Amended Architectural Program
K-State Engineering Complex
Phase IV Addition

Prepared by
Facilities Planning
Kansas State University
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Program for Engineering Addition

Introduction

In Kansas, the engineering profession is a primary source of the workforce. It is estimated that 80 percent of all science- and technology-based occupations in the state stem from the engineering and information technology fields. In 2008, the top 25 U.S. exports via Kansas fell largely into two commodity categories – agriculture- and engineering-intensive machines and equipment. Of the $8.1 billion export value of these top 25 commodities, engineering-intensive commodities accounted for more than $5.5 billion or two-thirds of the total.

The Kansas Board of Regents supported an effort to increase the number of engineering graduates and has included it as one of the priorities for the university regents system. The 2011 Legislature passed the University Engineering Initiative Act with the goal of increasing the annual number of engineering graduates by about 60% by 2023. Kansas State University's College of Engineering, the largest in the state, is at capacity in view of facilities and will require additional space to reach their portion of the goal.

Phases I through III, also known as the Durland, Rathbone and Fiedler wings, are complete. This complex houses the Departments of Electrical Engineering, and Industrial Manufacturing Engineering as well as portions of Chemical Engineering, Civil Engineering, and Mechanical and Nuclear Engineering. Phase IV of the Durland/Rathbone/Fiedler complex exists in concept.

The Departments of Biological and Agricultural Engineering, Architectural Engineering and Construction Science, Computing and Information Science and the Institute for Environmental Research occupy other buildings on campus.

Current Conditions

Due to the increased enrollment, additional faculty has been hired to meet the growing educational needs. The number of graduate students has also increased and lack adequate office space for their work as Teaching Assistants. The faculty offices are overcrowded and make it difficult for them to meet with and advise students.

The trends of our undergraduate enrollment and faculty have stabilized at around 3,000 students due to space constraints. For the fall of 2010, we had 125 professors following dramatic drops due to budget cuts. For the fall of 2011, we have seen a slight increase due to the infusion of new student fees.

In addition to the growing enrollment, research in several engineering fields has evolved. As a result, existing laboratories no longer meet the departments' needs. The labs used by several of the academic departments are too small for modern testing equipment. As a result, it is not possible to retrofit existing laboratories to meet current equipment needs.

Part of the university's long range master plan is to locate colleges and departments in adjacent buildings wherever possible. At this point in time, the Departments of Biological and Agricultural Engineering, Architectural Engineering and Construction Science and the Institute for Environmental Research are located in the west wing of Seaton Hall, which are located across 17th Street from the Engineering Complex. Other geographically adjacent buildings that house the College of Engineering's departments are Ward Hall, Seaton Court and the Environmental Design Lab. The Department of Computing and Information Science has faculty offices and laboratories in Nichols and Kedzie Halls. These buildings are located on the south end of campus. This physical separation from the other engineering disciplines creates extra educational and networking challenges for faculty and students alike.

Project Description

This 108,600 square foot addition will be dedicated to student educational needs. Within these needs, three Communities of Excellence emerge as top priorities for infrastructure expansion: educational space for our nationally prominent design teams (e.g., SAE Formula car, mini Baja car, quarter-scale tractor, chemical engineering car, concrete canoe, steel bridge, etc.), computer and information systems with a focus in cyber security, and a bio-based fuels focus.

Phase IV of the Engineering Complex will add capacity such that more suitable space will be made available to the Department of Computing and Information Science as well as teaching laboratories for all departments. This will complete the relocation of the whole of the College of Engineering to one geographic location on the west side of the main campus. Offices for the overcrowded faculty, graduate students and a dedicated office space for visiting faculty, who are working on specialized research, will also be included. It is also expected a great portion of the expansion will be allocated to modern teaching (studio computer environment, lecture facilities holding 75-100 students, large board room with modern A/V) and laboratory facilities, as well as dedicated space for college-level student organizations and student recruitment and retention activities.

In addition to office and teaching spaces, larger labs and lab support spaces will be included in the design. The lab support spaces include a dedicated loading dock for the receipt and distribution of supplies and equipment for current and future research. Once the ongoing research has been moved into the new research labs, the old labs can be retrofit for other departments that use smaller equipment in their research.

Because the College of Engineering is encouraging more interdisciplinary research and education among the various Engineering disciplines, work spaces for students are also needed. These small, study laboratories are needed by the students so they may have a dedicated space to work on projects involving two or more departments. Special attention will be given to the design space so that it is designed to be a working/teaching laboratory and not disturbing the classic teaching environment.

There is also a growing need for small lounges and conversational areas adjacent to the hallways so the faculty and students can interact in a more spontaneous manner that encourages cross-disciplinary efforts. These spaces will address the developing need for cultural and information exchanges.

Project Goals

- Enhance the educational experience for students and faculty.
- Provide a front door to the College of Engineering complex to showcase the world class teaching and research within.
- "Inspirational Gateway", high visibility, attracting donors, drawing expertise and community together.
- Encourage collaboration, discovery, and innovation in a flexible and dynamic facility, with the ability to adapt for specialized research and teaching activities and equipment.
- Promote communication and interaction, both formal and informal, between faculty, staff, students and visitors.
- Make a statement to prospective students and faculty that Kansas State is committed to excellence by providing cutting edge facilities to go along with the resources and passion.
- Design an environmentally sustainable building that promotes environmental stewardship.

Site Description and Considerations

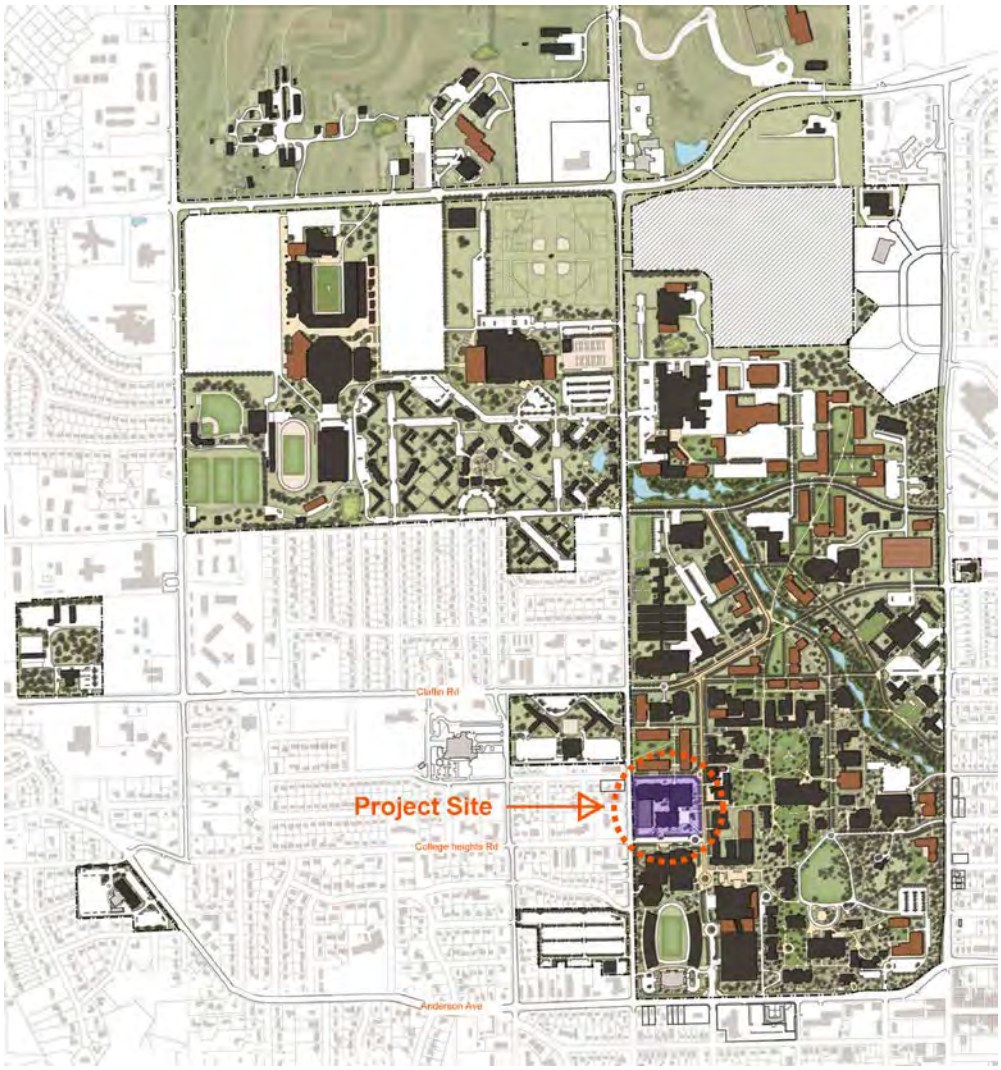
The site for the College of Engineering Phase IV Expansion project is a prominent location in the historic core on Kansas State University's campus. The heart of the KSU campus is just steps away from the engineering complex to the east, with the Hale Library and K-State Student Union within close walking distance. Ahearn Field House, an 11,700 capacity sports facility used for volleyball and indoor track sits to the south along with the Natatorium and multi-purpose gymnasium. Northwest of the site are residential areas with University owned and private multi student housing facilities. The College of Engineering complex will become the gateway between the resident halls, apartments, and other student housing and the campus core.

Three existing buildings connect to form the current College of Engineering complex. Durland Hall, Rathbone Hall, and Fiedler hall were constructed at different times from 1976 to 2000. Together they house the Dean's Office for the College of Engineering as wells as the Departments of Electrical and Computer Engineering, Industrial and Manufacturing Systems Engineering, Mechanical and Nuclear Engineering, Chemical Engineering, Civil Engineering, engineering library and auditoriums, meeting rooms and computer labs for the college. The

Phase IV Expansion building will add to the existing 267,000 square foot complex and will be positioned to provide pedestrian access from the western residential areas.

The site is currently an open grass yard with a slope down to the south west. An existing service access road is used to deliver service items and for parking cuts through the site to the west of Durland Hall. The new building proposes shifting the service road and parking and allowing for the space between buildings to be used for pedestrian access, while creating a new service access point for the complex.

The future complex looks to redefine the east west axis lines of circulation from residential areas to the campus core. The positioning of the new building will aim to enhance pedestrian circulation on the site as well as through the site. Major foot traffic from the Student Union, Hale Library, and buildings to the east will pass through the site, as students travel between the historic core campus, mid campus, and residential areas.



Program Space

The following spaces are to be integrated in the design of the new facility and in light of the design considerations established in this document. Spaces dedicated to each department will be indicated as follows: Civil Engineering (CE), Computer and Information Sciences (CIS), and Electrical and Computer Engineering (ECE). All other spaces not otherwise indicated are intended for general College of Engineering use and assignment.

The proposed addition to the Engineering complex will be composed of the following spaces compare to the Original Program dated November 1, 2012:

		PROGRAM Nov. 1, 2012				ACTUAL Feb 27, 2014			DEPT
	Space Description	Qty	Net Area	Total Area		Qty	Net Area	Total Area	
Instructional									
1.01	Large College Classroom [110]	1	1,800	1,800		1	1,566	1,566	College
1.02	Large Lecture Hall [110]	1	4,475	4,475		1	3,459	3,459	College
1.03	Distance Learning Recording Room [530]	1	350	350		1	122	122	College
1.04	College Classroom [110]	2	945	1,890		2	939	1,878	College
1.21	General Teaching Lab [210]	1	1,200	1,200		1	1,244	1,244	CIS
1.22	Specialized Teaching Lab [210]	1	1,004	1,004		1	1,064	1,064	CIS
1.23	Teaching Labs [210]	2	800	1,600		1	917	917	CIS
1.31	Computer Lab [210]	1	740	740		1	673	673	ECE
1.32	Digital Systems Lab [210]	1	740	740		1	673	673	ECE
1.33	Microcontrollers Lab [210]	1	740	740		1	665	665	ECE
1.34	Microprocessor Lab [210]	1	740	740		1	661	661	ECE
1.35	Intro to Computer Engineering Lab [210]	1	740	740		1	663	663	ECE
1.36	Communication Circuits Lab [210]	1	740	740		1	746	746	ECE
	INSTRUCTIONAL NSF TOTAL			**16,759**				**14,331**	
Laboratory									
2.01	Competition Spaces [250]	5	1,200	6,000		0	0	0	College
2.01a	Flex Project Area (Formula Baja HPV)			0		1	2,188	2,188	College
	Aero & UAV					1	496		College
	Composite					1	360		College
	Conc Canoe					1	506		College
2.01b	Computer Lab			0		1	842	842	College
2.01c	Collabarative Learning			0		1	3,399	3,399	College

	Collaborative Learning Office					1	197	197	College
	Collaborative Teaming					4	213	852	College
2.01d	Motor Assembly			0		0	662	0	College
2.01e	Paint Shop			0		1	109	109	College
2.02	Student Shop [250]	1	750	750		1	894	894	College
2.03	Central Support Space [755]	1	750	750		0	0	0	College
2.11	Structures Lab [250]	1	4,000	4,000		1	1,392	1,392	CE
	Concrete Mixing Lab					1	916	916	
	Curing Room					1	109	109	
2.12	Insulated Pump Room [255]	1	240	240		0	0	0	CE
2.13	Instrumentation and Calibration Room [255]	1	480	480		0	0	0	CE
2.14	Control Room [255]	1	240	240		0	0	0	CE
2.21	Robotics Lab [250]	1	500	500		1	469	469	CIS
2.22	Security Lab [250]	1	500	500		1	605	605	CIS
2.23	KDD Lab [250]	1	300	300		1	314	314	CIS
2.24	High Assurance Lab [250]	1	1,000	1,000		1	916	916	CIS
2.25	Kedzie Mutli_Agent Robotics Lab [250]	1	800	800		1	694	694	CIS
2.26	GK-12/Embedded Systems Lab [250]	1	600	600		1	654	654	CIS
2.27	Bioinformatics Lab [250]	1	400	400		1	463	463	CIS
2.28	Cyber Defense Lab [250]	1	1,200	1,200		1	1,348	1,348	CIS
	Shared Meeting					1	200	200	
2.29	Program Adaptable [070]	1	1,500	1,500					CIS
2.29a	Student Center			0		1	997	997	CIS
2.29b	Teaching Assitance			0		1	388	388	CIS
2.29c	ACM			0		1	154	154	CIS
2.31	Wireless Hardware Lab (W H L) [250]	1	300	300		1	317	317	ECE
2.32	Power Electronics Lab [250]	1	740	740		1	664	664	ECE
2.33	NASA / Sandia Lab [250]	1	700	700		1	471	471	ECE
2.34	Biomed - Bioinstrumentation Lab [250]	1	740	740		1	1,293	1,293	ECE
2.35	Biomed - Medical Devices Lab [250]	1	740	740		0	553	0	ECE
2.35a	Bio-Prep Lab			0		1	140	140	ECE
2.36	Smart Grid Lab [250]	1	740	740		1	664	664	ECE
2.37	Program Adaptable [070]	1	260	260					ECE
2.37a	Acoustical Isolation Room			0		1	90	90	ECE
2.37b	Faraday Cage			0		0	110	0	ECE
2.38	Roof Area Research Support								ECE
2.38a	Penthouse Storage			0		1	336	336	ECE
	LABORATORY NSF TOTAL			**23,480**				**22,075**	

Collaboration									
3.01	Hospitality Center Reception Lounge [650]	1	700	700		1	1,038	1,038	College
	Office					1	172	172	College
	Assistant Dean					1	199	199	College
3.02	Hospitality Center Meeting Room [680]	1	750	750		0	0	0	College
3.03	Large Conference Room [680]	1	1,850	1,850		1	1,216	1,216	College
	Collaborative Teaming					4	245	980	College
3.04	Medium Conference Room [350]	1	1,240	1,240		1	1,318	1,318	College
3.05	Small Conference Room [350]	1	620	620		1	318	318	College
	Small Conference Room [350]					1	552	552	
3.06	Seminar [410]	2	530	1,060		0	496	0	College
3.07	Common Lounge (CL) [410]	2	365	730		0	331	0	College
3.21	Meeting Area [350]	1	120	120		1	165	165	CIS
3.22	Copy Area [315]	1	160	160		0	110	0	CIS
3.23	Department Lounge [315]	1	400	400		1	208	208	CIS
3.31	Copy Area [315]	1	180	180		1	232	110	ECE
3.32	Meeting Area [350]	1	120	120		0	165	0	ECE
3.33	Department Lounge [315]	1	400	400		1	283	283	ECE
3.34	Graduate Research Area	4	300	1,200		3	462	1,386	ECE
	COLLABORATION NSF TOTAL			**9,530**				**7,945**	
Offices									
4.11	Faculty Office (FO) [310]	3	140	420		0	142	0	CE
4.21	Reception Office/Waiting [310]	1	440	440		1	743	743	CIS
4.22	Department Head Office [310]	1	260	260		1	240	240	CIS
4.23	Staff Office [310]	3	140	420		3	140	420	CIS
4.24	Faculty Office (FO) [310]	25	140	3,500		25	144	3,600	CIS
4.25	System Administrator Office (SAO) [310]	2	140	280		2	142	284	CIS
4.26	Technician Office (Tech) [310]	1	140	140		0	142	0	CIS
4.27	Graduate Research Open Office [310]					1	1,425	1,425	CIS
	Meeting					1	210	210	CIS
4.31	Reception Office/Waiting [310]	1	440	440		1	598	598	ECE
4.32	Department Head Office [310]	1	260	260		1	214	214	ECE
4.33	Project Coordinator Office [310]	1	160	160		1	137	137	ECE
4.34	Staff Office [310]	3	140	420		3	123	369	ECE
4.35	Advisors Office [310]	1	160	160		1	142	142	ECE
4.36	Faculty Office (FO) [310]	24	140	3,360		28	144	4,032	ECE
4.37	System Administrator Office [310]	1	250	250		1	165	165	ECE
4.38	Graduate Research Offices [310]	10	140	1,400		1	1,443	1,443	ECE

	OFFICES NSF TOTAL			**11,910**				**14,022**	
Building Support									
5.01	Catering Kitchen [685]	1	315	315		1	181	181	College
5.02	IT Support Room (IT) [036]	3	25	75				0	College
5.03	Departmental IT Support (IT Supp) [036]	3	100	300				0	College
5.04	Lactation Room (Lac) [590]	1	115	115				0	College
5.05	Custodial Rooms (JC) [021]	3	80	240		4		0	College
5.11	Exterior Wash Pit								CE
	Storage					3	355	1,065	College
5.21	Storage (S) [315]	1	80	80		1	80	80	CIS
5.22	Storage/Hardware [715]	1	250	250		1	226	226	CIS
5.23	Data Center [710]	1	1,500	1,500		1	2,528	2,528	CIS
5.31	Storage (S) [315]	1	80	80		1	80	80	ECE
5.32	Storage/Hardware [315]	1	200	200		1	226	226	ECE
	BUILDING SUPPORT NSF TOTAL			**2,425**				**4,386**	
	TOTAL BUILDING NET ASSIGNABLE			**64,104**				**62,759**	
	TOTAL BUILDING GROSS S.F.			**99,198**				**108,600**	

Program Description

- General College of Engineering

The College of Engineering allocated space that consist of a 250 person lecture hall, various classrooms with distance learning capabilities and a computer lab that can be easily converted to a classroom when needed. Most of these spaces are located on the ground and first floor that are designated as public spaces within the facility. The Lecture hall is a two story space than can be accessed from both ground and first floor. It is located right across from the existing Fiedler Hall lecture hall for easier access and wayfinding. It shares a catering warming kitchen with the Large Conference Room on the first floor.

One of the “science on display” space called “Flex lab” is located on the ground floor. This space will be utilized as designated competition project spaces for the students. It will display exciting projects going on in the College while acting as a recruitment tool for the incoming students as well as anyone passing through the space.

To reinforce the main entry into the engineering complex, Phase IV will expand out into the existing east entry. It will create a 3-story volume that can be easily identified as the main

complex entry from the campus side. Once inside, there will be an enclosed and open College Reception area that will welcome the students and visitors.

- Civil Engineering (CE)

The Civil Engineering department spaces for the expansion are all located on the south side of the building with direct access to the loading area. The existing staging for the Asphalt Lab will be remained at current location but will be enclosed inside of building. All other loading and staging activities will be relocated to the new Loading Yard on the south side of complex. Structures Lab will have 100 kip rated strong floor with one five ton overhead crane system. It will have an overhead door large enough for a direct semi-trailer access into the Structures Lab. Structures Lab and adjacent Concrete Mixing Lab will be lowered 4'-0" into the ground to provide 14'-0" clear height for the overhead crane system. There will be an overhead door between the Structures Lab and Concrete Mixing Lab to accommodate any large concrete beam movement in-between the two labs. Curing Lab will be operated at 100 RH with 75 degree temperature throughout the year.

- Computer Information Sciences Engineering (CIS)

The Computer Information department consist of roughly 20,000 square feet of space within the new Phase IV project. Within this area are spaces for faculty, graduates, and a number of teaching labs that will be used for either research or instructional with each lab serving a specific purpose.

One of the main elements in the department is the Data Center. This is a showcase space and will house vertically stacked data processing servers, including dense frame and rack-mounted processing systems. It will house the servers for the College as well as some that will be designated for the University functions. Servers will be served from the overhead infrastructure that will have the backup air and power systems.

- Electrical and Computer Engineering (ECE)

The Electrical and Computer Engineering department consist of roughly 18,000 square feet of space within the new Phase IV project. Within this area are spaces for faculty, graduates, and a number of teaching labs that will be used for either research or instructional with each lab serving a specific purpose.

A Faraday Cage support lab and a Sound Isolation support lab are located on the third floor adjacent to other research spaces. On the roof top, there are areas allocated to accommodate outdoor research activities involving solar panels, wind turbines and satellite tracking devices.

- Daylighting

The faculty offices are located spread throughout the north wing of the Phase IV. They either face the atrium, light well or outside landscape to bring in as much daylighting into the offices. There will be interior glazing on the office walls to encourage better communication as well as safety. On each CIS and ECE floors, there will be a common lounge space that will encourage

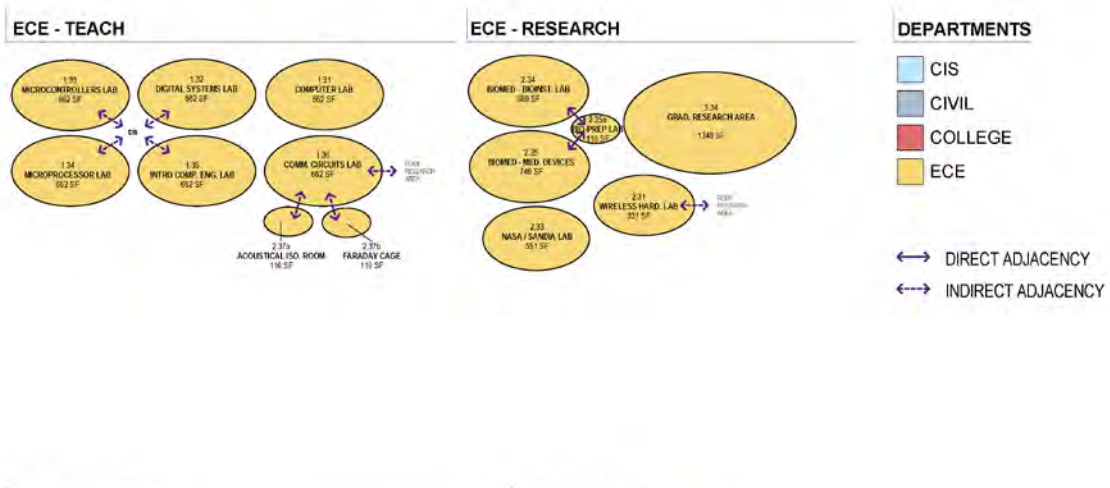
collaboration and teamwork. Most of the offices will have interior glazing to allow light into the corridor to make the interior spaces more vivant and cheerful.
The Graduate student areas to be flexible open office system and mobile tables that can be reconfigured to enhance teamwork and collaboration. The atmosphere will encourage everyone to freely and openly discuss ideas and interact with each other.

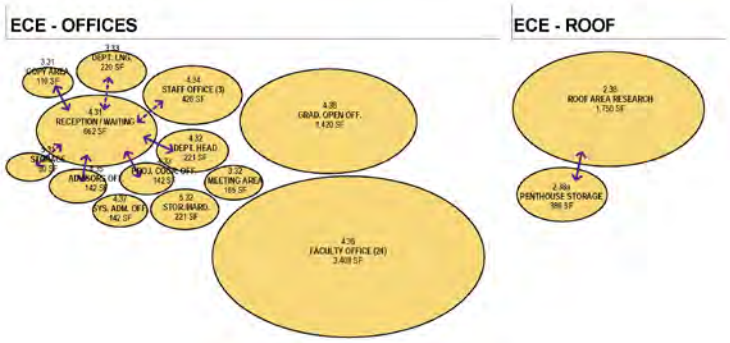
To minimize the impact of the new Phase IV expansion to the existing windows, most of the areas where the Phase 4 and existing building collide there is either an atrium or light well to still provide daylighting into the existing spaces.

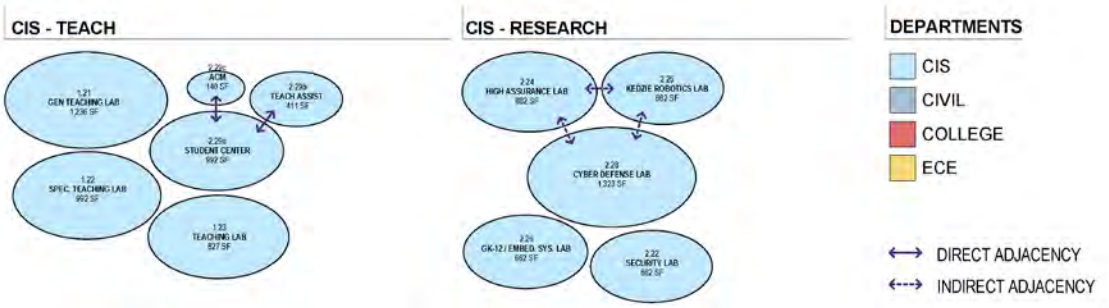
- Loading Yard

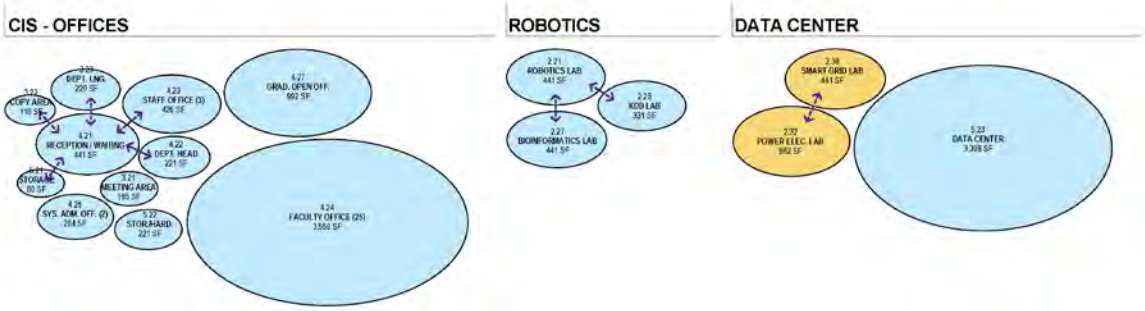
The service entrance for the loading yard is located at the south side of the building facing the College Heights. It will be sized to accommodate one semi-trailer or a similarly sized vehicle as well as enough three-way turning space for a dump truck. It will also house the emergency generator and en electrical transformer. All the service functions will be physically separated from the required Civil Engineering functions in the yard. To serve the existing overhead doors for both Durland and Rathbone, an industrial service corridor has been established on the ground floor. It is sized wide enough for an electrical fork lift access and turn. Some of the bigger existing equipment can be services directly in/out of the west entry loading out into the courtyard.

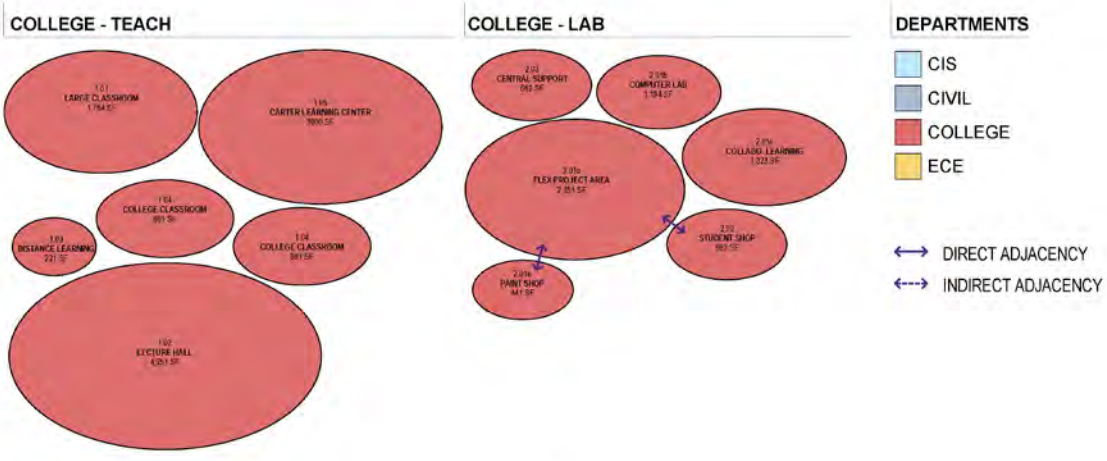
Program Adjacency Diagram

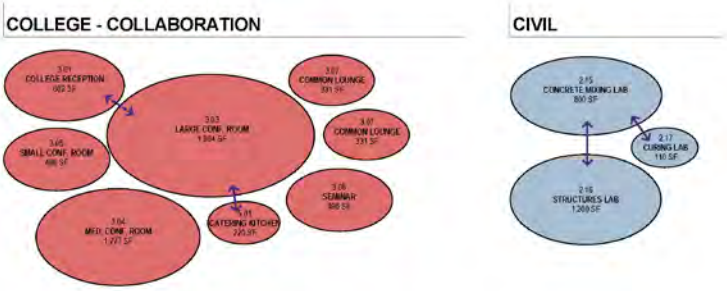




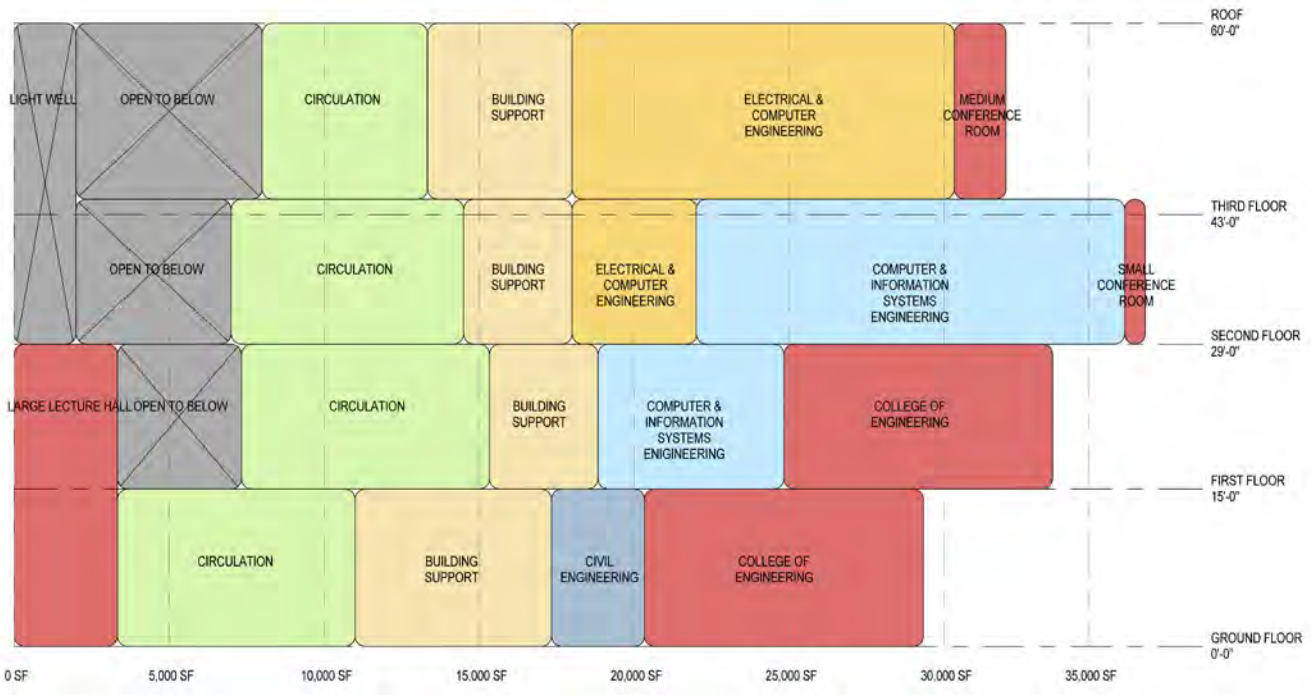

CIS - TEACH
1.21 GEN TEACHING LAB 1,236 SF
2.29c ACM 140 SF
2.29b TEACH ASSIST 411 SF
2.29a STUDENT CENTER 992 SF
1.22 SPEC. TEACHING LAB 992 SF
1.23 TEACHING LAB 827 SF
CIS - RESEARCH
2.24 HIGH ASSURANCE LAB 882 SF
2.25 KEDZIE ROBOTICS LAB 882 SF
2.28 CYBER DEFENSE LAB 1,323 SF
2.26 GK-12 / EMBED. SYS. LAB 882 SF
2.22 SECURITY LAB 882 SF
DEPARTMENTS
CIS
CIVIL
COLLEGE
ECE
DIRECT ADJACENCY
INDIRECT ADJACENCY


CIS - OFFICES
3.21 COPY AREA 110 SF
3.23 DEPT. LNG. 220 SF
4.23 STAFF OFFICE (3) 426 SF
4.27 GRAD. OPEN OFF. 882 SF
4.21 RECEPTION / WAITING 441 SF
4.22 DEPT. HEAD 221 SF
3.11 STORAGE 80 SF
3.21 MEETING AREA 165 SF
4.26 SYS. ADM. OFF. (2) 284 SF
3.22 STOR./HARD. 221 SF
4.24 FACULTY OFFICE (25) 3350 SF
ROBOTICS
2.21 ROBOTICS LAB 441 SF
2.23 KI09 LAB 321 SF
2.27 BIOINFORMATICS LAB 441 SF
DATA CENTER
2.30 SMART GRID LAB 441 SF
2.32 POWER ELEC. LAB 882 SF
5.23 DATA CENTER 3,308 SF


COLLEGE - TEACH
1.01 LARGE CLASSROOM 1,764 SF
1.05 CARTER LEARNING CENTER 3000 SF
1.04 COLLEGE CLASSROOM 861 SF
1.03 DISTANCE LEARNING 221 SF
1.04 COLLEGE CLASSROOM 861 SF
1.02 LECTURE HALL 4,251 SF
COLLEGE - LAB
2.03 CENTRAL SUPPORT 882 SF
2.01b COMPUTER LAB 1,764 SF
2.01a FLEX PROJECT AREA 2,251 SF
2.01d COLLAB. LEARNING 1,323 SF
2.01c STUDENT SHOP 882 SF
2.01b PAINT SHOP 441 SF
DEPARTMENTS
CIS
CIVIL
COLLEGE
ECE
DIRECT ADJACENCY
INDIRECT ADJACENCY


COLLEGE - COLLABORATION
3.01 COLLEGE RECEPTION 882 SF
3.03 LARGE CONF. ROOM 1,764 SF
3.07 COMMON LOUNGE 331 SF
3.07 COMMON LOUNGE 331 SF
3.05 SMALL CONF. ROOM 486 SF
3.06 SEMINAR 868 SF
3.04 MED. CONF. ROOM 1,277 SF
3.31 CATERING KITCHEN 220 SF
CIVIL
2.15 CONCRETE MIXING LAB 880 SF
2.17 CURING LAB 110 SF
2.16 STRUCTURES LAB 1,269 SF

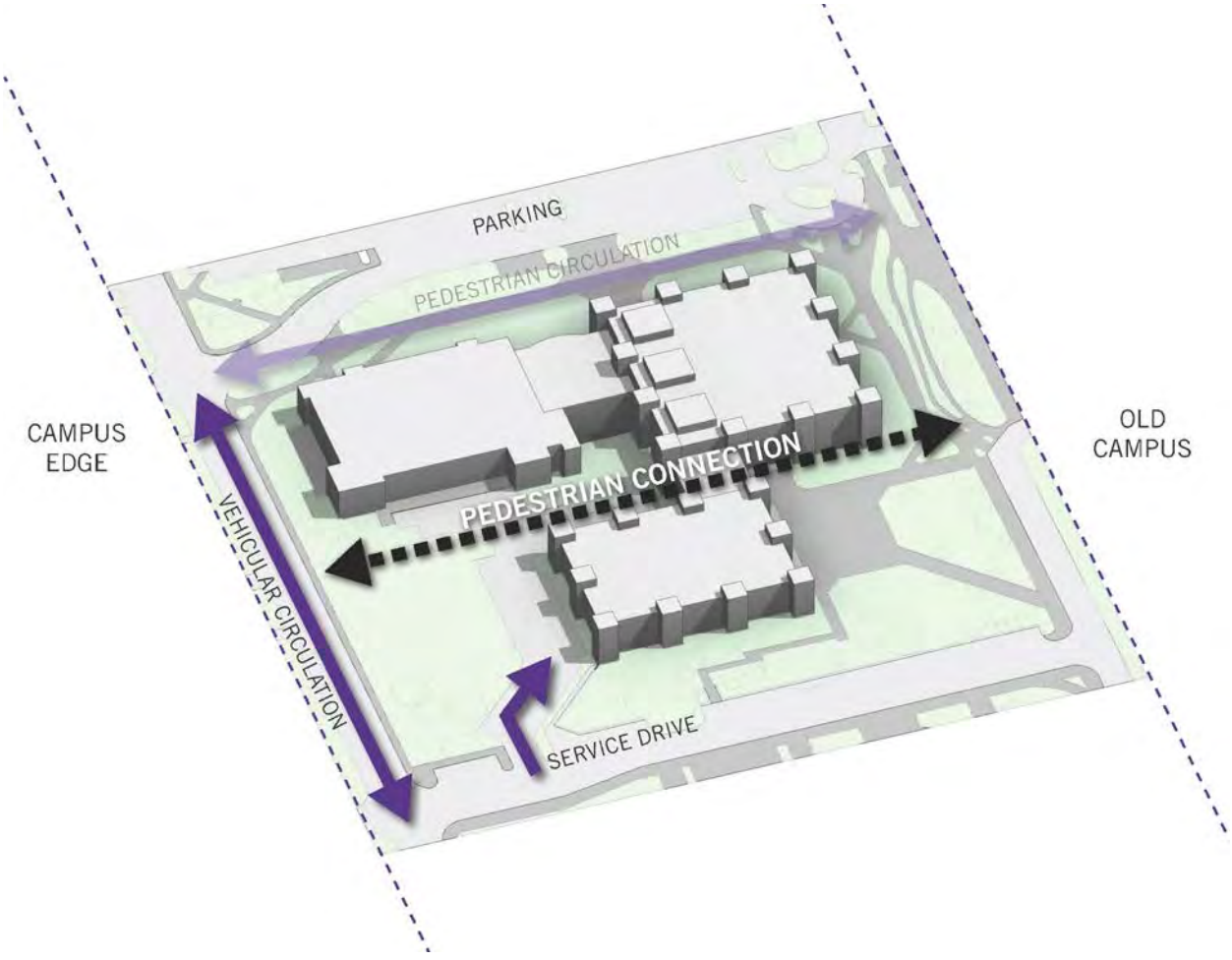
Program Stacking Diagram



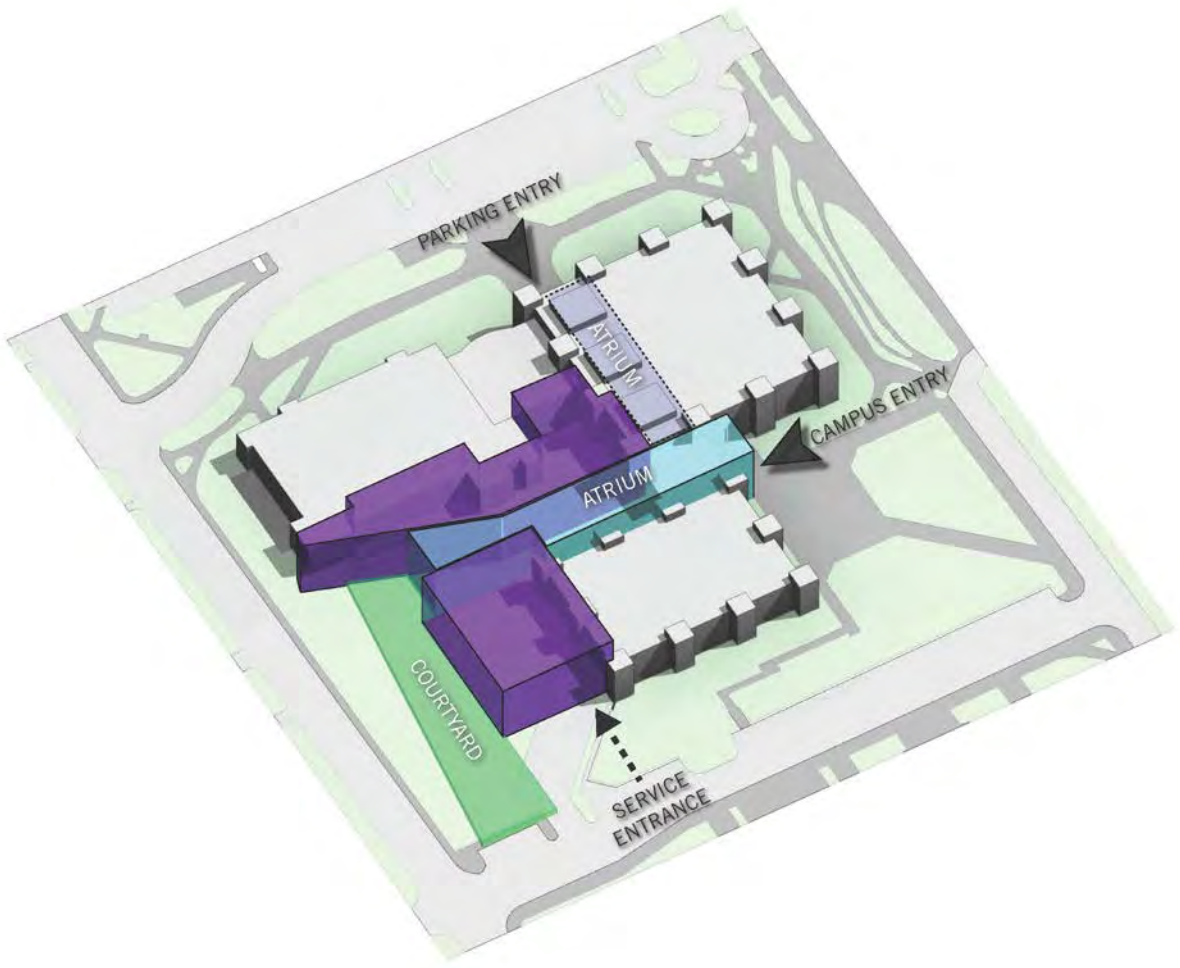
Architectural Design

The Existing Engineering complex is anchored by a north-south atrium which connects the three phases of the building and provides a breakout space for the library, auditorium and major classroom spaces. The existing entries at the ends of the atrium, while understated, provide entry points which align with the major flow of pedestrians on the north side of the building and the old campus to the east. The center of the complex is a service court.

As an Initial conceptual study, three distinct massing schemes were studied. The starting point of all 3 was the organizational concept of establishing a strong east-west axis which aligns with the east entry of the building, and moving service to the southern edge of the site. After review, the Gallery scheme, which proposed a fully enclosed atrium connector along the entire axis was selected as the scheme to develop further.



By moving the service out of the center of the building, the new addition establishes a strong east-west axis for the building which ties to the new program on either side, and provides a bold new image for the college along Denison Avenue. The east entry, anchored by the new college reception center, becomes the major center of the complex as the intersection point of the new and old circulation spines. The program is distributed in two masses, a linear element running along this axis on the northern edge containing primarily faculty offices, and second mass to the south containing laboratories and classrooms. Bridges provide connection points to the existing buildings at multiple levels. Existing docks are serviced internally via a service corridor that connects to a central loading dock on the southwest edge of the complex.



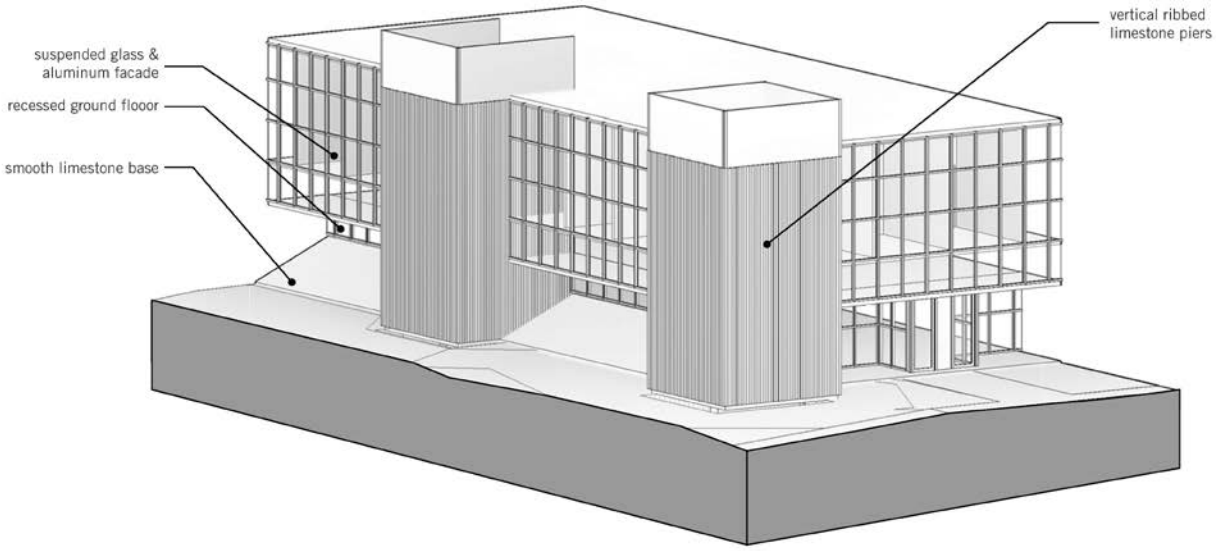
Architectural Language

The Existing Engineering Complex, as typified by the original Durland Hall, has a rigorous architectural language. Ribbed stone vertical piers are distributed on a regular module with suspended glass and metal bars between them. A smooth, canted Limestone base below these bars creates a substantial recess in the façade at the first floor.

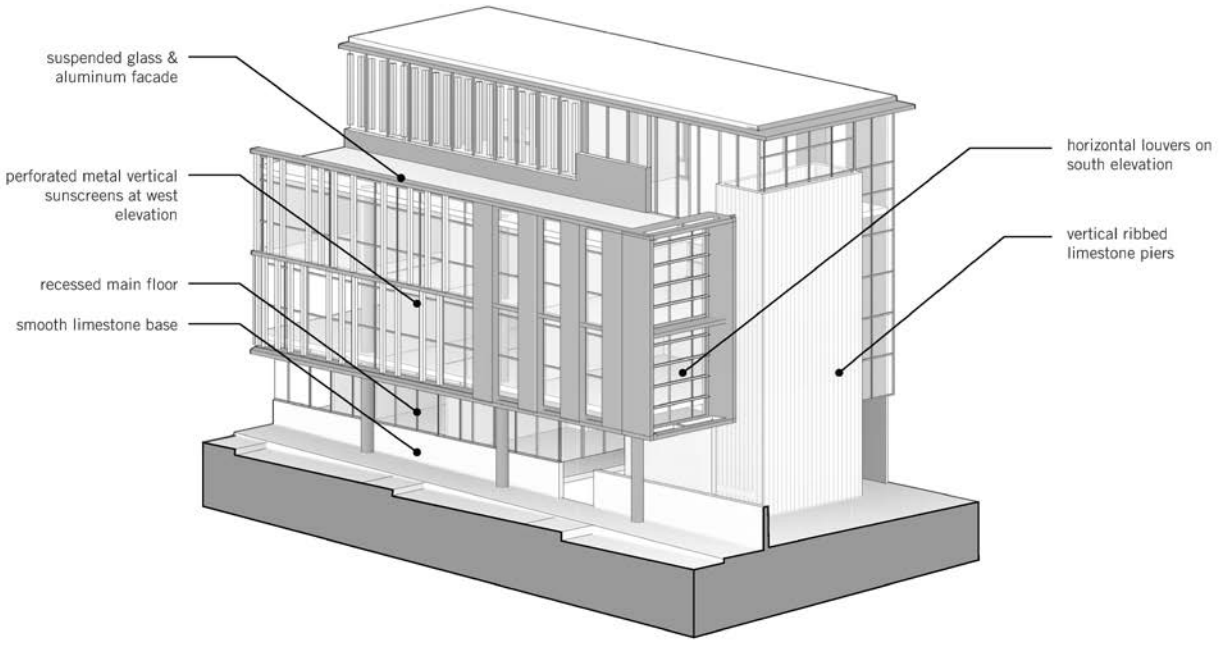
The Rathbone Building continues this exterior language at the base of the building, but increases the height of the suspended bar to two stories. The Fiedler addition departs from the rigid structural module of the first two phases, but maintains the basic material logic of limestone piers and suspended glass and metal bars. In Fiedler, round structural columns are also introduced in areas with longer glass spans.

The new addition maintains the basic structural logic of ribbed concrete piers, smooth limestone base, and suspended glass and metal bars. Like Fiedler, exposed round columns are used under the suspended bars. The ground floor is likewise recessed, but the limestone bases are vertical rather than canted to allow for partial covering of the adjacent walkways.

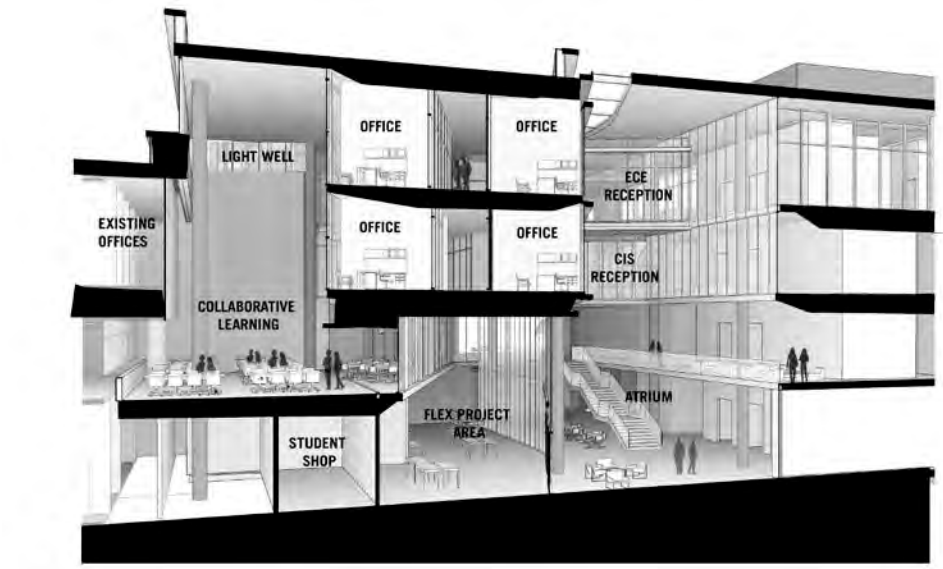
The language of the phase 4 addition also departs from previous additions in the material treatment of the glass and metal of the suspended bars. Instead of the Dark metal and glass used elsewhere on the complex, Phase 4 will use high performance clear glass and a lighter silver-gray metal to impart a lighter, more contemporary feel. Horizontal and Vertical Sunshades and overhangs will reduce heat gain and glare while maintaining views and daylight to and from the spaces inside.



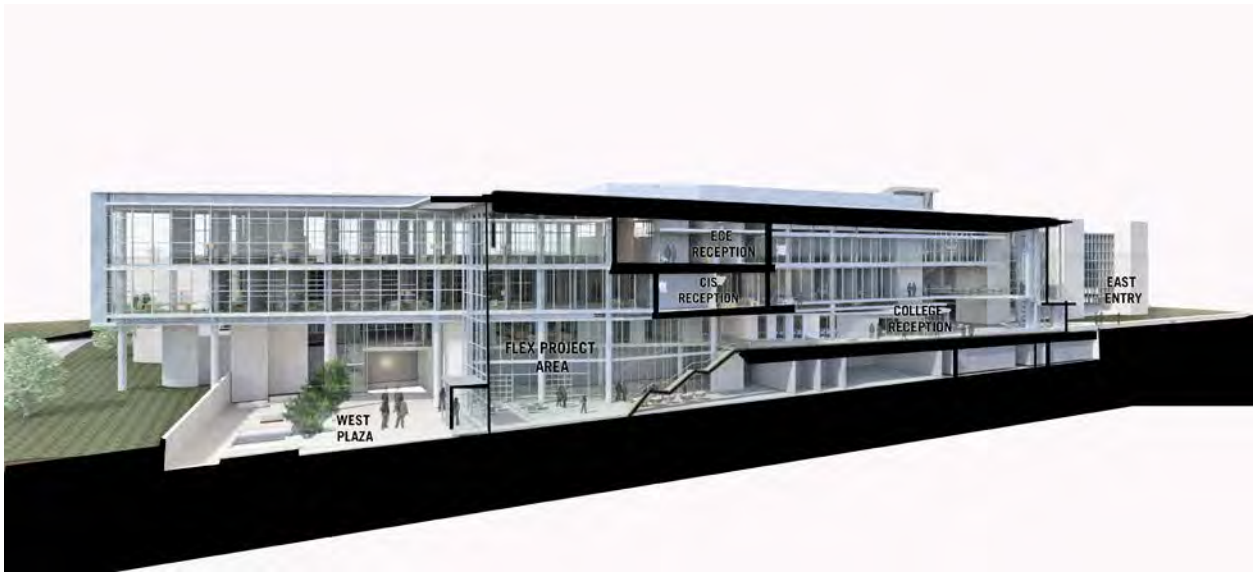
Existing



Phase IV



Building Section North South



Section Perspective

The Main circulation Space of the Addition is a 3-4 Story Atrium space which runs from the East Entrance to the courtyard. The Atrium space provides visual and circulation connections to the major program elements of the building along its path. A continuous clerestory on the south façade provides daylight to the atrium space and the faculty offices which run the full length of the north side.

The college reception center sits at the crossroads of the old and new atrium spines, welcoming and directing visitors and prospective students. A stair runs along the south edge of the space leading directly to the ECE and CIS reception areas which are suspended in the center of the space.

Aerial View from Southwest

Rain Garden

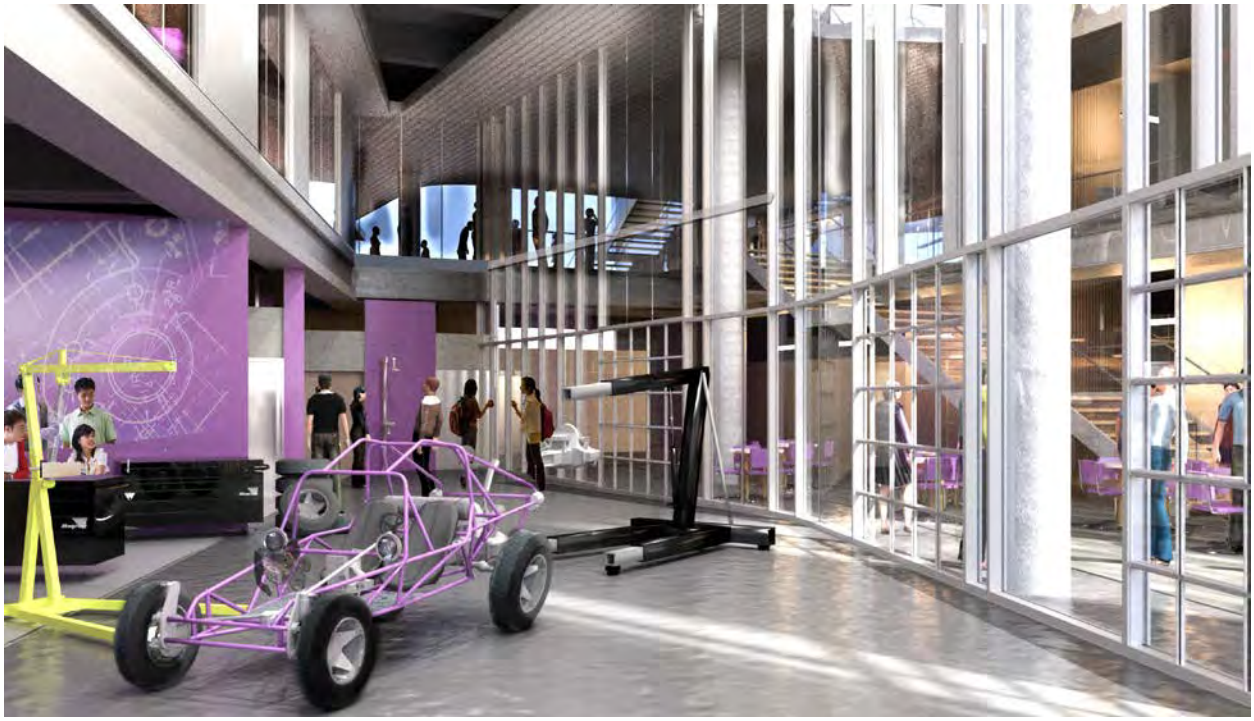
View from Dennison

East Entrance

East Atrium

West Atrium

Auditorium



Flex Project Laboratory

Collaborative Learning

Daylighting Study

Maximize diffuse daylight into occupied space to improve quality of light and reduce the need for artificial lighting (reduced electricity load)

- Minimize issues with glare for improved occupant comfort
- Minimize solar gains into space for energy performance and improved thermal comfort

Design for daylight is one of the more impactful sustainable strategies for an institutional building to be considered. It influences the architectural expression of a space, health and well-being of students and staff, as well as reduces energy consumption required for artificial lighting and cooling. The main benefits of design for daylight from a human standpoint have been found to improve student performance, create healthier indoor environments as well as result in increase in attendance.

The daylighting strategy for KSU is considering the complexities and tradeoffs that exist when designing a space and façade design for maximized use of daylight. Design for daylight involves providing a good illumination and distribution of daylight, while minimizing glare as well as solar gain into a space. Tradeoffs between design parameters and performance aspects needs to be evaluated and will vary with each orientation, geometry and type of space.

- **Atrium**

The Atrium space clerestory glazing provides daylight into the atrium space and also to surrounding spaces adjacent to the atrium. Given the South facing clerestory, a brise-soleil airfoil type shade is recommended to block the peak solar load and glare. The depth of the shade has been designed to mitigate solar insolation for solar altitude angles of 60deg for effective shading. The openness of the shade block direct solar gains on the exterior side while allowing diffuse light to come through the shade to maximize the amount of daylight into the atrium space.

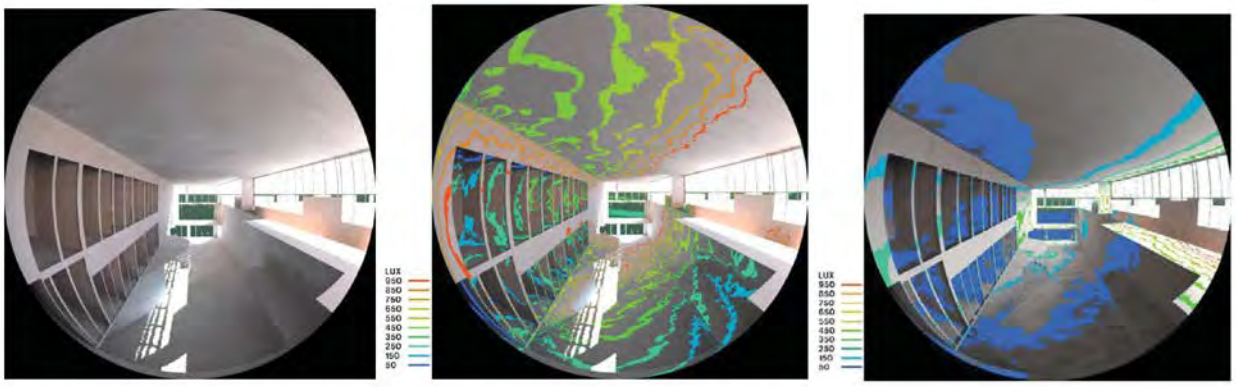


Figure 1. September 21st 9am sunny sky, glare (left) illuminance (middle) and overcast sky illuminance (right).

- **Laboratory**

The labs on the West side are designed with vertical perforated metal fins at a tilt, spaced at a distance which allows as much daylight into the space as possible while providing good shading at critical times.
There is a tradeoff in daylight levels into the space and amount of shading provided for glare and solar gain. Based on the building orientation, the vertical fins are tilted 40deg from façade and spaced to block most of the solar gains and glare in peak cooling season and into the shoulder seasons from late afternoon sun. Vertical strips of translucent or spandrel panels have been integrated into the curtain wall to reduce the glazing percentage while still providing good amounts of daylight into the rooms. Integration of spandrel panels are recommended to further help reduce the solar gain. Interior blinds are recommended to fully control late afternoon glare in summer, shoulder and winter season.

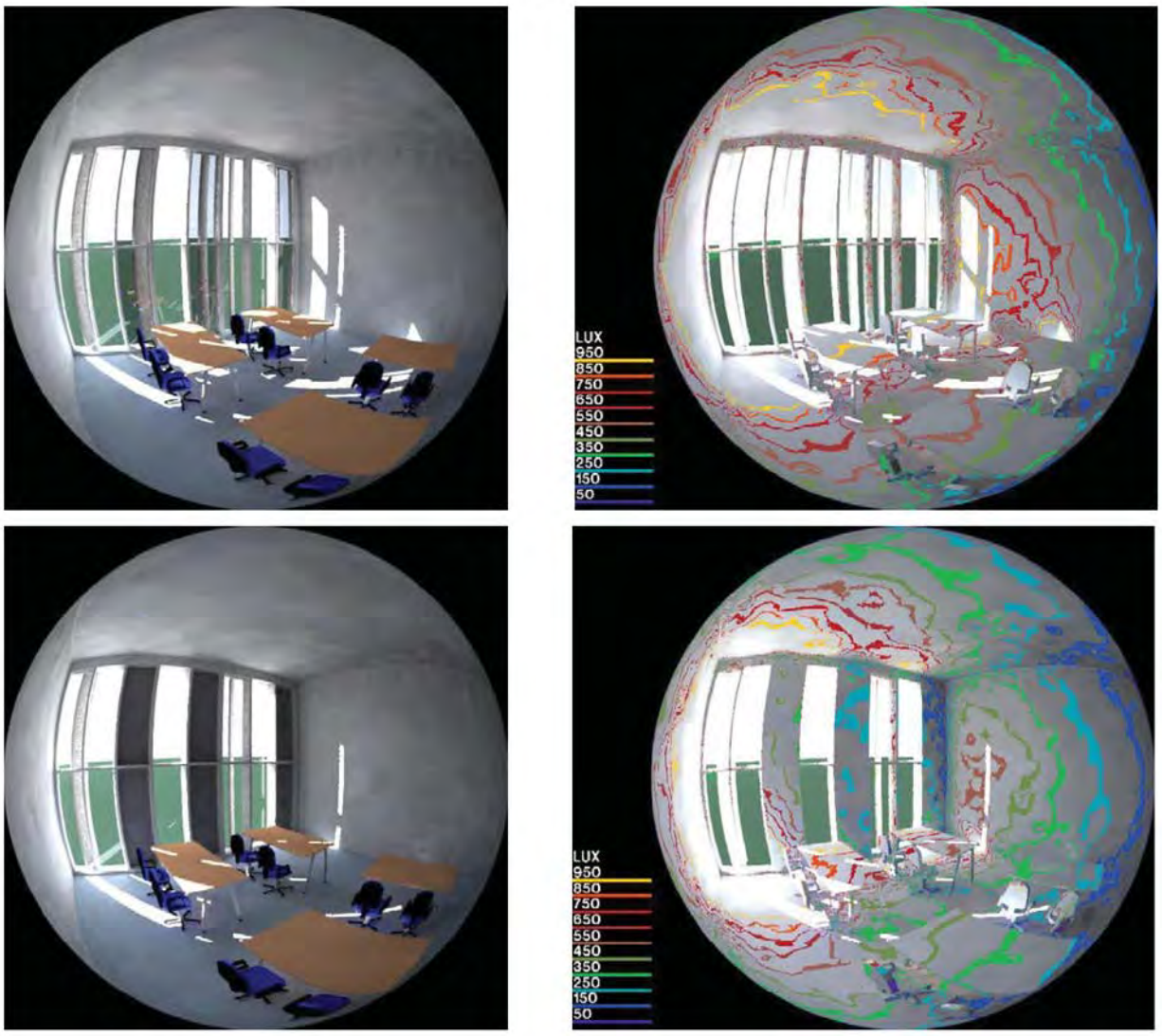


Figure 2. West orientation glare (left) and illuminance levels (right) with translucent infills (top) or spandrel panels (bottom), 3pm September 21st, sunny sky.

- **Office**

The offices on the Southwest side are designed with horizontal perforated overhang shades. The higher solar altitude on this orientation provides for offset overhang shades as an effective strategy that allows good views out, high luminance levels into the spaces, while providing good shade for peak solar days. The shades have been designed with a depth and spacing that effectively block the direct solar loads throughout summer and into shoulder season. It is recommended to tilt the shades to avoid reflections into the line of sight of occupants. The direct solar loads with this configuration are reduced fully in peak summer months, 60% in shoulder season and 30% in winter months. For wintertime interior blinds are recommended to control glare in the offices from the low altitude sun on clear days.

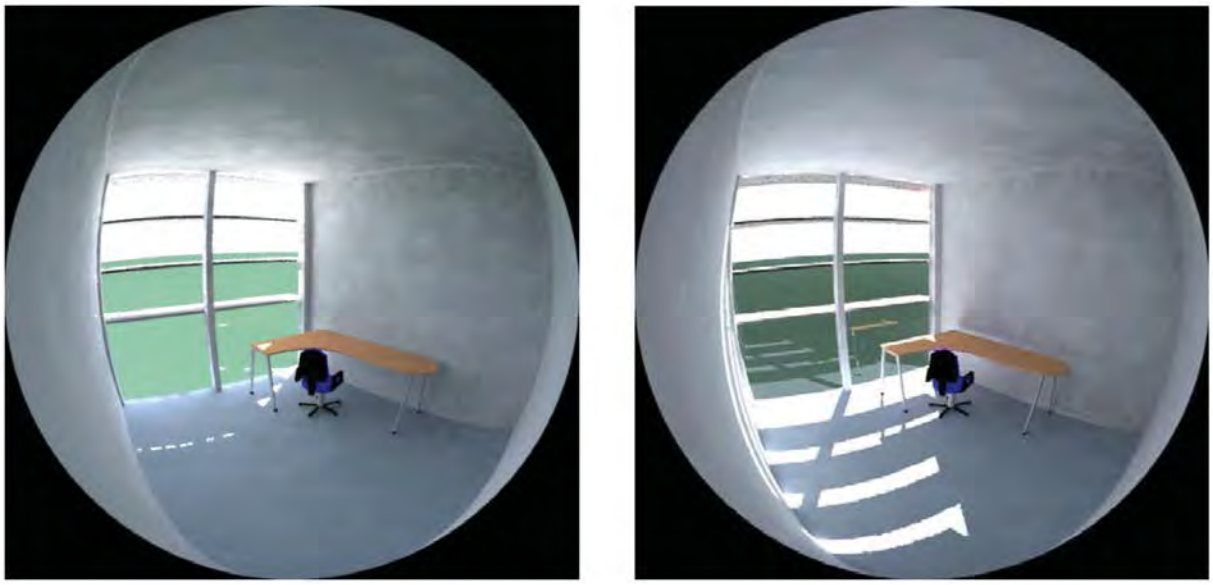


Figure 3. Office Southwest, glare June 3pm (left) and September 3pm (right), sunny sky

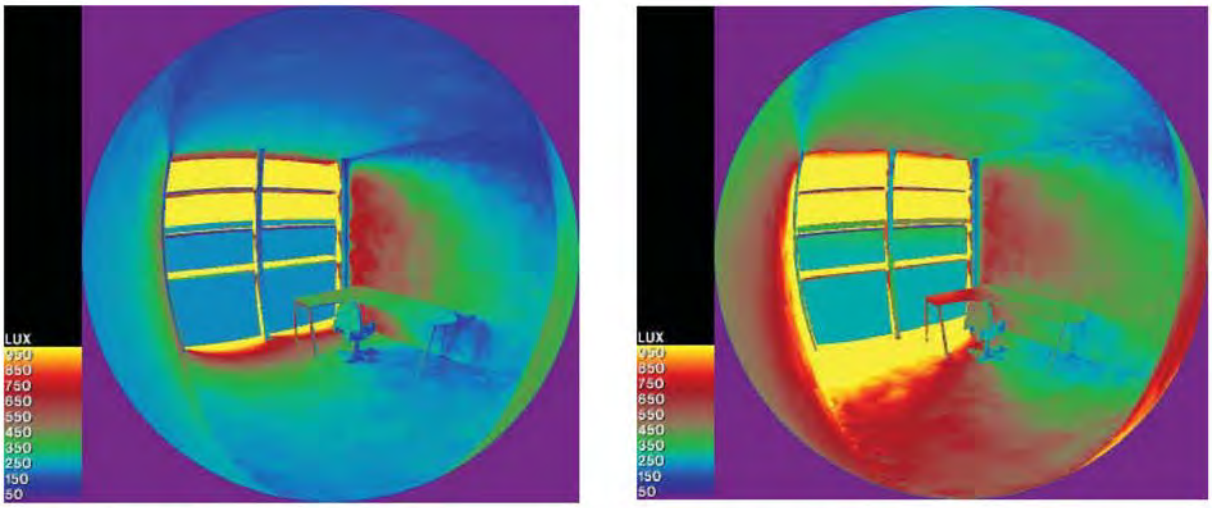


Figure 4. Office Southwest, illuminance June 9pm (left) and September 3pm (right), clear sky

Project Budget

	Orig. Program	Current View
Utilities and Site Improvements	$ 2,500,000	$ 2,500,000
Building Construction & Renovation	$ 28,000,000	$ 33,500,000
New Addition Area	*(99,198 SF)*	*(101,100 SF)*
Renovation Area		*(7,500 SF)*
Fire-Safety Improvements to Existing Buildings	Not Included	$ 1,500,000
Construction Subtotal	$ 30,768,618	$ 37,500,000
Furniture & Equipment	$ 769,215	$ 1,400,000
Audio/Visual, Telecom & Data	No Break Out	$ 1,750,000
Design Fees	$ 2,307,646	$ 2,564,000
Other Soft Costs & Contingency	$ 6,153,722	$ 1,786,000
Total	$ 39,999.194	$ 45,000,000

Funding

The project will be funded by a combination of private gifts and bond funds to be repaid with University Engineering Initiative Act state funds.

Maintenance

No additional funds will be requested for the maintenance of this building. The Phase IV wing of the Engineering Complex will be endowed.

Timeline

Board of Regents Approval	October	2011		
Legislative Authorization	April	2012		
Architect/Engineer Selection	December	2012	– April	2013
Design/Construction Documents	April	2013	– April	2014
CMAR Selection	January	2013	– April	2013
GMP Construction	March	2014	– August	2015
Completion	September	2015		