CALIFORNIA STATE UNIVERSITY, CHANNEL ISLANDS

GATEWAY HALL
PROGRAM & FEASIBILITY STUDY REPORT

07.07.17

DRAFT

Channel Islands
CALIFORNIA STATE UNIVERSITY

CO ARCHITECTS

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1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

PURPOSE

The following report has been developed for the California State University, Channel Islands, in order to establish a project scope for a two phase implementation of Gateway Hall. The purpose of the report is to define the goals, parameters and constraints of the project. It is also the intent of the report to provide design guidance to the architect by establishing a clear definition of design goals, space program, phasing, functional relationships, site and building design requirements. Unit rates for both phases have been developed based on this information, along with blocking and stacking diagrams and associated cost models (Section 5).

The project will be implemented in two phases of construction. Phase 1 of the project will relocate the current occupants from the existing Sage Hall and other existing locations on campus to a renovated building on an adjacent site, in response to deficiencies in their current location. Phase 1 is predominantly administration space, including enrollment services, student business services, academic advising, and faculty offices of the university. Phase 2 will provide a new front door to the campus through a blend of programs facing Santa Barbara Ave and within the North Quad. The programs include a welcome center, instructional space, 200p auditorium, and administrative space for Extended University and The Martin V Smith School of Business and Economics. Each Phase includes (2) design options within this report (Section 6), and a preferred option for each base is identified. The program is arranged to support the goals of the project, which are to provide student-centered buildings and facilitate an integrated, team-based delivery of services to students, staff and faculty.

PROJECT SITE

Gateway Hall will be constructed as a blend of the Phase 2 and Phase 3A projects outlined in the campus visions plan, prepared by ASG-Architects. The site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad (see Section 3.4). It currently has ~142,000 GSF of original structures from the Camarillo State Hospital that are not in use. The vision plan identifies which structures are to remain and to be demolished to allow for new structures, which is studied in this report. The proposed site plays a central role in development of a new campus precinct and energizing the north end of campus as well as defining the arrival point for those entering the campus from the north. The vision plan establishes this as a new symbolic point of arrival and public identity for the campus, with the aggregation of buildings in Gateway Hall playing a significant role in this regard, as a "front door". Furthermore, the addition of new instructional facilities at the north edge of the north quad will reinforce the educational nature of the quad and foster more student life and activity in the north end of the campus.

PROJECT PROGRAM

The target space program consists of 60,660 net assignable square feet (ASF) including departments from each of the following divisions:

- Enrollment Services
- Student Business Services
- Academic Advising
- Faculty Offices
- Extended University
- School of Business
- Interdisciplinary Instruction
- Computer Science
- Mathematics

Functional spaces listed in the space program under section 2 of this report were selected that fulfilled the project goals established during the Visioning phase of the project which were to:

- Optimize the delivery of services to the client
- Optimize collaboration between divisions and departments

CONCEPT DESIGN

Program test fits and space distribution studies suggest that Phase one of the project can accommodate 70-100% of the administrative program depending on how much area of the existing facilities is utilized. The phase 1 program generally locates all service centers, containing informational, transaction and counseling services functions on the first two levels, organized into groupings that encourage inter-departmental collaboration.

The Phase 2 portion of the project takes into consideration the master planning of the north quad and uses Del Norte and Madera Hall as a precedent for introducing large footprint, educational facilities to the quad. A number of studies were conducted to analyze the organization and massing of the public programs outside the quad along Santa Barbara Avenue, with the intent to build on the existing character of the campus and provide a inviting, navigable, and collaborative front door the University. Further studies were conducted to provide for welcoming courtyard environments intune with the scale and variety of exterior spaces elsewhere on campus. See section 6 for the design options for Phase 2. The preferred option consolidates program into (2) of the (3) developable quadrants on the site, landbanking a portion of the site for future use.

BUILDING AREA SUMMARY

The following table compares the original program area as provided by the University, with the program area requested by the various user groups representing each division.

	Program Area	*Building Area*
• Original Program Area	53,630 ASF	109,792 GSF
• Verified Program Area	60,690 ASF	123,717 GSF
• Difference	7,060 ASF	13,925 GSF

A grossing factor of 2.5 is used for Phase 1, and 1.67 was used for Phase 2. This is based on historical efficiencies of other, similar projects on campus. Several discussions with the project Building Advisory Committee to verify the program have taken place during programming, but should again be verified at the commencement of schematic design.

1.2 PROCESS

PROCESS

At the commencement of the study, CSUCI provided CO with a working, tabular program that was the result of a previously conducted programming process for the Gateway Hall facility in 2004. This process began by performing a basic analysis of the provided program, which was then used for a series of program verification meetings with a Building Advisory Committee (BAC). The BAC represented each of the departments in the tabular program.

The programming of Gateway Hall was a collaborative, interactive, and iterative process that included the (BAC) and leadership from the Department of Planning Design & Construction. As further outlined in Section 2.1, the program validation process commenced in March 2017 and was finalized in May 2017. A three meeting process was implemented to imagine, evaluate, and create the tabular and descriptive programs as well as a basic understanding of programmatic relationships and departmental phasing.

Following the programming process with the Building Advisory Committee, several stack and block iterations were studied and reviewed with CSUCI to arrive at (2) design options for both phases of the project. The program requirements and functional adjacencies established during the programming process were utilized in the development of each option and are further described in Section 6. These options were also developed within the guidelines of the recently completed campus master plan.

2.0 PROGRAM REQUIREMENTS

2.1 PROGRAMMING PROCESS

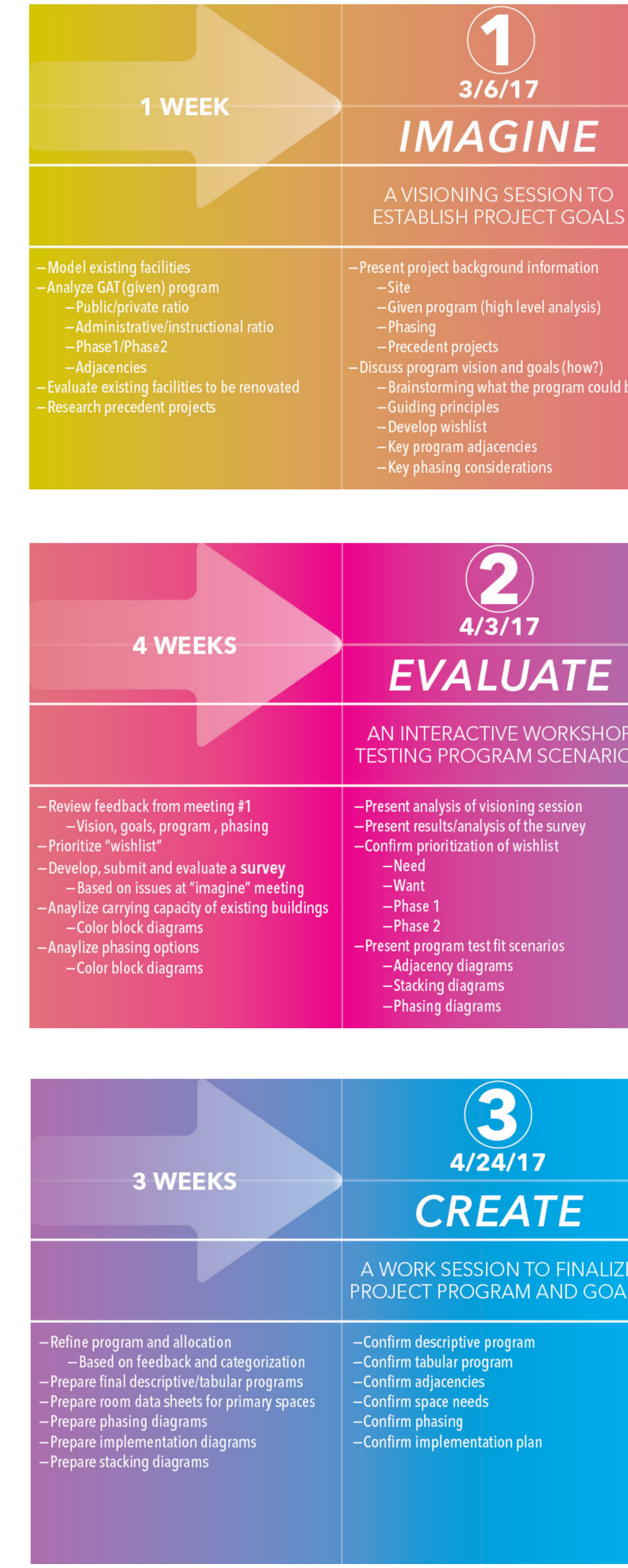
PROGRAMMING PERIOD

Programming for the project began in March 2017, and continued through three regularly scheduled workshops with committee members of the University with the final meetings in May 2017.

BUILDING ADVISORY COMMITTEE

Oversight for the development of the vision, goals and space program for the project was delegated by the University to Building Advisory Committee (BAC), which was comprised of leaders of each of the five University divisions a, since each is expected to have constituents who will be relocated into the new building. The BAC met throughout the programming process to review work presented by the programming team, provide recommendations and direction, and prioritize the various needs of the divisions within the scope parameters of the project.

LAST NAME	FIRST NAME	TITLE	DEPARTMENT
Gormley	John H.	AVP	Planning, Design and Construction, Campus Architect
Carlson	David	Associate Architect	Planning, Design, and Construction
Frisch	Scott A.	AVP	Academic Programs and Planning
Hung	Dang	AVP	Enrollment Services
Cordeiro	William P.	Dean	MVS School of Business and Economics
Andrzejewski	Susan	Associate Professor	MVS School of Business and Economics
Berg	Gary	Dean	Extended University
Fuentes	Nicholas	Director of Operations	Extended University
Claveau	David	Associate Professor	Computer Science



2.2 GOALS

A significant portion of the Gateway Hall Phase 1 renovation project is dedicated to the provision of various types of student services that will be provided by each of the three divisions. The programming team conducted a series of discussions with the BAC to define goals for the development of the project program.

From these discussions, two approaches emerged that strongly supported the university's goals of increasing student enrollment, improving student retention, and creating lifelong supporters.

STUDENT-CENTERED DELIVERY – In this approach, resources and efforts are focused on optimizing the delivery of services to the student, by placing their needs at the center of the delivery experience. However, these services must still be provided within the context of a number of challenges including:

- Reduced funding from the state
- Increasing demand for classes and enrollment, relative to reduced funding.
- Student demands for improvement in the quality of the university experience
- New methods for accountability, assessment and improvement

TEAM BASED SERVICE - In response, the University has recognized the need for improved collaboration and coordination between all departments providing student services. Efforts to date have resulted in improved service and efficiencies.

As a result, the BAC agreed that the design team should plan spaces, to the extent possible, to support an integrated approach to student centered service.

The building sites for Phase 2 of the project will play central roles in both as a new symbolic point of entry for the campus and an activated edge of the North Quad educational precinct. Through our programming discussions with BAC, several goals for the second phase of the project were established.

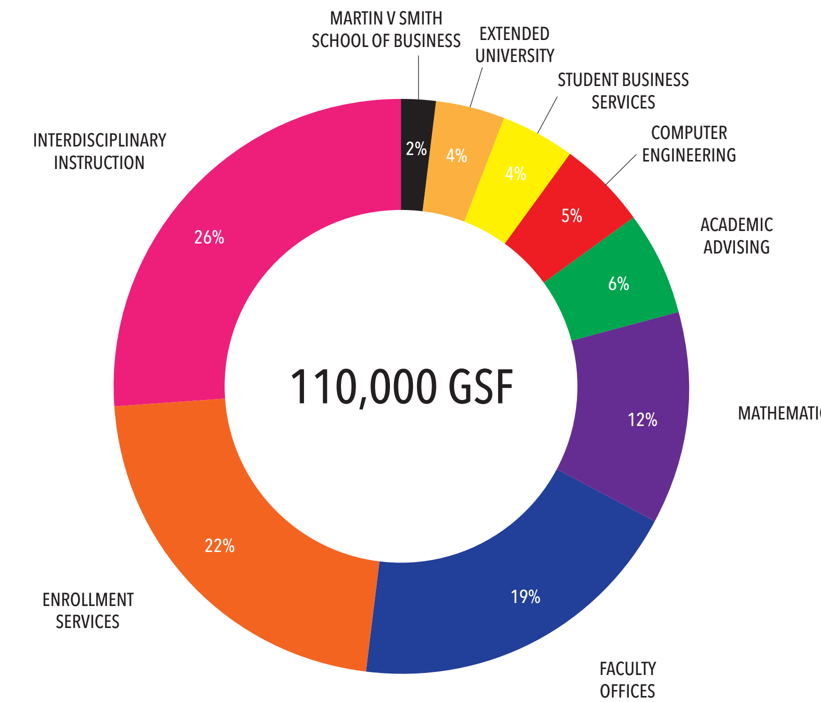
INTERPROFESSIONAL COLLABORATION – Building massing and layouts are to be arranged in such a way to encourage collaboration across departments and between students and faculty. In an effort to eliminate educational silos, the instructional programs of the project are carefully organized to create informal interior and exterior spaces for interaction and connectivity amongst the student body and faculty. The arrangement of program has the capacity to facilitate increased discourse and collaboration on campus to bring more components of the university together.

ORIENTATION AND WAYFINDING – The original planning of the campus as the Camarillo State Hospital was designed to thwart connections and limit circulation throughout the campus. Moreover, the consistency of architectural language on campus makes it difficult for first or second time visitors to campus to distinguish buildings and orientation. The intent for both phases of Gateway Hall are to create a strong sense of arrival and navigable, strongly connected circulation both internally within the building and externally between them.

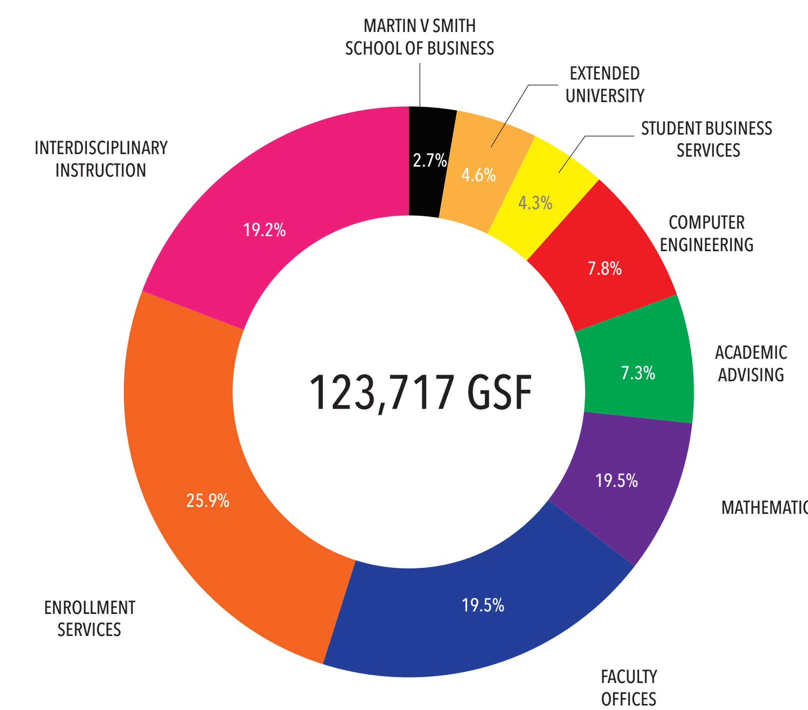
COMMUNITY– The public oriented programs along Santa Barbara Avenue, including the welcome center, 200-person auditorium, and administrative programs for the MVS School of Business and Economics and the Extended University should be configured and designed to create public outreach and also to invite community into the campus. These facilities and associated courtyards will become hubs for interaction between the university and public visitors.

2.3 SPACE PROGRAM

PROGRAM MODIFICATIONS THROUGH PROGRAMMING EFFORT

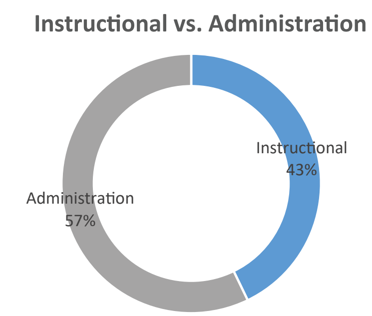


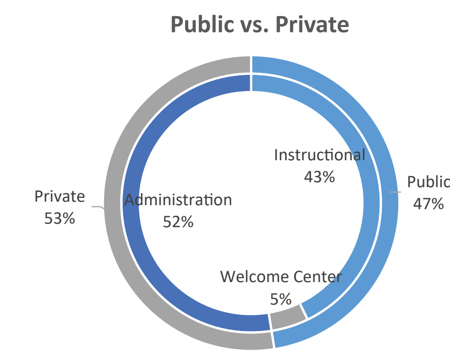
TABULAR PROGRAM PROVIDED BY CSUCI AT COMMENCEMENT OF STUDY

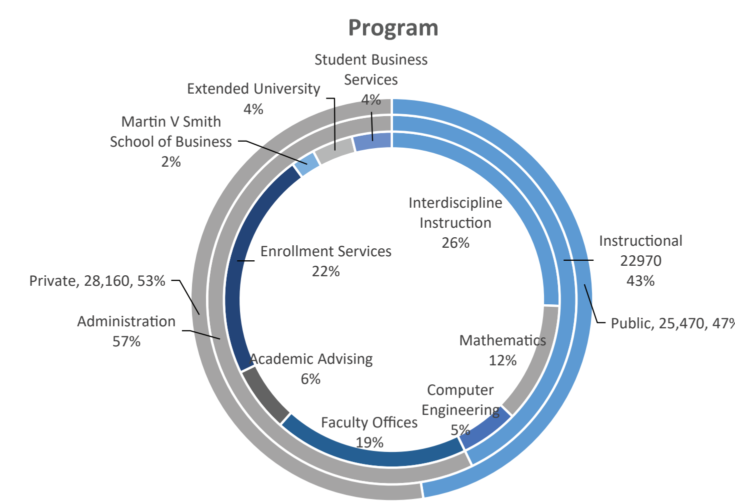


TABULAR PROGRAM REPRESENTING BAC FEED-BACK DURING PROGRAMMING PROCESS

2.3A PROGRAM RATIOS







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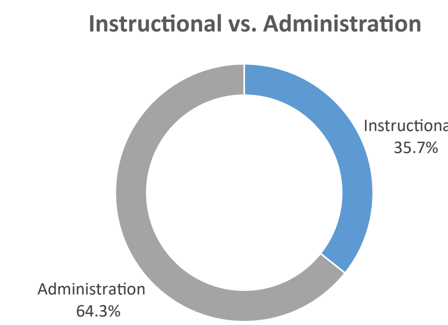
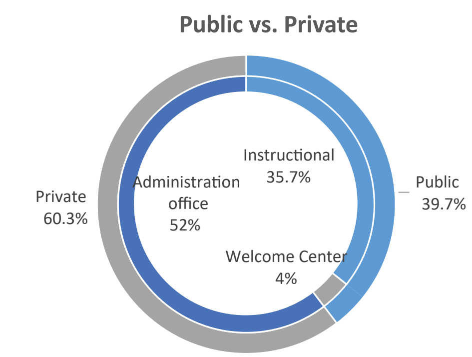
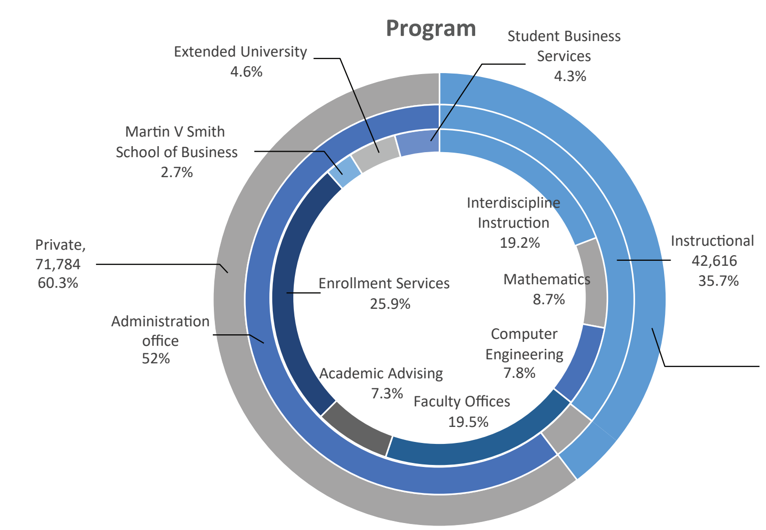
PROGRAM PROVIDED BY CSUCI AT COMMENCEMENT OF STUDY







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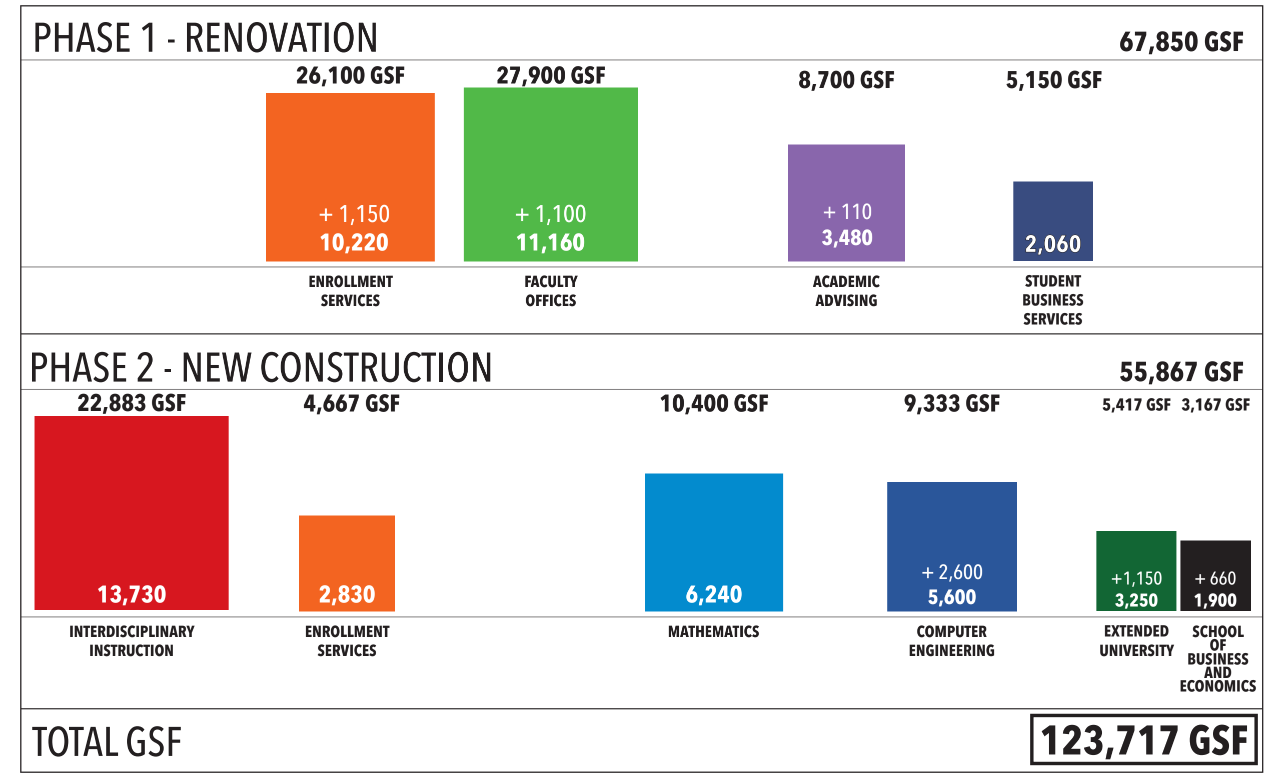
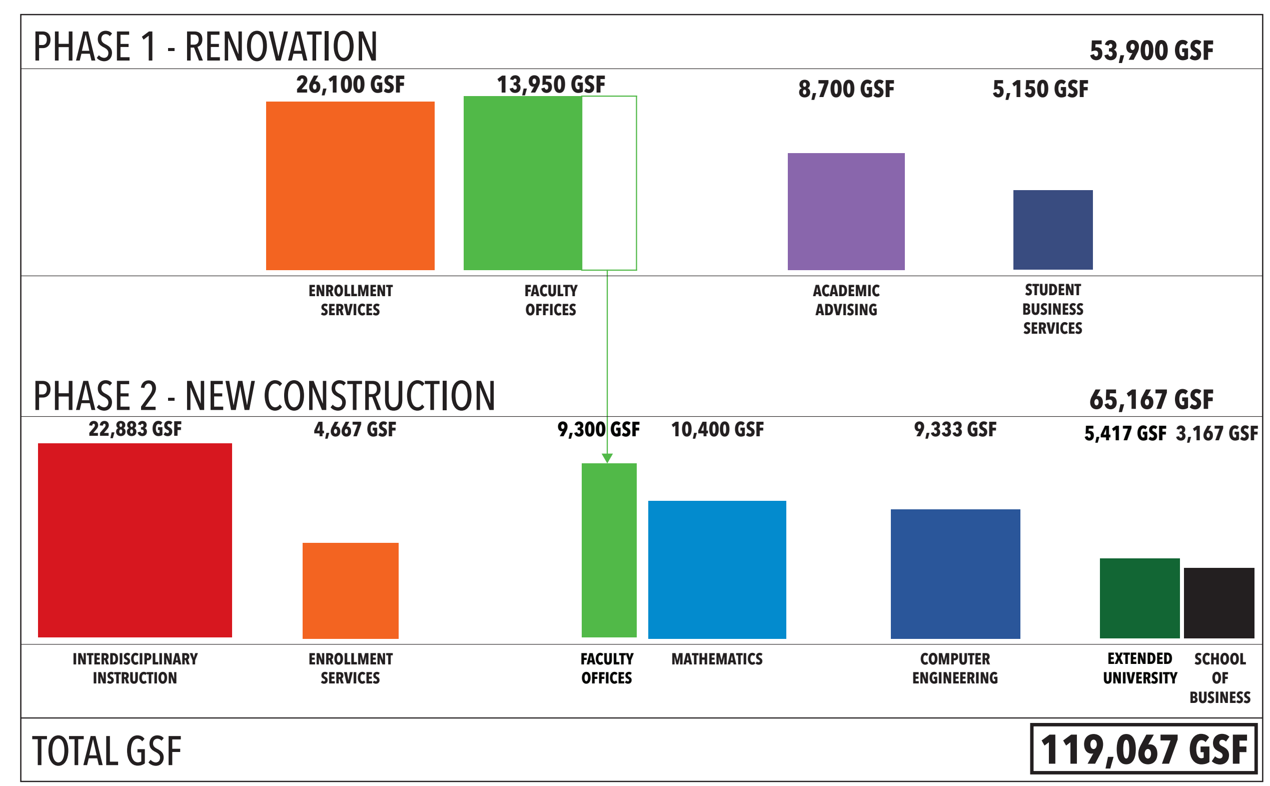
PROGRAM REPRESENTING BAC FEEDBACK DURING PROGRAMMING PROCESS

2.3B PROGRAM PHASING

OPTION 1 - PREFERRED



OPTION 2 - ALTERNATE



2.3C TABULAR PROGRAM

INTERDISCIPLINARY INSTRUCTION

INTERDISCIPLINARY INSTRUCTION (NO CHANGES FROM ORIGINAL PROGRAM)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Auditorium					
200p Tiered Lecture Hall	200	1	3000	**3,000**	**2**
Auditorium Storage		1	200	**200**	**2**
Auditorium Control Room		1	130	**130**	**2**
Lecture Hall					
60p Lecture Hall	240	4	1200	**4800**	**2**
40p Lecture Hall	160	4	800	**3200**	**2**
Self-Instructed Computer Laboratory					
24p Computer Lab	48	2	1200	**2,400**	**2**
				13,730	

	GSF TOTAL	**22,883**
AUDITORIUM	**GSF TOTAL**	**5,550**
LECTURE	**GSF TOTAL**	**17,333**

* No program changes to this category

STUDENT BUSINESS SERVICES

STUDENT BUSINESS SERVICES (PROGRAM)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Director	1	1	110	**110**	**1**
Assistant Director	1	1	110	**110**	**1**
Collections Specialist	2	2	80	**160**	**1**
Student Account Specialist	4	4	80	**320**	**1**
Cashier Stations	6	6	80	**480**	**1**
Waiting	2	1	220	**220**	**1**
Interview Room	2	1	220	**220**	**1**
Vault		1	220	**220**	**1**
Work Room		1	110	**110**	**1**
Storage		1	110	**110**	**1**
				2,060	
			GSF TOTAL	**5,150**	

* No program changes to this category

MATHEMATICS

MATHEMATICS (NO CHANGES FROM ORIGINAL PROGRAM)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
24p Instructional Lab	24	3	960	**2,880**	**2**
24p Instructional Lab	24	3	960	**2,880**	**2**
Lab Support		1	480	**480**	**2**
				6,240	
			GSF TOTAL	**10,400**	

* No program changes to this category

COMPUTER ENGINEERING

COMPUTER ENGINEERING (UPDATED PROGRAM PER 3/14/17 MEETING FEEDBACK)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
24p Instructional Lab	24	2	1200	**2,400**	**2**
Lab Support		1	600	**600**	**2**
40p Mechatronics Lab	40	1	2000	**2,000**	**2**
Lab Support/Shop		1	600	**600**	**2**
				5,600	
			GSF TOTAL	**9,333**	

ORIGINAL PROGRAM			
Stations	Space Qty	NSF each	NSF Subtotal
24	2	1200	**2,400**
	1	600	**600**
0	0	0	**0**
0	0	0	**0**
			3,000
		GSF TOTAL	**5,000**

FACULTY OFFICES

FACULTY OFFICES (UPDATED PROGRAM PER 3/14/17 MEETING FEEDBACK)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Faculty Office (Closed)	50	50	110	**5500**	**1**
Faculty Office (Shared)	40	20	160	**3200**	**1**
Clerical Faculty Support (Closed)	4	4	110	**440**	**1**
Clerical Faculty Support (Shared)	4	2	160	**320**	**1**
Admin Coordinator (Closed)	2	2	110	**220**	**1**
Admin Coordinator (Open)	2	2	80	**160**	**1**
8p Conference	8	1	360	**360**	**1**
12p Conference	12	1	480	**480**	**1**
Work Room		1	220	**220**	**1**
Mail Room		1	110	**110**	**1**
AVP Office	1	1	150	**150**	**1**
				11,160	
			GSF TOTAL	**27,900**	**PHASE 1**

ORIGINAL PROGRAM			
Stations	Space Qty	NSF each	NSF Subtotal
50	50	88	**4400**
40	20	160	**3200**
4	4	110	**440**
4	2	160	**320**
2	2	110	**220**
2	2	80	**160**
8	1	360	**360**
12	1	480	**480**
	1	220	**220**
	1	110	**110**
1	1	150	**150**
			10,060
		GSF TOTAL	**25,150**

ACADEMIC ADVISING

ACADEMIC ADVISING (UPDATED PROGRAM PER 3/14/17 MEETING FEEDBACK)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Director	1	1	110	**110**	**1**
Associate Director	2	2	110	**220**	**1**
~~Articulation Office~~		0	0	**0**	**1**
Analyst	1	1	110	**110**	**1**
Academic Advisor	12	12	110	**1320**	**1**
Administrative Support Coord'r	1	1	80	**80**	**1**
~~Administrative Support Assistant~~		0	0	**0**	**1**
Reception	1	1	160	**160**	**1**
12p Conference Room	12	1	360	**360**	**1**
Work Room		1	110	**110**	**1**
File Room		1	110	**110**	**1**
Peer Advising	15	15	60	**900**	**1**
				3,480	
			GSF TOTAL	**8,700**	

ORIGINAL PROGRAM			
Stations	Space Qty	NSF each	NSF Subtotal
1	1	110	**110**
1	1	110	**110**
	0	0	**0**
1	1	110	**110**
12	12	110	**1320**
1	1	80	**80**
	0	0	**0**
1	1	160	**160**
12	1	360	**360**
	1	110	**110**
	1	110	**110**
15	15	60	**900**
			3,370
		GSF TOTAL	**8,425**

ENROLLMENT SERVICES

ENROLLMENT SERVICES (UPDATED PROGRAM PER 4/11/17 MEETING FEEDBACK)					
Room Type	Stations	Room Qty	NSF each	NSF Subtotal	Phase
Associate VP	1	1	*150*	**150**	**1 or 2**
Assistant VP	1	1	*110*	**110**	**1 or 2**
Administrative Assistant	1	1	110	**110**	**1 or 2**
Analyst	1	1	110	**110**	**1 or 2**
Reception	1	1	160	**160**	**1 or 2**
16p Conference	16	1	480	**480**	**1 or 2**
8p Conference	8	1	240	**240**	**1 or 2**
Work Room	0	1	220	**220**	**1 or 2**
Administrative Services	0	1	220	**220**	**1 or 2**
Storage		1	110	**110**	**1 or 2**
Welcome Center		1	1600	**1,600**	**2**
Welcome Center Lobby		1	900	**900**	**2**
Storage		1	300	**300**	**2**
Director	1	1	110	**110**	**1**
Assistant Director	1	1	110	**110**	**1**
Administrative Assistant	1	1	110	**110**	**1**
Recruitment Counselor	8	8	80	**640**	**1**
Operations	9	9	80	**720**	**1**
Advising Room		1	330	**330**	**1**
Reception		1	160	**160**	**1**
Director	1	1	110	**110**	**1**
Associate Director	2	2	110	**220**	**1**
Administrative Assistant	1	1	110	**110**	**1**
Operations	10	10	80	**800**	**1**
Counselor/Customer Support	13	13	80	**1,040**	**1**
Reception	2	1	220	**220**	**1**
Storage		1	110	**110**	**1**
Registrar	1	1	110	**110**	**1**
Associate Registrar	1	1	110	**110**	**1**
Administrative Assistant	1	1	110	**110**	**1**
Data Management	1	1	110	**110**	**1**
Data Systems Support	8	8	80	**640**	**1**
Degree Audit Assistant	1	1	80	**80**	**1**
Electronic Document Mgr	3	3	80	**240**	**1**
Records/Evaluations	9	9	80	**720**	**1**
Registration Services	5	5	80	**400**	**1**
Document Imaging Studio Ass't	2	2	80	**160**	**1**
Reception	0	1	160	**160**	**1**
Peer Advising	15	15	60	**900**	**1**
		PHASE 1		10,440	
		PHASE 2		2,800	
		PHASE 1	**GSF TOTAL**	**26,100**	
		PHASE 2	**GSF TOTAL**	**4,667**	

PROGRAM 4/11			
Stations	Room Qty	NSF each	NSF Subtotal
1	1	*150*	**150**
0	0	*0*	**0**
1	1	110	**110**
1	1	110	**110**
1	1	160	**160**
16	1	480	**480**
8	1	240	**240**
0	1	220	**220**
0	1	220	**220**
	1	110	**110**
	1	1600	**1,600**
	1	900	**900**
	1	300	**300**
1	1	110	**110**
1	1	110	**110**
1	1	110	**110**
8	8	80	**640**
9	9	80	**720**
	1	330	**330**
	1	160	**160**
1	1	110	**110**
2	2	110	**220**
1	1	110	**110**
10	10	80	**800**
13	13	80	**1,040**
2	1	220	**220**
	1	110	**110**
1	1	110	**110**
0	0	0	**0**
1	1	110	**110**
1	1	110	**110**
8	8	80	**640**
1	1	80	**80**
3	3	80	**240**
9	9	80	**720**
5	5	80	**400**
2	2	80	**160**
0	1	160	**160**
15	15	60	**900**
PHASE 1			10,220
PHASE 2			2,800
PHASE 1	**GSF TOTAL**		**25,550**
PHASE 2	**GSF TOTAL**		**4,667**

ORIGINAL PROGRAM			
Stations	Room Qty	NSF each	NSF Subtotal
1	1	*150*	**150**
0	0	*0*	**0**
1	1	110	**110**
1	1	110	**110**
1	1	160	**160**
16	1	480	**480**
8	1	240	**240**
0	1	220	**220**
0	1	220	**220**
	1	110	**110**
	1	1600	**1,600**
	1	900	**900**
	1	300	**300**
1	1	110	**110**
1	1	110	**110**
1	1	110	**110**
8	8	80	**640**
9	9	80	**720**
	1	330	**330**
	1	160	**160**
1	1	110	**110**
1	1	110	**110**
1	1	110	**110**
9	9	80	**720**
10	10	80	**800**
2	1	220	**220**
	1	110	**110**
1	1	110	**110**
0	0	0	**0**
1	1	110	**110**
1	1	110	**110**
8	8	80	**640**
1	1	80	**80**
3	3	80	**240**
9	9	80	**720**
5	5	80	**400**
2	2	80	**160**
0	1	160	**160**
0	0	0	**0**
PHASE 1			8,890
PHASE 2			2,800
PHASE 1	**GSF TOTAL**		**22,225**
PHASE 2	**GSF TOTAL**		**4,667**

MARTIN V SMITH SCHOOL OF BUSINESS AND ECONOMICS

MARTIN V SMITH SCHOOL OF BUSINESS (UPDATED PROGRAM PER 3/14/17 MEETING FEEDBACK)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Dean's Office	1	1	150	**150**	**2**
Admin Coordinator	2	2	110	**220**	**2**
Clerical Support	2	2	110	**220**	**2**
Institute/Centers	5	5	110	**550**	**2**
Reception	0	1	160	**160**	**2**
20p Conference	20	1	600	**600**	**2**
				1,900	
			GSF TOTAL	**3,167**	

ORIGINAL PROGRAM			
Stations	Space Qty	NSF each	NSF Subtotal
1	1	150	**150**
2	2	110	**220**
2	2	110	**220**
5	5	110	**550**
0	1	160	**160**
0	0	0	**0**
			1,300
		GSF TOTAL	**2,167**

EXTENDED UNIVERSITY

EXTENDED UNIVERSITY (UPDATED PROGRAM PER 4/11/17 MEETING FEEDBACK)					
Room Type	Stations	Space Qty	NSF each	NSF Subtotal	Phase
Dean's Office	1	1	150	**150**	2
Admin Coordinator	1	1	110	**110**	2
Reception		1	0	**0**	2
Marketing Director	1	1	110	**110**	2
Marketing Coordinator	2	2	110	**220**	2
Recruiter	2	2	110	**220**	2
Conference Room	20	1	600	**600**	2
Int'l Director	1	1	110	**110**	2
Assistant Director	1	1	110	**110**	2
Program Coordinator	4	4	110	**440**	2
Clerical Support	1	1	80	**80**	2
Operations Director	1	1	110	**110**	2
Analyst	1	1	110	**110**	2
Admissions, Advising, Rec	3	3	110	**330**	2
Budget, Grants, Student Finances	3	3	110	**330**	2
Lab Tech, IT	2	2	110	**220**	2
				3,250	
			GSF TOTAL	**5,417**	

ORIGINAL PROGRAM			
Stations	Space Qty	NSF each	NSF Subtotal
1	1	150	**150**
1	1	110	**110**
	1	0	**0**
0	0	0	**0**
0	0	0	**0**
0	0	0	**0**
0	0	0	**0**
1	1	110	**110**
1	1	110	**110**
4	4	110	**440**
1	1	80	**80**
1	1	110	**110**
1	1	110	**110**
3	3	110	**330**
3	3	110	**330**
2	2	110	**220**
			2,100
		GSF TOTAL	**3,500**

2.4 DEPARTMENTAL GROUPINGS

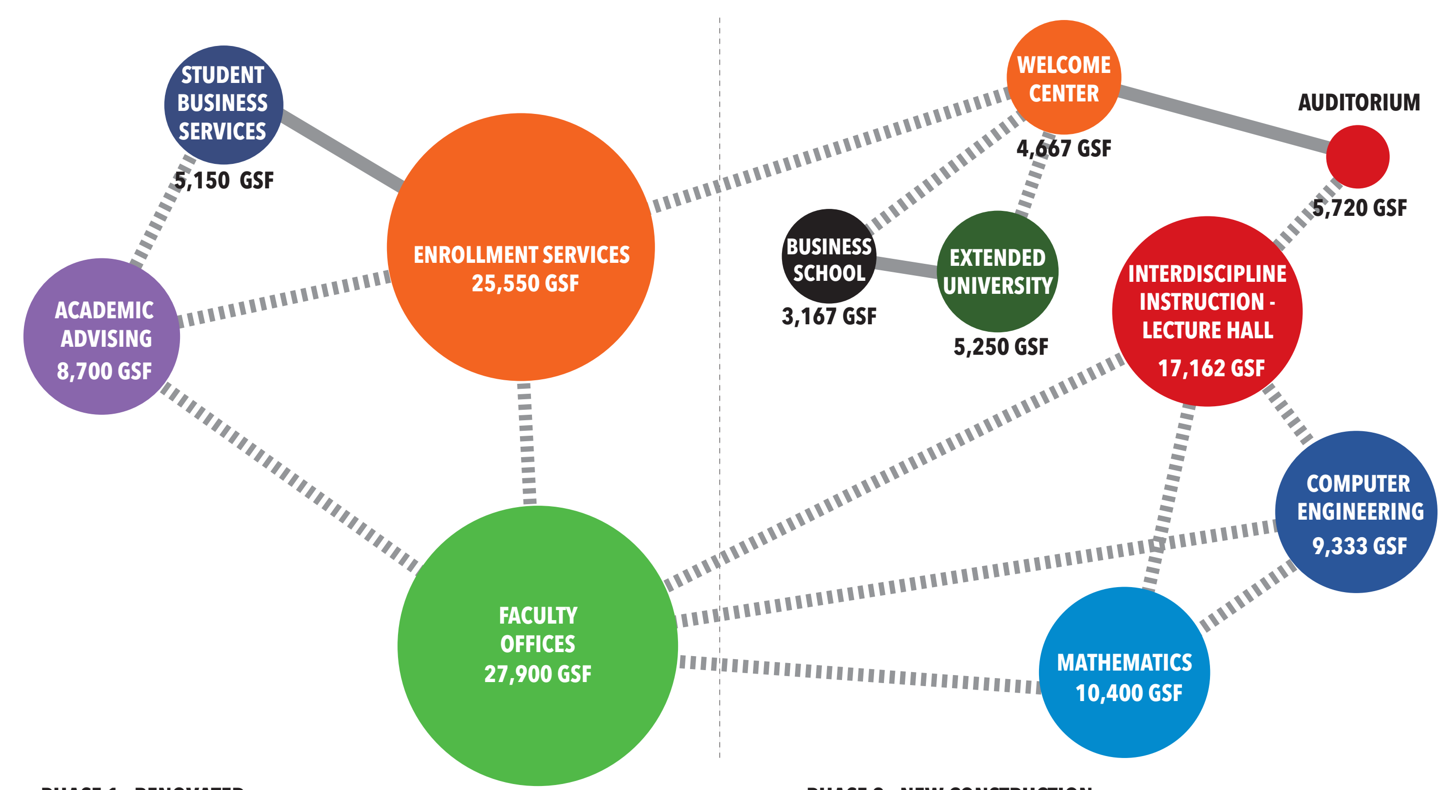
ORGANIZATION

The following diagram graphically indicates key relationships between each program department and identifies the phasing of each departmental piece. Generally, each department is fully allocated within a single phase of the project, with the exception of Enrollment Services, which is primarily in Phase 1, with the Welcome Center component held until Phase 2. Phase 1 consists of administrative program that can be accommodated by the existing, thin-footprint building stock on campus. Phase 2 consists primarily of instructional program that requires larger footprint buildings, and also includes more publicly oriented program pieces, such as Extended University and the School of Business and Economics. The Building Advisory Committee also advised that the Welcome Center should function as an integrated service for Enrollment Services, Extended University, and the School of Business and Economics.

These groupings were defined during the course of the user meetings and reflect the project goals of optimizing delivery of services to the client, and optimizing collaboration within and between departments.

COLLABORATION AND SHARING

Through an interactive process with the Building Advisory Committee, the design team has arranged the program departments in order to encourage inter-departmental and cross-divisional collaboration. If further collaboration and space efficiency were desired, integrated groups may consider sharing support spaces (copy, kitchen and break rooms) as this would strengthen a team-based service delivery. To maximize utilization rates and efficiency, conference rooms could also be shared.

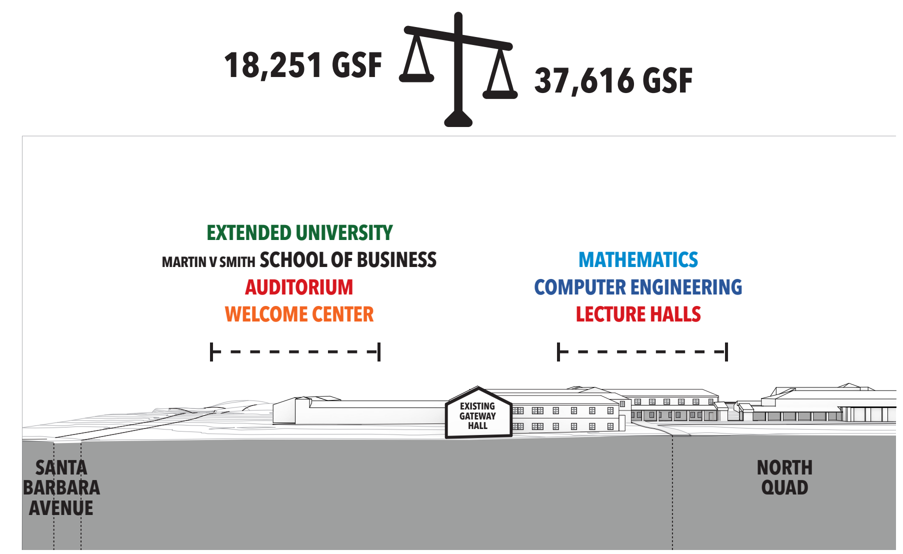


2.5 ADJACENCY & STACKING

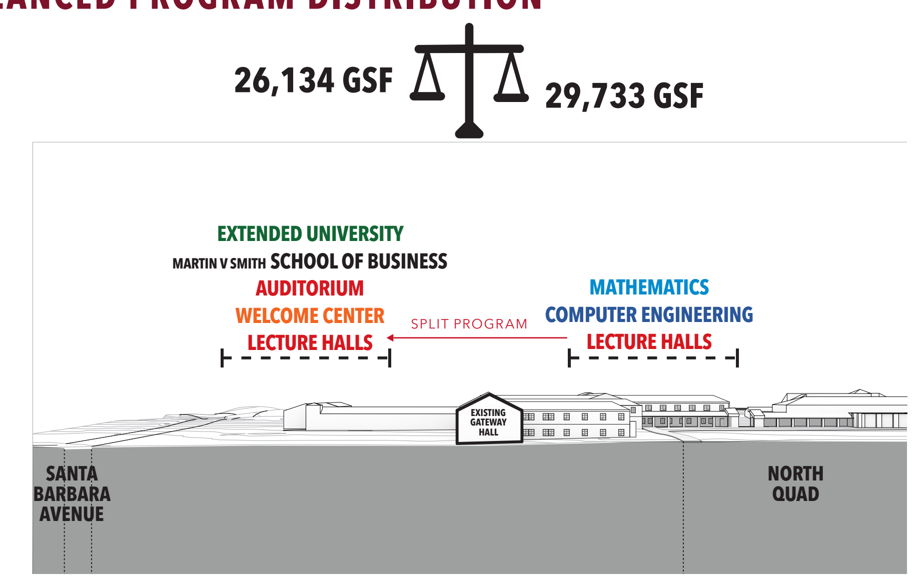
Through discussions with the BAC critical adjacencies between departments were established to streamline functionality and collaboration. The Vision Plan establishes (3) available developable quadrants that surround the existing structures that will be renovated as part of Phase 1 of the project. The quadrants facing Santa Barbara Avenue were deemed more public in nature, and better suited for programs that involve public outreach and reception. As the Vision Plan outlines the North Quad as an "academic" quad, the quadrant along the north edge of the Quad will support Phase 2's instructional programs. The ideal location of functions within the building was also discussed to ensure an optimized delivery of service, which generally located all informational, transaction and counseling service functions on the lower floors with most administrative and executive functions on the upper levels.

The diagrams included in this section identify these **preferred adjacencies** and proposed an **ideal programmatic stacking scenario**, which can be further detailed in the design options represented in Section 6 of this report. Option 1 demonstrates the ideal adjacencies. However, these adjacencies overload the North Quad quadrant with program. Option 2 splits the lecture hall program between quadrants to better distribute the program.

OPTION 1 PREFERRED ADJACENCIES



OPTION 2 BALANCED PROGRAM DISTRIBUTION



3.0 SITE MASTER PLANNING ISSUES

3.1 CAMPUS ANALYSIS

OVERVIEW

The following text for this section was taken from the Vision Plan by ASG. Any subsequent drawings and diagrams in this section that show this symbol (VP) were taken directly from the Vision Plan by ASG. For further information, please refer to the Vision Plan.

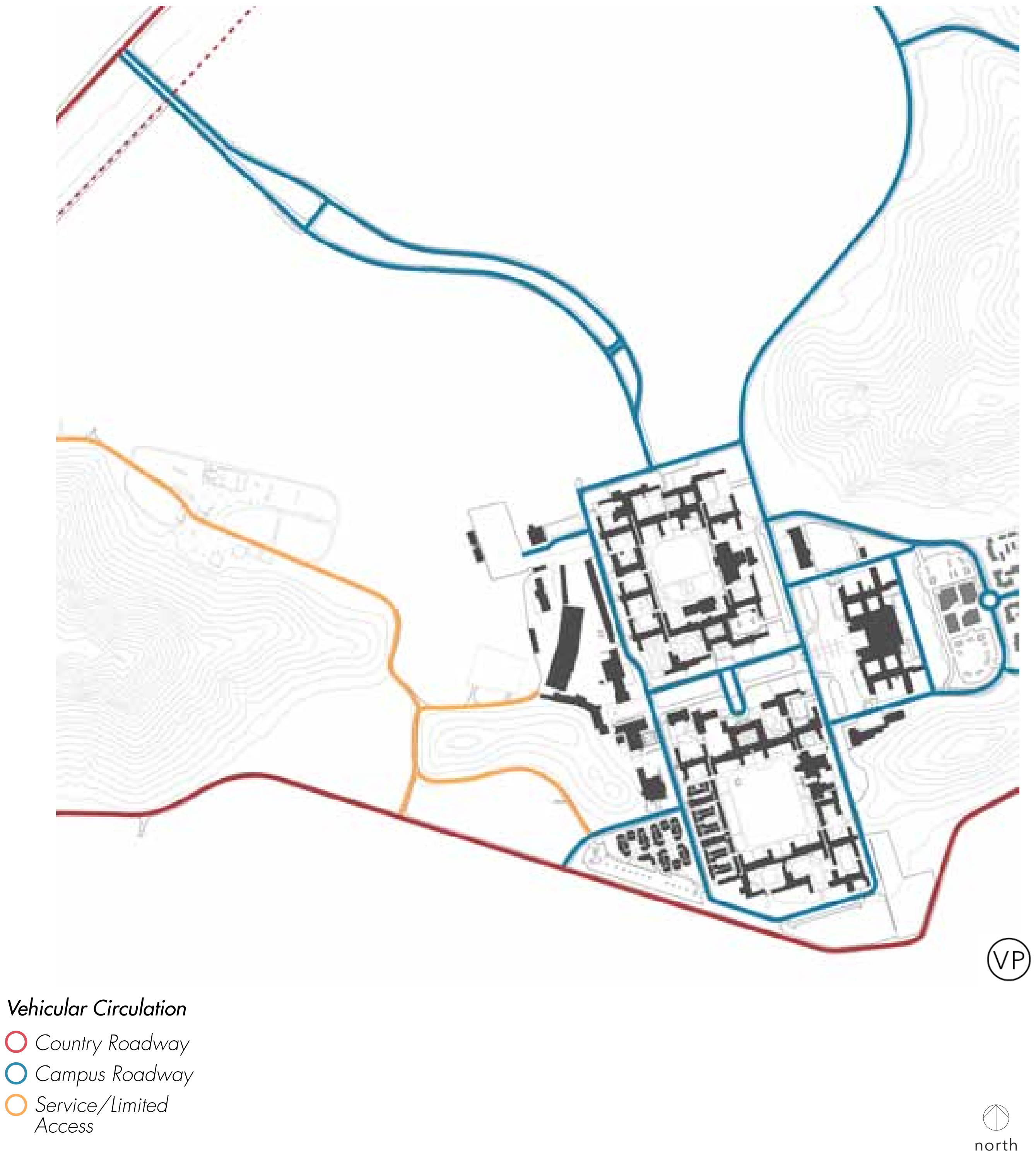
LOCATION AND CONTEXT

The CI campus is located in Camarillo, California, approximately 40 miles northwest of Los Angeles and 40 miles southeast of Santa Barbara, in Ventura County. Six miles inland from the Pacific Ocean, it sits on the Oxnard Plain along the western front of the Santa Monica Mountains. To the southwest, beyond the coastline, are the eight Channel Islands, the source of the university's name. Four miles to the north is Interstate Highway 101 and five miles to the south is California Highway 1 along the Pacific coast. Downtown Camarillo is approximately four miles to the north of the campus.

In addition to is proximity to the Santa Monica Mountains, the campus is bordered to the west by Round Mountain (elevation 500 feet above campus elevation). Peanut Hill, in the middle of campus, has an elevation of 80 feet above the campus elevation.

The overall site, owned by the State of California, is a tract approximately 1,200 acres in size, although only a fourth of that land is designated for direct campus use. The north east portion of the site is reserved for use as a regional park. The eastern portion of the campus includes University Glen, a residential community with a small town center. The buildable segments are described as Core, East, West, and North campuses.

VEHICULAR CIRCULATION



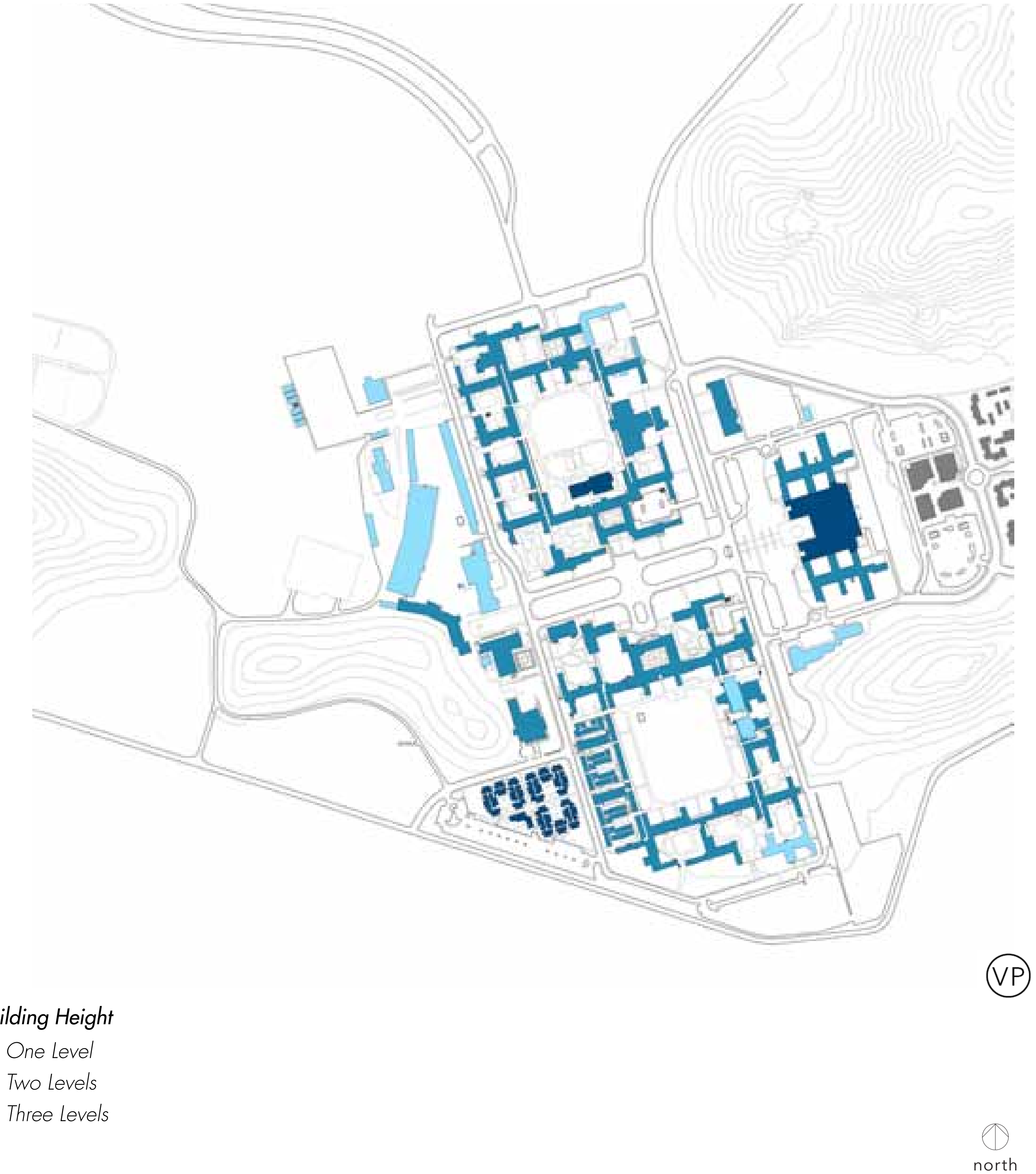
PEDESTRIAN CIRCULATION

BUILDING CHARACTER

Building Character

- *Original Campus Building - Not Renovated*
- *Original Campus Building - Renovated*
- *New Campus Building*
- *Utilitarian Building*

BUILDING HEIGHT



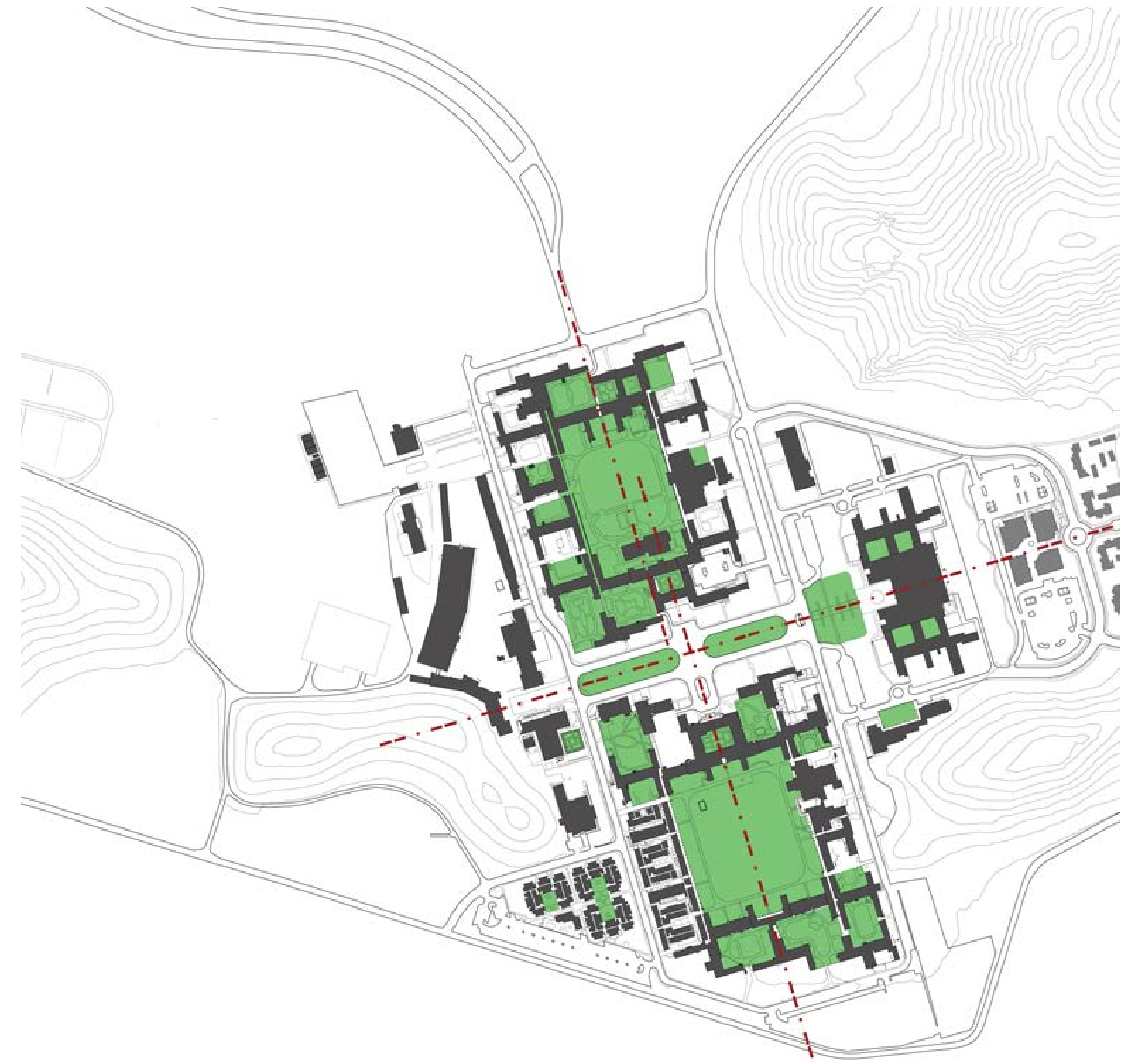
Building Height

- *One Level*
- *Two Levels*
- *Three Levels*

BUILDING USE

Building Use
- *Mostly Academic*
- *Mostly Administration*
- *Student Life*
- *Housing*
- *Facilities*
- *Un-used*

OPEN SPACE



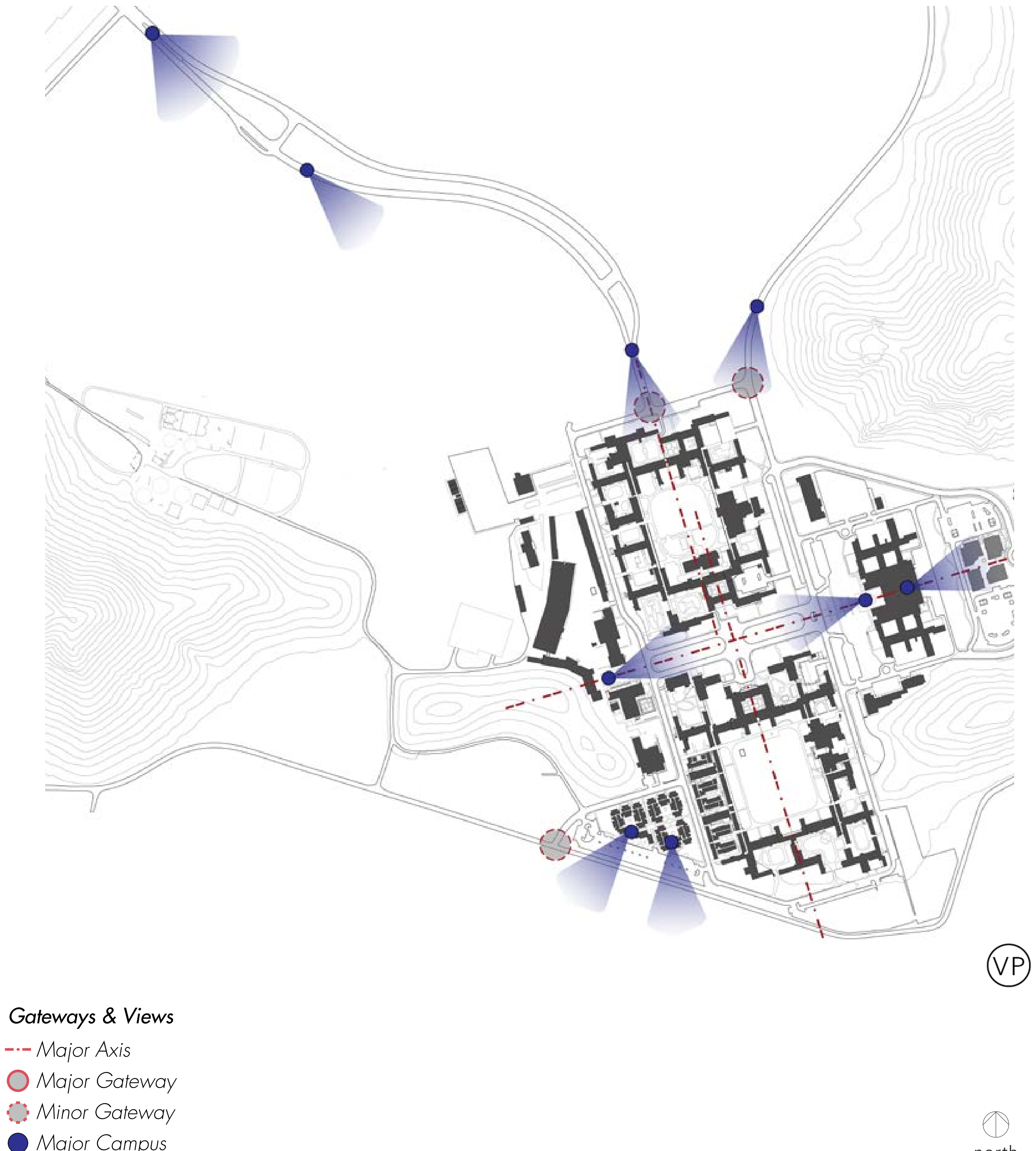
Open Space
- *Major Axis*
- *Open Space*

DAYROOMS

Dayrooms

Dayroom Location

GATEWAYS AND VIEWS



Gateways & Views

Major Axis

Major Gateway

Minor Gateway

Major Campus Views

3.2 GEOGRAPHIC FACTORS

The following text for this section was taken from the Vision Plan by ASG. Any subsequent drawings and diagrams in this section that show this symbol (VP) were taken directly from the Vision Plan by ASG. For further information, please refer to the Vision Plan.

GEOLOGY

The campus lies on the Oxnard Plain, a part of the larger Ventura basin. The adjoining mountains are of volcanic material and the Plain is largely alluvial. The core of the academic campus sits in a small valley between Round Mountain and the southern flank of Conejo Mountain. The underlying soil of the academic campus is an alluvium of gravel, sand, and clay eroded from the adjoining slopes. Like the larger region, the hillsides are primarily volcanic in composition.

TOPOGRAPHY

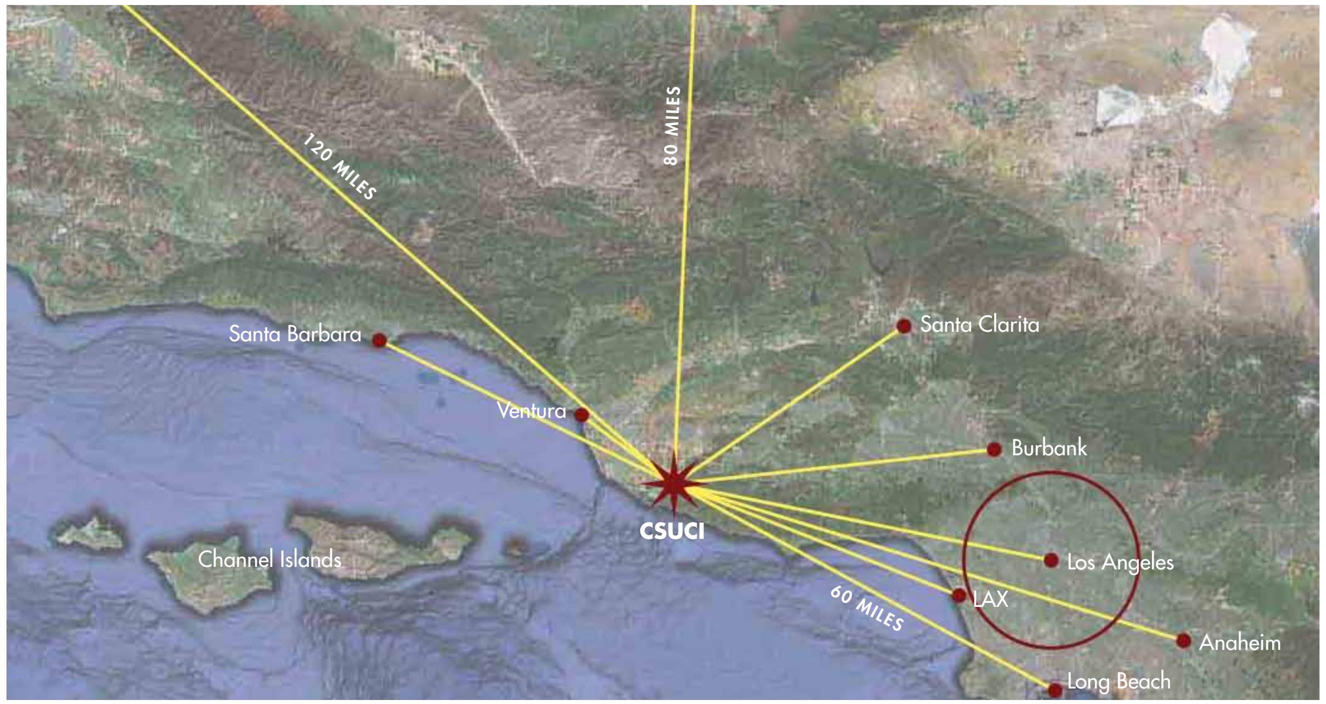
The entire 1,200-acre CSU tract has a broad range of elevations, with a mixture of relatively flat or gradually sloping land with counter points of steep-sided hills and mountains. In the southwest portion of the tract, where the CI campus sits, the elevations range from approximately 30 feet above sea level to 70 feet above sea level, except for Round Mountain and Peanut Hill. The slope of the flatter land treads down from the northeast section of campus to the southwest. A variation on this topography is the promontory on the eastern part of campus where the prestigious Broome Library stands. There is a noticeable rise of approximately 10 feet from Camarillo Street to the Library, making it one of the prominent locations on campus.

CLIMATE

CI has an attractive, mild climate characterized by warm, dry summers and mild, rainy winters. Summer temperatures have average highs in the upper 70s (Fahrenheit) and lows in the lower 60s, with frequent sunny days. Relatively short winters have average highs in the mid-60s and lows in the upper 40s. Average evening relative humidity is 60 to 70 percent. Average rainfall is between 13 and 14 inches annually, primarily during the winter, but the campus usually has more than 300 days of sunshine per year.

Summer winds typically come from the west and winter has a mix of wind from the west and northeast. The average windspeed is 5.9 miles per hour, with little variation across the year. Occasionally, the campus will experience several days of Santa Ana winds. These usually strong breezes bring hot, dry air from the northeast. Formed in autumn and early spring, the temperature of these extremely dry winds can be well into the 90-degree range. For the most part, the campus enjoys steady, mild ocean breezes.

GEOGRAPHIC LOCATION



TOPOGRAPHY & FLOOD PLAIN

HYDROLOGY

3.3 RELATIONSHIP TO CAMPUS MASTER PLAN

The following text for this section was taken from the Vision Plan by ASG. Any subsequent drawings and diagrams in this section that show this symbol (VP) were taken directly from the Vision Plan by ASG. For further information, please refer to the Vision Plan.

The Vision Planning team outlined goals for each precinct, developed alternative planning approaches to issues targeted during the Concept Plan phase, and refined the most appropriate solutions for each campus precinct.

The vision plan identifies the "campus core" as Precinct One, which consists of the North Quad, South Quad, and the Library Edge. The Gateway Hall project site extends from the north edge of the North Quad out to Santa Barbara Avenue, and the Vision Plan defines this area as the new front door to campus.

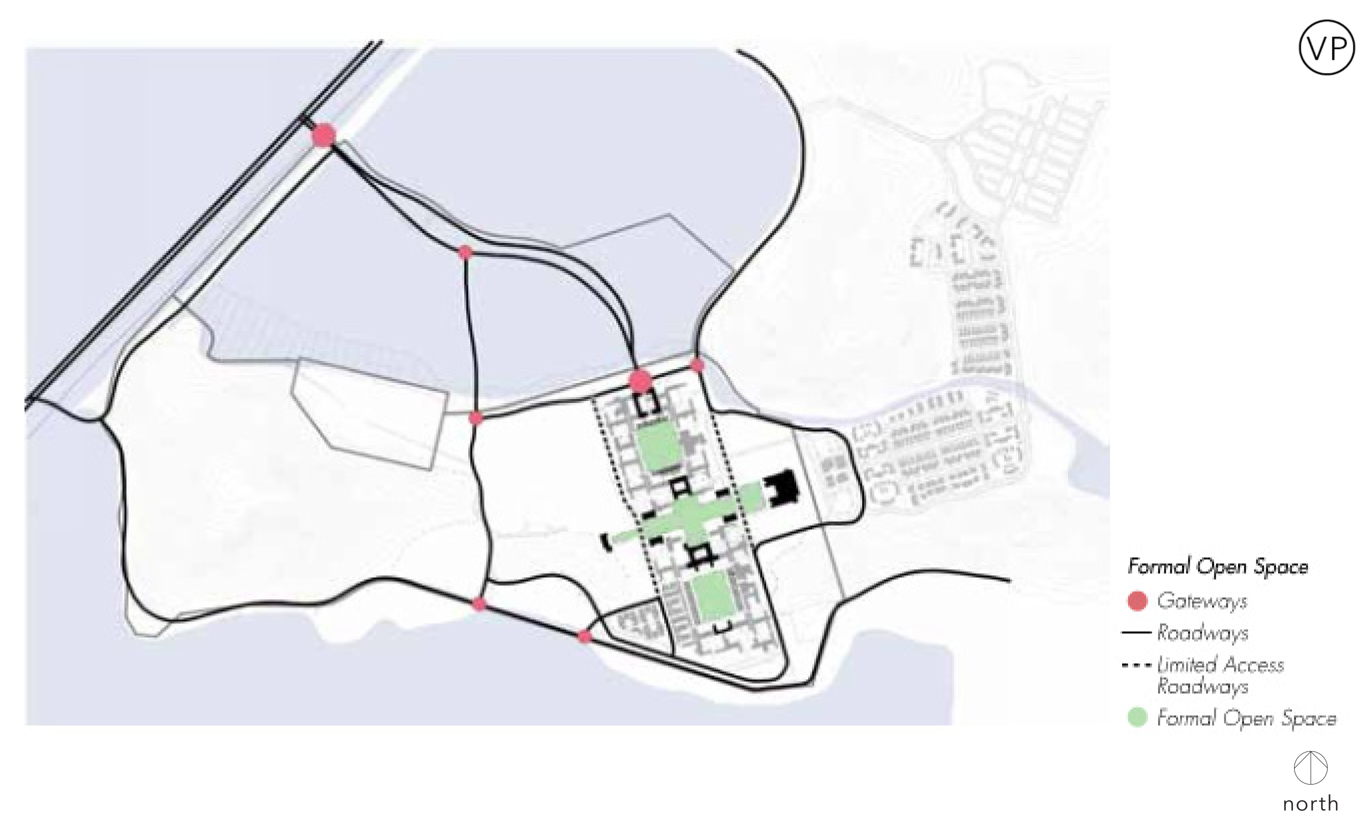
NORTH QUAD

Three planning alternatives for the North Quad analyzed different degrees of balance between building renovations and new construction, as well as the scale of the new structures. The schemes also explored an enclosed versus an open Gateway Hall, as well as a performing arts center within the campus core. Each variation starts with the assumption that parking within the existing courtyards is removed, with the exception of the prospective student parking for admissions at Gateway Hall, necessary special needs parking, and service access.

The second option sites a new building directly in line with North Hall on the opposite end of the Quad. The third option explores student housing on the northeast corner of the Quad, so it is fully integrated into the academic campus.

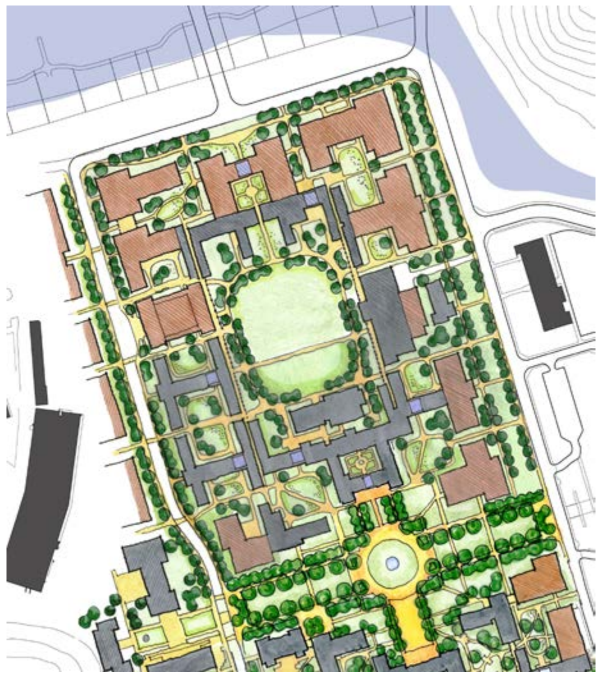
Section 6 of the report describes the programmatic and architectural approach to adapt the design principles of the Vision Plan for the specific programmatic and phasing requirements for Gateway Hall.

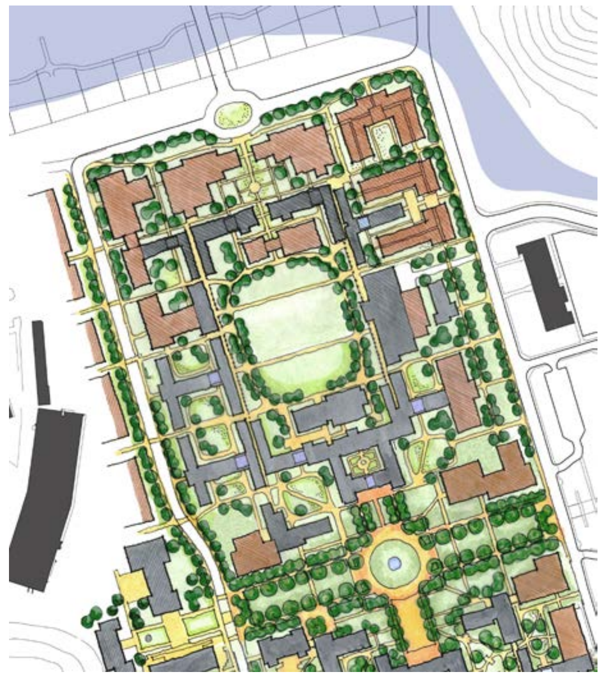
FORMAL OPEN SPACE



MASTER PLAN - DESIGN OPTIONS

VP


North Quad Option A


North Quad Option B

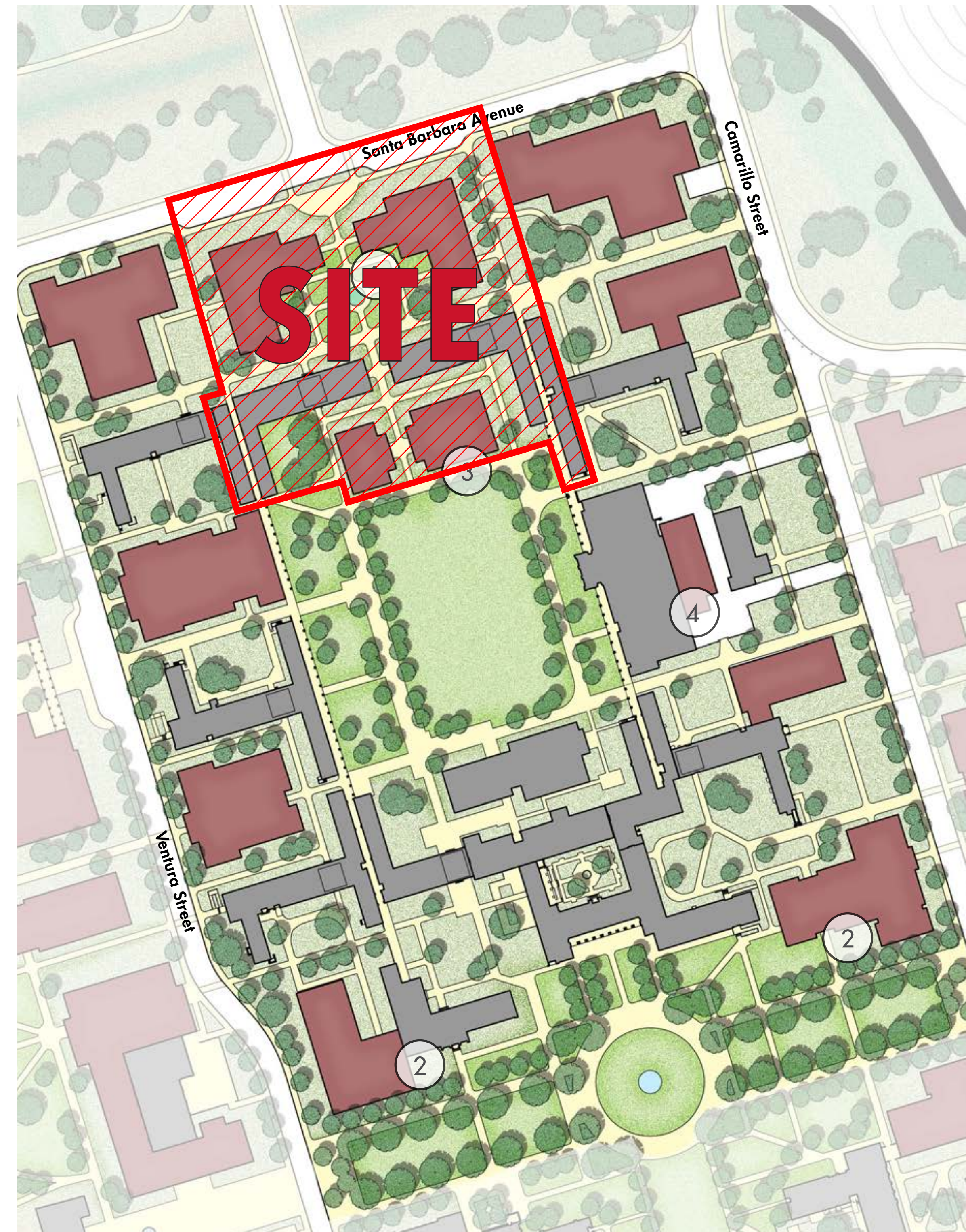

North Quad Option C


North Quad Option D

north

PREFERRED VISION PLAN

VP



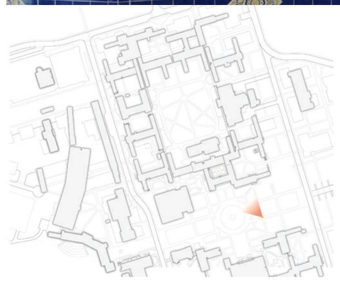
north

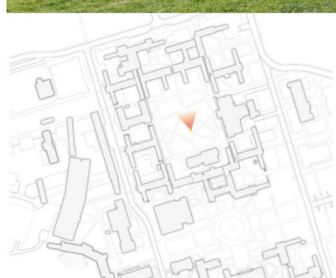
3.4 SITE BOUNDARY ANALYSIS

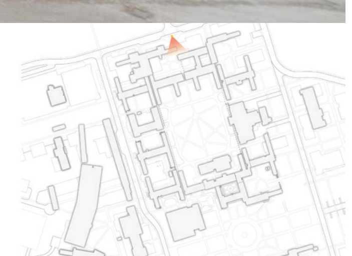
DEFINITION OF EDGE CONDITIONS

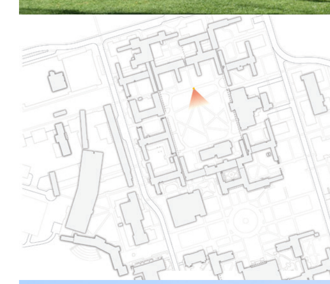
Defining the limits of the site is a key initial step prior to the start of the schematic design phase. Gateway Hall will be constructed as a blend of the Phase 2 and Phase 3A projects outlined in the campus visions plan, prepared by ASG-Architects. The site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad.

- » The photographic series of this section documents the edge conditions of the existing fabric on campus.
- » Diagram A demonstrates which portions of the existing structures will be renovated, demolished, and left to remain in Phase 1
- » Diagram B demonstrates the (3) available quadrants for Phase 2 new construction, as outlined in the Vision Plan.









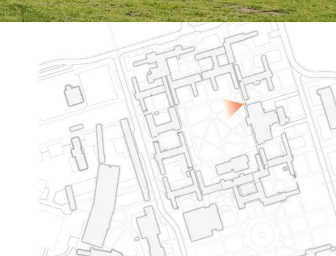


DIAGRAM A

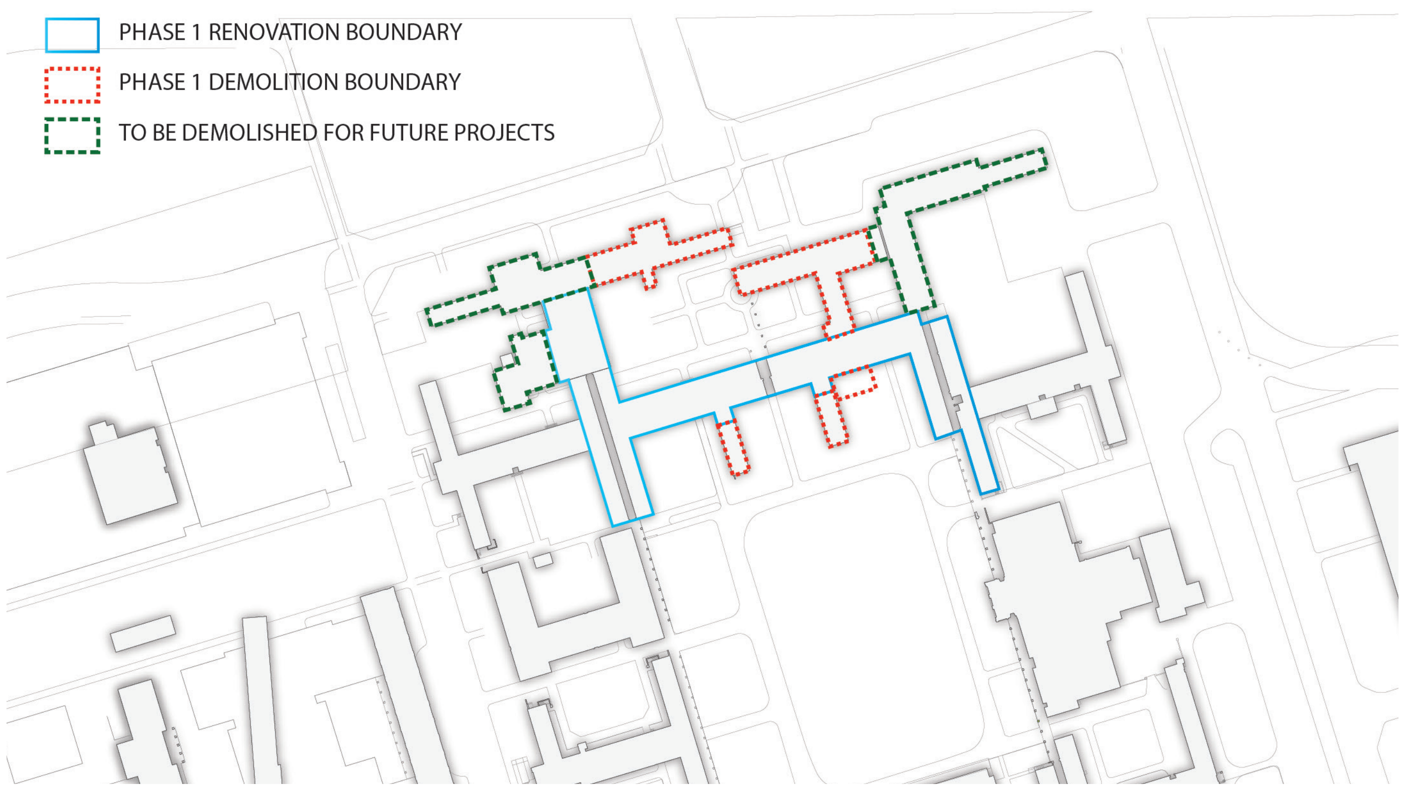
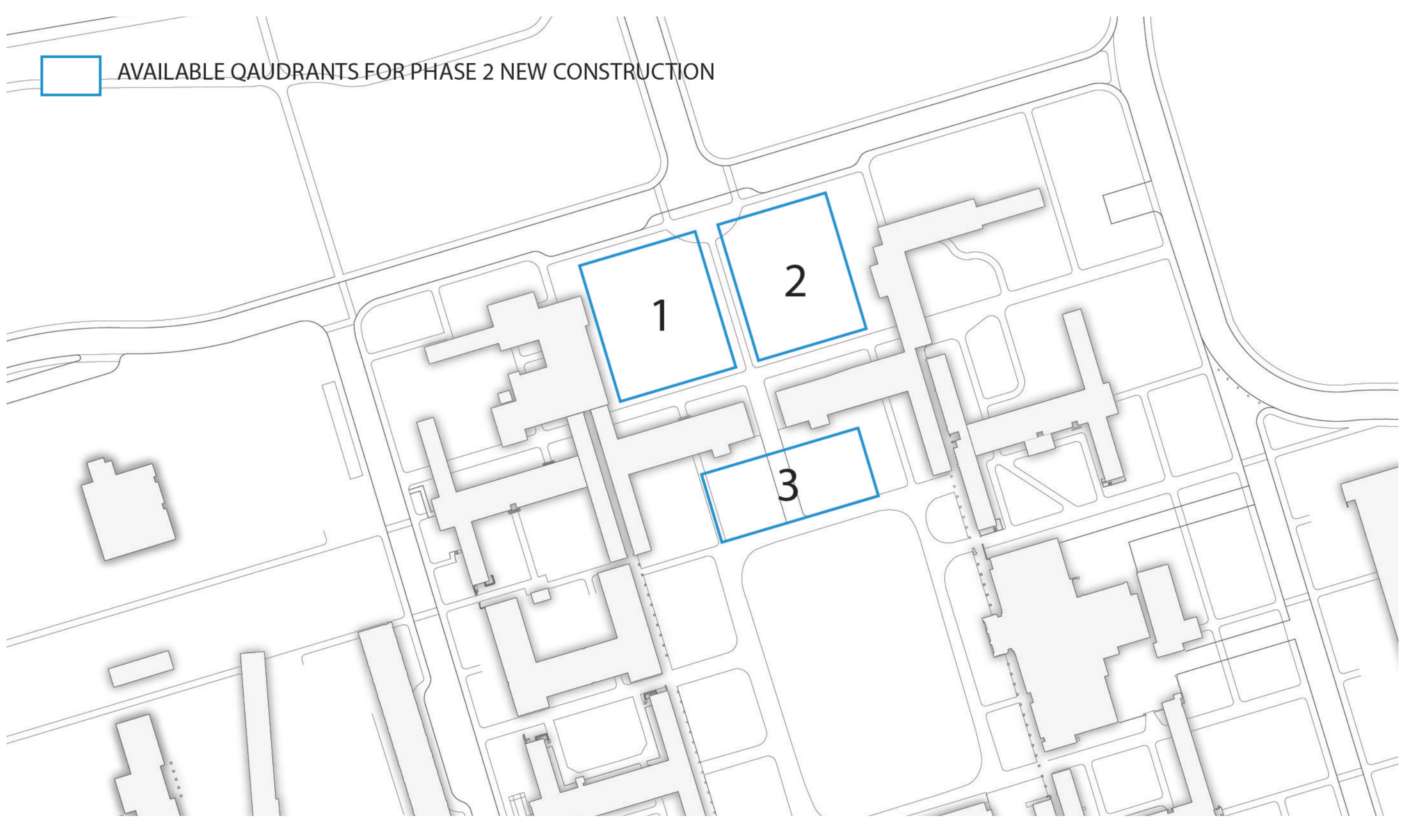
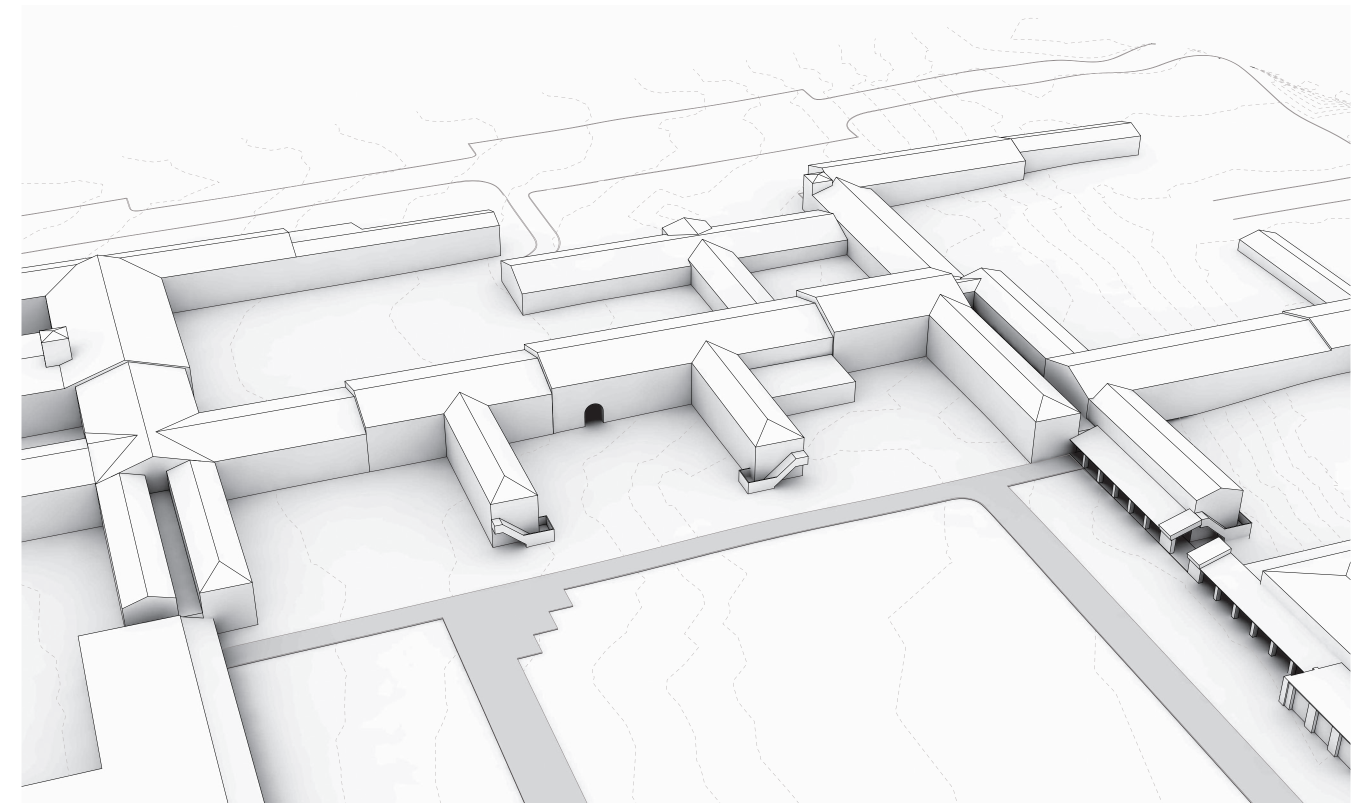


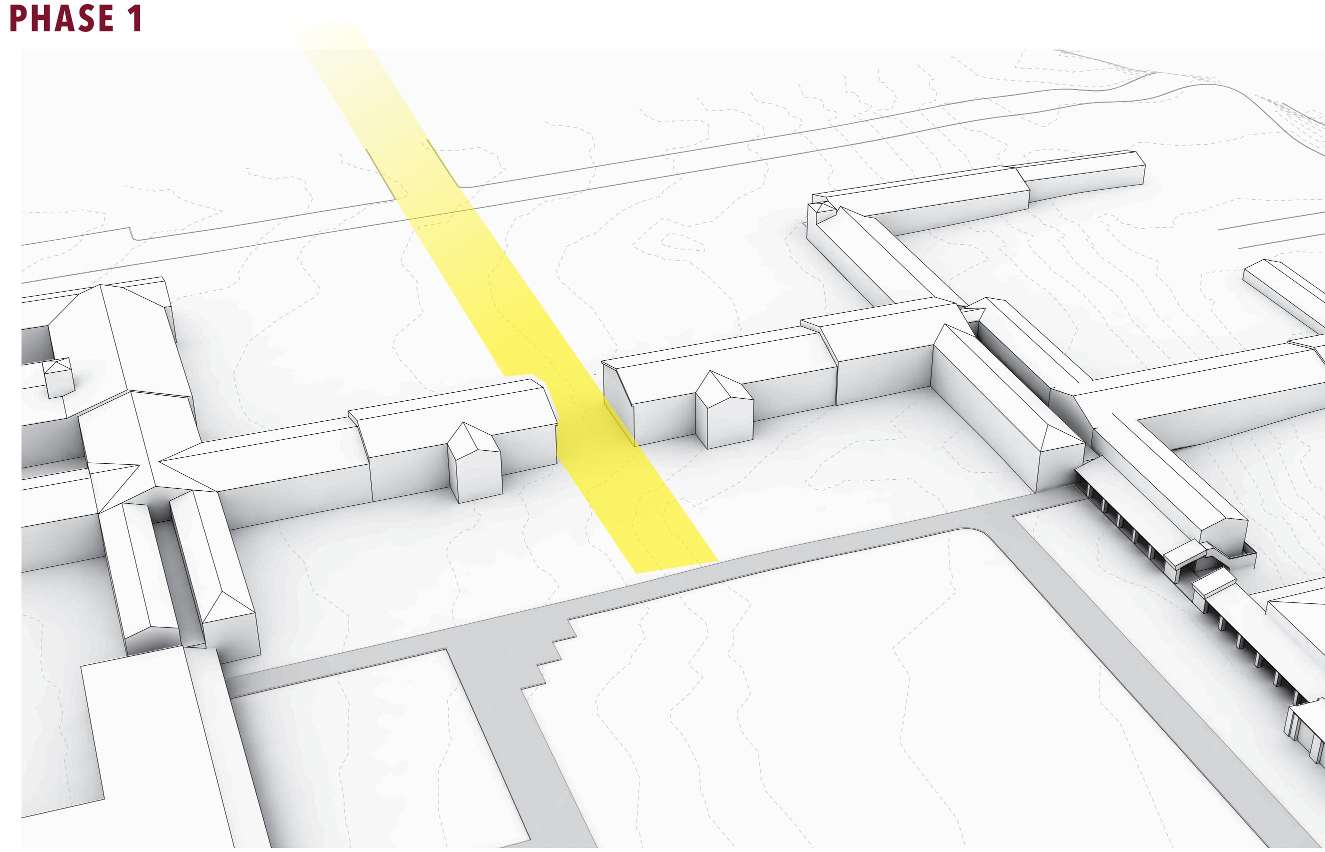
DIAGRAM B



EXISTING CAMPUS



PHASE 1



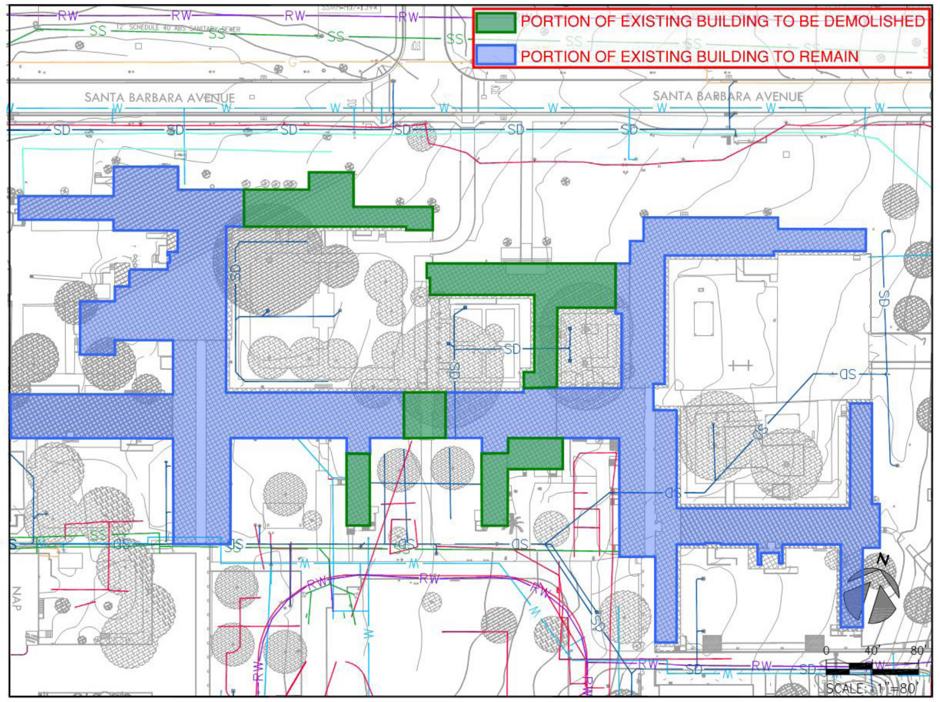
3.5 SITE SURVEY & UTILITIES

A final topographical and underground utilities survey is currently underway, and the final report is yet to be completed for the Gateway Hall Site. Preliminary investigations and assumptions in this report as outlined in Section 3 and 4 are based on the following information provided by the University facilities group:

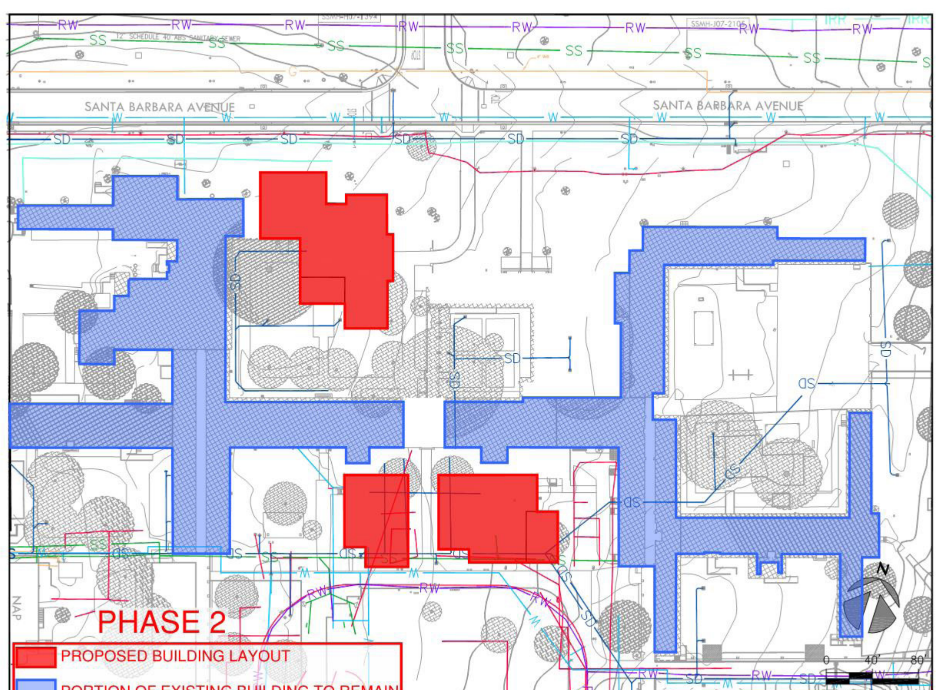
- A Composite Utilities Sketch dated 05/07/08
- As-built drawings for Del Norte, Madera Hall, and Gateway Hall with exception for Unit F17

Existing utilities in and around the site will be evaluated in more detail upon receipt of the final topographical and underground utilities survey to determine the adequacy of utility lines to support the Gateway Hall project, located points of connection (POC) for all utilities and quantify the scope for off-site improvements that may be required to serve this project.

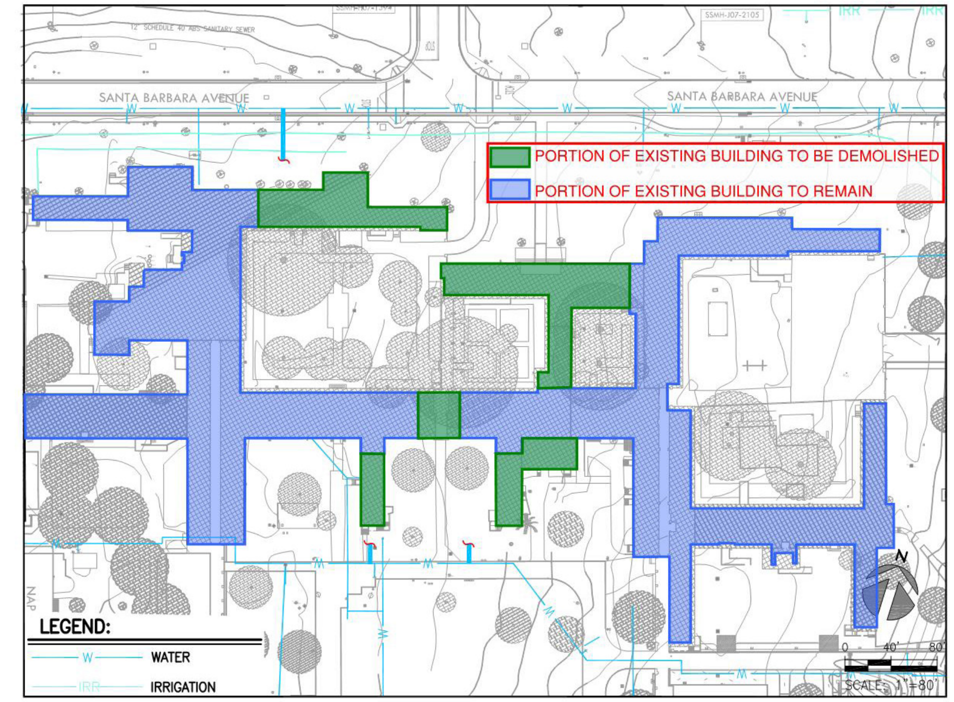
UTLITY SURVEY (PRELIMINARY) - PHASE 1



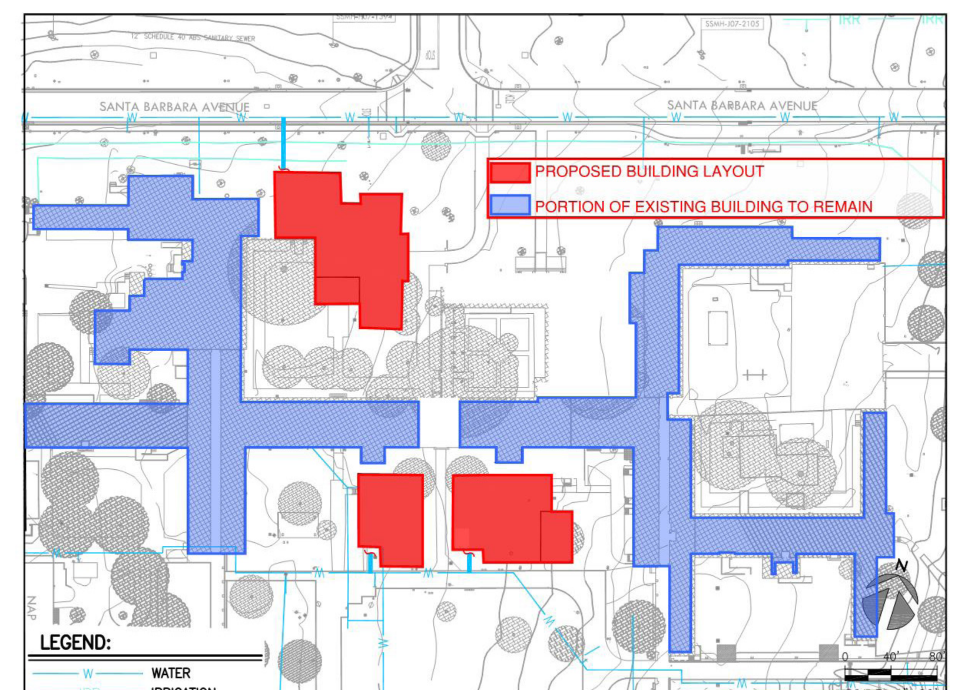
UTLITY SURVEY (PRELIMINARY) - PHASE 2



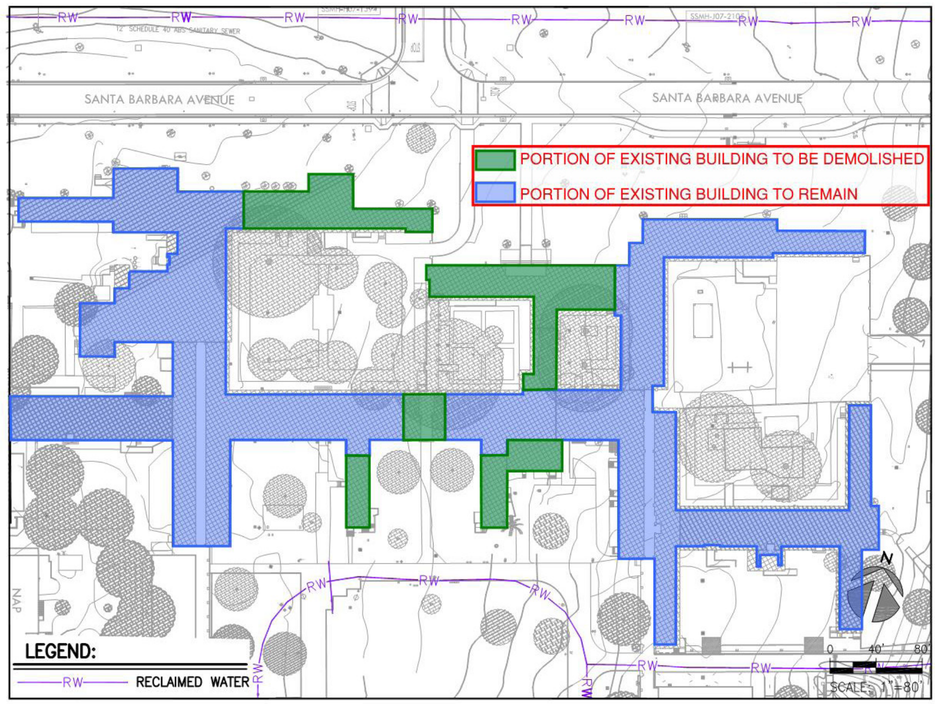
DOMESTIC WATER - PHASE 1



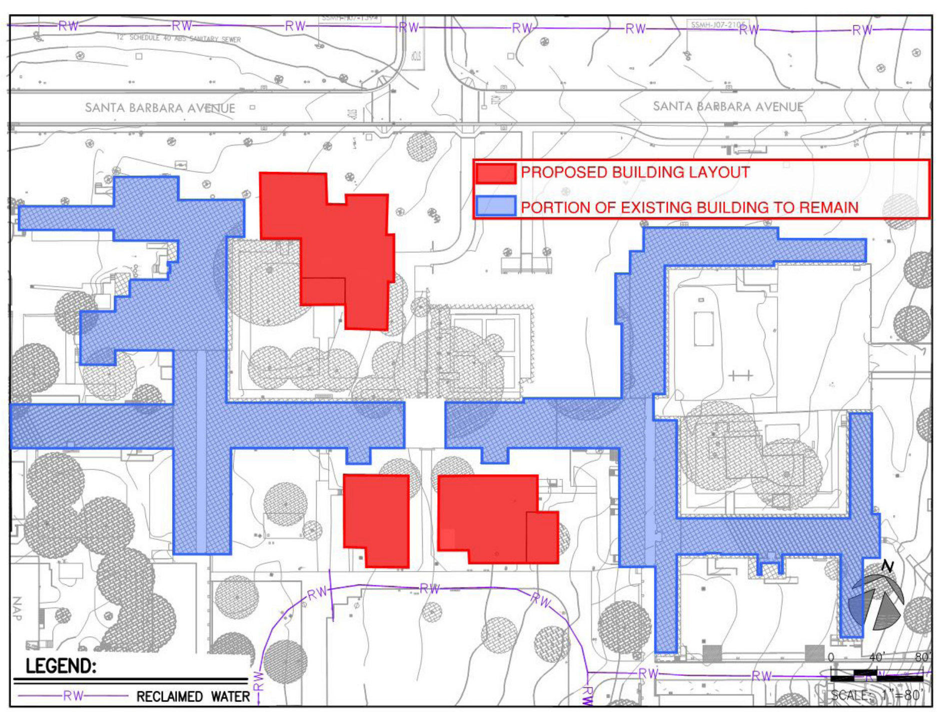
DOMESTIC WATER - PHASE 2



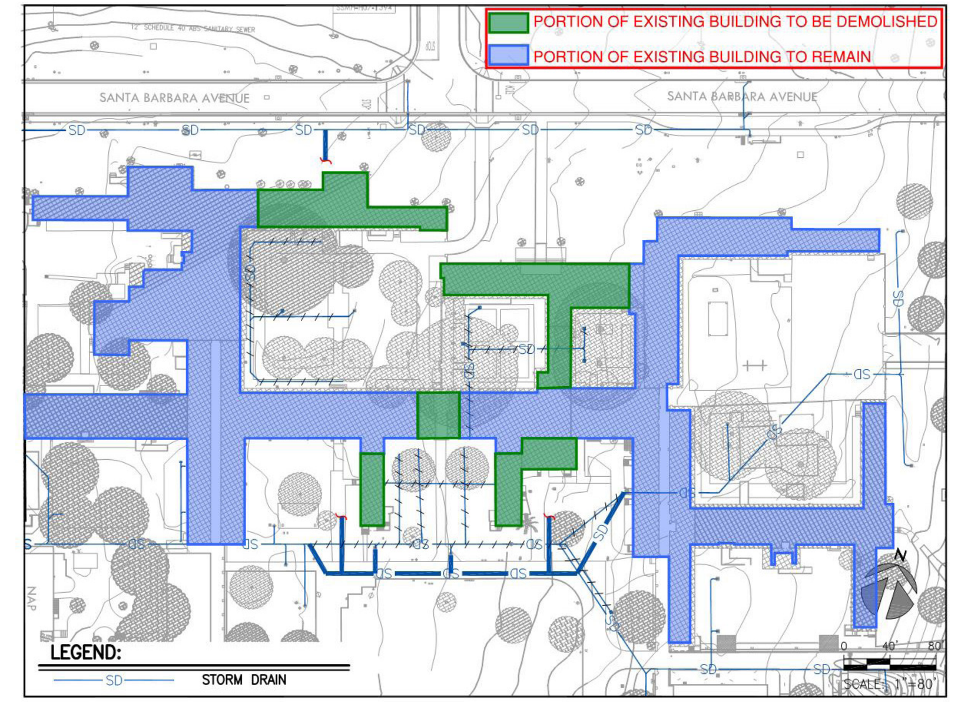
RECLAIMED WATER - PHASE 1



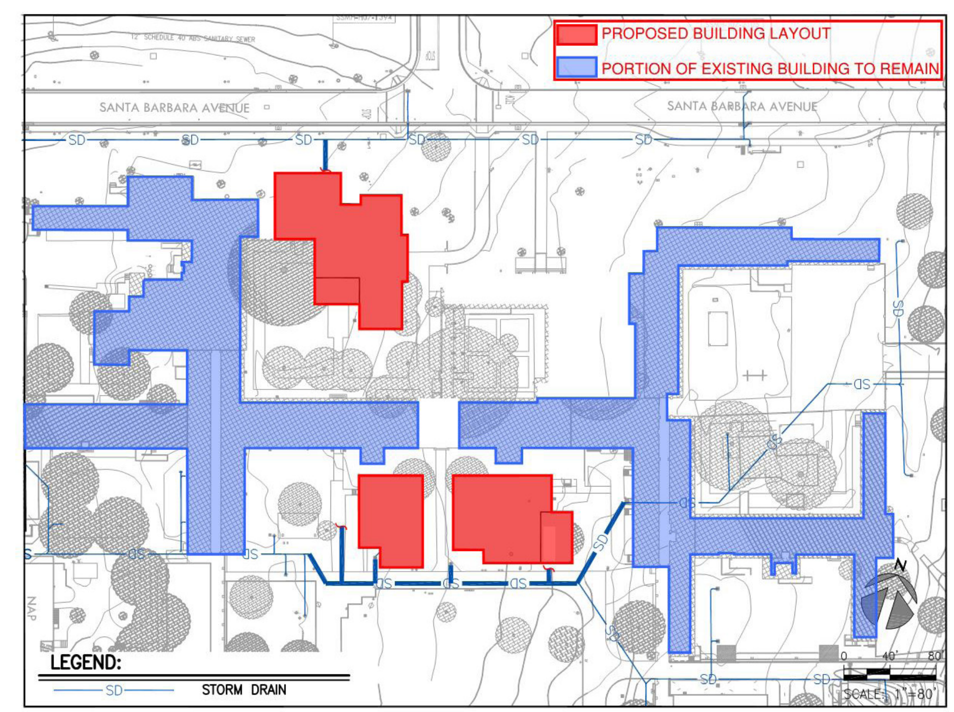
RECLAIMED WATER - PHASE 2



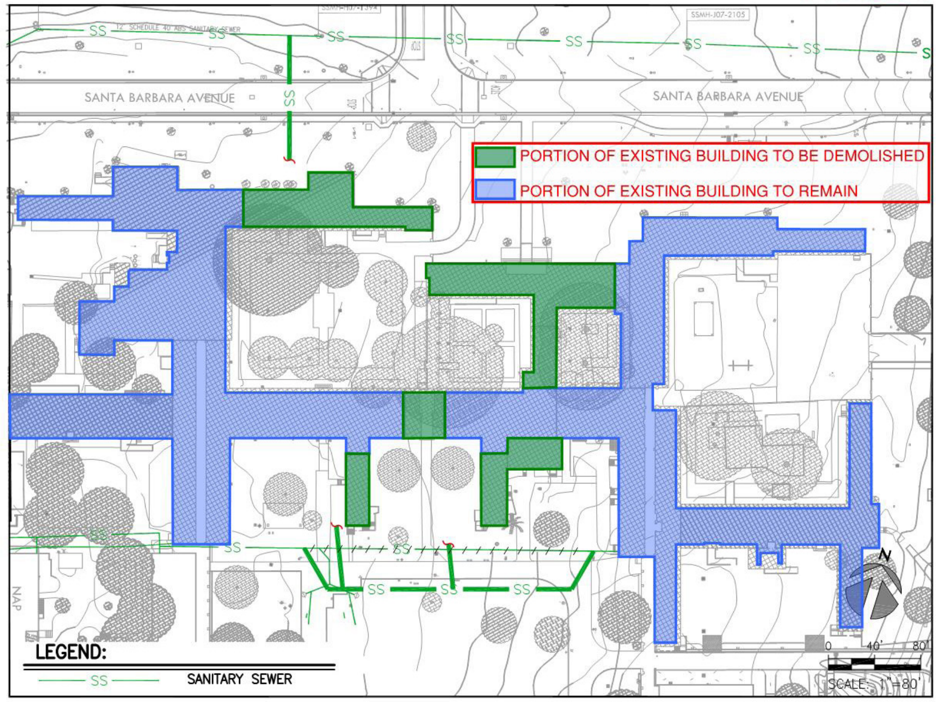
STORM WATER - PHASE 1



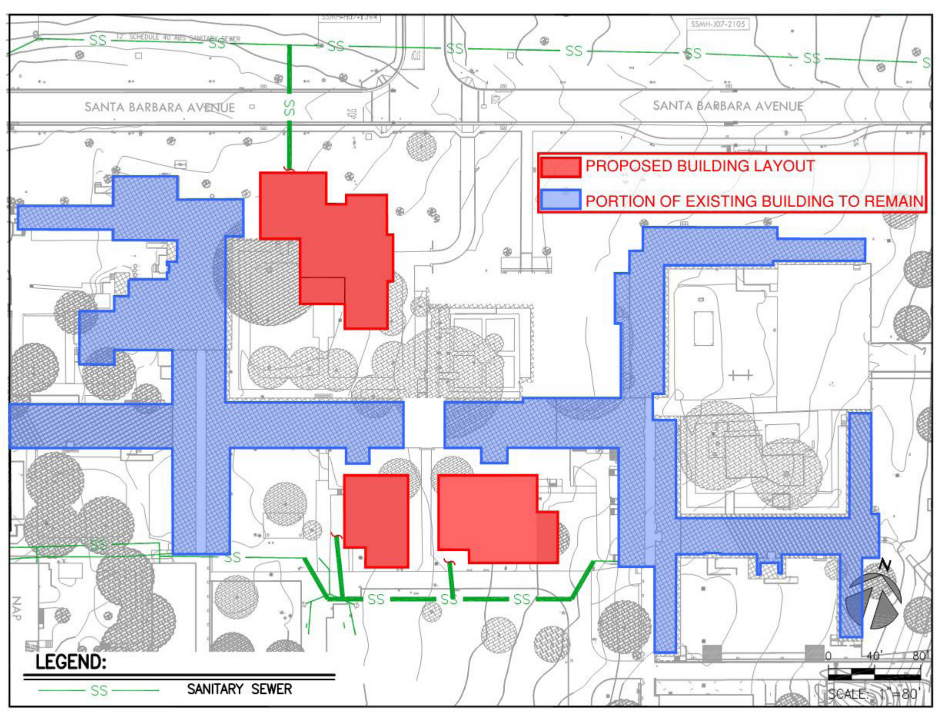
STORM WATER - PHASE 2



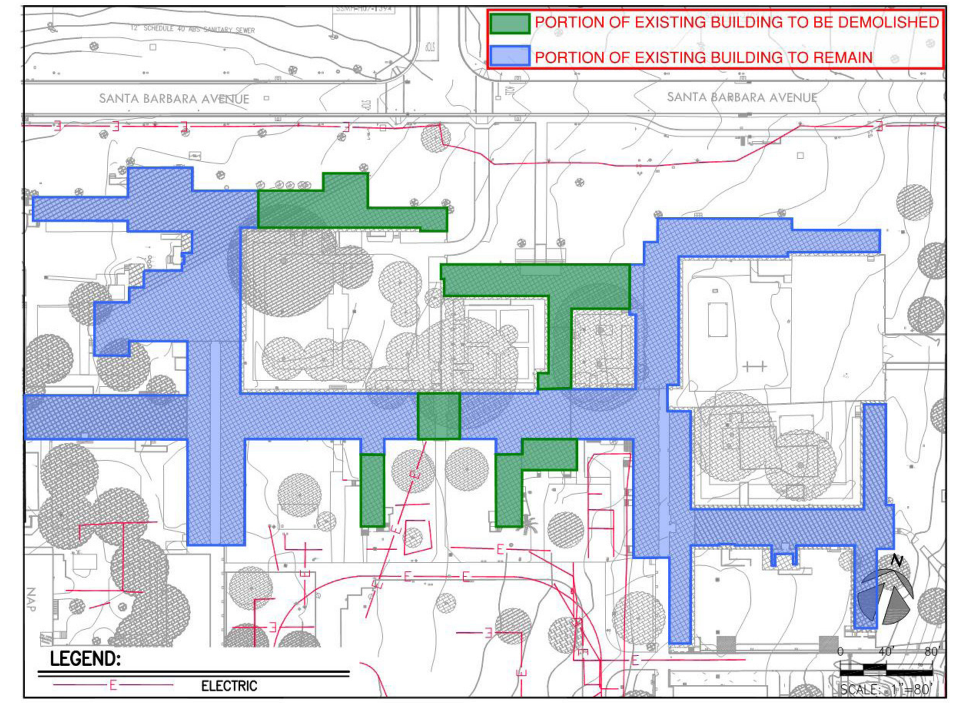
SEWER - PHASE 1



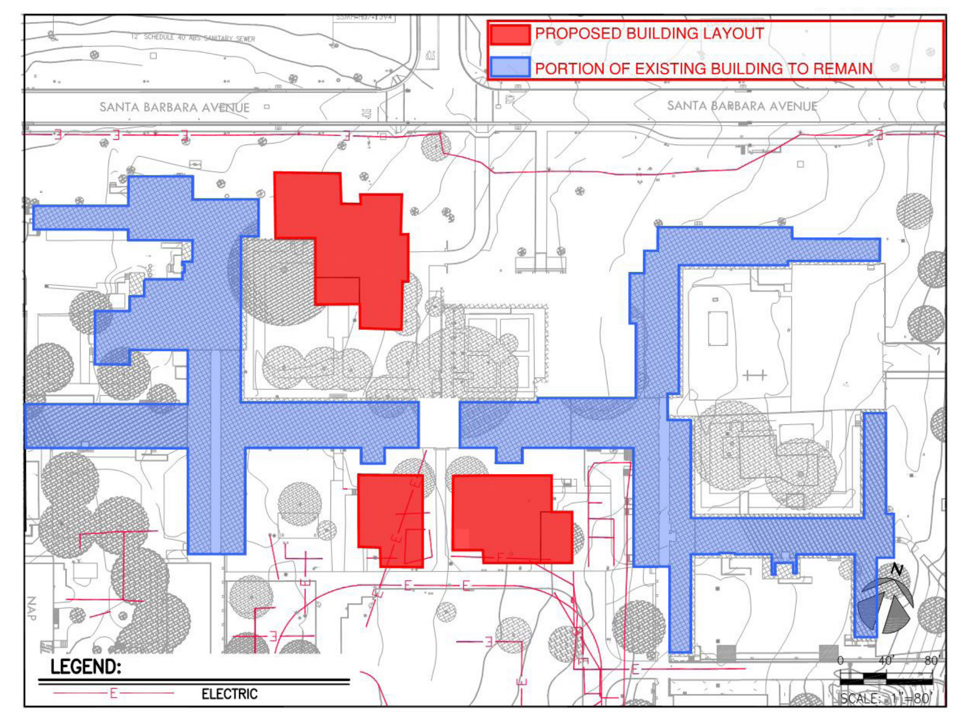
SEWER - PHASE 2



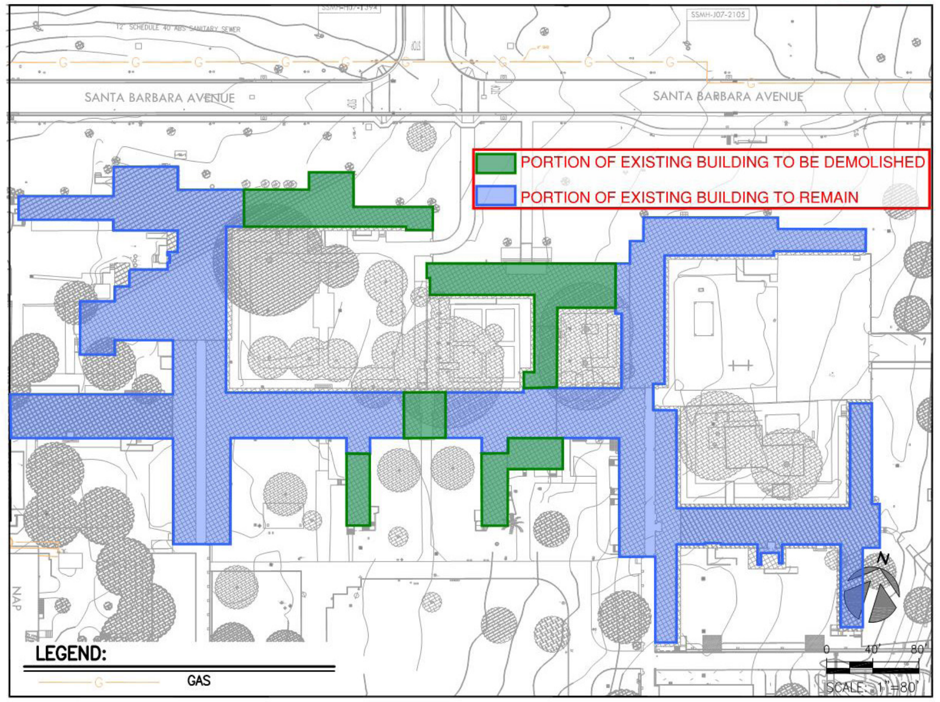
ELECTRICAL - PHASE 1



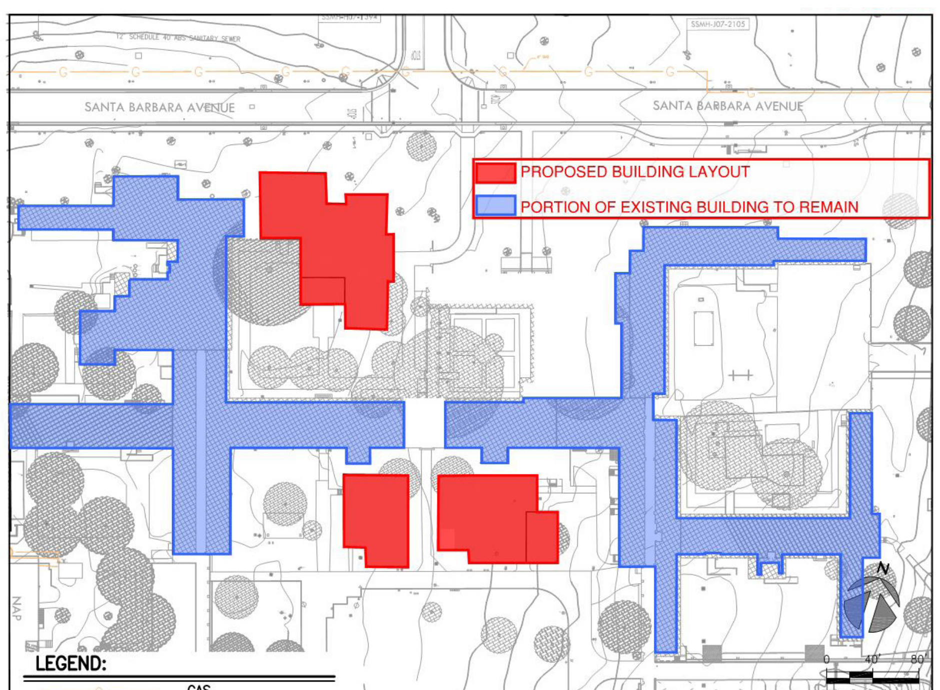
ELECTRICAL - PHASE 2



GAS - PHASE 1



GAS - PHASE 2



3.6 SOIL CONDITIONS & GEOTECHNICAL REPORT

A final soil conditions and geotechnical report has yet to be completed for the Gateway Hall building site. Preliminary investigations and assumptions in this report as outlined in Section 4 are based on the following information provided by the University Facilities group:

- Geotechnical Study Entrance Road and Parking Lot by Fugro West Inc. - Dated 10/07
- Geotechnical Study North Hall Building Addition by Fugro West Inc. - Dated 08/07

Final, site-specific geotechnical studies need to be performed on the proposed project site to provide detailed grading recommendations and foundation design criteria for the project. It is our understanding that all necessary investigations have been carried out to determine the soil conditions and that the final geotechnical report will be issued shortly.

4.0 BUILDING CONSIDERATIONS, ANALYSIS & DESCRIPTION

4A.1 PHASE 1 SUMMARY OF WORK

PROJECT SIZE

The current site area for the project as shown in the campus Vision Plan is demonstrated in Section 3.

Phase 1 of the Gateway Hall project will accommodate the following student services and academic departments:

- Enrollment Services
- Academic Advising
- Student Business Services
- Faculty Offices

The existing structures can accommodate up to 69,930 gross square foot (GSF) of program as outlined in Section 6.2. As suggested by CSUCI, Phase 1 renovation uses a 2.5 grossing factor based on historical data from a similar project at Madera Hall. Preliminary test fits suggest the entire Phase 1 assignable program of 26,920 square feet (ASF) can be accommodated within the existing structures to be renovated for Phase 1. Further program test fits and verification of these assumptions will need to be verified during schematic design of the project.

BUILDING HEIGHT

The existing building height is 2 floors with a floor-to-floor height of 11'-0". The finish floor steps down from the east to the west following the grade of the adjacent site. Mechanical space will either be distributed within the building or located within the existing mechanical spaces in the basement.

CONSTRUCTION BUDGET

The current construction budget for the project (including building, demolition and site work) based on the cost model provided in Section 5 is $21,339,000, and the assumed escalation rate of 4% produces a total GMAX of $24,360,000 based on a project schedule allowing for a 1/1/2021 construction midpoint.

CODES AND STANDARDS

This building will comply the American Disabilities Act and all the current building codes in the State of California including Title 24, Parts 2, 3, 4, 5, 6, 7, 8, 10 and 12 of the California Code of Regulations which encompasses:

- 2016 California Building Code (CBC)
- 2016 California Electrical Code (CEC)
- 2016 California Mechanical Code (CMC)
- 2016 California Plumbing Code (CPC)
- 2016 California Energy Code
- 2016 California Elevator Safety Construction Code
- 2016 California Referenced Standards Code

CONSTRUCTION AND OCCUPANCY TYPE

The existing structures to be renovated are Type II B construction, with poured in place concrete bearing walls and slabs. The structures will be upgraded with Automatic Supervised Sprinkler System construction and reviewed as a B occupancy for all office space with lobbies and multi-purpose rooms as a possible A-3 occupancy.

4A.2 PHASE 1 ARCHITECTURAL

OVERVIEW

Architectural explorations begun during the program and feasibility study phase will be further developed in the schematic design phase. No single scheme explored in this phase and described in Section 6 represents the complete solution that this project requires. It is our expectation that we will study alternatives at the beginning of the next phase that may include successful elements and strategies from various schemes to provide a unified approach to the project.

SITE

The site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad (see Section 3.4). It currently has ~142,000 GSF of original structures from the Camarillo State Hospital that are not in use. The vision plan identifies which structures are to remain and to be demolished to allow for new structures, which is studied in this report. The proposed site plays a central role in development of a new campus precinct and energizing the north end of campus as well as defining the arrival point for those entering the campus from the north. The vision plan establishes this as a new symbolic point of arrival and public identity for the campus, with the aggregation of buildings in Gateway Hall playing a significant role in this regard, as a "front door". Furthermore, the addition of new instructional facilities at the north edge of the north quad will reinforce the educational nature of the quad and foster more student life and activity in the north end of the campus.

BUILDING

As the new 'front door' to the campus the building should have visual prominence and should be representative of the current and future campus community. The massing of the building should carefully balance increased density requirements with the open character and landscape nature of the overall campus. Its relationship to the campus, as well as the exterior materials used should express the importance of the functions that take place in its interior.

FUNCTION

The building program elements should be configured and distributed in a clear way to move people quickly and efficiently to their destinations. Student service functions should be easily accessible and highly visible while administrative and executive components should include transparency while respecting the need for privacy and security essential to these functions.

EFFICIENCY

Flexibility over time is key to address evolving functional and technological requirements and accommodate both short term and long term changes. The design should also be expressive of efficiency, both to minimize long term operating costs and to facilitate staff operational needs.

4A.3 PHASE 1 ACCESSIBILITY

CSUCI is committed to providing all students, faculty, staff and visitors with an accessible experience across the entire campus. The new Gateway building, renovated structures, and its surroundings will be designed to seamlessly connect to the existing campus to accommodate the needs of the disabled. The significant finish floor variations of the existing buildings in the east/west direction will be renovated to become readily accessible to and usable by individuals with disabilities.

All exterior circulation and seating areas accessible to the public and interior program spaces will be designed to be accessible to the disabled according to the following codes and standards:

- Division of the State Architect Accessibility Guidelines
- 1990 Americans with Disabilities Act
- 2010 ADA Standards for Accessible Design

All building entries and lobbies will provide an accessible path of travel into the building leading to elevators that provide access to upper floors. Restrooms will be design according to all current accessibility standards while lighting, signage and threshold indicators shall be designed to the needs of the visually impaired. heights of call buttons, light switches and drinking fountains will all be designed for wheelchair usage.

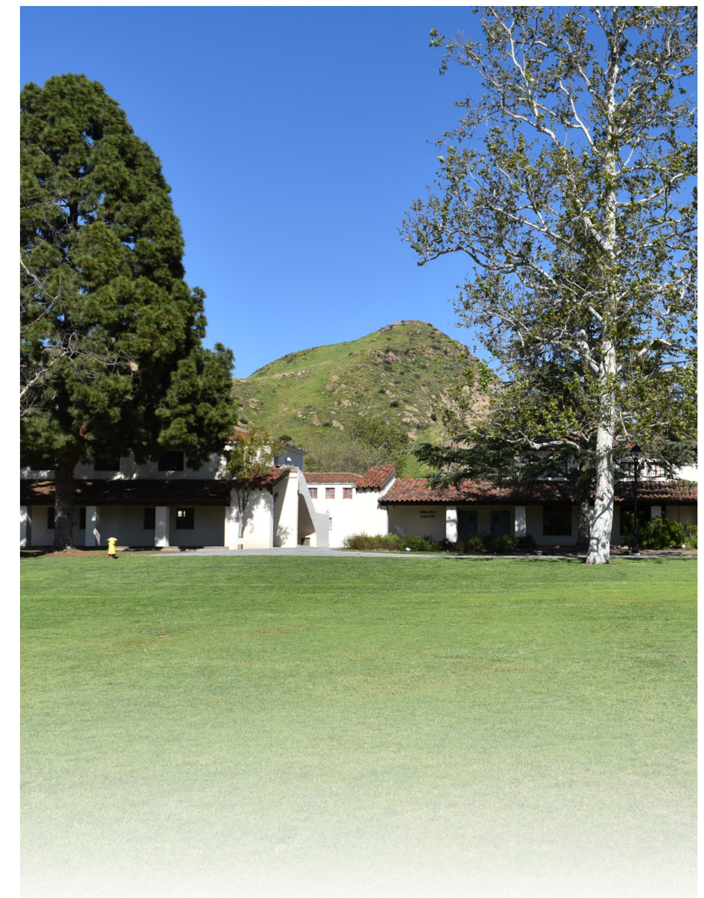
Pedestrian Circulation

Pedestrian Circulation

4A.4 PHASE 1 SUSTAINABILITY

APPROACH

CO Architects believes in taking an expanded approach to sustainability that is inclusive of a variety of strategies that reach beyond certification requirements to ensure a completely integrated, holistic design strategy.



MULTIPLE SUSTAINABILITIES

A building needs to be functionally sustainable to ensure adaptability and success over time. Cultural sustainability acknowledges how people should be positively affected by the space that surrounds them, especially through access to daylight and views which has been shown to have a positive effect on people by reducing stress and increasing productivity. Improving performance and reducing a buildings energy, water and carbon footprint is extremely important to protect natural resources. Building systems should also be well integrated, feasible and cost effective, ensuring maximum efficiency and operational savings, and through tools like Building Information Modeling we can facilitate and streamline the process by enhancing communication within the complete project team and maximizing the design outcome.

FUNCTION

- Centralize and streamline student services
- Encourage interdisciplinary collaboration
- Building as a tool for the campus community
- Anticipate growth and changing technology
- Increase opportunities for sharing
- Flexibility through modular planning

CULTURE

- Blur departmental boundaries
- Strengthen community life and social fabric
- Put student services on display
- Increase productivity and improve social well being
- Enhance recruitment & retention of staff, faculty and students

ENVIRONMENT

- Protect natural resources
- Protect ecosystems
- Improved energy performance
- Efficient water use & re-use
- Maximize daylight

ECONOMY

- Ensure feasibility of systems
- Integrated process efficiencies
- Operational savings
- Strategic cost modeling vs. cost cutting

PROCEDURE

- Clear communication
- Increased efficiency
- Improved quality
- Ongoing re-evaluation of process

CAMPUS GOALS

This project will meet the CSU Sustainability and Climate Policy.

The campus' strategy is to actively encourage that all major capital projects achieve LEED Platinum equivalency and CAL Green Tier II level of energy efficiency.

4A.5 PHASE 1 STRUCTURAL

STRUCTURAL NARRATIVE

GENERAL PROJECT DESCRIPTION

The California State University Channel Island's (CSUCI) Gateway project consists of performing a feasibility study to investigate the renovation of existing buildings and adding new buildings to the North side of the campus. Phase 1: the renovation portion of the project will consist of investigating the demolition of 2 or 3 existing buildings and the renovation of approximately 68,000-sf of existing buildings. The existing buildings will be renovated to house faculty offices and administration offices and student service functions. Phase 2: the new buildings portion of the project will consist of approximately 56,000-sf of new construction and house academic programs such as: classrooms, lecture halls and auditoriums.

This portion of the structural narrative only addresses Phase 1 of the project.

Description of Existing Buildings

The existing buildings to be renovated are generally one (1) and two (2) story structures, concrete construction and were constructed in the 1960's. The gravity framing of the buildings consist of concrete one-way slabs spanning to concrete beams which either span to concrete columns or perimeter concrete walls. The columns and/or walls are supported on individual concrete spread footings or continuous wall footings.

The lateral resisting system of the buildings consist of perimeter concrete shear walls with punched openings (for windows and doors) and interior concrete shear walls located at discrete locations. The concrete shear wall thicknesses vary between 8 to 10 inches. Minimal reinforcing steel was provided in the walls, which was based on the code requirements from when these buildings were designed and constructed.

GENERAL DESIGN CRITERIA

Governing Codes

The governing code for this project will be the 2016 California Building Code (CBC). Chapter 34 of the 2016 CBC will be used to address the renovations to the existing buildings.

Other referenced design codes include:

- CSU Seismic Requirements, date July 14, 2014
- ASCE 41-13: Seismic Evaluation and Retrofit of Existing Buildings
- ASCE 7-10: Minimum Design Loads for Buildings and Other Structures
- ACI Building Code, Commentary, ACI 318-11,
- AISC Manual of Steel Construction (ASD), Fourteenth Edition,
- AWS Structural Welding Code, ANSI/AWS D1.1 thru D1.9, Latest Edition.

Gravity Design Loads

Design load information has been developed based on a review of the referenced building code. All live loads are assumed to be reducible for beams, columns and foundations as permitted by the building code except as noted below.

A. Live Loads

- General Office- 80 psf
- Classrooms – 50 psf
- Exit Corridors- 100 psf (non-reducible)
- Stairs- 100 psf
- Roof- 20 psf
- Light Storage and Data Center – 125 psf (non-reducible)
- Mechanical Floor and Roof- 150 psf (or per equipment/pads layout and weights)

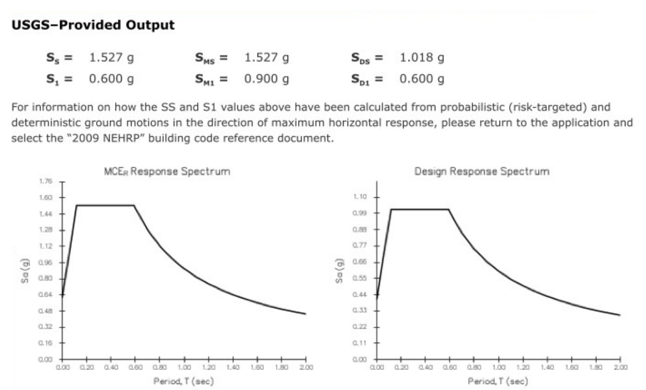
B. Dead Loads

- General: Estimated weight of construction material
- Mechanical Equipment: 150 psf or weight of mechanical equipment

Seismic Design Loads

The new Gateway project will be located in a high seismic region, as defined by the Latest California Building Code, and per the latitude and longitudinal coordinates of the University. The ground motions for the site, per the USGS seismic mapped spectral response accelerations, are shown below. These response acceleration parameters are used for the design of new buildings at the site and will be discussed more in the Phase 2 portion of the report.

USGS MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS



For the Existing buildings on the site, they will need to be evaluated based on Chapter 34 of the 2016 CBC. The response acceleration parameters will be determined based on geo-hazard site specific investigations to be performed by a licensed Geotechnical engineering firm. Per Chapter 34 of the code, the buildings to be renovated will be evaluated to a "LIFE SAFE" and "COLLAPSE PREVENTION" seismic level of performance. The definitions of these levels of performance are noted below:

LIFE SAFE
Significant damage to both structural and non-structural components during a design earthquake, though structure remains stable with at least some margin against either partial or total structural collapse. Injuries may occur, but the level of risk for life-threatening injury and entrapment is low. Building may be evacuated following earthquake. Repair may be possible, but may be economically impractical.

COLLAPSE PREVENTION
Severe damage to structural and non-structural components during a design earthquake, but collapse of the building is prevented. Non-structural elements may fall. Significant risk of injury due to falling hazards from structural debris may exist. The structure may not be technically practical to repair and is not safe for re-occupancy, as aftershock activity could induce collapse.

Please note that the levels of seismic performance, noted above, are defined collectively by the American Society of Civil Engineers (ASCE), Federal Emergency Management Agency (FEMA), and the Structural Engineers Association of California (SEAOC).

The prescribe Earthquake Hazard Level, per each level of seismic performance, are based on the requirements of Chapter 34, sections 3417 and 3418 and are noted below.

1. Level 1 - Life Safe Seismic Performance Criteria evaluated at a BSE-R Earthquake Hazard Level.
2. Level 2 - Collapse Prevention Seismic Performance Criteria evaluated at a BSE-C Earthquake Hazard Level.
3. The more restrictive requirements from either criteria shall apply.

Risk Category III

Seismic Design Category D

W - Seismic Weight of Building

BSE-R – Response Acceleration Parameters based on Site Specific Response Spectrum developed according to ASCE 41, for an Earthquake Hazard Level of 20-percent/ 50-years probability of exceedance, equivalent to a mean return period of 225 years.

BSE-C - Response Acceleration Parameters based on Site Specific Response Spectrum developed according to ASCE 41, for an Earthquake Hazard Level of 5-percent/ 50-years probability of exceedance, equivalent to a mean return period of 975 years.

Wind Design Loads
Wind load effects over the entire structure and on individual elements shall be considered with recognition of its variation over the height of the building and orientation to the wind.

Wind loading criteria is as follows:

- Ultimate Wind Speed = 115 mph (at a 3-sec. gust)
- Exposure C

PROPOSED CONSTRUCTION MATERIALS

Concrete
All structural concrete shall be Type II cement. All structural concrete shall have a minimum compressive strength f'c at 28-days as follows:
- Shotcrete: f'c=4000 psi (145 pcf)
- Foundations: f'c=4000 psi (145 pcf)
- All other Concrete: f'c=4000 psi (145 pcf)

Masonry
- CMU Block ASTM C-90, normal weight
- Cement (Low Alkali, Type I or II): ASTM C150
- Grout ASTM C476 (f'm = 2000 psi)

Reinforcement
- Typical reinforcement at Mat Foundation: ASTM A615, Grade 75
- Typical reinforcement at Gravity Footings: ASTM A615, Grade 60 (FY=60ksi)
- Foundation Grade Beam Reinforcement: ASTM A706, Grade 60 (FY=60ksi)
- Welded Reinforcement: ASTM A706, Grade 60

Structural Steel
- Structural Wide Flange Shapes, ASTM A992, Grade 50
- Steel Angles and Channels: ASTM Grade 36
- Structural Tubes: ASTM A500, Grade B
- Structural Pipes: ASTM A53, Grade B
- Structural Bolts: ASTM A325-SC, ASTM A490-SC
- Foundation Anchor Rods: ASTM F1554, Grade 105

Welding
- Welding shall conform to AWS D1.1 thru D1.9
- Electrode Strength: E80xx (Reinforcing Steel)
  E70xx (Structural Steel)

GEOTECHNICAL INFORMATION

A geotechnical and geo-hazard study of the site for this project has not yet been performed. Therefore, estimates of foundation design parameters/recommendations for the project site will be based on information from the existing geotechnical report of the adjacent North Hall Building site, which is located on the opposite (east end) of the Quad.

The existing geotechnical study of the North Hall Building Science Building (Del Norte Hall) was performed by Fugro West, Inc. and described in a report dated August 2007, Project No. 3133.022. The report describes the need to prepare the existing site soil to deal with expansive soils, undocumented fill, as well as potentially wet subgrade conditions. If deep excavations are required for this project (currently the project massing does not indicate a basement an allowance should be included in the budget to handle wet subgrade conditions.

The report indicates that shallow spread foundations that extend at least 2 ft. below the adjacent finish floor elevation may be designed for an allowable bearing value of 2,000 psf. The recommended bearing values are relatively low and an appropriate allowance should be included in the project budget for increased foundation costs.

A minimum slab thickness of 5 in. is recommended, along with a gravel, vapor barrier and sand system designed to promote uniform curing of tile slab and to serve as a capillary break.

Based on the Fugro report, it appears th.at the site contains expansive soil. Mitigation of potentiality expansive soil at the site appears to require over excavation of the site to a depth at least four feet to a maximum of 10 feet below the bottom of the footings. The over excavation in plan would extend a distance beyond the edge of the building equal to five feet or the distance a foundation extends beyond the edge of the building, whichever is greater. The over excavated soil should be replaced with approved compacted fill.

Vibration
There are no stated floor vibration criteria for this project, but published vibration criteria suggest a maximum root mean square (RMS) velocity between 8,0000 to 16,000 μ-inches per second. The final recommended vibration value would depend on program requirements.

The following table provides a range of vibration characteristics that suggests the range of generally acceptable vibration criteria. It is not known if the existing structure is capable of meeting vibration criteria contemplated for this project, but the generally short spans and the use of concrete construction make it likely that the existing structure can achieve at least the high end of the vibration criteria range.

CRITERION CURVE	VRMS (μIN/S)	VELOCITY LEVEL (DB) REF: 1μIN/S	DETAIL SIZE	DESCRIPTION OF USE
Workshop (ISO)	32,000	90	N/A	Distinctly felt vibration. Appropriate to workshops and non-sensitive areas.
Office (ISO)	16,600	84	N/A	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential Day (ISO)	8.000	78	75	Barely felt vibration. Sleep areas in most instances. Probably adequate for computer equipment, probe test equipment and low-power microscopes (to 20x).
Op. Theatre (ISO)	4,000	72	25	Vibration not felt. Suitable for sensitive sleeping areas. Suitable in most instances for microscopes to 100x and for other equipment of low sensitivity.

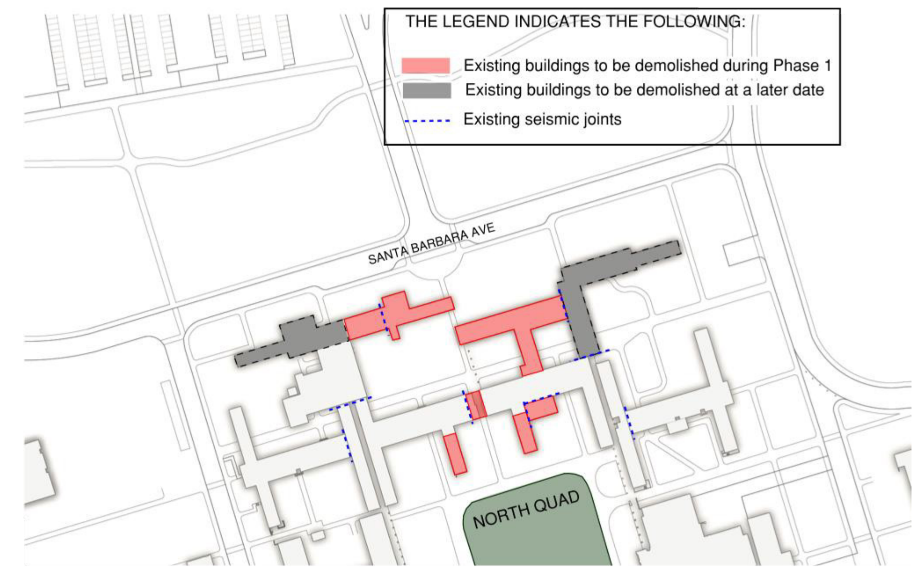
SEISMIC UPGRADE OF EXISTING BUILDINGS

The existing concrete structures to be renovated (as described in the previous section) were not designed to sustain seismic demands consistent with current building code requirements for new structures. It is assumed that the buildings to remain would be designated as Priority 2 buildings on the list of California State University existing buildings requiring seismic upgrade. Priority 2 requires that the building be seismically evaluated and, if necessary, upgraded to satisfy the requirements of Chapter 34 of the 2016 California Building Code.

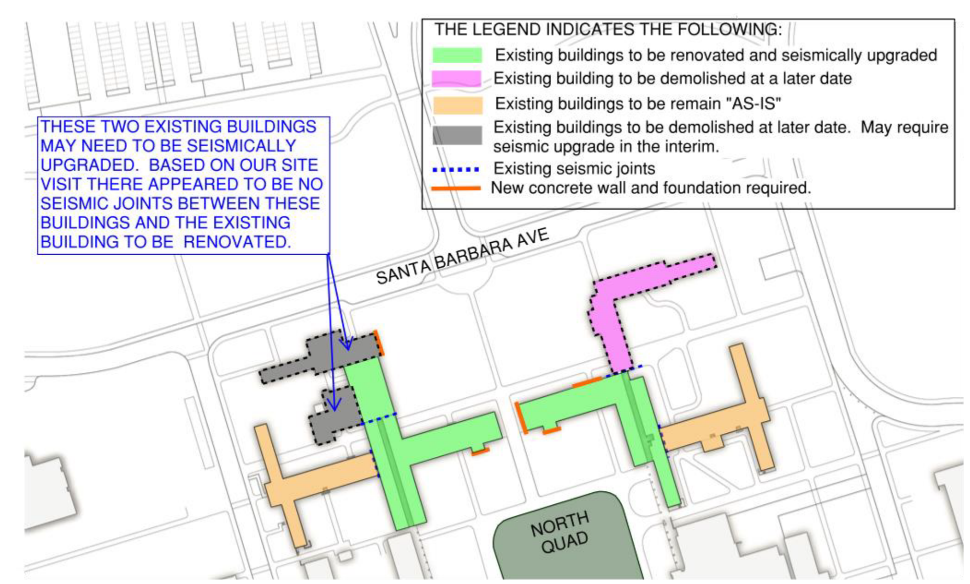
Although a Chapter 34 analysis has not been performed at this preliminary stage of the project, a review of the existing buildings to remain suggest that seismic upgrade work may be required (refer to figures below). Although reasonable amounts of shear wall appear to be present in the longitudinal direction (i.e. to resist seismic loads applied in the long direction of the buildings), there appears to be inadequate lateral resistance in the transverse direction (i.e. resist seismic loads applied in the short directions of the buildings).

It is recommended that a Chapter 34 evaluation be conducted as the project progresses and the extent of existing and new construction is better established. In the interim, it is recommended that an appropriate construction cost allowance for seismic upgrade work be included in the project budget in addition to the fees associated with the evaluation. As a recommendation for an appropriate allowance for the seismic upgrade work, we believe that using the seismic retrofit/renovation drawings from the existing Del Norte Hall project would provide a similar level of seismic upgrade work to the existing buildings on our project.

PHASE 1 DEMOLITION PLAN



PHASE 1 - SITE PLAN AFTER DEMOLITION



4A.6 PHASE 1 MEP, LIGHTING & FIRE PROTECTION

MECHANICAL SYSTEMS - PHASE 1

INTRODUCTION

Phase One of the project will house the following programed areas in the existing remodeled Gateway Buildings.

- Enrollment Services
- Faculty Offices
- Academic Advising
- Student Business Services

The existing building has a gross area of 67,850 sq. ft.

The University has two important goals for the Mechanical, Electrical and Plumbing systems for the project.

1. Provide the most energy efficient classroom building in the CSU and UC systems
2. Provide long term flexibility by selecting systems and infrastructure that allows for change in use in the building.

The report outlines the Basis of Design for the project. The objective of this report is to provide a narrative describing the design of the mechanical, electrical, plumbing and lighting systems to be provided and outlines the design assumptions of the HVAC system, electrical and lighting system, and plumbing system in the Gateway Hall. The Basis of Design document will be updated during each phase of the project.

This report can also be used as part of the document for applying LEED EA credits.

CODE AND STANDARDS

The latest editions of the codes and standards are intended as guidelines for design. The codes and standards are not limited to the lists below.

Code

- California Building Code
- California Mechanical Code
- National Electrical Code
- California Plumbing Code
- California Fire Code
- California Administrative Code
  - Title 8 General Industry Safety Order
  - Title 17 Public Health
  - Title 22 Social Security
  - Title 24 Building Efficiency Standards

Standards

- ANSI American National Standards Institute
- UL Underwriters Laboratories
- AGA American Gas Association
- ASME American Society of Mechanical Engineers
- ASHRAE American Society of Heating Refrigerating and Air Conditioning Engineers
- ARI American Refrigeration Institute
- ASTM American Society for Testing and Materials
- FM Factory Mutual
- NFPA National Fire Protection Association

MECHANICAL

Design Criteria

Heating and cooling load estimations for sizing systems and equipment will be performed in accordance with California Energy Code based on following design assumptions.

Outdoor Climate Conditions

Outdoor Design Conditions

LOCATION	CAMARILLO, CALIFORNIA	
LATITUDE	34.2	
LONGITUDE	119.2	
ELEVATION (FT)	147	
CLIMATE ZONE	6	
OUTSIDE DESIGN DRY BULB	MAXIMUM: 91.0°F DB / 69°F WB (0.1%)	RECOMMENDED: 84 F DB / 68 F WB (0.5%)
WINTER DESIGN	MAXIMUM: 32.0°F (0.2%)	RECOMMENDED:35F (0.6%)

Indoor Design Criteria
The table below lists the indoor design criteria used in the modeling of the building unless otherwise dictated by Title 24.

Internal Design Condition

ROOM	OCCUPIED DESIGN AIR TEMPERATURE SETPOINT (°F)	
	SUMMER	WINTER
Classrooms	74±2, No humidity control	70±2, No humidity control
Administration offices (provided with operable windows)	74±2; No humidity control	70±2; No humidity control
Corridor and Circulation Area	78±5 F, no humidity control	68±5F, no humidity control
Support Areas	78±5 F, no humidity control	68±5F, no humidity control
Storage	72±2 F, no humidity control	72±2 F, no humidity control

Notes:

1. Electrical rooms will be conditioned as required to offset the heat rejection of equipment and maintain room at or below 90°F.
2. Telecommunication Spaces will be maintained below a maximum of 78°F unless dictated otherwise by the IT consultant,
3. Elevator Machine Rooms shall be maintained below a maximum of 80°F.
4. Indoor Relative Humidity: The cooling systems will be designed to ensure the summer humidity is maintained below 60%RH during part load conditions and winter humidity is maintained above 30%RH. However, in general, humidity will not be controlled and there will times when conditions are outside these limits.
5. There are no areas in the building where humidity control is required to maintain humidity within any specific range.
6. Temperature setpoint for all spaces will be further examined during the next phases of the design.

BUILDING ENVELOPE
The building envelope shall exceed the requirements of the 2016 Title 24 Part 6 California Energy Code.

The design of the exterior construction shall be such as to minimize infiltration. An infiltration rate of 0.25 air changes per hour shall be assumed in the perimeter 15 feet. Rooms with openings to outdoors with either doors or operable windows shall assume an infiltration rate of 0.5 air changes per hour. Operable windows will only be provided in office areas.

The conditioned areas of the building shall be maintained under positive pressure of 0.02"W.C. under 0 mph exterior wind conditions; with the exception of restrooms and plumbing spaces. Positive pressurization is achieved by offsetting the return air quantity from the supply air volumetric flow rate.

INTERNAL HEAT GAIN
The HVAC system will be sized by the program to compensate for the following internal heat gains.

General Internal Heat Gains - People (students + staff)

SPACE	BASIS	HEAT GAIN SENSIBLE / LATENT
Meeting / conference rooms	20 sq ft per person	250/200 Btuh
Corridors & support spaces	100 ft2/person	250/200 Btuh
Open offices	100 ft2/person	250/200 Btuh
Individual offices	2 person per room	250/200 Btuh

General Internal Heat Gains - Lighting

SPACE	LIGHTING LOAD
Meeting / Conference Rooms	1.0 Watts/ft^2
Corridors & Support Spaces	0.6 Watts/ft^2
Individual offices	0.8 Watts/ft^2

Notes:

1. These are lighting budget number only. Actual heat gain from lighting will be determined by the lighting designer during the schematic design of the project. An allowance will be made for percentage of heat gain going to the space based on fixture type. The numbers noted above are maximum requirements. The design intent will be to substantially reduce these figures.

General Internal Heat Gains – Miscellaneous Equipment

SPACE	LIGHTING LOAD
Meeting / Conference Rooms	1.0 Watts/ft^2
Corridors & Support Spaces	0.5 Watts/ft^2
Individual offices	1.5 Watts/ft^2

It should be noted that the above heat gains have been provided as a basis to begin the schematic design.

Heats gains in the data closets and electrical rooms will also be defined during the schematic design phase.

AIR FILTRATION
All systems will be provided with a minimum MERV 8 pre filters and MERV 14 final in the air handling unit.

Filters shall be rated per ASHRAE 52.2 Standard Test Method. All air filters shall be of the pleated type. No bag filters will be used.

BUILDING HOURS OF OPERATION
The building is a facility that should allow staff 24 hour access to the building. All conditioned spaces shall be scheduled to close down when not in use. The system will be provided with override switches to allow out of hour operation in the offices and classrooms.

Consideration will be given to the use of occupancy sensors in each of the classrooms to turn down the HVAC when the rooms are unoccupied. Where possible, the same occupancy sensors maybe used for both lighting control and HVAC control.

The systems serving the classrooms and offices, conference rooms and meeting rooms shall be designed to allow normal maintenance without shutting down the complete system.

VENTILATION REQUIREMENTS

Offices, Meeting Rooms and other Conference Rooms
Offices and conference rooms shall be provided with minimum of 15 CFM per person outside air. The total air supplied shall meet the maximum cooling load. The occupancy shall be based on block local amount and not individual occupant room total. CO_2 sensors will be utilized in all meeting rooms and conference rooms.

Storage and Equipment Areas
Storage rooms will provide 3 air changes exhaust per hour or 50 CFM minimum.

Telecommunication, elevator machine rooms, and electrical rooms with transformer will provide dedicate fan coil unit with recirculating air. The fan coil units for these spaces will be provided with DX and chilled water cooling coils.

Toilets and Janitor Rooms
Ten air change per hour exhaust for toilets (but not less than 50 CFM per fixture) will be provided. Toilet rooms will be supplied with air conditioning or transfer air from air conditioned space to maintain the design condition. Janitor closets will not be provided with air conditioning. Six air changes per hour exhaust will be provided to janitor rooms.

BUILDING MANAGEMENT SYSTEM
All HVAC systems shall be monitored and controlled by the campus standard building management system (BMS). The system will use direct digital control (DDC) technology and shall match the existing campus ALC standards and systems. Requirements, control points and control interface shall be based upon the University's requirements. The BMS system shall have the ability to receive Occupancy sensor based signals from the campus standard lighting control system to determine when zones are occupied or otherwise.

Stand-alone modules will control air handlers, chilled beams, pumps, etc. A common data highway will link the modular controllers. Valve and damper actuators will be electronic. The building control system will be connected to the campus energy management control system through wiring or through a modem.

Control panels for each room shall be installed above the classroom entrance doors (or adjacent to the door) for ease of access and maintenance.)

The BMS will be able to performing the following functions:

- Provide full color graphics and sequence modification
- Initiate alarms when monitored equipment exceed allowable limits and indicate necessary corrective measures to the user
- Monitor status and run time for all equipment connected to the system
- Compile and print reports of system operation according to the predetermined schedule or as requested by the user.
- Control all major equipment and modify set points.
- The BMS system components including control valves, actuators, sensors, etc. will be specified per existing campus standards.

FUTURE CAPACITY

Future Capacity and Diversity Within the Building

The base design of the air handling supply and return air systems shall allow for 10% additional capacity, based on cooling requirements, for future use. The capacity shall be allowed for all fans, ducting and piping only. Cooling and heating capacity shall be obtained by increasing the face velocity of air across the coils. Initial coil sizing shall be based on maximum face velocity of 350 fpm. The spare capacity shall be utilized in the future for remodeling and renovations without placing an excessive burden on the construction costs.

In VAV systems, AHU fan capacity shall be based on meeting 100% flow requirement of all VAV boxes combined. No diversity shall be used.

Ductwork air leakage and heat loss factors shall be added to suit design conditions and actual installation.

Morning warm up shall not be included, as the system shall operate 24 hours per day.

ENERGY CONSERVATION

A goal of the project is to pursue an energy conscious design with energy use a minimum of 20% below the CEC Title 24 maximum allowance. While energy efficiency is important also very important is the safety of the researches and students especially while they are working alone at night time.

The University strives to achieve a USGBC LEED Platinum rating.

Energy efficiency goals can be accomplished in a number of ways, as a minimum consideration will be given to the following:

- Increase pipe and duct insulation minimum thickness by 30% minimum.
- Building Envelope: Thermal insulation of a performance up to 30% greater than the minimum required.
- Fenestration: Double Glazed, low E, low solar heat gain coefficient (SHGC) glazing, and internal blinds and external sun control or shades shall be an integral part of the design.
- Consider the use of skylights and / or sun tubes.
- The most energy saving premium efficient motor shall be provided for the equipment.
- Active chilled beams will be considered for use where ever possible (offices etc)
- Reduced coil face velocity design for low air pressure drop to save fan horsepower all year. Maximum coil face velocity will be 400fpm.
- Two way or Delta P valves for coils.
- Unoccupied set back of classrooms and office HVAC system
- Ensure that thermal mass provided in the building is analyzed as part of the cooling and heating calculations including the thermal lag properties.
- High efficiency lighting systems, including consideration of LED lighting
- Use of lower ambient light in combination with LED task lights for offices

CENTRAL UTILITIES

The building will be provided with Chilled Water and Heating Hot Water from the Campus Utility Distribution. Consideration will be given in the schematic design phase to whether each phase has its own central utilities mechanical room or not. The systems described below can be used for individual building mechanical rooms or one combined room.

Chilled Water System

Chilled water will be supplied from the campus chilled water loop. The new chilled water supply and return connections will be provided with pressure independent valves shall be provided from existing chilled water mains. The new connections shall run directly from the nearest campus utility manhole (located on the west side of the building).

The route for the underground piping will avoid piping under the footprint of the building. The chilled water will be metered.

The chilled water distribution system will serve all custom air handling unit cooling coils and plate heat exchanger for the chilled beam system. Two chilled water pumps, sized at 60% capacity each will be provided to serve the chilled beam system. Variable speed drives shall be provided on both pumps.

The central plant chilled water system provides chilled water at 42°F.

Air handling units will be provided with delta P valves, all other control valves will be 2-way.

No piping shall be run across the roof. Pipes to air handling units shall be routed under the roof slab and only penetrate the roof at the location of coil connections.

All heat exchangers and pumps shall be located in the basement or on the first floor mechanical rooms.

Chilled water loop shall have differential pressure sensors at the POC in the building that can be used to signal the central plant for adequacy of flow. Chilled water flow into the building shall be metered.

Heating Hot Water System

Heating hot water at 180°F supply and 140°F return will be provided to the building from the Campus Heating Hot Water loop. The new connections shall run directly from the nearest campus utility manholes. The heating hot water will be metered.

Pressure independent valves shall be provided to heating hot water branch serving the Gateway Hall. The heating hot water distribution system will serve all custom air handling unit cooling coils, terminal reheat at variable air volume boxes, and the plate heat exchanger for the chilled beam system. Two heating hot water pumps, sized at 60% capacity each will be provided to serve the chilled beam system. Variable speed drives shall be provided on both pumps.

All heating coils will be provided with 2-way valves.

No pipes shall be run across the roof. Pipes to air handling units shall be routed under the roof slab and only penetrate the roof at the location of coil connections.

All heat exchangers and pumps shall be located in the basement/first floor mechanical rooms.

Heating hot water loop shall have differential pressure sensors at the POC in the building that can be used to signal the central plant for adequacy of flow. Heating Hot water flow into the building shall be metered.

Mechanical HVAC Distribution

The building will consider the use of active chilled beams in spaces where they are appropriate. It is proposed that this system be used in conjunction with a variable air volume system. The air handling units will be located either within the roof attic space or within an air handling room located at the roof level or at the basement / lower level. Adequate maintenance access will be required.

Offices

The offices will be served by 4-pipe active chilled beams. These are highly efficient and allow control of each space individually. One thermostat will be provided for each room to control all of the chilled beams in that space. Thermostats will be provided with an override button for off-hours occupancy. Return air system can be omitted and conditioned air from office spaces can be released to adjacent corridor to enable passive conditioned system while maintaining certain level of comfort. Exterior offices with operable windows and using chilled beams will be provided with window switches to shut down the active chilled beams when the windows are open.

A maximum of 4 offices will be provided with a variable air volume terminal unit prior to serving the active chilled beams. Corner offices and spaces with active chilled beams will be provided with its own variable air volume terminal unit.

Room occupancy sensors will be capable of switching off the terminal units serving a bank of offices, all of the offices are unoccupied.

Meeting Rooms, Conference Room and Lobby

Spaces with a high occupancy load will be served by dedicated variable air volume terminal units with hot water reheat using overhead distribution and 55°F from the air handling units.

Terminal units with reheat coils shall be provided with an access door when located above inaccessible ceilings. An effort shall be made in the design to locate terminal units above removable, accessible ceiling tiles. Internal liner shall be covered with suitable material to avoid degradation of the liner.

Lobbies and corridors will use relieve air from classrooms and offices where possible (in non fire rated situations) to condition the spaces.

Each meeting room and conference room will be provided with occupancy sensors to switch of the VAV terminal unit that serves the space.

Electrical and Elevator Machine Rooms

The main electrical room and the elevator machine room will each be provided with a dedicated, cooling-only fan coil unit to maintain desired space conditions. The fan coil units will not be located within the electrical room or the elevator machine room.

Restrooms

A constantly running exhaust fan will be provided to serve the janitor closets and main restrooms. These will be exhausted at a rate of 10 ACH; most of the make-up air will be transferred from surrounding spaces. A small amount of fresh air will be provided directly to the restrooms. Fans shall be direct drive and shall be linked to the building EMS.

All fans shall bear the AMCA seal and performance shall be based on tests made in accordance with AMCA Standard 210.

Grilles, Registers and Diffusers
Supply, return and exhaust inlets and outlets shall be coordinate with the Architect and the Acoustician.

The face velocity at the diffusers shall not exceed 500 fpm, unless approved by Acoustical Consultant.

All inlets and outlets shall be selected at least 10 NC levels below the NC level of the room.

All supply outlets shall be provided with a minimum of 5' of flexible ductwork to reduce vibration transmission, provide sound attenuation and assist in locating the diffusers in the ceilings or walls. Flexible ductwork shall not exceed 7 feet.

Design will ensure a minimum separation of 8 ft. between supply and return diffusers to prevent short circuit of supply air flow.

HYDRONIC PIPING SYSTEMS

All piping shall be chemically cleaned and flushed before start up.

All piping in chilled water and heating hot water system shall be insulated in accordance with current energy code and regulations, such as ASHRAE 90.1 and Title 24 whichever is more stringent.

All insulation exposed to view shall have metal cladding of 0.16 aluminum embossed.

Piping shall be tested with a hydrostatic pressure of not less than 100 psig, but not less than 1.5 times greater than operation pressure. Pressure shall be maintained for at least one hour.

Chilled water and heating hot water piping shall be sized according to the following guidelines:
- Friction loss of 1.0 to 3.0 feet WG/100 feet
- Minimum pipe size of 3/4 inch, except for gage or control piping.
- Maximum velocity of 6 fps for 2½" pipe size and larger.
- Maximum velocity of 4 fps for 2 pipe size and smaller.
- Maximum pressure drop of 4 ft/100 ft for any pipe size.
- Minimum velocity of 2 fps (except for terminal reheat runouts).

Pump rooms shall have noise and vibration protection and isolation considered in the design.

DUCTWORK SYSTEM DESIGN REQUIREMENTS

General
Duct systems will be designed to obtain lowest cost-beneficial pressure loss by limiting certain duct velocities, avoiding dynamic loss components where possible and utilization of low dynamic loss components. High-loss fittings, such as mitered elbows, abrupt transitions, and takeoffs and internal obstructions will be avoided. The distribution system pressure losses will be determined by total pressure.

It is an objective to design the pressure distribution duct (between the AC unit and terminal units) for pressure drops to 1.0 inches WG or less. Long duct runs will be designed with special consideration of pressure loss since the maximum loss for any run will be imposed upon the entire fan system.

Horizontal duct distribution will be routed to maximize long, straight runs without multiple penetrations through fire and/or smoke partitions. Multiple horizontal mains will be of comparable length and configuration to equalize pressure losses. The overall objective is to route ducts that shall avoid or minimize architecturally and/or structurally induced dynamic losses.

Construction of ductwork shall be in accordance with SMACNA for the appropriate duct pressure classification. Variations in duct size, and additional duct fittings shall be provided, as required to clear obstructions and maintain clearance.

Drive slip or equivalent flat seams for ducts exposed in the conditioned space or where necessary due to space limitations, shall be provided. Longitudinal seams will use Pittsburgh lock. Button punch snap lock shall not be used on the project. On ducts over 48 inches wide, provide standard reinforcing on inside of duct. Run-outs to grilles, registers or diffusers on exposed ductwork will be the same size as the flange outer perimeter on the grille, register, or diffuser.

Return air system will be ducted in shafts and non-conditioned spaces. Return air plenum may be used above conditioned spaces.

Painting inside of ducts behind grilles is not allowed.

Friction Losses and Minimum duct Sizes
Supply air ducts from cooling unit's discharge up to the terminal unit will be sized for friction losses of 0.1 inches WG/100 feet but not exceeding a velocity of 1500 fpm. Minimum size duct to terminal units or air valves will be eight inches in diameter but not less than terminal inlet size.

Supply air ducts downstream of terminal units or air valves; return air ducts, and general (e.g., toilet) exhaust ducts will be sized for friction losses of 0.08 and WG/100 feet but not exceeding 1000 fpm.

Maximum velocities and friction loss will be maintained including future increase of 20% airflow.

Ducts serving or routed through acoustically sensitive areas are designed based on acoustical consultant's recommendations, which includes maximum allowed duct velocities, usage of duct liner, preferred duct shape and material, etc.

Ductwork Accessories
Terminal units mixing dampers shall be provided with an access door. Internal liner shall be covered with suitable material to avoid degradation of the liner. Closed cell insulation shall be sued for duct liner, fiberglass duct liner will not be used.

The selection of the diffusers and grilles shall be carried out in conjunction with the Architect when they design the ceiling systems. The pre-schematic basis of design shall adhere to the following:
- In order to minimize noise and improve air discharge patterns supply registers shall have square necks and plenums.

Return grilles will be 2 feet x 2 feet to lay-in T-bar ceilings. Provide with 45 degree angled blades or perforated face. Exhaust grilles shall be 45 degree angle blade type.

CONTROLS

General
A modular direct digital control (DDC) system to match the existing ALC campus control system shall be provided for the HVAC system. Standalone modules shall control air handler, pumps etc. A common data highway shall link the modular controller.

Thermostat for terminal units, chilled beams and air valves will be wall mounted. Thermostat shall be programmable and have set back function. All control component shall be digital.

A DDC system shall also be used for alarms for emergency generator, smoke detectors, vacuum pumps, compressed air etc.

Alarm Monitoring
Non HVAC equipment needs to be monitored for alarm conditions. Each alarm shall be for only one specific room or item so that maintenance shall have no question what needs service. These alarm shall include, but not limited to the following:
- Building Electrical Switchgear
- Additional alarm points shall be discussed during CD phase.

Sound, Vibration and Seismic Control
Sound and vibration levels generated by the building's mechanical and electrical equipment shall be controlled as necessary to comply with the CSU specific NC requirements by area type, taking into account in the acoustic analyses any significant noises likely to also be generated by occupant-related equipment.

Before the completion of the Preliminary design phase, the acoustical consultant will provide an acoustical analysis for the mechanical ducting systems to ensure the design meets the acoustical criteria.

M/EP equipment location and vibration isolation requirements shall be coordinated between the mechanical designers and the structural designers.

The following equipment shall be provided with vibration isolation:
- Fans (all of EF)
- Air Handling Units (AHU)
- Pumps

Sound attenuators (duct silencers) shall be provided for AHU supply, and return, and as indicated by acoustical consultant.

Specific areas requiring attention to control noise and vibration may include:
- Fan noise, transmitted either through the structure or through the duct system.
- Noise generated by air flowing past dampers, turning vanes and terminal device and louvers.
- Noise caused by excitation of duct wall resonance, produced by fan noise; by pressure fluctuations caused by fan instability; and by turbulence caused by discontinuance in the duct systems.
- Noise from the water circulation system, generally transmitted through the structural connections.
- Noise and vibration from out of balance forces from fans, pumps, compressors, etc.
- The best sound attenuation is the selection of a quiet fan.

Duct silencers shall only be considered when duct distance is not sufficient to provide adequate acoustical separation between rooms.

Vibrations generated by HVAC systems must be minimized: judicious equipment selection; limitation of fluid flow velocities;

and isolation of key mechanical, piping and ducting systems is required.

Vibration isolation systems shall be provided on rotating mechanical equipment greater than ½ hp located within the critical area, greater than 5 hp elsewhere in the building, and greater than 10 hp outside the building within 200 feet of the building. Reciprocating equipment (other than emergency equipment) shall not be used.

Steel frames shall be used for air handling equipment. Flexible pipe connectors (e.g., twin-sphere connectors) shall be used on piping connecting to isolated equipment and where piping and ducting exit the mechanical room. Flexible duct connectors shall be used in a similar manner.

Special design consideration shall been given to the duct layout reducing noise transfer between rooms, especially noise generated by loud equipment or discussions in adjacent rooms.

Ducts of diameter less than 24 inches do not require isolation provided flow velocities do not exceed 1,200 feet per minute. (In the case of rectangular ducting, the effective diameter is defined as the square foot of the product of the two duct dimensions.)

System Start-Up, Testing, Adjusting & Balancing - The work includes system start-up, test, adjust, and balance (TAB) of HVAC air and water distribution systems including equipment, ducts, and piping. Include sound testing and vibration recordings for HVAC equipment.

SYSTEM START-UP, TESTING, ADJUSTING, AND BALANCING

The work incudes system start-up, test, adjust, and balance (TAB) of HVAC air and water distribution systems including equipment, ducts, and piping for the project, sound testing and vibration recordings for HVAC equipment.

The building systems will undergo enhanced commissioning to help achieve the USGBC Gold LEED rating.

ELECTRICAL SYSTEMS – PHASE 1

EXECUTIVE SUMMARY

This phase of the project consists of full and partial demolition of existing buildings, renovation of existing buildings. The approximate size of the renovation is 68,000 GSF. The project will be broken down into 2 phase, with Phase 1 being the demolition and renovation portion of work and Phase 2 construction of the new building.

We anticipate that the renovated buildings will be fully gutted and reconstructed. The reconstruction will consists of new lighting, power, data, and fire alarm systems. Our understanding is that the existing buildings associated with this project are, and will remain, unoccupied until after construction.

New construction will be a complete and functional built out facility. The overall program is essentially offices, support spaces, classrooms, light instruction labs (no wet labs), and both small and large conference rooms and auditoriums.

All work shall conform to the CSU Channel Island campus standards.

BASE DESIGN CRITERIA

Design Voltages

SPACE	LIGHTING LOAD
Campus Distribution	12.47kV, 3 phase, 3 wire + ground
Motors; ½ HP and larger	480V, 3 phase, 3 wire
Motors; less than ½ HP	120 or 208 Volts, 1 phase, 2 wire + ground
Lighting	277 Volts, 1 phase, 2 wire + ground
Specific Equipment	480 Volts, 3 phase, 3 wire + ground
Specialty Equipment	208Y/120V, 3 phase, 4 wire
Receptacles	120V, 1 phase, 2 wire + ground

EQUIPMENT SIZING CRITERIA

Branch Circuit Sizing Criteria

TYPE	LOAD
Lighting	Actual Installed VA
Receptacles	180 VA per outlet (duplex or single)
Multiple Outlet Assemblies	180 VA per 2'
Special Outlets	Actual Installed VA of Equipment Served
Motors	125% of Motor VA
Special Equipment	Actual Installed VA

Diversity Factor

Diversity factors will be used in establishing power service, feeder and equipment capacities. The diversity factor represents the ratio of the sum of the individual non-coincident maximum demands of various subdivisions of the system to the maximum demand of the complete system and will be established using historical data from similar buildings in conjunction with industry standards.

Long Continuous Load/Demand Factors Criteria

TYPE	LCL FACTOR
Lighting (Continuous Loads)	125% of installed VA
General Receptacles	100% of first 10 kVA installed plus 50% of remainder
Motors	125% of VA of largest motor plus 100% of VA of all other motors
Fixed Equipment	100% of total installed VA

LOAD CALCULATION CRITERIA

Functional Area Load Density Criteria – Peak Connected

FUNCTIONAL AREA	SERVICE LOAD DENSITY
Office Receptacle	3.0
Lighting	1.0
Conference Rooms	2.0
Corridor	1.0
Public Space	3.0
Building Support	2.0
HVAC Systems (utilizing campus chilled water and steam)	4.0

Notes:
1. VA/sf values is based on historical data from projects with similar program

LOAD TABLE

System Capacity and Calculated Demand Load

BUILDING LOAD SUMMARY	
	NORMAL POWER
kVA	500
VA/SF	9

SYSTEMS DESCRIPTIONS

Electrical Service

Systems Description
The facilities will be fed from the existing campus 12.47 kV medium voltage system.

Phase 1 Work (Renovation): The renovated facilities will utilize the existing 12KV feeders to the building. All new power distribution equipment will be provided for the renovated building inclusive of new pad mounted transformers and service entrance switchgear.

The transformer will reduce the 12.47KV distribution voltage down to the building's utilization voltage of 480/277V, 3 phase, 4 wire. This in turn will feed a new service entrance switchboard located within the building. The pad mounted transformer shall utilize FR3 non-hazardous fluid and the installation shall be equipped with fluid containment.

Design Criteria
The primary system service capacity will be designed to serve the estimated demand load of the facility plus an additional 20% for anticipated future loads.

Lightning and surge protection shall be provided at the exterior transformer and at the main switchboard.

Switchgear distribution circuit breakers shall be fixed mounted molded case circuit breakers with power metering and power quality monitoring and reporting capability.

EMERGENCY POWER SYSTEM

System Description
Emergency power is required only for egress lighting and the fire alarm systems. Because these loads are small batteries will be utilized. A central inverter will be provided to consolidate the batteries into a single location for easier maintenance and testing. The batteries shall be sized to meet the life safety code with a 90 minute minimum run time.

The fire alarm panels shall be equipped with integral battery backups in both the renovation and new construction.

No emergency generator will be provided.

ELECTRICAL DISTRIBUTION

System Description

Normal Power Distribution
The normal distribution system shall include all electrical distribution equipment from the campus medium voltage distribution system to the branch distribution outlet device, not including those systems and devices as described in the following subsections.

The service entrance switchboard for the new construction shall be rated between 400 - 800 amps, 48-/277V, 3 phase, 4 wire.

Distribution will consist of conduit and wire.

480Y/277V distribution will be accomplished with conduit and wire. No busway shall be utilized. Each level will be equipped with lighting panelboard and a 112.5kVA, 480:208Y/120V distribution transformer.

Each 208Y/120V secondary distribution transformer will deliver power to a 400 amp Distribution Panel. The Distribution Panel will deliver power to the branch circuit panelboards.

Emergency/Standby Power Distribution
As required by Code, the feeders and branch circuit wiring to the emergency loads (egress lighting) will be in dedicated raceway. Individual feeders will originate at the lighting inverter distribution panel and will run through the building to serve the emergency lighting panels. The emergency branch circuit panelboards will be served from the emergency lighting panels via a small distribution transformer.

Design Criteria
Building service and distribution equipment sizes will be based on estimated demand plus known or anticipated future loads.

Power distribution equipment will be sized to support 20% spare capacity (amperes) to accommodate functional changes over the life of the building.

Power distribution equipment will be sized to include 20% spare circuit breakers spaces and load capacity

Equipment and Components

EQUIPMENT	DESCRIPTION OF COMPONENTS
Service Entrance and Distribution Switchboards	UL 891 construction Front access NEMA 1 enclosure Copper Bus Main Circuit Breaker Group mounted bolt-on feeder circuit breakers Electronic trip circuit breakers with field-adjustable and field-changeable trip units will be used for all circuit breakers greater than 225A and for smaller sizes if special circumstances exist Circuit breakers 800 amps and greater will be UL listed for applications at 100% of their continuous ampere rating in their intended enclosure Service entrance switchboard shall be service
Distribution Panelboards	UL 891 listed, Front access NEMA 1 enclosure switchboards Copper Bus Main Circuit Breaker Fixed, Group-mounted circuit breakers Electronic trip circuit breakers with field-adjustable and field-changeable trip units will be used for all circuit breakers greater than 225A and for smaller sizes if special circumstances exist
Branch Panelboards	UL 67 listed 42 Pole, NEMA 1 enclosure, recessed and/or surface mounted Copper Bus Main Circuit Breaker Molded case with non-adjustable trip units to be used for all circuit breakers 225 amps and smaller All circuit breakers will be bolt-on style Panelboard covers will be hinged trim with door-in-door construction.
Distribution Transformers	480 Delta to 208Y/120 VAC, Wye, three-phase, four-wire; 3-coil, 2-winding type; 115°C rise above 40°C ambient Copper Windings K13 rated Neutral conductors for K-4 and higher units to be increased in size from the transformer to the first distribution panel and will be able to support 200% of the normal phase current. Transformers will incorporate vibration isolation pads in their construction located between the core/coil assembly and the transformer case

GROUNDING SYSTEM

System Description
For the existing buildings utilizing the existing service entrance switchboard, we will augment the exiting grounding system with a new grounding triad consisting of 3 driven ground rods interconnected with bare #4/0 ground cable.

A complete low-impedance grounding electrode system will be provided. The grounding electrode system will include the main water service line, structural steel, (if any), and a ground triad. The equipment grounding system will extend from the building service entrance equipment to the branch circuit. All grounding system connections will be made using irreversible compression connections.

Bonding jumpers will be provided as required across pipe connections to water meters, dielectric couplings in a metallic cold water system, and across expansion/deflection couplings in conduit and piping systems.

All feeders and branch circuits will be provided with an equipment ground conductor. Under no circumstances will the raceway system be used as an equipment grounding conductor.

Design Criteria
The grounding electrode system will be designed in accordance with NEC article 250.

System resistance to ground will be 5 ohms or less.

All conductors will be installed in steel conduit unless installed below grade or in concrete.

Equipment and Components
The reference ground for the equipment grounding system will be established from a structural ground grid as follows:

Wall-mounted copper ground bus will be located in the main electrical room, floor electrical rooms, and voice/data rooms. The main electrical room ground bus will be connected to the grounding electrodes.

Distribution
A separate, insulated 4/0 AWG ground wire will be provided from the main electrical room ground bus to each floor's electrical room ground buses, underground incoming water service line ahead of meter, and underground gas line at the building entrance.

The main service entrance neutral will be bonded to the system ground bar within the switchboard by a removable bus bar link.

A code-sized, unbroken bond leader will be connecting the electrical room ground bar to the XO terminal of the local transformers.

A No. 4/0 AWG, bare copper, grounding electrode conductor will be extended to all voice/data rooms, so that those systems can be properly bonded.

A separate ground wire will be provided for all feeders and branch circuits.

LIGHTNING PROTECTION SYSTEM

A lightning protection system will not be provided.

LIGHTING SYSTEMS

System Description

The design of the spaces represents a unique opportunity to create an outstanding and memorable building while striving to reach reduced energy consumption goals for the building. The lighting systems will provide appropriate task oriented light levels for both the students and faculty, with minimum energy consumption, while creating beautiful spaces. To successfully meet these energy goals and the University objective of high energy efficiency, the lighting systems must be designed to incorporate efficient technologies. Highly efficient light sources are utilized to maximize light and reduce glare or veiling reflections. Light systems should be integrated with the architectural form and design character. Critical design decisions affecting light intensity will be rigorously analyzed to confirm the correct solution. Key components will be developed to form a comprehensive scheme which unites various spaces within the building to create a consistent light character and quality of light. The solutions to be developed will integrate light within the form and structure of the space to clearly communicate function and the relationship of the lighting to the larger architecture of the building. The lighting design for these spaces will embody the following lighting hierarchy:

- General ambient lighting
- Task lighting
- Illuminated surfaces – walls/ceilings
- Highlighted areas of focus and entertainment
- Visual cues for wayfinding

Daylighting and views help to connect us to the outside world and can create comfortable and inviting spaces. A variety of architectural features could be considered to mitigate glare and maximize available daylight.

The project will consist primarily of dimmable LED light sources capable of providing the highest quality of light in relation to the lowest lighting energy consumption. Intensity of light must be accurately tailored to the task requirements of the users, with little or no excess capacity. The correlated color temperature of the lamp sources will be chosen based on task requirements. Higher color temperatures which provide white light will be chosen where tasks with a high level of visual acuity are performed. Lower color temperatures which provide warmer light colors will be chosen where patient and occupant comfort ability is essential.

Innovative control systems are employed to maximize the benefits of day light, turn off lights when spaces are unoccupied, and reduce lighting after hours. In general, indoor lighting controls will consist of networked low voltage system consisting of dimmers and switches, room vacancy sensors, photocells for daylight harvesting, and a centralized front end for programming and annunciation. Outdoor lighting controls will utilize photocells and occupancy sensors with manual override switches.

The lighting fixtures and control systems shall comply with the State's energy code, Title 24.

Emergency egress lighting and illuminated exist signs in the new building will be provided with unswitched branch circuits fed from the centralized lighting inverter. Exit signs and emergency egress lighting will be provided throughout the facility to illuminate egress corridors, stairwells, lobbies, etc. Within the renovated spaces the egress lighting fixtures shall be equipped with internal battery backup.

Illuminance Levels Design Criteria

SPACE	BASIS		HEAT GAIN SENSIBLE / LATENT
	GENERAL AMBIENT	TASK	
Lobby	10-20	20	0.6
Offices	25-30	45	0.7
Classrooms	40-50	varies	0.9
Conference Rooms	30-35	50	0.8
Auditoriums	30-35	--	1.0
Corridor	15-20	--	0.6
Public Space	30-35	--	0.7
Information Technology	35-45	--	0.7
Building Support	35-45	--	0.7

Lighting Fixtures

SPACE	FIXTURE TYPE DESCRIPTIONS
Public Spaces	• Recessed, dimmable LED downlights for general lighting. • Recessed, dimmable LED accent lights for art wall illumination. • Recessed, linear LED perimeter wall washer for vertical illumination and to highlight wall surfaces. • Decorative LED pendant fixtures over reception and grand lobby spaces.
Offices	• Pendant mounted, direct/indirect linear LED dimmable fixtures or recessed direct linear LED fixture depending on ceiling height.
Classrooms	• Pendant mounted, direct/indirect linear LED dimmable fixtures or recessed direct linear LED fixture depending on ceiling height.
Conference Rooms	• Recessed, lensed linear LED downlights, dimming. • Recessed, linear LED perimeter wall washer, dimming.
Auditoriums	• Recessed, lensed linear LED downlights, dimming. • Recessed, linear LED perimeter wall washer,
Corridor	• Patient and Procedure corridors - Wall mounted linear, lensed LED uplight running continuously along corridor. • Back-of-House Corridors – Recessed 1x4 LED troffers.
Information Technology and Building Support spaces	• Industrial LED strip lights

Exterior lighting must comply with Title 24 and Campus Guidelines for Outdoor Lighting to ensure a safe environment around the campus.

Lamps, Drivers and Power Supplies

CC0002_AEILED lamps to be LM-79 and LM-80 tested, have two step MacAdam ellipse tolerance, and have a minimum CRI of 80 to be supplied with applicable drivers or power supplies.

Lighting Controls

Lighting control systems offer multiple opportunities for significant energy savings via task tuning, daylight harvesting, vacancy sensors, and scheduling functions. The latest lighting control technologies will be utilized while designing the lighting system to maximize potential lighting energy savings. Interior lighting control devices will be selected to maximize simplicity within spaces while still providing the highest level of controllability. Lighting control devices include programmable low voltage pushbutton switches, programmable dimmer switches, vacancy sensors, daylight sensors, time switches and low voltage manual override switches. Various combinations of lighting control devices will be selected based on space criteria to maximize savings through reduced lighting power consumption. The highest value is achieved by fully integrated control systems.

The lighting control system proposed for this project will be a hybrid system which will operate with both software based networked lighting control as well as standalone room controls. Areas will be categorized based on space usage and task, and the most efficient lighting controls will be applied accordingly.

The following system components are proposed:

- Lighting within each area will have manual switching or dimming to allow for a greater level of control.
- All enclosed areas larger the 100 square feet with a connected lighting power above 0.5 w/sf will be provided with continuous dimming.
- Bi-level occupancy controls will be provided in all corridors and stairwells to reduce the lighting by at least 50% when not occupied.
- All lighting will be shut off completely during unoccupied times.
- A task/ambient strategy will be utilized wherever possible to reduce lighting power densities.
- The outdoor lighting system will consist of dimmable LED full cutoff luminaires with photocell and occupancy sensor controls for reduced maintenance, after hours luminance reduction and reduced energy consumption.
- To comply with the CA Title 24 requirements, the lighting control system will be equipped with demand response capabilities to provide electrical load shedding when requested by the utility. When a demand response signal is given from the utility, lighting power will be lowered a minimum of 15% below the maximum total lighting power.
- Vacancy sensors will be provided in all office areas 250 Sq. Ft. or less, conference rooms and secondary spaces (support, circulation, etc.) to force off lights when occupancy is not detected.
- Daylight sensors will automatically dim all luminaires in the primary daylight zones in response to available daylight in all areas.
- The lighting power density of security and egress lighting will be limited to a maximum of 0.2W/SF when the building is occupied, and will be shut off during unoccupied times.
- Control of the portion of lighting connected to the networked lighting control system will be adjustable at a centralized CPU location or via net portal login.

Distribution

In general, lighting will be served at 277V.

All lighting circuit wiring will be in conduit and routed concealed within walls, partitions, or ceiling spaces. Surface-mounted conduit will be minimized and used only in non-finished spaces.

The ampacity of lighting circuits will be sized for 25% future growth plus 125% continuous loading factor per the National Electric Code.

FIRE ALARM SYSTEM

System Description

A complete new fire alarm system will be provided in the renovated buildings. The fire alarm system will be a stand-alone, fully addressable system comprised of smoke detectors, heat detectors, duct detectors, manual pull stations, and audio/visual signaling devices.

Design Criteria
The fire alarm system will comply with requirements of NFPA 72 for a protected premises signaling system except as modified and supplemented by this document.

A main fire alarm control panel will be located at the main lobby or in the main electrical room with an annunciator at the lobby.

Audio/visual devices will be installed in all areas of the building in accordance with the NFPA and the ADA Guidelines.

Smoke detectors shall be installed as required by the National Fire Protection Association, the Uniform Building Code, and the Uniform Fire Code. Smoke detectors will be installed in, but not limited to, the following locations: air handling units, elevator lobbies, elevator machine rooms, and electrical equipment rooms.

Heat detectors will be installed in areas that are not feasible for smoke detectors.

Manual Pull Stations will be installed adjacent to all exit doors and in each elevator lobby.

The fire alarm system will be linked with the campus central system.

Equipment and Material
The fire alarm system will be an electronically multiplexed voice communication system.

Remote transponder panels will be used to provide supervised amplifiers and signal circuits for audio/visual devices and magnetic door holders.

The system will utilize individual, addressable photoelectric smoke detectors; heat detectors; addressable manual pull stations; and addressable monitor and control modules. The system will monitor all sprinkler supervisory and water flow switches and will interface with elevators, and smoke fire dampers.

Distribution
All initiating and signaling devices will operate at 24VDC and will be installed in accordance with manufacturer's specifications.

All wiring will be installed in conduit. Minimum conduit size will be 3/4".

ELECTRICAL SYSTEM STANDARDS

Feeder and Branch Circuits
Secondary distribution and branch circuit system design will be based on a maximum of 5% voltage drop from the transformer to the utilization equipment.

Neutral conductors derived from harmonic mitigating transformers will be capable of carrying 200% of normal phase current from transformer to first distribution panelboard. Neutral conductors from distribution panelboard to downstream panelboard or device will not be increased in size.

Feeder and branch circuit sizes will be based on the load supplied and adjusted for voltage drop.

Feeder and branch circuit ampacity will not be smaller than the upstream overcurrent device or downstream equipment bus.

CIRCUIT VOLTAGE LENGTH	WIRE SIZE
480Y/277 volt circuits over 150' in length	Increase wire size one size for each 150' of length
208Y/120 volt circuits over 60' in length	Increase wire size one size for each 60' of length

Receptacles
Receptacles in offices, general support rooms and similar locations, (depending upon room layout) will be provided with a minimum of (4) outlets total or (1) outlet on each wall. Enclosed offices will be provided with a double duplex receptacle at desk location.

Conference rooms and common areas will be provided with at least (1) duplex receptacle per wall. Typically receptacles to be spaced on 12' centers.

Building Support (Equipment rooms, storage rooms) will be provided with (1) duplex receptacle per wall or (1) per every 150 square feet, whichever is greater.

Duplex receptacles in office areas, lounges, lobbies, etc., shall be circuited with an average of (6) duplex receptacle's per 20A, single pole circuit.

Receptacles designated to serve desk top computer loads shall be circuited with an average of (3) duplex receptacle's per 20A, single pole circuit.

Each workstation to receive minimum of (2) duplex receptacles that will be circuited with maximum of (4) receptacle's per 20A, single pole circuit.

Receptacles along laboratory benches shall be circuited with an average of (4) duplex receptacle's per 20A, single pole circuit.

Ground fault protection will be provided for outlets within 6' of a sink edge and other wet locations. Electrical outlets will be individually ground fault interrupted (GFCI) protected (not at the circuit breaker or first outlet on the circuit).

Receptacles required to be automatically controlled by Title 24 will be controlled by an occupancy sensor located in proximity to the receptacle.

Overcurrent Protective Device Coordination
Overcurrent protective devices will be selectively coordinated from source of supply through final device. Selectivity will be through the entire instantaneous region including ground fault.

Arc Flash
The electrical distribution system will be configured to allow equipment to be worked on energized using reasonable PPE (category 3 or less). Arc flash calculations for Arc Flash Incident Energy (AFIE) levels and flash protection boundary distances will be by the contractor based on the actual equipment supplied using an independent Registered Profession Engineer in the State of California using SKM System Analysis tools.

Fault Current Ratings
The preliminary short circuit withstand and interrupting ratings will be provided for electrical distribution equipment, feeder conductors, etc. based upon an infinite bus analysis with motor contribution.]

The preliminary available fault current will be determined design of the project and will be verified by 3rd party calculations provided in contractor submittals.

Equipment will have ratings not less than the calculated symmetrical short circuit value at each point in the distribution system.

Equipment will be fully rated for the calculated available short circuit. Series ratings shall not be allowed.

SHORT CIRCUIT RATINGS	
208Y/120V	480Y/277V
10 kAIC where fed via 75kVA and smaller transformers	14 kAIC where fed via 300 kVA and smaller transformers
22 KAIC where fed via 112.5 kVA transformer	30 kAIC where fed via 500 kVA transformer
22 KAIC where fed via 150 kVA transformer	35 kAIC where fed via 750 kVA transformer
42 KAIC where fed via 225 kVA transformer	42 kAIC where fed via 1000 kVA transformer
42 KAIC where fed via 300 kVA transformer	65 kAIC where fed via 1500 kVA transformer
65 KAIC where fed via 500 kVA transformer	100 kAIC where fed via 2000 kVA transformer

Conduit and Raceway

CONDUIT TYPES AND APPLICATION	
208Y/120V	480Y/277V
Electrical Metallic Tubing (EMT)	Low voltage feeders and branch circuit wiring where installed above 6'-6" AFF, when exposed in unfinished spaces.
Galvanized Rigid Steel (GRS)	Low voltage feeders and branch circuit wiring where exposed below 6'-6" AFF. Exterior locations or areas subject to
Intermediate Metal Conduit (IMC)	Low voltage feeders and branch circuit wiring where exposed below 6'-6" AFF.
Schedule 40 PVC	Concrete encased duct banks

Conduit will be run concealed, unless installed in mechanical, electrical, telecom, interstitial areas and other similar unfinished spaces.

Minimum conduit size for power circuits will be 3/4".

Conduits will be independently supported.

All conduit stub-ups from below floor or in floor (where specifically allowed) will be galvanized rigid steel.

Surface mounted conduits below 6'-6" will be rigid galvanized steel with threaded fittings and boxes will be cast steel.

EMT fittings will be compression type with steel body.

Conduits shall not be installed below floor slabs on grade.

For lighting conduit homeruns, a j-box will be located above light fixture in an accessible location to allow for future expansion.

No home run will terminate in a wall mounted device box. A separate J-box will be provided above device box above ceiling in an accessible location.

Wire and Cable

CABLE TYPES		
VOLTAGE CLASS	INSULATION	NOTES
15 kV	EPR 105 C	133% rated, tape shield
600 V	THWN/THHN-2 for branch circuits and XHHW-2 for feeders	Conductors #10 and smaller will be solid copper. Conductors larger than #10 will be stranded copper

All conductors to be 98% conductivity copper.

Minimum wire size #12 AWG, for all areas.

Multi-wire branch circuits will be provided with dedicated neutral conductors for each phase, common neutral circuits will not be permitted.

Feeder conductors will be terminated using compression lugs. Mechanical lugs will not be used for feeders. Branch circuit conductors will typically be terminated using mechanical lugs.

Conductor insulation color code will be as follows:

CONDUCTOR COLOR CODE	
208Y/120V	480Y/277V
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green

Wiring Devices

Wiring devices will be specification grade, complete with all accessories

Isolated ground receptacles will be used only when necessary. If used, isolated grounds will be in addition to equipment ground. Panelboard will have an isolated ground bus that will be connected back to applicable derived system or service.

RECEPTACLE AND SWITCH COLOR CODE	
Normal Power	Selected by Architect

Receptacles, switches, etc., will have faceplates with labeling indicating system panel and circuit identification.

Motors and Motor Control

Stand-alone motor disconnects (separate from starter or VFD) will be fused and will be installed at each motor.

Motors smaller than 60 HP that are not provided with a variable frequency drive (VFD) will be provided with an across the line combination magnetic motor starter. Motors 60 HP and larger that are not provided with a variable frequency drive (VFD) will be provided with reduced voltage motor starter. Refer to other sections of the narrative for VFD requirements.

Combination motor starters will use circuit breakers or motor circuit protectors in lieu of fuses to reduce the possibility of single phasing. For mechanical and HVAC equipment that are not provided with a VFD, individual combination motor starters will be located within sight of the motor.

Selected motors will have variable frequency drives (VFDs) as described in other sections of this narrative.

VFD drive specifications will require that the VFDs for the project be provided such that the Special Category harmonic limits recommended in IEEE 519-1992 be maintained. The supplier of the drive will be required to perform harmonic analysis as defined in IEEE 519-1992 and employ as a minimum 6 pulse VFD with equivalent 5% impedance by employing a combination of line reactors and/or DC bus choke to achieve the equivalent impedance.

Grounding and Bonding

A separate, insulated equipment grounding conductor, sized per the Electrical Code, will be provided within each raceway and cable tray, with each end terminated on a suitable lug, bus, enclosure, or bushing.

A grounding riser with ground box will be located in each electrical closet.

Surge Protection

Surge Protective Devices (SPD) will be used as design dictates. A single SPD device will be installed on the load side of each main service disconnects, the generator switchboard and at the first distribution panel on the load side to each automatic transfer switch.

Second-tier SPD devices at branch panelboards and other locations will be incorporated as required but is not anticipated at this time.

Electrical Rooms

Electrical equipment rooms will be positioned to facilitate unobstructed initial installation of large equipment, and unobstructed removal and replacement of defective equipment.

Adequate space will be provided for maintenance of electrical equipment and equipment removal.

Pipes and other equipment foreign to the electrical equipment will not be located in, enter, or pass through such spaces or rooms.

Panelboards will be grouped, surface-mounted, in dedicated ventilated rooms. Electrical rooms will be stacked vertical whenever practicable.

Penthouses and mechanical rooms will be utilized for electrical equipment and panelboard placement where applicable for optimization of space.

Panelboards serving lighting and appliance circuits will be located on the same level as the circuits they serve and will be served from source of supply with a dedicated feeder.

Feed through, subfed and double section panelboards will not be used unless required to comply with selective coordination requirements

Prohibited Materials and Construction Practices

The entire power distribution system will consist of conduit and wire. Busway will not be used in any portion of this system,

Use of wood strips and wood screws to support lighting fixtures.

Extra-flexible non-labeled conduit

Conduit installation in concrete slabs

Conduit less than 3/4" diameter will not be used except for switch legs, fixture whips and door controls

Use of wire ties to support conduit

Suspension systems for conduits, fixtures, etc. connected to other utility equipment is prohibited. Any suspension system with multiple levels must be hung from trapeze suspension systems

Use of Incompatible Materials: Aluminum fittings and boxes will not be used with steel conduit. All materials in a raceway system will be compatible

Direct burial electrical cable

Power Distribution Acceptance Testing

An independent testing firm will be employed to assure all electrical equipment, both contractor and Owner supplied, is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

Testing firm will be a corporately and financially independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturer, supplier, and installers of equipment or system evaluated by the testing firm. The testing firm's on-site technical person will be currently certified by the International Electrical Testing Association in electrical power distribution system testing.

ACCEPTABLE MANUFACTURERS	
Medium Voltage Transformers	Cooper, Square D, GE, Siemens
Low Voltage Distribution Equipment	Eaton, Square D, GE, Siemens
Lighting Inverters	Dual-Lite, Eaton Powerware, Liebert
Meters	Campus Standard (TBD)
Lighting Controls	NLight or Wattstopper
Fire Alarm System	Campus Standard (TBD)
Wiring Devices	Cooper, Hubbell, Leviton
Surface Raceway	Wiremold, Mono-Systems, Post Glover, Square D

PIPING SYSTEMS – PHASE 1

EXECUTIVE SUMMARY

Phase 1 of this project consists of full and partial demolition of existing buildings, renovation of existing buildings and new construction. The approximate size of the renovation is 68,000 GSF

We anticipate that the renovated buildings will be fully gutted and reconstructed. It is anticipated all existing plumbing infrastructure, fixtures, and associated accessories will be removed. New plumbing fixtures and materials will meet current code and their associated flow rates as outlines later in the report. Our understanding is that the existing buildings associated with this project are, and will remain, unoccupied until after construction.

SYSTEM DESCRIPTIONS

The following systems shall comply with all the latest applicable standards; ordinances, local code and all other authorities having jurisdiction, regulations and codes of all agencies including but not limited to:

- California Building Code 2016
- California Plumbing Code 2016
- California Title24 Energy Code 2016
- University Standards

STORM AND CLEARWATER DRAINAGE

System Description

A storm drainage system will be provided to convey rainwater from roofs to site storm sewers. The roof design is anticipated to be of similar fashion as existing surrounding buildings and as such, the storm water will be collected via a gutter system and downspouts.

For areas where flat roof is anticipated, primary and secondary roof drainage will be provided. The secondary drainage will be provided by using a dedicated piped overflow drainage system separate from the primary storm drainage system which will discharge through the building wall onto grade. Clearwater waste from air handling units, coolers, and other devices and equipment that discharge clearwater will be conveyed by gravity flow through a separate piping system and will indirect connect to the building sanitary drain.

Design Criteria

The primary storm drainage system will be sized based on a maximum rainfall rate of 3 in/hr. The secondary storm drainage system will be sized based on the same design criteria as the primary system.

The sizing for all clearwater discharge from equipment system will be based on the maximum flow rate of the equipment.

Equipment and Material

Storm drainage systems which cannot discharge to the storm sewer by gravity flow will be drained by gravity to a sump with pump(s) and will be pumped into the building storm drainage system.

Sump pumps will not be connected to the emergency (standby) power system as there is no emergency generator.

Distribution

STORM AND CLEARWATER WASTE SYSTEMS MATERIALS		
SYSTEM	BELOW GROUND	ABOVE GROUND
Storm and Clearwater Waste and Vent	Hubless cast-iron pipe with heavyweight no-hub couplings with stainless steel clamps	Hubless cast iron pipe with standard weight stainless steel clamp
Pressurized Storm and Clearwater Waste and Vent		Schedule 40 galvanized steel with threaded joints and fittings

Roof and overflow drain bodies and above ground storm, secondary roof drainage and clearwater waste piping will be insulated.

WASTE AND VENT SYSTEMS

System Description

A sanitary waste and vent system will be provided for all plumbing fixtures and other devices that produce sanitary waste. Plumbing fixtures will be drained by gravity through conventional soil, waste and vent stacks the site sewer.

All fixtures will have traps and will be vented through the roof. Vent terminals will be located away from air intakes, exhausts, doors, operable windows and parapet walls at distances required by the plumbing code.

Sanitary waste drainage systems which cannot discharge to the sanitary sewer by gravity flow will be drained by gravity to a sump with pump(s) and will be pumped into the building sanitary drainage system.

Design Criteria

The waste and vent piping will be sized in accordance with code requirements.

Equipment and Material
Floor drains, floor sinks and indirect waste receptors will be provided with electronic automatic trap primers when subject to loss of their trap seals due to evaporation caused by infrequent use.

Sewage ejectors will not be connected to the emergency (standby) power system as there is no emergency generator.

All sanitary waste piping which collects clearwater condensate from air handing equipment will be insulated to prevent condensation on the piping.

Distribution

WASTE SYSTEMS MATERIALS		
SYSTEM	BELOW GROUND	ABOVE GROUND
Gravity Sanitary Waste and Vent	Hubless cast-iron pipe with heavyweight no-hub couplings with stainless steel clamps	Hubless cast iron pipe with standard weight stainless steel clamp
Pressurized Sanitary Waste		Schedule 40 galvanized steel with threaded joints and fittings

Waste piping will be pitched according to code to maintain a minimum velocity of 2 fps when flowing half full.

Vents and the venting systems will be designed and installed so that the water seal of a trap will be subject to a maximum pneumatic pressure differential equal to 1" water column. This will be accomplished by sizing and locating the vents in accordance with the venting tables contained in the plumbing code.

DOMESTIC AND NONPOTABLE WATER

System Description
Domestic water will be provided to all toilet room fixtures, electric water coolers/drinking fountains, sinks, emergency shower/eyewash units, and any other devices that require a domestic water supply.

Hot water at 120°F will be provided to all fixtures and devices that require hot water.

Non-potable water system will provide make-up water to irrigation, mechanical (HVAC) systems such as heating hot water and chilled water. A reduced pressure backflow preventer will protect the domestic water supply.

It is anticipated capped outlets with shut off valves for domestic and nonpotable will be provided for connected building to be construction in Phase 2.

Design Criteria
Water heater will be sized for 100% of the design hot water load at an outlet temperature of 140°F.

Backflow preventers will be sized for 100% of the design flow.

Equipment and Material
A water meter will be provided on the building service entrance. The water meter will be sized for the building's maximum design flow rate.

The building's water system will be isolated from the municipal water system by a duplex reduced pressure backflow preventer located downstream of the water meter.

Domestic hot water will be produced by a steam to water heat storage-type water heaters. Tube bundles in water heaters will be double walled.

Remote fixtures will be provided with hot water by electric instantaneous water heaters.

Legionella control in the domestic hot water system will be accomplished by heating water to 140F.

The hot water system temperature will be maintained by recirculating the hot water through a continuous loop with an in-line circulating pump.
Water hammer arrestors will be provided at all quick closing solenoid valves and at other potential water hammer sources.

Distribution

WATER SYSTEM MATERIALS		
SIZE	BELOW GROUND	ABOVE GROUND
2-1/2" and smaller:	Copper water tube, Type K, soldered joints and wrought copper fittings	Type L copper tube with soldered joints and wrought copper fittings
Copper	Not applicable	Type K copper tube with brazed joints and wrought copper fittings with rolled groove couplings

Piping 2-1/2" and larger and located in mechanical equipment rooms may be rolled groove mechanical joints.

The hot water system will be insulated in accordance with Code. The cold water system will be insulated to prevent condensation from forming. Isolation valves will be provided at all riser connections, branch piping run-outs to fixture groups, and at devices requiring maintenance.

The piping will be sized to limit the velocity in any section of the system to a maximum of 8 fps for cold water system and 4 fps for hot water and hot water circulating systems.

Fixture	Flow Rate
Water Closets	1.28 gallon flush
Urinals	0.125 gallon flush
Lavatories	0.5 gpm flow control
Sinks	1 gpm flow control
Janitor Sinks	2 gpm flow control

FIRE PROTECTION SYSTEMS – PHASE 1

EXECUTIVE SUMMARY

Phase 1 of this project consists of full and partial demolition of existing buildings and renovation of existing buildings. The approximate size of the renovation is 68,000 GSF.

We anticipate that the renovated buildings will be fully gutted and reconstructed. It is assumed the building is currently non-sprinklered.

SYSTEM DESCRIPTIONS

The following systems shall comply with all the latest applicable standards; ordinances, local code and all other authorities having jurisdiction, regulations and codes of all agencies including but not limited to:

- California Building Code 2016
- California Fire Code 2016
- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 14 Standard for the Installation of Standpipe and Hose Systems
- NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- University Standards

Building systems shall include the following; fire service, standpipe, and wet sprinkler.

FIRE SERVICE

System Description

An underground fire line will supply the sprinkler system in the building.

Design Criteria

The design of the underground fire lines shall comply with NFPA 24.

Current water supply flow test data will be obtained from a flow test which shall be performed by a licenses contractor and in order to determine the capacity of the water mains.

Equipment and Material

Piping for all underground lines will be cement lined ductile iron.

STANDPIPE SYSTEM

System Description

The building will be protected by a hydraulically designed, Class I Standpipe System without hoses or hose cabinets.

Design Criteria

The design of the standpipe system will comply with NFPA 14.

For manual standpipe systems in a fully sprinklered building, the standpipe system will be designed and hydraulically calculated to provide a flow of 250 gpm at 100 psig residual pressure at the highest fire department valve located on the most remote standpipe, when supplied by the local fire department apparatus through the fire department connection (FDC). An additional flow of 250 gpm will be added at the next highest valve on that standpipe. Finally, 250 gpm flows will be added at the 2 next remote standpipes, bringing the total to 1,000 gpm.

Equipment and Material

The standpipe system piping will be black steel. Piping will be Schedule 10 with roll groove couplings.

Distribution

Standpipe risers within a standpipe system shall be interconnected. Capped outlets and control valves with tamper switches shall be provided for Phase 2 construction and additions.

New piping floor and wall penetrations shall include clearances as required per NFPA 13 or be installed with flexible couplings within twelve inches of wall or floor on each side.

A 2-1/2" fire department valve will be provided on the stair's intermediate landing between each floor level.

Additional fire department valves will be provided on the roof and at other locations as required by Code or the local authority.

WET PIPE SPRINKLER SYSTEM

System Description

The building will be protected throughout with hydraulically calculated sprinkler systems, which except for special protection needs, will be wet pipe systems. All areas of the building will be protected per NFPA 13, including electrical rooms (i.e. switchgear rooms, transformer rooms, generator rooms, electrical closets, and similar rooms), loading docks, stair towers, exterior canopies, and mechanical rooms.

Design Criteria

The sprinkler system for the building will be designed and installed in accordance with NFPA 13. Due to the approximate size of each floor, it is anticipated at a minimum there will be two sprinkler zones per floor. As defined in NFPA 13, the maximum floor area on any one floor to be protected by sprinklers supplied by any one sprinkler system riser shall be 52,000 square feet. The number of sprinkler zones will be subject to the authority having jurisdiction (AHJ).

All systems will be hydraulically calculated with a computer calculation program using the Hazen-Williams method.

It is currently assumed any combustible concealed space will meet the provisions set forth as defined within NFPA 13. If there are no special Client standards or Client insurance carrier recommendations, the following sprinkler design densities shall apply:

SPRINKLER DESIGN DENSITIES			
HAZARD-AREAS DESIGNATED AS	DENSITY-MINIMUM SPRINKLER FLOW	REMOTE AREA	HOSE STREAM ALLOWANCE
Light Hazard	0.10 gpm per sq ft	1500 sq ft	100 gpm
Ordinary Hazard Group 1	0.15 gpm per sq ft	1500 sq ft	250 gpm
Ordinary Hazard Group 2, where stockpiles of combustibles do not exceed 12 ft.	0.20 gpm per sq ft	1500 sq ft	250 gpm

The pipe sizing for the systems will be as required to satisfy the hydraulic demand.

Equipment and Material

Each sprinkler riser assembly shall consist of an indicating control valve with tamper switch, check valve, flow switch, inspectors test and tee, drain valve, and pressure gauge. The inspector's test connection will be connected to the main drain.

A dedicated drain riser will be provided along the sprinkler riser and will discharge indirectly to a hub drain.

All tamper switches and flow switches are to be connected to the building fire alarm.

Piping 2" and smaller in size will be Schedule 40 black steel with threaded joints.

Piping larger than 2" will be Schedule 10 black steel with roll groove couplings.

All sprinklers in Light Hazard areas will be quick-response type.

The type of sprinkler installed in a particular area will be selected by the Engineer and the Project Architect. Generally, concealed sprinklers will be installed in areas of high visibility and quality of finishes. Recessed sprinklers will be installed in other areas having suspended ceilings. Pendent or upright sprinklers will be installed in areas without ceilings. Sidewall sprinklers will be provided only when other types cannot be utilized.

Sprinkler heads shall be spaced for symmetry with ceiling features. This shall require additional heads that shall be provided in the base bid.

- Basis of head location shall be:
- Equal distance between lights.
- Equal distance between lights and wall.
- Equal distance between lights and air inlets and outlets.
- Equal distance between wall, lights, and air inlets and outlets.
- Located in center of ceiling tiles.
- Lab module head layout shall be repeated.
- Provide complete and unobstructed coverage for rooms, void spaces, overhangs, and as required by the California Building Code and NFPA 13.

4A.7 PHASE 1 CIVIL

CIVIL NARRATIVE

KPFF Consulting Engineers prepared this civil assessment report that includes a general overview of the existing site conditions at 1 University Drive, Camarillo, California 93012. We understand the Gateway Hall is being considered for a combination of partial demolition, as well as three different configurations of future infrastructure modifications.

On May 31, 2017, KPFF Civil conducted a visual observation of the existing site and the surrounded site features. Photographs and as-built records were utilized and have been included for reference at the end of this section.

This portion of the civil narrative only addresses Phase 1 of the Gateway Project.

GENERAL PROJECT DESCRIPTION

The project site to be developed is located on the northern portion of California State University, Channel Islands (CSUCI) campus in southern Ventura County at the eastern edge of the Oxnard Plain and at the western flank of the Santa Monica Mountains.

The California State University Channel Island's (CSUCI) Gateway project consists of performing a feasibility study to investigate the renovation of existing buildings and adding new buildings to the North side of the campus. Phase 1: the renovation portion of the project will consist of investigating the demolition of 2 or 3 existing buildings and the renovation of approximately 68,000-sf of existing buildings. The existing buildings will be renovated to house faculty offices and administration offices and student service functions. Phase 2: the new buildings portion of the project will consist of approximately 56,000-sf of new construction and house academic programs such as: classrooms, lecture halls and auditoriums. This portion of the civil narrative only addresses Phase 1 of the project.

CODE REQUIREMENTS AND GUIDELINES

Governing Codes

Per the California State University Procedure Guide for Capital Projects (2011), the project shall comply with federal and state laws, codes, rules, regulations, ordinances, and standards. For civil/site work, the applicable standards include, but are not limited to:

- The California Building Code
- The California Environmental Quality Act
- Requirements of the Regional Water Quality Control Board
- State/local health departments
- Americans with Disabilities Act (ADA), Title II, ADAAG
- CSU Energy & Utility Systems Requirements
- U.S. Green Building Council, LEED Certification
- CSU Program for Environmental Responsibility
- The California State University Office of the Chancellor - Access Compliance Design Guideline
- CSU Guidance Document Post Construction BMPs Municipal Separate Storm Sewer Systems (MS4s) Phase II Permit
- State of California Fire Code, current edition
- Standard Specifications for Public Works Construction (SSPWC)
- National Fire Protection Association (NFPA), current edition
- American Water Works Association (AWWA)
- Uniform Plumbing Code, current edition
- National Sanitation Foundation (NSF)
- CSU Telecommunications Infrastructure Planning Guidelines
- CSU Computer Aided Design Standards

STORM WATER MITIGATION

CSUCI is considered to be a Non-Traditional municipal separate storm sewer systems (MS4) permitee, which would need to comply with the State of California National Pollutant Discharge Elimination System (NPDES) Permit requirements. When one acre or more is disturbed, a Stormwater Pollution Prevention Plan (SWPPP) is required to be filed and approved by the State of CA. At this planning stage, it is anticipated that more than one acre will be disturbed, so a SWPPP is required for the proposed project.

In addition, CSUCI requires a Low Impact Design Plan (LID) for projects that result in the creation, addition, or replacement of at least 5,000 square feet or more of impervious surface area. Phase II of the MS4 Permit provides a list of new development and redevelopment projects and/or activities requiring the incorporation of Best Management Practices (BMPs) into the project plans. LID should be taken into consideration early in the design due to schedule and cost impact.

Per Section E.12.e of the Phase II General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), in conjunction with, "CSU Guidance Document for Phase II of the MS4s", for projects that create or replace 5,000 square feet or more of impervious surface, the permit allows four specific numeric sizing criteria. They are as follows:

1. Volumetric Criteria

a. The maximized capture stormwater volume for the tributary area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87 (1998) pages 175-178 (that is, approximately the 85th percentile 24-hour storm runoff event); or

b. The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

2. Flow-based Criteria

a. The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

b. The flow of runoff produced from a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records".

Based on the aforementioned criteria, it is anticipated that the option that produces the least cost will be chosen. This will minimize the amount of storm water volume to be treated and reduce the runoff flow while also minimizing the cost.

BMPs considered for this project will be infiltration, biofiltration, and structural treatment devices in compliance with the California Stormwater Quality Association (CASQA) BMP guidelines as well as the Ventura County BMP sizing criteria. Storm water treatment systems will capture and treat the runoff prior to connecting to the campus storm drain system.

LEED

Per the CSU Program for Environmental Responsibility (PER) C.8, CSU projects should address multiple strategies to eliminate or reduce water pollution from storm water runoff.

The following strategies are being considered:

1. Prevent erosion and sedimentation during construction by implementing an erosion control plan (SWPPP) throughout the duration of construction.
2. Increase on-site infiltration by reducing impervious surface area. As the existing site is largely occupied by existing buildings, the introduction of landscaping around the site and Best Management Practices (BMPs) such as bio-filtration and bio-planter systems will accomplish this strategy.
3. Remove pollutants from storm water runoff. For pre-treatment of larger solids, BMPs considered for the site include, but are not limited to, bio-filtration and/or bio-planter systems.

The project is also anticipated to achieve Leadership in Energy and Environmental Design (LEED) certification status. The following LEED credits are being considered:

1. LEED credit 6.1 pertains to storm water quantity control and requires a 25% decrease in storm water runoff volume from the two-year, 24-hour storm and treatment of runoff from the 90% average annual rainfall to reduce total suspended solids by 80%. With introduction of landscape, this credit may be achieved.
2. LEED credit 6.2 pertains to storm water quality control and requires that a post construction storm water management plan be implemented on site to effectively treat storm water runoff. For purposes of LEED Credit Quality control, the plan must demonstrate the capture and treatment of storm water runoff from 90% of the average annual rainfall through the use of structural or non-structural Best Management Practices (BMPs). BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. With the introduction of BMPs per the MS4 Phase II permit and LID requirements, this credit may be achieved.

SITE ASSESSMENT

Accessibility

Upon site inspection, it appears as though the existing building finish floor elevations are about two to three feet above the adjacent site finish grade elevations. Even though the majority of the buildings on campus were constructed prior to the implementation of the Americans with Disabilities Act (ADA), it appears as if most of the doors have a ramp leading to them. It is anticipated that proposed site accessible pedestrian pathway will provide a link to the existing building and part of the first phase of the Gateway project.

Per the "CSU Access Compliance Design Guidelines", design slopes for site accessible paths are as follows:

Ramps	Design (to max)	7.1%
Cross Slopes	Design (to max)	1.5%
Apron Side Slopes	Design (to max)	8.33%
Apron Side Slopes	Design (to max)	level and clear

SITE GRADING AND DRAINAGE

Based on site exploration and record document research, the elevations of the overall site tend to decrease in the north direction along Camarillo Street, in the west direction along Santa Barbara Avenue, and in the south direction along Ventura Street. It appears that the localized low point is an existing grate drain that is located near the centerline of Ventura Street, just North of Napa Hall. It appears that the localized high point is located near the intersection of Camarillo Street and Rincon Drive, northeast of the Smith Decision Center. Courtyards enclosed by building wings generally tend to grade from east to west.

Elevations throughout the project site range from approximately 65 to 40 feet above mean sea level. At the northeast corner of the site, there is an eight foot change in grade which may make ADA accessibility a challenge.

Per the Vision Plan, the campus was previously located in the flood zone prior to the creation of the flood control channel north of Santa Barbara Avenue. Per the FEMA flood zone map, CSUCI is located adjacent to a flood zone, thus the finish floor elevations of the existing Gateway building were elevated to mitigate any flooding that may have previously occurred. Proposed grading will join to existing building finish floor elevations.

Proposed site grading design will attempt to minimize earthwork while providing adequate drainage for new facilities and accessible paths throughout the site. Additionally, grading will be designed such that any surface storm water flows away from the buildings to be collected by a variety of inlets before being introduced into the storm drain system.

UTILITIES

During the site visit, numerous USA markings were encountered which showed the existing utility connections to the building site. The existing Gateway building is currently unoccupied; therefore, it is assumed that all utility points of connections have been disconnected. The following list describes the utilities to be taken into consideration for Phase 1:

Storm Drain

The site has an existing storm drain network which consists of a series of catch basins and three storm drain lines running parallel to the centerlines of Santa Barbara Street, Camarillo Street, and Ventura Street. The existing storm drain network for the campus is a gravity flow system flowing primarily to the west.

There are multiple existing roof drains, which were previously connected directly to the storm drain lines below grade. However, these roof drains have since been disconnected and the connections to the storm drain line capped.

For the Phase 1 limits of work, the storm drain network in the northern portion of the North Quad and the north portion of the project site will be redesigned to work with proposed site grading. The majority of the existing storm drain network will be demolished; however there is a portion of the storm drain line located in the southern portion of the project site which will have to be relocated to avoid any potential conflicts with the proposed buildings.

Sanitary Sewer

Based on the site visit, numerous sewer manholes were observed along the southern edge of Santa Barbara Avenue and along the eastern edge of Ventura Street. Therefore, it appears as though there are sewer lines running parallel to the centerlines of Santa Barbara Street and Ventura Street.

Based on site utility maps, there appears to be an 8" sanitary sewer line running parallel to and north of Santa Barbara Avenue. Additionally, there appears to be an 8" sanitary sewer line running parallel to Santa Barbara Avenue, located south of the project site and north of the North Quad.

New sewer lateral points of connection to the campus sewer main will be provided. The majority of the existing sanitary sewer network will be demolished; however there is a portion of the sanitary sewer line located in the southern portion of the project site which will have to be relocated to avoid any potential conflicts with the proposed buildings.

Domestic Water

Based on record drawings, there appears to be a 6" water line running east-west, located on the north edge of the North Quad, just south of the proposed project site. Additionally, there appears to be a water line running parallel to and south of the centerline of Santa Barbara Avenue. The water line appears to have laterals that connect to existing fire hydrants throughout the site.

Based on the Phase 1 limits of work, there is a potential anticipation for the demolition of portions of the laterals off the domestic water lines currently connected to the existing and adjacent buildings. However, it is imperative to protect in place the existing water main in order to maintain service to adjacent buildings which may be connected to the existing water lines.

Fire Water & Fire Access

The existing Gateway building did not have any post indicator valves (PIV), fire department connection (FDC), and backflow device(s) during the site visit.

Currently, there are four existing campus fire hydrants located along the southern edge of Santa Barbara Ave, four along the eastern edge of Ventura Street, and three along the western edge of Camarillo Street. It is anticipated that these existing fire hydrants can be used to serve portions of the new buildings.

It appears as though there is a fire access lane connecting Ventura Street, the North Quad, and Camarillo Street. This lane appears to be located south of the Solano Hall and north of the Grand Salon. Proposed fire access for the project site is governed by existing and proposed fire hydrant locations.

It is anticipated that new PIV, FDC, and backflow preventer devices will be provided for the Gateway project. Possible need for additional fire hydrants and other fire appurtenances will be determined through review and discussions with the Fire Marshal. A current fire flow test, no more than 6 months, will be required to confirm water pressure within the project vicinity and for submittal to State Fire Marshal review.

RECLAIMED WATER

Per the Vision Plan, the campus goal is to use at least 95% reclaimed water. Based on the site utilities map, it appears as though the majority of the irrigation lines are reclaimed water, with the exception of two lines along the northern grassy area south of Santa Barbara Avenue.

It is anticipated that potential points of connection to the reclaimed water lines will be provided. Additionally, it is anticipated that reclaimed water will be used for irrigation.

OTHER SYSTEMS CONSIDERED

The design, points of connection, and required capacities for chilled water, hot water, electrical, communications, fuel, oil, natural gas, and other utilities are to be determined by the project MEP consultant. Civil will provide coordination assistance for horizontal and vertical alignment.

4B.1 PHASE 2 SUMMARY OF WORK

PROJECT SIZE

The current site area for the project as shown in the campus Vision Plan is demonstrated in Section 3.

Phase 2 of the Gateway Hall project will accommodate the following departments:

- Enrollment Services (Welcome Center)
- School of Business and Economics
- Extended University
- Interdisciplinary Instruction
- Computer Science
- Mathematics

These programs will be housed in two separate new structures that combine to a total of ~56,000 GSF. Section 6.3 of this report further demonstrates the massing of each building and its programmatic distribution.

BUILDING HEIGHT

The building height will be 2 or 3 floors with a floor-to-floor height between 14'-6" and 15'-6" as required by the various structural and mechanical systems described in this section. Floor to ceiling height for the tired auditorium will be approximately 25'-0". Mechanical penthouse space will be either be distributed within the building, provided on an intermediate floor as louvered, non-conditioned space or located on the roof depending on the various massing schemes and to maximize efficiency and minimize duct runs.

CONSTRUCTION BUDGET

The current construction budget for the project (including building, demolition and site work) based on the cost model provided in Section 5 is $29,711,000, and the assumed escalation rate of 4% produces a total GMAX of $33,917,000 based on a project schedule allowing for a 1/1/2021 construction midpoint.

CODES AND STANDARDS

This building will comply the American Disabilities Act and all the current building codes in the State of California including Title 24, Parts 2, 3, 4, 5, 6, 7, 8, 10 and 12 of the California Code of Regulations which encompasses:

- 2016 California Building Code (CBC)
- 2016 California Electrical Code (CEC)
- 2016 California Mechanical Code (CMC)
- 2016 California Plumbing Code (CPC)
- 2016 California Energy Code
- 2016 California Elevator Safety Construction Code
- 2016 California Referenced Standards Code

CONSTRUCTION AND OCCUPANCY TYPE

Based on preliminary findings, this building could be categorized as a Type II-B with Automatic Supervised Sprinkler System construction and reviewed as a B occupancy for all office space and classroom, and lobbies, auditorium, and multi-purpose rooms as a possible A-3 occupancy.

4B.2 PHASE 2 ARCHITECTURAL

OVERVIEW

Architectural explorations begun during the program and feasibility study phase will be further developed in the schematic design phase. No single scheme explored in this phase and described in Section 6 represents the complete solution that this project requires. It is our expectation that we will study alternatives at the beginning of the next phase that may include successful elements and strategies from various schemes to provide a unified approach to the project.

SITE

The site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad (see Section 3.4). It currently has ~142,000 GSF of original structures from the Camarillo State Hospital that are not in use. The vision plan identifies which structures are to remain and to be demolished to allow for new structures, which is studied in this report. The proposed site plays a central role in development of a new campus precinct and energizing the north end of campus as well as defining the arrival point for those entering the campus from the north. The vision plan establishes this as a new symbolic point of arrival and public identity for the campus, with the aggregation of buildings in Gateway Hall playing a significant role in this regard, as a "front door". Furthermore, the addition of new instructional facilities at the north edge of the north quad will reinforce the educational nature of the quad and foster more student life and activity in the north end of the campus.

BUILDING

As the new 'front door' to the campus the building should have visual prominence and should be representative of the current and future campus community. The massing of the building should carefully balance increased density requirements with the open character and landscape nature of the overall campus. Its relationship to the campus, as well as the exterior materials used should express the importance of the functions that take place in its interior.

FUNCTION

The building program elements should be configured and distributed in a clear way to move people quickly and efficiently to their destinations. Student service functions should be easily accessible and highly visible while administrative and executive components should include transparency while respecting the need for privacy and security essential to these functions.

EFFICIENCY

Flexibility over time is key to address evolving functional and technological requirements and accommodate both short term and long term changes. The design should also be expressive of efficiency, both to minimize long term operating costs and to facilitate staff operational needs.

4B.3 PHASE 2 ACCESSIBILITY

CSUCI is committed to providing all students, faculty, staff and visitors with an accessible experience across the entire campus. The new Gateway building, renovated structures, and its surroundings will be designed to seamlessly connect to the existing campus to accommodate the needs of the disabled. The significant finish floor variations of the existing buildings in the east/west direction will be renovated to become readily accessible to and usable by individuals with disabilities.

All exterior circulation and seating areas accessible to the public and interior program spaces will be designed to be accessible to the disabled according to the following codes and standards:

- Division of the State Architect Accessibility Guidelines
- 1990 Americans with Disabilities Act
- 2010 ADA Standards for Accessible Design

All building entries and lobbies will provide an accessible path of travel into the building leading to elevators that provide access to upper floors. Restrooms will be design according to all current accessibility standards while lighting, signage and threshold indicators shall be designed to the needs of the visually impaired. heights of call buttons, light switches and drinking fountains will all be designed for wheelchair usage.

VP

Pedestrian Circulation

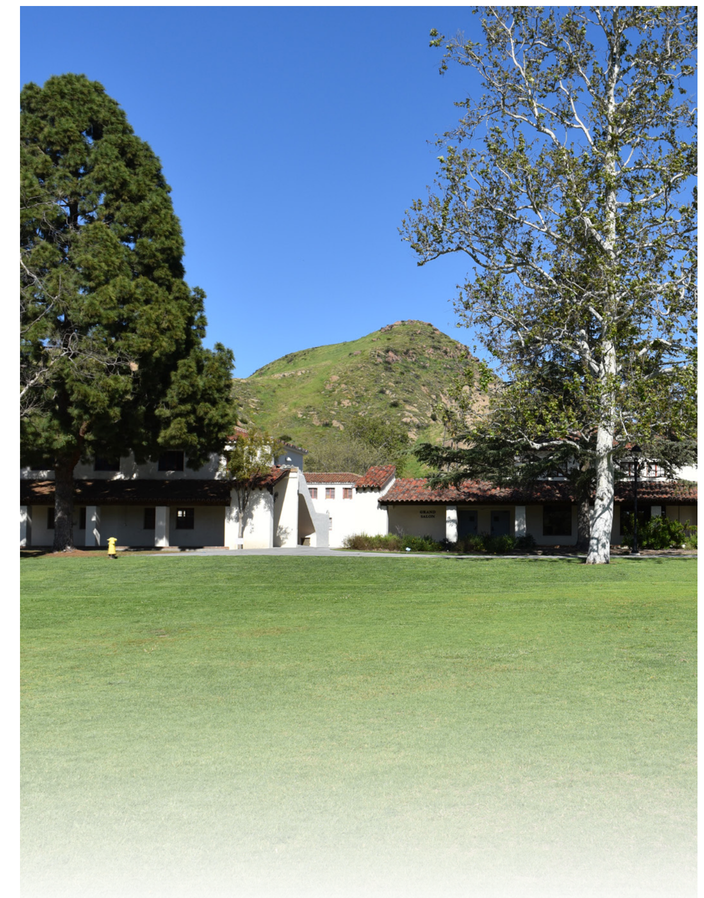
Pedestrian Circulation

north

4B.4 PHASE 2 SUSTAINABILITY

APPROACH

CO Architects believes in taking an expanded approach to sustainability that is inclusive of a variety of strategies that reach beyond certification requirements to ensure a completely integrated, holistic design strategy.



MULTIPLE SUSTAINABILITIES

A building needs to be functionally sustainable to ensure adaptability and success over time. Cultural sustainability acknowledges how people should be positively affected by the space that surrounds them, especially through access to daylight and views which has been shown to have a positive effect on people by reducing stress and increasing productivity. Improving performance and reducing a buildings energy, water and carbon footprint is extremely important to protect natural resources. Building systems should also be well integrated, feasible and cost effective, ensuring maximum efficiency and operational savings, and through tools like Building Information Modeling we can facilitate and streamline the process by enhancing communication within the complete project team and maximizing the design outcome.

FUNCTION

- Centralize and streamline student services
- Encourage interdisciplinary collaboration
- Building as a tool for the campus community
- Anticipate growth and changing technology
- Increase opportunities for sharing
- Flexibility through modular planning

CULTURE

- Blur departmental boundaries
- Strengthen community life and social fabric
- Put student services on display
- Increase productivity and improve social well being
- Enhance recruitment & retention of staff, faculty and students

ENVIRONMENT

- Protect natural resources
- Protect ecosystems
- Improved energy performance
- Efficient water use & re-use
- Maximize daylight

ECONOMY

- Ensure feasibility of systems
- Integrated process efficiencies
- Operational savings
- Strategic cost modeling vs. cost cutting

PROCEDURE

- Clear communication
- Increased efficiency
- Improved quality
- Ongoing re-evaluation of process

CAMPUS GOALS

This project will meet the CSU Sustainability and Climate Policy.

The campus' strategy is to actively encourage that all major capital projects achieve LEED Platinum equivalency and CAL Green Tier II level of energy efficiency.

4B.5 PHASE 2 STRUCTURAL

STRUCTURAL NARRATIVE

GENERAL PROJECT DESCRIPTION

The California State University Channel Island's (CSUCI) Gateway project consists of performing a feasibility study to investigate the renovation of existing buildings and adding new buildings to the North side of the campus. Phase 1: the renovation portion of the project will consist of investigating the demolition of 2 or 3 existing buildings and the renovation of approximately 68,000-sf of existing buildings. The existing buildings will be renovated to house faculty offices and administration offices and student service functions. Phase 2: the new buildings portion of the project will consist of approximately 56,000-sf of new construction and house academic programs such as: classrooms, lecture halls and auditoriums. This portion of the structural narrative only addresses Phase 2 of the project.

GENERAL DESIGN CRITERIA

Governing Codes

The governing code for this project will be the 2016 California Building Code (CBC).

Other referenced design codes include:

- CSU Seismic Requirements, date July 14, 2014
- ASCE 7-10: Minimum Design Loads for Buildings and Other Structures
- ACI Building Code, Commentary, ACI 318-11,
- AISC Manual of Steel Construction (ASD), Fourteenth Edition,
- AWS Structural Welding Code, ANSI/AWS D1.1 thru D1.9, Latest Edition.

Gravity Design Loads

Design load information has been developed based on a review of the referenced building code. All live loads are assumed to be reducible for beams, columns and foundations as permitted by the building code except as noted below.

A. Live Loads

- Laboratories- 125 psf
- Laboratory Support Areas – 125 psf
- General Office- 80 psf
- Classrooms – 50 psf
- Exit Corridors- 100 psf (non-reducible)
- Stairs- 100 psf
- Roof- 20 psf
- Light Storage and Data Center – 125 psf (non-reducible)
- Mechanical Floor and Roof- 150 psf (or per equipment/pads layout and weights)

B. Dead Loads

- General: Estimated weight of construction material
- Mechanical Equipment: 150 psf or weight of mechanical equipment

Seismic Design Loads

The new Gateway project will be located in a high seismic region, as defined by the Latest California Building Code, and per the latitude and longitudinal coordinates of the University. The ground motions for the site, per the USGS seismic mapped spectral response accelerations, are shown below.

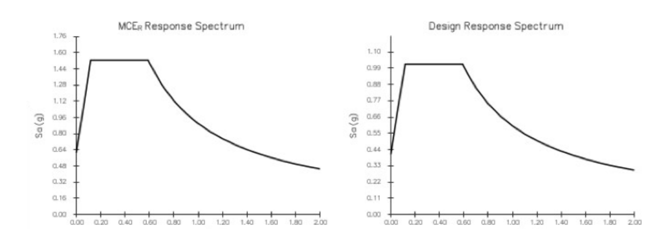
USGS MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS

Risk Category I/II/III

USGS–Provided Output

S_S =	1.527 g	S_{MS} =	1.527 g	S_{DS} =	1.018 g
S_1 =	0.600 g	S_{M1} =	0.900 g	S_{D1} =	0.600 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



The earthquake lateral forces applied to the building (The Design Base Shear "V") are to be calculated using the following equations:

Design Base Shear: $V = CsW$

Where: $Cs = S_{DS}/(R/I)$ & $Cs < S_{D1}/(TxR/I)$

Risk Category III

Seismic Design Category D

I = 1.25 - Importance Factor

W - Seismic Weight of Building

R – Over-Strength and Ductility Coefficient

T - Elastic Fundamental Period of Vibration

S_S - the USGS mapped spectral response acceleration for short periods

S_1 – the USGS mapped spectral response acceleration at a period of 1sec.

S_{DS} & S_{D1} – Design Spectral Response Acceleration Parameters

Note: The minimum CSU Seismic Requirements for spectral accelerations, at all periods, will need to be investigated and compared to the 2016 CBC. The larger spectral accelerations will govern the seismic design at the site.

Wind Design Loads

Wind load effects over the entire structure and on individual elements shall be considered with recognition of its variation over the height of the building and orientation to the wind.

Wind loading criteria is as follows:

- Ultimate Wind Speed = 115 mph (at a 3-sec. gust)
- Exposure C

PROPOSED CONSTRUCTION MATERIALS

Concrete

All structural concrete shall be Type II cement. All structural concrete shall have a minimum compressive strength f'c at 28-days as follows:

- Foundations: f'c=4000 psi (145 pcf)
- Normal weight concrete fill on metal deck: f'c=4000psi (145 pcf)
- Lightweight concrete fill on metal deck: f'c=3000 psi (115 pcf)
- All other Concrete: f'c=4000 psi (145 pcf)

Masonry

- CMU Block ASTM C-90, normal weight
- Cement (Low Alkali, Type I or II): ASTM C150
- Grout ASTM C476 (f'm = 2000 psi)

Reinforcement

- Typical reinforcement at Mat Foundation: ASTM A615, Grade 75
- Typical reinforcement at Gravity Footings: ASTM A615, Grade 60 (FY=60ksi)
- Foundation Grade Beam Reinforcement: ASTM A706, Grade 60 (FY=60ksi)
- Welded Reinforcement: ASTM A706, Grade 60

Structural Steel

- Structural Wide Flange Shapes, ASTM A992, Grade 50
- Steel Angles and Channels: ASTM Grade 36
- Structural Tubes: ASTM A500, Grade B
- Structural Pipes: ASTM A53, Grade B
- Structural Bolts: ASTM A325-SC, ASTM A490-SC
- Foundation Anchor Rods: ASTM F1554, Grade 105

Welding

- Welding shall conform to AWS D1.1 thru D1.9
- Electrode Strength: E80xx (Reinforcing Steel)
  E70xx (Structural Steel)

GEOTECHNICAL INFORMATION

A geotechnical and geo-hazard study of the site for this project has not yet been performed. Therefore, estimates of foundation design parameters/recommendations for the project site will be based on information from the existing geotechnical report of the adjacent North Hall Building site, which is located on the opposite (east end) of the Quad.

The existing geotechnical study of the North Hall Building Science Building (Del Norte Hall) was performed by Fugro West, Inc. and described in a report dated August 2007, Project No. 3133.022. The report describes the need to prepare the existing site soil to deal with expansive soils, undocumented fill, as well as potentially wet subgrade conditions. If deep excavations are required for this project (currently the project massing does not indicate a basement an allowance should be included in the budget to handle wet subgrade conditions.

The report indicates that shallow spread foundations that extend at least 2 ft. below the adjacent finish floor elevation may be designed for an allowable bearing value of 2,000 psf. The recommended bearing values are relatively low and an appropriate allowance should be included in the project budget for increased foundation costs.

A minimum slab thickness of 5 in. is recommended, along with a gravel, vapor barrier and sand system designed to promote uniform curing of tile slab and to serve as a capillary break.

Based on the Fugro report, it appears that the site contains expansive soil. Mitigation of potentiality expansive soil at the site appears to require over excavation of the site to a depth at least four feet to a maximum of 10 feet below the bottom of the footings. The over excavation in plan would extend a distance beyond the edge of the building equal to five feet or the distance a foundation extends beyond the edge of the building, whichever is greater. The over excavated soil should be replaced with approved compacted fill.

Vibration

There are no stated floor vibration criteria for this project, but published vibration criteria suggest a maximum root mean square (RMS) velocity between 8,0000 to 16,000 μ-inches per second. The final recommended vibration value would depend on program requirements.

The following table provides a range of vibration characteristics that suggests the range of generally acceptable vibration criteria. It is not known if the existing structure is capable of meeting vibration criteria contemplated for this project, but the generally short spans and the use of concrete construction make it likely that the existing structure can achieve at least the high end of the vibration criteria range.

CRITERION CURVE	VRMS (μIN/S)	VELOCITY LEVEL (DB) REF: 1μIN/S	DETAIL SIZE	DESCRIPTION OF USE
Workshop {ISO}	32,000	90	N/A	Distinctly felt vibration. Appropriate to workshops and non-sensitive areas.
Office (ISO)	16,600	84	N/A	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential Day {ISO)	8.000	78	75	Barely felt vibration. Sleep areas in most instances. Probably adequate for computer equipment, probe test equipment and low-power microscopes (to 20x).
Op. Theatre (ISO)	4,000	72	25	Vibration not felt. Suitable for sensitive sleeping areas. Suitable in most instances for microscopes to 100x and for other equipment of low sensitivity.

STRUCTURAL SYSTEMS

General Description

We understand the new buildings planned for this site will consist of approximately 56,000-sf of new construction and house academic programs such as: classrooms, lecture halls and auditoriums. We also understand that the number and approximate footprint size of each building has yet to be determined, but each building will be no taller than 3 stories in height.

Based on our current understanding of the feasibility study/project and the functions for these new buildings, we are recommending steel construction for these buildings. We believe that structural steel buildings will provide the following advantages to the University:

1. Present and future flexibility for the life of the structure.
    a. Allows long spans to be achieved in the large classroom and auditorium spaces to minimize column impacts to the programmatic planning of the interior spaces.
    b. Adding new floor and roof penetrations can be easily achieved with minimum modifications to a structural steel building.
2. Steel buildings can be erected expeditiously, which will allow the construction team to meet the aggressive construction schedule, if required.

Please note that other construction materials can be considered for this project, such as concrete. Also, we believe this recommendation/assumption should be validated once more project information is established/available as the project moves into the conceptual and design phases to make sure this recommendation meets all project specific goals.

Foundations

Based on the geotechnical report cited above, the soil underlying this site may result in relatively expensive foundations. The low allowable bearing values will require relatively large foundations.

Estimated foundation sizes for spread footings are based on an assumed 30 ft. x 30 ft. structural grid, dead loads consistent with the recommended structural system described in this structural narrative, an allowance for additional loads from seismic frames, and an assumed allowable bearing capacity of 2,000 psf. Typical interior foundations are assumed to be 14'-0"- square by 30 inches thick. Typical foundations along exterior building lines are assumed to be 12'-6" square by 27 inches thick. Footings along the interface between the existing and new building should be treated as interior footings or the purposes of developing the conceptual project estimate. Smaller bay spacing would reduce footing sizes but increase the number of footings.

Slab on grade is assumed to be five inches thick reinforced with rebar.

GRAVITY FLOOR & ROOF FRAMING

Floor Framing
Recommended floor framing consists of steel beam and girders supporting 3-inch metal deck with 3.25 inches of lightweight concrete fill (total slab thickness of 6.25 inches). Steel wide flange columns support the steel floor framing. Steel framing (beams and columns) is estimated to weigh, based on a 30 ft. x 30 ft. structural grid and dead and live loads consistent with the recommended loading in this narrative, approximately 8 psf to 9 psf.

Roof Framing
Recommended roof framing consists of steel beam and girders supporting metal deck with lightweight concrete fill, similar to the floor framing system. Also, un-topped metal deck can be investigated, depending on the fire ratings of the new buildings and the extent of mechanical equipment on the roof, to potentially provide some cost savings. Steel wide flange columns support the steel roof framing. Steel framing (beams and columns) is estimated to weigh approximately 7 psf to 9 psf (depending on the size of the MEP equipment space on the roof). If mission/mansard style roofs are required, an allowance should be provided for the additional steel and/or metal stud framing that would be required to create this roof style.

VIBRATION
Refer to general requirements section for vibration information.

LATERAL FORCE RESISTING SYSTEM (LFRS)

Classroom and Lecture Hall Buildings
Two alternative lateral force resisting systems (LRFS) are discussed below. Braced frames are likely to be the most cost-effective systems from a structural perspective, but may require compromises of the building program and architectural design. Moment frames is the most flexible system from a programming perspective, although the overall structural steel framing weight will be greater than with an all braced frame system.

It is assumed that new construction will be seismically separated from the existing buildings that are retained. The use of moment frames will require a larger seismic separation than if braced frames are used. There does not appear to be much structural advantage to be gained from tying the new and existing buildings together unless it can be shown that this will mitigate the deficiencies in the transverse direction within the existing building.

For a braced frame system, it is recommended that eccentrically braced frames (EBF), or buckling restrained braced frames (BRBF) be used. Brace sizes will depend on the number and location of the braced frames, but are estimated to be on the order of 8- to 10-inches {square or round). Column sizes will be on the order of 12- to 16-inches square. It is estimated that an all-braced frame system would add approximately 6 psf to 8 psf to the steel weight allowance required for the gravity load system.

For a moment frame system, the special moment frame will require beam depths on the order of 30 to 33 inches. Column sizes will be approximately 24 to 27 inches deep to reduce the weight of the seismic system. It is estimated that an all-moment frame system would add approximately 8 psf to 10 psf to the steel weight allowance required for the gravity load system.

Auditorium Building
The lateral force resisting system for the Auditorium building will be a combination of perimeter and interior CMU block walls, solid grouted, similar to the existing Del Norte Hall building. The perimeter walls will be 12- inches thick CMU block and the interior walls, where required, will be 8 to 10 inches thick CMU block.

Miscellaneous Steel Allowance
An additional allowance of 1.5 to 2.0 psf should be included in the structural steel estimate to account for mechanical equipment support, exterior enclosure back-up, and other miscellaneous structural steel items. An additional steel allowance should also be made for Grand stairs, egress/evacuation stairs and elevator guide-rail supports.

4B.6 PHASE 2 MEP, LIGHTING & FIRE PROTECTION

MECHANICAL SYSTEMS - PHASE 2

INTRODUCTION

Phase Two of the project will house the following programed areas in the newly constructed Gateway Building Expansion.

- Enrollment Services
- Interdisciplinary Instruction
- Mathematics
- Computer engineering
- Extended University
- School of Business and Economics

The new building has a gross area of 55,867 sq. ft.

The University has two important goals for the Mechanical, Electrical and Plumbing systems for the project.

1. Provide the most energy efficient classroom building in the CSU and UC systems
2. Provide long term flexibility by selecting systems and infrastructure that allows for change in use in the building.

The report outlines the Basis of Design for of the project. The objective of this report is to provide a narrative describing the design of the mechanical, electrical, plumbing and lighting systems to be provided and outlines the design assumptions of the HVAC system, electrical and lighting system, and plumbing system in the Gateway Hall. The Basis of Design document will be updated during each phase of the project.

This report can also be used as part of the document for applying LEED EA credits.

CODE AND STANDARDS

The latest editions of the codes and standards are intended as guidelines for design. The codes and standards are not limited to the lists below.

Code

- California Building Code
- California Mechanical Code
- National Electrical Code
- California Plumbing Code
- California Fire Code
- California Administrative Code
    - Title 8 General Industry Safety Order
    - Title 17 Public Health
    - Title 22 Social Security
    - Title 24 Building Efficiency Standards

Standards

- ANSI American National Standards Institute
- UL Underwriters Laboratories
- AGA American Gas Association
- ASME American Society of Mechanical Engineers
- ASHRAE American Society of Heating Refrigerating and Air Conditioning Engineers
- ARI American Refrigeration Institute
- ASTM American Society for Testing and Materials
- FM Factory Mutual
- NFPA National Fire Protection Association

MECHANICAL

Design Criteria

Heating and cooling load estimations for sizing systems and equipment will be performed in accordance with California Energy Code based on following design assumptions.

Outdoor Climate Conditions

Outdoor Design Conditions

LOCATION	CAMARILLO, CALIFORNIA	
LATITUDE	34.2	
LONGITUDE	119.2	
ELEVATION (FT)	147	
CLIMATE ZONE	6	
OUTSIDE DESIGN DRY BULB	MAXIMUM: 91.0°F DB / 69°F WB (0.1%)	RECOMMENDED: 84 F DB / 68 F WB (0.5%)
WINTER DESIGN	MAXIMUM: 32.0°F (0.2%)	RECOMMENDED:35F (0.6%)

Indoor Design Criteria
The table below lists the indoor design criteria used in the modeling of the building unless otherwise dictated by Title 24.

Internal Design Condition

ROOM	OCCUPIED DESIGN AIR TEMPERATURE SETPOINT (°F)	
	SUMMER	WINTER
Classrooms	74±2, No humidity control	70±2, No humidity control
Administration offices (provided with operable windows)	74±2; No humidity control	70±2; No humidity control
Corridor and Circulation Area	78±5 F, no humidity control	68±5F, no humidity control
Support Areas	78±5 F, no humidity control	68±5F, no humidity control
Storage	72±2 F, no humidity control	72±2 F, no humidity control

Notes:

1. Electrical rooms will be conditioned as required to offset the heat rejection of equipment and maintain room at or below 90°F.
2. Telecommunication Spaces will be maintained below a maximum of 78°F unless dictated otherwise by the IT consultant,
3. Elevator Machine Rooms shall be maintained below a maximum of 80°F.
4. Indoor Relative Humidity: The cooling systems will be designed to ensure the summer humidity is maintained below 60%RH during part load conditions and winter humidity is maintained above 30%RH. However, in general, humidity will not be controlled and there will times when conditions are outside these limits.
5. There are no areas in the building where humidity control is required to maintain humidity within any specific range.
6. Temperature setpoint for all spaces will be further examined during the next phases of the design.

BUILDING ENVELOPE
The building envelope shall exceed the requirements of the 2016 Title 24 Part 6 California Energy Code.

The design of the exterior construction shall be such as to minimize infiltration. An infiltration rate of 0.25 air changes per hour shall be assumed in the perimeter 15 feet. Rooms with openings to outdoors with either doors or operable windows shall assume an infiltration rate of 0.5 air changes per hour. Operable windows will only be provided in office areas.

The conditioned areas of the building shall be maintained under positive pressure of 0.02"W.C. under 0 mph exterior wind conditions; with the exception of restrooms and plumbing spaces. Positive pressurization is achieved by offsetting the return air quantity from the supply air volumetric flow rate.

INTERNAL HEAT GAIN
The HVAC system will be sized by the program to compensate for the following internal heat gains.

General Internal Heat Gains - People (students + staff)

SPACE	BASIS	HEAT GAIN SENSIBLE / LATENT
Classrooms	20 sq ft per person	250/200 Btuh
Meeting / Conference Rooms	20 sq ft per person	250/200 Btuh
Corridors & support Spaces	100 ft2/person	250/200 Btuh
Open offices	100 ft2/person	250/200 Btuh
Individual offices	2 person per room	250/200 Btuh

General Internal Heat Gains - Lighting

SPACE	LIGHTING LOAD
Classrooms	1.0 Watts/ft²
Meeting / Conference Rooms	1.0 Watts/ft²
Corridors & Support Spaces	0.6 Watts/ft²
Individual offices	0.8 Watts/ft²

Notes:

1. These are lighting budget number only. Actual heat gain from lighting will be determined by the lighting designer during the schematic design of the project. An allowance will be made for percentage of heat gain going to the space based on fixture type. The numbers noted above are maximum requirements. The design intent will be to substantially reduce these figures.

General Internal Heat Gains – Miscellaneous Equipment

SPACE	LIGHTING LOAD
Classrooms	1.0 Watts/ft²
Meeting / Conference Rooms	11.0 Watts/ft²
Corridors & Support Spaces	0.6 Watts/ft²
Individual offices	0.8 Watts/ft²

It should be noted that the above heat gains have been provided as a basis to begin the schematic design.

Heats gains in the data closets and electrical rooms will also be defined during the schematic design phase.

AIR FILTRATION
All systems will be provided with a minimum MERV 8 pre filters and MERV 14 final in the air handling unit.

Filters shall be rated per ASHRAE 52.2 Standard Test Method. All air filters shall be of the pleated type. No bag filters will be used.

BUILDING HOURS OF OPERATION
The building is a facility that should allow staff 24 hour access to the building. All conditioned spaces shall be scheduled to close down when not in use. The system will be provided with override switches to allow out of hour operation in the offices and classrooms.

Consideration will be given to the use of occupancy sensors in each of the classrooms to turn down the HVAC when the rooms are unoccupied. Where possible, the same occupancy sensors may be used for both lighting control and HVAC control.

The systems serving the classrooms and offices, conference rooms and meeting rooms shall be designed to allow normal maintenance without shutting down the complete system.

VENTILATION REQUIREMENTS

Classroom
Computer laboratories and classrooms shall be provided with minimum of 15 CFM per person outside air. The total air supplied shall meet the maximum cooling load. The occupancy shall be based on block local amount ad not individual occupant room total.

Offices and other Conference Rooms
Offices and conference rooms shall be provided with minimum of 15 CFM per person outside air. The total air supplied shall meet the maximum cooling load. The occupancy shall be based on block local amount and not individual occupant room total. CO2 sensors will be utilized in all meeting rooms and conference rooms.

Storage and Equipment Areas
Storage rooms will provide 3 air changes exhaust per hour or 50 CFM minimum.

Telecommunication, elevator machine rooms, and electrical rooms with transformer will provide dedicate fan coil unit with recirculating air. The fan coil units for these spaces will be provided with DX and chilled water cooling coils.

Toilets and Janitor Rooms
Ten air change per hour exhaust for toilets (but not less than 50 CFM per fixture) will be provided. Toilet rooms will be supplied with air conditioning or transfer air from air conditioned space to maintain the design condition. Janitor closets will not be provided with air conditioning. Six air changes per hour exhaust will be provided to janitor rooms.

BUILDING MANAGEMENT SYSTEM
All HVAC systems shall be monitored and controlled by the campus standard building management system (BMS). The system will use direct digital control (DDC) technology and shall match the existing campus ALC standards and systems. Requirements, control points and control interface shall be based upon the University's requirements. The BMS system shall have the ability to receive Occupancy sensor based signals from the campus standard lighting control system to determine when zones are occupied or otherwise.

Stand-alone modules will control air handlers, chilled beams, pumps, etc. A common data highway will link the modular controllers. Valve and damper actuators will be electronic. The building control system will be connected to the campus energy management control system through wiring or through a modem.

Control panels for each room shall be installed above the classroom entrance doors (or adjacent to the door) for ease of access and maintenance.)

The BMS will be able to performing the following functions:

- Provide full color graphics and sequence modification

- Initiate alarms when monitored equipment exceed allowable limits and indicate necessary corrective measures to the user
- Monitor status and run time for all equipment connected to the system
- Compile and print reports of system operation according to the predetermined schedule or as requested by the user.
- Control all major equipment and modify set points.
- The BMS system components including control valves, actuators, sensors, etc. will be specified per existing campus standards

FUTURE CAPACITY

Future Capacity and Diversity Within the Building

The base design of the air handling supply and return air systems shall allow for 10% additional capacity, based on cooling requirements, for future use. The capacity shall be allowed for all fans, ducting and piping only. Cooling and heating capacity shall be obtained by increasing the face velocity of air across the coils. Initial coil sizing shall be based on maximum face velocity of 350 fpm. The spare capacity shall be utilized in the future for remodeling and renovations without placing an excessive burden on the construction costs.

In VAV systems, AHU fan capacity shall be based on meeting 100% flow requirement of all VAV boxes combined. No diversity shall be used.

Ductwork air leakage and heat loss factors shall be added to suit design conditions and actual installation.

Morning warm up shall not be included, as the system shall operate 24 hours per day.

ENERGY CONSERVATION

A goal of the project is to pursue an energy conscious design with energy use a minimum of 20% below the CEC Title 24 maximum allowance. While energy efficiency is important also very important is the safety of the researches and students especially while they are working alone at night time.

The University strives to achieve a USGBC LEED Platinum rating.

Energy efficiency goals can be accomplished in a number of ways, as a minimum consideration will be given to the following:

- Increase pipe and duct insulation minimum thickness by 30% minimum.
- Building Envelope: Thermal insulation of a performance up to 30% greater than the minimum required.
- Fenestration: Double Glazed, low E, low solar heat gain coefficient (SHGC) glazing, and internal blinds and external sun control or shades shall be an integral part of the design.
- Consider the use of skylights and / or sun tubes.
- The most energy saving premium efficient motor shall be provided for the equipment.
- Active chilled beams will be considered for use where ever possible (offices etc)
- Reduced coil face velocity design for low air pressure drop to save fan horsepower all year. Maximum coil face velocity will be 400fpm.
- Two way or Delta P valves for coils.
- Unoccupied set back of classrooms and office HVAC system
- Ensure that thermal mass provided in the building is analyzed as part of the cooling and heating calculations including the thermal lag properties.
- High efficiency lighting systems, including consideration of LED lighting
- Use of lower ambient light in combination with LED task lights for offices

CENTRAL UTILITIES

The building will be provided with Chilled Water and Heating Hot Water from the Campus Utility Distribution. Consideration will be given in the schematic design phase to whether each phase has its own central utilities mechanical room or not. The systems described below can be used for individual building mechanical rooms or one combined room.

Chilled Water System

Chilled water will be supplied from the campus chilled water loop. New xx inch diameter chilled water supply and return connections with pressure independent valves shall be provided from existing chilled water mains. The new connections shall run directly from the nearest campus utility manhole (located on the west side of the building).

The route for the underground piping will avoid piping under the footprint of the building. The chilled water will be metered.

The chilled water distribution system will serve all custom air handling unit cooling coils and plate heat exchanger for the chilled beam system. Two chilled water pumps, sized at 60% capacity each will be provided to serve the chilled beam system. Variable speed drives shall be provided on both pumps.

The central plant chilled water system provides chilled water at 42°F.

Air handling units will be provided with delta P valves, all other control valves will be 2-way.

No piping shall be run across the roof. Pipes to air handling units shall be routed under the roof slab and only penetrate the roof at the location of coil connections.

All heat exchangers and pumps shall be located in the basement or on the first floor mechanical rooms.

Chilled water loop shall have differential pressure sensors at the POC in the building that can be used to signal the central plant for adequacy of flow. Chilled water flow into the building shall be metered.

Heating Hot Water System

Heating hot water at 180°F supply and 140°F return will be provided to the building from the Campus Heating Hot Water loop. The new connections shall run directly from the nearest campus utility manholes. The heating hot water will be metered.

Pressure independent valves shall be provided to heating hot water branch serving the Gateway Hall. The heating hot water distribution system will serve all custom air handling unit cooling coils, terminal reheat at variable air volume boxes, and the plate heat exchanger for the chilled beam system. Two heating hot water pumps, sized at 60% capacity each will be provided to serve the chilled beam system. Variable speed drives shall be provided on both pumps.

All heating coils will be provided with 2-way valves.

No pipes shall be run across the roof. Pipes to air handling units shall be routed under the roof slab and only penetrate the roof at the location of coil connections.

All heat exchangers and pumps shall be located in the basement/first floor mechanical rooms.

Heating hot water loop shall have differential pressure sensors at the POC in the building that can be used to signal the central plant for adequacy of flow. Heating Hot water flow into the building shall be metered.

Mechanical HVAC Distribution

The building will consider the use of active chilled beams in spaces where they are appropriate. It is proposed that this system be used in conjunction with a variable air volume system.

Offices

The offices will be served by 4-pipe active chilled beams. These are highly efficient and allow control of each space individually. One thermostat will be provided for each room to control all of the chilled beams in that space. Thermostats will be provided with an override button for off-hours occupancy. Return air system can be omitted and conditioned air from office spaces can be released to adjacent corridor to enable passive conditioned system while maintaining certain level of comfort. Exterior offices with operable windows and using chilled beams will be provided with window switches to shut down the active chilled beams when the windows are open.

A maximum of 4 offices will be provided with a variable air volume terminal unit prior to serving the active chilled beams. Corner offices and spaces with active chilled beams will be provided with its own variable air volume terminal unit.

Room occupancy sensors will be capable of switching off the terminal units serving a bank of offices, all of the offices are unoccupied.

Classrooms, Conference Room and Lobby

Spaces with a high occupancy load will be served by dedicated variable air volume terminal units with hot water reheat using overhead distribution and 55°F from the air handling units.

Terminal units with reheat coils shall be provided with an access door when located above inaccessible ceilings. An effort shall be made in the design to locate terminal units above removable, accessible ceiling tiles. Internal liner shall be covered with suitable material to avoid degradation of the liner.

Lobbies and corridors will use relieve air from classrooms and offices where possible (in non fire rated situations) to condition the spaces.

Each classroom, meeting room and conference room will be provided with occupancy sensors to switch of the VAV terminal unit that serves the space.

Electrical and Elevator Machine Rooms

The main electrical room and the elevator machine room will each be provided with a dedicated, cooling-only fan coil unit to maintain desired space conditions. The fan coil units will not be located within the electrical room or the elevator machine room.

Restrooms

A constantly running exhaust fan will be provided to serve the janitor closets and main restrooms. These will be exhausted at a rate of 10 ACH; most of the make-up air will be transferred from surrounding spaces. A small amount of fresh air will be provided directly to the restrooms. Fans shall be direct drive and shall be linked to the building EMS.

All fans shall bear the AMCA seal and performance shall be based on tests made in accordance with AMCA Standard 210.

Grilles, Registers and Diffusers
Supply, return and exhaust inlets and outlets shall be coordinate with the Architect and the Acoustician.

The face velocity at the diffusers shall not exceed 500 fpm, unless approved by Acoustical Consultant.

All inlets and outlets shall be selected at least 10 NC levels below the NC level of the room.

All supply outlets shall be provided with a minimum of 5' of flexible ductwork to reduce vibration transmission, provide sound attenuation and assist in locating the diffusers in the ceilings or walls. Flexible ductwork shall not exceed 7 feet.

Design will ensure a minimum separation of 8 ft. between supply and return diffusers to prevent short circuit of supply air flow.

HYDRONIC PIPING SYSTEMS

All piping shall be chemically cleaned and flushed before start up.

All piping in chilled water and heating hot water system shall be insulated in accordance with current energy code and regulations, such as ASHRAE 90.1 and Title 24 whichever is more stringent.

All insulation exposed to view shall have metal cladding of 0.16 aluminum embossed.

Piping shall be tested with a hydrostatic pressure of not less than 100 psig, but not less than 1.5 times greater than operation pressure. Pressure shall be maintained for at least one hour.

Chilled water and heating hot water piping shall be sized according to the following guidelines:

- Friction loss of 1.0 to 3.0 feet WG/100 feet
- Minimum pipe size of 3/4 inch, except for gage or control piping.
- Maximum velocity of 6 fps for 2½" pipe size and larger.
- Maximum velocity of 4 fps for 2 pipe size and smaller.
- Maximum pressure drop of 4 ft/100 ft for any pipe size.
- Minimum velocity of 2 fps (except for terminal reheat runouts).

Pump rooms shall have noise and vibration protection and isolation considered in the design.

DUCTWORK SYSTEM DESIGN REQUIREMENTS

General
Duct systems will be designed to obtain lowest cost-beneficial pressure loss by limiting certain duct velocities, avoiding dynamic loss components where possible and utilization of low dynamic loss components. High-loss fittings, such as mitered elbows, abrupt transitions, and takeoffs and internal obstructions will be avoided. The distribution system pressure losses will be determined by total pressure.

It is an objective to design the pressure distribution duct (between the AC unit and terminal units) for pressure drops to 1.0 inches WG or less. Long duct runs will be designed with special consideration of pressure loss since the maximum loss for any run will be imposed upon the entire fan system.

Horizontal duct distribution will be routed to maximize long, straight runs without multiple penetrations through fire and/or smoke partitions. Multiple horizontal mains will be of comparable length and configuration to equalize pressure losses. The overall objective is to route ducts that shall avoid or minimize architecturally and/or structurally induced dynamic losses.

Construction of ductwork shall be in accordance with SMACNA for the appropriate duct pressure classification. Variations in duct size, and additional duct fittings shall be provided, as required to clear obstructions and maintain clearance.

Drive slip or equivalent flat seams for ducts exposed in the conditioned space or where necessary due to space limitations, shall be provided. Longitudinal seams will use Pittsburgh lock. Button punch snap lock shall not be used on the project. On ducts over 48 inches wide, provide standard reinforcing on inside of duct. Run-outs to grilles, registers or diffusers on exposed ductwork will be the same size as the flange outer perimeter on the grille, register, or diffuser.

Return air system will be ducted in shafts and non-conditioned spaces. Return air plenum may be used above conditioned spaces.

Painting inside of ducts behind grilles is not allowed.

Friction Losses and Minimum duct Sizes
Supply air ducts from cooling unit's discharge up to the terminal unit will be sized for friction losses of 0.1 inches WG/100 feet but not exceeding a velocity of 1500 fpm. Minimum size duct to terminal units or air valves will be eight inches in diameter but not less than terminal inlet size.

Supply air ducts downstream of terminal units or air valves; return air ducts, and general (e.g., toilet) exhaust ducts will be sized for friction losses of 0.08 and WG/100 feet but not exceeding 1000 fpm.

Maximum velocities and friction loss will be maintained including future increase of 20% airflow.

Ducts serving or routed through acoustically sensitive areas are designed based on acoustical consultant's recommendations, which includes maximum allowed duct velocities, usage of duct liner, preferred duct shape and material, etc.

Ductwork Accessories
Terminal units mixing dampers shall be provided with an access door. Internal liner shall be covered with suitable material to avoid degradation of the liner. Closed cell insulation shall be sued for duct liner, fiberglass duct liner will not be used.

The selection of the diffusers and grilles shall be carried out in conjunction with the Architect when they design the ceiling systems. The pre-schematic basis of design shall adhere to the following:

- In order to minimize noise and improve air discharge patterns supply registers shall have square necks and plenums.

Return grilles will be 2 feet x 2 feet to lay-in T-bar ceilings. Provide with 45 degree angled blades or perforated face. Exhaust grilles shall be 45 degree angle blade type.

CONTROLS

General
A modular direct digital control (DDC) system to match the existing ALC campus control system shall be provided for the HVAC system. Standalone modules shall control air handler, pumps etc. A common data highway shall link the modular controller.

Thermostat for terminal units, chilled beams and air valves will be wall mounted. Thermostat shall be programmable and have set back function. All control component shall be digital.

A DDC system shall also be used for alarms for emergency generator, smoke detectors, vacuum pumps, compressed air etc.

Alarm Monitoring
Non HVAC equipment needs to be monitored for alarm conditions. Each alarm shall be for only one specific room or item so that maintenance shall have no question what needs service. These alarm shall include, but not limited to the following:

- Building Electrical Switchgear
- Additional alarm points shall be discussed during CD phase.

Sound, Vibration and Seismic Control
Sound and vibration levels generated by the building's mechanical and electrical equipment shall be controlled as necessary to comply with the CSU specific NC requirements by area type, taking into account in the acoustic analyses any significant noises likely to also be generated by occupant-related equipment.

Before the completion of the Preliminary design phase, the acoustical consultant will provide an acoustical analysis for the mechanical ducting systems to ensure the design meets the acoustical criteria.

M/EP equipment location and vibration isolation requirements shall be coordinated between the mechanical designers and the structural designers.

The following equipment shall be provided with vibration isolation:

- Fans (all of EF)
- Air Handling Units (AHU)
- Pumps

Sound attenuators (duct silencers) shall be provided for AHU supply, and return, and as indicated by acoustical consultant.

Specific areas requiring attention to control noise and vibration may include:

- Fan noise, transmitted either through the structure or through the duct system.
- Noise generated by air flowing past dampers, turning vanes and terminal device and louvers.
- Noise caused by excitation of duct wall resonance, produced by fan noise; by pressure fluctuations caused by fan instability; and by turbulence caused by discontinuance in the duct systems.
- Noise from the water circulation system, generally transmitted through the structural connections.
- Noise and vibration from out of balance forces from fans, pumps, compressors, etc.
- The best sound attenuation is the selection of a quiet fan.

Duct silencers shall only be considered when duct distance is not sufficient to provide adequate acoustical separation between rooms.

Vibrations generated by HVAC systems must be minimized: judicious equipment selection; limitation of fluid flow velocities; and isolation of key mechanical, piping and ducting systems is required.

Vibration isolation systems shall be provided on rotating mechanical equipment greater than ½ hp located within the critical area, greater than 5 hp elsewhere in the building, and greater than 10 hp outside the building within 200 feet of the building. Reciprocating equipment (other than emergency equipment) shall not be used.

Steel frames shall be used for air handling equipment. Flexible pipe connectors (e.g., twin-sphere connectors) shall be used on piping connecting to isolated equipment and where piping and ducting exit the mechanical room. Flexible duct connectors shall be used in a similar manner.

Special design consideration shall been given to the duct layout reducing noise transfer between rooms, especially noise generated by loud equipment or discussions in adjacent rooms.

Ducts of diameter less than 24 inches do not require isolation provided flow velocities do not exceed 1,200 feet per minute. (In the case of rectangular ducting, the effective diameter is defined as the square foot of the product of the two duct dimensions.)

System Start-Up, Testing, Adjusting & Balancing - The work includes system start-up, test, adjust, and balance (TAB) of HVAC air and water distribution systems including equipment, ducts, and piping. Include sound testing and vibration recordings for HVAC equipment.

SYSTEM START-UP, TESTING, ADJUSTING, AND BALANCING

The work incudes system start-up, test, adjust, and balance (TAB) of HVAC air and water distribution systems including equipment, ducts, and piping for the project, sound testing and vibration recordings for HVAC equipment.

The building systems will undergo enhanced commissioning to help achieve the USGBC Gold LEED rating.

ELECTRICAL SYSTEMS – PHASE 2

EXECUTIVE SUMMARY

This phase of the project consists of new construction. The approximate size of the new construction is 56,000 GSF. The project will be broken down into 2 phases, with Phase 1 being the demolition and renovation portion of work and Phase 2 construction of the new building.

We anticipate that the renovated buildings will be fully gutted and reconstructed. The reconstruction will consists of new lighting, power, data, and fire alarm systems. Our understanding is that the existing buildings associated with this project are, and will remain, unoccupied until after construction.

New construction will be a complete and functional built out facility. The overall program is essentially offices, support spaces, classrooms, light instruction labs (no wet labs), and both small and large conference rooms and auditoriums.

All work shall conform to the CSU Channel Island campus standards.

BASE DESIGN CRITERIA

Design Voltages

SPACE	LIGHTING LOAD
Campus Distribution	12.47kV, 3 phase, 3 wire + ground
Motors; ½ HP and larger	480V, 3 phase, 3 wire
Motors; less than ½ HP	120 or 208 Volts, 1 phase, 2 wire + ground
Lighting	277 Volts, 1 phase, 2 wire + ground
Specific Equipment	480 Volts, 3 phase, 3 wire + ground
Specialty Equipment	208Y/120V, 3 phase, 4 wire
Receptacles	120V, 1 phase, 2 wire + ground

EQUIPMENT SIZING CRITERIA

Branch Circuit Sizing Criteria

TYPE	LOAD
Lighting	Actual Installed VA
Receptacles	180 VA per outlet (duplex or single)
Multiple Outlet Assemblies	180 VA per 2'
Special Outlets	Actual Installed VA of Equipment Served
Motors	125% of Motor VA
Special Equipment	Actual Installed VA

Diversity Factor

Diversity factors will be used in establishing power service, feeder and equipment capacities. The diversity factor represents the ratio of the sum of the individual non-coincident maximum demands of various subdivisions of the system to the maximum demand of the complete system and will be established using historical data from similar buildings in conjunction with industry standards.

Long Continuous Load/Demand Factors Criteria

TYPE	LCL FACTOR
Lighting (Continuous Loads)	125% of installed VA
General Receptacles	100% of first 10 kVA installed plus 50% of remainder
Motors	125% of VA of largest motor plus 100% of VA of all other motors
Fixed Equipment	100% of total installed VA

LOAD CALCULATION CRITERIA

Functional Area Load Density Criteria – Peak Connected

FUNCTIONAL AREA	SERVICE LOAD DENSITY
Office Receptacle	3.0
Lighting	1.0
Conference Rooms	2.0
Corridor	1.0
Public Space	3.0
Building Support	2.0
HVAC Systems (utilizing campus chilled water and steam)	4.0

Notes:
1. VA/sf values is based on historical data from projects with similar program

LOAD TABLE

System Capacity and Calculated Demand Load

BUILDING LOAD SUMMARY	
	NORMAL POWER
kVA	500
VA/SF	9

SYSTEMS DESCRIPTIONS

Electrical Service

Systems Description
The facilities will be fed from the existing campus 12.47 kV medium voltage system.

Phase 2 Work (New Construction): A single 12.47kV primary service feeder will be provided to the new building and will terminate into a new pad mounted exterior fluid filled transformer. The transformer will reduce the 12.47KV distribution voltage down to the building's utilization voltage of 480/277V, 3 phase, 4 wire. This in turn will feed a new service entrance switchboard located within the building. The pad mounted transformer shall utilize FR3 non-hazardous fluid and the installation shall be equipped with fluid containment.

Design Criteria
The primary system service capacity will be designed to serve the estimated demand load of the facility plus an additional 20% for anticipated future loads.

Lightning and surge protection shall be provided at the exterior transformer and at the main switchboard.

Switchgear distribution circuit breakers shall be fixed mounted molded case circuit breakers with power metering and power quality monitoring and reporting capability.

EMERGENCY POWER SYSTEM

System Description

Emergency power is required only for egress lighting and the fire alarm systems. Because these loads are small batteries will be utilized. A central inverter will be provided to consolidate the batteries into a single location for easier maintenance and testing. The batteries shall be sized to meet the life safety code with a 90 minute minimum run time.

The fire alarm panels shall be equipped with integral battery backups in both the renovation and new construction.

No emergency generator will be provided.

ELECTRICAL DISTRIBUTION

System Description

Normal Power Distribution
The normal distribution system shall include all electrical distribution equipment from the campus medium voltage distribution system to the branch distribution outlet device, not including those systems and devices as described in the following subsections.

The service entrance switchboard for the new construction shall be rated between 400 - 800 amps, 48-/277V, 3 phase, 4 wire.

Distribution will consist of conduit and wire.

480Y/277V distribution will be accomplished with conduit and wire. No busway shall be utilized. Each level will be equipped with lighting panelboard and a 112.5kVA, 480:208Y/120V distribution transformer.

Each 208Y/120V secondary distribution transformer will deliver power to a 400 amp Distribution Panel. The Distribution Panel will deliver power to the branch circuit panelboards.

Emergency/Standby Power Distribution
As required by Code, the feeders and branch circuit wiring to the emergency loads (egress lighting) will be in dedicated raceway. Individual feeders will originate at the lighting inverter distribution panel and will run through the building to serve the emergency lighting panels. The emergency branch circuit panelboards will be served from the emergency lighting panels via a small distribution transformer.

Design Criteria

Building service and distribution equipment sizes will be based on estimated demand plus known or anticipated future loads.

Power distribution equipment will be sized to support 20% spare capacity (amperes) to accommodate functional changes over the life of the building.

Power distribution equipment will be sized to include 20% spare circuit breakers spaces and load capacity.

Equipment and Components

EQUIPMENT	DESCRIPTION OF COMPONENTS
Service Entrance and Distribution Switchboards	UL 891 construction Front access NEMA 1 enclosure Copper Bus Main Circuit Breaker Group mounted bolt-on feeder circuit breakers Electronic trip circuit breakers with field-adjustable and field-changeable trip units will be used for all circuit breakers greater than 225A and for smaller sizes if special circumstances exist Circuit breakers 800 amps and greater will be UL listed for applications at 100% of their continuous ampere rating in their intended enclosure Service entrance switchboard shall be service
Distribution Panelboards	UL 891 listed, Front access NEMA 1 enclosure switchboards Copper Bus Main Circuit Breaker Fixed, Group-mounted circuit breakers Electronic trip circuit breakers with field-adjustable and field-changeable trip units will be used for all circuit breakers greater than 225A and for smaller sizes if special circumstances exist
Branch Panelboards	UL 67 listed 42 Pole, NEMA 1 enclosure, recessed and/or surface mounted Copper Bus Main Circuit Breaker Molded case with non-adjustable trip units to be used for all circuit breakers 225 amps and smaller All circuit breakers will be bolt-on style Panelboard covers will be hinged trim with door-in-door construction.
Distribution Transformers	480 Delta to 208Y/120 VAC, Wye, three-phase, four-wire; 3-coil, 2-winding type; 115°C rise above 40°C ambient Copper Windings K13 rated Neutral conductors for K-4 and higher units to be increased in size from the transformer to the first distribution panel and will be able to support 200% of the normal phase current. Transformers will incorporate vibration isolation pads in their construction located between the core/coil assembly and the transformer case

GROUNDING SYSTEM

System Description

A complete low-impedance grounding electrode system will be provided. The grounding electrode system will include the main water service line, structural steel, (if any), and a ground triad. The equipment grounding system will extend from the building service entrance equipment to the branch circuit. All grounding system connections will be made using irreversible compression connections.

Bonding jumpers will be provided as required across pipe connections to water meters, dielectric couplings in a metallic cold water system, and across expansion/deflection couplings in conduit and piping systems.

All feeders and branch circuits will be provided with an equipment ground conductor. Under no circumstances will the raceway system be used as an equipment grounding conductor.

Design Criteria

The grounding electrode system will be designed in accordance with NEC article 250.

System resistance to ground will be 5 ohms or less.

All conductors will be installed in steel conduit unless installed below grade or in concrete.

Equipment and Components

The reference ground for the equipment grounding system will be established from a structural ground grid as follows:

A "Ufer" ground will be provided in the footing of the building consisting of 50' of 250 kcmil wire located 3" from the bottom of the footing

Wall-mounted copper ground bus will be located in the main electrical room, floor electrical rooms, and voice/data rooms. The main electrical room ground bus will be connected to the grounding electrodes.

Distribution

A separate, insulated 4/0 AWG ground wire will be provided from the main electrical room ground bus to each floor's electrical room ground buses, underground incoming water service line ahead of meter, and underground gas line at the building entrance.

The main service entrance neutral will be bonded to the system ground bar within the switchboard by a removable bus bar link.

A code-sized, unbroken bond leader will be connecting the electrical room ground bar to the XO terminal of the local transformers.

A No. 4/0 AWG, bare copper, grounding electrode conductor will be extended to all voice/data rooms, so that those systems can be properly bonded.

A separate ground wire will be provided for all feeders and branch circuits.

LIGHTNING PROTECTION SYSTEM

A lightning protection system will not be provided.

LIGHTING SYSTEMS

System Description

The design of the spaces represents a unique opportunity to create an outstanding and memorable building while striving to reach reduced energy consumption goals for the building. The lighting systems will provide appropriate task oriented light levels for both the students and faculty, with minimum energy consumption, while creating beautiful spaces. To successfully meet these energy goals and the University objective of high energy efficiency, the lighting systems must be designed to incorporate efficient technologies. Highly efficient light sources are utilized to maximize light and reduce glare or veiling reflections. Light systems should be integrated with the architectural form and design character. Critical design decisions affecting light intensity will be rigorously analyzed to confirm the correct solution. Key components will be developed to form a comprehensive scheme which unites various spaces within the building to create a consistent light character and quality of light. The solutions to be developed will integrate light within the form and structure of the space to clearly communicate function and the relationship of the lighting to the larger architecture of the building. The lighting design for these spaces will embody the following lighting hierarchy:

- General ambient lighting
- Task lighting
- Illuminated surfaces – walls/ceilings
- Highlighted areas of focus and entertainment
- Visual cues for wayfinding

Daylighting and views help to connect us to the outside world and can create comfortable and inviting spaces. A variety of architectural features could be considered to mitigate glare and maximize available daylight.

The project will consist primarily of dimmable LED light sources capable of providing the highest quality of light in relation to the lowest lighting energy consumption. Intensity of light must be accurately tailored to the task requirements of the users, with little or no excess capacity. The correlated color temperature of the lamp sources will be chosen based on task requirements. Higher color temperatures which provide white light will be chosen where tasks with a high level of visual acuity are performed. Lower color temperatures which provide warmer light colors will be chosen where patient and occupant comfort ability is essential.

Innovative control systems are employed to maximize the benefits of day light, turn off lights when spaces are unoccupied, and reduce lighting after hours. In general, indoor lighting controls will consist of networked low voltage system consisting of dimmers and switches, room vacancy sensors, photocells for daylight harvesting, and a centralized front end for programming and annunciation. Outdoor lighting controls will utilize photocells and occupancy sensors with manual override switches.

The lighting fixtures and control systems shall comply with the State's energy code, Title 24.

Emergency egress lighting and illuminated exist signs in the new building will be provided with unswitched branch circuits fed from the centralized lighting inverter. Exit signs and emergency egress lighting will be provided throughout the facility to illuminate egress corridors, stairwells, lobbies, etc. Within the renovated spaces the egress lighting fixtures shall be equipped with internal battery backup.

Illuminance Levels Design Criteria

SPACE	BASIS		HEAT GAIN SENSIBLE / LATENT
	GENERAL AMBIENT	TASK	
Lobby	10-20	20	0.6
Offices	25-30	45	0.7
Classrooms	40-50	varies	0.9
Conference Rooms	30-35	50	0.8
Auditoriums	30-35	--	1.0
Corridor	15-20	--	0.6
Public Space	30-35	--	0.7
Information Technology	35-45	--	0.7
Building Support	35-45	--	0.7

Lighting Fixtures

SPACE	FIXTURE TYPE DESCRIPTIONS
Public Spaces	• Recessed, dimmable LED downlights for general lighting. • Recessed, dimmable LED accent lights for art wall illumination. • Recessed, linear LED perimeter wall washer for vertical illumination and to highlight wall surfaces. • Decorative LED pendant fixtures over reception and grand lobby spaces.
Offices	• Pendant mounted, direct/indirect linear LED dimmable fixtures or recessed direct linear LED fixture depending on ceiling height.
Classrooms	• Pendant mounted, direct/indirect linear LED dimmable fixtures or recessed direct linear LED fixture depending on ceiling height.
Conference Rooms	• Recessed, lensed linear LED downlights, dimming. • Recessed, linear LED perimeter wall washer, dimming.
Auditoriums	• Recessed, lensed linear LED downlights, dimming. • Recessed, linear LED perimeter wall washer, dimming.
Corridor	• Patient and Procedure corridors - Wall mounted linear, lensed LED uplight running continuously along corridor. • Back-of-House Corridors – Recessed 1x4 LED troffers.
Information Technology and Building Support spaces	• Industrial LED strip lights

Exterior lighting must comply with Title 24 and Campus Guidelines for Outdoor Lighting to ensure a safe environment around the campus.

Lamps, Drivers and Power Supplies

CC0002_AEILED lamps to be LM-79 and LM-80 tested, have two step MacAdam ellipse tolerance, and have a minimum CRI of 80 to be supplied with applicable drivers or power supplies.

Lighting Controls

Lighting control systems offer multiple opportunities for significant energy savings via task tuning, daylight harvesting, vacancy sensors, and scheduling functions. The latest lighting control technologies will be utilized while designing the lighting system to maximize potential lighting energy savings. Interior lighting control devices will be selected to maximize simplicity within spaces while still providing the highest level of controllability. Lighting control devices include programmable low voltage pushbutton switches, programmable dimmer switches, vacancy sensors, daylight sensors, time switches and low voltage manual override switches. Various combinations of lighting control devices will be selected based on space criteria to maximize savings through reduced lighting power consumption. The highest value is achieved by fully integrated control systems.

The lighting control system proposed for this project will be a hybrid system which will operate with both software based networked lighting control as well as standalone room controls. Areas will be categorized based on space usage and task, and the most efficient lighting controls will be applied accordingly.

The following system components are proposed:

- Lighting within each area will have manual switching or dimming to allow for a greater level of control.
- All enclosed areas larger the 100 square feet with a connected lighting power above 0.5 w/sf will be provided with continuous dimming.
- Bi-level occupancy controls will be provided in all corridors and stairwells to reduce the lighting by at least 50% when not occupied.
- All lighting will be shut off completely during unoccupied times.
- A task/ambient strategy will be utilized wherever possible to reduce lighting power densities.
- The outdoor lighting system will consist of dimmable LED full cutoff luminaires with photocell and occupancy sensor controls for reduced maintenance, after hours luminance reduction and reduced energy consumption.
- To comply with the CA Title 24 requirements, the lighting control system will be equipped with demand response capabilities to provide electrical load shedding when requested by the utility. When a demand response signal is given from the utility, lighting power will be lowered a minimum of 15% below the maximum total lighting power.
- Vacancy sensors will be provided in all office areas 250 Sq. Ft. or less, conference rooms and secondary spaces (support, circulation, etc.) to force off lights when occupancy is not detected.
- Daylight sensors will automatically dim all luminaires in the primary daylight zones in response to available daylight in all areas.
- The lighting power density of security and egress lighting will be limited to a maximum of 0.2W/SF when the building is occupied, and will be shut off during unoccupied times.
- Control of the portion of lighting connected to the networked lighting control system will be adjustable at a centralized CPU location or via net portal login.

Distribution

In general, lighting will be served at 277V.

All lighting circuit wiring will be in conduit and routed concealed within walls, partitions, or ceiling spaces. Surface-mounted conduit will be minimized and used only in non-finished spaces.

The ampacity of lighting circuits will be sized for 25% future growth plus 125% continuous loading factor per the National Electric Code.

FIRE ALARM SYSTEM

System Description

A complete new fire alarm system will be provided in the renovated buildings. The fire alarm system will be a stand-alone, fully addressable system comprised of smoke detectors, heat detectors, duct detectors, manual pull stations, and audio/visual signaling devices.

Design Criteria

The fire alarm system will comply with requirements of NFPA 72 for a protected premises signaling system except as modified and supplemented by this document.

A main fire alarm control panel will be located at the main lobby or in the main electrical room with an annunciator at the lobby.

Audio/visual devices will be installed in all areas of the building in accordance with the NFPA and the ADA Guidelines.

Smoke detectors shall be installed as required by the National Fire Protection Association, the Uniform Building Code, and the Uniform Fire Code. Smoke detectors will be installed in, but not limited to, the following locations: air handling units, elevator lobbies, elevator machine rooms, and electrical equipment rooms.

Heat detectors will be installed in areas that are not feasible for smoke detectors.

Manual Pull Stations will be installed adjacent to all exit doors and in each elevator lobby.

The fire alarm system will be linked with the campus central system.

Equipment and Material

The fire alarm system will be an electronically multiplexed voice communication system.

Remote transponder panels will be used to provide supervised amplifiers and signal circuits for audio/visual devices and magnetic door holders.

The system will utilize individual, addressable photoelectric smoke detectors; heat detectors; addressable manual pull stations; and addressable monitor and control modules. The system will monitor all sprinkler supervisory and water flow switches and will interface with elevators, and smoke fire dampers.

Distribution

All initiating and signaling devices will operate at 24VDC and will be installed in accordance with manufacturer's specifications.

All wiring will be installed in conduit. Minimum conduit size will be 3/4".

ELECTRICAL SYSTEM STANDARDS

Feeder and Branch Circuits

Secondary distribution and branch circuit system design will be based on a maximum of 5% voltage drop from the transformer to the utilization equipment.

Neutral conductors derived from harmonic mitigating transformers will be capable of carrying 200% of normal phase current from transformer to first distribution panelboard. Neutral conductors from distribution panelboard to downstream panelboard or device will not be increased in size.

Feeder and branch circuit sizes will be based on the load supplied and adjusted for voltage drop.

Feeder and branch circuit ampacity will not be smaller than the upstream overcurrent device or downstream equipment bus.

CIRCUIT VOLTAGE LENGTH	WIRE SIZE
480Y/277 volt circuits over 150' in length	Increase wire size one size for each 150' of length
208Y/120 volt circuits over 60' in length	Increase wire size one size for each 60' of length

Receptacles

Receptacles in offices, general support rooms and similar locations, (depending upon room layout) will be provided with a minimum of (4) outlets total or (1) outlet on each wall. Enclosed offices will be provided with a double duplex receptacle at desk location.

Conference rooms and common areas will be provided with at least (1) duplex receptacle per wall. Typically receptacles to be spaced on 12' centers.

Building Support (Equipment rooms, storage rooms) will be provided with (1) duplex receptacle per wall or (1) per every 150 square feet, whichever is greater

Duplex receptacles in office areas, lounges, lobbies, etc., shall be circuited with an average of (6) duplex receptacle's per 20A, single pole circuit.

Receptacles designated to serve desk top computer loads shall be circuited with an average of (3) duplex receptacle's per 20A, single pole circuit.

Each workstation to receive minimum of (2) duplex receptacles that will be circuited with maximum of (4) receptacle's per 20A, single pole circuit.

Receptacles along laboratory benches shall be circuited with an average of (4) duplex receptacle's per 20A, single pole circuit.

Ground fault protection will be provided for outlets within 6' of a sink edge and other wet locations. Electrical outlets will be individually ground fault interrupted (GFCI) protected (not at the circuit breaker or first outlet on the circuit).

Receptacles required to be automatically controlled by Title 24 will be controlled by an occupancy sensor located in proximity to the receptacle.

Overcurrent Protective Device Coordination

Overcurrent protective devices will be selectively coordinated from source of supply through final device. Selectivity will be through the entire instantaneous region including ground fault.

Arc Flash

The electrical distribution system will be configured to allow equipment to be worked on energized using reasonable PPE (category 3 or less). Arc flash calculations for Arc Flash Incident Energy (AFIE) levels and flash protection boundary distances will be by the contractor based on the actual equipment supplied using an independent Registered Profession Engineer in the State of California using SKM System Analysis tools.

Fault Current Ratings

The preliminary short circuit withstand and interrupting ratings will be provided for electrical distribution equipment, feeder conductors, etc. based upon an infinite bus analysis with motor contribution.]

The preliminary available fault current will be determined design of the project and will be verified by 3rd party calculations provided in contractor submittals.

Equipment will have ratings not less than the calculated symmetrical short circuit value at each point in the distribution system.

Equipment will be fully rated for the calculated available short circuit. Series ratings shall not be allowed.

SHORT CIRCUIT RATINGS	
208Y/120V	480Y/277V
10 kAIC where fed via 75kVA and smaller transformers	14 kAIC where fed via 300 kVA and smaller transformers
22 KAIC where fed via 112.5 kVA transformer	30 kAIC where fed via 500 kVA transformer
22 KAIC where fed via 150 kVA transformer	35 kAIC where fed via 750 kVA transformer
42 KAIC where fed via 225 kVA transformer	42 kAIC where fed via 1000 kVA transformer
42 KAIC where fed via 300 kVA transformer	65 kAIC where fed via 1500 kVA transformer
65 KAIC where fed via 500 kVA transformer	100 kAIC where fed via 2000 kVA transformer

Conduit and Raceway

CONDUIT TYPES AND APPLICATION	
208Y/120V	480Y/277V
Electrical Metallic Tubing (EMT)	Low voltage feeders and branch circuit wiring where installed above 6'-6" AFF, when exposed in unfinished spaces.
Galvanized Rigid Steel (GRS)	Low voltage feeders and branch circuit wiring where exposed below 6'-6" AFF. Exterior locations or areas subject to
Intermediate Metal Conduit (IMC)	Low voltage feeders and branch circuit wiring where exposed below 6'-6" AFF.
Schedule 40 PVC	Concrete encased duct banks

Conduit will be run concealed, unless installed in mechanical, electrical, telecom, interstitial areas and other similar unfinished spaces.

Minimum conduit size for power circuits will be 3/4".

Conduits will be independently supported.

All conduit stub-ups from below floor or in floor (where specifically allowed) will be galvanized rigid steel.

Surface mounted conduits below 6'-6" will be rigid galvanized steel with threaded fittings and boxes will be cast steel.

EMT fittings will be compression type with steel body.

Conduits shall not be installed below floor slabs on grade.

For lighting conduit homeruns, a j-box will be located above light fixture in an accessible location to allow for future expansion.

No home run will terminate in a wall mounted device box. A separate J-box will be provided above device box above ceiling in an accessible location.

Wire and Cable

CABLE TYPES		
VOLTAGE CLASS	INSULATION	NOTES
15 kV	EPR 105 C	133% rated, tape shield

600 V	THWN/THHN-2 for branch circuits and XHHW-2 for feeders	Conductors #10 and smaller will be solid copper. Conductors larger than #10 will be stranded copper

All conductors to be 98% conductivity copper.

Minimum wire size #12 AWG, for all areas.

Multi-wire branch circuits will be provided with dedicated neutral conductors for each phase, common neutral circuits will not be permitted.

Feeder conductors will be terminated using compression lugs. Mechanical lugs will not be used for feeders. Branch circuit conductors will typically be terminated using mechanical lugs.

Conductor insulation color code will be as follows:

CONDUCTOR COLOR CODE	
208Y/120V	480Y/277V
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green

Wiring Devices
Wiring devices will be specification grade, complete with all accessories

Isolated ground receptacles will be used only when necessary. If used, isolated grounds will be in addition to equipment ground. Panelboard will have an isolated ground bus that will be connected back to applicable derived system or service.

RECEPTACLE AND SWITCH COLOR CODE	
Normal Power	Selected by Architect

Receptacles, switches, etc., will have faceplates with labeling indicating system panel and circuit identification.

Motors and Motor Control
Stand-alone motor disconnects (separate from starter or VFD) will be fused and will be installed at each motor.

Motors smaller than 60 HP that are not provided with a variable frequency drive (VFD) will be provided with an across the line combination magnetic motor starter. Motors 60 HP and larger that are not provided with a variable frequency drive (VFD) will be provided with reduced voltage motor starter. Refer to other sections of the narrative for VFD requirements.

Combination motor starters will use circuit breakers or motor circuit protectors in lieu of fuses to reduce the possibility of single phasing. For mechanical and HVAC equipment that are not provided with a VFD, individual combination motor starters will be located within sight of the motor.

Selected motors will have variable frequency drives (VFDs) as described in other sections of this narrative.

VFD drive specifications will require that the VFDs for the project be provided such that the Special Category harmonic limits recommended in IEEE 519-1992 be maintained. The supplier of the drive will be required to perform harmonic analysis as defined in IEEE 519-1992 and employ as a minimum 6 pulse VFD with equivalent 5% impedance by employing a combination of line reactors and/or DC bus choke to achieve the equivalent impedance.

Grounding and Bonding
A separate, insulated equipment grounding conductor, sized per the Electrical Code, will be provided within each raceway and cable tray, with each end terminated on a suitable lug, bus, enclosure, or bushing.

A grounding riser with ground box will be located in each electrical closet.

Surge Protection
Surge Protective Devices (SPD) will be used as design dictates. A single SPD device will be installed on the load side of each main service disconnects, the generator switchboard and at the first distribution panel on the load side to each automatic transfer switch. Second-tier SPD devices at branch panelboards and other locations will be incorporated as required but is not anticipated at this time.

Electrical Rooms
Electrical equipment rooms will be positioned to facilitate unobstructed initial installation of large equipment, and unobstructed removal and replacement of defective equipment.

Adequate space will be provided for maintenance of electrical equipment and equipment removal.

Pipes and other equipment foreign to the electrical equipment will not be located in, enter, or pass through such spaces or rooms.

Panelboards will be grouped, surface-mounted, in dedicated ventilated rooms. Electrical rooms will be stacked vertical whenever practicable.

Penthouses and mechanical rooms will be utilized for electrical equipment and panelboard placement where applicable for optimization of space.

Panelboards serving lighting and appliance circuits will be located on the same level as the circuits they serve and will be served from source of supply with a dedicated feeder.

Feed through, subfed and double section panelboards will not be used unless required to comply with selective coordination requirements

Prohibited Materials and Construction Practices
The entire power distribution system will consist of conduit and wire. Busway will not be used in any portion of this system,

Use of wood strips and wood screws to support lighting fixtures.

Extra-flexible non-labeled conduit

Conduit installation in concrete slabs

Conduit less than 3/4" diameter will not be used except for switch legs, fixture whips and door controls

Use of wire ties to support conduit

Suspension systems for conduits, fixtures, etc. connected to other utility equipment is prohibited. Any suspension system with multiple levels must be hung from trapeze suspension systems

Use of Incompatible Materials: Aluminum fittings and boxes will not be used with steel conduit. All materials in a raceway system will be compatible

Direct burial electrical cable

Power Distribution Acceptance Testing
An independent testing firm will be employed to assure all electrical equipment, both contractor and Owner supplied, is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

Testing firm will be a corporately and financially independent testing organization that can function as an unbiased testing authority, professionally independent of the manufacturer, supplier, and installers of equipment or system evaluated by the testing firm. The testing firm's on-site technical person will be currently certified by the International Electrical Testing Association in electrical power distribution system testing.

Power Distribution Acceptance Manufacturers

ACCEPTABLE MANUFACTURERS	
Medium Voltage Transformers	Cooper, Square D, GE, Siemens
Low Voltage Distribution Equipment	Eaton, Square D, GE, Siemens
Lighting Inverters	Dual-Lite, Eaton Powerware, Liebert
Meters	Campus Standard (TBD)
Lighting Controls	NLight or Wattstopper
Fire Alarm System	Campus Standard (TBD)
Wiring Devices	Cooper, Hubbell, Leviton
Surface Raceway	Wiremold, Mono-Systems, Post Glover, Square D

PIPING SYSTEMS – PHASE 2

EXECUTIVE SUMMARY

The phase 2 of this project consists of new construction. The approximate size is 56,000 GSF.

New plumbing fixtures and materials will meet current code and their associated flow rates as outlines later in the report. Our understanding is that the existing buildings associated with this project are, and will remain, unoccupied until after construction.

New construction will be a complete and functional built out facility. The overall program is essentially offices, support spaces, classrooms, light instruction labs (no wet labs), and both small and large conference rooms and auditoriums

SYSTEM DESCRIPTIONS

The following systems shall comply with all the latest applicable standards; ordinances, local code and all other authorities having jurisdiction, regulations and codes of all agencies including but not limited to:

- California Building Code 2016
- California Plumbing Code 2016
- California Title24 Energy Code 2016
- University Standards

STORM AND CLEARWATER DRAINAGE

System Description

A storm drainage system will be provided to convey rainwater from roofs to site storm sewers. The roof design is anticipated to be of similar fashion as existing surrounding buildings and as such, the storm water will be collected via a gutter system and downspouts.

For areas where flat roof is anticipated, primary and secondary roof drainage will be provided. The secondary drainage will be provided by using a dedicated piped overflow drainage system separate from the primary storm drainage system which will discharge through the building wall onto grade. Clearwater waste from air handling units, coolers, and other devices and equipment that discharge clearwater will be conveyed by gravity flow through a separate piping system and will indirect connect to the building sanitary drain.

Design Criteria

The primary storm drainage system will be sized based on a maximum rainfall rate of 3 in/hr. The secondary storm drainage system will be sized based on the same design criteria as the primary system.

The sizing for all clearwater discharge from equipment system will be based on the maximum flow rate of the equipment.

Equipment and Material

Storm drainage systems which cannot discharge to the storm sewer by gravity flow will be drained by gravity to a sump with pump(s) and will be pumped into the building storm drainage system.

Sump pumps will not be connected to the emergency (standby) power system as there is no emergency generator.

Distribution

STORM AND CLEARWATER WASTE SYSTEMS MATERIALS		
SYSTEM	BELOW GROUND	ABOVE GROUND
Storm and Clearwater Waste and Vent	Hubless cast-iron pipe with heavyweight no-hub couplings with stainless steel clamps	Hubless cast iron pipe with standard weight stainless steel clamp
Pressurized Storm and Clearwater Waste and Vent		Schedule 40 galvanized steel with threaded joints and fittings

Roof and overflow drain bodies and above ground storm, secondary roof drainage and clearwater waste piping will be insulated.

WASTE AND VENT SYSTEMS

System Description

A sanitary waste and vent system will be provided for all plumbing fixtures and other devices that produce sanitary waste. Plumbing fixtures will be drained by gravity through conventional soil, waste and vent stacks the site sewer.

All fixtures will have traps and will be vented through the roof. Vent terminals will be located away from air intakes, exhausts, doors, openable windows and parapet walls at distances required by the plumbing code.

Sanitary waste drainage systems which cannot discharge to the sanitary sewer by gravity flow will be drained by gravity to a sump with pump(s) and will be pumped into the building sanitary drainage system.

Design Criteria

The waste and vent piping will be sized in accordance with code requirements.

Equipment and Material
Floor drains, floor sinks and indirect waste receptors will be provided with electronic automatic trap primers when subject to loss of their trap seals due to evaporation caused by infrequent use.

Sewage ejectors will not be connected to the emergency (standby) power system as there is no emergency generator.

All sanitary waste piping which collects clearwater condensate from air handing equipment will be insulated to prevent condensation on the piping.

Distribution

WASTE SYSTEMS MATERIALS		
SYSTEM	BELOW GROUND	ABOVE GROUND
Gravity Sanitary Waste and Vent	Hubless cast-iron pipe with heavyweight no-hub couplings with stainless steel clamps	Hubless cast iron pipe with standard weight stainless steel clamp
Pressurized Sanitary Waste		Schedule 40 galvanized steel with threaded joints and fittings

Waste piping will be pitched according to code to maintain a minimum velocity of 2 fps when flowing half full.

Vents and the venting systems will be designed and installed so that the water seal of a trap will be subject to a maximum pneumatic pressure differential equal to 1" water column. This will be accomplished by sizing and locating the vents in accordance with the venting tables contained in the plumbing code.

DOMESTIC AND NONPOTABLE WATER

System Description
Domestic and non-potable water will connect to capped outlets provided in Phase 1.

Domestic water will be provided to all toilet room fixtures, electric water coolers/drinking fountains, sinks, emergency shower/eyewash units, and any other devices that require a domestic water supply.

Hot water at 120°F will be provided to all fixtures and devices that require hot water.

Design Criteria
Water heater will be sized for 100% of the design hot water load at an outlet temperature of 140°F.

Backflow preventers will be sized for 100% of the design flow.

Equipment and Material
A water meter will be provided on the building service entrance. The water meter will be sized for the building's maximum design flow rate.

The building's water system will be isolated from the municipal water system by a duplex reduced pressure backflow preventer located downstream of the water meter.

Domestic hot water will be produced by electric instantaneous water heaters for the Auditorium.

Legionella control in the domestic hot water system will be accomplished by heating water to 140F.

The hot water system temperature will be maintained by recirculating the hot water through a continuous loop with an in-line circulating pump.

Water hammer arrestors will be provided at all quick closing solenoid valves and at other potential water hammer sources.

Distribution

WATER SYSTEM MATERIALS		
SIZE	BELOW GROUND	ABOVE GROUND
2-1/2" and smaller:	Copper water tube, Type K, soldered joints and wrought copper fittings	Type L copper tube with soldered joints and wrought copper fittings
Copper	Not applicable	Type K copper tube with brazed joints and wrought copper fittings with rolled groove couplings

Piping 2-1/2" and larger and located in mechanical equipment rooms may be rolled groove mechanical joints.

The hot water system will be insulated in accordance with Code. The cold water system will be insulated to prevent condensation from forming. Isolation valves will be provided at all riser connections, branch piping run-outs to fixture groups, and at devices requiring maintenance.

The piping will be sized to limit the velocity in any section of the system to a maximum of 8 fps for cold water system and 4 fps for hot water and hot water circulating systems.

Fixture	Flow Rate
Water Closets	1.28 gallon flush
Urinals	0.125 gallon flush
Lavatories	0.5 gpm flow control
Sinks	1 gpm flow control
Janitor Sinks	2 gpm flow control

FIRE PROTECTION SYSTEMS – PHASE 2

EXECUTIVE SUMMARY

Phase 2 of this project consists of new construction. The approximate size of the new construction is 56,000 GSF.

New construction will be a complete and functional built out facility. The overall program is essentially offices, support spaces, classrooms, light instruction labs (no wet labs), and both small and large conference rooms and auditoriums.

SYSTEM DESCRIPTIONS

The following systems shall comply with all the latest applicable standards; ordinances, local code and all other authorities having jurisdiction, regulations and codes of all agencies including but not limited to:

- California Building Code 2016
- California Fire Code 2016
- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 14 Standard for the Installation of Standpipe and Hose Systems
- NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances
- University Standards

Building systems shall include the following; fire service, standpipe, and wet sprinkler.

FIRE SERVICE

System Description

An underground fire line will supply the sprinkler system in the building.

Design Criteria

The design of the underground fire lines shall comply with NFPA 24.

Current water supply flow test data will be obtained from a flow test which shall be performed by a licenses contractor and in order to determine the capacity of the water mains.

Equipment and Material

Piping for all underground lines will be cement lined ductile iron.

STANDPIPE SYSTEM

System Description

The building will be protected by a hydraulically designed, Class I Standpipe System without hoses or hose cabinets.

Design Criteria

The design of the standpipe system will comply with NFPA 14.

For manual standpipe systems in a fully sprinklered building, the standpipe system will be designed and hydraulically calculated to provide a flow of 250 gpm at 100 psig residual pressure at the highest fire department valve located on the most remote standpipe, when supplied by the local fire department apparatus through the fire department connection (FDC). An additional flow of 250 gpm will be added at the next highest valve on that standpipe. Finally, 250 gpm flows will be added at the 2 next remote standpipes, bringing the total to 1,000 gpm.

Equipment and Material

The standpipe system piping will be black steel. Piping will be Schedule 10 with roll groove couplings.

Distribution

For Phase 2 additions, standpipe risers within a standpipe system shall be interconnected and connect to the Phase 1 capped outlets.

New piping floor and wall penetrations shall include clearances as required per NFPA 13 or be installed with flexible couplings within twelve inches of wall or floor on each side.

A 2-1/2" fire department valve will be provided on the stair's intermediate landing between each floor level.

Additional fire department valves will be provided on the roof and at other locations as required by Code or the local authority.

WET PIPE SPRINKLER SYSTEM

System Description

The building will be protected throughout with hydraulically calculated sprinkler systems, which except for special protection needs, will be wet pipe systems. All areas of the building will be protected per NFPA 13, including electrical rooms (i.e. switchgear rooms, transformer rooms, generator rooms, electrical closets, and similar rooms), loading docks, stair towers, exterior canopies, and mechanical rooms.

Design Criteria
The sprinkler system for the building will be designed and installed in accordance with NFPA 13. Each floor of the new additions will have a separate sprinkler zone from Phase 1.

All systems will be hydraulically calculated with a computer calculation program using the Hazen-Williams method.

It is currently assumed any combustible concealed space will meet the provisions set forth as defined within NFPA 13. If there are no special Client standards or Client insurance carrier recommendations, the following sprinkler design densities shall apply:

SPRINKLER DESIGN DENSITIES			
HAZARD-AREAS DESIGNATED AS	DENSITY-MINIMUM SPRINKLER FLOW	REMOTE AREA	HOSE STREAM ALLOWANCE
Light Hazard	0.10 gpm per sq ft	1500 sq ft	100 gpm
Ordinary Hazard Group 1	0.15 gpm per sq ft	1500 sq ft	250 gpm
Ordinary Hazard Group 2, where stockpiles of combustibles do not exceed 12 ft.	0.20 gpm per sq ft	1500 sq ft	250 gpm

The pipe sizing for the systems will be as required to satisfy the hydraulic demand.

Equipment and Material
Each sprinkler riser assembly shall consist of an indicating control valve with tamper switch, check valve, flow switch, inspectors test and tee, drain valve, and pressure gauge. The inspector's test connection will be connected to the main drain.

A dedicated drain riser will be provided along the sprinkler riser and will discharge indirectly to a hub drain.

All tamper switches and flow switches are to be connected to the building fire alarm.

Piping 2" and smaller in size will be Schedule 40 black steel with threaded joints.

Piping larger than 2" will be Schedule 10 black steel with roll groove couplings.

All sprinklers in Light Hazard areas will be quick-response type.

The type of sprinkler installed in a particular area will be selected by the Engineer and the Project Architect. Generally, concealed sprinklers will be installed in areas of high visibility and quality of finishes. Recessed sprinklers will be installed in other areas having suspended ceilings. Pendent or upright sprinklers will be installed in areas without ceilings. Sidewall sprinklers will be provided only when other types cannot be utilized.

Sprinkler heads shall be spaced for symmetry with ceiling features. This shall require additional heads that shall be provided in the base bid.

- Basis of head location shall be:
- Equal distance between lights.
- Equal distance between lights and wall.
- Equal distance between lights and air inlets and outlets.
- Equal distance between wall, lights, and air inlets and outlets.
- Located in center of ceiling tiles.
- Lab module head layout shall be repeated.
- Provide complete and unobstructed coverage for rooms, void spaces, overhangs, and as required by the California Building Code and NFPA 13.

4B.7 PHASE 2 CIVIL

CIVIL NARRATIVE

KPFF Consulting Engineers prepared this civil assessment report that includes a general overview of the existing site conditions at 1 University Drive, Camarillo, California 93012. We understand the Gateway Hall is being considered for a combination of partial demolition, as well as three different configurations of future infrastructure modifications.

On May 31, 2017, KPFF Civil conducted a visual observation of the existing site and the surrounded site features. Photographs and as-built records were utilized and have been included for reference at the end of this section.

This portion of the civil narrative only addresses Phase 2 of the Gateway Project.

GENERAL PROJECT DESCRIPTION

The project site to be developed is located on the northern portion of California State University, Channel Islands (CSUCI) campus in southern Ventura County at the eastern edge of the Oxnard Plain and at the western flank of the Santa Monica Mountains.

The California State University Channel Island's (CSUCI) Gateway project consists of performing a feasibility study to investigate the renovation of existing buildings and adding new buildings to the North side of the campus. Phase 1: the renovation portion of the project will consist of investigating the demolition of 2 or 3 existing buildings and the renovation of approximately 68,000-sf of existing buildings. The existing buildings will be renovated to house faculty offices and administration offices and student service functions. Phase 2: the new buildings portion of the project will consist of approximately 56,000-sf of new construction and house academic programs such as: classrooms, lecture halls and auditoriums. This portion of the civil narrative only addresses Phase 2 of the project.

The second phase initially had three different options, each with a different configuration of proposed buildings, as follows:

A. There are four total proposed buildings. Two are located in the northern portion of the North Quad, one of which appears to be connected to the adjacent existing building. The other two buildings are located south of Santa Barbara Avenue. One of these proposed buildings is adjacent to the remaining portions of the existing Gateway building.
B. There are four total proposed buildings. Two are located in the northern portion of the North Quad, one of which appears to be connected to the adjacent existing building. The other two buildings are located south of Santa Barbara Avenue, neither of which is directly adjacent to the remaining portions of the existing Gateway building.
C. There are three total proposed buildings. There is one larger proposed building located in the northern portion of the North Quad. The other two buildings are located south of Santa Barbara Avenue and are not directly adjacent to the remaining portion of the existing Gateway building.

However, upon further evaluation, the preferred configuration of proposed buildings is a total of two buildings. One building is located north of the North Quad and south of the existing buildings. The other building is located north of the existing buildings and south of Santa Barbara Avenue.

CODE REQUIREMENTS AND GUIDELINES

Governing Codes

Per the California State University Procedure Guide for Capital Projects (2011), the project shall comply with federal and state laws, codes, rules, regulations, ordinances, and standards. For civil/site work, the applicable standards include, but are not limited to:

- The California Building Code
- The California Environmental Quality Act
- Requirements of the Regional Water Quality Control Board
- State/local health departments
- Americans with Disabilities Act (ADA), Title II, ADAAG
- CSU Energy & Utility Systems Requirements
- U.S. Green Building Council, LEED Certification
- CSU Program for Environmental Responsibility
- The California State University Office of the Chancellor - Access Compliance Design Guideline
- CSU Guidance Document Post Construction BMPs Municipal Separate Storm Sewer Systems (MS4s) Phase II Permit
- State of California Fire Code, current edition
- Standard Specifications for Public Works Construction (SSPWC)
- National Fire Protection Association (NFPA), current edition
- American Water Works Association (AWWA)
- Uniform Plumbing Code, current edition
- National Sanitation Foundation (NSF)
- CSU Telecommunications Infrastructure Planning Guidelines
- CSU Computer Aided Design Standards

STORM WATER MITIGATION

CSUCI is considered to be a Non-Traditional municipal separate storm sewer systems (MS4) permitee, which would need to comply with the State of California National Pollutant Discharge Elimination System (NPDES) Permit requirements. When one acre or more is disturbed, a Stormwater Pollution Prevention Plan (SWPPP) is required to be filed and approved by the State of CA. At this planning stage, it is anticipated that more than one acre will be disturbed, so a SWPPP is required for the proposed project.

In addition, CSUCI requires a Low Impact Design Plan (LID) for projects that result in the creation, addition, or replacement of at least 5,000 square feet or more of impervious surface area. Phase II of the MS4 Permit provides a list of new development and redevelopment projects and/or activities requiring the incorporation of Best Management Practices (BMPs) into the project plans. LID should be taken into consideration early in the design due to schedule and cost impact.

Per Section E.12.e of the Phase II General Permit for Storm Water Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), in conjunction with, "CSU Guidance Document for Phase II of the MS4s", for projects that create or replace 5,000 square feet or more of impervious surface the permit allows four specific numeric sizing criteria. They are as follows:

1. Volumetric Criteria

a. The maximized capture stormwater volume for the tributary area, on the basis of historical rainfall records, determined using the formula and volume capture coefficients in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87 (1998) pages 175-178 (that is, approximately the 85th percentile 24-hour storm runoff event); or

b. The volume of annual runoff required to achieve 80 percent or more capture, determined in accordance with the methodology in Section 5 of CASQA's Stormwater Best Management Practice Handbook, New Development and Redevelopment (2003), using local rainfall data.

2. Flow-based Criteria

a. The flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or

b. The flow of runoff produced from a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity as determined from local rainfall records".

Based on the aforementioned criteria, it is anticipated that the option that produces the least cost will be chosen. This will minimize the amount of storm water volume to be treated and reduce the runoff flow while also minimizing the cost.

BMPs considered for this project will be infiltration, biofiltration, and structural treatment devices in compliance with the California Stormwater Quality Association (CASQA) BMP guidelines as well as the Ventura County BMP sizing criteria. Storm water treatment systems will capture and treat the runoff prior to connecting to the campus storm drain system.

LEED

Per the CSU Program for Environmental Responsibility (PER) C.8, CSU projects should address multiple strategies to eliminate or reduce water pollution from storm water runoff.

The following strategies are being considered:

1. Prevent erosion and sedimentation during construction by implementing an erosion control plan (SWPPP) throughout the duration of construction.
2. Increase on-site infiltration by reducing impervious surface area. As the existing site is largely occupied by existing buildings, the introduction of landscaping around the site and Best Management Practices (BMPs) such as bio-filtration and bio-planter systems will accomplish this strategy.
3. Remove pollutants from storm water runoff. For pre-treatment of larger solids, BMPs considered for the site include, but are not limited to, bio-filtration and/or bio-planter systems.

The project is also anticipated to achieve Leadership in Energy and Environmental Design (LEED) certification status. The following LEED credits are being considered:

1. LEED credit 6.1 pertains to storm water quantity control and requires a 25% decrease in storm water runoff volume from the two-year, 24-hour storm and treatment of runoff from the 90% average annual rainfall to reduce total suspended solids by 80%. With introduction of landscape, this credit may be achieved.
2. LEED credit 6.2 pertains to storm water quality control and requires that a post construction storm water management plan be implemented on site to effectively treat storm water runoff. For purposes of LEED Credit Quality control, the plan must demonstrate the capture and treatment of storm water runoff from 90% of the average annual rainfall through the use of structural or non-structural Best Management Practices (BMPs). BMPs used to treat runoff must be capable of removing 80% of the average annual post development total suspended solids (TSS) load based on existing monitoring reports. With the introduction of BMPs per the MS4 Phase II permit and LID requirements, this credit may be achieved.

SITE ASSESSMENT

Accessibility

Upon site inspection, it appears as though the existing building finish floor elevations are about two to three feet above the adjacent site finish grade elevations. Even though the majority of the buildings on campus were constructed prior to the implementation of the Americans with Disabilities Act (ADA), it appears as if most of the doors have a ramp leading to them. It is anticipated that proposed site accessible pedestrian pathway will provide a link to the existing building and part of the first phase of the Gateway project.

Per the "CSU Access Compliance Design Guidelines", design slopes for site accessible paths are as follows:

Ramps	Design (to max)	7.1%
Cross Slopes	Design (to max)	1.5%
Apron Side Slopes	Design (to max)	8.33%
Apron Side Slopes	Design (to max)	level and clear

SITE GRADING AND DRAINAGE

Based on site exploration and record document research, the elevations of the overall site tend to decrease in the north direction along Camarillo Street, in the west direction along Santa Barbara Avenue, and in the south direction along Ventura Street. It appears that the localized low point is an existing grate drain that is located near the centerline of Ventura Street, just North of Napa Hall. It appears that the localized high point is located near the intersection of Camarillo Street and Rincon Drive, northeast of the Smith Decision Center. Courtyards enclosed by building wings generally tend to grade from east to west.

Elevations throughout the project site range from approximately 65 to 40 feet above mean sea level. At the northeast corner of the site, there is an eight foot change in grade which may make ADA accessibility a challenge.

Per the Vision Plan, the campus was previously located in the flood zone prior to the creation of the flood control channel north of Santa Barbara Avenue. Per the FEMA flood zone map, CSUCI is located adjacent to a flood zone, thus the finish floor elevations of the existing Gateway building were elevated to mitigate any flooding that may have previously occurred.

Proposed site grading design will attempt to minimize earthwork while providing adequate drainage for new facilities and accessible paths throughout the site. Additionally, grading will be designed such that any surface storm water flows away from the buildings to be collected by a variety of inlets before being introduced into the storm drain system.

UTILITIES

During the site visit, numerous USA markings were encountered which showed the existing utility connections to the building site. The existing Gateway building is currently unoccupied; therefore, it is assumed that all utility points of connections have been disconnected. The following list describes the utilities to be taken into consideration for Phase 2:

Storm Drain

The site has an existing storm drain network which consists of a series of catch basins and three storm drain lines running parallel to the centerlines of Santa Barbara Street, Camarillo Street, and Ventura Street. The existing storm drain network for the campus is a gravity flow system flowing primarily to the west.

There are multiple existing roof drains, which were previously connected directly to the storm drain lines below grade. However, these roof drains have since been disconnected and the connections to the storm drain line capped. Therefore, it is anticipated that new roof drains and points of connections will be provided as part of the second phase of the Gateway project.

There are multiple existing roof drains, which were previously connected directly to the storm drain lines below grade. However, these roof drains have since been disconnected and the connections to the storm drain line capped. Therefore, it is anticipated that new roof drains and points of connections will be provided as part of the second phase of the Gateway project.

The proposed storm drain network for the project site will be designed to properly function with the existing campus storm drain system.

Sanitary Sewer

Based on the site visit, numerous sewer manholes were observed along the southern edge of Santa Barbara Avenue and along the eastern edge of Ventura Street. Therefore, it appears as though there are sewer lines running parallel to the centerlines of Santa Barbara Street and Ventura Street.

Based on site utility maps, there appears to be an 8" sanitary sewer line running parallel to and north of Santa Barbara Avenue. Additionally, there appears to be an 8" sanitary sewer line running parallel to Santa Barbara Avenue, located south of the project site and north of the North Quad.

The proposed points of connections for sanitary sewer are still being developed. Proposed sanitary sewer connections to the CSUCI campus sanitary sewer main will be coordinated with CSUCI facility staff and the project plumbing engineer.

Domestic Water

Based on record drawings, there appears to be a 6" water line running east-west, located on the north edge of the North Quad, just south of the proposed project site. Additionally, there appears to be a water line running parallel to and south of the centerline of Santa Barbara Avenue. The water line appears to have laterals that connect to existing fire hydrants throughout the site.

The proposed points of connections for domestic water are still being developed. Proposed domestic water connections to the CSUCI campus water main will be coordinated with CSUCI facility staff and the project plumbing engineer.

Fire Water & Fire Access

The existing Gateway building did not have any post indicator valves (PIV), fire department connection (FDC), and backflow device(s) during the site visit.

Fire water submeter, backflow preventer device, PIV, and FDC will be provided for fire water lateral servicing the new buildings. Proposed fire water connection and appurtenances to the CSUCI campus water main will be coordinated with CSUCI facility staff, the project fire consultant, and the state Fire Marshal.

Currently, there are four existing campus fire hydrants located along the southern edge of Santa Barbara Ave, four along the eastern edge of Ventura Street, and three along the western edge of Camarillo Street. It is anticipated that these existing fire hydrants can be used to serve portions of the new buildings.

It appears as though there is a fire access lane connecting Ventura Street, the North Quad, and Camarillo Street. This lane appears to be located south of the Solano Hall and north of the Grand Salon. Proposed fire access for the project site is governed by existing and proposed fire hydrant locations.

It is anticipated that new PIV, FDC, and backflow preventer devices will be provided for the Gateway project. Possible need for additional fire hydrants and other fire appurtenances will be determined through review and discussions with the Fire Marshal. A current fire flow test, no more than 6 months, will be required to confirm water pressure within the project vicinity and for submittal to State Fire Marshal review.

RECLAIMED WATER

Per the Vision Plan, the campus goal is to use at least 95% reclaimed water. Based on the site utilities map, it appears as though the majority of the irrigation lines are reclaimed water, with the exception of two lines along the northern grassy area south of Santa Barbara Avenue.

OTHER SYSTEMS CONSIDERED

The design, points of connection, and required capacities for chilled water, hot water, electrical, communications, fuel, oil, natural gas, and other utilities are to be determined by the project MEP consultant. Civil will provide coordination assistance for horizontal and vertical alignment.

5.0 PROJECT COST ESTIMATE

5.1 BASIS COST MODEL

BASIS OF MODEL

CONSTRUCTION SCHEDULE

Phase 1

- Construction Start Date of January 2020
- Construction Period of 24 months

Phase 2

- To be determined

PROJECT DELIVERY

For the purposes of this cost model, the general contract is understood to be CM @ Risk delivery. Should the contract proceed under a traditional design-bid-build project delivery format, the cost model will need to be modified to account for the difference in bid-day costs resulting from the different project delivery approach.

There will not be small business set aside requirements.

The contractor will not be required to pay prevailing wages, but may find that it needs to pay what is effectively a union wage depending on the quality and productivity requirements, or their obligations as signatory to union agreements.
This contract will be an effective sequential tender.

SITE ACCESS

The general contractor will have full access to the site during normal business hours.

PRICING AND ESCALATION

This cost model includes unit rates that are based on bid data and therefore include escalation from start date to the point in the construction schedule when each trade's work will be performed. Escalation from the estimate date to the anticipated start of construction is carried as a escalation contingency calculated on the direct costs and design contingency.
Escalation to construction start is calculated at 4.0 %/a.

BIDDING

This report is based on the measurement and pricing of quantities where possible, informed assumptions where information is limited or nonexistent, and captures our expectation of the construction cost on bid day.

The unit rates used were obtained from historical data and/or discussion with the local contracting community. The unit rates used in this report reflect the current bidding environment in the area. All unit rates relating to subcontractor work include all subcontractor mark ups, which cover field overhead, home office overhead and profit and range from 15%to25% of the cost for a particular trade.

Pricing reflects likely construction costs on the bid-day noted in this report. This cost plan is not a prediction of low bid. Pricing assumes competitive bidding, with a minimum of 3 bidders, for all subcontracted work. Pricing also assumes a negotiated bid with one pre-selected contractor for the general contract. History has shown that bid results are tied to the number of bidders, with fewer bidders resulting in less competitive bids and a greater number of bidders resulting in more competitive bids.
The Capital Projects Group has no control over the costs of labor, material, equipment, or the contractor's means and methods or bidding strategy, or prevailing market conditions on bid day. This cost plan is based on industry practice, professional experience and qualifications, and represents our best judgment as professional consultants familiar with the construction industry. However, the Capital Projects Group cannot and does not guarantee that the proposals, bids, or the construction cost will not vary from this cost plan.

The accuracy of these costs is understood to be +/- 5%, and the possible range is understood to be +/- 15%. This range increases as the start date moves out in the future given the uncertainty regarding long-term cost escalation beyond 3 years out.

BUDGET ALLOCATION

	Budget Category	Const. Budget	Proj. Budget	Excluded	Funding Source	Comments
1	PROPERTY ACQUISITION					
	Property acquisition			■		
2	PROFESSIONAL SERVICES					
	Design fees		■			
4.	PROJECT DELIVERY					
i)	ENABLING					
	Demolition and removal of existing development	■				
	Utility relocation and/or removal - on-site	■				
	Utility relocation and/or removal - off-site		■			
	Connection to utilities (fees)		■			
	Moving and/or relocation expense		■			
	Haz-mat abatement	■				
	Environmental clean up			■		
I)	SYSTEMS					
	UPS			■		
	Emergency generator			■		
	Low Voltage					
	Security conduit, wire, contacts	■				
	Tele/Data network, routers, switches		■			
	Tele/Data active equipment		■			
	Tele/Data conduit and cabling	■				
	Master clock			■		
	Fire alarm is addressable	■				
	PA			■		
	AV infrastructure	■				
	AV equipment		■			
	Screens	■				
II)	FURNITURE					
	Fixed furniture	■				
	Loose furniture		■			
III)	FURNISHINGS					
	Window treatment	■				
	Movable interior furnishings		■			
	Movable exterior furnishings		■			
IV)	FIXED EQUIPMENT					
	Building maintenance / window washing equipment	■				
	Loading dock equipment			■		
	Institutional equipment (TBD)			■		
	Kitchen equipment			■		
	Toilet accessories	■				

BUDGET ALLOCATION - CONTINUED

	Budget Category	Const. Budget	Proj. Budget	Excluded	Funding Source	Comments
V)	SIGNAGE					
	Interior Signage					
	Wayfinding	■				
	Room identification	■				
	Donor		■			
	Exterior signage					
	Building	■				
	Site	■				
VI)	PROCUREMENT / DELIVERY					
	Preconstruction services		■			
	General requirements	■				
	General conditions	■				
	Bonds	■				
	Insurance	■				
VII)	CONTINGENCIES					
	Design contingency	■				
	Escalation contingency	■				
	Construction contingency	■				
	Bidding contingency			■		
	Project contingency		■			

EXCLUSIONS

- Owner supplied and installed furniture, fixtures and equipment
- Loose furniture and equipment except as specifically identified
- Hazardous material handling, disposal and abatement
- Compression of schedule, premium or shift work, and restrictions on the contractor's working hours
- Testing and inspection fees
- Architectural, design and construction management preconstruction fees
- Scope change and post contract contingencies
- Assessments, taxes, finance, legal and development charges
- Environmental impact mitigation
- Builder's risk, project wrap-up and other owner provided insurance program
- Land and easement acquisition
- Cost escalation beyond a midpoint of January 2021
- Public address
- Utility connection charges and fees
- Independent 3rd party MEP commissioning (including LEED)
- Tele/data - equipment - including hubs, routers, LAN, servers, switches, PBX
- AV equipment
- Renewables - such as PV panels etc. - Below the line
- Sub-metering
- Emergency generator

5.1A PHASE 1 COST ESTIMATE

PHASE 1 - CONCEPTUAL DESIGN COST MODEL

	Construction Costs Baseline			Escalate to Future Date		
	Area (GSF)	$/GSF	Total ('000s)	Midpoint	Esc. 4.5%/a	Total ('000s)
PHASE 1 - START DATE JANUARY 2020						
Renovation	67,850	337.00	23,008	1/1/2021	15.71%	26,622
Site Development			1,745	1/1/2021	15.71%	2,019
Site Utilities			577	1/1/2021	15.71%	668
TOTAL PHASE 1			**25,330**			**26,622**

ELEMENTAL SUMMARY - OVERALL		Phase 1							
		Renovation 67,850 SF		Site Development 70,000 SF		Site Utilities 70,000 SF		Total 67,850 SF	
		$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000
A SUBSTRUCTURE									
A10 Foundations		5.04	342	-	-	-	-	5.04	342
A20 Basement Construction		-	-	-	-	-	-	-	-
Subtotal		5.04	342	-	-	-	-	5.04	342
B SHELL									
B10 Superstructure		12.88	874	-	-	-	-	12.88	874
B20 Exterior Enclosure		22.33	1,515	-	-	-	-	22.33	1,515
B30 Roofing		3.16	214	-	-	-	-	3.16	214
Subtotal		38.36	2,603	-	-	-	-	38.36	2,603
C INTERIORS									
C10 Interior Construction		20.26	1,374	-	-	-	-	20.26	1,374
C20 Stairs		1.11	75	-	-	-	-	1.11	75
C30 Interior Finishes		17.50	1,187	-	-	-	-	17.50	1,187
Subtotal		38.86	2,637	-	-	-	-	38.86	2,637
D SERVICES									
D10 Conveying		2.21	150	-	-	-	-	2.21	150
D20 Plumbing		14.50	984	-	-	-	-	14.50	984
D30 HVAC		55.75	3,783	-	-	-	-	55.75	3,783
D40 Fire Protection		6.50	441	-	-	-	-	6.50	441
D50 Electrical		51.50	3,494	-	-	-	-	51.50	3,494
Subtotal		130.46	8,852	-	-	-	-	130.46	8,852
E EQUIPMENT AND FURNISHINGS									
E10 Equipment		1.00	68	-	-	-	-	1.00	68
E20 Furnishings		2.50	170	-	-	-	-	2.50	170
Subtotal		3.50	237	-	-	-	-	3.50	237
F SPECIAL CONSTRUCTION & DEMOLITION									
F10 Special Construction		-	-	-	-	-	-	-	-
F20 Selective Building Demolition		27.50	1,866	-	-	-	-	27.50	1,866
Subtotal		27.50	1,866	-	-	-	-	27.50	1,866
G BUILDING SITEWORK									
G10 Site Preparation		-	-	5.00	350	-	-	5.16	350
G20 Site Improvements		-	-	9.60	672	-	-	9.90	672
G30 Site Mechanical Utilities		-	-	2.00	140	3.57	250	5.75	390
G40 Site Electrical Utilities		-	-	1.75	123	2.50	175	4.38	298
G50 Other Site Construction		-	-	-	-	-	-	-	-
Subtotal		-	-	18.35	1,285	6.07	425	25.20	1,710
Subtotal Direct Cost		**243.73**	**16,537**	**18.35**	**1,285**	**6.07**	**425**	**268.93**	**18,247**
Contingency for Development of Design	12.00%	29.24	1,984	2.20	154	0.73	51	32.26	2,189
Construction Contingency	3.00%	13.65	926	0.61	43	0.20	14	14.49	983
Subtotal Direct Cost + Design Contingency		**286.62**	**19,447**	**21.16**	**1,482**	**7.00**	**490**	**315.68**	**21,419**
General Conditions	11.00%	32.96	2,236	2.33	163	0.77	54	36.15	2,453
Subguard	1.30%	4.16	282	0.30	21	0.10	7	4.57	310
Bond	1.70%	5.50	373	0.40	28	0.13	9	6.04	410
Contractor's Overhead & Profit or Fee	3.00%	9.87	670	0.73	51	0.24	17	10.88	738
Total Construction Cost	**July 2017**	**339.10**	**23,008**	**24.92**	**1,745**	**8.24**	**577**	**373.32**	**25,330**

AREAS - RENOVATION

Enclosed Areas				Areas
Level 1				33,925
Level 2				33,925
TOTAL GROSS FLOOR AREA				**67,850**
				Ratios
Number of stories (x1,000)		2	EA	0.029
Gross Area		67,850	SF	1.000
Enclosed Area		67,850	SF	1.000
Footprint Area		33,925	SF	0.500
Volume		814,200	CF	12.00
Gross Wall Area		55,000	SF	0.811
Retaining Wall Area		0	SF	0.000
Above Grade Wall Area		55,000	SF	0.811
Solid Wall Area		46,750	SF	0.689
Windows or Glazing Area	15%	8,250	SF	0.122
Roof Area - Skylight		0	SF	0.000
Roof Area - High		35,621	SF	0.525
Roof Area - Total		35,621	SF	0.525
Building Soffit		1,696	SF	0.025
Canopy		500	SF	0.007
Interior Partition Length		4,071	LF	0.060
Interior Glazing Length		339	LF	0.005
Doors		170	EA	0.003
Elevators (x10,000)		2	EA	0.000

ELEMENTAL SUMMARY - RENOVATION

	Gross Area:	67,850 SF	$/SF	$x1,000
A SUBSTRUCTURE				
A10 Foundations			5.04	342
A20 Basement Construction			-	-
Subtotal			5.04	342
B SHELL				
B10 Superstructure			12.88	874
B20 Exterior Enclosure			22.33	1,515
B30 Roofing			3.16	214
Subtotal			38.36	2,603
C INTERIORS				
C10 Interior Construction			20.26	1,374
C20 Stairs			1.11	75
C30 Interior Finishes			17.50	1,187
Subtotal			38.86	2,637
D SERVICES				
D10 Conveying			2.21	150
D20 Plumbing			14.50	984
D30 HVAC			55.75	3,783
D40 Fire Protection			6.50	441
D50 Electrical			51.50	3,494
Subtotal			130.46	8,852
E EQUIPMENT AND FURNISHINGS				
E10 Equipment			1.00	68
E20 Furnishings			2.50	170
Subtotal			3.50	237
F SPECIAL CONSTRUCTION & DEMOLITION				
F10 Special Construction			-	-
F20 Selective Building Demolition			27.50	1,866
Subtotal			27.50	1,866
G BUILDING SITEWORK				
G10 Site Preparation			-	-
G20 Site Improvements			-	-
G30 Site Mechanical Utilities			-	-
G40 Site Electrical Utilities			-	-
G50 Other Site Construction			-	-
Subtotal			-	-
Subtotal Direct Cost			**243.73**	**16,537**
Contingency for Development of Design		12.00%	29.24	1,984
Construction Contingency		5.00%	13.65	926
Subtotal Direct Cost + Design and Escalation Contingency			**286.62**	**19,447**
General Conditions		11.50%	32.96	2,236
Subguard		1.30%	4.16	282
Bond		1.70%	5.50	373
Contractor's Overhead & Profit or Fee		3.00%	9.87	670
Total Construction Cost	**July 2017**		**339.10**	**23,008**

AREAS - SITE DEVELOPMENT & SITE UTILITIES

Site Areas				Areas
Site Area				70,000
TOTAL SITE AREA				70,000
				Ratios
Gross Site Area		70,000	SF	1,000.000
Developed Site Area		70,000	SF	1.000
Hardscape	15%	10,500	SF	0.150
Softscape	85%	59,500	SF	0.850

ELEMENTAL SUMMARY - SITE DEVELOPMENT

		Gross Area:	70,000 SF	$/SF	$x1,000
G BUILDING SITEWORK					
G10 Site Preparation				5.00	350
G20 Site Improvements				9.60	672
G30 Site Mechanical Utilities				2.00	140
G40 Site Electrical Utilities				1.75	123
G50 Other Site Construction				-	-
Subtotal				18.35	1,285
Subtotal Direct Cost				**18.35**	**1,285**
Contingency for Development of Design			12.00%	2.20	154
Construction Contingency			3.00%	0.61	43
Subtotal Direct Cost + Design and Escalation Contingency				**21.16**	**1,482**
General Conditions			11.00%	2.33	163
Subguard			1.30%	0.30	21
Bond			1.70%	0.40	28
Contractor's Overhead & Profit or Fee			3.00%	0.73	51
Total Construction Cost	**July 2017**			**24.92**	**1,745**

ELEMENTAL SUMMARY - SITE UTILITIES

		Gross Area:	70,000 SF	$/SF	$x1,000
G BUILDING SITEWORK					
G10 Site Preparation				-	-
G20 Site Improvements				-	-
G30 Site Mechanical Utilities				3.57	250
G40 Site Electrical Utilities				2.50	175
G50 Other Site Construction				-	-
Subtotal				6.07	425
Subtotal Direct Cost				**6.07**	**425**
Contingency for Development of Design			12.00%	0.73	51
Construction Contingency			3.00%	0.20	14
Subtotal Direct Cost + Design and Escalation Contingency				**7.00**	**490**
General Conditions			11.00%	0.77	54
Subguard			1.30%	0.10	7
Bond			1.70%	0.13	9
Contractor's Overhead & Profit or Fee			3.00%	0.24	17
Total Construction Cost	**July 2017**			**8.24**	**577**

5.1B PHASE 2 COST ESTIMATE

PHASE 2 OVERALL SUMMARY

	Construction Costs Baseline			Escalate to Future Date		
	Area (GSF)	$/GSF	Total ('000s)	Midpoint	Esc. 4.%/a	Total ('000s)
PHASE 2 - START DATE TBD						
North Building	25,801	545.00	14,101			-
South Building	30,066	473.00	14,285			-
Site Development			2,577			-
Site Utilities			884			-
TOTAL PHASE 2			**31,846**			**-**

ELEMENTAL SUMMARY - OVERALL	North Building 25,801 SF		South Building 30,066 SF		Phase 2 Site Development 64,000 SF		Site Utilities 64,000 SF		Total 55,867 SF		Total Total 123,717 SF	
	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000
A SUBSTRUCTURE												
A10 Foundations	13.26	342	12.03	362	-	-	-	-	12.60	704	8.46	1,046
A20 Basement Construction	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	13.26	342	12.03	362	-	-	-	-	12.60	704	8.46	1,046
B SHELL												
B10 Superstructure	47.01	1,213	44.37	1,334	-	-	-	-	45.59	2,547	27.65	3,420
B20 Exterior Enclosure	89.66	2,313	84.46	2,539	-	-	-	-	86.86	4,853	51.47	6,368
B30 Roofing	19.22	496	13.02	392	-	-	-	-	15.89	888	8.91	1,102
Subtotal	155.89	4,022	141.85	4,265	-	-	-	-	148.33	8,287	88.02	10,890
C INTERIORS												
C10 Interior Construction	33.30	859	33.30	1,001	-	-	-	-	33.30	1,860	26.15	3,235
C20 Stairs	8.14	210	6.98	210	-	-	-	-	7.52	420	4.00	495
C30 Interior Finishes	30.00	774	22.50	676	-	-	-	-	25.96	1,451	21.32	2,638
Subtotal	71.44	1,843	62.78	1,888	-	-	-	-	66.78	3,731	51.47	6,368
D SERVICES												
D10 Conveying	15.12	390	6.49	195	-	-	-	-	10.47	585	5.94	735
D20 Plumbing	14.00	361	13.00	391	-	-	-	-	13.46	752	14.03	1,736
D30 HVAC	56.50	1,458	52.50	1,578	-	-	-	-	54.35	3,036	55.12	6,819
D40 Fire Protection	6.00	155	6.00	180	-	-	-	-	6.00	335	6.27	776
D50 Electrical	55.00	1,419	50.00	1,503	-	-	-	-	52.31	2,922	51.87	6,417
Subtotal	146.62	3,783	127.99	3,848	-	-	-	-	136.59	7,631	133.23	16,483
E EQUIPMENT AND FURNISHINGS												
E10 Equipment	5.00	129	1.50	45	-	-	-	-	3.12	174	1.96	242
E20 Furnishings	10.00	258	3.50	105	-	-	-	-	6.50	363	4.31	533
Subtotal	15.00	387	5.00	150	-	-	-	-	9.62	537	6.26	775
F SPECIAL CONSTRUCTION & DEMOLITION												
F10 Special Construction	-	-	-	-	-	-	-	-	-	-	-	-
F20 Selective Building Demolition	-	-	-	-	-	-	-	-	-	-	15.08	1,866
Subtotal	-	-	-	-	-	-	-	-	-	-	15.08	1,866
G BUILDING SITEWORK												
G10 Site Preparation	-	-	-	-	6.62	424	-	-	7.58	424	6.25	774
G20 Site Improvements	-	-	-	-	18.50	1,184	-	-	21.19	1,184	15.00	1,856
G30 Site Mechanical Utilities	-	-	-	-	2.00	128	6.25	400	9.45	528	7.42	918
G40 Site Electrical Utilities	-	-	-	-	2.50	160	3.91	250	7.34	410	5.72	708
G50 Other Site Construction	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	-	-	-	-	29.62	1,896	10.16	650	45.56	2,546	34.39	4,255
Subtotal Direct Cost	**402.20**	**10,377**	**349.65**	**10,513**	**29.62**	**1,896**	**10.16**	**650**	**419.49**	**23,435**	**336.91**	**41,682**
Contingency for Development of Design	48.25	1,245	41.97	1,262	3.55	227	1.22	78	50.33	2,812	40.42	5,001
Construction Contingency	13.53	349	11.74	353	1.00	64	0.34	22	14.10	788	14.31	1,771
Subtotal Direct Cost + Design Contingency	**463.98**	**11,971**	**403.37**	**12,128**	**34.16**	**2,187**	**11.72**	**750**	**483.92**	**27,035**	**391.65**	**48,454**
General Conditions	51.04	1,317	44.37	1,334	3.77	241	1.30	83	53.25	2,975	43.87	5,428
Subguard	6.71	173	5.82	175	0.50	32	0.17	11	7.00	391	5.67	701
Bond	8.88	229	7.72	232	0.66	42	0.22	14	9.25	517	7.49	927
Contractor's Overhead & Profit or Fee	15.93	411	13.84	416	1.17	75	0.41	26	16.61	928	13.47	1,666
Total Construction Cost	**546.54**	**14,101**	**475.11**	**14,285**	**40.26**	**2,577**	**13.81**	**884**	**570.04**	**31,846**	**462.15**	**57,176**

AREAS - NEW CONSTRUCTION - NORTH BUILDING

Enclosed Areas				Areas
Level 1				12,000
Level 2				8,000
Level 3				5,801
TOTAL GROSS FLOOR AREA				**25,801**
				Ratios
Number of stories (x1,000)		3	EA	0.116
Gross Area		25,801	SF	1.000
Enclosed Area		25,801	SF	1.000
Footprint Area		12,000	SF	0.465
Volume		361,214	CF	14.00
Gross Wall Area		25,000	SF	0.969
Retaining Wall Area		0	SF	0.000
Above Grade Wall Area		25,000	SF	0.969
Solid Wall Area		16,250	SF	0.630
Windows or Glazing Area	35%	8,750	SF	0.339
Roof Area - Low Roof	10%	4,000	SF	0.155
Roof Area - Skylight		300	SF	0.012
Roof Area - High		8,000	SF	0.310
Roof Area - Total	2%	12,300	SF	0.477
Building Soffit		300	SF	0.012
Canopy		1,000	SF	0.039
Exterior Guardrails		100	LF	0.004
Interior Partition Length		2,064	LF	0.080
Interior Glazing Length		258	LF	0.010
Doors		69	EA	0.003
Elevators (x10,000)		1	EA	0.000

ELEMENTAL SUMMARY - NEW CONSTRUCTION - NORTH BUILDING

	Gross Area:	25,801 SF	$/SF	$x1,000
A SUBSTRUCTURE				
A10 Foundations			13.26	342
A20 Basement Construction			-	-
Subtotal			13.26	342
B SHELL				
B10 Superstructure			47.01	1,213
B20 Exterior Enclosure			89.66	2,313
B30 Roofing			19.22	496
Subtotal			155.89	4,022
C INTERIORS				
C10 Interior Construction			33.30	859
C20 Stairs			8.14	210
C30 Interior Finishes			30.00	774
Subtotal			71.44	1,843
D SERVICES				
D10 Conveying			15.12	390
D20 Plumbing			14.00	361
D30 HVAC			56.50	1,458
D40 Fire Protection			6.00	155
D50 Electrical			55.00	1,419
Subtotal			146.62	3,783
E EQUIPMENT AND FURNISHINGS				
E10 Equipment			5.00	129
E20 Furnishings			10.00	258
Subtotal			15.00	387
F SPECIAL CONSTRUCTION & DEMOLITION				
F10 Special Construction			-	-
F20 Selective Building Demolition			-	-
Subtotal			-	-
G BUILDING SITEWORK				
G10 Site Preparation			-	-
G20 Site Improvements			-	-
G30 Site Mechanical Utilities			-	-
G40 Site Electrical Utilities			-	-
G50 Other Site Construction			-	-
Subtotal			-	-
Subtotal Direct Cost			**402.20**	**10,377**
Contingency for Development of Design		12.00%	48.25	1,245
Construction Contingency		3.00%	13.53	349
Subtotal Direct Cost + Design and Escalation Contingency			**463.98**	**11,971**
General Conditions		11.00%	51.04	1,317
Subguard		1.30%	6.71	173
Bond		1.70%	8.88	229
Contractor's Overhead & Profit or Fee		3.00%	15.93	411
Total Construction Cost	**July 2017**		**546.54**	**14,101**

AREAS - NEW CONSTRUCTION - SOUTH BUILDING

Enclosed Areas				Areas
Level 1				11,000
Level 2				10,000
Level 3				9,066
TOTAL GROSS FLOOR AREA				**30,066**
				Ratios
Number of stories (x1,000)		3	EA	0.100
Gross Area		30,066	SF	1.000
Enclosed Area		30,066	SF	1.000
Footprint Area		11,000	SF	0.366
Volume		420,924	CF	14.00
Gross Wall Area		27,500	SF	0.915
Retaining Wall Area		0	SF	0.000
Above Grade Wall Area		27,500	SF	0.915
Solid Wall Area		17,875	SF	0.595
Windows or Glazing Area	35%	9,625	SF	0.320
Roof Area - Low Roof	9%	1,000	SF	0.033
Roof Area - Skylight		200	SF	0.007
Roof Area - High		10,000	SF	0.333
Roof Area - Total	2%	11,200	SF	0.373
Building Soffit		200	SF	0.007
Canopy		1,000	SF	0.033
Exterior Guardrails		50	LF	0.002
Interior Partition Length		2,405	LF	0.080
Interior Glazing Length		301	LF	0.010
Doors		80	EA	0.003
Elevators (x10,000)		2	EA	0.000

ELEMENTAL SUMMARY - NEW CONSTRUCTION - SOUTH BUILDING

	Gross Area:	**30,066 SF**	**$/SF**	**$x1,000**
A SUBSTRUCTURE				
A10 Foundations			12.03	362
A20 Basement Construction			-	-
Subtotal			12.03	362
B SHELL				
B10 Superstructure			44.37	1,334
B20 Exterior Enclosure			84.46	2,539
B30 Roofing			13.02	392
Subtotal			141.85	4,265
C INTERIORS				
C10 Interior Construction			33.30	1,001
C20 Stairs			6.98	210
C30 Interior Finishes			22.50	676
Subtotal			62.78	1,888
D SERVICES				
D10 Conveying			6.49	195
D20 Plumbing			13.00	391
D30 HVAC			52.50	1,578
D40 Fire Protection			6.00	180
D50 Electrical			50.00	1,503
Subtotal			127.99	3,848
E EQUIPMENT AND FURNISHINGS				
E10 Equipment			1.50	45
E20 Furnishings			3.50	105
Subtotal			5.00	150
F SPECIAL CONSTRUCTION & DEMOLITION				
F10 Special Construction			-	-
F20 Selective Building Demolition			-	-
Subtotal			-	-
G BUILDING SITEWORK				
G10 Site Preparation			-	-
G20 Site Improvements			-	-
G30 Site Mechanical Utilities			-	-
G40 Site Electrical Utilities			-	-
G50 Other Site Construction			-	-
Subtotal			-	-
Subtotal Direct Cost			**349.65**	**10,513**
Contingency for Development of Design		12.00%	41.97	1,262
Construction Contingency		3.00%	11.74	353
Subtotal Direct Cost + Design and Escalation Contingency			**403.37**	**12,128**
General Conditions		11.00%	44.37	1,334
Subguard		1.30%	5.82	175
Bond		1.70%	7.72	232
Contractor's Overhead & Profit or Fee		3.00%	13.84	416
Total Construction Cost	**July 2017**		**475.11**	**14,285**

AREAS - SITE DEVELOPMENT & SITE UTILITIES

Site Areas				Areas
Site Area				64,000
TOTAL SITE AREA				**64,000**
				Ratios
Gross Site Area		87,000	SF	1,359.375
Developed Site Area		64,000	SF	1.000
Hardscape	30%	19,200	SF	0.300
Softscape	70%	44,800	SF	0.700

ELEMENTAL SUMMARY - SITE DEVELOPMENT

	Gross Area:	64,000 SF	$/SF	$x1,000
G BUILDING SITEWORK				
G10 Site Preparation			6.62	424
G20 Site Improvements			18.50	1,184
G30 Site Mechanical Utilities			2.00	128
G40 Site Electrical Utilities			2.50	160
G50 Other Site Construction			-	-
Subtotal			29.62	1,896
Subtotal Direct Cost			**29.62**	**1,896**
Contingency for Development of Design		12.00%	3.55	227
Construction Contingency		3.00%	1.00	64
Subtotal Direct Cost + Design and Escalation Contingency			**34.16**	**2,187**
General Conditions		11.00%	3.77	241
Subguard		1.30%	0.50	32
Bond		1.70%	0.66	42
Contractor's Overhead & Profit or Fee		3.00%	1.17	75
Total Construction Cost	**July 2017**		**40.26**	**2,577**

ELEMENTAL SUMMARY - SITE UTILITIES

	Gross Area:	64,000 SF	$/SF	$x1,000
G BUILDING SITEWORK				
G10 Site Preparation			-	-
G20 Site Improvements			-	-
G30 Site Mechanical Utilities			6.25	400
G40 Site Electrical Utilities			3.91	250
G50 Other Site Construction			-	-
Subtotal			10.16	650
Subtotal Direct Cost			**10.16**	**650**
Contingency for Development of Design		12.00%	1.22	78
Construction Contingency		3.00%	0.34	22
Subtotal Direct Cost + Design and Escalation Contingency			**11.72**	**750**
General Conditions		11.00%	1.30	83
Subguard		1.30%	0.17	11
Bond		1.70%	0.22	14
Contractor's Overhead & Profit or Fee		3.00%	0.41	26
Total Construction Cost	**July 2017**		**13.81**	**884**

5.2 OVERALL COST MODEL

OVERALL COST SUMMARY

	Construction Costs Baseline			Escalate to Future Date		
	Area (GSF)	$/GSF	Total ('000s)	Midpoint	Esc. 4.5%/a	Total ('000s)
PHASE 1 - START DATE JANUARY 2020						
Renovation	67,850	337.00	23,008	1/1/2021	15.71%	26,622
Site Development			1,745	1/1/2021	15.71%	2,019
Site Utilities			577	1/1/2021	15.71%	668
TOTAL PHASE 1			**25,330**			**26,622**
PHASE 2 - START DATE TBD						
North Building	25,801	545.00	14,101			-
South Building	30,066	473.00	14,285			-
Site Development			2,577			-
Site Utilities			884			-
TOTAL PHASE 2			**31,846**			**-**
TOTAL			**57,176**			

ELEMENTAL SUMMARY - OVERALL	North Building 25,801 SF		South Building 30,066 SF		Phase 2 Site Development 64,000 SF		Site Utilities 64,000 SF		Total 55,867 SF		Total Total 123,717 SF	
	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000	$/SF	$x1,000
A SUBSTRUCTURE												
A10 Foundations	13.26	342	12.03	362	-	-	-	-	12.60	704	8.46	1,046
A20 Basement Construction	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	13.26	342	12.03	362	-	-	-	-	12.60	704	8.46	1,046
B SHELL												
B10 Superstructure	47.01	1,213	44.37	1,334	-	-	-	-	45.59	2,547	27.65	3,420
B20 Exterior Enclosure	89.66	2,313	84.46	2,539	-	-	-	-	86.86	4,853	51.47	6,368
B30 Roofing	19.22	496	13.02	392	-	-	-	-	15.89	888	8.91	1,102
Subtotal	155.89	4,022	141.85	4,265	-	-	-	-	148.33	8,287	88.02	10,890
C INTERIORS												
C10 Interior Construction	33.30	859	33.30	1,001	-	-	-	-	33.30	1,860	26.15	3,235
C20 Stairs	8.14	210	6.98	210	-	-	-	-	7.52	420	4.00	495
C30 Interior Finishes	30.00	774	22.50	676	-	-	-	-	25.96	1,451	21.32	2,638
Subtotal	71.44	1,843	62.78	1,888	-	-	-	-	66.78	3,731	51.47	6,368
D SERVICES												
D10 Conveying	15.12	390	6.49	195	-	-	-	-	10.47	585	5.94	735
D20 Plumbing	14.00	361	13.00	391	-	-	-	-	13.46	752	14.03	1,736
D30 HVAC	56.50	1,458	52.50	1,578	-	-	-	-	54.35	3,036	55.12	6,819
D40 Fire Protection	6.00	155	6.00	180	-	-	-	-	6.00	335	6.27	776
D50 Electrical	55.00	1,419	50.00	1,503	-	-	-	-	52.31	2,922	51.87	6,417
Subtotal	146.62	3,783	127.99	3,848	-	-	-	-	136.59	7,631	133.23	16,483
E EQUIPMENT AND FURNISHINGS												
E10 Equipment	5.00	129	1.50	45	-	-	-	-	3.12	174	1.96	242
E20 Furnishings	10.00	258	3.50	105	-	-	-	-	6.50	363	4.31	533
Subtotal	15.00	387	5.00	150	-	-	-	-	9.62	537	6.26	775
F SPECIAL CONSTRUCTION & DEMOLITION												
F10 Special Construction	-	-	-	-	-	-	-	-	-	-	-	-
F20 Selective Building Demolition	-	-	-	-	-	-	-	-	-	-	15.08	1,866
Subtotal	-	-	-	-	-	-	-	-	-	-	15.08	1,866
G BUILDING SITEWORK												
G10 Site Preparation	-	-	-	-	6.62	424	-	-	7.58	424	6.25	774
G20 Site Improvements	-	-	-	-	18.50	1,184	-	-	21.19	1,184	15.00	1,856
G30 Site Mechanical Utilities	-	-	-	-	2.00	128	6.25	400	9.45	528	7.42	918
G40 Site Electrical Utilities	-	-	-	-	2.50	160	3.91	250	7.34	410	5.72	708
G50 Other Site Construction	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal	-	-	-	-	29.62	1,896	10.16	650	45.56	2,546	34.39	4,255
Subtotal Direct Cost	**402.20**	**10,377**	**349.65**	**10,513**	**29.62**	**1,896**	**10.16**	**650**	**419.49**	**23,435**	**336.91**	**41,682**
Contingency for Development of Design	48.25	1,245	41.97	1,262	3.55	227	1.22	78	50.33	2,812	40.42	5,001
Construction Contingency	13.53	349	11.74	353	1.00	64	0.34	22	14.10	788	14.31	1,771
Subtotal Direct Cost + Design Contingency	**463.98**	**11,971**	**403.37**	**12,128**	**34.16**	**2,187**	**11.72**	**750**	**483.92**	**27,035**	**391.65**	**48,454**
General Conditions	51.04	1,317	44.37	1,334	3.77	241	1.30	83	53.25	2,975	43.87	5,428
Subguard	6.71	173	5.82	175	0.50	32	0.17	11	7.00	391	5.67	701
Bond	8.88	229	7.72	232	0.66	42	0.22	14	9.25	517	7.49	927
Contractor's Overhead & Profit or Fee	15.93	411	13.84	416	1.17	75	0.41	26	16.61	928	13.47	1,666
Total Construction Cost	**546.54**	**14,101**	**475.11**	**14,285**	**40.26**	**2,577**	**13.81**	**884**	**570.04**	**31,846**	**462.15**	**57,176**

6.0 CONCEPTUAL PROJECT & SITE DESIGN DRAWINGS

6.1 SITE ANALYSIS

LOCATION

The site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad (see Section 3.4). It currently has ~142,000 GSF of original structures from the Camarillo State Hospital that are not in use. The vision plan identifies which structures are to remain and to be demolished to allow for new structures, which is studied in this report. The proposed site plays a central role in development of a new campus precinct and energizing the north end of campus as well as defining the arrival point for those entering the campus from the north. The vision plan establishes this as a new symbolic point of arrival and public identity for the campus, with the aggregation of buildings in Gateway Hall playing a significant role in this regard, as a "front door". Furthermore, the addition of new instructional facilities at the north edge of the north quad will reinforce the educational nature of the quad and foster more student life and activity in the north end of the campus.

Defining the limits of the site is a key initial step prior to the start of the schematic design phase. The Gateway Hall site parcel is at the north end of campus, from Santa Barbara Avenue into the North Quad, and the following site analysis diagram examine a variety of factors particular to the North Quad.

- » Axis
- » Space Edges
- » Program Nodes and Wings
- » Open Green Space
- » Public vs. Private
- » Program Category

SITE ANALYSIS – AXIS

SITE ANALYSIS – SPACE EDGE

SITE ANALYSIS – PROGRAM NODES AND WINGS

SITE ANALYSIS – OPEN GREEN SPACE

SITE ANALYSIS – PUBLIC VS PRIVATE

SITE ANALYSIS – PROGRAM CATEGORY

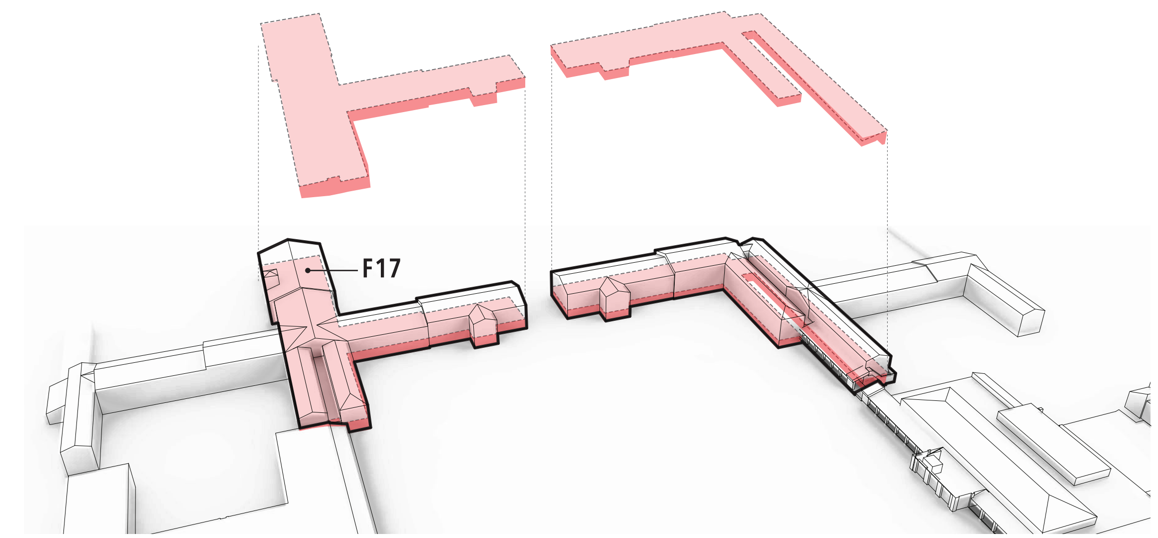
6.2A PHASE 1 OPTION 1

OPTION 1 - PREFERRED

The following option for Phase 1 massing and program distribution is the preferred option of the (2) demonstrated in this section. Option 1 utilizes a portion of the existing building F17. While this structure (F17) was shown to be demolished in the Vision Plan, this study proposes to keep this existing structure. By renovating this portion of existing building, Phase 1 can accommodate all of the faculty office program without deferring any into Phase 2.

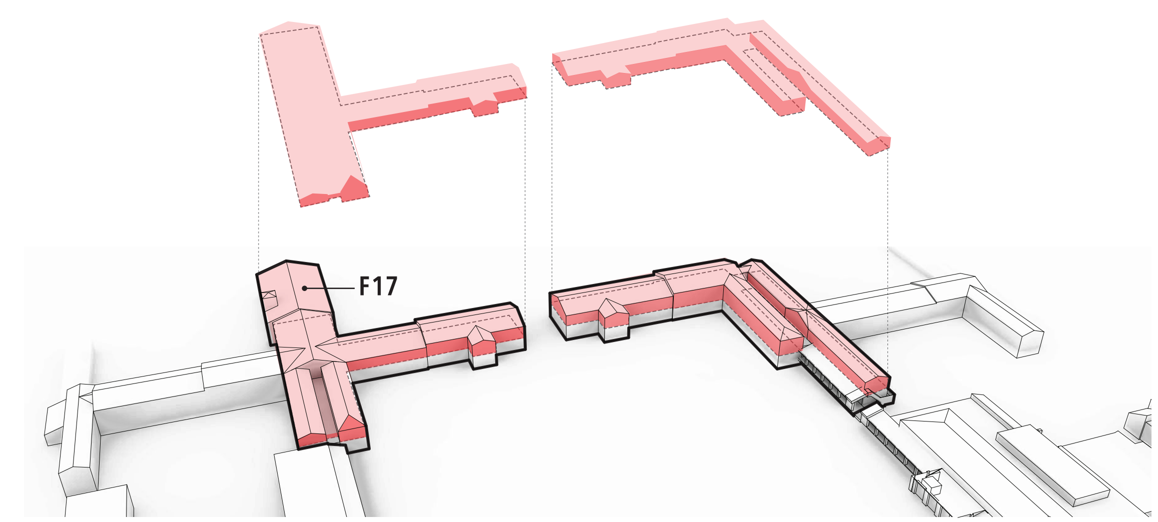
TOTAL CARRYING CAPACITY = 69,930 GSF

LEVEL 1
CARRYING CAPACITY = 34,965 GSF



VIEW LOOKING NORTH

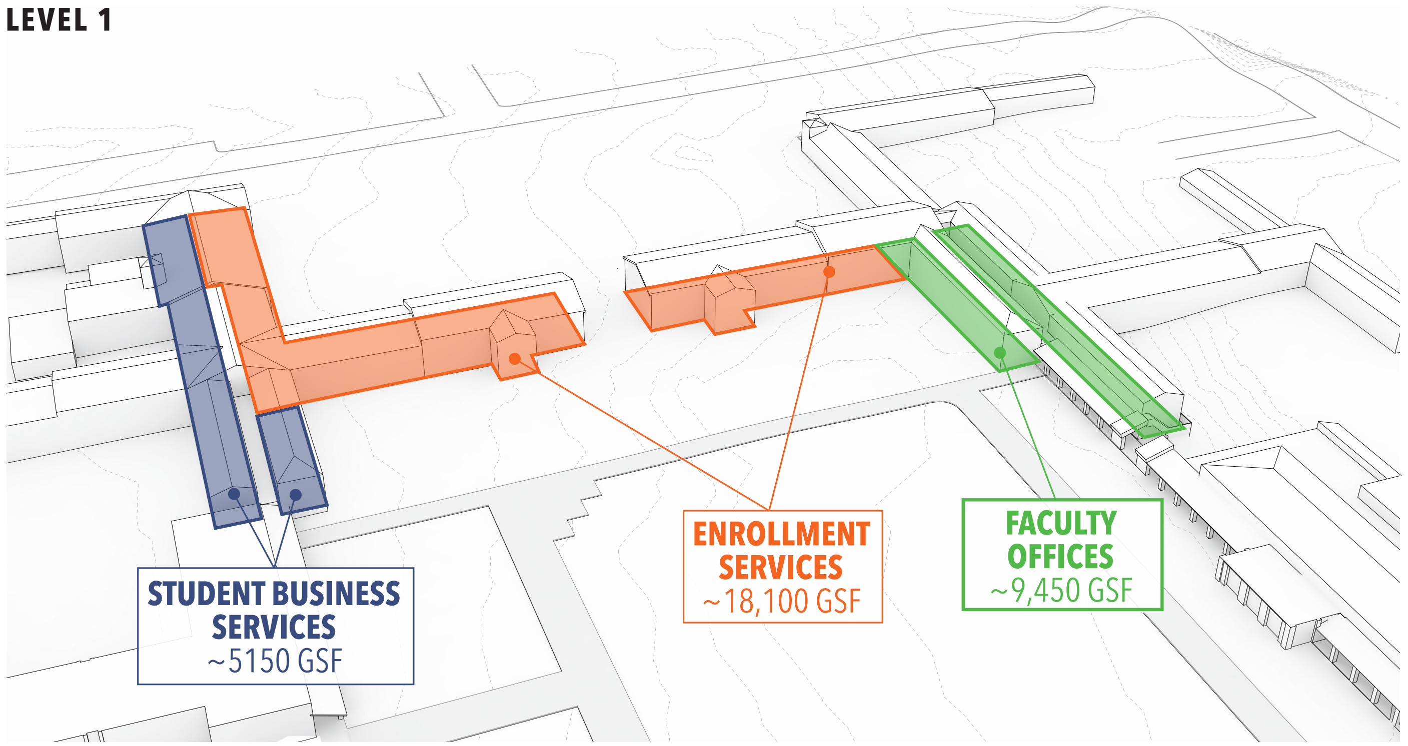
LEVEL 2
CARRYING CAPACITY = 34,965 GSF



VIEW LOOKING NORTH

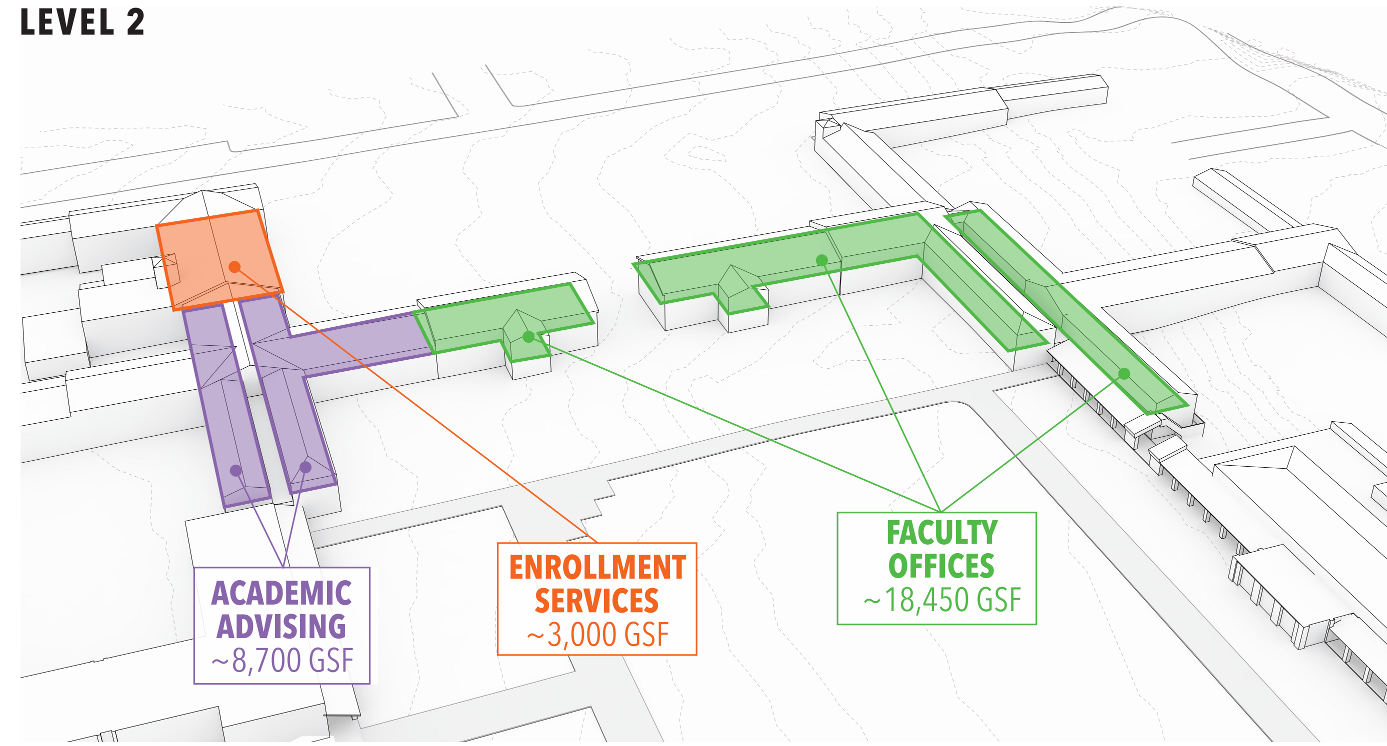
PHASE 1 OPTION 1

LEVEL 1



VIEW LOOKING NORTH

LEVEL 2



VIEW LOOKING NORTH

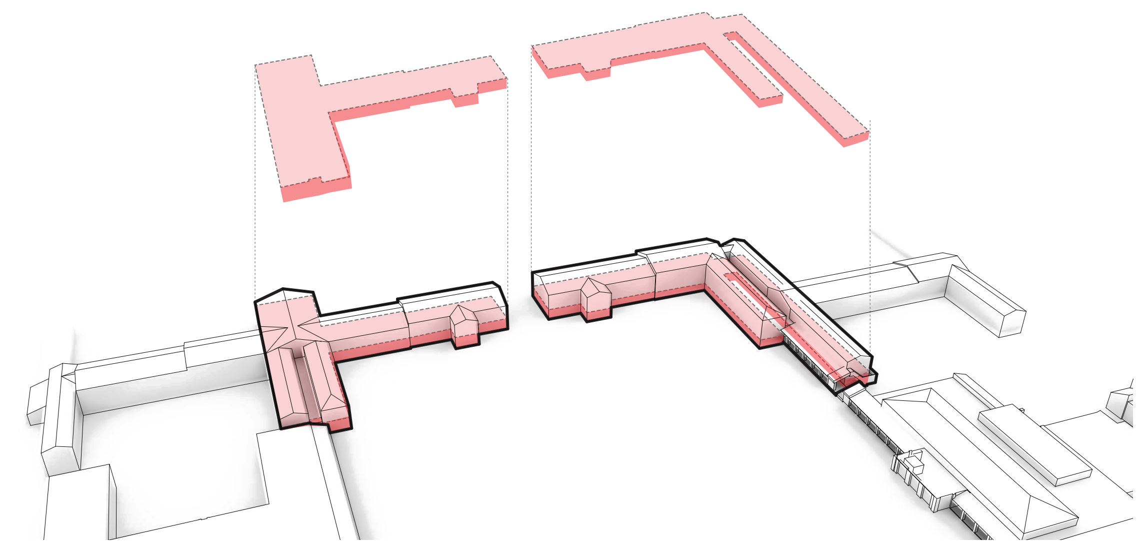
6.2B PHASE 1 OPTION 2

OPTION 2 - ALTERNATE

The following option for Phase 1 massing and program distribution is the alternate option of the (2) demonstrated in this section. Option 2 strictly follows the Vision Plan's model for which structures are to be renovated and demolished. By following these guidelines, the total area provided by the renovated structures is not enough to accommodate the entire faculty office program, therefore 1/3 of that program would have to be deferred until the Phase 2.

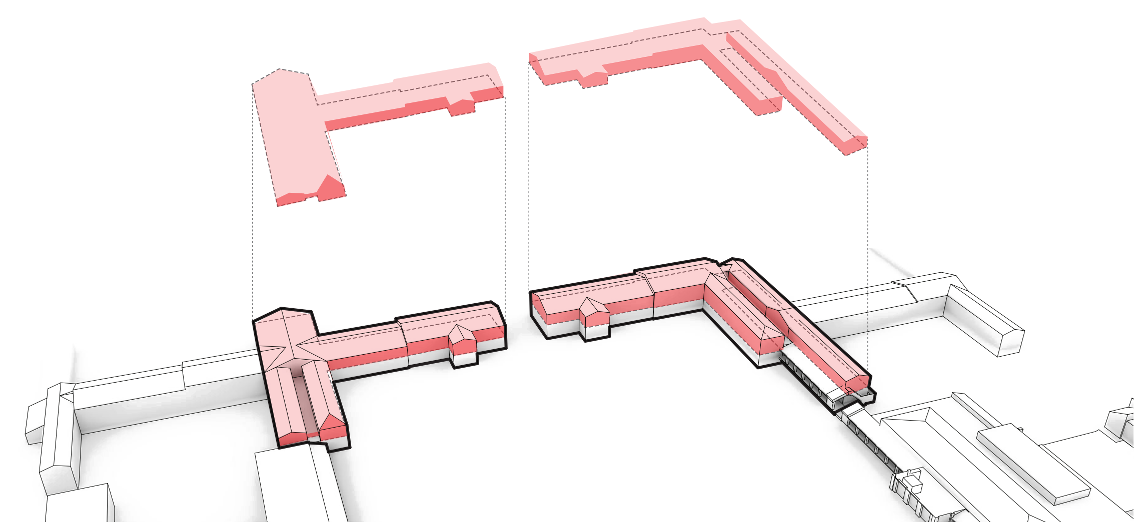
TOTAL CARRYING CAPACITY = 59,236 GSF

LEVEL 1
CARRYING CAPACITY = 29,618 GSF



VIEW LOOKING NORTH

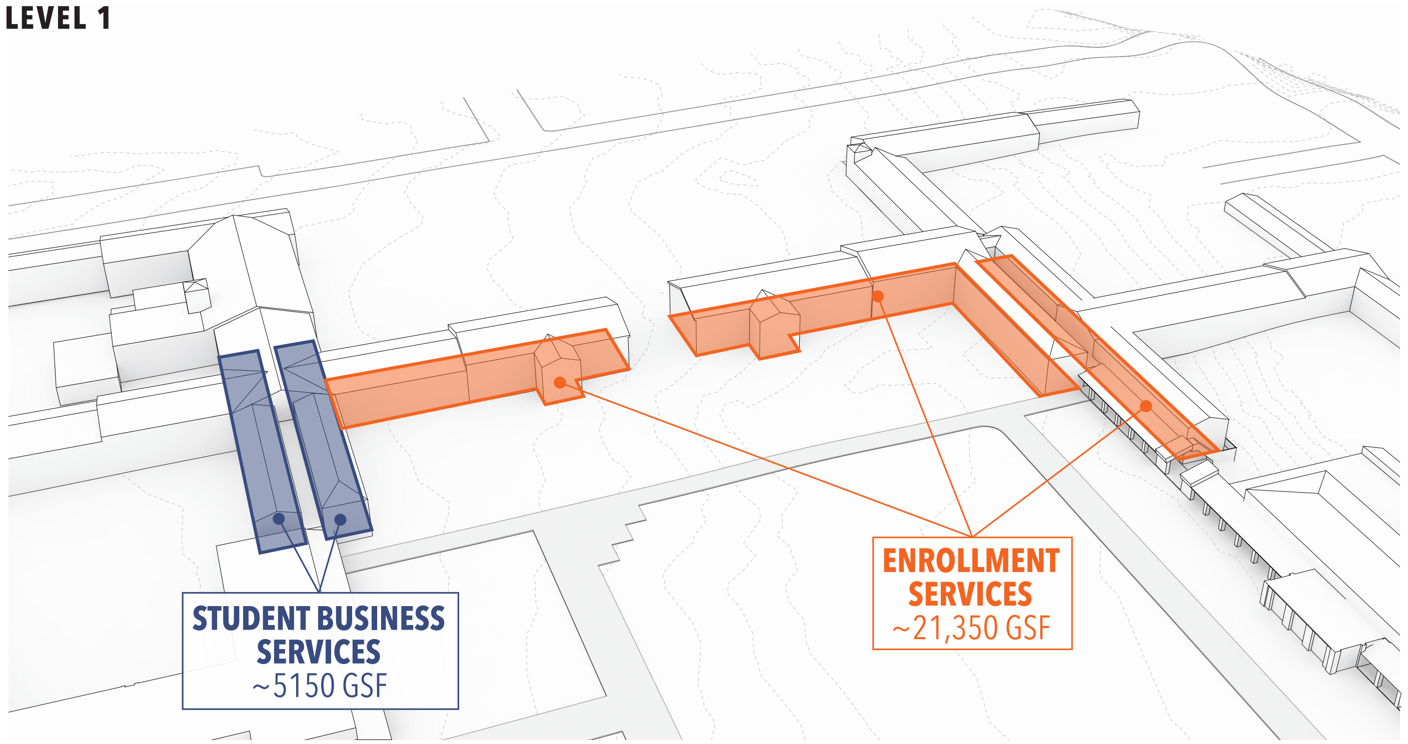
LEVEL 2
CARRYING CAPACITY = 29,618 GSF



VIEW LOOKING NORTH

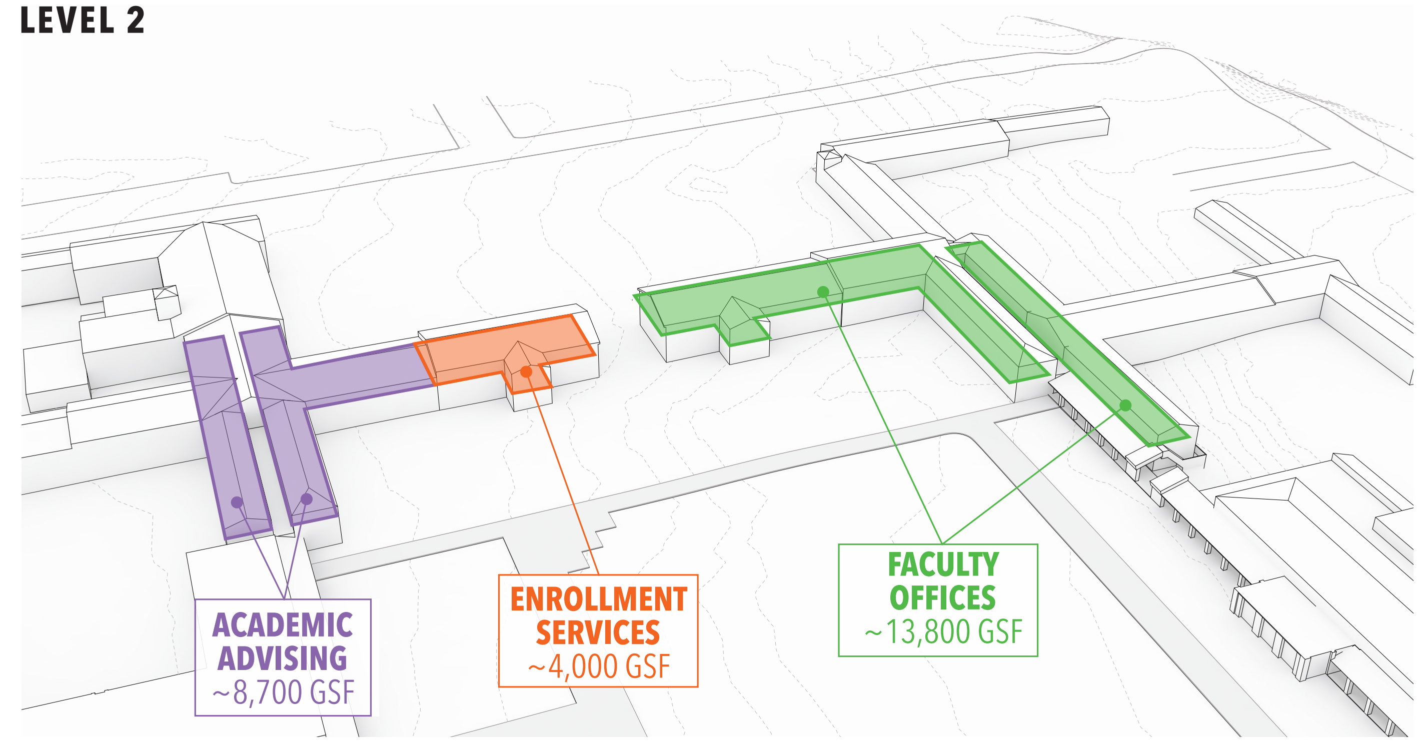
PHASE 1 OPTION 2

LEVEL 1



VIEW LOOKING NORTH

LEVEL 2

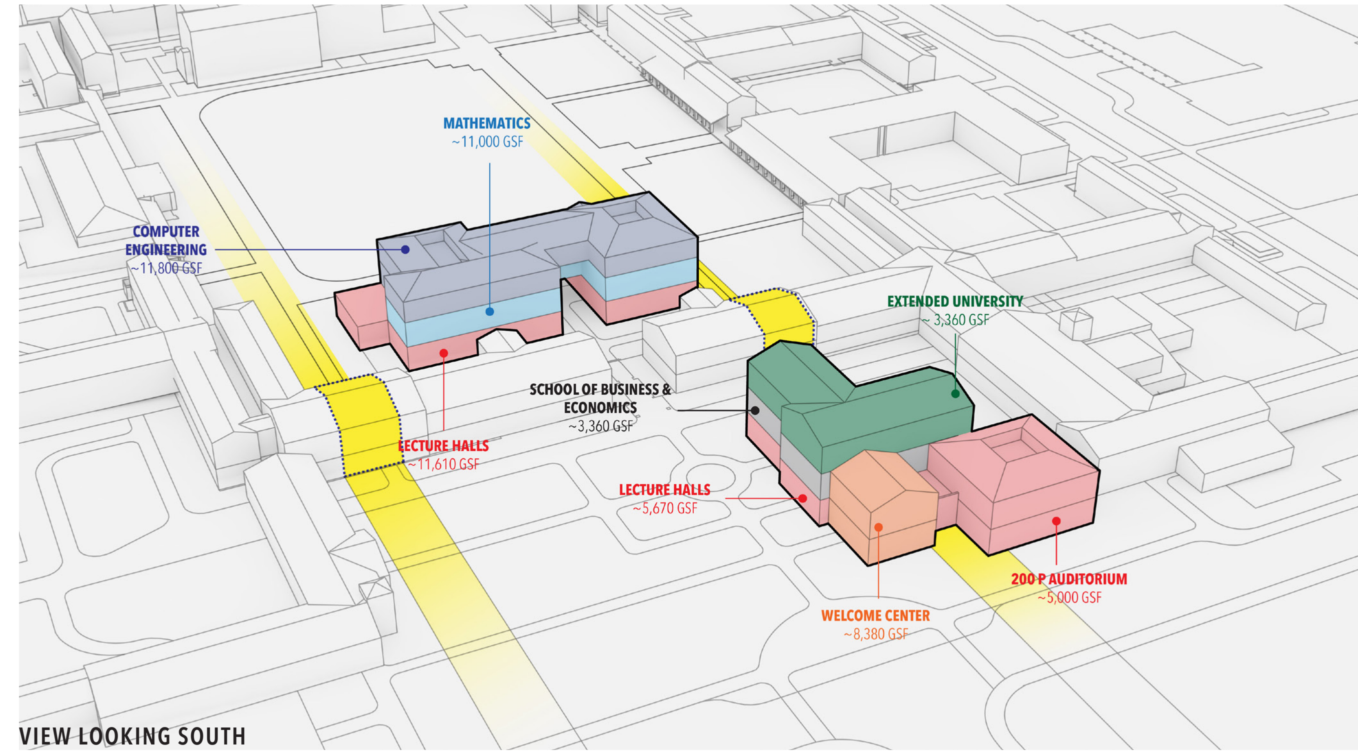


VIEW LOOKING NORTH

6.3A PHASE 2 OPTION 1

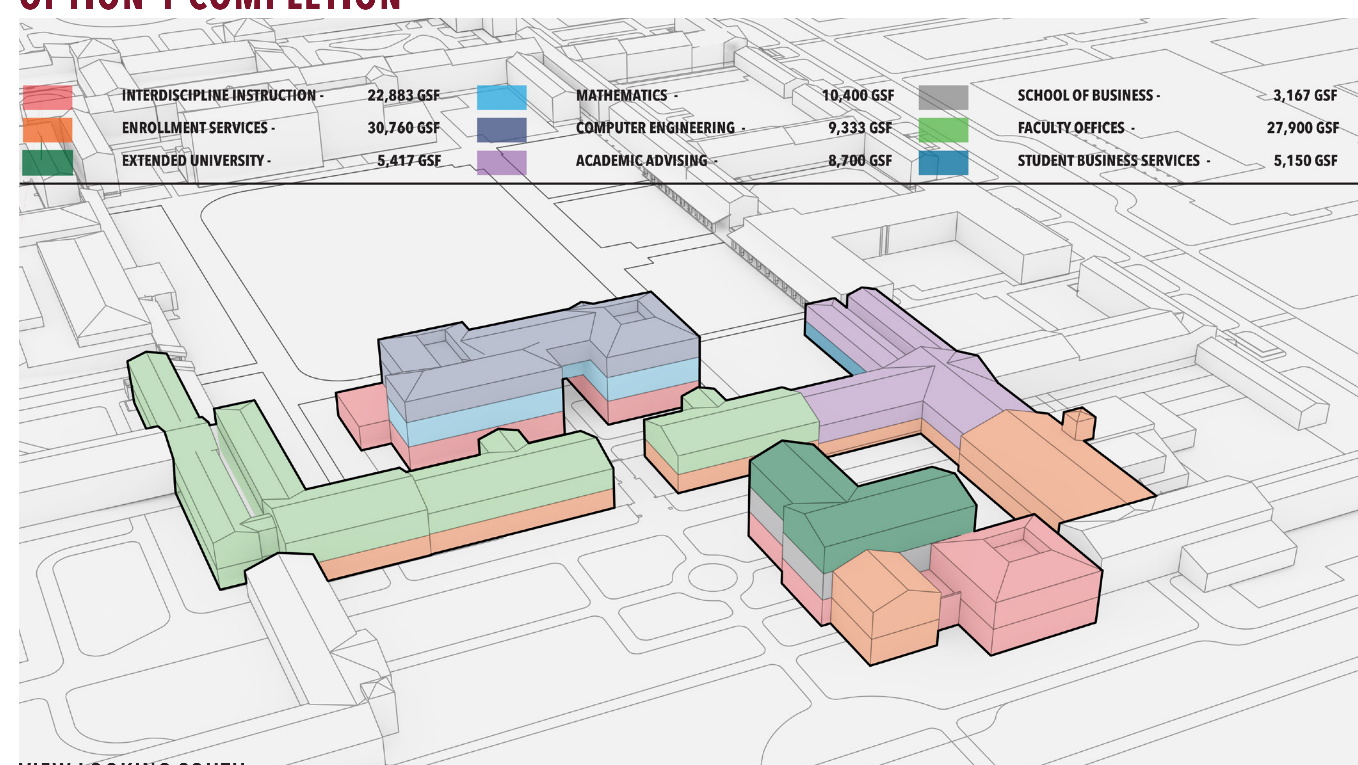
Both Phase 2 options assume that the preferred Phase 1 - Option 1 has been implemented. Option 1 combines the Welcome Center, Extended University, the School of Business and Economics, the auditorium, and approximately 1/3 of the lecture hall program onto quadrant 1 as shown on Diagram B in Section 3.4. By consolidating the program, quadrant 2 can be land banked for future projects. The instructional building within the North Quad is connected on the 2nd and 3rd levels so that the entire structure can be serviced by a single elevator core. Efforts were made to align to and/or provide courtyards aligned to the day room axis.

PHASE 2 OPTION 1 - PREFERRED



VIEW LOOKING SOUTH

OPTION 1 COMPLETION

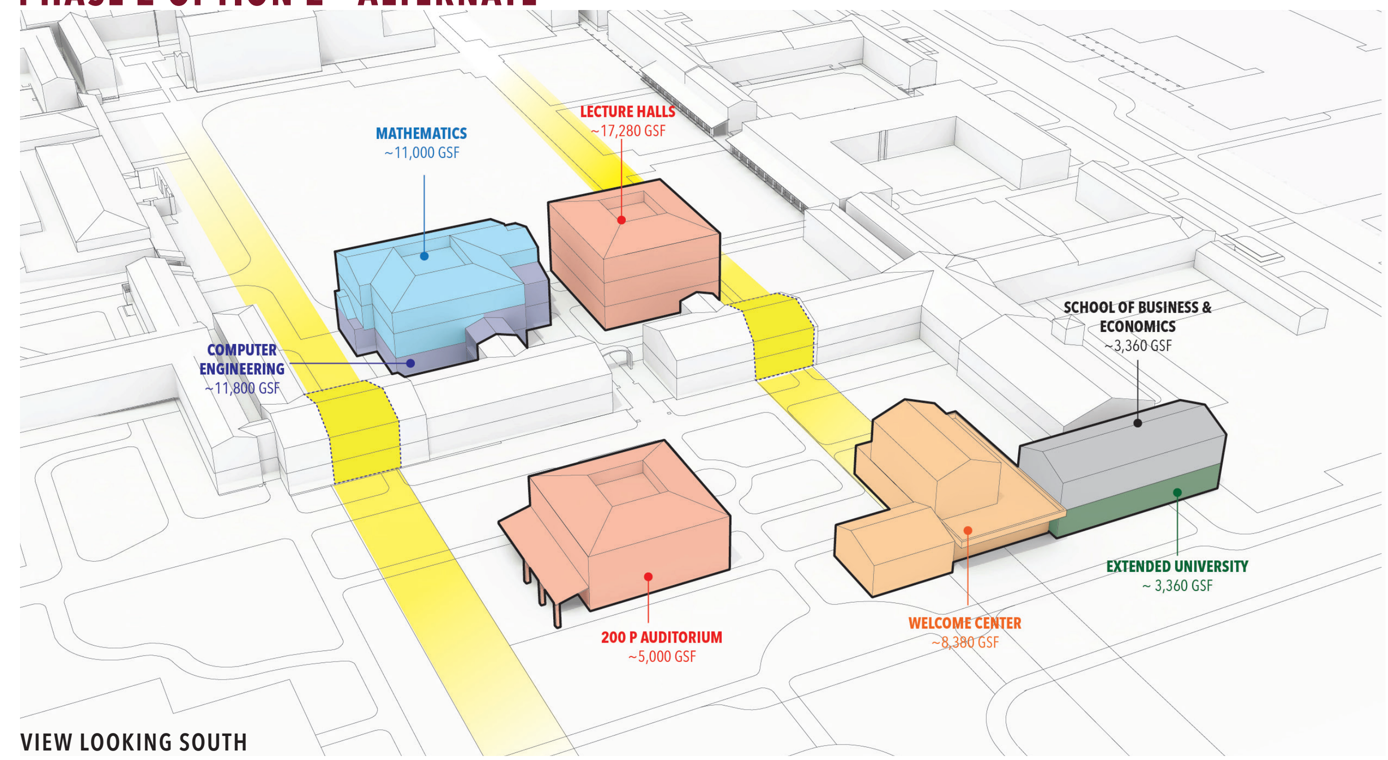


VIEW LOOKING SOUTH

6.3B PHASE 2 OPTION 2

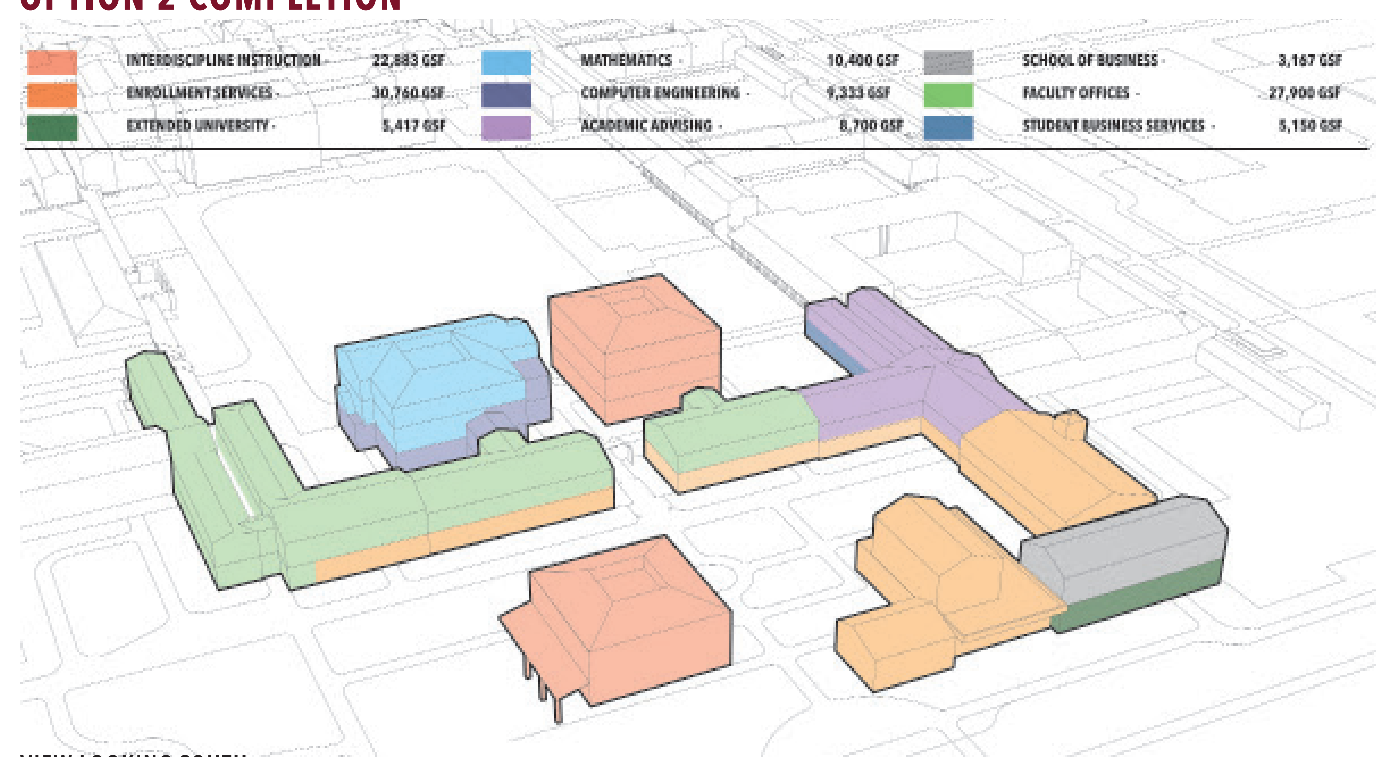
Both Phase 2 options assume that the preferred Phase 1 - Option 1 has been implemented. Option 2 distributes program across all three quadrants identified in Diagram B in Section 3.4; this creates larger courtyard spaces in quadrants 1 & 2, and potentially land banks a portion of quadrant 2 for future projects. Consequently, the massing along Santa Barbara Avenue is only 1 or 2 levels, providing a lower density. Quadrant 3 accommodates the entirety of the lecture hall program. Efforts were made to align to and/or provide courtyards aligned to the day room axis.

PHASE 2 OPTION 2 - ALTERNATE



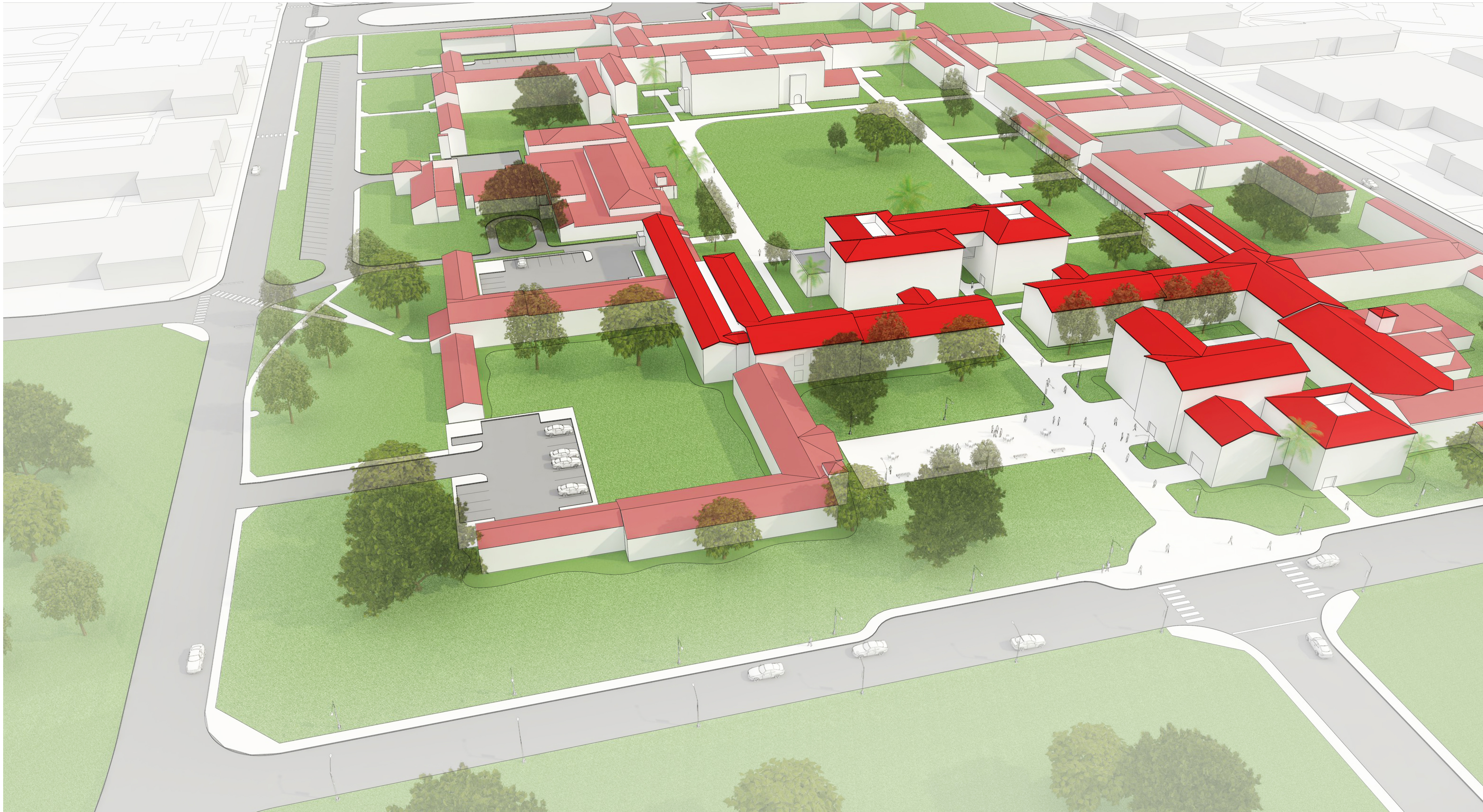
VIEW LOOKING SOUTH

OPTION 2 COMPLETION



VIEW LOOKING SOUTH

6.4 CONCEPTUAL RENDERING OF PREFERRED SCHEME - OPTION 1

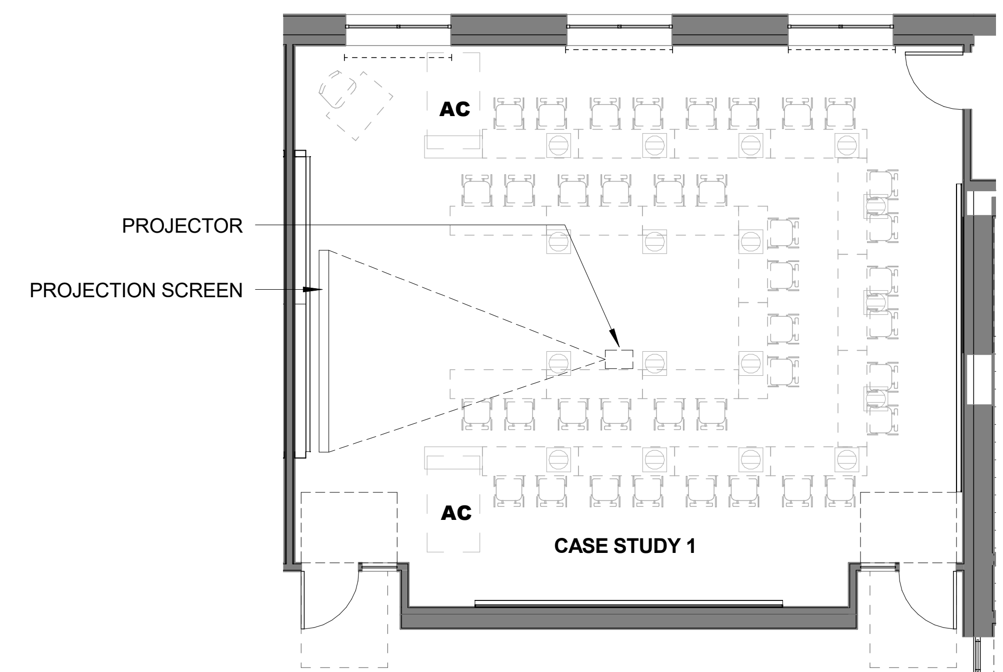


7.0 APPENDIX

7.1 DEPARTMENTAL DATA SHEETS

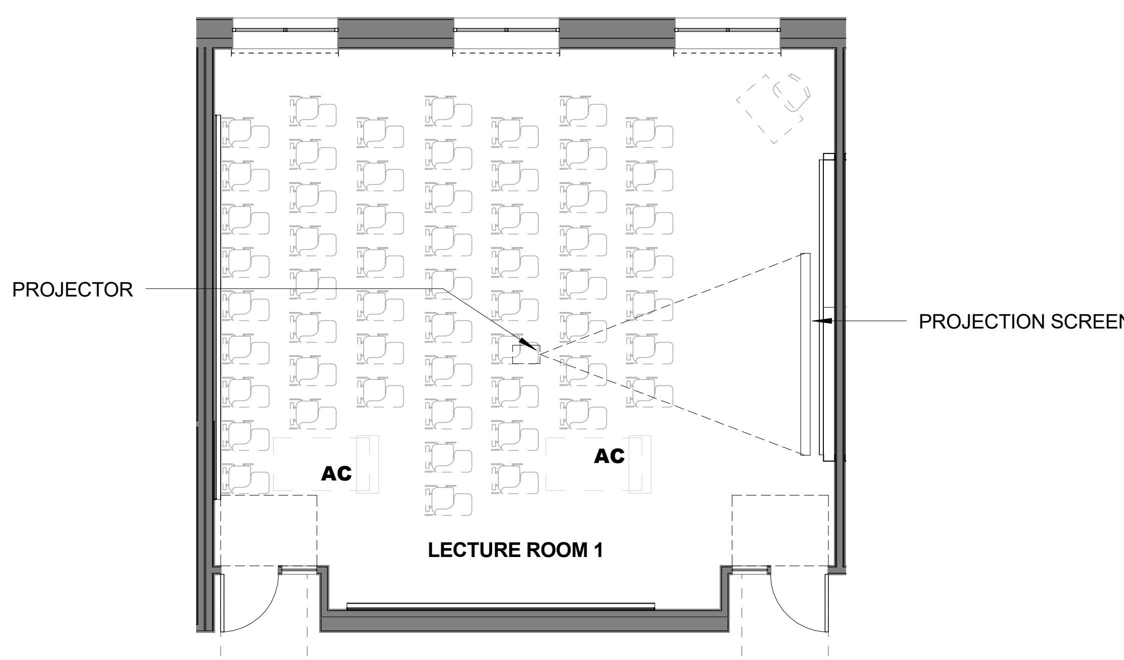
ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: 40 PPL CLASSROOM
STATION:



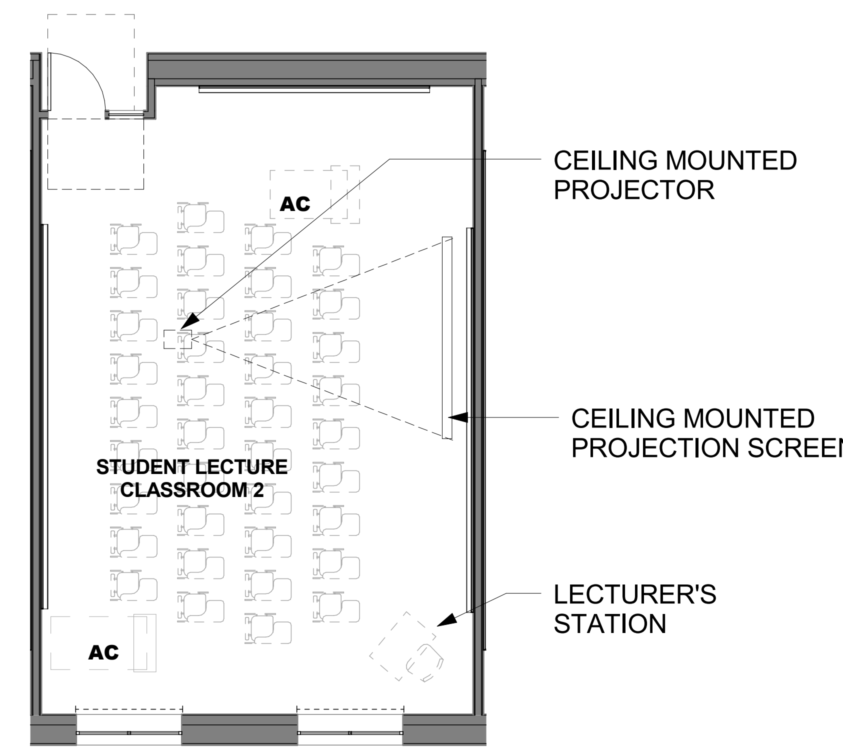
ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: 60 PPL LECTURE HALL
STATION:



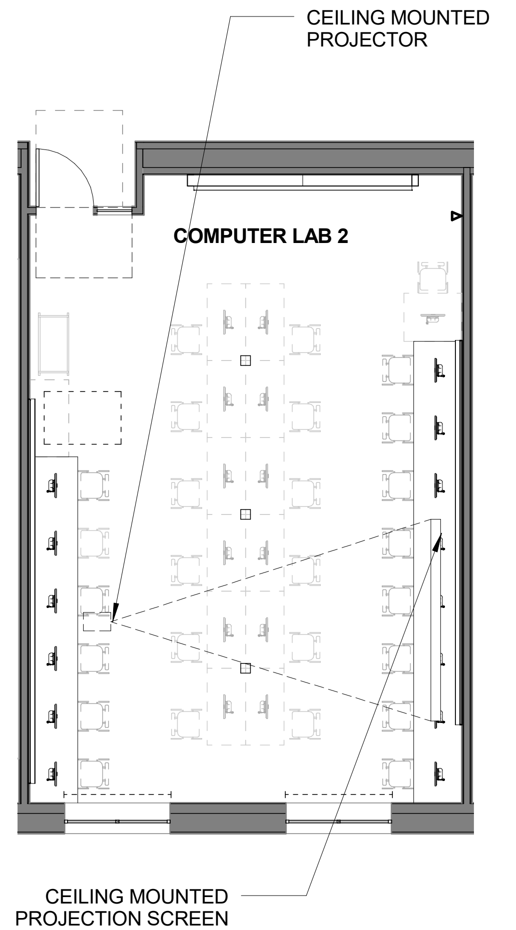
ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: 40 PPL CLASSROOM
STATION:

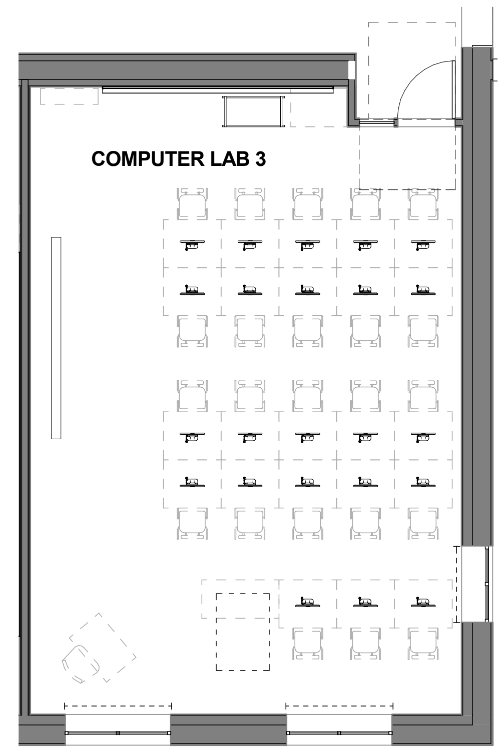


ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: COMPUTER LAB
STATION:



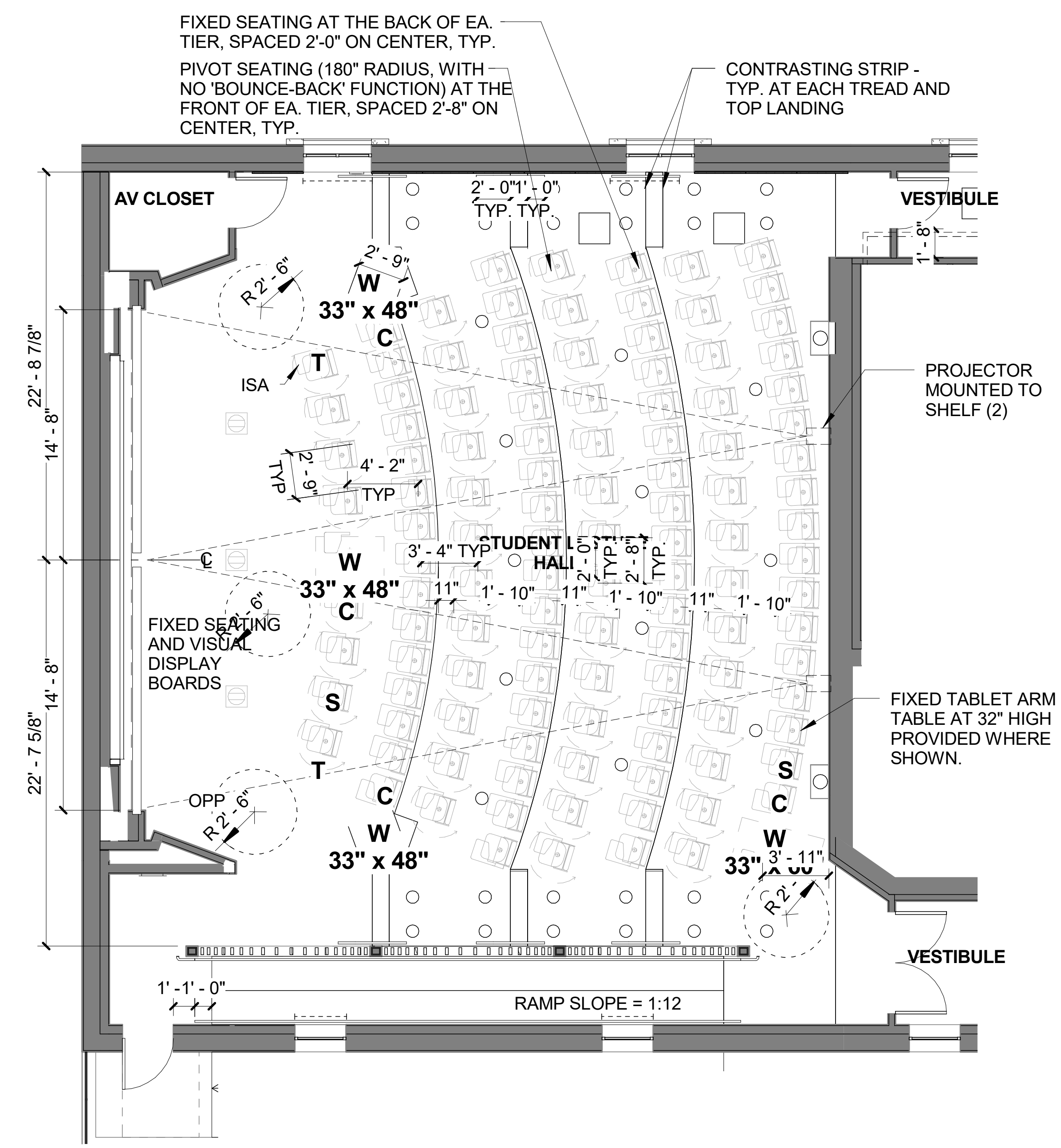
1 COMPUTER LAB - TYPE A
1/8" = 1'-0"



2 COMPUTER LAB TYPE B
1/8" = 1'-0"

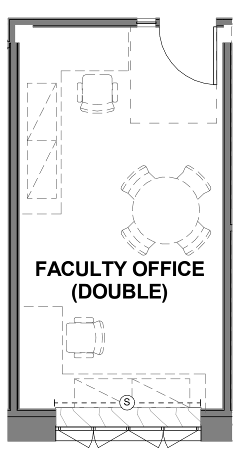
ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: 200 PPL LECTURE HALL
STATION:

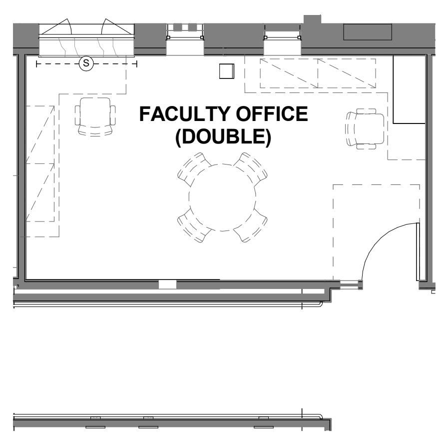


ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: FACULTY OFFICE (DOUBLE)
STATION:



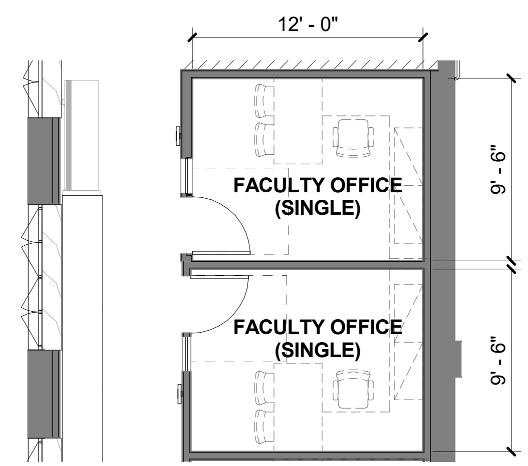
1 FACULTY OFFICE (DOUBLE) TYPE 1
1/8" = 1'-0"



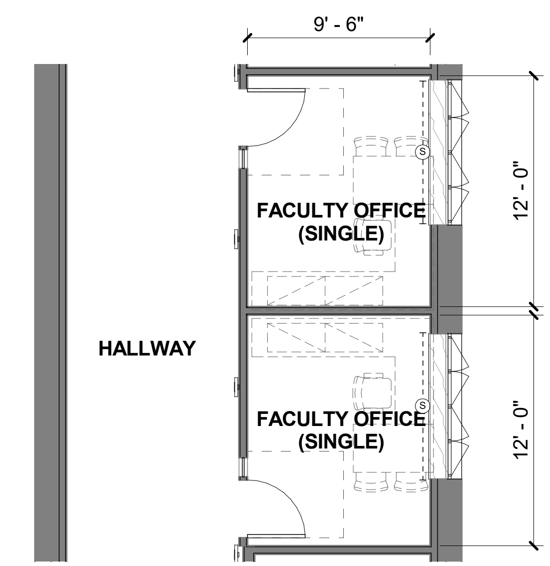
2 FACULTY OFFICE (DOUBLE) TYPE 2
1/8" = 1'-0"

ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: FACULTY OFFICE (SINGLE)
STATION:



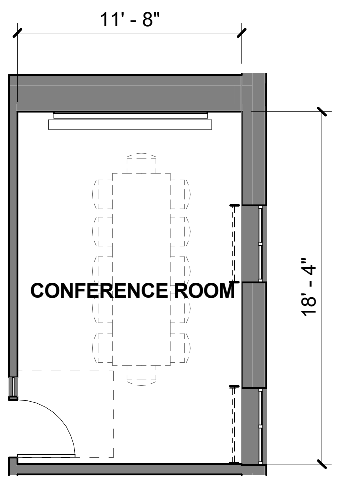
1 ROOM DATA_FACULTY OFFICE S1
1/8" = 1'-0"



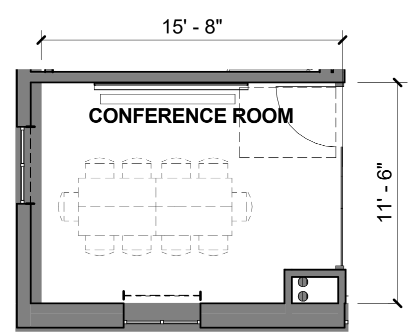
2 ROOM DATA_FACULTY OFFICE S2
1/8" = 1'-0"

ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: CONFERENCE ROOM
STATION:



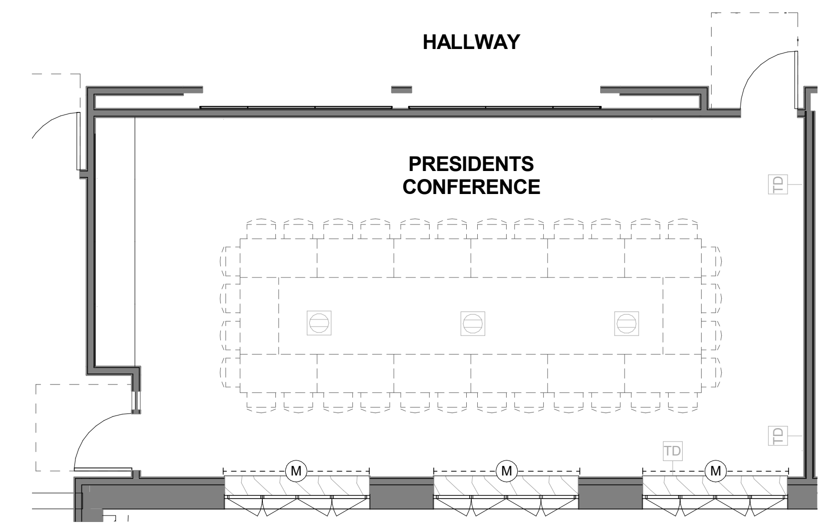
1 12 PPL CONFERENCE ROOM
1/8" = 1'-0"



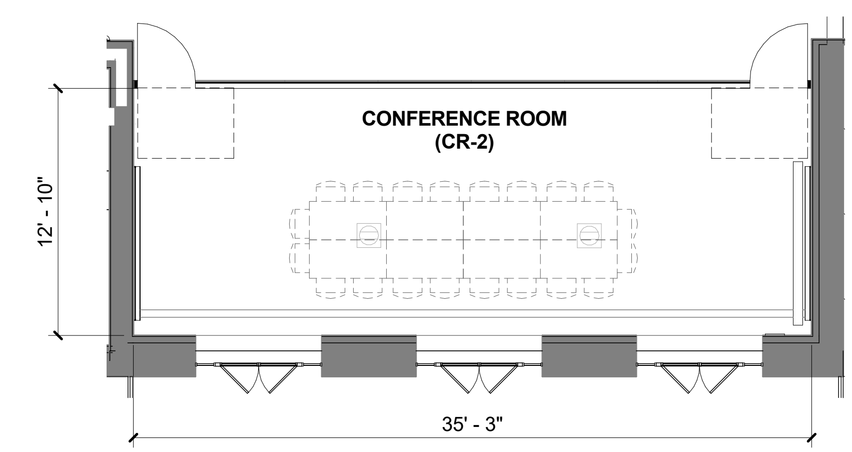
2 8PPL CONFERENCE ROOM
1/8" = 1'-0"

ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: CONFERENCE ROOM
STATION:



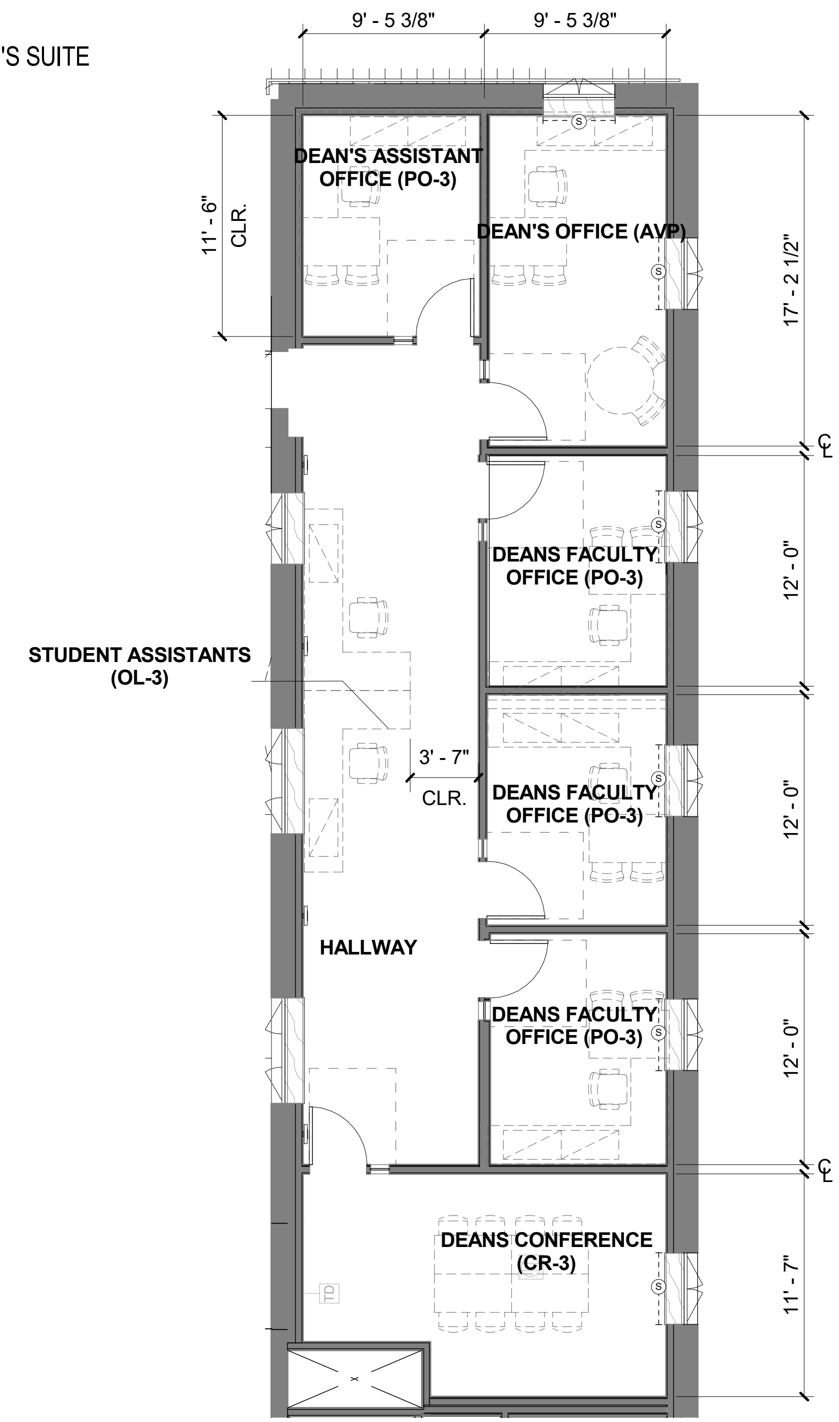
1 ROOM DATA_PRESIDENTS CONFERENCE
1/8" = 1'-0"



2 ROOM DATA_20 PPL CONFERENCE ROOM
1/8" = 1'-0"

ROOM DATA SHEET

DEPARTMENT:
SPACE NAME: DEAN'S SUITE
STATION:



1 ROOM DATA_DEAN SUITE
1/8" = 1'-0"

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