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CAMPBELL HALL SEISMIC REPLACEMENT BUILDING

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SUMMARY

The proposed project will construct a new physical science building of approximately 53,450 assignable square feet (asf) and 88,800 gross square feet (gsf) on the Berkeley campus to replace the present 47-year-old, seismically "Poor" (DGS level V) Campbell Hall, a 40,362 asf building that will be demolished. The new, larger building will:

- move the Department of Astronomy from the seismically deficient Campbell Hall into safe, modern teaching and research facilities;
- provide the Department of Physics with urgently needed specialized research laboratories and additional work space; and
- physically integrate the new Physics and Astronomy space with the adjacent existing LeConte Hall and Birge Hall.

The need to address seismic deficiencies continues to be the highest capital improvement priority for the Berkeley campus, but at the same time the campus must be strategic in balancing seismic safety with academic program needs to make the wisest use of scarce capital improvement funds. After studying the measures necessary to retrofit the existing Campbell Hall, correct its code deficiencies, and make adaptations for modern program needs, the campus has determined that the estimated $42.4 million project cost would still leave the building poorly suited to meet current academic needs.

At present, Campbell Hall houses the Department of Astronomy and associated research groups as well as the College of Letters and Science deans' offices, the College's Undergraduate and Interdisciplinary Studies division, and its Undergraduate Advising unit. Both Astronomy and the College of Letters and Science are severely crowded in their present space and the high volume of student traffic in the building puts a large population at significant risk of injury or loss of life in the event of a large earthquake.

In addition to the seismic risk, the need for additional, improved space for Astronomy and high quality laboratory space for the Physics department has reached a critical point where the future of these departments as leaders in their respective disciplines is at stake. The lack of quality laboratory space that can support contemporary research practices has seriously impacted the ability of the Physics program to undertake the advanced research for which the department has been renowned. This has caused the loss of important faculty members and is making it increasingly difficult to recruit replacements.

Constructing new physics laboratory facilities is critical to maintain the success of the department.

This project will achieve the dual goals of improving seismic safety and advancing the academic programs in Astronomy and Physics. Through demolition of the existing building and construction of a new, one-third larger building in its place, the new building will provide critically needed laboratory facilities for the Physics Department as well as expand space for the Department of Astronomy and its associated research groups. This project will create a compact and contiguous physical sciences complex to support the growing interdisciplinary trend in the sciences at Berkeley. The Campbell Hall site provides a unique opportunity adjacent to the existing LeConte and Birge physics buildings for such an important undertaking in the densely developed central campus.

It is estimated that a retrofit/restoration project for the existing Campbell Hall would cost approximately $42.4 million at CCCI 4890. In comparison, the retrofit/restoration cost is about two-thirds of the cost of the proposed replacement with a 32 percent larger building, or 29 percent greater than the construction cost of a new building of equal size.

BACKGROUND

The Berkeley campus is the oldest of the University of California's general campuses. It provides a broad range of academic programs in the humanities, sciences, and professional schools as well as auxiliary services to support the needs of a diverse student population. The campus, centered in a highly developed and mature urban environment, is organized in precincts that serve the needs of the various disciplines and populations.

Over most of the past few decades the campus's enrollment remained relatively stable at about 29,000 to 30,000 FTE. Starting in 2000, however, as a consequence of Tidal Wave II, the campus has experienced new growth that places added demands on facilities that are already at capacity. Berkeley's projected growth to the year 2010-11 (Table 1), although a relatively small percentage of total campus enrollment, creates a significant impact on campus facilities, particularly those that are highly specialized. The problem is made distinctly more complicated by the difficulty of adding new space in a campus environment that is already densely developed.

Table 1
Campus FTE Enrollment and Faculty,
2000-01 and 2010-11

	2000-01 Actual	2010-11 Projected	Change %	Change FTE
Undergraduate FTE	21,645	24,940	15%	3,295
Graduate FTE	7,342	8,230	12%	888
Total Enrollment	28,987	33,170	14%	4,183
Budgeted Faculty FTE	1,661	1,887	14%	226

A long-standing problem for the campus has been the need for additional space for modern laboratories and research facilities in the departments of Physics and Astronomy. At present these departments are housed in three buildings: Birge Hall, Campbell Hall, and LeConte Hall situated in the northeast precinct of the campus, which is primarily dedicated to the physical sciences and engineering. The newest building in the group, Birge Hall (1964), is over 40 years old, and the second newest, Campbell Hall (1959), is approaching 50 years old. The oldest of these buildings, the original portion of LeConte Hall (1924), is 82 years old, with a major addition that was constructed in 1950. The physical sciences programs have experienced substantial growth in the years since Birge Hall was constructed. Over the thirty year period from 1970 to 2000, combined total enrollments in Astronomy and Physics have increased by 32 percent (Table 2) with no corresponding increase in facilities. A State-funded seismic retrofit has just been

completed at LeConte Hall, followed by a major campus-funded program improvements project. The 2006 Budget Act includes a project in Birge Hall, limited to utility systems upgrades, to address infrastructure problems that have constrained modern research in that building. The present project will address the seismic and program deficiencies of Campbell Hall and also provide specialized research laboratories needed by Berkeley's Physics Department.

The campus currently has 94 percent of the instruction and research space allowed by CPEC space guidelines. With this project and other funded projects already in development, it is projected that the Berkeley campus will be at 97 percent of the CPEC guidelines in 2010-11.

Table 2
Undergraduate and Graduate Student Workload

	1970-71 Actual	2000-01 Actual	2010-11 Projected	% Change 1970 to 2000	% Change 2000 to 2010	% Change 1970 to 2010
Astronomy						
Undergraduate (FTE)	65	202	211			
Graduate (FTE)	44	33	40			
Subtotal	109	235	251	115.6%	6.8%	130.3%
Physics						
Undergraduate (FTE)	500	700	720			
Graduate (FTE)	294	204	227			
Subtotal	794	904	947	13.9%	4.8%	19.3%
Totals						
Undergraduate (FTE)	565	902	931			
Graduate (FTE)	338	237	267			
Subtotal	903	1,139	1,198	26.1%	5.2%	32.7%

PROGRAM NEED AND OBJECTIVES

The existing physical sciences complex houses the Physics Department, the Astronomy Department, and several research centers associated with each. Three research units in Campbell Hall (the Radio Astronomy Laboratory, the Center for Theoretical Astrophysics, and the Center for Integrative Planetary Science) provide a major focus for graduate student research in Astronomy as well as providing academic connections to other researchers in Physics, Engineering, and Earth and Planetary Science.

Astronomy conducts research in three broad areas: general astrophysics (including compact objects such as black holes, star formation, and evolution of galaxies), cosmology (including both understanding and measurement of fundamental parameters and the origin of structure in the universe), and planetary and space sciences (including study of the Sun and its environs and exploration of extra solar planetary systems). The Astronomy offers undergraduate and graduate instruction in a wide variety of fields, including theoretical and observational astrophysics; infrared, optical, and radio astronomy; galactic structure and dynamics of stellar systems; high-energy astrophysics and cosmology; and spectroscopy.

The Physics faculty, broadly speaking, is divided into experimentalists and theorists. The former require laboratory space in which their students work side by side with them to study and explore the forces and properties of matter under carefully controlled conditions. In the fields of condensed matter physics, atomic, molecular, and optical physics, and biophysics, Berkeley is a leading experimental center, in spite of its aging infrastructure. Theorists in Physics study fundamental questions of matter and space-time that involve sub-disciplines such as particle physics, cosmology and string theory.

A new unit, the Berkeley Atmospheric Sciences Center, has recently been formed to bring together researchers in Earth and Planetary Science; Environmental Science, Policy, and Management; Chemistry; Geography; and Civil and Environmental Engineering. Atmospheric science is intrinsically interdisciplinary, with chemistry, physics, mathematics, biology, geology, and ecology all core disciplines. The goal of the Center is to broaden the atmospheric sciences beyond its traditional boundaries to embrace the biogeochemical frontier and the human dimension. The Center facilitates communication and integration across these traditional boundaries and aims to define a new paradigm for investigating changes in the atmosphere. Its work integrates the microscopic mechanisms of chemical, physical, and biological processes with large-scale ecological and geological interactions between the geosphere, biosphere, and oceans, and how these interactions alter atmospheric composition. At present, the Center has no space specifically assigned to it and its location in the Campbell Hall replacement building will establish it as an important collaborator with the research activities in physics and astronomy.

Interdisciplinary research that crosses the boundaries between astronomy, biology, chemistry, geology, and physics presents great opportunities for discoveries. Yet faculty and students in all these fields are now disbursed throughout numerous buildings, departments, and colleges. Core programs in astronomy and astrophysics, pursuing work in cosmology, galaxies, and the origin and death of stars, exist in both the Astronomy and

Physics departments but they are housed in physically separate buildings: Campbell Hall and LeConte Hall. Another example, the Center for Integrative Planetary Science, draws faculty from several widely separated departments, including Geophysics, Astrophysics, Meteorology, Oceanography, Organic Chemistry, Biology, and Planetary Science and its work has affinities with the Berkeley Atmospheric Sciences Center. And most of the condensed matter physics groups, whose fundamental nanoscience research has great potential impact on the natural and observational sciences as well as being fundamental in its own right, are housed in laboratories in the basement of Birge Hall with no place to expand and grow. The goal is to bring these programs closer together and improve interaction among them. Table 3 shows the current assignment of space to Astronomy and Physics.

The requirement to address the seismic life-safety hazards and condition of Campbell Hall provides an opportunity to provide expanded, modern facilities meeting the current program needs of the physical sciences in proximity to Birge Hall and LeConte Hall, reinforcing the functional relationships of these interdependent programs. This will create a new integrative physical sciences complex that will increase the interaction between the students and faculty in Astronomy and Physics and other physical sciences. A compact and contiguous physical sciences complex, designed to maximize interaction and to mix, not segregate, intellectual and age subgroups, will promote the growing interdisciplinary trend of the sciences at Berkeley. The proposed project will also support the campus's plans to improve student access to the College of Letters and Science deans' offices and the Undergraduate and Interdisciplinary Studies division, which will be permanently relocating from Campbell Hall to approximately 12,000 asf of space in Durant Hall. A separate project is being proposed to convert Durant Hall from its current use as library and academic department space to its new use. In addition, Letters and Science Undergraduate Advising will be moved to approximately 10,000 asf of campus-funded space in the Hearst Field Annex.

Table 3
Existing Space by Type and Building for Major Departments in the Physical Sciences Complex

	Birge	Campbell	LeConte	Totals
Astronomy& assoc. research centers				
Instruction		1,672		**1,672**
Research & Scholarly Activity		7,865		**7,865**
Academic Office		6,806		**6,806**
Administrative Office & Support		7,668		**7,668**
Subtotal	-	24,011	-	**24,011**
Physics				
Instruction			17,816	**17,816**
Research & Scholarly Activity	37,801		26,407	**64,208**
Academic Office	7,975		8,851	**16,826**
Administrative Office & Support	5,824		16,309	**22,133**
Subtotal	51,600	-	69,383	**120,983**
College of Letters and Science				
Academic Office		1,305		**1,305**
Administrative Office & Support		15,011		**15,011**
Subtotal	-	16,316	-	**16,316**
Other	1,532	35		
Totals				
Instruction	1,532	1,672	17,816	**21,020**
Research & Scholarly Activity	37,801	7,865	26,407	**72,073**
Academic Office	7,975	8,111	8,851	**24,937**
Administrative Office & Support	5,824	22,714	16,309	**44,847**
Totals	**53,132**	**40,362**	**69,383**	**162,877**

CAMPBELL HALL'S DEFICIENCIES

Seismic Deficiencies

The Berkeley campus is located in an area of extensive seismic activity on a site that is vulnerable to geologic hazards. The entire San Francisco Bay Area contains numerous earthquake faults and is within one of the most seismically active regions in the United States. The Hayward fault is a seismically active, major element of the San Andreas Fault system, and an earthquake could occur on it at any time. The Hayward fault passes directly through the eastern edge of the Berkeley campus.

Campbell Hall is a 40,362 asf, seven-story plus basement, reinforced concrete structure completed in 1959 with a gross area of 63,719 square feet. It is located near the eastern edge of the central campus area approximately 1,000 feet from the main trace of the Hayward fault, and approximately 500 feet from the western edge of the fault's Alquist-Priolo Special Studies Zone.

The 1978 seismic study carried out by H. J. Degenkolb & Associates gave Campbell Hall a "Good" rating for seismic performance and until relatively recently the building's seismic performance was considered acceptable. Since 1989 there have been several major earthquakes in large, urban areas. Seismic events at Loma Prieta, Northridge, and Kobe, Japan provided significant new knowledge in seismology, geology, and structural engineering, and scientists and engineers gained a greater understanding of how earthquake forces are generated and how buildings react to them.

Two subsequent studies, one in 1997 and the latest in 2003, by the structural engineering firm of Rutherford and Chekene reevaluated Campbell Hall's lateral resistance to assess the earlier rating. The results of those studies reduced the seismic rating of the building from "Good" to "Poor." Among other details, the studies indicated that the building's shear wall strength is inadequate to resist strong earthquake forces. The longitudinal reinforcing bars have inadequate lap splice lengths and confinement ties that do not meet FEMA criteria, and exterior concrete frames are also inadequate to resist strong earthquake forces. The exterior cladding system exceeds current code limitations for attached masonry veneer.

Although generally every seismic event demonstrates unique characteristics of ground shaking and, consequently, building performance, Campbell Hall's proximity to the Hayward Fault puts it in the "near field" portion of the seismic zone. The structure is therefore expected to experience a very large "pulse" ground motion. The studies predicted that after an earthquake of approximate magnitude 7.0 on the adjacent Hayward Fault, the building would likely experience heavy structural damage at interior shear walls and the exterior frame and cladding system. Failure of these structural elements may cause portions of the primary structure to collapse, presenting a life-threatening hazard ranging from appreciable to high, depending on the severity of the seismic event.

The recommended seismic strengthening approach would necessitate removal of the existing masonry veneer cladding, reinforcing the concrete frame using steel jacketing and a carbon-fiber system, and replacing the exterior skin of the building with a new cladding system properly attached to the structure. This approach would involve complete replacement of the interior finishes of the exterior wall and would have extensive impacts on finishes of the core where the structure must be exposed for reinforcement. It would also

involve replacement of the heating radiators and storm water collection system at the exterior walls.

Alternative retrofit solutions would be even more intrusive and would involve addition of shear wall systems with major foundation work that would be significantly more costly than the recommended retrofit solution. These alternatives would have the further drawbacks of reducing the useable program space of the building, and further degrading the use of the existing space because the thick new walls would result in small windowless rooms at the perimeter of the building.

The proposed structural work would also trigger mandatory code upgrades for fire and life safety and accessibility. Restrooms throughout the building would require disabled access improvements. The elevators would require seismic upgrade and, in addition, would have to be extended to provide ADA access to existing seventh floor instructional observatory facilities.

Other Physical and Functional Deficiencies

The existing building infrastructure systems in Campbell Hall are approaching 50 years of age and in most cases are past due for life cycle replacement. Disturbing these systems in the process of a seismic retrofit project is anticipated to trigger failures requiring extensive replacement.

The existing mechanical systems include a fan-powered heating and ventilation system serving interior core spaces, and a hot water finned-tube radiator heating system serving perimeter spaces that are in poor condition and at the end of their economic life. Replacement of these systems with appropriate new systems would be required and would trigger extensive work to restore finishes. Duct runs for the new fan-powered ventilation system serving interior areas would need to be rerouted to coordinate with structural improvements at core. New ductwork would require fire/smoke dampers tied into the building fire alarm system to conform with current codes. In addition, electrical upgrades may be required to power new fans. Replacement of corroded heating hot water piping around entire perimeter would require removal of ceilings in each room and pipe penetrations through floor slabs would also need to be removed and replaced. Heating and ventilation systems would require a new integrated building controls system.

Plumbing piping systems, including hot and cold water and sewer systems, require life cycle replacement. Restrooms would also need to be redesigned to conform to ADA accessibility requirements. The opportunities for expansion of restroom facilities at the building core are limited and it may become necessary to rebuild toilet rooms at the perimeter, thereby taking up valuable office space. The building's toilet count would need to be studied further and extra restrooms could be required.

The current electrical system is obsolete, in poor condition, and was intended to provide service for less-intensive power requirements and research practices. The system would need to be replaced, particularly to support new use for modern informational technology requirements on upper floors and physics labs at the basement level. Replacement components would include switchgear, conduit and panels, and a new medium voltage system would be required for experiments.

ALTERNATIVES

The campus has evaluated a variety of options, including retrofit versus replacement, and meeting program needs elsewhere. Given the building's age--approaching 50 years old--and the deteriorated building infrastructure systems that are inadequate to support modern research, it was decided that to reinforce the existing building and provide other life-safety and code upgrades, as described above, with just minimal program improvements to accommodate changed use, would not be cost-effective. It is estimated that the retrofit/restoration work would cost approximately $42.4 million at CCCI 4890, about two-thirds of the cost of the proposed replacement with a 32 percent larger building, or 29 percent greater than the construction cost of a new building of equal size.

The campus has considered several alternatives to the proposed project, and each has difficulties that seriously reduce its feasibility and attractiveness relative to the proposed project. Most of these alternatives respond to the facilities needs of Astronomy and Physics, but would not address the basic seismic problem of Campbell Hall except to allow its demolition.

- Build an addition west of LeConte Hall under the Campanile esplanade to meet the need for low-vibration laboratories: Construction of a 28,000 asf underground laboratory facility west of the 1950 portion of LeConte Hall was examined as part of a review of space needs for Physics several years ago. This option is no longer considered feasible because of the major utility infrastructure under the roadway. Furthermore, construction below grade would have to be deeper than the proposed

Campbell replacement, and therefore would not provide any savings on excavation costs. The esplanade drive is an emergency access route for LeConte and Birge, so the additional cost for a roof structure at this location would be substantial because of the need to be able to support fully loaded fire trucks in the event of an emergency. Such a structure would also be less isolated from vibration because of the roadway passing over it, thereby incurring additional costs to compensate.

- Demolish Donner Laboratory and construct a new building on that site: Donner Laboratory is an approximately 30,000 asf building built in 1942 and added to in 1955. It has a seismic safety rating of "Poor." This building was originally funded from non-State sources to accommodate the biophysics, nuclear medicine, and space biology research programs at Lawrence Berkeley National Laboratory (LBNL), and most of its space is committed to LBNL programs under a long-term use agreement. This building could also be demolished to construct a new integrated physical science building. The cost of such a project would not differ significantly from a similar project on the Campbell Hall site, but has added complexity because of the current use by LBNL would require construction of replacement space for LBNL use. Furthermore, the site has somewhat less favorable physical vibration characteristics because of its close proximity to heavy traffic on Gayley Road. Also, its location would be less satisfactory in accomplishing the programmatic goal of a closely integrated science center.

- Build at another campus site: The Berkeley campus is highly developed, having evolved precincts and a localized support infrastructure tailored to the specific needs of the buildings. Extensive planning and construction has been done to build rational adjacencies, insofar as practical, among various academic disciplines. It would be costly to duplicate the existing specialized infrastructure of piped gases, shops, and stockrooms in the physical science precinct elsewhere on campus. The very few other campus sites that are potentially large enough to accommodate the planned program of Campbell Hall replacement building are committed for other purposes and, similar to the Donner Laboratory site, their distance from the existing physical sciences complex runs counter to the program's goal of improving adjacencies for researchers and students in their respective disciplines.

- Build off-campus space: This alternative has the unacceptable problem of locating a basic instruction and research department, Astronomy, away from the central campus. Astronomy serves thousands of non-major students each year and a basic

criterion is that students must be able to travel from one class to the next in the allotted ten-minute class change period which would not be possible from an off-campus location. In addition to problems similar to that of other campus sites: the need for support infrastructure and proximity to other researchers in allied fields.

- No Action: The "no project" alternative would not resolve the seismic problem of Campbell Hall, address the need for modern physics laboratories to support Berkeley's physics program, or provide the additional, appropriately designed space required for Astronomy.

It was determined that the most effective approach to address Campbell Hall's seismic safety deficiencies as well as the programmatic needs of the physical sciences would be to demolish the existing deficient structure and replace it with a larger, modern laboratory and office building that maximizes use of the current site and its proximity to existing students and faculty working in directly related instruction and research.

Relationship to University Mission and Objectives

The University's mission of instruction, research, and public service requires that it accommodate increased numbers of students; address seismic, fire, and other life-safety hazards; renew obsolete and aging facilities; renovate facilities to meet changing program needs; and expand critical infrastructure and utility systems to support academic programs. The Regents have given a high priority to rapid completion of the University's program of seismic corrections and other life safety improvements. The proposed project will address the need for modern physics laboratories, the need for integrated facilities for programs in the physical sciences, and the need to correct a significant seismic hazard on the Berkeley campus.

PROJECT DESCRIPTION

The Campbell Hall Seismic Replacement project will construct a new laboratory and office building of approximately 53,450 asf (88,800 gsf), to replace the existing seismically deficient Campbell Hall, and will provide improved space for programs in Astronomy and Physics and meet the critical need for additional high quality physics laboratories on the Berkeley campus. As planned, it will provide one below-grade level for low vibration physics research laboratories and support space, and approximately six upper levels for other less utility-intensive laboratories, academic offices, instructional activities, and academic and administrative offices, instructional activities, and support spaces. A roof-level deck will be accessible for student astronomical observations and, if feasible, a bridge structure will connect the new building to adjacent LeConte Hall to facilitate close interaction with astrophysicists and theorists in the Physics Department.

Research Space

The basement level will house approximately 7,945 asf of laboratory and laboratory support space to take advantage of the site's underlying bedrock for natural vibration dampening. These laboratories will be protected from electromagnetic induction and radio frequency interference. This will require isolating and shielding electrical equipment and distribution systems.

The above-grade floors will house approximately 17,000 asf of other less utility-intensive laboratories, associated support space, and research offices. Those laboratories will serve researchers from the Astronomy and Physics Departments and associated research centers, the observatory, and the Berkeley Atmospheric Sciences Center, working with computers and optical or other equipment.

Instructional Space

Two class laboratory rooms, totaling approximately 2,400 asf are planned to replace the existing 1,672 class laboratory space in Campbell Hall and relieve crowding in large laboratory sections. These rooms will be dry laboratory spaces with instructional media, workbenches for experiments, racks for electronics, and computing capabilities to support lower division class laboratory sections for Astronomy 7A and 7B, "Introduction to Astrophysics" serving all undergraduates but Astronomy and Physics in particular. These rooms are planned to provide approximately 45 student stations. Instructional observatory facilities, providing both optical- and radio-frequency observing instruments, will be housed on the roof similar to the existing facilities but fully accessible by

physically disabled users. These facilities will accommodate approximately 100 users and will support Astronomy 10, "Introduction to General Astronomy" that serves about 4,000 students per year, as well as the upper division "Optical Astronomy Laboratory" and "Radio Astronomy Laboratory" courses for Astronomy majors. Class laboratory utilization rates at the Berkeley campus were over 99 percent of the legislated standard for the last two years and it is expected that the campus will exceed 100 percent of the legislated standard by the time the proposed project is completed.

Academic and Administrative Offices and Support

The upper floors will also house approximately 15,900 asf of academic offices and approximately 10,205 asf of administrative offices, meeting spaces, and related support functions. Faculty will be housed in single private offices, possibly clustered around a shared meeting space. Graduate student researchers and postdocs will be housed in shared group offices. Administrative offices will be provided for the Department of Astronomy and conference rooms will be distributed throughout the building.

Tables 4 and 5 summarize the distribution of space throughout the building by location, function, and departmental assignment.

Table 4
Summary of Building Space Distribution by Floor and Function (asf)

	Research	Academic Office	Instructional	Administration & Support	Totals
Level 6	2,700	1,960		615	**5,275**
Level 5	3,200	4,280		430	**7,910**
Level 4		2,100	1,500	4,310	**7,910**
Level 3	3,100	3,780		1,030	**7,910**
Level 2	3,400	3,780		730	**7,910**
Level 1	4,600		900	3,090	**8,590**
Level B1	7,945				**7,945**
Total	**24,945**	**15,900**	**2,400**	**10,205**	**53,450**

Table 5
Summary of Space Use by Department and Function (asf)

	Research	Academic Office	Instructional	Administration & Support	Totals
Astronomy & assoc. research centers	12,100	10,860	2,400	9,705	**35,065**
Physics	10,345	5,040		500	**15,885**
Berkeley Atmospheric Sciences Center	2,500				**2,500**
Totals	**24,945**	**15,900**	**2,400**	**10,205**	**53,450**

Tables 6 and 7 show the proposed distribution of space by building and the overall change in space assignments following completion of the new building.

Table 6
Planned Space Distribution Following Project Completion (asf)

	Birge	Campbell Replacement	LeConte	**Totals**
Astronomy				
Instruction		2,400		**2,400**
Research & Scholarly Activity		12,100		**12,100**
Academic Office		10,860		**10,860**
Administrative Office & Support		9,705		**9,705**
Subtotal	-	35,065	-	**35,065**
Physics				
Instruction	-		17,816	**17,816**
Research & Scholarly Activity	37,801	10,345	26,407	**74,553**
Academic Office	7,975	5,040	8,851	**21,866**
Administrative Office & Support	5,824	500	16,309	**22,633**
Subtotal	51,600	15,885	69,383	**136,868**
Berkeley Atmospheric Sciences Center				
Research & Scholarly Activity		2,500		**2,500**
Other	1,532			**1,532**
Totals				
Instruction	1,532	2,400	17,816	**21,748**
Research & Scholarly Activity	37,801	24,945	26,407	**89,153**
Academic Office	7,975	15,900	8,851	**32,726**
Administrative Office & Support	5,824	10,205	16,309	**32,338**
Totals	**53,132**	**53,450**	**69,383**	**175,965**

Note: the College of Letters and Science, currently occupying 16,316 asf in Campbell Hall, is planned to permanently relocate to approximately 12,000 asf in Durant Hall and 6,000 asf in Hearst Field Annex.

Table 7
Summary of Space Changes Following Project Completion (asf)

	Existing	Proposed	Change
Astronomy			
Instruction	1,672	2,400	728
Research & Scholarly Activity	7,865	12,100	4,235
Academic Office	6,806	10,860	4,054
Administrative Office & Support	7,668	9,705	2,037
Subtotal	24,011	35,065	11,054
Physics			
Instruction	17,816	17,816	-
Research & Scholarly Activity	64,208	74,553	10,345
Academic Office	16,826	21,866	5,040
Administrative Office & Support	22,133	22,633	500
Subtotal	120,983	136,868	15,885
Berkeley Atmospheric Sciences Center			
Research & Scholarly Activity		2,500	2,500
Other	1,532	1,532	-
Totals			
Instruction	21,020	21,748	42,768
Research & Scholarly Activity	72,073	89,153	161,226
Academic Office	23,632	32,726	56,358
Administrative Office & Support	29,801	32,338	62,139
Totals	146,526	175,965	29,439

Other Related Work

Infrastructure Improvements: In addition to construction of the new building, the project will require a modest upgrade to the electrical infrastructure in the immediate vicinity of the building. This will consist of a new 12 kV feeder pulled to the site through existing duct banks from Switchgear Station 1 to provide adequate power for the new building, which will be larger than Campbell Hall and will have an increased electrical demand to serve the new laboratories.

College of Letters and Science: Offices for the College deans and its Undergraduate and Interdisciplinary Studies division will be permanently moved from Campbell Hall to approximately 12,000 asf of space in Durant Hall. A separate project is being proposed to convert Durant Hall from its current use as library and academic department space to

its new use. Letters and Science Undergraduate Advising will be moved to approximately 6,000 asf of campus-funded space in the Hearst Field Annex.

Cost Basis and Sustainability

The campus has conducted predesign studies and cost analyses and has prepared a detailed cost estimate. The work proposed in this project will be subject to further assessment during the design process and limited by construction market conditions at the time of bid.

This project will comply with the University of California Policy on Green Building Design and Clean Energy Standards dated June 16, 2004. As required by this policy, the project will adopt the principles of energy efficiency and sustainability to the fullest extent possible, consistent with budgetary constraints and regulatory and programmatic requirements.