the STEM Center. Relationships with industry partners such as Boeing, the city's largest employer, have begun to create workforce transition programs in the STEM fields that begin on campus. The STEM Center is a flexible collaboration space that can accommodate exhibits and workshops led by local industry partners to educate and build bridges with future tech employees while they are still getting an education, thus creating a pipeline for businesses to train the future workforce.

The resulting educational environment is a testament to the values of all of those involved, and reflects **the vision of the college - to welcome, inspire, empower, and transform its students.**

"At the interview, the design team walked in, three people sat down, told us exactly what they were going to do, and then went out and did it. They worked hard to capture our needs and wants and designed a building that serves the student and faculty needs, not their own."

-Jeff Courchaine
Dean of Mathematics and Science (Retired)

Curb Appeal
The building presents a fresh face to the community, emphasizing the importance of the sciences along a major city boulevard.

West Elevation