

# Berkeley Lab 2006

**B**erkeley Lab main site operations occupy 1.8 million gross square feet (gsf) of scientific, administrative, and operations space in permanent facilities and temporary trailers. In addition, the Laboratory occupies 113,000 gsf of space in Donner and Calvin Laboratories and other buildings on the adjacent UC Berkeley campus. The Laboratory currently leases 314,000 gsf of space offsite in Berkeley, Oakland, Livermore, Walnut Creek, California; and Washington DC. These leased spaces are used for administrative and research functions such as facilities for high performance computing in Oakland, biosciences research in Berkeley, and genomics research in Walnut Creek.

Berkeley Lab is a multi-program, interdisciplinary scientific research facility with a mission to reach a deeper understanding of our world while delivering science-based solutions to challenges in life sciences, energy, and the environment. Berkeley Lab has developed internationally-recognized scientific capabilities that support multi-discipline collaborations and make possible new breakthroughs that benefit society and the economy in the areas of:

- Energy science and technology
- Materials synthesis, characterization, and nanotechnology

**TABLE 1.1** Building space occupied by Scientific Research Area in assignable square feet (ASF)

Science/Support Area	Main Site	UC Berkeley	Leased	Total
Life & Environmental Sciences	151,000	19,000	75,000	245,000
Physical Sciences	422,000	56,000	23,000	501,000
Computing Sciences	27,000	0	38,000	65,000
General Sciences	304,000	0	0	304,000
Operations	246,000	1,000	156,000	403,000
<b>Subtotals</b>	<b>1,150,000</b>	<b>76,000</b>	<b>292,000</b>	<b>1,518,000</b>
Non-Assignable and Common	658,000	37,000	78,000	773,000
<b>Total Gross Square Feet</b>	<b>1,808,000</b>	<b>113,000</b>	<b>370,000</b>	<b>2,291,000</b>

- Multidisciplinary biology and environmental science
- Chemical physics and surface science, and ultrafast science
- Computational science and engineering
- Detector systems for astrophysics, high energy physics, and nuclear science
- Photon and particle beams

The University of California manages Berkeley Lab as a research campus, providing the intellectual leadership, scientific ingenuity, and operational expertise to accomplish the Laboratory's mission. Since its creation, Berkeley Lab has provided continuous support to the University of California's core missions of research, education, and public service. The Laboratory's research is conducted in close collaboration with many UC campuses, especially UC Berkeley, UC San Francisco, and UC Davis. There are 470 faculty associated with Berkeley Lab, over 250 of whom hold both UC faculty and Laboratory appointments. The new knowledge gained from joint research projects advances university education with the latest methods and discoveries.

Berkeley Lab plays a significant role in the development and education of the next generations of scientists and engineers. There are currently more than 760 graduate students, 670 undergraduate students, and 680 postdoctoral associates involved in Berkeley Lab research. This strong university connection provides students with unique research opportunities and prepares them for work in cutting-edge fields.

## BERKELEY LAB AT A GLANCE—2006

**Management and Operation:** University of California

### Physical Assets:

- 107 buildings and 53 trailers
- 202 acres

### Human Capital:

- 3,014 full time employees;
  - 18% Scientists and engineers
  - 43% technical staff
  - 7% faculty
  - 13% students & post docs
  - 18% support staff
- 480 students
- 4,170 Facility Guests and Visiting Scientists Annually

**Adjusted Daily Population:** 4,515

**Joint UC Appointments:** over 250

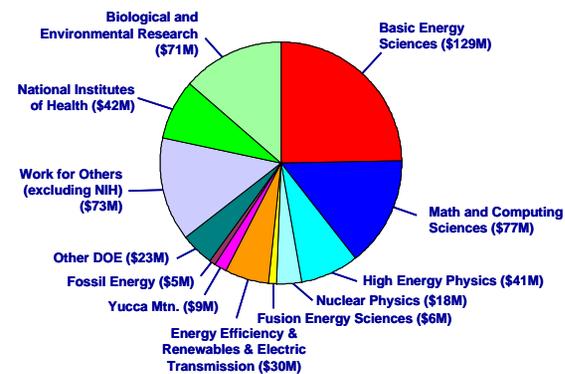
**Nobelists:** 11 associated with the Laboratory

**National Academies Memberships:** 81

**FY 2005 Budget:** >\$524 Million

### Funding by Sponsor:

- DOE Office of Science – 65%
- Other DOE – 12%
- NIH – 8%
- NNSA/DHS – 2%
- Other WFO – 13%



Berkeley Lab builds partnerships with academia, private industry, and government that deliver scientific tools and results far beyond the capabilities of any one institution. To promote these collaborations the Laboratory operates six national user facilities which are shared with the worldwide science community. These facilities include an ultra-bright light source, electron microscopes, high-speed data networks, supercomputers, a research center for the creation of new materials, and a genome sequencing facility.

The Berkeley Lab research enterprise is supported by a full range of operational support services that include environment, health, safety, and site and facilities management. In addition, the Laboratory includes services and amenities to benefit its employees and work environment, such as site security, a fire station, a medical clinic, logistical services (e.g. shuttle bus and mail) and a cafeteria.

As stewards of this public trust, Berkeley Lab management and staff must protect the public's interest and investment in the people, land, environment, facilities and equipment that make up the Laboratory. Berkeley Lab maintains a balance between ensuring a safe and secure working environment for all employees and visitors, and an open, collaborative work environment



that facilitates scientific excellence. With the Laboratory engaged in an unclassified mission, security threats are deemed to be relatively low.

Sustainability has been a priority at the Laboratory since the 1970's. Subsequently, Berkeley Lab has been a leader in the development of new technologies and industry standards for energy/resource conservation and renewable energy sources. As

**FIGURE 1.11** Berkeley Lab operates user facilities for use by the world-wide scientific community



**FIGURE 1.12** The Laboratory's natural environment and adjacency to UC Berkeley are cherished attributes

such, the Laboratory has managed its own facilities to lead the way in resource conservation within the national laboratory system. In 1985 the Laboratory initiated the "In-House Energy Management Program." By 1996 this program had achieved a reduction of energy use by 43% (from a 1990 baseline) and a commensurate reduction in water consumption. The technologies and policies developed in the program are integrated with

the broader sustainable building practices used in the development of its more recent projects.

While the lease of off-site commercial property has worked well to meet short term demand for space, it is more expensive than having the functions located in main site facilities, reduces productivity, and hampers multidisciplinary collaboration. Berkeley Lab recently initiated an effort to return staff to the main site to reduce cost and program fragmentation, improve economies of scale, strengthen employee's sense of identity, and improve communication. Fragmentation of research functions exists on the main site as well, as a result of expanding and contracting research group sizes and infrastructure needs in a relatively fixed building space capacity. The Plan provides a comprehensive solution to the fragmentation problem.

# Facilities Conditions

The advancement of scientific discovery requires a constant evolution in facility infrastructure such as environmental controls, space configurations, and safety systems. As Berkeley Lab's facilities developed for an earlier era of scientific endeavor age, they become less able to meet the demands of current research programs. Only fifty-one percent of the Laboratory's buildings have been assessed as suitable for current use.

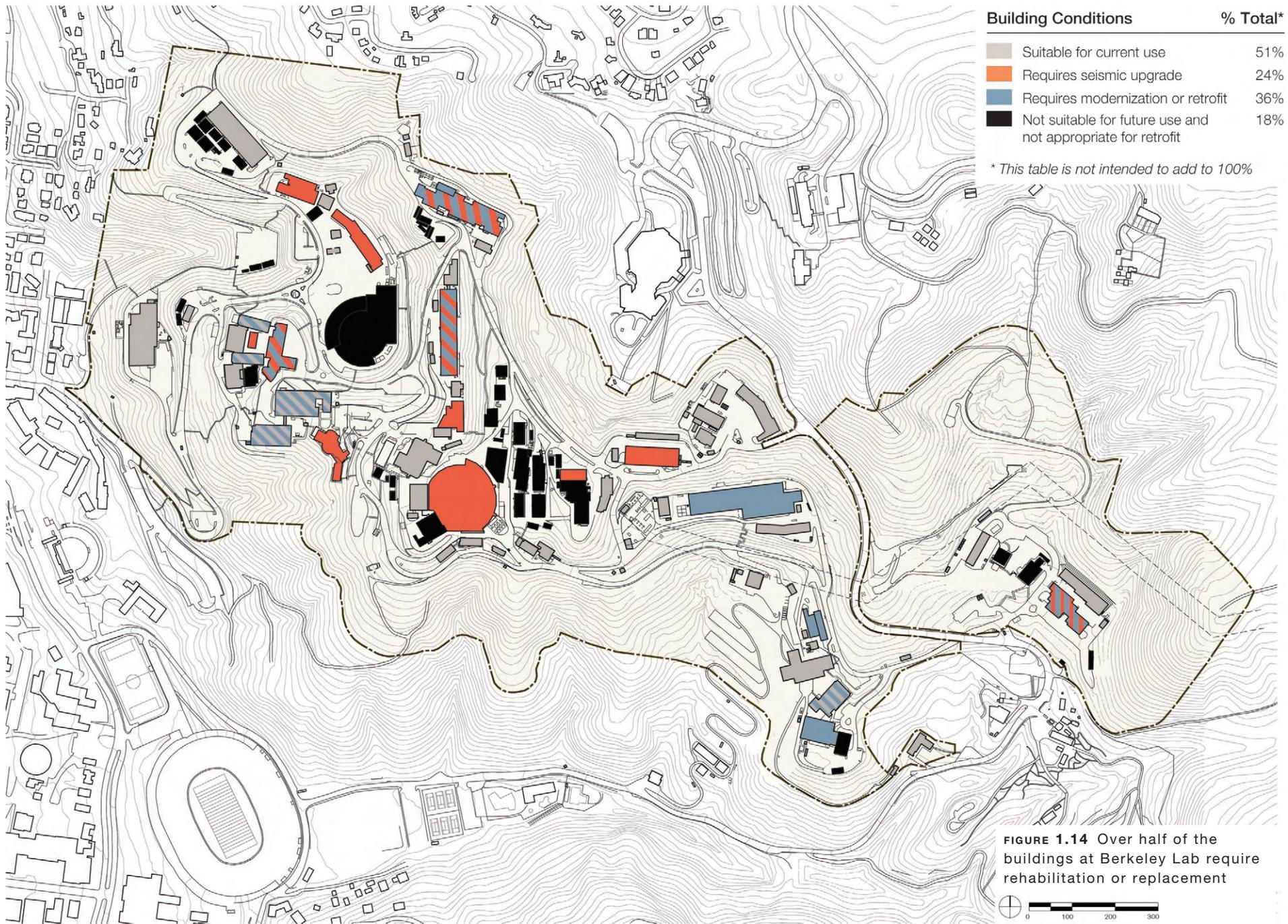
Sixty-two percent of the Laboratory's buildings are over 40 years old, an age at which demolition and replacement often become more cost-effective than continued use. Moreover, many of the Laboratory's buildings were built as temporary facilities. The outdated condition of these buildings is more pronounced than even their age would suggest. The aging building stock presents three specific challenges to the continued successful operation of the Laboratory:

- Need for upgrades of facilities to meet current seismic restraint requirements and provide a safe workplace
- Need for modernization of facilities to maintain the reliability of building support systems and improve environmental conditions to support the scientific mission
- Suitability of older buildings to the needs of future research equipment and methods



**FIGURE 1.13** Inefficient, high-maintenance office trailers make up 5% of the main site's space

The Building Conditions map shown in Figure 1.14 provides a concise assessment of the state of the Laboratory's facilities in 2006.



**FIGURE 1.14** Over half of the buildings at Berkeley Lab require rehabilitation or replacement

*Seismic Restraint Upgrades:*

Over the past decades, building code requirements for seismic resistance have advanced to require much greater restraining strength. As the permanent building stock that was built to earlier codes is evaluated relative to the current version, 17% of the square footage at Berkeley Lab's main site has been rated as an appreciable or high life hazard to occupants due to potential structural failure during a major seismic event.

*Modernization:*

The increased reliance on high precision technology in modern science increases the need for higher levels of cleanliness and temperature & pressure stability. When research tools such as robotics and supercomputers evolve, so do their space and infrastructure needs. Buildings configured to support the tools in use decades ago lose their ability to support modern research needs. Thirty-six percent of the higher-quality main site facilities require modernization and retrofit to make them suitable for future use as research facilities.

*Suitability:*

A facility's adaptation to meet the needs of a new purpose can be driven by new scientific research or by a change in the technologies employed by a scientific program. Newer facilities can usually be made suitable for new research purposes, though as buildings age their adaptability diminishes and they are eventually only appropriate for support functions.

As the type of research performed at the Laboratory has evolved from specialized areas to multi-disciplined team research, the older buildings especially become unsuitable for new research purposes. Eventually, facilities can no longer be effectively rehabilitated for future use and must be demolished and replaced. Eighteen percent of the Laboratory's buildings have been assessed as not suitable for future use and not appropriate for retrofit, and are therefore prime candidates for demolition and replacement.

**FIGURE 1.15** Demolition of facilities that are unsuitable for future research purposes



The seismic retrofit and rehabilitation of the Laboratory's facilities that are suitable for modernization, and the replacement of facilities that are not suitable for future use, will underpin the Laboratory's success in the coming decades. Berkeley Lab's rationale and guiding principles for the implementation of these changes is discussed in the next section.