

University of California, Santa Cruz

PROJECT PLANNING GUIDE

ENGINEERING BUILDING

(971020)

September 27, 2000

**Engineering Building
Distribution List**

	<u>No. of Copies</u>
Director of State Capital Planning, L. Aull	16
Chancellor, M. R. C. Greenwood	1
Senior Planner, C. Aldecoa	1
Dean of Social Sciences Division, M. Chemers	1
Senior Accountant, J. Kling	1
Dean of the School of Engineering, P. Mantey	1
Associate Vice Chancellor--Planning and Budget, M. Michaels	1
Director of Capital Planning and Space Management, F. Owens	1
Campus Provost and Executive Vice Chancellor, J. Simpson	1
Vice Chancellor--Business and Administrative Services, T. Vani	1
Assistant Vice Chancellor--Physical Planning and Construction, F. Zwart	1
McHenry Library--Special Collections	2

APPROVAL OF PROJECT PLANNING GUIDE:

September 27, 2000
Date

Original signed by
M. R. C. Greenwood, Chancellor
University of California, Santa Cruz

**CAPITAL IMPROVEMENT BUDGET
ANALYTICAL DATA**

UNIVERSITY OF CALIFORNIA 1
Santa Cruz 2
Campus 3

Engineering Building	971020		CCCI: 4019
			EPI: 2564
Project Title	Campus Reference	Asset No.	Cost Indexes

F ANALYTICAL DATA					
A	Column (1)	(2)	(3)	(4) Total All Sources	
R	ASF per PPG	ASF	ASF	ASF	69,110 ASF
E	ASF Current	ASF	ASF	ASF	ASF
A	OGSF	OGSF	OGSF	OGSF	115,000 OGSF
S	Ratio (ASF per amend/OGSF) ••	to 1.00	to 1.00	to 1.00	0.60 to 1.00
U	Construction Cost per ASF	\$/ASF	\$/ASF	\$/ASF	\$ 443.06 /ASF
N	Construction Cost per OGSF	\$/OGSF	\$/OGSF	\$/OGSF	\$ 266.26 /OGSF
I	Total PWC Cost per ASF	\$/ASF	\$/ASF	\$/ASF	\$ 621.17 /ASF
T	Total PWC Cost per OGSF	\$/OGSF	\$/OGSF	\$/OGSF	\$ 373.30 /OGSF
s	Gr. 2&3 Equip Cost per ASF	\$/ASF	\$/ASF	\$/ASF	\$ 57.88 /ASF

G CONSTRUCTION COST ANALYSIS					
	Costs	Unit Costs		%	Remarks
		\$/ASF	\$/OGSF		
	•••Concrete & Structure	\$			
	•••Closing-in				
	•••Finishing				
	•••Group 1 Equipment				
	a. SUBTOTAL-Gen. Constr.	\$			
	b. HVAC				
	c. Plumbing				
	d. Electrical				
	e. Elevators				
	f. Other				<- Identify:
	TOTAL BUILDING COST ONLY	\$		100.0	
	g. Additional Bldg. Costs				<- Identify:
	TOTAL BUILDING ADDITIONAL COSTS	\$			
	h. Other Construction				<- Identify:
	i. Other Construction				<- Identify:
	TOTAL CONSTRUCTION COST	\$			<- Same as Schedule C, Item 1 (line 24), Page 1

H NOTES:				
C.8 Special Items				
Environmental Impact Report	\$	200,000		
Air quality analysis		32,000		
Agency reviews		27,000		
Communications & geology consultants		53,000		
Value Engineering (3 sessions)		210,000		
& constructibility review				
Independent seismic review		32,000		
	\$	554,000		
			Budget No.	1
			Issue Date	9/27/00
			Revised	
			Revised	
			Revised	
			Revised	

Engineering Building

Contents

	<u>Page</u>
Budget	
I. EXECUTIVE SUMMARY	1
II. STATEMENT OF NEED	3
A. Space Planning	3
B. Enrollment and Overall Campus Space Situation	3
C. Planning for Engineering Facilities	5
D. Description of Academic Programs	
School of Engineering Programs	6
Economics Program	9
III. PROBLEM ANALYSIS	11
A. Overview of Workload Data	11
B. Space Needs in the School of Engineering	13
Space Needed	13
Utilization--School of Engineering Class Laboratories	19
C. Space Needs in Economics	20
D. Space Needs in General Assignment Classrooms	21
E. Relationship to University Mission and Objectives	22
F. Alternatives	22
IV. PROJECT DESCRIPTION	23
A. Beneficiaries of Secondary Effects	28
B. Cost Basis	28
Attachments:	
Project Schedule	
Environmental Impact Classification	
Site Map	
Appendix A Proposed Spaces in Engineering Building and Jack Baskin Engineering Building	

Engineering Building

Tables and Figures

	<u>Page</u>	
Table 1	Projected Budgeted FTE Enrollment Growth from 1999-00 through 2007-8	5
Table 2	Student FTE Instructional Workload 2007-8	11
Table 3	School of Engineering and Economics Department Workload 1999-00 through 2007-8	12
Table 4	Projected Growth in School of Engineering Academic Personnel 1999-2008	19
Table 5	Class Laboratory Utilization	20
Table 6	Campuswide Classroom Utilization in Fall 1999 and 2007	22
Table 7	Engineering Building and Baskin Engineering Building Summary of ASF by Space Type	24
Table 8	Engineering Building and Secondary Effects Summary of Changes in ASF	25
Table 9	Summary Distribution of Academic ASF by Category School of Engineering, Economics, and General Assignment Classrooms	26
Figure 1	UC Santa Cruz FTE Enrollment 1995-96 through 2010-11	4

I. EXECUTIVE SUMMARY

The Jack Baskin School of Engineering (Baskin School) at the Santa Cruz campus was established in 1998 with the mission of building programs to fill twenty-first century needs in computer engineering, electrical engineering, software engineering, biomolecular engineering, and engineering management.

In the late 1990s, California experienced a phenomenally successful economic recovery, and engineering disciplines have played an integral part. The demand for engineers has never been higher, and an ongoing shortage of engineers and computer scientists, expected to continue for some years, is an issue for every sector of the state and national economies. The Baskin School has been designed to help meet the current needs of our state's industries, and to anticipate the challenges of the future by training engineers in the new technologies of the twenty-first century. As the campus develops and builds the Baskin School, there is an opportunity to distinguish it from existing schools of engineering by focusing on areas of engineering central to California's economy. The Baskin School will focus on defining high-technology engineering training and will educate engineers in crucial high-technology fields, such as communications, networking, and electronics, upon which so many important engineering advances are based.

The Baskin School of Engineering is one of the fastest growing programs on the campus, projected to more than double in size by 2007-8. The existing space assigned to the Baskin School is inadequate for current needs and cannot accommodate the rapid growth expected in the next seven years. New space must be built to accommodate this need.

The *Engineering Building* project, a new 69,110 assignable square foot (asf) building, will provide data-intensive engineering laboratory and office space to support existing and developing teaching and research programs in the School of Engineering; general assignment classrooms to help meet general campus growth needs; and office and research space for the Economics Department. The design of the new Engineering Building as data-intensive research and office space will allow an economically efficient division of space within the School of Engineering. The existing Baskin Engineering Building was designed with a large complement of utility-intensive, wet-bench laboratories, and the building's infrastructure exists to accommodate the need for that type of space for at least the near term. However, the need for space to accommodate non-wet-laboratory-type, data-intensive engineering research can be most efficiently and economically met by building new, adaptable, flexible space, heavily wired for data communications.

Space in the new building not immediately required by engineering will be assigned to the Economics Department on a temporary basis, until engineering requires it to accommodate

program growth. Economics will eventually move into a social sciences building to be constructed in a future project.

The new Engineering Building will provide approximately 69,110 asf of flexible and interdisciplinary space for teaching, research, and office use, to be assigned as follows:

School of Engineering	48,270
Economics	14,840
General assignment classrooms	<u>6,000</u>
Total	69,110

The Baskin School will have a total of 115,245 asf in one existing and one new building when the project is completed.

When this project is completed, the total increase in School of Engineering, Economics Department, and general assignment classroom space, by category, will be:

Teaching space	13,923
Research/scholarly activity space	26,510
Office space	<u>15,551</u>
Total	55,984

Approximately 8,400 asf of Economics Department space located in College Nine will be released to the Education Department. Education will release some existing space in Crown and Merrill Colleges to other social sciences programs.

The *Engineering Building* project is based on the following main objectives:

- to plan for undergraduate and graduate growth for the School of Engineering, the Economics Department, and the general campus;
- to help solve existing space deficiencies for the School of Engineering, Social Sciences Division programs, and general assignment classrooms;
- to provide efficient use of existing laboratory space; and
- to help meet California’s need for well-trained engineers and computer scientists.

II. STATEMENT OF NEED

This section provides an overview of campus planning, enrollment and the overall space situation, and the academic programs proposed to occupy the new Engineering Building.

A. SPACE PLANNING

The Santa Cruz campus opened in the fall of 1965. The campus developed a plan in 1985, which established the goals, program directions, and priorities for both undergraduate and graduate programs that UC Santa Cruz would pursue over the subsequent twenty years, in order to fulfill its mission as a comprehensive university campus of national distinction. Several academic planning initiatives since then have developed aspects of the campus' academic plan.

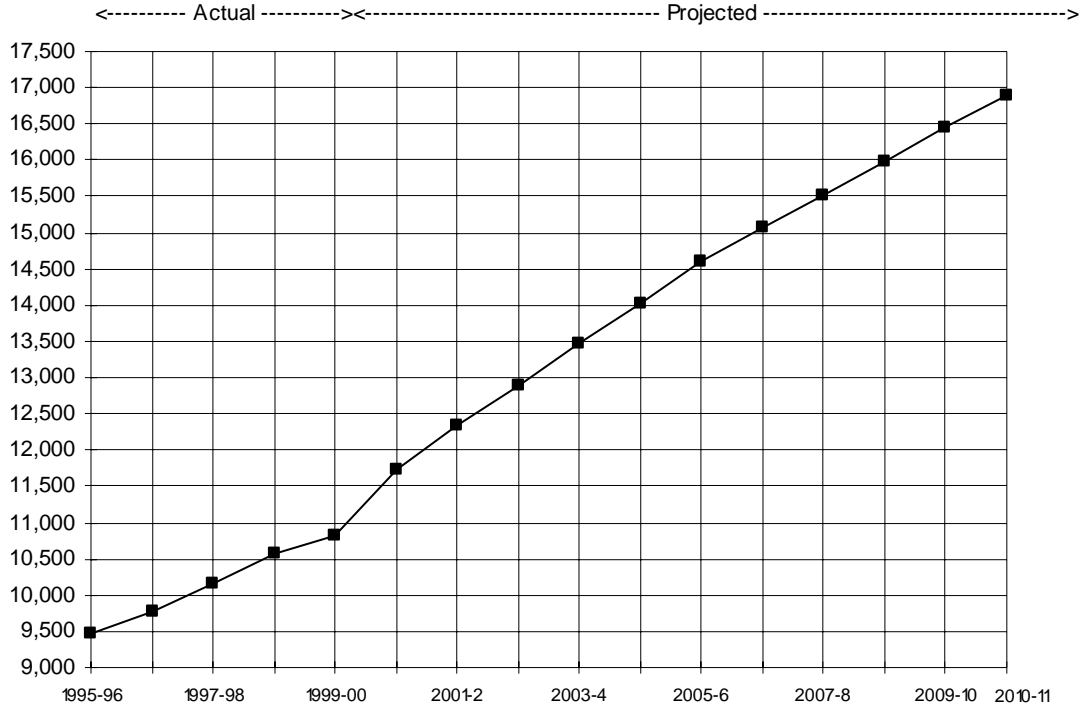
The campus completed the 1988 *Long Range Development Plan (LRDP)* in accordance with the 1985 planning. The *LRDP* is a planning study expressing a policy framework for physical planning and development of the Santa Cruz campus consistent with campus academic goals. The campus has developed an implementation program for the *LRDP* to provide general guidance for decisions that must be made in order to size, site, and design new facilities. The campus' on-going planning efforts respond to the continual refinement of its academic plans.

B. ENROLLMENT AND OVERALL CAMPUS SPACE SITUATION

Following a period of rapid enrollment growth from 1978-79 to 1981-82, the campus remained at a stable enrollment level of 6,720 headcount students from 1981-82 to 1983-84. Between 1983-84 and 1999-2000, however, enrollment increased 62%, to 10,830 three-quarter-average student FTE (see **Figure 1** on the next page). FTE enrollment is projected to grow from approximately 11,700 in 2000-1 to approximately 16,900 in 2010-11.

Figure 1

UC Santa Cruz FTE Enrollment
1995-96 through 2010-11



In 1983-84, before the increases in enrollment, campus space was already insufficient to meet campus needs. Enrollment growth since then has created a shortage of space in virtually all campus programs. Even though construction of new space between 1984 and the present has met some of the existing instruction and research needs, serious space deficiencies have continued to be chronic and unrelieved--campus space has never been able to “catch up” to enrollments.

Based on 1998-99 enrollment, the campus had 77% of the space allowed by California Postsecondary Education Commission (CPEC) space guidelines for instruction and research--approximately 156,000 asf less than the allowable amount by CPEC guidelines. By 2007-8, two years after occupancy of the Engineering Building, FTE enrollment will have increased by about 47%. According to the 2000-5 Space Analysis Tables, the campus then will have about 66% of the space allowed by CPEC guidelines, short by approximately 360,000 asf--even with the addition of the Engineering Building. This represents projected workload adjusted to reflect summer term and off-campus enrollments at 40% of three-quarter average enrollments, pending resolution of funding and implementation agreements.

Enrollment is projected to grow to 15,520 student FTE by 2007-8 as shown in **Table 1** on the following page.

Table 1

Projected Budgeted FTE Enrollment Growth from 1999-00 through 2007-8			
	Actual FTE 1999-00	Engineering Building occupancy 2005-6	2 years after occupancy 2007-8
Undergraduate	9,795	13,180	13,910
Graduate	1,035	1,420	1,610
Total	10,830	14,600	15,520

C. PLANNING FOR ENGINEERING FACILITIES

Campus space planning calls for growth in the School of Engineering to be accommodated by new buildings within the campus core. The campus' 1963 *Long Range Development Plan (LRDP)* designated a specific area near the center of the campus for engineering and natural sciences buildings. The campus' 1988 *LRDP* describes organizing principles whereby the campus core will continue to be the focus of centralized resources and research space on campus. Within the central campus area, the campus core comprises approximately 100 acres circumscribed by a loop road system.

Following these *LRDP* principles, five laboratory buildings have been completed for the engineering and natural sciences programs in the campus core since the campus opened: Thimann Laboratories in 1966; Natural Sciences 2 in 1969; Jack Baskin Engineering Building (formerly the Applied Sciences Building) in 1971; and Sinsheimer Laboratories in 1989; and the Earth and Marine Sciences Building in 1994. Engineering programs are currently housed in the Baskin Engineering Building. Two buildings now under construction, the Interdisciplinary Sciences Building and the Physical Sciences Building, will be completed in 2001 and 2002, respectively. Both will provide additional space for the natural sciences, and engineering will have some space in the Physical Sciences Building.

Engineering and economics both have serious space deficiencies, and engineering is now, and will be for some time, one of the fastest-growing programs on campus. Space is needed for both the short-term and long-term needs of engineering and economics. The planning for the project is based on optimizing the use of the existing Baskin Engineering Building for research requiring heavy-utility and wet-bench laboratory use, for which the building was designed and is well suited. There is sufficient capacity for at least the near term in Baskin Engineering Building to accommodate the need for heavy-utility and wet-bench laboratories. Engineering needs additional data-intensive engineering research space, which would be more efficiently provided in a separate building while continuing to assign heavy-utility, wet-bench type research to space in the existing Baskin Engineering Building.

D. DESCRIPTION OF ACADEMIC PROGRAMS

The following provides information concerning the School of Engineering and Economics Department academic programs that will occupy the new building.

SCHOOL OF ENGINEERING PROGRAMS

	Actual 1999-00	Projected 2005-6	Projected 2007-8
Faculty FTE	44	97	104
Graduate Students	148	294	425
Undergraduate FTE	587	1,171	1,267

Existing programs in the School of Engineering are: computer engineering, computer science, electrical engineering, applied mathematics and statistics, and information systems management (a joint program with the Economics Department). The School of Engineering will develop three new programs in a second phase over the next four years: software engineering, engineering management, and biomolecular engineering.

These existing and planned programs will form an interdisciplinary, high-profile school that will offer both academic and professional training. Because of the interactive nature of the programs and their shared characteristic of intensive computer use, much of the space needed to accommodate them should be adaptable. The adaptable nature of the space will allow the School of Engineering valuable flexibility in space assignments, and allow sharing of space between programs within the school.

A third phase of program development will round out the school's high-technology focus and will offer several opportunities for interdisciplinary programs and research collaborations. The third phase programs are mechanical engineering, applied mechanics, and manufacturing engineering.

Undergraduate and Graduate Programs

Existing Engineering Programs

Recent developments in computer technology are changing virtually every field of human endeavor. **Computer engineering** focuses on the design of hardware and software systems to support every sort of human activity, from business and industry to medicine, education, the arts, and everything in between. **Computer science** studies theoretical and practical aspects of computer technology and computer usage. The computer engineering and computer science programs at UCSC offer Bachelor of Science, Master of Science, and Doctor of Philosophy degrees. Computer Science also offers a Bachelor of Arts degree.

Electrical engineering at UCSC focuses on electronics. The program enrolled its first class of undergraduates for the Bachelor of Science degree in 1997; Master of Science

and Doctor of Philosophy degrees are initially being offered in conjunction with other existing graduate programs until a separate graduate program begins in 2001-02.

Applied mathematics and statistics focuses on fluid and nonlinear dynamics, the mathematical modeling of astrophysical, biological, and geophysical phenomena, and stochastic processes and their applications to life sciences and computer sciences. Applied mathematics and statistics will offer Master of Science and Doctor of Philosophy programs beginning in fall 2002.

Information systems management is the application of information technology to support the major functions and activities of businesses and institutions. The information systems management program offered its first undergraduate course in 1998. This program of study leads to a Bachelor of Science degree.

Planned Engineering Programs

Software engineering at UCSC focuses on the creation of complex software systems; this program will offer the Master of Science degree. **Engineering management** combines advanced studies in computer science, computer engineering, or electrical engineering with the development of management and leadership skills. Master of Science and Doctor of Philosophy degrees will be offered in this discipline.

Biomolecular engineering is interdisciplinary and includes the development and analysis of technologies that enable an in-depth analysis of the human genome. This program will offer Bachelor of Science, Master of Science, and Doctor of Philosophy degrees.

Mechanical engineering at UCSC will focus on electro-mechanics and design. **Applied mechanics** will emphasize engineering science and prepare students for engineering positions in industry, but is particularly attractive for students intending to obtain advanced degrees and engage in engineering research in industry or academia. The mechanical engineering and applied mechanics programs will offer both undergraduate and graduate degrees. **Manufacturing engineering** will focus on designing, enhancing, and improving manufacturing technology. Graduate degrees will be offered; the program is intended for persons with a Bachelor of Science in any field of engineering.

A degree from the UCSC School of Engineering confers on the graduate excellent employment prospects in a wide variety of fields, including electronics, computers, communications, biotechnology, aerospace, automotive design, environmental engineering, electrical engineering, ocean and atmospheric science, petroleum, robotics, manufacturing, government, and finance.

Individual Program Areas

Current research at UCSC within the **computer science** and **computer engineering** programs is grouped in the following areas:

- computer Very Large Scale Integration (VLSI) design and testing;
- computer graphics, image processing, and multimedia systems;

- computer systems, networks, applications, and performance; and
- computer science.

Some areas involve faculty and students from both departments. For example, both departments are involved in the Real-time Environmental Information Network and Analysis System (REINAS). REINAS is a complex system utilizing a distributed architecture to support a variety of user needs related to the collection, management, analysis, and display of environmental information. Strong collaborative research projects have developed with other institutions in conjunction with REINAS, including work with the Naval Postgraduate School, San Jose State University, and the Monterey Bay Aquarium Research Institute.

Computer science, with expertise in machine learning, and **computer engineering**, with expertise in computer architecture and VLSI design, are joining together for a program of research in biological computation for DNA string matching. This group works with campus biologists from the RNA center, and is developing learning algorithms and their hardware implementations.

Electrical engineering complements the offerings of computer engineering and computer science by providing a focus on electronics. General areas of emphasis are: analog electronics, communications engineering (including signal and image processing), and control and dynamic systems.

The initial scientific focus of the recently established **applied mathematics and statistics** program will be in dynamics and mechanics, including the numerical techniques used therein, and statistics and stochastic processes. **Information systems management**, a joint offering with the Economics Department, focuses on providing computer-based solutions for business problems.

A major area of emphasis in the **software engineering** program will be the software development process and the management of the process to make the creation of software a more quantitative and manageable engineering undertaking.

Management in the environment of rapidly changing technology presents challenges to enterprises and individual managers. The planned program in **engineering management** will impart technical depth in areas of engineering specialization, broad knowledge of business management, and leadership skills for technical and business challenges.

Biomolecular engineering is an interdisciplinary program between the School of Engineering and the Division of Natural Sciences and is intended to meet the challenges of the post-genomic era. The revolutionary technologies already being developed to gather and analyze genomic information will forge new understandings in biology with widespread applications in molecular medicine and agriculture, as well as genetic ecology and evolution.

Mechanical engineering will have strong ties to computer engineering and electrical engineering, and will be a key component of the planned program in biomolecular engineering (the development and use of “gene chips” depends on advances in electromechanical engineering and robotics). The program will also focus on areas of interest critical to Silicon Valley firms, including microelectronic devices and microfluidics used for controlling heat transfer in the chip manufacturing process. **Applied mechanics** will stress advanced work in fluid and solid mechanics with a particular emphasis on computational fluid dynamics and computer analysis of structures. **Manufacturing engineering** will focus on designing, enhancing, and improving manufacturing technology.

In addition to the departmental programs, an Internet and Data-intensive Systems Research Institute is being planned, which will advance research related to the Internet and computer systems, especially data-intensive systems.

ECONOMICS PROGRAM

	Actual 1999-00	Projected 2005-6	Projected 2007-8
Faculty FTE	22	31	32
Graduate Students	50	53	65
Undergraduate FTE	491	613	633

An understanding of economics is a vital component of a liberal arts education and a necessity for anyone interested in such areas as business, environmental policy, welfare reform, unemployment, international competitiveness and trade, or transformations in the global economy.

Undergraduate and Graduate Programs

The Economics Department offers three undergraduate majors: economics, global economics, and business management economics. A fourth major, information systems management, is offered jointly with the School of Engineering.

The economics undergraduate major provides a solid education in standard economics, with a number of optional areas of concentration available. In the mid-1990s, the department introduced a significant innovation through the addition of the global economics major. This program enhances the usual course of study in economics by imposing an additional set of integrated requirements for foreign language and culture, and foreign study. In addition, the department recently established a business management economics major in response to a high student demand for business classes.

Students entering UCSC as undergraduates may complete a combined Bachelor of Arts/Master of Science degree in applied economics and finance in five years. The Master of Science program is designed for students who wish to supplement their

undergraduate work in economics with analytical graduate training that prepares them for careers in business, government, international and domestic banking, consulting firms, and nonprofit organizations. The program is distinctive in its focus on graduate-level economics training for practical application and its emphasis on communication skills. It differs from typical Master of Business Administration programs by preparing students to meet the increasing technical demands of private and public sector employers through comprehensive course work in economic analysis. The Master of Science program in applied economics and finance includes possibilities for distance learning and for a part-time degree program in Silicon Valley.

The Doctor of Philosophy degree program in international economics was developed in response to a rising need for professional economists with the ability to analyze economic policy in an increasingly interdependent global economy and to acquire knowledge of specific economies and institutions. The program has three distinctive aspects: international perspectives are integrated into the entire curriculum; applications of contemporary economic analysis to policy issues in the international economy are stressed; and there is a foreign language requirement.

Individual Program Areas

Faculty research interests are varied, but they converge on international themes. Individual interests includes econometrics, international finance, emerging markets, international trade, corporate finance, economic development, the labor market, monetary policy, public policy, industrial organization, and electronic commerce. Many of these specialties, represented in the Santa Cruz Center for International Economics, are broadly defined to cover international finance, open economy macroeconomics, international trade, development (and linkages with environmental issues), and international political economy.

The department's strong focus on international research is exemplified by diverse research interests such as Japanese reciprocal alliances in industry, Japanese monetary and banking policies, East Asian capital mobility and exchange rates, the Mexican economy and American immigration policy, GATT rules, and economic reform in India. Almost all full faculty members have either primary or secondary research interests in international economics.

International research is facilitated by faculty member affiliations and visiting research appointments with the Federal Reserve Bank of San Francisco, the Federal Reserve Board of Governors, the World Bank, the International Monetary Fund, and the Inter-American Development Bank.

Public policy research includes work on the effects of immigration on U.S. labor markets, welfare reform, antitrust policy, military defense procurement, education policy, job displacement, and democratic institutions. Interests in electronic markets, laboratory experimentation, econometrics, economic history, and ethics also contribute to the breadth of department research activities.

III. PROBLEM ANALYSIS

This section provides information on overall campus growth and data on School of Engineering and Economics Department workloads; describes the space needs of academic programs that will be included in the project; and provides utilization data for general assignment classrooms and teaching laboratories.

A. OVERVIEW OF WORKLOAD DATA

The campus continues to grow and to try to keep up with space demands caused by this growth. **Table 2** below shows campus student FTE growth by division since 1980-81 and projected out to 2007-8, two years after the planned completion of the *Engineering Building* project.

Table 2

Student FTE Instructional Workload 2007-8				
	Actual 1980-81	Actual 1999-00	Projected 2005-6	Projected 2007-8
School of Engineering				
Undergraduates	-- *	587	1,171	1,267
Graduates	-- *	148	294	425
Total	0	735	1,465	1,692
Natural Sciences				
Undergraduates	1,890	2,496	3,197	3,353
Graduates	258	349	406	406
Total	2,148	2,845	3,603	3,759
Social Sciences				
Undergraduates	1,899	3,214	4,149	4,331
Graduates	88	327	519	548
Total	1,987	3,541	4,668	4,879
Humanities				
Undergraduates	1,237	2,324	2,818	3,049
Graduates	97	165	179	191
Total	1,334	2,489	2,997	3,240
Arts				
Undergraduates	733	1,460	1,845	1,910
Graduates	19	12	22	40
Total	752	1,472	1,867	1,950
Total Campus				
Undergraduates	5,759	10,081	13,180	13,910
Graduates	462	1,001	1,420	1,610
Total	6,221	11,082	14,600	15,520

*Prior to the start of the School of Engineering in 1997-98, its programs were in the Natural Sciences.

Table 3 below shows the School of Engineering and Economics Department programs with their associated student workload and academic staff in 1999-00, and as projected to 2007-8.

Table 3

School of Engineering and Economics Department Workload 1999-00 to 2007-8					
		Actual 1999-00	Projected 2005-6	Projected 2007-8	% Change from 1999-00
School of Engineering					
Ap Math & Statistics	UG SCH		1,200	1,380	
	Graduate students		20	39	
	Faculty FTE	2.00	8.00	10.00	400%
	TA FTE		2.01	2.28	
Biomolecular Engin	UG SCH		875	1,080	
	Graduate students		50	68	
	Faculty FTE		8.00	9.00	
	TA FTE		1.62	1.93	
Computer Engineer	UG SCH	3,069	4,400	4,570	49%
	Graduate students	84	92	92	10%
	Faculty FTE	14.74	20.50	21.00	43%
	TA FTE	5.93	7.94	8.20	38%
Computer Science	UG SCH	5,380	6,540	6,840	27%
	Graduate students	64	67	82	28%
	Faculty FTE	21.40	24.50	26.00	22%
	TA FTE	8.79	10.42	10.87	24%
Electrical Engineer	UG SCH	353	3,400	3,800	977%
	Graduate students		37	60	
	Faculty FTE	6.00	14.00	15.00	150%
	TA FTE	0.60	5.62	6.23	938%
Engineering Mgmt	UG SCH				
	Graduate students		8	24	
	Faculty FTE		4.00	4.00	
	TA FTE				
Info Systems Mgmt	UG SCH		800	920	
	Graduate students				
	Faculty FTE	0.32	4.00	4.00	1150%
	TA FTE	0.18	1.38	1.57	772%
Mechanical Engin	UG SCH		350	410	
	Graduate students			12	
	Faculty FTE		6.00	7.00	
	TA FTE		0.53	0.62	
Software Engineer	UG SCH				
	Graduate students		20	48	
	Faculty FTE		8.00	8.00	
	TA FTE				
School of Engin Totals	UG SCH	8,802	17,565	19,000	116%
	Graduate students	148	294	425	187%
	Faculty FTE	44.46	97.00	104.00	134%
	TA FTE	15.50	29.52	31.70	105%
Economics Department	UG SCH	7,361	9,190	9,490	29%
	Graduate students	50	53	65	30%
	Faculty FTE	21.93	31.00	32.00	46%
	TA FTE	10.05	12.10	12.31	23%

B. SPACE NEEDS IN THE SCHOOL OF ENGINEERING

The School of Engineering is currently housed in 48,596 asf in the Baskin Engineering Building (formerly called Applied Sciences), which was constructed in 1971 to house engineering and related programs on the Santa Cruz campus. Changes in enrollment conditions throughout the 1970s caused the campus to postpone implementation of some engineering program elements, and space in the Baskin Engineering Building was temporarily used to meet other campus program deficiencies, particularly in the arts, earth sciences, ocean sciences, environmental studies, and environmental toxicology programs.

Suitable facilities have been constructed for most of these programs, which have moved out and released space in the Baskin Engineering Building to engineering. Science communication and environmental toxicology will release a total of 11,139 asf in Baskin to engineering after completion of the Interdisciplinary Sciences Building in 2002 and the Physical Sciences Building in 2003. In addition, 12,500 asf of space has been planned for engineering programs in the Physical Sciences Building.

However, the planned new and released space will not meet engineering's growth needs. With the development of existing and new programs as well as general campus enrollment growth, the School of Engineering is expected to more than double student FTE enrollments from 735 in 1999-00 to 1,692 by the year 2007-8 (130% increase).

The space needs of the School of Engineering programs are discussed below. Analysis of space needs is based on projected enrollment and faculty increases through 2007-8. The existing Baskin Engineering Building will be used primarily for laboratory functions requiring heavy-utility systems and wet benches, allowing the new building to be designed as data-intensive engineering research and office space.

Space Needed

Engineering's total space needs are:

- 17 teaching laboratories and associated support spaces;
- 104 research spaces to serve 104 faculty groups; and
- 227 office spaces to house 104 faculty members, 26 postdoctoral scholars, 31 teaching assistant FTEs, four visiting industry partners, 28 departmental and institute staff, 22 School of Engineering staff, and 12 computer infrastructure support staff.

Teaching and Teaching Support

The Baskin Engineering Building will house 17 teaching laboratories (eight class laboratories, four special class laboratories, and five open computer laboratories) required for existing and planned courses to support enrollments. Twelve of these teaching laboratories already exist (nine of the 12 were constructed for electrical engineering and computer engineering under the *Alterations to Applied Sciences, Phase 1* project completed

in 1999). The remaining five new teaching laboratories can be accommodated in the existing building; any renovations required will be done under a separate project.

New Teaching Laboratories

Biomolecular Engineering Class Laboratories (two new 20-station rooms in Baskin Engineering)

These two laboratories will be provided in the existing Baskin Engineering Building (any renovations required will be done under a separate project). The work in these laboratories will focus on introducing undergraduates to bio-analytical and sequencing instrumentation and will be used to demonstrate and explore topics in biomolecular engineering.

General Engineering Open Computer Laboratories (two new 40-station rooms in Baskin Engineering)

To relieve the existing shortage of available space in two open computer laboratories and to provide for projected growth in course offerings, two new laboratories in Baskin Engineering will be provided (any renovations required will be done under a separate project). These laboratories will be open 24 hours a day to all School of Engineering students, and will provide space for both scheduled laboratory hours and unscheduled hours required to complete course assignments.

Mechanical Engineering Class Laboratory (one new 20-station room in Baskin Engineering)

Existing space in Baskin Engineering will be used by mechanical engineering to teach topics such as statics, dynamics, mechanics and thermodynamics (any renovations required will be done under a separate project). Experiments may consist of heating/cooling physical devices, fabricating mechanical systems, or designing robotic systems and/or vehicles.

Existing Teaching Laboratories

Computer Engineering Digital Logic Class Laboratory (existing 28-station room in Baskin Engineering)

Introductory digital logic circuit design and development are explored in this laboratory as well as the configuration and use of field programmable gate arrays (FPGAs). These are fundamental topics that are required for introduction of more advanced topics in digital integrated circuits, microprocessors, and computational systems design.

Computer Engineering Senior Projects Class Laboratory (existing 10-station room in Baskin Engineering)

Students design and build their individual senior projects in this laboratory. Advanced logic design using field programmable gate arrays (FPGAs) is also explored in this laboratory as well.

Computer Engineering Networks Special Class Laboratory (existing 20-station room in Baskin Engineering)

In this laboratory, topics in computer network architecture and design are explored in hardware with switches and routers and in software using computer-aided engineering (CAE) software packages.

Computer Science Scientific Visualization Open Computer Laboratory (existing 10-station room in Baskin Engineering)

Topics in computer graphics and the methods to effectively display scientific data are explored in this laboratory using Sun Microsystems and Silicon Graphics computers.

Electrical Engineering Controls, Instrumentation, and Communications Class Laboratory (existing 16-station room in Baskin Engineering)

Digital electronic control systems, such as those used for aircraft autopilots and robotics, are explored in this laboratory using computers, digital to analog (D/A) converters, analog to digital (A/D) converters, and robotics. Control algorithm programs are written, compiled, assembled, and downloaded to embedded processors. Computer instrumentation and communication systems, such as AM/FM, pulse code modulation, and digital signal processing, are explored using electronic hardware.

Electrical Engineering Circuits and Electronics Class Laboratory (existing 24-station room in Baskin Engineering)

Basic electrical and electronic circuits are introduced in this laboratory. This is usually the first electrical or electronics laboratory that most undergraduate engineering students are exposed to. Basic circuit theory is explored with discrete analog parts such as resistors, capacitors, inductors, and transistors. Low-level integrated circuits such as operational amplifiers and discrete logic components (such as TTL NAND gates) are also introduced.

Electrical Engineering CAD/CAE Class Laboratory (existing 16-station room in Baskin Engineering)

Computer-aided design and computer-aided engineering are introduced and explored in this laboratory. Software will include AutoCAD, P-Spice, and possibly some electronic circuit design and layout programs such as OrCAD and Cadence. Use of advanced electronic design automation software for electronics communication systems, such as Agilent Advanced Design System (ADS), may also be explored.

Electrical Engineering Optics Special Class Laboratory (existing 10-station room in Baskin Engineering)

Properties and effects of optical devices for communications systems and computing are investigated in this laboratory using devices such as fiber optics, lasers, heliography, and lenses.

Electrical Engineering Electromagnetics and Radio Frequency Special Class Laboratory (existing 20-station room in Baskin Engineering)

An introduction to the principals of electromagnetics, electronic radiation, and radio frequency propagation is explored in this laboratory. Communication system electronics may also be explored in the laboratory, providing complementary functionality with the Instrumentation and Controls Laboratory.

Electrical Engineering Physical Electronics Special Class Laboratory (existing 10-station room in Baskin Engineering)

In this laboratory, properties of device electronics are explored. This includes building models of semiconductors used for transistors and making measurements of semiconductor materials under various environmental states, such as heated and super-cooled.

General Engineering Open Computer Laboratory (existing 44-station room in Baskin Engineering)

This laboratory, administered by Communications and Technology Services (CATS), is a campus open computing facility containing general-purpose software for Sun Microsystems workstations. The School of Engineering primarily uses the laboratory for courses in general purpose programming (C, C++) and compiler design.

General Engineering Open Computer Laboratory (existing 49-station room in Baskin Engineering)

This laboratory, administered by CATS, is a campus open computing facility containing general-purpose software for PC workstations. The School of Engineering primarily uses the laboratory for courses in general purpose programming (C, C++), Windows NT applications, and basic microcontroller interfacing using the workstation computers as host computers.

Teaching laboratory support spaces in Baskin Engineering will consist of space for the instructional laboratory support group (space for five staff, an equipment preparation area, and storage); part of the central computer room; and part of the space for the computer infrastructure support group, which supports the instruction and research needs of the School of Engineering.

Research and Research Support

Data-intensive research laboratories at approximately 495 asf each are needed to support 95 faculty groups. Twenty-six of these will be housed in the Baskin Engineering Building, leaving a need for 69 laboratories. Of the 26 in Baskin, six were constructed for electrical engineering with the *Applied Sciences Alterations, Phase 1* project, completed in 1999. Twenty additional spaces will be made available in Baskin Engineering (any renovations required will be done under in a separate project).

The 69 new data-intensive research laboratories that are needed will each contain computer workstations, equipment as needed for particular programs (such as spectrum analyzers and oscilloscopes), whiteboards, and a small conference table. These data-intensive laboratories will house faculty and research staff in areas such as software engineering, storage systems, databases, scientific visualization, and computer systems engineering. Each of these disciplines relies on high-speed computing resources (servers) accessed through desktop workstations. These spaces will be used by an average of four graduate students plus faculty, undergraduates, postdoctoral scholars, researchers, and technicians.

Wet-bench research laboratory and support spaces are required for four electrical engineering and five biomolecular engineering faculty research groups. The laboratories require a range of equipment and services, such as fume hoods, wet bench areas, vibration isolation, filtered supply air, clean room requirements of class 100 to class 10,000, cooling water, multiple lighting zones (for the Optics/Holography laboratory), data, vacuum, compressed air, nitrogen gas, temperature controls, three-phase electrical power, door interlocks, etc. All of the wet laboratory spaces either already exist, or will be created in Baskin Engineering (any renovations required will be done under a separate project). The wet laboratory spaces include:

Biomolecular Experimentalist. Five biomolecular experimentalist faculty researchers will work closely with selected chemical and biology faculty groups to develop applications stemming from basic human genome research. These spaces will be made available in Baskin Engineering (any renovations required will be done under a separate project).

Optics/Holograph Lab. This existing electrical engineering laboratory in Baskin Engineering is used to conduct opto-electronic research involving the use of lasers and other optical measuring devices.

Molecular Beam Epitaxy Laboratory. This existing laboratory, which is currently undergoing renovation in Baskin Engineering to install a molecular beam epitaxy machine and two fume hoods, will be used by electrical engineering. Molecular beam epitaxy is used to grow thin films and artificial semiconductor materials for electronic and opto-electronic device applications.

Semiconductor Lab. Two faculty of the Electrical Engineering Department will operate this facility. In the semiconductor lab, electronic and opto-electronic devices (transistors, semiconductor lasers, etc.) and circuits will be fabricated using integrated circuit (IC) fabrication technology. Facilities such as photolithography, wet and dry etching, chemical deposition, electron beam evaporation, annealing and characterization will be needed. This facility will be accommodated in Baskin Engineering (any renovations required will be done under a separate project).

Anechoic Chamber. The anechoic chamber is a packaged unit that will be shared in the Electrical Engineering Department for signal processing research to test the electromagnetic compatibility of electronic devices as well as the measurement of

antenna test patterns in radio frequencies. This space will be made available in Baskin Engineering (any renovations required will be done under a separate project).

Scholarly activity space is required. Spaces required in the new building include: a large interactive area used for student and faculty presentations (called “posters”--in which students produce large posters and present their work to other students, faculty members, and visitors from government and industry); and six small (150 asf) conference rooms where four or five faculty members, staff, and students can meet to work on course work, problem solving, etc.

Spaces that already exist or will be made available in Baskin Engineering include workspace, library space, graduate student mailbox space, and scholarly activity space for students.

Two central computer rooms and an equipment preparation space for the computer infrastructure support group are also required to support instruction and research activities in the School of Engineering. The existing central computer room in Baskin Engineering, is devoted about 40% to teaching support and 60% to research support. An equipment preparation room is needed and will be provided in Baskin Engineering (any renovations required will be done under a separate project). A small central computer room will be required in the new building, and will be electronically linked to the central computer room in Baskin.

Academic and Administrative Offices

By 2007-08, engineering will need academic office space for a total of 160 faculty members, teaching assistants, postdoctoral scholars, and visiting industry partners (who teach on a temporary basis to provide a real-world perspective to the students, and who participate in research initiatives in cooperation with the faculty). Each of the 104 faculty members will require an office, except for the five department chairs who can use the department chair offices as their faculty offices. The 31 teaching assistant FTEs and 26 postdoctoral scholars also require office space. In addition, four offices are needed to serve as shared workspace for visiting industry partners so that they can be available to students and faculty when on campus. Space for 69 faculty offices is needed in the new building; all of the remaining academic offices will be housed in the existing Baskin Engineering Building.

Administrative office and support space is needed, including five department chair offices, space for 22 department and faculty services staff, and five departmental conference rooms. Almost all of the administrative office and support space either already exist or will be provided in Baskin Engineering (any renovations required will be done under a separate project); space for three departmental conference rooms and one faculty services staff member is needed in the new building.

The dean’s office of the School of Engineering and business and student affairs functions require space for the dean and 21 staff members. The planned Internet and Data-intensive Systems Research Institute requires space for the director and five staff. All of this space

either already exists or will be provided in Baskin Engineering (any renovations required will be done under a separate project).

Offices are also needed in Baskin Engineering for 12 technical staff associated with the computer infrastructure support group. These offices already exist or will be provided in Baskin Engineering (any renovations required will be done under a separate project).

Connection between Two Buildings

In order for the School of Engineering to function effectively as a whole, the new Engineering Building needs to be connected to the existing Baskin Engineering Building.

Table 4 below shows existing and projected growth in academic personnel in the School of Engineering programs.

Table 4

Projected Growth in School of Engineering Academic Personnel 1999-2008												
	Number of Faculty				Number of Graduate Students				Number of Postdocs			
	1999-00 Actual	2005-6	2007-8	Increase '99-2008	1999-00 Actual	2005-6	2007-8	Increase '99-2008	1999-00 Actual	2005-6	2007-8	Increase '99-2008
Ap Math & Stats	2.00	8.00	10.00	8.00		20	39	39		2	2	2
Biomolecular Eng		8.00	9.00	9.00		50	68	68		2	2	2
Computer Engin	14.74	20.50	21.00	6.26	84	92	92	8	1	6	7	6
Computer Science	21.40	24.50	26.00	4.60	64	67	82	18	7	7	7	0
Electrical Engineer	6.00	14.00	15.00	9.00		37	60	60		4	4	4
Engineering Mgmt		4.00	4.00	4.00		8	24	24		1	1	1
Info Sys Mgmt	0.32	4.00	4.00	3.68				0		1	1	1
Mech Engineer		6.00	7.00	7.00			12	12				0
Software Engineer		8.00	8.00	8.00		20	48	48		2	2	2
Schl of Eng totals	44.46	97.00	104.00	59.54	148	294	425	277	8	25	26	18

Utilization--School of Engineering Class Laboratories

For fall 1999, the utilization of total campus class laboratories was 78.6% of CPEC standards. See **Table 5** on the following page, which also shows a summary of the projected utilization in School of Engineering class laboratories by undergraduate students in 2007-8 (two years after occupancy). This represents projected workload adjusted to reflect summer term and off-campus enrollments at 40% of three-quarter average enrollments, pending resolution of funding and implementation agreements.

Table 5

Class Laboratory Utilization						
	# of TLs	# of Stns	Avg Sched Wkly Hrs/Stn	Avg % Stn Occup	Wkly Stn Util Hrs	% of Stnd Util (20 hrs/wk)
Actual fall 1999 utilization						
Total Campus	51	1,039	19.2	81.7%	15.7	78.6%
2007-8 projected Engineering 3-qtr-avg utilization						
Biomolecular Engineering	2	40	32.6	74.8%	24.4	122.0%
Computer Engineering	2	38	42.0	79.5%	33.4	167.0%
Electrical Engineering	3	56	41.8	80.4%	33.6	168.0%
Mechanical Engineering	1	20	36.2	77.9%	28.2	141.0%
School of Engineering	8	154	38.7	78.6%	30.4	152.0%

C. SPACE NEEDS IN ECONOMICS

Prior to construction of the College Nine Academic Building, the Economics Department occupied a little over 5,000 asf of space scattered between three locations (Crown College, Merrill College, and Kerr Hall). With the completion of the College Nine Academic Building in fall 1994, more adequate and consolidated space was provided for the Economics Department. However, Economics has since outgrown this space as student workload increased over 50% from 1994-95 to 1999-00. The 8,434 asf in College Nine that Economics currently occupies provides only about half of the space needed to meet current workload and projected growth.

Space Needed

Research and Research Support

Ten *graduate research offices* of approximately 495 asf each are needed in the new building to support 65 graduate students. The research offices will each contain computer workstations and possibly one small conference table. These spaces will each be used by an average of six to seven graduate students, but, depending upon the particular research project, undergraduates, postdoctoral scholars, and faculty members may also meet with the graduate students in these offices.

An *experimental research laboratory* with 12 stations is needed for experiments conducted by faculty members, graduate students, and undergraduate students. Over the last 10 years, all of the top journals in economics have published articles based primarily on laboratory experiments, because experiments help identify the most empirically useful theories. A typical experiment conducted in this laboratory might

be a simulated market with students acting as buyers and sellers. The laboratory data are then used to test various competing theories (e.g., of how prices form and whether they remain dispersed).

A small *census research laboratory* with two computer workstations and access limited to authorized researchers is needed for the housing and use of confidential government datasets. An increasing number of confidential datasets are becoming accessible to researchers; previously, many of these datasets were accessible only to researchers who could travel to Washington, DC.

A *journal research office* will house the editor of the *International Journal of Finance and Economics*. This research office contributes to the teaching mission by providing graduate students with the opportunity to serve as referees for journal submissions.

Scholarly activity spaces include a small graduate conference room and a departmental library/reading room. The departmental library/reading room will provide space to house and use the journals and working papers upon which economic research relies heavily, and will accommodate the graduate student mailboxes also.

Academic and Administrative Offices

By 2007-8, the Economics Department will require office space for 32 faculty members, 12 teaching assistant FTEs, two postdoctoral scholars, and nine departmental and faculty services staff members. Each of the 32 faculty members requires an office, except for the department chair, who will use the department chair office as his or her faculty office. One large conference room is also needed for departmental support.

D. SPACE NEEDS IN GENERAL ASSIGNMENT CLASSROOMS

The campus must continually add general assignment classroom space as the campus grows. In 2007-8 (two years after completion of the *Engineering Building* project), 1,103 additional stations will be needed based on CPEC 100% station utilization of 35 hours per week. The campus projects that by 2007-8 the greatest need for classrooms will be for those with less than 60 stations and more than 150 stations. This project will provide a total of 300 stations, with two 50-station classrooms and one 200-station classroom.

Table 6 on the following page shows fall 1999 classroom utilization and projected utilization in fall 2007 with and without this project. This represents projected workload adjusted to reflect summer term and off-campus enrollments at 40% of three-quarter average enrollments, pending resolution of funding and implementation agreements.

Table 6

Campuswide Classroom Utilization in Fall 1999 and 2007				
Room size category		Fall 1999	Fall 2007	
			Without this project	With this project
Below 60	Rooms	58	61	63
	Stations	1,623	1,754	1,854
	Average scheduled weekly hours/station	39.5	66.3	62.7
	Weekly station utilization hours	28.2	44.2	41.8
	Utilization as % Restudy (35 hrs/week)	80.6%	126.3%	119.4%
60-149	Rooms	13	15	15
	Stations	1,260	1,429	1,429
	Average scheduled weekly hours/station	41.1	48.3	48.3
	Weekly station utilization hours	26.3	32.2	32.2
	Utilization as % Restudy (35 hrs/week)	75.3%	92.0%	92.0%
150 & over	Rooms	7	7	8
	Stations	1,883	1,883	2,083
	Average scheduled weekly hours/station	42.2	56.4	51.0
	Weekly station utilization hours	26.6	37.6	34.0
	Utilization as % Restudy (35 hrs/week)	76.1%	107.4%	97.1%
Campus	Rooms	78	83	86
	Stations	4,766	5,066	5,366
	Average scheduled weekly hours/station	41.0	57.6	54.3
	Weekly station utilization hours	27.1	38.4	36.2
	Utilization as % Restudy (35 hrs/week)	77.4%	109.7%	103.4%

E. RELATIONSHIP TO UNIVERSITY MISSION AND OBJECTIVES

This project supports the instructional and research mission of the University of California by providing essential facilities for undergraduate and graduate education for the School of Engineering, the Department of Economics, and the Department of Education. The campus recognizes the important benefits these programs provide to the State's economy, and the *Engineering Building* project plays a major role in fulfilling the University's efforts to accommodate expanding enrollments. Without the *Engineering Building* project, the campus will be unable to meet enrollment demands in critical high-technology fields and in economics and education.

F. ALTERNATIVES

Given anticipated campus enrollment increases, and particularly engineering enrollments, there is no reasonable alternative to building a new engineering building.

An alternative of providing a smaller building, by eliminating temporary Economics Department space, was rejected because: 1) the Economics space will be needed by the School of Engineering to accommodate growth planned for them after 2007-8, and 2) the Economics and Education Departments have only about half the space they need now, and they are planned to grow rapidly. This project will provide some temporary relief and some expansion space to these two departments until future projects can be built.

IV. PROJECT DESCRIPTION

The School of Engineering is developing and growing at a very fast pace and needs teaching and research space that can serve its computer-based programs. The Economics Department also needs additional space, and additional general assignment classrooms are needed to accommodate general campus growth.

This project will address these needs by constructing a new building of 69,110 asf that would house School of Engineering programs (48,530 asf), the Economics Department (14,580 asf), and general assignment classrooms (6,000 asf).

The following spaces planned for the Engineering Building would meet these needs through 2007-8 (two years after occupancy). The School of Engineering will continue also to occupy the adjacent Baskin Engineering Building; a connection to the new building is desirable and will be included if possible.

School of Engineering

- Research and research support space for faculty, graduate students, postdoctoral scholars, visiting researchers, and support staff (37,055 asf)
- Academic and administrative offices and support space (11,215 asf) for 70 people (69 faculty members and one staff member)

Economics

- Research and research support space (6,535 asf)
- Academic and administrative offices and support space (8,305 asf) for 55 people (32 faculty members, two postdoctoral scholars, 12 teaching assistant FTEs, and nine staff members)
- Existing Economics Department space in College Nine (8,434 asf) would be released to the Education Department. Education will release some existing space (2,090 asf) in Crown and Merrill Colleges to other social sciences programs, while four existing substandard trailers will be demolished.

General Assignment Classrooms

- Classrooms totaling 300 stations (6,000 asf)

Eighteen trailers containing about 10,000 asf are located on the site of the new Engineering Building and will be demolished. The trailers are occupied by the Natural Sciences Division (6,305 asf), the School of Engineering facilities group and teaching assistants (1,038 asf), and the Institute of Marine Sciences (2,838 asf). The Natural Sciences Division occupants will move into approximately 5,000 asf released in the Baskin Engineering Building, and thereby consolidate with the rest of the Division, which already occupies 7,663 asf in the building. The School of Engineering facilities group and teaching assistants will move into the Baskin Engineering Building. The Institute of Marine Sciences occupants will move into the off-campus Ocean Health Building currently under construction.

Table 7 below shows a breakdown of space by space category in the new Engineering Building and the existing Baskin Engineering Building.

Table 7

Engineering Building and Baskin Engineering Building Summary of Asf by Space Type			
Space Category	Engineering Building asf	Baskin Engineering asf	Total asf
Teaching laboratories			
Class and special class laboratories	0	12,740	12,740
Open laboratories	0	6,560	6,560
Research/scholarly activity	43,590	24,080	67,670
Academic and administrative offices and support	19,520	18,400	37,920
General assignment classrooms	6,000	0	6,000
Total I&R asf	69,110	61,780	130,890
School of Engineering administration	0	5,195	5,195
Total asf	69,110	66,975	136,085

Table 8 on the following page is a summary of the planned distribution of released space created by the Engineering Building.

Table 8

Engineering Building and Secondary Effects Summary of Changes in Asf								
Programs	Before							Asf
	Eng Bldg Occup ¹	Engin Bldg	Baskin Engineer	Coll Nine	Crown Coll	Merrill Coll	Trailers ²	@ occup
Ap Math & Statistics		+5,010	+3,145					8,155
Biomolecular Engin		+2,520	+8,460					10,980
Computer Engineering	44,247	+9,420	-34,782					18,885
Computer Science	12,211	+11,410	-2,836					20,785
Electrical Engineering	7,717	+6,300	+3,358					17,375
Engineering Mgmt		+1,890	+760					2,650
General Engineering	2,860	+2,900	+11,890					17,650
Info Systems Mgmt		+1,890	+890					2,780
Mechanical Engineer		+3,150	+2,340					5,490
Software Engineering		+3,780	+1,520					5,300
School of Engineer Adm	5,546		+687				-1,038	5,195
Total School of Engin	72,581	48,270	-4,568	0	0	0	-1,038	115,245
Economics	8,434	+14,840		-8,434				14,840
Education	9,138			+8,434	-1,600	-490	-3,442	12,040
Politics/LS & LALS	3,411				+1,600	+490		5,501
Gen Assign Classrooms	78,543	+6,000						84,543
Inst Marine Sciences	69,297						-2,838	66,459
Nat Sci Division	18,333		+4,568				-6,305	16,596
Net Effect	259,737	69,110	0	0	0	0	-13,623	315,224
<p>1 Once funded projects are completed. Inventory includes non-standard asf. Based on 2001-6 Space Tables and fall 1999 inventory.</p> <p>2 Two temporary trailers located near Crown and Merrill Colleges will be removed from parking lots since the parking spaces are needed; two temporary trailers located in a remote area will be removed or used for campus storage; and eighteen trailers will be removed from the Engineering Building site and 4,568 asf of replacement space will be provided in the Baskin Engineering Building.</p>								

Table 9 provides an analysis of space by use (teaching, research, etc.) for the School of Engineering and Economics Department programs and for general assignment classrooms. The table indicates the types of space assigned to the School of Engineering and Economics Department once funded projects are completed, and compares this information to the types of space each discipline will have following completion of the *Engineering Building* project.

Table 9

Summary Distribution of Academic Asf by Category School of Engineering, Economics, and General Assignment Classrooms				
Department	Inventory once funded projects completed	At project completion		
		New Engineer Building	Exist Baskin Engineer Bld	Total asf
Space by category				
Applied Math & Statistics				
Research/scholarly activities		3,465	1,485	4,950
Offices		1,545	1,660	3,205
Applied Math & Statistics total	0		3,145	8,155
Biomolecular Engineering				
Class laboratories			1,600	1,600
Research/scholarly activities		1,980	4,200	6,180
Offices		540	2,660	3,200
Biomolecular Engineering total	0	2,520	8,460	10,980
Computer Engineering				
Class and special class laboratories	5,247		2,600	2,600
Research/scholarly activities	26,228	6,930	3,465	10,395
Offices	11,858	2,490	3,400	5,890
Computer Engineering total	43,333	9,420	9,465	18,885
Computer Science				
Research/scholarly activities	7,673	8,415	4,455	12,870
Offices	3,727	2,995	4,420	7,415
Standard I&R total	11,400	11,410	8,875	20,285
Open laboratories	811		500	500
Computer Science total	12,211	11,410	9,375	20,785
Electrical Engineering				
Class and special class laboratories	1,911		3,700	3,700
Research/scholarly activities	4,485	4,950	4,195	9,145
Offices	1,321	1,350	3,180	4,530
Electrical Engineering total	7,717	6,300	11,075	17,375
Engineering Management				
Research/scholarly activities		1,485	495	1,980
Offices		405	265	670
Engineering Mgmt total	0	1,890	760	2,650
General Engineering				
Teaching laboratory support			4,040	4,040
Research/scholarly activities		2,900	3,310	6,210
Offices			1,340	1,340
Standard I&R total	0	2,900	8,690	11,590
Open laboratories	2,860		6,060	6,060
General Engineering total	2,860	2,900	14,750	17,650
Information Systems Management				
Research/scholarly activities		1,485	495	1,980
Offices		405	395	800
Information Systems Mgmt total	0	1,890	890	2,780

Table 9

Summary Distribution of Academic Asf by Category School of Engineering, Economics, and General Assignment Classrooms				
Department Space by category	Inventory once funded projects completed	At project completion		
		New Engineer Building	Exist Baskin Engineer Bld	Total asf
Mechanical Engineering				
Class laboratories			800	800
Research/scholarly activities		2,475	990	3,465
Offices		675	550	1,225
Mechanical Engineering total	0	3,150	2,340	5,490
Software Engineering				
Research/scholarly activities		2,970	990	3,960
Offices		810	530	1,340
Software Engineering total	0	3,780	1,520	5,300
School of Engineering Administration				
Non-I&R offices	5,546		5,195	5,195
School of Engineering Admin total	5,546	0	5,195	5,195
School of Engineering				
Class and special class laboratories	7,158	0	12,740	12,740
Research/scholarly activities	38,386	37,055	24,080	61,135
Offices (I&R)	16,906	11,215	18,400	29,615
Standard I&R total	62,450	48,270	55,220	103,490
Open laboratories	3,671	0	6,560	6,560
I&R total	66,121	48,270	61,780	110,050
Non-I&R offices	5,546	0	5,195	5,195
School of Engineering total	71,667	48,270	66,975	115,245
Economics				
Research/scholarly activities	2,774	6,535		6,535
Offices	5,112	8,305		8,305
Standard I&R total	7,886	14,840	0	14,840
Open laboratories	548			0
Economics total	8,434	14,840	0	14,840
General Assignment Classrooms				
Classrooms (in Baskin Eng & other bldgs)	69,819	6,000		75,819
Self-instructional laboratories in other bldgs	8,724			8,724
General Assignment Classrms total	78,543	6,000	0	84,543
Total				
Class and special class laboratories	7,158	0	12,740	12,740
Research/scholarly activities	41,160	43,590	24,080	67,670
Offices	22,018	19,520	18,400	37,920
General assignment classrooms	78,543	6,000	0	6,000
Standard I&R total	148,879	69,110	55,220	124,330
Open laboratories	4,219	0	6,560	6,560
I&R total	153,098	69,110	61,780	130,890
Non-I&R offices	5,546	0	5,195	5,195
Total	158,644	69,110	66,975	136,085

Appendix A is a summary of the types of space (research laboratory, faculty office, etc.) under each category (teaching, research, etc.) that will be provided by this project.

A. BENEFICIARIES OF SECONDARY EFFECTS

The Economics and Education Departments are housed in approximately half of the space that they currently need. Until adequate space for these two departments is provided, the significant growth projected in these and other social sciences departments is threatened. Provision of temporary space for Economics in the new Engineering Building will allow Economics to release approximately 8,400 asf of space in College Nine for use by Education. Education can then release approximately 2,100 asf in Crown and Merrill Colleges for use by the Politics Department, legal studies, and Latin American/Latino Studies (LALS).

Education Department

About 55% of the 8,512 asf currently assigned to Education is in temporary trailers or in off-campus leased space: 2,186 asf in two trailers (each over ten years old and without restrooms) in a parking lot; 1,256 asf in two trailers (with no data lines, restrooms, or exterior safety lighting) at a remote location on a fire road; and 1,282 asf in off-campus leased space. The remainder of Education's space is scattered between Crown College (3,184 asf), Merrill College (490 asf), and Porter College (114 asf). Education is able to make only limited use of the space in the four trailers due to their lack of facilities, and the parking spaces taken by the two trailers in the parking lot are needed to meet campus parking needs.

Not only is Education short of space now, but student workload will increase by 103% from 302 student FTE in 1999-00 to 613 FTE in 2007-8 (two years after occupancy of the new Engineering Building). Academic offices and research space are needed. The 8,434 asf released in College Nine by economics will not meet all of education's space needs, but it will provide consolidated, better-functioning space, and will allow the removal of the four social sciences trailers. Education will then be able to release 490 asf at Merrill College and 1,600 asf at Crown College to Politics, legal studies, and LALS.

Adequate space for Education will be provided when a future planned building is completed.

Politics Department, Legal Studies, and Latin American/Latino Studies

The Politics Department, including legal studies, is currently short of space and is projected to grow by 44% from 309 student FTE in 1999-00 to 446 FTE in 2007-08. The program will admit its first graduate students in 2001. While LALS has sufficient space to meet current programs, student enrollment will grow by 88% from 112 FTE to 211 FTE by 2007-8. With a graduate program beginning in 2003, LALS will need additional space. Education will release 490 asf in Merrill College and approximately half of its space (1,600 asf) in Crown College for use by these programs.

B. COST BASIS

The campus has conducted cost analyses and has prepared a detailed cost estimate.

Campus or Field Station Santa Cruz

Project Account 971020

Project Title Engineering Building

For purposes of compliance with the California Environmental Quality Act of 1970 (CEQA), and Amended University of California Procedures for Implementation of CEQA, this project has been reviewed and intially classified as indicated below. Please check (X) as appropriate. Include project description and appropriate local map.

I. EXEMPT FROM THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

When it can be seen with certainty that there is no possibility the action will result in physical changes to the environment or the action is specifically exempted by statute, the project is classified as exempt from CEQA.

II. CATEGORICALLY EXEMPT

This project falls under the indicated Class of Exemption and there is no significant effect on the environment.

- Class 1: Existing Facilities
- Class 2: Replacement or Reconstruction
- Class 3: New Construction of Small Structures
- Class 4: Minor Alterations to Land
- Class 5: Alterations in Land Use Limitations
- Class 6: Information Collection
- Class 7: Regulatory Protection of Natural Resources
- Class 8: Regulatory Protection of the Environment
- Class 9: Inspection
- Class 10: Loans
- Class 11: Accessory Structures
- Class 12: Surplus Government Property Sales
- Class 13: Acquisition for Conservation
- Class 14: Minor Additions to Schools
- Class 15: Minor Land Divisions
- Class 16: Transfer of Ownership of Land to Create Parks
- Class 17: Open Space Contracts
- Class 18: Designation of Wilderness Areas
- Class 19: Annexation of Existing Facilities and Lots
- Class 20: Changes in Organizaion of Local Agencies
- Class 21: Regulatory Enforcement Actions
- Class 22: Educational Programs
- Class 23: Normal Operation
- Class 24: Regulations of Working Conditions
- Class 25: Transfer of Ownership of Land to Preserve Open Space
- Class 26: Acquisition Housing for Housing Assistance
- Class 27: Leasing New Facilities
- Class 28: Small Hydroelectric Projects
- Class 29: Cogeneration Projects
- Class 30: Minor Actions to Prevent Hazardous Substance Release
- Class 31: Historic Resource Restoration/Rehabilitation
- Class 32: In-fill Development Projects

III. INITIAL STUDY

This project is not Exempt from CEQA or Categorically Exempt; an Initial Study is to be prepared to determine if the project may have a significant effect on the environment that has not been substantially and adequately analyzed in a certified program EIR.

Checklist Narrative

X IV. ENVIRONMENTAL IMPACT REPORT (EIR)

It is known that the project will have a significant effect on the environment and has not been adequately and substantially analyzed in a certified program EIR.

PROJECT DESCRIPTION

The proposed project is the construction of an Engineering Building on the north UCSC campus. The project would construct approximately 69,000 assignable square feeet (asf) of space to house School of Engineering programs (approximately 48,000 asf), Economics programs (approximately 15,000 asf), and general assignment classrooms (approximately 6,000 asf). Facilities to support teaching and research programs in engineering and economics would include data-intensive research laboratories, academic offices, administrative offices, and other support space. The building would probably be constructed north of the existing Applied Sciences Building (now called the Baskin Engineering Building).

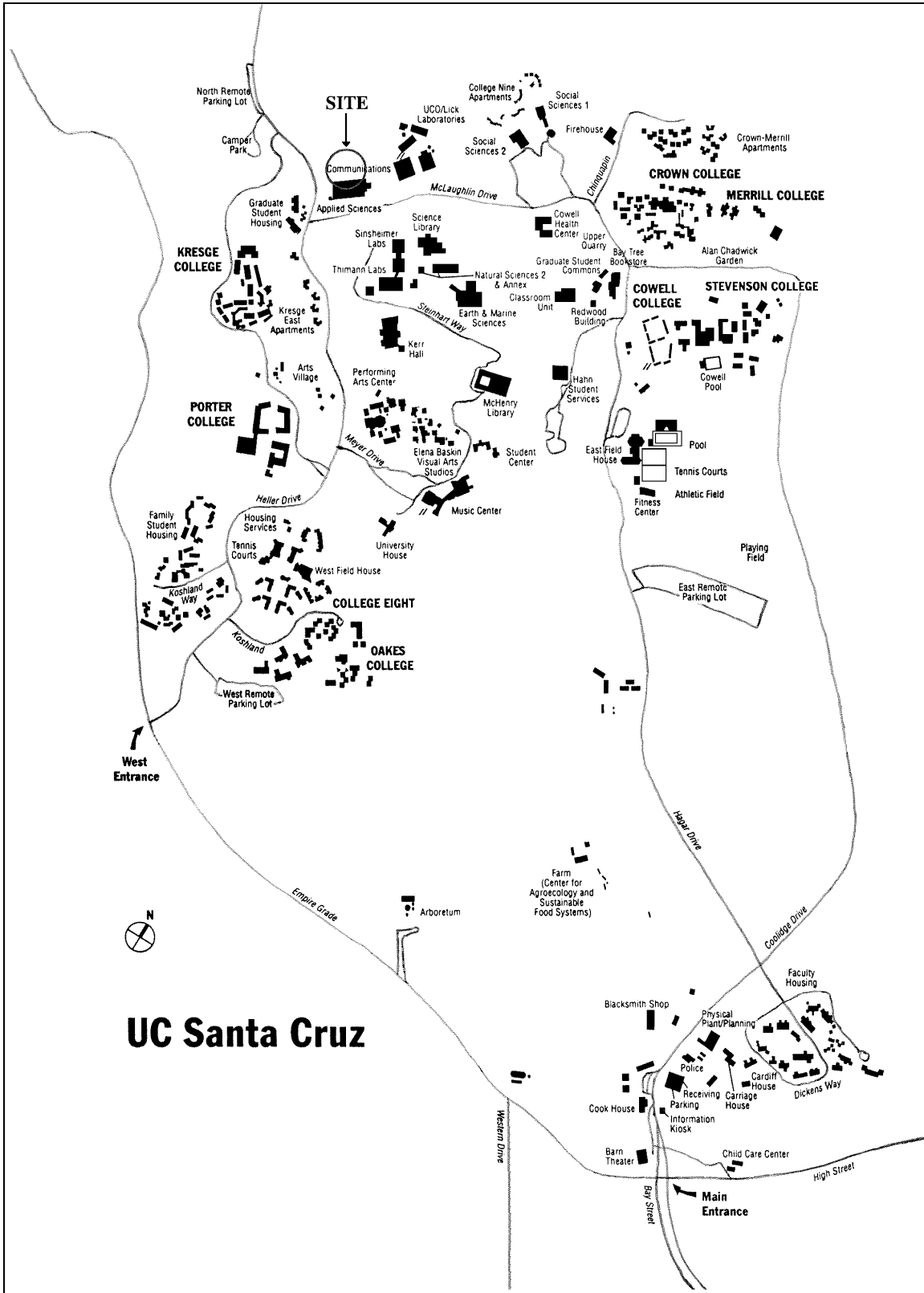
V. Does this project conform to the approved LRDP? YES NO NOT APPLICABLE

VI. C. Aldecoa 9/27/00 Original signed by _____ Date 9/27/00
Prepared by _____ Date _____ Local Approved by: Thomas Vani Date _____

VII. OFFICE OF THE PRESIDENT COMMENTS
 Concur with Classification _____
 Do not Concur _____

Signed _____ Date _____

Engineering Building Site Map



Proposed Spaces in Engineering Building and Jack Baskin Engineering Building			
	New Engin Bld	Exist Baskin Eng	Total Asf
Applied Math & Statistics			
Research and research support space			
Data-intensive research laboratories (10 @ 495 asf each)	3,465	1,485	4,950
Total research and research support space	3,465	1,485	4,950
Academic and administrative offices and support space			
Faculty offices (9 @ 135 each)	945	270	1,215
Postdoc offices (2 @ 130 each)		260	260
TA offices (2 @ 130 each)		260	260
Department office (Chair and 5 staff)		870	870
Faculty services workroom	150		150
Conference room	450		450
Total academic and administrative offices and support space	1,545	1,660	3,205
Total Applied Math & Statistics	5,010	3,145	8,155
Biomolecular Engineering			
Teaching and teaching support space			
Biomolecular class laboratories (2 @ 800 asf each)		1,600	1,600
Total teaching and teaching support space	0	1,600	1,600
Research and research support space			
Data-intensive research laboratories (4 @ 495 asf each)	1,980		1,980
Wet research lab			
Biomolecular experimentalists (5 faculty)		4,200	4,200
Total research and research support space	1,980	4,200	6,180
Academic and administrative offices and support space			
Faculty offices (8 @ 135 each)	540	540	1,080
Postdoc offices (2 @ 130 each)		260	260
TA offices (2 @ 130 each)		260	260
Industry partners office		130	130
Department office (Chair and 5 staff)		870	870
Faculty services workroom		150	150
Conference room		450	450
Total academic and administrative offices and support space	540	2,660	3,200
Total Biomolecular Engineering	2,520	8,460	10,980
Computer Engineering			
Teaching and teaching support space			
Digital logic class laboratory		1,075	1,075
Senior projects class laboratory		600	600
Networks special class laboratory		925	925
Total teaching and teaching support space	0	2,600	2,600
Research and research support space			
Data-intensive research laboratories (21 @ 495 asf each)	6,930	3,465	10,395
Total research and research support space	6,930	3,465	10,395
Academic and administrative offices and support space			
Faculty offices (20 @ 135 each)	1,890	810	2,700
Postdoc offices (7 @ 130 each)		910	910
TA offices (8 @ 130 each)		1,040	1,040
Industry partners office		130	130
Department office (Chair and 2.5 staff FTE)		510	510
Faculty services workroom	150		150
Conference room	450		450
Total academic and administrative offices and support space	2,490	3,400	5,890
Total Computer Engineering	9,420	9,465	18,885

Proposed Spaces in Engineering Building and Jack Baskin Engineering Building			
	New Engin Bld	Exist Baskin Eng	Total Asf
Computer Science			
Teaching and teaching support space			
Scientific visualization open computer laboratory		500	500
Total teaching and teaching support space	0	500	500
Research and research support space			
Data-intensive research laboratories (26 @ 495 asf each)	8,415	4,455	12,870
Total research and research support space	8,415	4,455	12,870
Academic and administrative offices and support space			
Faculty offices (25 @ 135 each)	2,295	1,080	3,375
Postdoc offices (7 @ 130 each)		910	910
TA offices (11 @ 130 each)		1,430	1,430
Industry partners office		130	130
Department office (Chair and 5 staff)		870	870
Faculty services workroom and 1 staff	250		250
Conference room	450		450
Total academic and administrative offices and support space	2,995	4,420	7,415
Total Computer Science	11,410	9,375	20,785
Electrical Engineering			
Teaching and teaching support space			
Controls, instrumentation, & communications class laboratory		625	625
Circuits & electronics class laboratory		620	620
CAD/CAE class laboratory		610	610
Optics special class laboratory		400	400
Electromagnetics & radio frequency special class laboratory		840	840
Physical electronics special class laboratory		605	605
Total teaching and teaching support space	0	3,700	3,700
Research and research support space			
Data-intensive research laboratories (11 @ 495 asf each)	4,950	495	5,445
Wet research labs and support			
Optics/holography laboratory (1 faculty)		600	600
Molecular beam epitaxy laboratory (1 faculty)		900	900
Semiconductor laboratory (2 faculty)		2,000	2,000
Anechoic chamber support room		200	200
Total research and research support space	4,950	4,195	9,145
Academic and administrative offices and support space			
Faculty offices (14 @ 135 each)	1,350	540	1,890
Postdoc offices (4 @ 130 each)		520	520
TA offices (6 @ 130 each)		780	780
Industry partners office		130	130
Department office (Chair and 2.5 staff FTE)		510	510
Faculty services workroom and 1 staff		250	250
Conference room		450	450
Total academic and administrative offices and support space	1,350	3,180	4,530
Total Electrical Engineering	6,300	11,075	17,375
Engineering Management			
Research and research support space			
Data-intensive research laboratories (4 @ 495 asf each)	1,485	495	1,980
Total research and research support space	1,485	495	1,980
Academic and administrative offices and support space			
Faculty offices (4 @ 135 each)	405	135	540
Postdoc office		130	130
Total academic and administrative offices and support space	405	265	670
Total Engineering Management	1,890	760	2,650

Proposed Spaces in Engineering Building and Jack Baskin Engineering Building			
	New Engin Bld	Exist Baskin Eng	Total Asf
General Engineering (space used by all programs)			
Teaching and teaching support space			
Open computer laboratories (1 @ 1,155 asf, 1 @ 1,705 asf, and 2 @ 1,600 asf each)		6,060	6,060
Instructional laboratory support (5 staff, equip prep, storage)		2,320	2,320
Computer infrastructure support (7 staff and equip prep)		1,090	1,090
Central computer room		630	630
Total teaching and teaching support space	0	10,100	10,100
Research and research support space			
Scholarly activity			
Large interactive area	1,500	760	2,260
Small interactive areas (6 @ 150 asf each)	900		900
Student organizations		1,500	1,500
Graduate student mailboxes		300	300
Computer infrastructure support (equipment preparation)		300	300
Central computer room	500	450	950
Total research and research support space	2,900	3,310	6,210
Administrative offices			
Computer infrastructure support (12 staff)		1,340	1,340
Total administrative offices		1,340	1,340
Total General Engineering	2,900	14,750	17,650
Information Systems Management			
Research and research support space			
Data-intensive research laboratories (4 @ 495 asf each)	1,485	495	1,980
Total research and research support space	1,485	495	1,980
Academic and administrative offices and support space			
Faculty offices (4 @ 135 each)	405	135	540
Postdoc office		130	130
TA office		130	130
Total academic and administrative offices and support space	405	395	800
Total Information Systems Management	1,890	890	2,780
Mechanical Engineering			
Teaching and teaching support space			
Mechanical class laboratory		800	800
Total teaching and teaching support space	0	800	800
Research and research support space			
Data-intensive research laboratories (7 @ 495 asf each)	2,475	990	3,465
Total research and research support space	2,475	990	3,465
Academic and administrative offices and support space			
Faculty offices (7 @ 135 each)	675	270	945
TA office		130	130
Faculty services workroom		150	150
Total academic and administrative offices and support space	675	550	1,225
Total Mechanical Engineering	3,150	2,340	5,490
Software Engineering			
Research and research support space			
Data-intensive research laboratories (8 @ 495 asf each)	2,970	990	3,960
Total research and research support space	2,970	990	3,960
Academic and administrative offices and support space			
Faculty offices (8 @ 135 each)	810	270	1,080
Postdoc offices (2 @ 130 each)		260	260
Total academic and administrative offices and support space	810	530	1,340
Total Software Engineering	3,780	1,520	5,300

Proposed Spaces in Engineering Building and Jack Baskin Engineering Building			
	New Engin Bld	Exist Baskin Eng	Total Asf
School of Engineering Administration			
Dean's office (Dean and 9 staff)		1,355	1,355
Conference room		450	450
Student affairs office (9 staff and small conference room)		1,270	1,270
Facilities group (3 staff)		450	450
Storage		800	800
IDISRI department office (Director and 5 staff)		870	870
Total School of Engineering Administration	0	5,195	5,195
School of Engineering Totals			
Teaching and teaching support space	0	19,300	19,300
Research and research support space	37,055	24,080	61,135
Total academic and administrative offices and support space	11,215	23,595	34,810
Total School of Engineering	48,270	66,975	115,245
Economics			
Research and research support space			
Graduate research offices for 65 (10 @ 495 each)	4,950		4,950
Experimental research laboratory	675		675
Census research laboratory	130		130
Journal research office	130		130
Scholarly activity space			
Graduate conference room	250		250
Department library/reading room	400		400
Total research and research support space	6,535	0	6,535
Academic and administrative offices and support space			
Faculty offices (31 @ 135 each)	4,185		4,185
Postdoc offices (2 @ 130 each)	260		260
TA offices (12 @ 130 each)	1,560		1,560
Department office (Chair and 8 staff)	1,200		1,200
Faculty services workroom and 1 staff	350		350
Conference room	750		750
Total academic and administrative offices and support space	8,305	0	8,305
Total Economics	14,840	0	14,840
General Assignment Classrooms	6,000		6,000
Building totals	69,110	66,975	136,085

1 The total size of the existing Jack Baskin Engineering building is 105,412 asf. Other building occupants remaining in Baskin Engineering include Natural Sciences academic programs (primarily Mathematics) and ORUs, Media Services, Natural Sciences Division, Duplicating, Mail Services, Campus Facilities, and Development, for a total of 33,869 asf. Occupants of displaced Natural Sciences Division trailers will move into 4,568 asf in Baskin Engineering.