Ernest Orlando Lawrence

Berkeley National Laboratory

# Ten Year Site Plan

# 2008 - 2017

prepared by

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for the

U.S. Department of Energy, Office of Science

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# Ten Year Site Plan 2008 - 2017

## Contents

# Acronyms and Abbreviations

| | |
|---|---|
| ACI | Asset Condition Index |
| AEC | Atomic Energy Commission |
| ALS | Advanced Light Source |
| AUI | Asset Utilization Index |
| CAS | Condition Assessment Survey |
| CEDR | Comprehensive Epidemiologic Data Resource |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CRD | Contractor Requirements Document |
| CY | Calendar Year |
| D&D | Decontamination and Decommissioning |
| DM | Deferred Maintenance |
| DMR | Deferred Maintenance Reduction |
| DOE | U.S. Department of Energy |
| DOE-EM | DOE Environmental Management Program |
| DOE-SC | DOE Office of Science |
| DR | Deferred Recapitalization |
| EERE | DOE Office of Energy Efficiency and Renewable Energy |
| EH&S | Environmental Health & Safety |
| EM | see DOE-EM |
| EPA | U.S. Environmental Protection Agency |
| ESnet | The Energy Sciences Network |
| FCI | Facility Condition Index |
| FIMS | DOE Facilities Information Management System |
| FY | Fiscal Year |
| GPP | General Plant Project |
| gsf | Gross Square Feet |
| GTL | Genomes to Life |
| HVAC | Heating, ventilation and Air Conditioning |
| IGPP | Institutional General Plant Project |
| IFI | Integrated Facilities and Infrastructure |
| MF | Molecular Foundry |
| NCEM | National Center for Electron Microscopy |
| NEPA | National Environmental Policy Act |
| NERSC | National Energy Research Scientific Computing Center |
| NGLS | Next Generation Light Source |
| NNSA | National Nuclear Security Administration |
| NSF | National Science Foundation |
| nsf | net square feet |
| OASCR | DOE SC Advanced Scientific Computing Research Program Office |
| OBER | DOE SC Biological and Environmental Research Program Office |
| OBES | DOE SC Basic Energy Sciences Program Office |
| OFES | DOE SC Fusion Energy Sciences Program Office |
| OHEP | DOE SC High Energy Physics Program Office |
| ONP | DOE SC Nuclear Physics Program Office |
| OWDTS | DOE SC Workforce Development for Teachers and Scientists Program Office |
| OSF | Other Structures and Facilities |
| PY | Prior Year |
| R&D | Research and Development |
| RPV | Replacement Plant Value |
| SC | see DOE-SC |
| SC NP | see ONP |
| sf | Square Feet |
| SLI | DOE SC Science Laboratory Infrastructure program |
| TSCI | Total Summary Condition Index |
| TYSP | Ten-Year Site Plan |
| VE | Value Engineering |

# Preface

The 2006 Lawrence Berkeley National Laboratory Ten Year Site Plan (TYSP) updates to the preceding May 2005 TYSP. The updates include:

- An updated Current and Future Missions chapter that includes descriptions of specific program developments, and their facilities and infrastructure implications;
- An updated Facilities and Infrastructure chapter that presents the mission-critical facility and infrastructure requirements, and includes a specific section the proposed Alternative Investment Plan;
- Chapter restructuring to better align with U.S. Department of Energy (DOE) Headquarters (HQ) guidance;
- Inclusion of the 2008 Integrated Facilities and Infrastructure (IFI) Cross-cut table per DOE HQ guidance;
- Updated data and information regarding the deferred maintenance management program per DOE HQ guidance;
- Updated aerial photos, figures and tables to present current conditions;
- Inclusion of a Preface section (to highlight changes made in this TYSP), and an Acronyms and Abbreviations list.

# Purpose and Scope

The Ten Year Site Plan (TYSP) is prepared by the Laboratory in accordance with the Contractor Requirements Document (CRD) provisions of the DOE Real Property Asset Management (RPAM) Order, DOE 0 430.1B.

"Based on DOE-furnished program planning guidance, the contractor must

a. assess the current real property assets against program mission projections,
b. identify the specific real property asset projects and activities required to meet program mission projections, and
c. propose a 10-year planning horizon through the development of a Ten-Year Site Plan (TYSP)...."

The Laboratory works with the DOE Site Manager in preparing this document; under the RPAM Order, the DOE Site Manager is "responsible for planning, programming, budgeting, and evaluation of activities in support of Secretarial office programs located on sites under his/her cognizance."

The TYSP also supports preparation of the DOE's Asset Management Plan (AMP), a requirement of Executive Order 13327 Federal Real Property Asset Management (February 2004). In accordance with the RPAM Order:

The TYSP integrates functional components of land use and real estate, facilities and infrastructure acquisition, maintenance, recapitalization, and disposition and long-term stewardship into a comprehensive site-wide management plan. The TYSP requires assessment of past performance and projected futures outcomes and is intended to strengthen communication and accountability between programs, sites and tenants.

The TYSP documents and ensures that DOE's real property assets at each SC site are inventoried, available, utilized in an effective and cost-efficient manner, and in a suitable condition to accomplish SC's and DOE's missions.

This 2006 TYSP covers the FY 2008 to FY 2017 planning period plus FY 2005 to FY 2007. The portion of the Resource Plan covering FY 2005 to FY 2012 reflects the FY 2008 Integrated Facilities and Infrastructure (IFI) Crosscut Budget prepared for the annual Field Budget submission.

# A. Executive Summary

Lawrence Berkeley National Laboratory (Berkeley Lab, LBNL, or the Laboratory) serves the DOE Office of Science mission with a continuing tradition of scientific excellence. LBNL is unique among the Office of Science Laboratories, being home to ten (10) Nobel prize winners, and the work of its scientists and engineers has been recognized with numerous other awards and prizes. LBNL is uniquely qualified and situated to achieve seminal breakthroughs under DOE's scientific missions in the early 21st Century.

The research mission is accomplished within, and is dependent upon, on the facilities and infrastructure of the Berkeley Lab site. As modern science requires exacting operating standards, and, as Berkeley Lab is home to many highly utilized "user facilities" hosting qualified researchers from other laboratories, universities, and industry, the performance and capabilities of the Laboratory's mission critical facilities and infrastructure are closely monitored and managed.

This TYSP outlines mission objectives, and considers the overall condition and suitability of current facilities, the need to address safety issues, the need to upgrade and augment current facilities to better match mission requirements, and both the proposed funding profile suggested for use in this TYSP by SC and funding needs that are proposed in the Laboratory's Alternative Investment Plan (Section D.11). The need to address the following three equally important primary mission-driven Facilities & Infrastructure objectives is identified and addressed;

- **Correct Seismic Safety Hazards:**

  Correct structural deficiencies that would allow some buildings to partially or fully collapse during a seismic event, and construct two replacement GPP-scale office and laboratory buildings to allow staff in seismically poor buildings that can not be cost-effectively upgraded to move to seismically safe spaces.

  To address these safety issues consistent with Federal Accounting regulations, the Laboratory requests (a.) an augmentation of Landlord (HEP) GPP funds for three years beginning in FY 2007, (b.) SC Operating funds to remove an abandoned NP accelerator that is identified as the root-cause of a predicted partial building collapse (funding requested in FY's 2007 & 2008), and (c) and that LBNL's SLI LIP funding be focused to correct seismic safety issues in an expedited manner.

- **Modernize Older Research Facilities and Infrastructure to Sustain World-Class 21st Century Science:**

  LBNL's older research facilities and infrastructure must be modernized to efficiently and effectively support DOE research programs and sustain its world-class science efforts**.** This requires modernizing fundamentally sound but older research laboratory buildings so they fully meet the requirements of current and anticipated scientific activities.

  The deferred recapitalization will also be achieved by constructing new buildings using both federal and non-federal funds, to replace buildings that can no longer effectively serve the mission and to enable the Laboratory to fully address 21st Century missions.

  Modernize fundamentally sound but older Research Laboratory Buildings so they fully meet the requirements of modern science.

Construct new buildings using both federal and non-federal funds, to better address 21st Century missions.

To address this issue, the Laboratory requests (a.) that LBNL's SLI LIP funding be focused to correct this issue in an expedited manner after the seismic safety issues are addressed, and (b.) that Landlord (HEP) GPP funds be re-baselined after the seismic hazards are address (beginning in FY 2010).

- **Demonstrate Stewardship of Assets & Funding:**

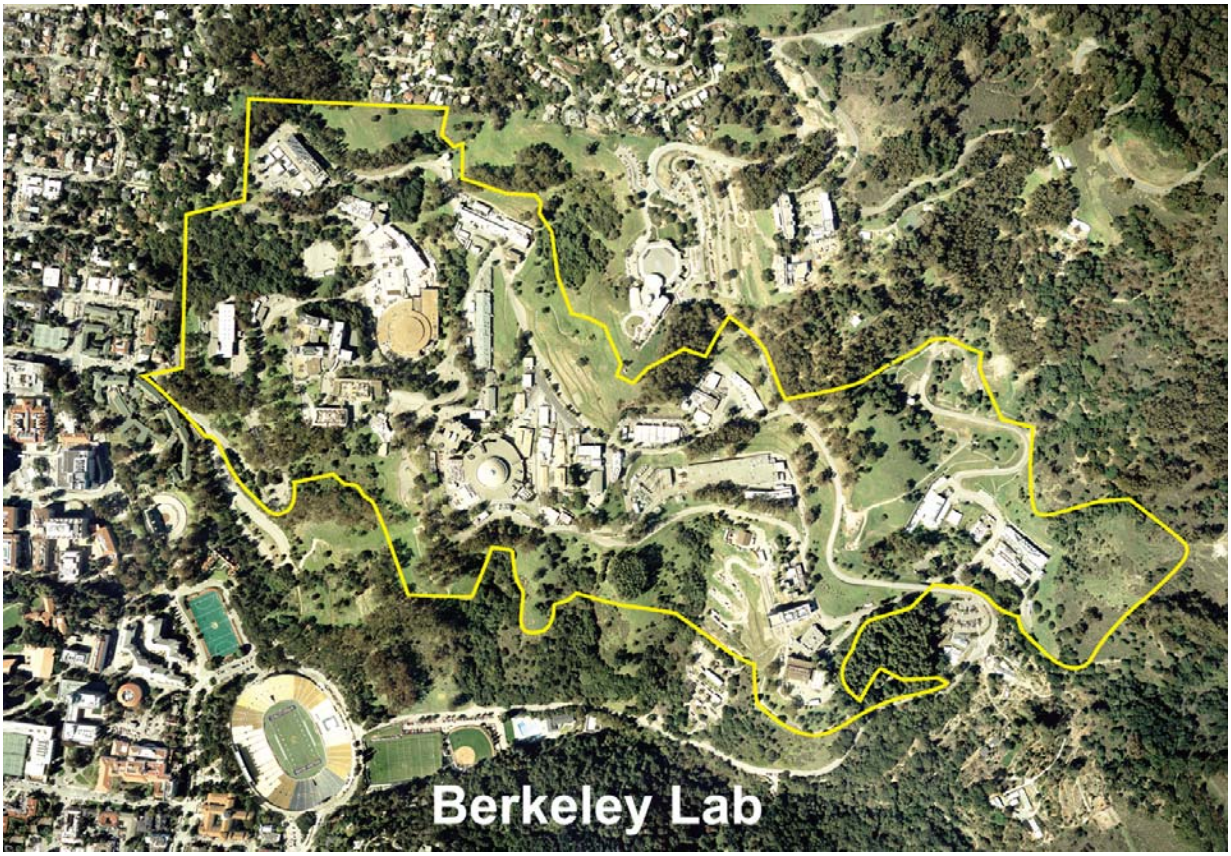
  Demolish legacy Special Purpose/Use buildings constructed by DOE for World War II and Atomic Energy Commission-era missions (especially the Bevatron and "Old Town" complexes) in order to eliminate liabilities and support new missions.

This TYSP covers the FY 2008 to FY 2017 planning period and provides data for FY 2005 to FY 2007 activities. During this planning period, LBNL proposes to work with DOE to address the infrastructure objectives above and correct deficiencies and fully implement its program of facility management that supports sustained research excellence.

# B. Overview of Site Facilities and Infrastructure

LBNL is a U.S. Department of Energy (DOE), Office of Science (DOE-SC, SC) research facility with research focused to achieve scientific breakthroughs in accordance with the SC scientific agenda. LBNL serves the overarching mission of the Department of Energy, "to advance the national, economic and energy security of the United States; to promote scientific and technological innovation in support of that mission …." and the Strategic Goal of the Department of Energy Office of Science "to protect our national and economic security by providing world-class scientific research capability and advancing scientific knowledge" (DOE Real Property Asset Management Plan, August 2005, page 2). LBNL is managed by the University of California for the Department of Energy.

The research mission is accomplished within, and is dependent upon, on the facilities and infrastructure of the Berkeley Lab site. As modern science requires safe, effective and efficient operating standards, and, as Berkeley Lab is home to many highly utilized "user facilities" hosting qualified researchers from other laboratories, universities, and industry, the performance and capabilities of the Laboratory's mission critical facilities and infrastructure are closely monitored and managed.




The Laboratory's primary location is the "Hill site" (delimited in the preceding figure); additional space is occupied on the adjacent University of California, Berkeley campus, and in commercial leased space. DOE buildings on the "Hill-site" are constructed on University of California Regent-owned land under long-term arrangements with the federal government.

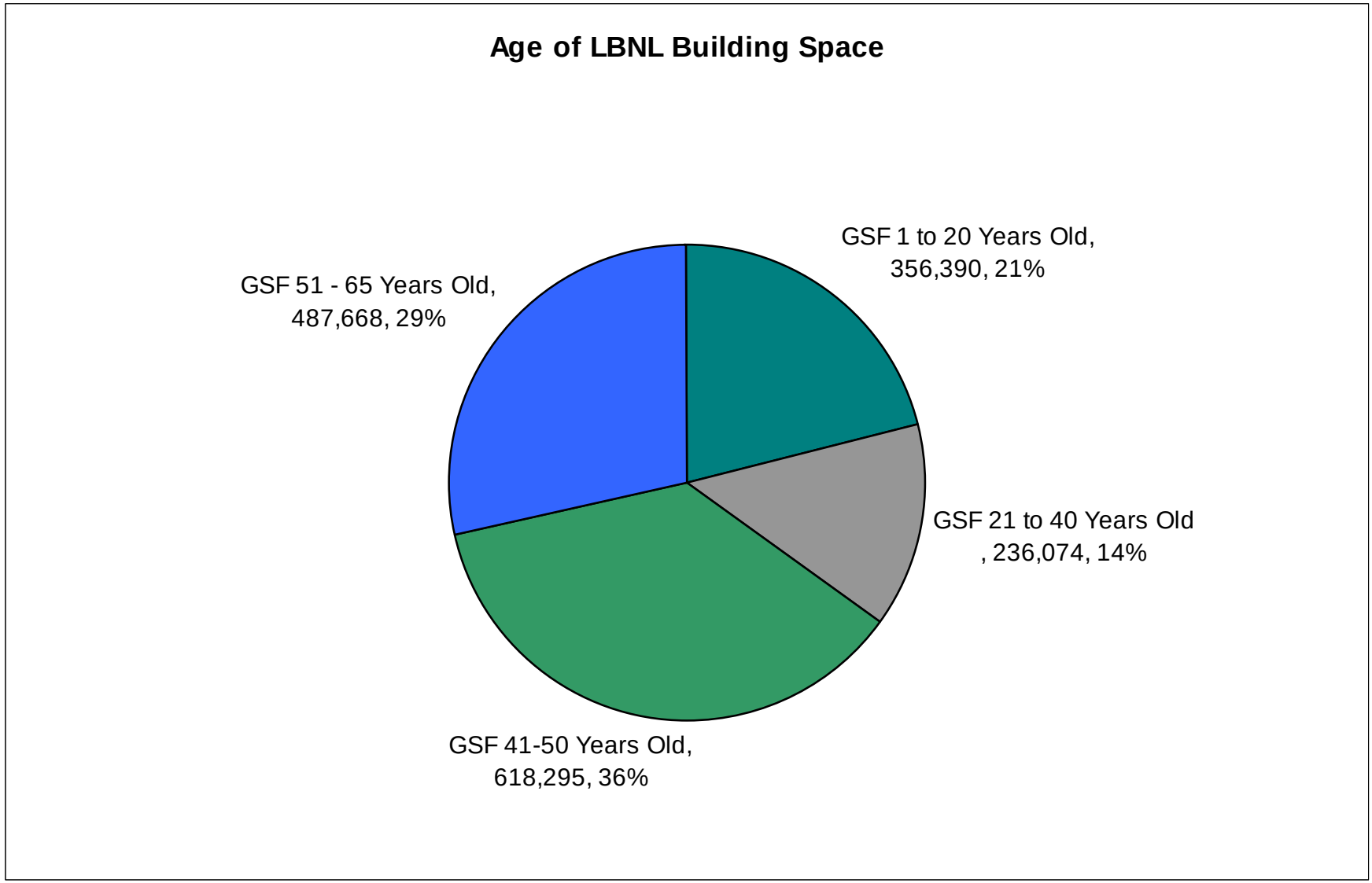
## Statistical Summary

| | |
|---|---|
| Laboratory Established | 1931 |
| | |
| Area of Laboratory (Hill site) | 203 Acres |
| | |
| Total Building Space (gsf)<br><br>JGI = Joint Genome Institute | 2,126,274 incl JGI<br><br>2,064,690 ex. JGI |
| Space in Hill site Buildings and Trailers | 1,702,812 |
| Space on UCB Campus (gsf) (space occupied under terms of the DOE/UC memorandum of understanding.) | 74,879 |

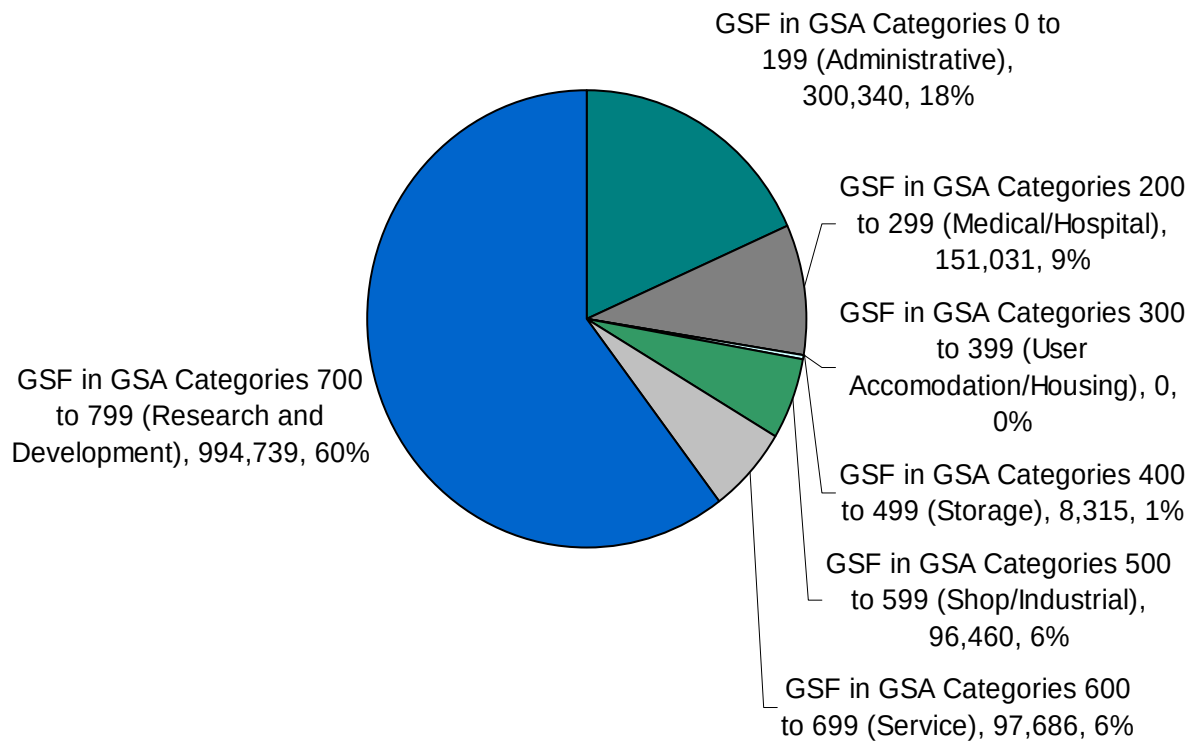
| | |
|---|---|
| Space in Leased Buildings (gsf) [current leased properties are located in nearby communities; including Berkeley, Oakland, Richmond, Walnut Creek (JGI), and Livermore California, in addition to a small office in Washington D.C.]<br>JGI = Joint Genome Institute | 348,583 incl. JGI<br><br>286,989 ex. JGI |
| | |
| Total Hill-site Space (Buildings and Trailers) (gsf) | 1,702,812 |
| Total Building Space (gsf) | 1,648,571 |
| Buildings on Hill-site, number of: | 107 |
| includes two small non-SC-owned facilities listed in FIMS at Berkeley Lab (Building 31, a UC-owned facility that is solely used by DOE SC programs and to be transferred, and Building 71T, an EERE facility) | |
| Total Trailer Space (gsf) | 54,241 |
| Trailers, number of: | |
| Real Property (49,856 gsf) | 37 |
| Personal Property (4,385 gsf) | 13 |
| | |
| Leased Buildings, number of: | 7 |
| Annual Lease Costs (figure does not include JGI): | $6,581,611 |
| | |
| Replacement Plant Value (RPV): 2006 | $788,069,000 |
| Programmatic (OSF 3000 category) | $138,069,000 |
| Non-Programmatic Facilities | $656,912,215 |
| | |
| Landlord Program | SC High Energy Physics |
| | |
| Age of Buildings: Average | 40 years |
| % of space older than 40 years | 65% |

| | |
|---|---|
| % of space between 20 years to 40 years old | 14% |
| % of space 20 years or younger | 21% |
| | |
| Identified Excess Facilities – 2006 and prior (to be demolished): | 13 |
| | |
| Excess Building Space Removed (gsf) | |
| FY 2005 – Building 29D (276 sf) & LEHR credit transfer (79,891 sf) | 80,891 |
| FY 2006 – Buildings 67B, 67C, 71E | 2,988 |
| | |
| Maintenance Investment Index (MII) & Funds allocated for Maintenance: | |
| FY 2005 | 1.7% ($11.05M) |
| FY 2006 | 2.0% ($13.00M) |
| | |
| Deferred Maintenance (DM) | |
| FY 2005 | $52,970,876 |
| FY 2006 (projected) | $51,838,385 |
| | |
| Total 2006 Summary Condition (DM + RIC) : | $181,489,656 |
| Deferred Maintenance (DM) | $ 51,838,385 |
| Rehab and Improvement Cost (based on RIC) | $129,651,271 |
| | |
| Total 2006 Summary Condition Index (TSCI): (percent of Total RPV) | 28% |
| Facility Condition Index (FCI) (based on DM) | 8% |
| Rehab & Improvement Cost Index (based on RIC) | 20% |

Note: Per SC TYSP Guidance - Fall 2005 FIMS data is used In this TYSP; therefore the building and RPV data in this TYSP does not include the Molecular Foundry (Building 67/67A).


Age of LBNL Building Space
GSF 1 to 20 Years Old, 356,390, 21%
GSF 21 to 40 Years Old , 236,074, 14%
GSF 41-50 Years Old, 618,295, 36%
GSF 51 - 65 Years Old, 487,668, 29%

## Space Distribution by GSA Use Code



# C. Current and Future Missions

The Laboratory is engaged in the new scientific directions recognized in the DOE SC twenty-year outlook at emerging science and scientific facilities. The LBNL TYSP directly supports the Office of Science research priorities and facility proposals outlined in SC's *Facilities for the Future of Science: A Twenty Year Outlook*. Berkeley Lab scientists are already hard at work on the underlying science. Facilities in that report that would be fabricated, constructed, or managed at Berkeley Lab include the Supernova Acceleration Probe for a dark energy mission, an upgrade to the National Energy Research Scientific Computing Center, an upgrade to the Energy Sciences Network (ESnet), a Transmission Electron Achromatic Microscope (TEAM), an upgrade to the Advanced Light Source, and an Integrated Beam Experiment. LBNL also plays leading or important roles in developing and fabricating projects planned for other locations, including, as examples, a Double Beta Decay Underground Detector, Relativistic Heavy Ion Collider upgrades, and a Rare Isotope Accelerator. In addition, LBNL contributes strongly to bioenergy and bioremediation research that would be complementary to the strategies being developed by the Office of Biological and Environmental Research. The TYSP sections below describe these valuable projects and related facilities that are emerging as new capabilities that support Office of Science and DOE strategic plans and energy goals.

A current major mission focus is developing long-term solutions to providing carbon-neutral or low-carbon energy supplies, in direct support of the 2005 National Energy Policy Act goals, the DOE Strategic Plan and the LBNL Business Plan. This effort builds on Berkeley Lab's mission capabilities in characterizing and fabricating nanostructured materials and understanding the complexity of physical, biological, and earth systems; capabilities that are well aligned to the 2006 American Competitiveness Act. The Laboratory will continue to develop scientific approaches to the understanding and prevention of disease and its longstanding high energy physics, nuclear physics and astrophysics programs. As a DOE steward of national research infrastructure, the Laboratory provides access to major research facilities including: the Advanced Light Source, a world center for ultraviolet and soft x-ray synchrotron-based science; the National Energy Research Scientific Computing Center (NERSC), a DOE-leading provider for high-performance computing capabilities for complex scientific applications; the National Center for Electron Microscopy for materials science; and the 88-Inch Cyclotron for nuclear science. With one-third of its scientific staff jointly affiliated with university campuses, LBNL delivers a highly capable science and engineering workforce for the nation's future. Founder Ernest Lawrence was the Laboratory's first Nobel Laureate and following that tradition, overall, ten Nobel Laureates are associated with the Laboratory and there are 81 memberships in the National Academies.

### Program Trends and Developments Affecting Facilities

Anticipated missions and program developments are driving forces behind the Ten Year Site Plan (TYSP) and infrastructure needs. For example, the Laboratory will be extensively engaged in

(1) a new Helios program focused on solar energy conversion, advanced bio-energy, and photochemical conversion,

(2) growing user programs in nanoscience at the Molecular Foundry,

(3) expanded petascale computing during the next decade,

(4) a growing astrophysics research effort centered on exploring dark energy,

(5) expanded efforts in synthetic biology and cell systems regulation, including programs related to health;

(6) new ultrafast science research [in collaboration with Stanford Linear Accelerator Center (SLAC) and other institutions];

(7) expanded global climate change research; and

(8) new efforts in nuclear energy science that can contribute to the Global Nuclear Energy Partnership and advanced fuel cycles.

The TYSP provides the facilities and site plan layout consistent with DOE's Five Year Business Plan for Berkeley Lab and updates the mission and program directions for a ten-year view that supports DOE Strategic Plans, DOE programmatic workshops and national priorities.

The TYSP reflects the legacy of past missions from as early as the 1940s, including the need to demolish Manhattan Project era structures in Old Town, and to remove the "legacy" LINAC accelerator in order to seismically stabilize the northwest portion of Building 71 and re-capture approximately 25,000 sf of useful space of research program use. It also reflects the need to seismically upgrade Atomic Energy Commission era buildings and to deconstruct the Bevatron and Building 51. The TYSP also reflects the fully adequate capabilities to meet expanded demands for electric power, as the Bevalac era feeder capacity is more than adequate for planned electrical needs to sustain the ALS and its upgrades, providing for an additional Next Generation Light Source, and the return of the NERSC facility to the main site. The TYSP also directly addresses the fundamental facilities and infrastructure issue – deferred recapitalization – with the "alternative" funding scenario proposed in Section 11. The table below reflects recent and near-term evolution of mission drivers over the term of this TYSP.

| Period | New and Expanding Science | New Experimental & Research Facilities | Infrastructure Needs/Development |
|---|---|---|---|
| 2000-2010 | Nanomaterials; genomics; advanced computing; astrophysics; 3rd generation electron storage rings and instrument engineering: new materials and x-ray science; understood genomes; dark energy discovered; neutrino oscillations | Advanced Light Source; National Energy Research Scientific Computing Center; Genome Sciences Laboratory; ALS Structural Biology Center, Molecular Foundry, TEAM 0.5 and 1.0 Microscope Facilities | Deconstruction of the Bevatron. Modernized laboratories and support spaces. Seismic safety upgrades and replacement space. Demolition of "legacy" accelerator at Bldg. 71 and of "legacy" Special Use/Purpose buildings in Old Town. Select mechanical utility upgrades and replacements. |
| 2010-2020 | Utrafast science and petascale computing; solar energy conversion, advanced bio-energy, and photochemical conversion; synthetic biology and cell systems regulation; global climate change research; nuclear energy science | ALS continuing upgrades and a complementary Next Generation Light Source; Helios Facility; SNAP, Computational Research and Theory Facility; Life Sciences space | Modernized laboratories and support spaces. Final seismic safety upgrades. Select mechanical utility upgrades and replacements. Utility modernization and upgrades. |

## Projected Program Funding and Population Growth

Consistent with the National Competitiveness Initiative, Berkeley Lab will probably have a projected funding growth nearly five percent annually over the next seven years (2006 – 2012). The Laboratory will annually fully serve a “user” population of more than 4000 scientists at its national user facilities, including those for the growing research communities in soft x-ray science, computing, electron microscopy, and genomics. Advanced Light Source (ALS) users will benefit from top-off mode and undulator replacements, substantially improving coherence, and spatial and spectral resolution. Computational scientists will benefit from a doubling of the high end capacity of the National Energy Research Scientific Computing Center (NERSC), to over 800 peak teraflops/s in the next decade, allowing advances in critical DOE mission areas of energy, environment, and advanced technology. A Solar to Chemical Energy program will be initiated that will address the great challenge of providing secure fuels that are low carbon or carbon neutral, essential to the nation’s economic and international security. Health research and environmental remediation will be advanced through a detailed understanding of molecular machinery and predictive modeling systems that will provide designed microbial and plant systems for DOE missions. Carbon sequestration will be demonstrated. The Supernova/Acceleration Probe (SNAP) will be launched in 2014 to reveal the nature of the dark energy. The development of new commercial building systems control technology will benefit the nation’s energy security. These activities and their associated facilities needs are described in the program summary provided below. Significant progress on improved infrastructure can be achieved, including seismic upgrades to buildings. The summary of program funding provided below reflects the implementation of these prospective research developments and is described in more detail in the narrative that follows. The Laboratory population grows at lower rate than the projected funding due to equipment and fabrication activities associated with programs in computing, astrophysics and other areas.

## Summary of Expected Program Funding (excluding construction) and Staffing

Fiscal Year (Constant Year $M)

| Funding Source | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SC – BES** | 90 | 104 | 130 | 140 | 140 | 150 | 150 | 150 | 160 | 160 | 160 | 160 | 160 |
| **SC – HEP** | 39 | 43 | 53 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 | 58 |
| **SC – BER** | 71 | 74 | 75 | 82 | 89 | 91 | 94 | 94 | 94 | 94 | 94 | 94 | 94 |
| **SC – NP** | 18 | 18 | 19 | 19 | 21 | 22 | 22 | 23 | 23 | 23 | 23 | 23 | 23 |
| **SC – ASCR** | 78 | 72 | 84 | 98 | 99 | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 97 |
| **SC – Fusion** | 6 | 4 | 10 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| **SC – Other** | 6 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| **Total SC** | 308 | 324 | 380 | 418 | 428 | 444 | 447 | 448 | 458 | 458 | 458 | 458 | 458 |
| **Other DOE** | 59 | 58 | 65 | 68 | 71 | 74 | 76 | 76 | 76 | 76 | 76 | 76 | 76 |
| **Work for Others & Hmlnd Sec.** | 115 | 119 | 124 | 129 | 134 | 134 | 134 | 134 | 134 | 134 | 134 | 134 | 134 |
| **Total Funding** | **483** | **502** | **569** | **615** | **633** | **652** | **657** | **658** | **668** | **668** | **668** | **668** | **668** |
| **Total Staffing: (FTE's)** | **3,140** | **3,130** | **3,250** | **3,350** | **3,450** | **3,550** | **3,580** | **3,610** | **3,630** | **3,630** | **3,630** | **3,630** | **3,630** |

## Advanced Scientific Computing for DOE Research Programs

Computation at the largest scales possible will be increasingly important to advance the scientific frontiers in every Office of Science (SC) program. Working in close conjunction with SC, Berkeley Lab will provide the facilities for dramatic advances in computational power at NERSC, high bandwidth and reliability with ESnet, and the development of powerful mathematical and software tools.

These efforts will also fulfill SC's high priority for the NERSC and ESnet upgrades in the *Facilities for the Future of Science* roadmap. Berkeley Lab's thrust in computing is to serve the growing SC and national computational science community to deliver new scientific results through expanded capacity and network bandwidth. Berkeley Lab's mathematics, computer science, and computational science programs will provide seminal advances for the Office of Advanced Scientific Computing Research (ASCR) and will contribute to important applications for other SC programs—in particular, through the development and deployment of algorithms, software, and tools, Berkeley Lab researchers funded under the SciDAC program will enhance the productivity of computational scientists, assure the more efficient utilization of terascale platforms, and enhance collaborations across the DOE complex. The construction of a

Computational Research and Theory Facility through alternative financing is essential for the implementation of these programs.

**Advanced Scientific Computing: Current Research, Trends, and Facilities Needs**

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| National Energy Research Scientific Computing Center (NERSC) | Provide leading scientific computing capability and support for DOE science | Increase the computing capability by 10- to 100-fold (petaflop/s computing) for the next-generation simulation science | Existing off-site facility is inadequate to support upgrades after 2010. Location is inefficient and less secure than optimal |
| Computational Research | Develop mathematical tools and algorithms for science applications. Scientific Discovery through Advanced Computing (SciDAC) | Development and evolution of stable tools that can be ported to different computing environments | Consolidation in Computational Research and Theory Facility needed |
| Energy Sciences Network (ESnet) | Provide high bandwidth and reliability for SC's networking needs | Expand bandwidth, backbones, metropolitan area networks, build grid | Consolidation in Computational Research and Theory Facility needed. |

## Basic Energy Sciences

Berkeley Lab is refocusing its strengths to address the national and global needs for sustainable, carbon-neutral or zero-carbon energy and fuels production. This strategy's aim is to yield radical improvements over the long term in the efficiency of solar to chemical energy and photovoltaic cells. To advance this goal, LBNL is proposing a Helios Project to pursue several paths to the solar-to-fuels solution: (1) biological approaches, especially the application of genomics and microbial science to convert cellulose to liquid fuels; (2) the creation of new inorganic nano-particle devices for the collection and conversion of sunlight into electrically driven fuel production; and (3) the synthesis of biological and inorganic components to create hybrid devices that produce fuels. In order to achieve these objectives, a Helios research facility is needed to provide state-of-the-art laboratories for multidisciplinary experimental physics, chemistry, biology, and engineering integrated with special facilities for computational and theoretical studies. Included would be core instrumental facilities for, e.g., mass spectrometry, genome sequencing, and electron microscopy, as well as a variety of thoughtfully-designed interaction spaces. The Facility will be located in close proximity to LBNL's Material Sciences buildings (Buildings 62 and 66) and the Molecular Foundry, and will allow both flexibility and expansion. Because of the need for diverse fuel supplies Berkeley Lab will continue to conduct research on increasing domestic fossil-fuel production, methane gas hydrate characterization, and nuclear waste disposal that are also underpinned by the BES geosciences program.

The photon and electron probes and materials research centers supported by the Office of Science are among the nation's most powerful science tools. 2000 scientists use the Advanced Light Source (ALS) annually; the demand will continue beyond the time horizon of the TYSP. To further meet growing user demands, Berkeley Lab is committed to keeping the ALS at the leading edge of performance. To remain at the cutting edge in high-resolution spectroscopy and x-ray microscopy, and to exploit coherence, the ALS is being upgraded for continuous electron-current fill of the storage ring ("top off mode"). The top-off mode will enable science currently not possible; high demand is expected once the capability is delivered. Further improvements will address user demands for the coming decade. However, the most critical current need is for staging areas and space for users. To this end, the User Support Building is essential for continued programmatic success at the ALS. It also replaces the seismically "very

poor" Building 10. The Laboratory will be constructing the Berkeley Lab Guest House with alternative financing to support the growing ALS user community as well as users of other Berkeley Lab facilities.

In the early planning stages is a complementary Next Generation Light Source that will provide a source of intense, high repetition rate, ultra-short pulse length, soft x-rays for advancing the frontiers of ultrafast science and high resolution studies. Research and development will be conducted for such a machine over the next five years. Several locations at the Laboratory can potentially be used as sites for the facility, with options narrowed as performance specifications become more defined.

The Molecular Foundry has been constructed at Berkeley Lab and now serves a growing base of nanoscience investigators. Work at the facility will serve the DOE community as well as a range of non-DOE sponsoring agencies and industries. The external scientists will benefit from the development of new tools and scientific capabilities at the facility, including methods for the synthesis, characterization, and design of organic and inorganic nanomaterial building blocks; they will also benefit from new capabilities for developing integrated assemblies of organic and inorganic molecular nano-components. New nanodevices and materials will be developed by these users, including materials for electrochemical, photovoltaic, electronic, optical, and other systems in demand by the nation's technology-based economy.

The Transmission Electron Aberration-corrected Microscope (TEAM) is a top tier priority for the SC *Facilities for the Future of Science* roadmap to meet this national technology need. TEAM is being developed as a collaborative project of the five BES electron beam microcharacterization facilities. Led by Berkeley Lab, TEAM will overcome limitations posed by current lens aberration to achieve 0.5-angstrom resolution in real-time with various contrast imaging techniques. The prototype TEAM "0.5" instrument is on track for commissioning in FY 2007, and the TEAM 1.0 instrument is planned for commissioning in FY 2009 or 2010, each instrument will be installed within an existing instrument silo of the National Center for Electron Microscopy.

BES supports basic research in the geosciences that underpins DOE's goal to deliver solutions to growing problems in $CO_2$ sequestration, fossil energy and climate change, geothermal energy, and nuclear energy. Focused field, laboratory, and modeling research will develop the techniques and methodologies to better delineate subsurface fluid flow paths and reactions and engineer the geochemical and microbiological processes. The effort will increase understanding of earth and atmospheric processes by combining new knowledge gained at the atomic-molecular level with conceptual and computational advances for simulating large-scale processes in order to predict, protect, and better utilize critical natural resources. Geoscientists utilize many facilities at LBNL, including the ALS, electron microscopes and NERSC. Laboratories need to be consolidated near offices, and improvements and expansion to Laboratories is needed over the next 10 years.

**Basic Energy Sciences: Current Research, Trends, and Facilities Needs**

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| Basic science for solar energy | Photochemistry; understood and engineered chemical reaction processes; catalysis | Efficient solar to chemical energy systems; hydrogen storage and catalytic systems | Modernization of laboratory spaces; Helios Research Facility (alternative financing) |

| | | | |
|---|---|---|---|
| Vacuum ultraviolet (VUV), soft x-ray, and ultrafast science | Provide VUV, soft, and intermediate x-ray probes for science and technology (Advanced Light Source); Provide systems for synchronized photon pulses at LCLS and other sources | Explore femtosecond and attosecond science in atomic, molecular, and optical phenomena | Modernization of laboratory spaces; ALS upgrades; complementary Next Generation Light Source with high rep rate, ultrashort pulses and high resolution |
| Nanoscience | Provide the characterization, synthesis, and theoretical capabilities to advance nanoscience for both organic and inorganic nanodevices | Synthesize hybrid nanodevices; develop tailored materials and devices with unique catalytic, electronic, structural, and optical performance | Modernization of laboratory spaces; Molecular Foundry; TEAM |
| Geosciences | Understood coupled transport process; reservoir delineation; geochemistry; geophysics; isotope geochemistry | Carbon sequestration strategies; interrelationships among impacts, from local to global level | Improvements to laboratories; replacement of the rock physics laboratory following Bevatron deconstruction |
| Basic Energy Sciences user facilities | Advanced Light Source, National Center for Electron Microscopy Molecular Foundry | Expanding user population | Berkeley Lab Guest House, User Support Building |

## Biological and Environmental Research

Multidisciplinary biology—at the interface of physical, life, and computational sciences promises tremendous value for the nation. There is a growing demand to reveal the molecular mechanisms of living systems' adaptation and response to their environment, to utilize microbes and plants to provide a new basis for fuels production, for clean-up, and carbon sequestration. Genome sequencing serves an expanding user base. Sixty percent of the Joint Genome Institute (JGI)'s sequencing capacity, now over three billion base pairs per month, is being made available to the scientific community through the Community Sequencing Program. The revolutionary advances in biological imaging science can be coupled to other new genomics tools for structural and functional characterization and modeling. The effort will contribute to the new science for designing the machinery, synthetic vesicles, and microorganisms capable of sensing and reporting on the environment, capturing energy, and producing new materials.

Berkeley Lab's environmental research programs will continue to address the major challenges of environmental restoration and global change. Environmental monitoring and analysis focuses on atmospheric, terrestrial, and subsurface processes, such as measuring and modeling climate change, the development of instrumentation to study carbon cycling, and the prediction of water and contaminant transport in the subsurface. Many of the tools and approaches that are developed for environmental applications are also relevant for energy exploration and management. Berkeley Lab will continue to play a central role in DOE's effort to remediate legacy waste and to sequester carbon. As a major component in one of DOE's seven regional centers of $CO_2$ sequestration, Berkeley Lab will have a broad-based effort in terrestrial and geologic sequestration. Due to space constraints, approximately 25,000 sf of offsite leased laboratory space was obtained to support these programs in 2006. Over the next year LBNL will consider if a new OBER laboratory facility will be needed for the biofuels, microbial, and environmental research.

### Biological and Environmental Research: Current Research, Trends, and Facilities Needs

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| Microbial science | Understand microbial organisms and communities | Tailored microbial communities for energy and remediation | Modernization of laboratory spaces. |
| Genome sequencing | Production genome sequencing and targeting micro-organisms and other organisms of significance to DOE | Comparative genome sequencing for DOE applications; community sequencing and ecogenomics | Modernization of laboratory spaces; Existing leased JGI facility is adequate |
| Biological imaging | Optical microscopy; geochemistry; geophysics; hydrology; crystallographic imaging systems; single particle imaging | Novel tools for imaging system dynamics on multiple length and time scales; x-ray tomography | Modernization of laboratory spaces. |
| Global climate change | Measure and model global environmental change; assess environmental impact of energy production and use | Develop models that couple carbon and water flux through the earth system from local to global scale | Modernization of laboratory spaces; Additional research office space will be needed for the growing LBNL program |
| Carbon sequestration | Develop sequestration strategies; Berkeley Lab is one of seven national $CO_2$ sequestration centers | Safely demonstrate carbon sequestration | Modernization of laboratory spaces; Additional research office space will be needed for the growing LBNL program |
| Remediation science | Understand biogeochemical transformation and remediation at contaminated sites | Sustainable, cost-effective, in-situ remediation approaches integrated real-time tracking of biogeochemical processes | Existing labs satisfactory; consolidate location of offices with labs |
| Low-dose radiation | Understand low-dose radiation effects and DNA damage responses | Monitor populations; define susceptibility; modulate and intervene in exposure risk | Modernization of laboratory spaces. |

## High Energy Physics

Berkeley Lab expects to be a leader for the Office of High Energy Physics in accelerator and spaced based experimental programs. The discovery that the expansion of the universe is accelerating marks a major scientific revolution. Berkeley Lab is leading this effort with a SuperNova/Acceleration Probe (SNAP) proposal to measure dark energy by observing distant Type Ia supernovae spectra with a highly instrumented orbiting telescope. SNAP is a top priority of the SC *Facilities for the Future of Science* roadmap. The effort will require sustained engineering labs and expanded office space.

The next generation of accelerator-based research will open an era where laboratory experiments shed light on some of the most profound mysteries of the universe. Supersymmetric particles will likely be discovered at the Large Hadron Collider and precision studies of their properties will be a major focus of the International Linear Collider program (ILC). A continuing program in advanced detectors and computing infrastructure are crucial for these programs. Advanced accelerator technology will need continuous development to build and fully exploit the capability of these machines. The Laboratory will be active in the development of the Linear Collider in the mid term and of the Super Neutrino Beam in the far term. Berkeley Lab will continue to be the leader in superconducting magnet design, particularly

addressing development of materials required for high-field magnets. Berkeley Lab will also advance ion beam technology by studying sources and front-end structures, neutron generators, nanofabrication, and plasma and ion beam tools. It will be important to sustain the laboratories essential to this superconducting magnet and ion source work as Old Town is deconstructed.

Berkeley Lab's demonstration of laser-accelerated beams, with narrow energy spread in fields of ~100 GeV/meter, promises extremely high energy beams with short accelerator structures. Within the current program, we will demonstrate centimeter-scale plasma structures that accelerate high quality beams to multi-GeV energies. Compact, high energy beam sources already offer a new paradigm for a national user facility. The Mesoscale Laser User Facility will advance the scientific frontiers across the Office of Science in high energy density physics, in structural and dynamic studies with femtosecond hard x-rays and electron beam probes, and ultimately, in revolutionary prospects for multi-TeV high energy physics. This effort requires the further rehabilitation of the southeastern portion of Building 71.

**High Energy Physics: Current Research, Trends, and Facilities Needs**

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| SuperNova Acceleration Probe(SNAP)/Joint Dark Energy Mission (JDEM) | Understand the nature of dark energy and dark matter Measure the properties of dark energy | A satellite will be launched in the next decade to increase the discovery rate for supernovae, give experimental measurements of cosmological parameters. | Modernization of laboratory spaces; Expand office space; maintain detector and electronics labs, clean rooms, and assembly areas. |
| Next-generation accelerator-based science | Detectors and experiments to search for the origin of particle mass at the LHC. Search for supersymmetry | Precision studies of supersymmetric particles at the International Liner Collider | Modernization of laboratory spaces; Maintenance of Detector and Electronics Laboratories |
| Laser accelerators | Gigavolt acceleration achieved. Demonstrate multi-centimeter-scale plasma structures that accelerate high quality beams to multi-GeV energies | Develop longer tandem couple plasma structures; achieve teravolt beams | Rehabilitate Southeastern portion of Building 71 to support mission-critical laser, detector, and accelerator development work. |

## Nuclear Physics

Berkeley Lab will continue to be a leader in several key aspects of nuclear physics, with a focus on nuclear structure, quark-gluon matter, and nuclear astrophysics. Over the next two decades, our programs will reveal the nature of the nucleon and nucleonic matter, including the evolution and properties of the quark-gluon plasma, the structure of stable nuclei and those at the limits of stability, and the properties of neutrinos. While the overall level of the research program will be relatively constant, the Berkeley Lab efforts in the Rare Isotope Accelerator (RIA), Double Beta Decay, and the e-RHIC detectors, all of which are in the Office of Science *Facilities for the Future* plan, will grow. In addition, stable 88-Inch Cyclotron operation, with modifications, will sustain the program during the ten years of this site plan.

Berkeley Lab will sustain its leadership in non-accelerator-based nuclear physics, including the development of neutrino experiments worldwide and the double beta decay experiments planned in the U.S. The Double Beta Decay Underground Detector experiments for understanding neutrino physics are a mid-term priority in SC plans and a key part of the NSF initiative to build a deep underground laboratory.

The Department of Defense and the Office of Nuclear Physics have expressed a commitment to support nuclear physics and space radiation simulation testing at Berkeley Lab's 88-inch Cyclotron through at least the mid-term of this TYSP. The Cyclotron provides a valuable low energy nuclear physics machine in the short term, and can form the basis of a cost-effective Stable Beams Facility in the RIA era. The facility has the capabilities for light and heavy ion beams, high intensity heavy-ion beams, and cocktail beams for efficiently simulating the space radiation environment. The facility is also installing a neutron beam line that will contribute data on isotope neutron cross sections important to the Global Nuclear Energy Partnership and Advanced Nuclear Fuel Cycle studies.

**Nuclear Physics: Current Research, Trends, and Facilities Needs**

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| Nuclear matter | Understanding nuclear matter under extreme conditions | Explore the properties of short-lived isotopes | Modernization of laboratory spaces; Rare isotopes facilities (located elsewhere) |
| Quark gluon plasma studies | Understanding phase transitions of nuclear matter at extremely high temperatures | Explore new phases of nuclear matter at the highest achievable temperatures and pressures | Modernization of laboratory spaces; Relativistic Heavy Ion Collider and its upgrades (located elsewhere) |
| Neutrino science (some projects sponsored by High Energy Physics) | Understanding properties of neutrinos and their impact on the cosmos | Determine the absolute mass scale of neutrinos; search for evidence of charge parity (CP) violation in lepton sector | Modernization of laboratory spaces; Underground research lab (NSF) for double beta decay; experiments at Daya Bay (with HEP) |
| Low energy nuclear research at the 88-Inch Cyclotron | Low energy nuclear physics, nuclear structure, and space radiation simulation for DOE | Stable isotopes facility consistent with the Nuclear Physics Long Range Plans; support nuclear energy through neutron cross sections | Modernization of laboratory spaces; Sustained infrastructure for the 88-Inch Cyclotron consistent with current scope and potential stable isotope facility |

## Fusion Energy Sciences

Berkley Lab is developing a strong high energy density physics research program and the Heavy Ion Fusion Virtual National Laboratory collaboration is advancing inertial fusion energy research based on heavy ion drivers. Additionally, Berkeley Lab's capabilities in diagnostic neutral beams and niobium-tin (Nb3Sn) magnets can support the success of a magnetic confinement research program at the International Thermonuclear Experimental Reactor (ITER). Both of these programs will contribute to the success of SC's Fusion Energy Sciences research program.

Heavy ions are excellent for studying high energy density physics by uniformly heating thin target plasmas with peak energy deposited in a location near the target center. The primary challenge for exploiting these properties when creating high energy density matter and fusion ignition conditions is to compress the beam's time to short durations compared to the target disassembly time, while also focusing on a small spot to deposit high energy density. We will pursue these challenges with an objective of establishing the physics basis for a heavy-ion accelerator capable of producing 1 to 10 eV solid density plasmas with uniformity and diagnostic resolution to discriminate the predictions of various *ab initio* theories for strongly-coupled plasmas. For the next five years the overall trend in Fusion Energy Sciences supported research is expected to be stable, with most research in the Building 58 vicinity with modest upgrade and/or extensions to the existing building as the size of experimental facilities dictates. With the removal of the SuperHilac from Building 71, that building can serve as the location for the Integrated Beam Experiment (IBX) that is included in the SC Facilities for the Future roadmap. Progress on larger scale engineering systems will likely be located offsite towards the end of the next decade.

**Fusion Energy Sciences: Current Research, Trends, and Facilities Needs**

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| Ion beams and magnet systems | Ion-beam driven high energy density physics | A user facility for studies of warm dense matter | Demolition of Old Town; consolidation in Building 71 |
| Heavy ion drivers | Heavy ion inertial fusion energy drivers (AFRD) | Development of a robust, cost-efficient, ion-based fusion driver | Upgrade of Building 58; renovations |

## Science and Engineering Workforce

Berkeley Lab provides for the education and training of future scientists, computer scientists, and engineers to meet the DOE mission. More than 1000 employees, including postdoctoral associates and graduate and undergraduate students are educated and trained through mentored research participation each year. Precollege programs promote careers in science and technology through summer work opportunities for high-school juniors and seniors and science teachers. The Office of Science supports undergraduate student and faculty fellowships. Programs include the Student Undergraduate Laboratory Internship, the Community College Institute, a Preservice Teacher Program, and Faculty and Student Teams. Berkeley Lab recruits students from minority-serving institutions to increase representation of underrepresented minorities in science and engineering in the national applicant pool. Education partnerships and outreach focus on local schools and colleges, ensuring the participation of a diverse population of students. The Berkeley Lab Guest House will greatly aid visiting graduate students and post doctoral associates in their access to LBNL facilities.

**Science and Engineering Workforce: Current Program, Trends, and Facilities Impact**

| Program Area | Current Activities | Trends/New Directions | Facilities Impact |
|---|---|---|---|
| Office of Science and DOE | Undergraduate research internships and preservice teacher training | Expanded efforts to build science pipeline | New location for program due to Old Town deconstruction |
| Other federal agencies, industry | Training graduate students and postdoctoral associates | New training in nanoscience and synthetic biology, etc | Berkeley Lab Guest House (UC funded facility) |

## DOE Energy Technology Research Programs

Berkeley Lab also has a leadership role in understanding nuclear waste disposal and the enhanced exploration of resources that are critical for securing a viable near-term energy future, including oil, gas, and geothermal. Berkeley Lab is well positioned to make substantial contributions to U.S. domestic production capacity through its leading role in geophysical imaging technology and its many existing research and development relationships with domestic producers. Berkeley Lab leads a national effort in nuclear waste site characterization at Yucca Mountain, and also plays a leadership role in exploring chemical reactivity and mechanisms in gas phase combustion, homogeneous and heterogeneous catalysis, chemical and physical processes in the earth, and the environmental degradation of radioactive compounds.

### DOE Energy Technology Research Programs: Current Research, Trends, and Facilities Needs

| Program Area | Current Research | Trends/New Directions | Facilities Needs |
|---|---|---|---|
| Civilian radioactive waste management | Berkeley Lab leads studies of the vadose zone where waste will be implaced at Yucca Mountain | Characterize other sites; assess alternative advanced fuel cycle wastes | Provide adequate office space; consolidate offices with labs |
| Energy efficiency and renewable energy | Lighting and control systems; commercial building systems; understood international energy issues; solutions to global carbon emissions | Integrated building control systems for high efficiency; energy efficiency assistance to China and developing nations | Renovations and upgrades needed in lighting and window labs; office building improvements; relocate from trailers and demolished structure |
| Electricity Reliability (and DHS) | Robust electricity transmission and distribution; power quality to meet customer needs | Demand response to reduce electric load in commercial buildings and industry | Office building improvements. |
| Fossil Energy | Understood and engineered chemical reaction processes Understood local, regional, and global impacts of fossil fuel combustion | Improved petroleum discovery and recovery; hydrogen storage and catalytic systems; interrelationships among impacts, from local to global level; carbon sequestration | Renovations and upgrades needed in chemistry labs; office building improvements |

## Homeland Security and NNSA

Berkeley Lab will utilize its specialized scientific and engineering capabilities to conduct unclassified research for homeland security and defense. Some of the science Berkeley Lab will offer for this national need includes: aerosol transport modeling, compact neutron sources for non-invasive container inspection, environmental characterization for threat agents, forensics and diagnostic analysis, structural biology of microbes, advanced information technology for cyber-security, infrastructure protection, and ultra-sensitive detectors. The Laboratory is identifying, synthesizing, and testing new detector and scintillator materials using first principles materials sciences, quantum science, and dedicated facilities. Such detectors will be essential for identifying contraband nuclear materials in transit. The most impacted facility is the ion probes laboratory which must be relocated for the deconstruction of the 1944 facility in Old Town. Seismic upgrades are also needed in the area of scintillator work in building 55.

### Homeland Security and NNSA: Current Research, Trends, and Facilities Needs

| Program Area | Current Program | Trends | Facilities needs |
|---|---|---|---|
| Detector systems for security and nonproliferation | Develop neutron probes, sensors, gamma ray, and charge particle detectors for security applications | High sensitivity sensors for rapid detection of threat agents including nuclear and biomaterials | Rehabilitate Southeastern portion of Building 71 to support mission-critical laser, detector and accelerator development work, including ion beam/neutron beam test stands. |

## Work for Others

Non-DOE sponsored research at LBNL complements DOE's mission and strengthens distinguishing competencies. The largest sponsor is the National Institutes of Health for research in cancer biology, genomic expression, structural biology, DNA repair, and diagnostic imaging. NIH support will continue to grow, building on LBNL expertise in biophysics, genome sciences, and instrumentation such as x-ray tomography and crystallography beamlines at the ALS. The Department of Defense will continue to sponsor breast cancer research, the use of particle beams to simulate the space radiation, and detector development and computational research. The Department of Homeland Security is not treated as WFO program (description above), although it is tabulated in the WFO base (see paragraph close). Berkeley Lab conducts space radiation effects studies, astrophysical research, and detector development for NASA. Berkeley Lab will sustain research for the California Energy Commission, the Environmental Protection Agency and other federal and state agencies, universities and the private sector. Although the amount of WFO funding will increase, as a share of LBNL research activity, WFO will be stable (in the range of 20-21 percent of operating and equipment funding).

### Work for Others: Current Research, Trends, and Facilities Needs

| Program Area | Current Program | Trends | Facilities needs |
|---|---|---|---|
| National Institutes of Health | Develop molecular, cellular, and tissue models of disease; cancer biology; genomic expression; structural biology; DNA repair; and diagnostic imaging | Quantitative understanding of disease causes and prevention; high-throughput analysis; paradigms for genetic variation | No specific special requirements. |
| Other Work for Others | Breast cancer (DOD); environmental science; energy efficiency (EPA); astrophysics (NASA), state, private | Joint Dark Energy Mission with NASA has largest potential for rapid growth. | No specific special requirements. |

## Summary of 10 Year Programmatic Facilities

| Project | Size and Waiver Status | Demolition Needs | FIMS Date; RPV and Maintenance Need | Site Impacts: staffing; office space, cafeteria, machine shops; utility capacity; traffic and parking |
|---|---|---|---|---|
| User Support Building | 30,000 gross square feet/waiver approved | Building 10 | 2010 | Parking to be provided adjacent to building |
| Transmission Electron Aberration-corrected Microscopes 0.5 & 1.0 (TEAM) | Existing building | None | — | None |
| Advanced Light Source (ALS) upgrades | Existing building | None | — | None |
| Helios Research Facility | 90,000 gross square feet | None | Non-Federal financing | Parking to be provided close to building |
| Computational Research and Theory Facility | 90,000 gross square feet | None | Non-Federal financing | Parking lot to be added close to building |
| Next Generation Light Source (NGLS) | 150,000 gross square feet/Waiver if Bevatron and/or other demolition projects are delayed | TBD | 2013 | Parking lot to be added close to building |
| Genomics (GTL) * | 95,000 gross square feet | None | 2012 | Parking lot to be added close to building |
| AFRD consolidation adjacent to Integrated Beam Experiment | Existing building | Remove Hilac | — | Parking area to be created close to building |
| Berkeley Lab Guest House | 24,000 gross square feet | None | Non-Federal financing | Extend cafeteria hours / services |

* - To be determined after review of DOE BER mission documents anticipated during the summer of 2006.

# D. Facilities and Infrastructure

## 1. Vision, Goals and Strategy

LBNL serves the DOE Office of Science mission with a continuing tradition of scientific excellence. LBNL is unique among the Office of Science Laboratories, being home to ten (10) Nobel prize winners, and the work of its scientists and engineers has been recognized with numerous other awards and prizes. LBNL is also uniquely qualified and situated to achieve seminal breakthroughs under DOE's scientific missions in the early 21st Century.

The research mission is accomplished within, and is dependent upon, on the facilities and infrastructure of the Berkeley Lab site. As modern science requires exacting operating standards, and, as Berkeley Lab is home to many highly utilized "user facilities" hosting qualified researchers from other laboratories, universities, and industry, the performance and capabilities of the Laboratory's mission critical facilities and infrastructure are closely monitored and managed. This TYSP outlines mission objectives in the FY 2005 – 2017 TYSP period, a concurrent need to address the following three primary mission-driven Facilities & Infrastructure objectives has been identified for this period. These three equally important TYSP objectives directly support the Laboratory's vision of continuing to provide outstanding breakthrough support to DOE SC.

- **Correct Seismic Safety Hazards:**

  Correct structural deficiencies that would allow some buildings to partially or fully collapse during a seismic event, and construct two replacement GPP-scale office and laboratory buildings to allow staff in seismically poor buildings that can not be cost-effectively upgraded to move to seismically safe spaces.

  To address these safety issues consistent with Federal Accounting regulations, the Laboratory requests (a.) an augmentation of Landlord (HEP) GPP funds for three years beginning in FY 2007, (b.) SC Operating funds to remove an abandoned NP accelerator that is identified as the root-cause of a predicted partial building collapse (funding requested in FY's 2007 & 2008), and (c) and that LBNL's SLI LIP funding be focused to correct seismic safety issues in an expedited manner.

- **Modernize Older Research Facilities and Infrastructure to Sustain World-Class 21st Century Science:**

  Modernize fundamentally sound but older Research Laboratory Buildings so they fully meet the requirements of modern science.

  Construct new buildings using both federal and non-federal funds, to better address 21st Century missions.

  To address this issue, the Laboratory requests (a.) that LBNL's SLI LIP funding be focused to correct this issue in an expedited manner after the seismic safety issues are addressed, and (b.) that Landlord (HEP) GPP funds be re-baselined after the seismic hazards are address (beginning in FY 2010).

- **Demonstrate Stewardship of Assets & Funding:**

Demolish legacy Special Purpose/Use buildings constructed by DOE for World War II and Atomic Energy Commission-era missions (especially the Bevatron and "Old Town" complexes) in order to eliminate liabilities and support new missions.

## 2. Process for Identifying Facilities and Infrastructure Needs and Development of Plans to meet the Vision, Goals and Strategy

The Laboratory assesses the capabilities of the buildings and infrastructure both with a regular (five-year cycle) survey of the physical condition of each asset, and with an annual suitability assessment directed to identify those assets that require alterations to better meet current and foreseeable research mission requirements, assets that need to be adapted for new uses, and those assets which need to be demolished as they can no longer cost-effectively serve modern missions. The Associate Laboratory Directors for Computing, General Sciences, Life and Environmental Sciences and Physical Sciences have taken an active role is assessing facilities needs and space planning. The Overall TYSP development is periodically reviewed by a steering committee and approved by Laboratory Leadership prior to submission to the Berkeley Site Office.

## 3. Land Use Plan

Within the University of California system, each campus and Laboratory periodically prepares a Long Range Development Plan (LRDP) to guide the future physical development of the facility. The LRDP identifies the physical development needed to enable the Laboratory to achieve its scientific objectives during a planning period of approximately two-decades.

Berkeley Lab's LRDP was prepared in 1987, this document will reach the end of it's intended twenty-year outlook in 2007. A revised LRDP, along with its accompanying Environmental Impact Report (EIR), is currently being prepared. These new documents will provide a planning framework for Berkeley Lab for the early decades of the 21$^{st}$ Century.

The Laboratory's Land Use Map is attached in Appendix 2.

## 4. Excess Real Property

Consistent DOE Operating Funding is at the base of the Laboratory's efforts to remove surplus/excess facilities. These are facilities that were:

a.) constructed to serve missions no longer supported by the DOE and which are not cost effective or suitable for full adaptive reuse, or,

b.) have been condemned and abandoned in place pending demolition.

Due to the high rate of asset utilitization at LBNL (98%), buildings are typically formally identified as excess in the year they are to be demolished (typically as replacement space is developed). At this time, the Bevatron and the associated Building 51 structure are the Laboratory's major excess facility, and the highest priority for demolition.

Demolition of this facility (and under the alternative planning scenario, in the later years of this TYSP, the "Old Town" structures) will eliminate buildings that are less than fully suitable for modern scientific research and cannot be effectively upgraded, and will both reduce the deferred maintenance backlog as they are removed, and allow for development of future new modern research facilities.

The ***Bevatron Redevelopment Area*** produces a 4.4 acre development site for modern new buildings. The Laboratory has proposed dismantling, decontaminating as required, and demolishing the Building 51 Bevatron Complex. The work includes removal of the accelerator, shielding, buildings, related structures, and surface foundation. This site would then be productively used to meet DOE's emerging scientific missions.

The abandoned Bevatron accelerator cannot be adaptively reused and should be removed. The Bevatron comprises 126,500 gsf of space at the Laboratory.

The mission of the Bevatron and Building 51 ended in 1993 with the last experimental run. The building accounts for 7.5% of the built space at the Lab and it occupies over 4 acres of centrally located, flat real estate in the hilly terrain of LBNL.

The demolition and removal of Building 51 and the Bevatron would have the following benefits to the Department of Energy:

- Eliminate approximately 126,500 gsf of excess facility space.
- Implement compliance with requirements established in the Congressional Conference Committee Report 107-258 that accompanied the Fiscal Year (FY) 2002 Energy and Water Development Appropriations Bill that at each DOE site the construction of new facility space be offset by the elimination of an equal amount of excess space at the site.
- Respond to conditions set by Secretary Abraham's approval of a Waiver of Requirement for Eliminating Excess Space at LBNL to allow construction of the Molecular Foundry. The approval letter directed the Office of Science to prepare a plan, including a schedule, for the demolition of Building 51 and the Bevatron. The Office of Science (SC) was directed to submit the plan to Under Secretary Robert G. Card, and to the Office of Management, Budget and Evaluation (OMBE) by May 1, 2004. The waiver requires that the plan demonstrate a commitment to commence the disposition process promptly in compliance with congressional direction.
- Support the Office of Science's Strategic Plan by providing a clear, centrally located spot at the LBNL site capable of accommodating a major DOE scientific facility.
- Remove a building code deficient, seismic risk with a porous roof.
- Remove an abandoned 180-foot diameter accelerator and safely dispose of the resultant low level, mixed, hazardous and common waste materials in a cost-effective manner.
- Respond to community stakeholders, "asking LBNL for timely environmental reviews and….requesting that the Department of Energy allocate funds to complete the Bevatron deconstruction in a manner acceptable to the community." (March 11, 2003 letter from the Berkeley City Manager advising the Mayor and City Council regarding "Bevatron deconstruction.")

- Eliminate future maintenance costs.

Demolition and removal methods will be impacted by adjacent occupied buildings, central location and community/environmental sensitivities. Dismantling, as well as, more conventional demolition methods will be used: particular attention will be paid to material characterization, separation and safe disposal.

Berkeley Lab has three priorities in area of Excess Property Demolition –

- The Bevatron
- Old Town
- Small un-sound and condemned structures

SC 31.2 guidance for the 2006 TYSP identifies only the first priority, the Bevatron, for demolition funding during the term of this TYSP:

SC 31.2's guidance shown in the Table "Currently Planned Excess Facilities Disposition Funding Plan by Site ($000)", includes the following line for LBNL:

| Lab | FY05 | FY06 | FY07 | FY08 | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15 | FY16 | FY17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LBNL | 1,360 | 10,900 | 14,000 | 6,145 | 7,204 | 14,000 | 14,000 | 14,000 | | | | | |

This funding profile was recently reviewed, and more effective, efficient and mission-supportive alternative has been identified. Based on recommendations from a November 2005 Lehman review of the Building 51 (B51) and Bevatron Demolition Project, a new management and engineering team was established and charged to identify the optimal demolition program. This new team has proposed the most efficient plan for completing the project. This alternative approach will allow the project to be completed in 2009 for an additional savings of $6.5M.

| $M | FY07 + Prior | FY08 | FY09 | FY10 | FY11 | FY12 | Total |
|---|---|---|---|---|---|---|---|
| Current Funding Plan | 26.4 | 6.1 | 7.2 | 14.0 | 14.0 | 8.0 | **75.9** |
| Most Efficient Funding Plan | 26.4 | 22.0 | 22.0 | 0.0 | 0.0 | 0.0 | **69.4** |

Note: The FY 2007 figure is consistent with the SC guidance provided for this TYSP; this figure is subject to change.

It is suggested that DOE fund the Building 51/Bevatron Demolition Project as shown in the "Most Efficient Funding Plan" above in order to reduce the cost of the work by $6.5M, complete the project four years earlier, take advantage of the assembled team of experts and provide excess facilities space at LBNL for future new construction. If DOE were to fund the Building 51/Bevatron Demolition Project in FY 2007, and increase FY 2008 and FY 2009 appropriations to $22M in each year, the project to be completed in 2009 for an additional savings of $6.5M, and the site would be available to the re-deployment in service of the DOE SC mission in FY 2010.

# 5. Long Term Stewardship

Once a facility is declared excess and becomes non-operational Berkeley Lab secures the facility by locking it tight, posting it and disconnecting all non-essential utilities and systems. In most instances the only remaining active systems are the fire alarm and fire sprinkler systems. Both fire systems continue receiving necessary maintenance and are monitored through a central control system. The facility is placed on a routine surveillance program where the exterior of the facility receives physical inspections on an on-going basis by the Plant Operations Department in the Facilities Division. The security of the interior of the excessed facility is managed by Lab Security in EH&S. This process continues until demolition occurs.

# 6. Replacement Plant Value (RPV) Estimates

SC has provided guidance that "the RPV for SC sites that will be used in the FY 08 budget process and for estimating out year RPV levels is the RPV at the end of FY 05". The TYSP guidance has identified the following figures for use by LBNL in the 2006 TYSP:

RPV Change from FY04 to FY 05

| LAB: | FY 04 RPV | FY 05 RPV | RPV Change FY 04 to FY 05 |
|---|---|---|---|
| LBNL | $650,000,000 | $656,912,215 | $6,912,215 |

This figure is used by LBNL in preparation of this TYSP and in maintenance planning.

LBNL's Replacement Plant Value (RPV) cost models have been developed by Vanderweil Facility Advisors (VFA) and reported to the Department of Energy (DOE) Facilities Information Management System (FIMS) as a Site Derived RPV. As a Site Derived RPV being inputted into FIMS, a reporting format and calculation process was created to calculate RPVs following FIMS reporting requirements. Three key areas were identified; Asset Information, the VFA Current Replacement Value (CRV) Cost Model method and development, and FIMS Required Facility Site Factors. The Asset Information comes directly from FIMS and is maintained in the VFA.facility database with the exception of the Complexity component. The asset complexity component definitions were derived from UCOP Facilities Infrastructure Renewal Model 2004 and applied to each asset accordingly. Different Site Factor percentages (low, best, and high) were applied based on Complexity and Gross Square Feet of the asset to create a more accurate RPV. The VFA CRV Cost Model data was collected by VFA inspectors, estimated using RSMeans libraries and resides in the VFA.facility database. The FIMS Required Facility Site Factor portion of the reporting format includes Cost Types and formula used in the FIMS Standard Format for calculations listed in the FIMS Users Guidelines. One addition to the FIMS Standard Format is Seismic Costs that the DOE SC RPV Validation Team has required LBNL to incorporate into our Site Factor calculations.

Cost models are an integral feature of VFA's methodology. They are used in the VFA software when projecting long-term lifecycle renewals and when calculating asset replacement values. Therefore, maintaining the accuracy of the cost models is a top priority. VFA has developed a methodology that models the replacement value of assets, specifically buildings, at the system level following the NIST Uniformat Category II Elemental Classification system. The unit costs of the systems in the building are assigned according to their configuration and material. The replacement cost of the building as a whole is derived from the sum of unit costs of the

component systems. As such, the model as constructed can accommodate variations between similar assets and can approximate the composition of a particular asset more definitely than a model based at the building level only. VFA employed this methodology in the development of cost models for Berkeley Laboratories.

The 2006 TYSP RPV Projections table below is Berkeley Lab's estimated RPV's for FY08 through FY17. Included in the table are additions from new and forecasted facilities, eliminations for future demolition targeted facilities, and escalation.

## RPV Projection Calculations

| | A<br>RPV of existing facilities<br>(Use RPV for FY 05 from Section III, SC Framework for Facilities and Infrastructure)<br>$656,912,215 | B<br>Estimated Additions in: | B<br>Description | B.1<br>Estimated Additions in: | B.1<br>Description | B.2<br>Estimated Eliminations in: | B.2<br>Description | B.3<br>Estimated Escalation Additions in: | B.3<br>Description | Total Estimated RPV (sum of columns A - B.4) |
|---|---|---|---|---|---|---|---|---|---|---|
| FY 08 | $656,912,215 | $52,013,343 | New Facility B67 Molecular Foundry | $9,318,614 | Grizzly Substation | $1,530,100 | Demolition of Bldgs. 29A - C and 67B, 67C | $78,376,773 | FY05 - 08 Escalation | $795,090,845 |
| FY 09 | $795,090,845 | | | | | $6,192,006 | Demolition of Bldgs. 10, 40, 41, 71E, 73A | $18,144,673 | 2.3% FY09 Escalation | $807,043,513 |
| FY 10 | $807,043,513 | $31,600,000 | New Facility User Support Building - BES | | | | | $19,288,801 | 2.3% FY10 Escalation | $857,932,313 |
| FY 11 | $857,932,313 | | | | | $89,749 | Demolition of Bldg. 75E | $19,730,379 | 2.3% FY11 Escalation | $877,572,943 |
| FY 12 | $877,572,943 | $100,000,000 | New Facility Genomics: Genomes To Life (GTL) Facility – BER* | | | | | $22,484,178 | 2.3% FY12 Escalation | $1,000,057,121 |

| | A<br>RPV of existing facilities<br>(Use RPV for FY 05 from Section III, SC Framework for Facilities and Infrastructure)<br>$656,912,215 | B<br>Estimated Additions in: | B<br>Description | B.1<br>Estimated Additions in: | B.1<br>Description | B.2<br>Estimated Eliminations in: | B.2<br>Description | B.3<br>Estimated Escalation Additions in: | B.3<br>Description | Total Estimated RPV (sum of columns A - B.4) |
|---|---|---|---|---|---|---|---|---|---|---|
| FY 13 | $1,000,057,121 | | | | | $867,317 | Demolition of Bldg. 50C | $22,981,365 | 2.3% FY13 Escalation | $1,022,171,170 |
| FY 14 | $1,022,171,170 | $190,000,000 | New Facility Next Generation Light Source (NGLS) - BES | | | $1,679,289 | Demolition of Bldg. 50D | $27,841,313 | 2.3% FY14 Escalation | $1,238,333,194 |
| FY 15 | $1,238,333,194 | | | | | | | $28,481,663 | 2.3% FY15 Escalation | $1,266,814,858 |
| FY 16 | $1,266,814,858 | | | | | | | $29,136,742 | 2.3% FY16 Escalation | $1,295,951,599 |
| FY 17 | $1,295,951,599 | | | | | | | $29,806,887 | 2.3% FY17 Escalation | $1,325,758,486 |

* - To be determined after review of DOE BER mission documents anticipated during the summer of 2006.

# 7. Maintenance

LBNL has implemented a Strategic, Integrated Facilities Condition Management Program. This program is enabling the Facilities Division to manage maintenance decision-making using current accurate data, and to monitor and address the Lab's deferred maintenance backlog efficiently and effectively. VFA's software including VFA.facility and AssetFusion VFA's integration with MAXIMO, the Facilities Division Work Management System, gains access to versatile and extensive capabilities for reporting and modeling, improving the accuracy of building cost estimates, estimating time to failure and optimal period to take action, and improves the quality of the information gathered.

LBNL uses MAXIMO as its Work Management System (WMS). Preventive, Predictive, Corrective, and Emergency Maintenance work is performed using MAXIMO to keep Berkeley Lab equipment running efficiently. PM's are used to plan for regular maintenance work by planning the labor, material, and tool needs of our regularly scheduled maintenance and inspection work orders. Preventive, Corrective, and Emergency Maintenance work hours are track monthly to determine the pro-activeness of our Maintenance program.

Annually maintenance project candidates are reviewed during the planning process with different strategies for maintaining a targeted asset condition level based on the strategic value to the Berkeley Lab Mission, requirement priority, varying spending, timing and project content to see the impact on facility condition and deferred maintenance over time. Grouping maintenance requirements across the facilities and sites allows us to identify opportunities to bundle projects cost effectively, and to readily identify the intersections of multiple projects ensuring that the existing project's scope of work is not duplicated. The current condition of the asset and the consequences of failure are assessed to determine the planning year of the project.

During the early years of this TYSP, LBNL will implement further process improvements such that Corrective and Emergency Maintenance work will be analyzed using Reliability Centered Maintenance (RCM) and the Failure Modes Effects and Criticality Analysis (FMECA) processes. RCM is a systematic way of identifying failure modes within equipment and determining appropriate maintenance tasks to combat the failures. The FMECA is the heart of the RCM process. This systematic approach when coupled with plant information about plant failures, costs, safety impacts, environmental impacts, and operational criticality will allow Facilities Plant Operations to set appropriate tasks and maintenance intervals to generate a strategy that is optimized to the needs of our business.

For a completely integrated Asset Management Solution, links between LBNL's Work Management System (MAXIMO) and Capital Planning and Management System (VFA facility) will be established to provide a more complete picture of associated projected and actual cost for routine/preventive maintenance, repair, capital renewal, and multi-year capital requirements. The integration of these two systems involves more than data synchronization. The integration will allow LBNL to manage all facilities assets in a more proactive manner, and to reduce reactive maintenance actions. The integrated system will provide solid knowledge of the deficiencies that must be corrected. When all of the deficiencies have been consolidated, it is far more difficult to omit critical items from the design of on-going renovation projects.

Moreover, this tool will be used to organize and prioritize all deficiency corrective measures using standardized criteria.

The below table shows the Laboratory's Funding Plan for FY08 through FY17

| | SC Goal Maintenance Based on 2% of RPV using RPV estimate in IV.D.6 | Site Maintenance Funding Plan | Explanation if Funding Plan does not meet goal or results in deferred maintenance |
|---|---|---|---|
| FY 08 | $15,901,817 | $15,901,817 | Not applicable |
| FY 09 | $16,140,870 | $16,140,870 | Not applicable |
| FY 10 | $17,158,646 | $17,158,646 | Not applicable |
| FY 11 | $17,551,459 | $17,551,459 | Not applicable |
| FY 12 | $20,001,142 | $20,001,142 | Not applicable |
| FY 13 | $20,443,423 | $20,443,423 | Not applicable |
| FY 14 | $24,766,664 | $24,766,664 | Not applicable |
| FY 15 | $25,336,297 | $25,336,297 | Not applicable |
| FY 16 | $25,919,032 | $25,919,032 | Not applicable |
| FY 17 | $26,515,170 | $26,515,170 | Not applicable |

## 8. Deferred Maintenance Reduction (DMR)

Deferred Maintenance backlog is a tabulation of maintenance actions and replacements that were not completed when they would optimally or typically be completed. While this list may include work for which funding was not available at that time, it can also include work that was consciously deferred (for example, a fan may have aged to the point that is should "optimally" be replaced, but it is continues to work well, and is located in a building to be demolished). Deferred Maintenance backlog is identified through the five-year cycle Condition Assessment Inspection process, and by in-house experts then prioritized, reviewed, and planned based on funding. Laboratory funding is annually applied to Deferred Maintenance Reduction. Maintenance investments are prioritized manner that addresses the most urgent issues first and also aims to help prevent further backlog growth. In some cases, deferred maintenance needs are addressed through the demolition of a structure or, with GPP or LIP "Recapitalization" projects.

**Estimated DM and ACI Based on Site DMR and Other Funding**

| | SC DRM Funding Goal (applicable to those sites identified in sectional, SC Framework for Facilities and Infrastructure) | Site DMR Funding Plan | Estimate of DM at the end of the Fiscal Year | Estimated ACI (use estimated DM to left and estimated RPV from D.6) |
|---|---|---|---|---|
| FY 05 | NA | NA | $52,882,301 | 0.92 |
| FY 06 | NA | $2,000,000 | $51,838,385 | 0.93 |
| FY 07 | $2,178,000 | $5,178,000 | $49,926,612 | 0.94 |
| FY 08 | $3,960,000 | $3,960,000 | $49,184,275 | 0.94 |
| FY 09 | $5,775,000 | $5,775,000 | $46,447,925 | 0.94 |

| | SC DRM Funding Goal (applicable to those sites identified in sectional, SC Framework for Facilities and Infrastructure) | Site DMR Funding Plan | Estimate of DM at the end of the Fiscal Year | Estimated ACI (use estimated DM to left and estimated RPV from D.6) |
|---|---|---|---|---|
| FY 10 | $7,590,000 | $7,590,000 | $41,577,979 | 0.95 |
| FY 11 | $7,590,000 | $7,590,000 | $36,367,138 | 0.96 |
| FY 12 | Continue as needed | | | |
| FY 13 | Continue as needed | | | |
| FY 14 | Continue as needed | | | |
| FY 15 | Continue as needed | | | |
| FY 16 | Continue as needed | | | |
| FY 17 | Continue as needed | | | |

**Assumptions**

Assumes 2% Backlog Deterioration

Assumes 5% Labor & Material Escalation

Assumes $36,683,000 in DMR Funding FY06-FY11

Assumes $3,000,000 DM Reduction in FY07 for B 77 Rehabilitization of Mech/Elect Systems

Based on the estimates in the table above, and the assumptions contained in the table and discussed in the following paragraph, LBNL intends to achieve the DOE ACI goal of .95 in FY 2010.

Please note that a significant portion of LBNL's deferred maintenance liability is located in buildings that are slated for demolition or adaptive reuse (see preceding discussion of "Legacy" Special Use/Purpose facilities).

# 9. Recapitalization and Modernization

### Condition and Suitability of Space for 21st Century Missions

Approximately 29% of building space at LBNL is older than 51-years. The DOE Real Property Asset Management Order (RPAM) prescribes a program where the infrastructure of buildings is "maintained" so as to achieve it's design/effective life, and that the infrastructure of assets are "recapitalized" at the end of it's effective life. The infrastructure of these assets is now due (or "past due") for "recapitalization" – aka "modernization" using Line Item funds (for medium to large buildings) and GPP funds (for small buildings). Another 36% of building space at LBNL is between 41 and 50 years of age and, under the RPAM management program will also undergo "recapitalization" during the term of this TYSP. Most of these buildings are medium to large size buildings and would require Line Item funding for "recapitalization".

# 9a IGPP

Consistent with applicable DOE orders, LBNL wishes to maximize its contribution to the DOE mission by allocating its indirect dollars to provide appropriate supporting institutional infrastructure and services. In regard to our facilities, LBNL continues to invest as much indirect funding as possible to meet MII requirements as well as to reduce the DMR. LBNL would welcome increased GPP from DOE to help ensure an appropriate future infrastructure at LBNL.

However, current overall DOE scientific priorities preclude us from utilizing existing indirect dollars as IGPP

## 9b Line Item Projects

SC has provided the following guidance regarding SLI LIP project starts and funding at LBNL:

### Funded SLI LIPs:

### Building 77 rehabilitation of structures/systems, Phase II

| FY | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PED | 313 | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | — |
| Const. | 5,532 | 3,780 | —— | —— | —— | —— | —— | —— | —— | —— | —— | — |
| Total | 5,845 | 3,780 | —— | —— | —— | —— | —— | —— | —— | —— | —— | — |

### Proposed SLI LIP Funding FY 2007 – FY 2017:

### Seismic & Structural Safety of Buildings & Infrastructure, Phase I

| FY | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PED | —— | —— | 2,500 | —— | —— | —— | —— | —— | —— | —— | —— | — |
| Const. | —— | —— | 5,000 | 7,000 | 2,500 | —— | —— | —— | —— | —— | —— | — |
| Total | —— | —— | 7,500 | 7,000 | 2,500 | —— | —— | —— | —— | —— | —— | — |

### Seismic and Structural Safety of Buildings, Phase I

Unacceptably high life-safety risks have been identified in recent seismic safety evaluations of Buildings 50 and 74. These buildings are occupied by over 300 personnel in the Life Sciences Division, Nuclear Science Division, Physics Division and Laboratory Administration. Relocation of personnel to life-safe space is not possible because of Berkeley Lab's critical space shortage. This project will correct the following structural deficiencies:

- **Building 50:** Reduces unacceptably high seismic demand capacity ratios in concrete spandrel beams and shear walls, reinforces a column supporting a discontinuous shear wall and rehabilitates inadequately anchored non-structural elements.
- **Building 74:** Strengthens vertical bracing, eliminates an inadequate seismic gap, resolves diaphragm discontinuities and a discontinuous shear wall, and retrofits a compromised shear wall.

This project is in the FY 2007 Federal Budget and is anticipated as a FY2007 project start.

## Seismic & Structural Safety of Buildings & Infrastructure, Phase II

| FY | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PED | —— | —— | —— | —— | —— | —— | —— | 3,125 | —— | —— | —— | — |
| Const. | —— | —— | —— | —— | —— | —— | —— | —— | 5,487 | 16,388 | —— | — |
| Total | —— | —— | —— | —— | —— | —— | —— | 3,125 | 5,487 | 16,388 | —— | — |

## Seismic and Structural Safety of Buildings and Infrastructure, Phase II

Unacceptably high life-safety risks have been identified in recent seismic safety evaluations of Buildings 64 and 46. Life-safety risks have been identified in recent seismic safety evaluations of Buildings 64 and 46. These buildings are occupied by over 200 personnel in the Life Sciences Division, Physical Biosciences Division, Earth Sciences Division, Advanced Light Source Division, Accelerator & Fusion Research Division, Environmental Energy Technologies Division and Engineering Division. Relocation of personnel to life-safe space is not possible because of Berkeley Lab's critical space shortage. These buildings are 29,374 gsf and 60,364 gsf respectively. This project will correct the structural deficiencies, upgrade the utility infrastructure in these 55-year old buildings and modernize approximately 20,000 sf of laboratories in these buildings so these assets will provide many additional decades of service. The CAMP rating is 67 based on the seriousness of the current risks and an expectation that this work will be performed in the first decade of the 21st Century, with deferral to the second decade, this CAMP score will increase.

## Seismic & Structural Safety of Buildings & Infrastructure Phase III

| FY | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PED | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | 2,000 | —— |
| Const. | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | 11,543 | 8,457 |
| Total | —— | —— | —— | —— | —— | —— | —— | —— | —— | —— | 13,543 | 8,457 |

## Seismic and Structural Safety of Buildings and Infrastructure, Phase III

Unacceptably high life-safety risks have been identified in recent seismic safety evaluation of Building 55. This building is a partial collapse hazard and can not be cost-effectively upgraded. Replacement is the most cost effective method to address the seismic issues with this structure. This project will demolish the 19,000 gross square foot laboratory/office building and construct replacement 25,000 gross square foot laboratory/office building at the same site. The new building will contain approximately 60% research laboratory space, with the balance of the space providing offices for the research teams, and both formal and informal meeting spaces for collaboration and use by the research groups and visitors. The new building is somewhat larger in order to better accommodate the larger apparatus and equipment used by modern research teams. The CAMP rating is 67 based on the seriousness of the current risks and an expectation that this work will be performed in the first decade of the 21st Century, with deferral of this safety-driven project to the second decade, this CAMP score will increase.

**Summary:**

This funding profile addresses the majority of the SLI LIP seismic safety risks during the term of this TYSP. This profile addresses the life safety risks in a methodical manner, allowing a number of risks to persist over the major portion of this TYSP period, and many to remain unaddressed until the third decade of the 21st century (the 2020 decade).

## 9c. General Plant Projects -

GPP funds are provided by SC Program Offices, in the case of LBNL, this is the "landlord" HEP. Funding determinations are made just prior to the beginning of the fiscal year, and reflect the most current information regarding the status of competing priorities across a number of categories.

In conformance with Federal accounting standards, LBNL applies GPP funds to address five fundamental capital project needs:

- Seismic safety upgrades of deficient buildings
- Modernization of 15 to 60 Year-old wet and dry research laboratory spaces so they are fully useable by any SC program,
- Infrastructure modernization and upgrades,
- Adaptive-reuse conversions of space, Building additions & Replacement structures needed to serve DOE missions,
- Special commitments to DOE SC in direct support of the Facilities for the Future of Science initiative.

GPP funds are already being applied to address seismic safety risks. Five additional buildings have been identified to have seismic safety issues that can be resolved using GPP funding solutions. Preliminary engineering solutions and estimates are complete for three of these buildings, and are underway for the additional two buildings.

SC has provided the following guidance regarding GPP funding for use in the 2006 TYSP, they also note that funding levels are subject to change.

| | FY 05 | FY 06 | FY 07 | FY 08 | FY 09 | FY 10 | FY 11 |
|---|---|---|---|---|---|---|---|
| LBNL | $5,465 | $5,193 | $4,065 | $4,065 | $4,065 | $4,065 | $4,065 |

Note: FY 2006 Allocation was actually $4,065

**Summary:**

Landlord GPP funding level at $4.065M/year is currently approximately 25% below mid-1990's funding levels (in real dollars). The above "flat" guidance projection would undercut the effectiveness of this important DOE program to the point that it provides only approximately 50% of the funding of the previous decade. This decrease in "real dollar" GPP funding, coupled with deferral of the anticipated RPAM LIP-funded "recapitalization" of major buildings that began in the 1980's and eliminated the RPAM anticipated orderly "recapitalization" of older research facilities, results in a current Deferred Recapitalization (DR) liability of $60-80M in GPP and an additional $75-100M in SLI LIP.

The Laboratory has used GPP funds to upgrade portions of facilities (on a "spot" basis) in order to modernize some WW II and early AEC-era laboratory spaces to meet current research requirements on a "space-by-space" basis, where the anticipated "recapitalization" of older building has not been funded. As the table above notes, to upgrade the minimum necessary space so it is mission-suitable space to accommodate current research, the Laboratory has had to request "re-coloring" of Landlord GPP funds in order to augment the baseline landlord $4M funding. In Section 11, the Laboratory suggests that GPP funding be augmented by $5 to $7M/year in FY's 2007 – 2009 in order to address the pressing life-safety seismic issues while allowing the most critical of mission-performance-driven upgrades of mission-critical space needs to be addressed. It is also suggested that DOE increase landlord GPP funding to levels that can address other high-priority needs resulting from the "Deferred Recapitalization" issue in a meaningful manner beginning in FY 2010 (once the seismic safety issues are addressed).

Under the above proposed SC funding scenario for Landlord (HEP) GPP funds, the Laboratory's GPP needs would have to be reviewed annually against the most recent information at the time of funding in order to attempt to address the most critical items under Triage conditions. Please note that , in any case, the Laboratory anticipates it will meet its GPP-scale obligations to SC under the *Facilities for the Future of Science* initiative, and that it will also address F&I safety concerns while is works to ensure that portions of aged facilities and infrastructure are upgraded to support modern research requirements and mission performance. The list of current and representative Landlord GPP priorities follows:

## Table of Approximately $85M of High-Priority GPP Candidate Projects (by category)

### Seismic Safety

| | $K |
|---|---|
| **Building 76 - Upgrade Structural Elements for Seismic Safety**<br>This project will correct identified structural deficiencies which pose life safety risks during a seismic event, and if left un-corrected would cause serious structural damage. This project will upgrade columns and make other improvements to the structure to address identified seismic risks. | **310** |
| **Building 72 - Upgrade Structural Elements for Seismic Safety**<br>This project will correct identified structural deficiencies in one portion of the NCEM building complex. These deficiencies pose life safety risks during a seismic event, and if left un-corrected would cause serious structural damage. This project will construct improved linkage between one section of roof and walls to eliminate an identified seismic safety risk. | **530** |
| **Building 54 - Upgrade Seismic Safety**<br>This project will correct identified structural deficiencies in a portion of the Laboratory's dining facility. These deficiencies pose life safety risks during a seismic event, and if left un-corrected would cause serious structural damage. This project will construct improved linkage between the roof and wall sections and make other improvements to the structure to address identified seismic risks. | **550** |

| | |
|---|---|
| **Building 25A - Upgrade Structural Elements for Seismic Safety**<br>This project will correct identified structural deficiencies in this building. These deficiencies pose life safety risks during a seismic event, and if left un-corrected would cause serious structural damage. This project will construct improved linkage between the roof and wall sections, upgrade columns, and make other improvements to the structure to address identified seismic risks. Preliminary design and estimating are in progress, the identified TEC is tentative and will be adjusted when the estimate is complete. | **600** |
| **Building 58 - Upgrade Structural Elements for Seismic Safety**<br>This project will correct identified structural deficiencies in this building. These deficiencies pose life safety risks during a seismic event, and if left un-corrected would cause serious structural damage. This project will upgrade columns and make other improvements to the structure to address identified seismic risks. Preliminary design and estimating are in progress, the identified TEC is tentative and will be adjusted when the estimate is complete. | **600** |
| **Seismic Safety Allocation**<br>LBNL is working to conclude it's seismic engineering evaluations in 2007. It is probable that additional GPP-scale seismic safety upgrade projects will be identified. This line identifies a need to allow for funding to address these priority projects. | **TBD** |
| **Seismic Safety Relocations - Construct 20,000 gsf Two-story Office Structure to Accommodate Staff in Hazardous Situations**<br>Project will replace space vacated and identified for demolition due to seismic safety issues. Construct two-story tilt-up or modular structure containing approximately 120 offices. | **4,900** |
| **Seismic Safety Relocations - Construct 15,000 gsf Two-story Laboratory/Office Structure to Accommodate Staff in Hazardous Situations**<br>Construct two-story tilt-up or modular structure containing approximately 6,500 sf of general-purpose/multi-user laboratory space on the first floor and approximately 35 offices on the second floor. This project is part of a multi-element effort to address a critical shortage of on-site office and general use laboratory space. | **4,900** |
| **Seismic Safety Surge Relocations - Construct 15,000 gsf Two-story Laboratory/Office "Surge" Structure to Temporarily Accommodate Staff as Required during Building Repair**<br>Construct two-story tilt-up or modular structure containing approximately 6,500 sf of general-purpose/multi-user laboratory space on the first floor and approximately 35 offices on the second floor. This project is part of a multi-element effort to address a critical shortage of on-site office and general use laboratory space. | **4,900** |

## Special Commitments to DOE SC
## - ***Facilities for the Future of Science*** Initiative

| | |
|---|---|
| **Upgrade B72B for TEAM 1.0 Microscope**<br>Upgrade Building 72B to accommodate the TEAM 1.0 microscope that is to arrive in FY09. The TEAM microscope user-facility is a major DOE SC initiative, the Laboratory has committed to provide appropriate housing for this new generation instrument. Upgrade and commission new facility. | **950** |

## Modernization of 15 to 60 Year-old Mission-Critical Wet & Dry Research Laboratory Spaces

| | |
|---|---|
| **Building 62 Modernize and Upgrade Mechanical and Electrical Infrastructure**<br>This project will update 1960-era mechanical and electrical utilities to make them fully suitable for mission critical 21st Century research. | **4,700** |
| **Building 71 Modernize and Upgrade Mechanical and Electrical Infrastructure**<br>This project will update 1960-era mechanical and electrical utilities to make them fully suitable for mission critical 21st Century research. Includes new Cooling Tower and Heat Exchanger for South-eastern Portion of Building | **4,700** |
| **Building 74 Modernize and Upgrade Research Spaces**<br>This project will update 1960-era laboratories, remove partition walls to create the larger floor plate laboratories that are most suitable for modern mission critical research, and convert approximately 5,000 so of former animal care space for research laboratory use. This project is scheduled for a period when the building will be unoccupied and this work will have minimal impact on research programs and can be most efficiently completed. This project is part of a multi-element program to maximize productive use of existing assets. | **4,700** |
| **Construct Superconducting Detector Lab (Clean Room)**<br>This project will update 1960-era laboratories so they are suitable for modern mission critical research. Project will upgrade standard mid-60's dry laboratory space to augment the existing semiconductor device fabrication facilities in Bldg. 70A and establish a Superconducting Detector Array Laboratory in the 2263 suite. The rationale is very similar to that of the Microsystems Laboratory, which has clearly demonstrated that a modern specialized facility with high scientific standards can provide unique capabilities and open the door to new experiments on a Lab-wide basis. The materials used tend to be incompatible with silicon processing, so a dedicated fabrication space is required to preclude a possible negative impact on MEL projects. | **250** |

| | |
|---|---|
| **Building 50 Modernize and Upgrade Research Spaces**<br>This project will update 1940/50-era laboratories and remove partition walls to create the larger floor plate laboratories that are most suitable for modern mission critical research. This project is scheduled to proceed in phases so this work will have minimal impact on research programs and can be efficiently completed. This project is part of a multi-element program to maximize productive use of existing assets. | **4,500** |
| **Building 70 Modernize and Upgrade Research Spaces**<br>This project will increase supply air to the laboratories, and update 1950/60-era laboratories and remove partition walls to create the larger floor plate laboratories that are most suitable for modern mission critical research. This project is scheduled to proceed in phases so this work will have minimal impact on research programs and can be efficiently completed. This project is part of a multi-element program to maximize productive use of existing assets. | **4,500** |
| **Building 70A Modernize and Upgrade Research Spaces**<br>This project will increase supply air to the laboratories, and update 1950/60-era laboratories and remove partition walls to create the larger floor plate laboratories that are most suitable for modern mission critical research. This project is scheduled to proceed in phases so this work will have minimal impact on research programs and can be efficiently completed. This project is part of a multi-element program to maximize productive use of existing assets. | **4,500** |
| **Upgrade Old-standard Wet and Dry Laboratories to Meet Expectations of Modern Research Science**<br>Multi-year research-driven program to upgrade wet and dry laboratories constructed to older-standards to meet the needs and expectations of modern missions and research science. This program will ensure that the Laboratory's 223,000 so of wet and dry laboratory space are fully suitable for modern high-expectation research science. This program will upgrade and modernize laboratory spaces in some 40-buildings on a "schedule to minimize impacts basis", and complement the building-wide wet and dry laboratory upgrade programs identified below. Care will be taken to ensure that GPP funding restrictions for work within individual buildings are observed during this multi-year multi-building program. | **25,000 Total for all buildings** |

## Mission-Critical Infrastructure Modernization and Upgrades

| | |
|---|---|
| **Upgrade Sanitary Sewer Monitoring Station**<br>The Strawberry Canyon sampling station is located in a difficult to access vault, moreover, the capacity of the monitoring system is barely able to meet current flow demands and creates a bottle-neck in the system. This project will construct a new shelter and modify sampling connections to improve work conditions and eliminate the bottleneck. | **250** |
| **Electrical Utility System - Power Factor Correction Upgrade**<br>Install power-factor correction capacitor banks to eliminate power factor harmonics in electrical utility system on a Lab-wide basis. | **1,500** |
| **Electrical Utility System - System Upgrades**<br>This project will upgrade specific portions of the electric utility system which have been determined to be undersized or inappropriate for the research mission requirements. | **600** |

| | |
|---|---|
| **Building 62 Utility Infrastructure Upgrade**<br>This project will upgrade electrical and mechanical utility infrastructure of this 1960's building so they meet modern research requirements and so this building can provide another 40-years of effective support to the DOE mission. This project is part of a multi-element program to maximize beneficial use of existing assets. | **2,500** |
| **Building 6 - Electrical Power Upgrade**<br>This project will upgrade the electrical power supply to three sectors of the Advanced Light Source user facilities. | **75** |
| **Building 54 - Upgrade Food Service Area and Kitchen**<br>Upgrade and modernize the kitchen and servery areas of the Laboratory's mid-1950's dining facility. | **1,900** |
| **Upgrade Mechanical Utility Distribution**<br>Upgrade and modernize portions of the sanitary sewer, domestic water and storm sewer utility systems in a multi-phase project. Care will be taken to ensure that GPP funding limits for individual utilities are respected. | **12,000 Total for overall program** |
| **Upgrade Computer/Communications Network Fiber Utility**<br>Install new communications duct bank, cable and fiber to eliminate constrained service areas. | **870** |

## Adaptive Reuse, Use Conversions, Building Additions & Replacement Structures

| | |
|---|---|
| **Convert Building 50 Library to Offices**<br>Convert Building 50 library space to create approximately 25 offices. Project is part of a multi-element effort to address a critical shortage of on-site office space. | **500** |
| **Convert Building 25A from Shop to Offices**<br>Convert Building 25A general electronics shop to create approximately 37 offices. Project is part of a multi-element effort to address a critical shortage of on-site office space. | **1,500** |
| **Convert Building 71B Shop to Offices**<br>Convert Building 71B mechanical shop to create approximately 25 offices. Project is part of a multi-element effort to address a critical shortage of on-site office space. | **800** |
| **Building 72 - Provide Office and Collaboration Space for the TEAM Microscope Users**<br>This project will construct an office / support space addition to Building 72, to accommodate additional visitors and user-guests using the TEAM Microscopes. | **4,250** |
| **Construct 15,000 gsf Two-story Laboratory/Office Structure to Address Over-crowding**<br>Construct two-story tilt-up or modular structure containing approximately 6,500 sf of general-purpose/multi-user laboratory space on the first floor and approximately 35 offices on the second floor. This project is part of a multi-element effort to address a critical shortage of on-site office and general use laboratory space. | **4,900** |

| | |
|---|---|
| **Construct 15,000 gsf Two-story Laboratory/Office Structure to Address Over-crowding**<br>Construct two-story tilt-up or modular structure containing approximately 6,500 sf of general-purpose/multi-user laboratory space on the first floor and approximately 35 offices on the second floor. This project is part of a multi-element effort to address a critical shortage of on-site office and general use laboratory space. | **4,900** |
| **Building 71B - Construct addition of Light-frame Structure to Address Over-crowding and Allow Demolition of Sub-standard Mission-Critical Structures**<br>This project will construct a 12,000 sf light-frame structure over a parking lot between Buildings 71 and 71B. This structure will provide general-use high-ceiling research space and associated offices, consolidating such functions at the main laboratory site and allowing the laboratory to eliminate use of off-site leased space. This project also supports the Laboratory's objective to maximize use of space. | **4,500** |
| **Building 64 - Construct New Laboratory Suites**<br>This project will construct approximately 2400 sf o general use laboratory space on the second floor of Building 64. This project is part of a multi-element effort to address a critical shortage of on-site general use laboratory space and maximize use of existing space. | **2,400** |
| **Building 64 - Convert Room 131 to Laboratory Use**<br>Convert Room 131 from it's previous accelerator-support use to create an 850 sf laboratory space on two floors. This project is part of a multi-element effort to address a critical shortage of on-site general use laboratory space and maximize use of existing space. | **600** |

| | |
|---|---|
| **TOTAL** | **82,730** |

## 10. Space Bank Analysis

Beginning with FY 2003, the Department is required by Congress to offset construction of new space with the elimination of an equivalent amount of excess space. To comply with this requirement, SC maintains a Space Bank, which tracks the amount of space to be constructed and eliminated at SC sites, and all SC-funded construction projects, must have an equivalent amount of excess space allocated from this bank. The maintenance of this bank requires timely identification of planned construction and elimination of excess facilities.

SC has provided the following “End of FY 2005 Balance” guidance for LBNL.

**Space Banked by Site at the End of FY 2005**

| Site | Banked Space By Site as of end of FY 05 (gsf) |
|---|---|
| LBNL | 142,650 |

In FY 2006, this “Banked” space figure will drop to 49,946 gsf as the Molecular Foundry is added to the inventory of buildings at the Laboratory and the Laboratory uses internal operating funds to demolish three condemned structures.

Berkeley Lab has identified sufficient offsetting demolition space for all proposed DOE-funded construction. In this TYSP the Laboratory proposes to demolish and construct fully off-set square footage (see second table, "B", below); however, the Laboratory notes that current SC guidance regarding SLI EFD program funding for the Laboratory would result in a 110,221 shortfall during the term of this TYSP, requiring a Secretarial Waiver in this amount in the FY 2012 timeframe (see the first table, "A", below). It is assumed that the three non-federal (UC and alternative financed) projects included in this TYSP, and any other similarly financed projects to be completed in the future, will be treated in the same manner as either UCB space or leased facilities. Neither of these classes of building is currently covered by the offsetting space requirement.

**Space Bank Plan "A" – Current SC SLI EFD funding guidance**

| Year | Expected Additions (SF) | Expected Removals (SF) | Net Change (A minus B) | Available Offsetting Space at the Site (sf) |
|---|---|---|---|---|
| FY 05 | | 80,891 (non-EFD) | (142,650) | 142,650 sf is the "end of FY 05 balance" |
| FY 06 | 95,692 | 2,988 (non-EFD) | 92,704 | 49,946 |
| FY 07 | | | | 49,946 |
| FY 08 | 5,005 | 15,200 (non-EFD) | (10,195) | 39,751 |
| FY 09 | | | | 39,751 |
| FY 10 | 30,000 | | 30,000 | 9,751 |
| FY 11 | | 125,028 | (125,028) | 134,779 |
| FY 12 | 95,000 | | 95,000 | 39,779 |
| FY 13 | 150,000 | | 150,000 | (110,221) |
| FY 14 | tbd | tbd | | |
| FY 15 | tbd | tbd | | |
| FY 16 | tbd | tbd | | |
| FY 17 | tbd | tbd | | |

tbd – to be determined

## Space Bank Plan "B" – Laboratory Plan to Achieve 1:1 Congressional Direction

| Year | Expected Additions (SF) | Expected Removals (SF) | Net Change (A minus B) | Available Offsetting Space at the Site (sf) |
|---|---|---|---|---|
| FY 05 | | 80,891<br>(non-EFD) | (142,650) | 142,650 sf is the "end of FY 05 balance" |
| FY 06 | 95,692 | 2,988<br>(non-EFD) | 92,704 | 49,946 |
| FY 07 | | | | 49,946 |
| FY 08 | 5,005 | 43,401<br>(15,200 non-EFD) | (38,396) | 88,342 |
| FY 09 | | 125,028 | (125,028) | 213,370 |
| FY 10 | 30,000 | 410 | 29,590 | 183,780 |
| FY 11 | | | | 183,780 |
| FY 12 | 95,000 | 67,568 | 27,432 | 156,348 |
| FY 13 | 150,000 | 4,959 | 145,041 | 11,307 |
| FY 14 | tbd | tbd | | |
| FY 15 | tbd | tbd | | |
| FY 16 | tbd | tbd | | |
| FY 17 | tbd | tbd | | |

tbd – to be determined

# 11. Laboratory's Alternative Investment Program and how this Program Addresses the primary F&I constraints to Mission Performance

This section describes the primary mission constraints posed by Facilities and Infrastructure issues, and proposes an alternative investment program, with a particular focus to FY's 2007 – 2009, that addresses these issues and effectively supports mission performance. The Alternative Investment program does not address the facility proposals outlined in SC's *Facilities for the Future of Science: A Twenty Year Outlook that were identified in Current and Future Missions*, as Berkeley Lab scientists are already working on the underlying science addressed in that *Outlook*. The following Alternative F&I investment program is developed to provide full and effective support both to DOE SC's on-going research programs. Facilities and infrastructure support from DOE SC is required in FY's 2007 – 2009 to address the following issues and constraints:

### *Mission Performance Constraint "A" -*

### Seismic Safety

**Augmentation of Landlord HEP GPP Funds Requested**

**– FY's 2007 - 2009 ($5 – 7M/year) &**

**Acceleration of SLI LIP Funds Requested**

**– FY's 2007 – 2015 (approx. $22M every two years)**

The Laboratory takes safety very seriously. Provision of a safe workplace for employees is a core value with direct ties to mission performance. The Laboratory proposes that recently identified life safety issues be addressed quickly in a manner that supports a continuing high-level of research mission performance as expected by the Laboratory and DOE SC.

**Overview of Seismic Issues**

Over the past two decades, international monitoring data regarding seismic events and from structures that sustained damage in seismic events has been combined with new computer modeling capabilities to dramatically advance our knowledge of the performance of buildings and infrastructure during seismic events. This breakthrough knowledge has been vetted, validated and has dramatically transformed the fields of structural and seismic engineering.

LBNL has worked with DOE BSO to retain leading experts in these fields to survey the seismic safety of buildings at the Laboratory site. As anticipated, a number of the structures that were built using the anecdotally-based engineering design principals of earlier decades show some serious flaws – structural flaws that will allow *some* buildings to partially or fully collapse, or otherwise pose life safety risks.

The Laboratory is in the process of completing a seismic safety assessment of all buildings. Those buildings where risks were perceived to be higher are being surveyed first under this program. (Nearly 70% of the Laboratory's building area has been, or is now being, surveyed.) Serious structural life-safety hazards have been identified in approximately forty-eight percent of the building area evaluated and rated to date. A Seismic Safety Action Program has been developed and is summarized in Appendix 8. As the engineering survey process will be

completed in 2007, it is possible that additional upgrade requirements will be identified in the 2007 and 2008 TYSPs.

**Seismic Repair/Upgrade Actions Completed and Underway**

The Laboratory has (a.) moved staff and programs from the most serious "very poor" problem buildings by doubling-up staff and programs in the Laboratory's already highly utilized space, (b.) identified those seismically "poor" and "very poor" buildings that can be cost-effectively upgraded to provide continued safe mission-critical service, (c.) identified those seismically "poor" and "very poor" buildings which can not be cost-effectively upgraded and are now slated for demolition when replacement mission-critical space is constructed, and (d.) worked with DOE BSO to begin to initiate an upgrade and building replacement program which will eliminate the safety risks in a measured expeditious manner.

As part of this initial effort, staff and programs, including major engineering shops, have been already been removed from two entire buildings, and a major portion of a third building, as these areas have been determined to pose exceptionally high life safety risks. In addition, structural upgrade projects are underway to address the hazards identified in the Fire House/Emergency Operations Center, at the Advanced Light Source (Building 6), and at Building 10, and a GPP project has been funded to construct a replacement Animal Care Facility in order to move the mouse colony from Bldg. 74 so that building can be seismically upgraded in the FY 2007 SLI LIP.

A Seismic Safety Program Proposal, consistent with Federal Accounting regulations has been developed, the framework of this program follows:

**I. SC Operating Funds Needed for Demolition/Removal of Legacy Equipment – ($2.5M in FY 2007 & $6.5M in FY 2008 – total $9M)**

The former Office of Science linear accelerator in Building 71 had a distinguished record of supporting scientific breakthroughs over nearly 40-years from the time it started operation as a National User Facility in 1956 until the time it was shuttered over a decade ago in the early 1990's. The building housing this accelerator is in fundamentally sound condition. The accelerator and its infrastructure occupy approximately 25,000 sf and fill the northwestern portion of the Building 71. The southeastern portion of the building (approximately 29,000 sf) continues to be fully occupied by research programs and continues to be a mission-critical facility.

Removal of the accelerator and infrastructure **is a top priority seismic safety project**. The accelerator and its shielding are attached directly to the super-structure of the northwestern portion of this building. Accordingly, this "legacy" equipment poses direct structural collapse risks to this portion of the building, with attendant serious life-safety and complex post-event accelerator/radiation materials clean-up issues. The life-safety issues have been mitigated but not eliminated; the risks of partial collapse of the northwestern portion of Building 71 and the issue of post-event clean-up of legacy acceleration/radiation materials would be fully addressed by this project.

This accelerator and its associated infrastructure can now be removed in an orderly manner under accelerator waste management procedures; removal after a seismic event would be far more complicated and costly as various additional waste streams would become intermingled

with the accelerator materials. Moreover, the northwest portion of the building, which can now be re-used for current missions once the accelerator is removed (and would be seismically sound both during and after a seismic event after the accelerator is removed) would likely be less than fully usable and significantly increase the waste stream from the northwest portion of this building.

Removal of the accelerator and infrastructure **is required to provide adequate and suitable space for high priority missions.** Berkeley Lab operates at a 98% Asset Utilization rate, restoration of this 25,000 sf of high-bay research space to the Laboratory's inventory of "useable space" is a pressing immediate priority. Restoration of this 25,000 sf of research space to the "useable space" inventory will allow programs that are currently housed in ill-suited "Old Town" spaces to be relocated to this research-appropriate experimental space. This 25,000 sf has not been "useable" since the linac accelerator was abandoned by SC over a decade ago. Restoration of this significant square footage is a very important mission performance issue in the 2007-2008 timeframe.

This project will remove the accelerator, injectors, shielding, mechanical and electrical infrastructure and associated equipment, and will make the area safe. To address the immediate life-safety and mission-need requirements, it would be preferable for the full project to be completed in FY 2007; however, as FY 2007 is only a few months away, an alternative funding scenario of $2.5M in FY 2007 and the balance of $6.5M in FY 2008 is proposed in this TYSP. Under this plan, the accelerator and the shielding which poses seismic risks would be addressed first, and all work would be completed during FY 2008 so that some research programs could move from ill-suited space in Old Town to this mission-appropriate space during FY 2008.

The "guidance" funding scenario does not include this funding source – SC Operating funds. SC Operating funds are appropriate under federal accounting regulations; this is an equipment removal project for a defunct SC experimental device that served the mission effectively for four decades, but has now been abandoned in place for over 10-years.

## II. Augmentation of Landlord HEP GPP Funds Requested – FY's 2007 - 2009 ($5 – 7M/year / $17 – 20M total)

The Laboratory requests HEP augmented GPP funding for three years ($5 - $7M/year in FY's 2007 – 2009) to address the following identified seismic safety issues.

(a.) correct seismic safety hazards in five buildings, Buildings 76, 72, 54, 25A, and 58 ($310K, $530K, $550K, $600K & $600K respectively). To address these risks, LBNL requests supplemental GPP funding in FY's 2007 – 2009.

(b.) construct a replacement office structure (to provide offices to replace those vacated in the three "emptied" buildings – Buildings 50D, 25 and the northwest portion of Bldg. 71 and required additional seismic safety relocations). As space at the Laboratory is fully utilized, the staff moved to date have been "doubled-up" with others pending construction of the replacement structure; additional staff can not be relocated until the replacement structure is constructed. To mitigate this seismic safety impact, LBNL, requests supplemental GPP funding in FY's 2007 and 2008 to support construction of a 20,000 gsf office structure.

(c.) construct a replacement laboratory/office structure to provide mission-critical space that which will be lost in buildings that can not cost-effectively be made seismically safe (Buildings 44, 71A, 17 & 50C and required additional seismic safety relocations). As space at the Laboratory is fully utilized, the program staff moved to date have been "doubled-up" with others pending construction of the replacement structure; additional staff can not be relocated until the replacement structure is constructed. To mitigate this seismic safety impact, LBNL, requests supplemental GPP funding in FY's 2008 and 2009 to support construction of a 15,000 gsf office structure, and to,

(d.) construct "surge" laboratory/office space to provide rotational temporary accommodations to mission-critical functions while their space is seismically upgraded. As space is fully utilized at the Laboratory, such relocations will otherwise involve off-site lease space and pose a distinct hardship to researchers. To mitigate this impact, LBNL, requests supplemental GPP funding in FY's 2008 and 2009 to support construction of a 15,000 gsf laboratory/office structure to address a significant element of this need for temporary assignments to "surge" space related to LIP-scale seismic upgrades – and to maintain research relationships consistent with reasonable seismic-safety and worker welfare precautions. This space will be used as "surge" space for approximately 10-years (when it is anticipated the building seismic correction LIPs will be completed), at that time this space will be integrated into the overall laboratory space management system and SC programs that have a mission-need for additional space will be accommodated in this space.

## III. Acceleration of SLI LIP Funds Requested

**- FY's 2007 – 2015 ($114M total / approx. $22M starts in odd numbered years)**

In accordance with federal accounting requirements, Line Item funding (SLI) will be required to resolve the life safety hazards in six buildings - five major mission-critical research laboratory

buildings (Buildings 50, 74, 64, 46 and 55) which remain fully occupied, and one major research/research support building (Building 25/25B) with particularly serious hazards (the approximately 20,000 sf of staff and programs have largely been temporarily "compressed" in with programs and staff in other buildings in order to address the particularly acute risks). In addition, portions of the Laboratory's infrastructure system require SLI LIP upgrade in order that they are fully usable after a seismic event.

(a.) a Line Item project to address the life-safety risks in two of these buildings, Buildings 50 and 74, is proposed in the Federal FY 2007 budget.

(b.) a CD-0 request to proceed forward with a project proposal to address the life safety risks in two additional buildings, Buildings 64 and 46, is in preparation and will be submitted for the FY 2008 Budget.

(c.) The last two building, Buildings 55 and 25/25B have structural problems that can not be cost-effectively repaired. Separate SLI LIP proposals will be submitted to ensure that the mission-critical service of these facilities continues with the construction of replacement structures and demolition of the two current facilities. The reference SC guidance does not fully address these safety hazards, and indicates that work on these buildings would be addressed in the third decade (2020's) of the 21st Century. The Laboratory wishes to work with SC to eliminate these serious safety issues in a more timely and deliberate manner.

(d.) Critical portions of the Laboratory roadway must be upgraded to survive an earthquake of foreseeable intensity and ensure egress and ingress to the Laboratory site after the seismic event. Associated critical sub-roadway utility infrastructure must be upgraded in order to reduce impacts from a seismic event, support rapid response and recovery efforts, and to provide the reliable and adequate utility services that are fundamental to modern laboratory research in the 21st Century. This project will modify and strength the roadways to ensure safe ingress/egress during and after a seismic event, and will install seismically appropriate retaining structures at two locations where the ground below the roadway (and sub-roadway utilities) will otherwise fail and slip down slope isolating portions of the Laboratory and leading directly to failure in the major utilities site wide. The reference SC guidance does not address these safety hazards, and infers that work on these buildings would be addressed in the third decade (2020's) of the 21st Century. The Laboratory wishes to work with SC to eliminate these serious safety issues in a more timely and deliberate manner.

## IV. SLI EFD Funds Requested
**- FY's 2011 – 2013 (est. approx. $1M/year)**

After replacement space is created with the previously discussed GPP-funded "replacement" structures, the Laboratory requests SC Excess Facilities Demolition funds to demolish five seismically poor buildings that can not be cost-effectively upgraded (total est. approx. $3M). (Buildings 44, 71A, 17, 50D and 50C). Four of these buildings will continue to serve as mission-critical facilities until replacement space is created, the fifth structure (50D) has been vacated, and staff "doubled up" in other spaces, due to the exceptionally high hazards in this facility.

## Summary of Scope of Seismic Safety Corrective Action Program by Funding Category

| | | |
|---|---|---|
| Work in Progress (4 Bldgs): | Repair of Fire House/Emergency Operations Center; Advanced Light Source (Building 6); & Bldg. 10; Construction of Replacement Animal Care Facility in order to move mice from Bldg. 74 so it can be seismically upgraded. | Highest Priority |
| SC Operating Funding (1 Bldg.): | Remove “Legacy” SC NP accelerator and infrastructure that poses seismic collapse risks to 25,000 sf of building area, and safety risks to people | Highest Priority |
| SLI LIP Funding (6 Bldgs.) | FY07 Budget: Fix Bldgs. 50 & 74<br><br>CD-0 in Preparation: Fix Bldgs. 64 & 46<br><br>Priority #3: Replace and Demolish Bldg. 55<br><br>Priority #4: Replace and Demolish Bldg. 25 | Highest Priority<br><br>High Priority<br><br>High Priority<br><br>High Priority |
| GPP Funding (5: | Repair Bldgs. 72, 76 (Facilities Shops), Cafeteria, 25A, 58<br><br>Replacement office space building to accommodate staff “compressed” due to seismic safety issues<br><br>Replacement laboratory/office space building to accommodate staff “compressed” due to seismic safety issues | High Priority<br><br>High Priority<br><br>High Priority |

| | | |
|---|---|---|
| | Surge laboratory/office space building to support research continuity during seismic upgrade projects | High Priority |
| Excess Facilities Demolition Funding | Continue use until it is possible to demolish Bldgs. 71A, 17, 50C & 50D | Demolish after replacement space is constructed – can not be cost-effectively upgraded |

## Summary of Scope of Seismic Safety Corrective Action Program by Funding Category

| Funding Source | TEC | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Augmentation of HEP GPP Funds** | **$17 – 20M** | **$5.0 M** | **$7.0M** | **$7.0M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Acceleration of SLI LIP Funds (note: FY 2007 SLI LIP project is in the Federal 2007 Budget)** | **$98M not incl. FY 07 start /$114 M** | **$17.0 M** | 0 | **$25.0 M** | 0 | **$25.0 M** | 0 | **$25.0 M** | 0 | **$22.0 M** | 0 | 0 |
| Reference Guidance scenario | **$67M** | **$17.0 M** | 0 | 0 | 0 | 0 | **$25.0 M** | 0 | 0 | **$25.0 M** | 0 | 0 |
| **SC Operating Funds - B71** | **$9M** | **$2.5 M** | **$6.5M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SC SLI EFD Funds (Demo after replacement space is in place - B's 44, 71A, 17, 50C, 50D)** | **$3M** | 0 | 0 | 0 | 0 | **1.0M** | **1.0M** | **1.0M** | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

***Mission Performance Constraint "B" -***

## Demolition of Excess Facilities – Bevatron & Bldg. 51 (SLI EFD)

**SC SLI EFD Funds Requested – FY's 2007 - 2009 ($58M)**

It is suggested that DOE fund the Building 51/Bevatron Demolition Project consistent with the value engineering assessment plan below in order to reduce the cost of the work by $6.5M, complete the project four years earlier, take advantage of the assembled team of experts and provide excess facilities space at LBNL for future new construction. If DOE were to fund the Building 51/Bevatron Demolition Project as proposed in the TYSP guidance document in FY 2007, and increase FY 2008 and FY 2009 appropriations to $22M in each year, the project to be completed in 2009 for an additional savings of $6.5M, and the site would be available to the re-deployment in service of the DOE SC mission in FY 2010.

It is suggested that the proposed funding plan fully demonstrates the required "commitment to commence the disposition process promptly in compliance with congressional direction". The Laboratory can re-deploy this large 4.4-acre site to serve SC missions in FY 2010.

| Funding Source | TEC | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SC SLI EFD Funds** | **69.4M** | **14.0M** | **22.0M** | **22.0M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 75.9M | 14.0M | 6.1M | 7.2M | 14M | 14.0M | 8.0M | 0 | 0 | 0 | 0 | 0 |

Notes: The FY 2007 figure is consistent with the SC guidance provided for this TYSP; this figure is subject to change. The TEC figure includes prior year costs.

## *Mission Performance Constraint "C"-*

## Address *Deferred* Re-Capitalization of Research Space

**SLI LIP Funds Requested**

**– FY's 2017 – 2025 ($80 - 100M total funded at approximately $22M every two years) &**

**Augmentation of Landlord HEP GPP Funds Requested**

**– FY's 2010 - 2017 ($5 – 7M/year)**

A number of the Laboratory's mission critical laboratory buildings remain in use beyond the original design life of their infrastructure and do not reflect modern laboratory design principles. As maintenance programs over preceding decades have focused to repair and replace the original system components, in many cases we have "well maintained" 1940, 1950 and 1960-era laboratory buildings in which 21st Century science is attempted (and with considerable extra work and precaution, achieved).

Consistent with DOE RPAM Order, the buildings which can continue to productively serve the mission should have been thoroughly "recapitalized" (typically using Line Item funds) in the 1980's, 1990's and the first decade of 2000, when they reached the end of their original design life.

LBNL has between $80M and $100M of deferred SLI LIP recapitalization at this time. Consistent with Federal Accounting rules, this situation can only be addressed with Line Item Funding as these individual building "recapitalization" projects exceed $10M each. When Buildings 64 and 46 are seismically upgraded, the infrastructure of these two buildings will also be upgraded. However, these two buildings represent a small portion of the buildings that require RPAM recapitalization. The highest priority SLI LIP recapitatization projects for research laboratory buildings ($74M in current dollars) are identified in the list of SLI LIP candidate projects in Appendix 4. LBNL requests that these projects be funded in an accelerated manner when seismic safety upgrades have been accomplished.

LBNL continues to meet mission objectives through administrative controls, extra maintenance and vigilance, and through tactical application of Landlord (HEP) GPP funds to effect "spot" modernization. LBNL requests that Landlord (HEP) GPP funding be increased to address additional high-priority mission-critical fall-out from the deferred recapitalization liability. LBNL requests that this funding be provided after the seismic safety issues are addressed, beginning in FY 2010, in order that the Laboratory and DOE can better address research requirements under deferred recapitalization conditions.

| Funding Source | TEC | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Augmentation of HEP GPP Funds** | **$56M** | 0 | 0 | 0 | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SLI LIP Funds to address Deferred Recapitalization after Seismic Safety Issues are addressed – beginning in FY 2017** | **$98M not incl. FY 07 start /$114 M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **$22.0 M** |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

### *Mission Performance Constraint "D" -*

### Demolition of Excess Facilities – Condemned Buildings and Old Town (SLI EFD)

**SC SLI EFD Funds Requested – FY's 2007 - 2009 ($58M)**

Beginning with FY 2003, the DOE is required by Congress to offset construction of new space with the elimination of an equivalent amount of excess space. SC has provided TYSP guidance that all SC-funded construction projects must have an equivalent amount of excess space identified for demolition. Although Asset Utilization is approximately 98% for useable space at LBNL, the Laboratory fully supports this 1:1 square foot (construction:demolition) objective as it is consistent with stewardship principles of removing aged facilities which can no longer effectively serve the mission and which cannot be cost-effectively updated, and which require high-levels of maintenance when they are retained in the mission-critical space inventory

During the term of this TYSP, LBNL anticipates that it will be able to work with DOE to fully meet the 1:1 guidance for SC facilities.

LBNL has developed a plan for the orderly demolition of already vacated buildings (Priority #1 and Priority #2 scope below), and for the movement of staff and programs from buildings identified for demolition later in the decade so these buildings can also be demolished in an orderly manner.

Priority #1 – Demolition of the Bevatron (Priority #1 is addressed in a preceding section of this chapter)

Priority #2 – Demolition of Small Condemned and Vacated Structures (Priority #2 & #3 scope is presented below)

Priority #3 – Demolition of "Old Town" buildings (Priority #2 & #3 scope is presented below)

| **Funding Source** | **TEC** | **2007** | **2008** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** | **2016** | **2017** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SC SLI EFD Funds – Recapitalization Needs (Demo after replacement space is in place – Small Condemned structures and "Old Town"** | **11.0M** | 0 | 0 | 0 | **1.0M** | **4.0M** | **4.0M** | **2.0M** | 0 | 0 | 0 | 0 |
| Reference Guidance (EFD funds applied to Bevatron only) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Summary Table of "Above SC Scenario Baseline" Funding Requests

| Funding Source | TEC | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Augmentation of HEP GPP Funds - Seismic** | **$17 – 20M** | **$5.0 M** | **$7.0M** | **$7.0M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Acceleration of SLI LIP Funds (note: FY 2007 SLI LIP project is in the Federal 2007 Budget) - Seismic** | **$98M not incl. FY 07 start /$114 M** | **$17.0 M** | 0 | **$25.0 M** | 0 | **$25.0 M** | 0 | **$25.0 M** | 0 | **$22.0 M** | 0 | 0 |
| Reference Guidance scenario | **$67M** | **$17.0 M** | 0 | 0 | 0 | 0 | **$25.0 M** | 0 | 0 | **$25.0 M** | 0 | 0 |
| **SC Operating Funds – B71 – Seismic/ Mission** | **$9M** | **$2.5 M** | **$6.5M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SC SLI EFD Funds – B 51** | **69.4M** | **14.0 M** | **22.0M** | **22.0M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 75.9M | 14.0 M | 6.1M | 7.2M | 14M | 14.0M | 8.0M | 0 | 0 | 0 | 0 | 0 |
| **SC SLI EFD Funds (Demo after replacement space is in place - B's 44, 71A, 17, 50C, 50D)** | **$3M** | 0 | 0 | 0 | 0 | **1.0M** | **1.0M** | **1.0M** | 0 | 0 | 0 | 0 |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Augmentation of HEP GPP Funds – Post-Seismic Re-baseline** | **$55M** | 0 | 0 | 0 | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** | **$7.0M** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SLI LIP Funds to address Deferred Recapitalization after Seismic Safety Issues are addressed – beginning in FY 2017** | **$98M not incl. FY 07 start /$114 M** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **$22.0 M** |
| Reference Guidance scenario | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **SC SLI EFD Funds – Recapitalization Needs (Demo after replacement space is in place – Small Condemned structures and "Old Town"** | $11.0 M | 0 | 0 | 0 | **$1.0M** | **$4.0M** | **$4.0M** | **$2.0M** | 0 | 0 | 0 | 0 |
| Reference Guidance (EFD funds applied to Bevatron only) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Note: Baseline assumes $4 – 5M annual funding of Landlord GPP (HEP).

# 12. Performance Indicators and Measures

LBNL's Contract Facilities Performance Measures are included in Appendix 7. Although qualitative measures can often best describe performance; such measures are difficult to benchmark. The following quantitative performance-based metrics are developed to address the use and condition of Laboratory assets relative to the research requirements.

## *Facilities Condition Index (FCI)*

$$FCI = \frac{\$\text{deferred maintenance}}{\$RPV}$$

This widely used metric provides insight into the effectiveness of the maintenance program. This metric measures the relative cost of remedying maintenance deficiencies listed in the deferred maintenance backlog and conveys condition information.

## *Asset Condition Index (ACI):*

ACI = 1- FCI and provides a declining scale matching the maintained condition of a building.

## *Deferred Maintenance (DM)*

Deferred maintenance is defined as maintenance that was not performed when it should have been or was scheduled to be and which, therefore, is put off or delayed for a future period. It specifically excludes major ”like-in-kind” rehabs normally funded from General Plant Project/General Purpose Equipment (GPP/GPE) and line item projects.

## *Rehabilitation and Improvement Cost (RIC)*

This indicator is defined as the total of all rehab and improvement costs, including needed function or capacity upgrades and the costs to bring the facility in compliance with all applicable building codes, such as Americans with Disability Act/Uniform Federal Accessibility Standards (ADA/UFAS) and Life Safety requirements, as well as the costs to make facilities suitable for planned mission needs. These costs are normally funded via GPP/GPE or line item funding, but could include large operating expense funded projects or Institutional General Plant Projects (IGPP). This metric provides insight into the overall management of facilities.

## *Rehabilitation and Improvement Cost Index (RICI)*

The Rehabilitation and Improvement Cost Index is RIC divided by the facility’s Replacement Plant Value (RPV)

## *Total Summary Condition Index (TSCI)*

TSCI = the sum of Deferred Maintenance (DM) plus Rehab and Improvement Costs (RIC) divided by the facility’s Replacement Plant Value (RPV).

## *Asset Utilization Index (AUI)*

The Asset Utilization Index (AUI) is the Department of Energy's corporate measure of facilities and land holdings against requirements. The index reflects the outcome from real property acquisition and disposal policy, planning, and resource decisions. The index is the ratio of the area of operating facilities, justified through annual utilization surveys (numerator), to the area of all operational and excess facilities without a funded disposition plan.

The Laboratory needs DOE support to achieve its recapitalization objectives. GPP funding needs to be increased into the $6 – 10M/year range, a range that appears realistic as it is consistent with GPP funding support provided by DOE to other multi-program laboratories. While $10M/year will support a realistic long-term capital building renewal program (and positively impact the Deferred Maintenance projections as well), the Laboratory recognizes that this figure may not be realistic over the next couple of years, therefore a range of $6- 10M is

identified in this plan to allow for consideration of Plan “A” and Plan “B” options in discussions between the Laboratory and DOE regarding this TYSP.

Similarly, there is a need to increase funding for GPE (capital equipment) funding, in this case a modest increase, to approximately $2.5M/year in order to ensure that general purpose equipment is available when required by researchers.

## *Rehabilitation and Improvement Cost (RIC)*

As the first DOE National Laboratory, Berkley Lab has a number of older buildings. Many of these buildings are fundamentally sound, but the building systems and the spaces reflect the nature of science at the time that they were constructed rather than modern research requirements. With upgrades, these buildings can continue to serve the DOE mission for many additional decades. The need for upgrades is a major theme of this TYSP and has been discussed previously in this Plan. Over the course of the next year, Berkeley Lab will refine the RIC figure.

A major indicator of building conditions is the Facilities Condition Index (FCI), which is defined as dollars of deferred maintenance for a building, trailer, or utility system divided by the Replacement Plant Value (RPV) for that building, trailer, or utility system. The Asset Condition Index (ACI) is simply 1 minus the FCI. While the ACI provides an accurate representation of the maintained state of an asset, it may not provide a complete picture of the asset’s condition.

The life-cycle status of each of the various subsystems comprising the asset needs to be determined and evaluated along with code deficiencies and other “non-maintenance” considerations in order to complete the condition analysis. This evaluation develops a Rehabilitation and Improvement Cost (RIC) which, for buildings and trailers, Berkeley Lab currently utilizes an analysis tool patterned after the RS Means methodology used by FIMS for RPV calculation. Appendix 4 contains a more detailed explanation of this process and the calculation of the Total Summary Condition Index (TSCI). Utility Systems are similarly evaluated and the appropriate percentage from Appendix 4 is applied to determine the RIC.

A significant part of VFA’s detailed condition assessment of our assets is the preparation of life-cycle based renewal information and code deficiencies. As more experience is gained with the VFA assessment and methodologies, it is anticipated that their actual inspection and evaluation data will replace the current, more qualitative, RIC calculation method.

| | |
|---|---|
| Rehab and Improvement Cost (RIC) | **$129,651,271** |
| *Doesn't include personal property trailers | |

### Total Rehabilitation and Improvement Costs (TRIC)

The 2006 figure (the sum of Deferred Maintenance (DM) and RIC) is $51,838,385 + $129,651,271 = $181,489,656

### Facility Condition Index (FCI)

A facility condition index (FCI) value is simply the cost required to correct all deficiencies in a building divided by the total replacement cost of that building. This FCI value is a useful tool for comparing the relative condition of all buildings. This tool will be useful in determining which buildings or systems should be considered for major renovations or up-grades, and to assure that funding sources have been identified for each project to help assure that each deficiency is properly addressed. Altogether this would be a powerful tool useful in the development of a five-year or longer capital renewal model that shows the needs versus available funding and the resultant FCI.

The 2006 figure (Deferred Maintenance (DM) as a percentage of RPV) is: $51,838,385 / $656,912,215 = 0.078.

### Total Summary Condition Index (TSCI)

The 2006 index figure (the sum of DM and RIC as a percentage of the RPV), and the associated Rehab & Improvement Cost Index follow:

| | |
|---|---|
| Total Summary Condition Index (TSCI): (percent of Total RPV)* | 0.276 |
| Rehab & Improvement Cost Index (based on RIC/percent of Total RPV) | 0.196 |

### Facilities Management; Space Management & Utilization

Berkeley Lab operates at near 100% occupancy. The Asset Utilitization Index (AUI) follows.

| | |
|---|---|
| AUI (Asset Utilization Index from RPAM Order) | 0.98 (excellent) |

### Asset Utilization

Berkeley Lab assets are near 100% utilized, with the exception of the Bevatron complex, and a few small condemned structures. Berkeley Lab's overall average AUI is currently 0.98 as derived from the data in FIMS. The rating assigned to the AUI of 0.98 is "Excellent". Our goal is to further improve the AUI as excess facilities are eliminated and consolidation increases the space utilization rate of our remaining facilities.

## 13. Energy Management

LBNL has a multi-decade history of both developing and implementing energy efficiency technologies. The Laboratory is continuing it's work in this area and has developed a comprehensive energy management program, the LBNL Energy Management Performance Agreement (EMPA) to guide progress in the early years of the 21st Century. This program combines all Department of Energy (DOE) requirements for tracking and measuring energy

management/energy conservation activities. The EMPA was developed in coordination with the DOE Berkeley Site Office. The EMPA contains the applicable elements of energy management/energy conservation which are contained in the DOE/UC Contract. These include the Performance Assessment Model (PAM) Performance Measures under UC Contract 31, Section J, Appendix B; the requirements in the DOE Order 430.2A, and The Energy Policy Act of 2005( EPACT 2005).

EPACT 2005, Section 103, requires all federal agencies to install metering and advanced metering to the maximum extent practicable, by October 1, 1012. LBNL will submit an implementation plan by August 3, 2006.

Section 7.1.2 of the Laboratory's Facilities and Infrastructure: Real Property and Construction Project Management Performance Assessment Model (attached in Appendix 7) contains the Laboratory's current Energy Management Program.

# 14. Leasing and Non-Federal Funded Construction of New Buildings

## Leased Space

Approximately 75,000 square feet of space directly to the west of the UCB campus is currently leased for administrative service functions. This downtown space is served by the Berkeley Lab shuttle bus system, which provides a direct connection to the main Hill site. The Laboratory also leases a shipping-and-receiving facility in an offsite industrial area. Materials are consolidated at this location and transported by truck to the Hill once or twice a day.

Offsite leased space houses research functions if dictated by the type of work or by the Laboratory's overall space needs. For example, greenhouse space for Earth Science Division in Richmond CA; approximately 40,000 nsf of research laboratory space in Berkeley CA; in a Washington, D.C., an office for Energy and Environment program development; and the Oakland (CA) Scientific Facility, housing computing equipment and staff. There is also a leased telecommuting center in Livermore, CA. The Laboratory also operates the Joint Genome Laboratory's Production Genomics Facility, jointly with other DOE laboratories, in Walnut Creek, CA.

At this time, the Laboratory anticipates that leases for office and laboratory space will decrease over time as personnel and programs are consolidated to the Hill-site location.

**LBNL Leased Space**

| Bldg. No. | Name | Net Sq. Ft. | Gross Sq. Ft. | Lease Expires |
|---|---|---|---|---|
| 903 | Warehouse, Receiving | 117,495 | 122,374 | 5/14/2006 Under negotiations (Tenancy is month to month) |
| 913 | Greenhouse | 6,051 | 6,051 | 9/30/2007 |
| 937 | Berkeley Tower | 26,163 | 46,109 | 2/2/2009 |
| 943 | Oakland Scientific Facility | 29,285 | 51,896 | 6/30/2010 |
| 962 | Wash. DC L'Enfant Plaza | 2,199 | 4,012 | 9/30/2007 |

| | | | | |
|---|---|---|---|---|
| 965 | Livermore Telecommute Center | 1,575 | 2,547 | 5/31/2006 Under negotiations (Tenancy is month to month) |
| 977 | 717 Potter Street | 40,894 | 54,000 | 1/31/2010 |

The LBNL Leased Space table above does not include the multi-Laboratory Joint Genome Institute leases, these leases are summarized below:

| | | | | |
|---|---|---|---|---|
| 100/400 | Joint Genome Institute | 42,274 | 56,990 | 6/7/2008 |
| 500 | JGI Warehouse | 4,459 | 4,604 | 6/7/2008 |

## Alternative Financed and University of California Developed Buildings

### Berkeley Lab Guest House (UC developed and owned)

Berkeley Lab's ALS and NCEM are host to a growing number of users—more than 1,300 this year. Many other scientific visitors come to work with researchers in laboratories at other locations across the site, and although most computational scientists use NERSC Center facilities remotely, many meet with NERSC Center scientific and support staff.

In addition, beginning in 2007, the Molecular Foundry is expected to host hundreds of users annually. All of these users need dormitories in close proximity to their research to effectively and efficiently conduct their experimental and scientific programs. Working with UCOP and UCB, Berkeley Lab is developing the scope and approach for third-party support of a dormitory in order to meet these visiting users' short-term housing needs. A central "Civic Center" location—in close proximity to the ALS and a short walk to NCEM, the Molecular Foundry, and NERSC Center scientific staff—has been identified as an ideal location for the proposed Guest House.

### Computational Research and Theory Facility

Existing off-site Oakland Scientific Facility for the National Energy Research Scientific Computing Center facilities are inadequate to support upgrades after 2010. Location is inefficient and less secure than optimal. A conceptual plan for the computer and office space is in preparation and a site to the west of Building 70A has been identified and preliminary site planning and occupant programming is underway. CD-0 for mission need and a lease-occupancy program has been approved by the Office of Science.

### Helios Research Facility

In order advance research in carbon-neutral transportation fuels vital to the national interests, the University supporting the development of a Helios Research Facility to provide state-of-the-art laboratories for multidisciplinary experimental physics, chemistry, biology, and engineering integrated with special facilities for theoretical studies. Included would be core instrumental facilities for, e.g., mass spectrometry, genome sequencing, and electron microscopy, as well as a variety of thoughtfully-designed interaction spaces. A conceptual plan to support research in

nano science and physics including laboratories and associated office space is in preparation. The Facility will be located in close proximity to LBNL's Material Sciences buildings (Buildings 62 and 66) and the Molecular Foundry, and preliminary site planning and occupant programming is underway.

# E. Appendices

Appendix 1 Land Use Plan

Appendix 2 Building Inventory & Map of Buildings and Utilities

Appendix 3 TYSP-guidance edit of FY 08 Integrated Facilities and Infrastructure (IFI) Crosscut Budget Submission

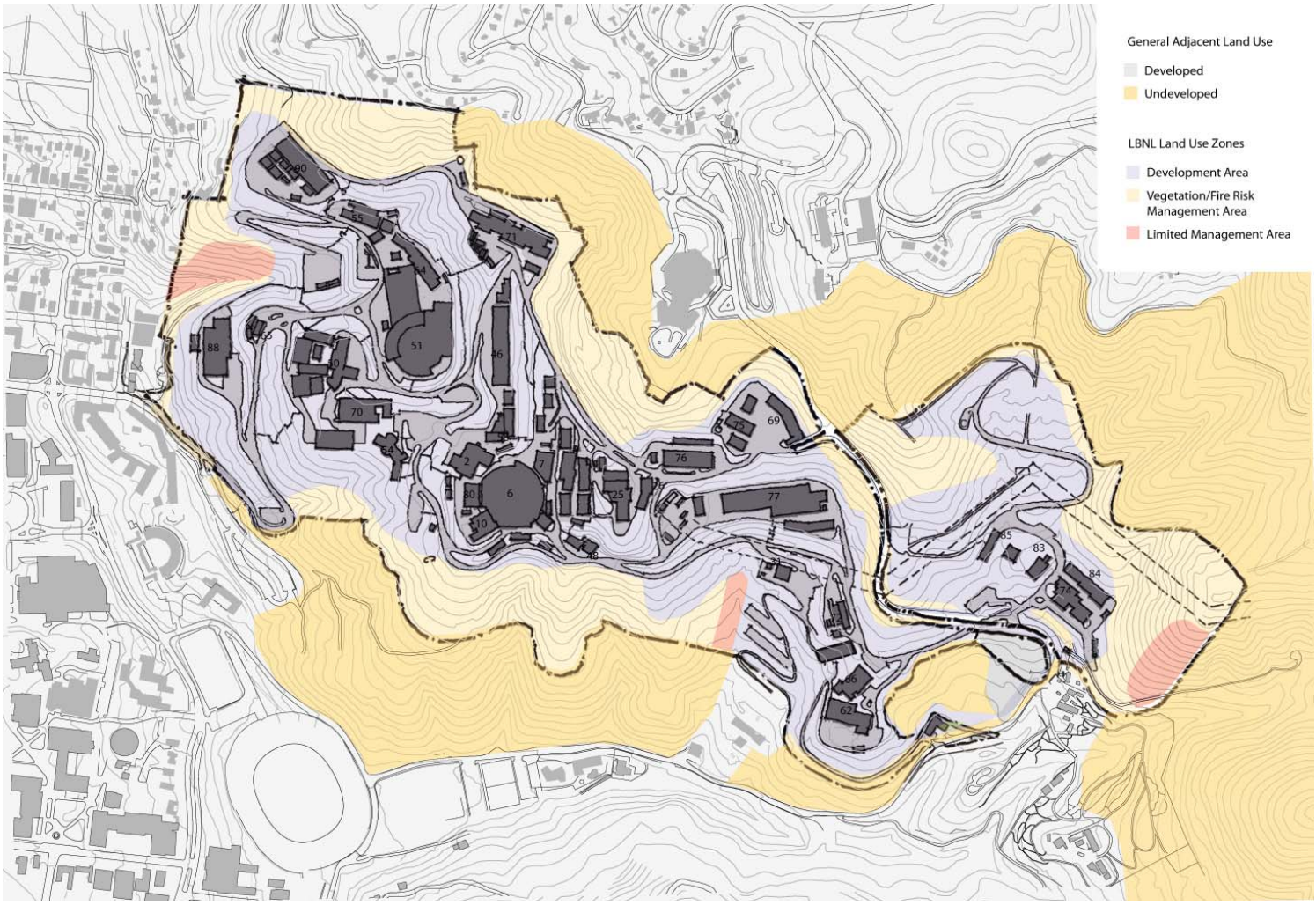
Appendix 4 Prioritized list of Line Items Projects

Appendix 5 List of Facilities to be Formally Declared Excess

Appendix 6 List of Excess Facility Projects

Appendix 7 Contract Facilities Performance Measures for LBNL

# Appendix 1 Land Use Plan



# Appendix 2 Building Inventory & Map of Buildings and Utilities

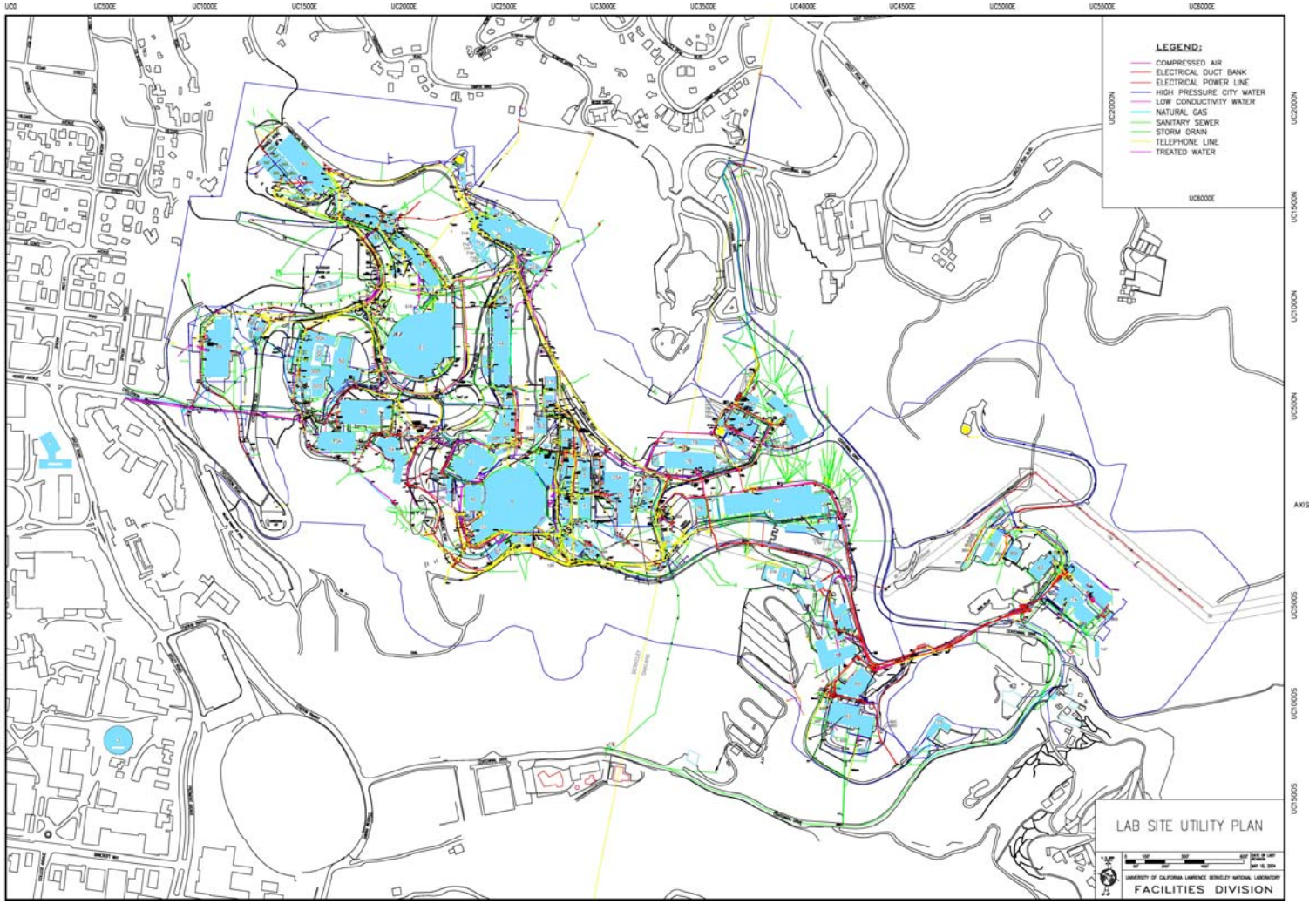
| Building Number | Gross Sq. Feet | RPV | Year Built | Anticipated Excess Year | Deferred Maintenance Needs ($) | Rehabilitation & Improvement Needs ($) |
|---|---|---|---|---|---|---|
| **Buildings** | | | | | | |
| 002 | 85,506 | 28,934,929 | 1988 | | 219,384 | 1,006,075 |
| 004 | 10,176 | 2,541,963 | 1944 | 2012 | 1,095,219 | 24,000 |
| 005 | 7,176 | 2,050,259 | 1950 | 2011 | 436,456 | 14,000 |
| 006 | 118,573 | 42,111,728 | 1991 | | 10,014 | 4,626,556 |
| 007 | 21,432 | 5,587,689 | 1943 | | 14,143 | 1,443,840 |
| 010 | 15,200 | 4,352,285 | 1944 | 2008 | 15,035 | 19,875,923 |
| 014 | 4,201 | 1,197,927 | 1944 | 2007 | 329,955 | 11,000 |
| 016 | 11,808 | 3,244,660 | 1943 | 2010 | 1,066,928 | 17,000 |
| 017 | 2,222 | 473,364 | 1949 | | 116,624 | 0 |
| 025 | 20,304 | 5,071,884 | 1947 | 2005 | 309,056 | 0 |
| 026 | 10,563 | 3,038,389 | 1964 | | 13,226 | 231,770 |
| 027 | 3,299 | 908,790 | 1948 | | 276,783 | 2,000 |
| 028 | 544 | 92,509 | 2003 | | 0 | 0 |
| 034 | 5,163 | 1,191,765 | 1992 | | 382,278 | 0 |
| 036 | 880 | 203,129 | 1989 | | 0 | 11,613 |
| 037 | 5,833 | 996,285 | 1987 | | 0 | 29,433 |
| 040 | 993 | 252,362 | 1947 | 2008 | 0 | 39,720 |
| 041 | 995 | 252,870 | 1948 | 2008 | 0 | 39,800 |
| 043 | 1,020 | 81,380 | 1979 | | 2,255 | 3,654 |
| 044 | 805 | 225,183 | 1956 | | 0 | 32,200 |
| 045 | 3,342 | 480,350 | 1970 | | 12,498 | 20,050 |
| 046 | 60,364 | 14,885,419 | 1949 | | 2,324,076 | 7,296,024 |
| 047 | 6,242 | 1,620,560 | 1957 | | 186,313 | 8,000 |
| 048 | 6,622 | 951,789 | 1981 | | 1,404 | 31,776 |
| 050 | 48,534 | 14,341,718 | 1943 | | 1,435,492 | 1,468,682 |
| 051 | 96,562 | 37,667,829 | 1950 | 2005 | 0 | 41,040,550 |
| 052 | 6,425 | 1,739,272 | 1943 | 2009 | 444,249 | 14,000 |
| 053 | 6,944 | 2,378,338 | 1949 | | 8,548 | 327,688 |
| 054 | 15,428 | 4,557,579 | 1950 | | 80,944 | 789,053 |
| 055 | 19,048 | 4,412,777 | 1951 | | 1,923,851 | 41,000 |
| 056 | 1,782 | 629,179 | 1976 | | 0 | 25,204 |
| 058 | 10,279 | 2,806,503 | 1950 | | 552,583 | 4,000 |
| 060 | 3,615 | 682,230 | 1979 | | 40,418 | 3,000 |
| 061 | 323 | 25,770 | 1969 | | 0 | 6,936 |
| 062 | 55,904 | 16,180,903 | 1965 | | 7,749,847 | 2,767,005 |
| 063 | 2,696 | 469,528 | 1963 | | 0 | 145,719 |
| 064 | 29,374 | 6,491,393 | 1951 | | 451,741 | 0 |
| 065 | 3,423 | 548,000 | 1952 | | 0 | 33,827 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 066 | 44,134 | 13,776,791 | 1987 | | 14,437 | 47,529 |
| 068 | 500 | 101,764 | 1979 | | 1,641 | 0 |
| 069 | 20,461 | 4,265,969 | 1967 | | 437,753 | 0 |
| 070 | 63,550 | 16,825,497 | 1955 | | 3,070,276 | 1,603,756 |
| 071 | 53,739 | 17,176,509 | 1956 | | 5,805,251 | 90,000 |
| 072 | 5,352 | 1,413,670 | 1961 | | 224,781 | 8,000 |
| 073 | 4,228 | 1,307,180 | 1961 | | 89,305 | 7,000 |
| 074 | 45,382 | 12,981,288 | 1962 | | 5,103,371 | 4,050,167 |
| 075 | 8,498 | 2,516,970 | 1961 | | 501,783 | 7,000 |
| 076 | 31,642 | 8,520,444 | 1964 | | 461,005 | 1,501,841 |
| 077 | 68,937 | 17,699,201 | 1963 | | 4,652,385 | 1,210,294 |
| 078 | 5,391 | 430,117 | 1966 | | 160,695 | 0 |
| 079 | 4,564 | 1,138,998 | 1965 | | 2,740 | 116,349 |
| 080 | 29,931 | 10,685,999 | 1954 | | 92,780 | 711,529 |
| 081 | 1,129 | 90,077 | 1968 | | 0 | 2,090 |
| 082 | 537 | 96,216 | 1981 | | 656 | 0 |
| 083 | 6,856 | 2,481,912 | 1979 | | 260,108 | 1,526,674 |
| 084 | 55,031 | 19,769,594 | 1997 | | 8,609 | 355,303 |
| 085 | 15,405 | 4,774,254 | 1996 | | 3,748 | 96,528 |
| 088 | 53,864 | 19,953,733 | 1960 | | 493,222 | 2,095,288 |
| 090 | 89,184 | 27,661,026 | 1960 | | 106,729 | 2,718,872 |
| 002A | 182 | 47,631 | 1993 | | 691 | 913 |
| 007A | 128 | 10,212 | 1974 | | 2,006 | 5,120 |
| 013A | 76 | 12,998 | 1965 | | 1,520 | 0 |
| 013B | 76 | 12,998 | 1965 | | 3,440 | 0 |
| 013C | 76 | 12,998 | 1965 | | 2,914 | 0 |
| 013D | 76 | 12,998 | 1965 | | 3,401 | 0 |
| 013E | 68 | 11,630 | 1977 | | 1,001 | 168 |
| 013F | 36 | 6,157 | 1965 | | 0 | 195 |
| 013H | 90 | 15,392 | 1990 | | 3,048 | 222 |
| 016A | 339 | 27,047 | 1960 | 2010 | 2,822 | 13,560 |
| 025A | 7,548 | 1,909,818 | 1963 | | 201,361 | 15,000 |
| 025B | 360 | 28,722 | 1963 | 2005 | 752 | 14,400 |
| 033A | 52 | 8,237 | 1965 | | 2,390 | 11,504 |
| 033B | 94 | 14,891 | 1996 | | 3,265 | 0 |
| 033C | 80 | 12,673 | 1965 | | 2,600 | 11,737 |
| 046A | 5,564 | 890,761 | 1977 | | 124,405 | 76,229 |
| 050A | 66,628 | 19,034,717 | 1962 | | 1,222,597 | 1,427,933 |
| 050B | 63,603 | 17,614,162 | 1967 | | 976,411 | 4,129,943 |
| 050C | 2,768 | 443,139 | 1980 | 2012 | 44,627 | 39,343 |
| 050D | 4,959 | 793,904 | 1979 | 2005 | 19,193 | 303,634 |
| 050E | 10,560 | 1,690,589 | 1984 | | 218,704 | 98,793 |
| 050F | 9,449 | 1,511,764 | 1985 | | 173,279 | 85,105 |
| 051A | 28,478 | 7,961,686 | 1958 | 2002 | 0 | 12,096,350 |
| 052A | 516 | 41,169 | 1961 | 2009 | 2,706 | 20,640 |
| 054A | 195 | 40,476 | 1982 | | 3,617 | 484 |
| 055A | 1,535 | 403,813 | 1985 | | 81,063 | 5,000 |
| 055B | 209 | 16,675 | 1987 | | 2,172 | 433 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 058A | 12,653 | 3,515,647 | 1969 | | 1,061,283 | 0 |
| 062B | 169 | 13,484 | 1965 | | 168 | 699 |
| 070A | 67,741 | 17,808,180 | 1961 | | 3,269,902 | 1,291,521 |
| 070B | 382 | 30,478 | 1979 | | 1,738 | 1,937 |
| 071A | 4,041 | 1,022,060 | 1964 | | 96,144 | 0 |
| 071B | 6,892 | 2,046,083 | 1978 | | 365,235 | 15,000 |
| 071T | 949 | 143,385 | 2003 | | 0 | 1 |
| 072A | 2,532 | 647,052 | 1980 | | 92,653 | 1,000 |
| 072B | 4,413 | 1,074,113 | 1984 | | 78,820 | 1,000 |
| 072C | 8,394 | 2,084,922 | 1984 | | 229,291 | 9,000 |
| 073A | 403 | 126,037 | 1961 | 2003 | 0 | 16,120 |
| 074F | 1,560 | 191,398 | 1996 | | 339 | 0 |
| 075A | 4,000 | 1,030,855 | 1987 | | 36,463 | 1,000 |
| 075C | 450 | 158,884 | 1979 | | 576 | 58,469 |
| 075D | 1,895 | 151,191 | 1979 | | 3,016 | 75,800 |
| 077A | 12,118 | 2,507,254 | 1988 | | 339,862 | 259,632 |
| 077H | 576 | 120,173 | 1983 | | 12,535 | 3,000 |
| 080A | 960 | 153,690 | 1977 | | 1,426 | 6,365 |
| 084B | 1,633 | 376,942 | 1997 | | 0 | 6,575 |
| 085A | 885 | 70,609 | 1996 | | 0 | 1,222 |
| 088D | 265 | 85,368 | 1979 | | 0 | 5,582 |
| **Trailers** | | | | | | |
| 007C | 479 | 84,939 | 1977 | | 35,887 | n.a. - trailer |
| 029A | 1,751 | 310,496 | 1978 | 2001 | 0 | n.a. - trailer |
| 029B | 1,440 | 255,348 | 1978 | 2001 | 0 | n.a. - trailer |
| 029C | 1,440 | 255,348 | 1978 | 2002 | 0 | n.a. - trailer |
| 031A | 623 | 110,473 | 1978 | | 118,355 | n.a. - trailer |
| 044A | 481 | 85,293 | 1979 | 2006 | 107,471 | n.a. - trailer |
| 044B | 1,441 | 255,525 | 1979 | 2006 | 104,561 | n.a. - trailer |
| 046B | 1,239 | 219,705 | 1979 | | 55,913 | n.a. - trailer |
| 046C | 1,029 | 182,467 | 1977 | | 99,157 | n.a. - trailer |
| 046D | 771 | 136,717 | 1984 | | 34,257 | n.a. - trailer |
| 051F | 1,499 | 529,259 | 1979 | 2006 | 37,903 | n.a. - trailer |
| 062A | 1,238 | 219,528 | 1978 | | 50,877 | n.a. - trailer |
| 064B | 480 | 85,116 | 1977 | | 9,729 | n.a. - trailer |
| 065A | 1,453 | 257,653 | 1984 | | 57,245 | n.a. - trailer |
| 065B | 1,020 | 180,871 | 1983 | | 9,809 | n.a. - trailer |
| 067B | 1,238 | 219,528 | 1978 | 2005 | 72,218 | n.a. - trailer |
| 067C | 1,237 | 219,351 | 1978 | 2005 | 69,382 | n.a. - trailer |
| 071C | 511 | 90,613 | 1968 | | 27,408 | n.a. - trailer |
| 071D | 520 | 92,209 | 1970 | | 33,715 | n.a. - trailer |
| 071E | 513 | 90,968 | 1973 | 1995 | 0 | n.a. - trailer |
| 071G | 517 | 91,677 | 1974 | | 5,479 | n.a. - trailer |
| 071J | 1,289 | 228,572 | 1978 | | 18,146 | n.a. - trailer |
| 071P | 511 | 90,613 | 1981 | | 17,768 | n.a. - trailer |
| 075B | 4,640 | 822,787 | 1979 | | 106,531 | n.a. - trailer |
| 075E | 410 | 72,703 | 1978 | 2006 | 19,049 | n.a. - trailer |
| 076L | 1,439 | 255,170 | 1977 | | 20,119 | n.a. - trailer |

| | | | | | | |
|---|---|---|---|---|---|---|
| 085B | 3,601 | 638,546 | 1996 | | 15,567 | n.a. - trailer |
| 090B | 1,443 | 255,880 | 1977 | | 37,161 | n.a. - trailer |
| 090C | 1,193 | 211,548 | 1977 | | 45,679 | n.a. - trailer |
| 090F | 2,462 | 436,573 | 1979 | | 52,463 | n.a. - trailer |
| 090G | 1,853 | 328,583 | 1978 | | 38,707 | n.a. - trailer |
| 090H | 1,849 | 327,873 | 1977 | | 40,738 | n.a. - trailer |
| 090J | 2,846 | 504,666 | 1978 | | 57,082 | n.a. - trailer |
| 090K | 2,846 | 504,666 | 1978 | | 53,646 | n.a. - trailer |
| 090P | 2,129 | 377,524 | 1979 | | 47,946 | n.a. - trailer |
| 090Q | 425 | 75,363 | 1978 | | 6,198 | n.a. - trailer |

# LBNL Site Map with Buildings and Utilities



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# Appendix 3 TYSP-guidance edit of FY 08 Integrated Facilities and Infrastructure (IFI) Crosscut Budget Submission

## *Blocks 1 – 4*

| 2006 Integrated Facilities and Infrastructure Budget Data Sheet (IFI) - 2006 TYSP Guidance & Format 6 4 06 | Deferred Maintenance Reduction | Gross Building Area Added | Gross Building Area Removed | TEC ($K) | FY 06 Approp. ($000) | FY 07 Approp ($000) | FY 08 Budget ($000) | FY 09 Budget ($000) | FY 10 Budget ($000) | FY 11 Budget ($000) | FY 12 Budget ($000) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SITE NAME: LBNL** | | | | | | | | | | | |
| **PROGRAM: SC HEP Landlord** | | | | | | | | | | | |
| **1.0 Capital Line Item** | | | | | | | | | | | |
| **1.1 New Infrastructure Construction (facilities and additions)** | | | | | | | | | | | |
| - | | | | | | | | | | | |
| **Subtotal 1.1** | | | | | | | | | | | |
| **1.2 All Other Infrastructure Projects (safety & recapitalization)** | | | | | | | | | | | |
| Building 77 - Rehabilitation of Bldg. Structures & Systems, Phase 2 | | **1,750** | **0** | | **3,742** | | | | | | |
| Seismic & Structural Safety Upgrades of Buildings Phase 1 - Buildings 74 & 50 | **0** | **0** | **0** | | | **7,500** | **7,000** | **2,500** | | | |
| Seismic & Structural Safety Upgrades of Buildings Phase 2 - Buildings 64 & 46 | **tbd** | **0** | **0** | | | | | | | | **3,125** |
| **Subtotal 1.2** | | **1,750** | **0** | | **3,742** | **7,500** | **7,000** | **2,500** | **0** | **0** | **3,125** |
| **Total Infrastructure Line Items (1.1 + 1.2)** | | **1,750** | **0** | | **3,742** | **7,500** | **7,000** | **2,500** | **0** | **0** | **3,125** |
| **1.3 Programmatic Line Items that Add Space** | | | | | | | | | | | |
| Molecular Foundry | **0** | **95,692** | **0** | | **9,510** | **257** | | | | | |
| User Support Building - BES | **0** | **30,000** | **-15,200** | | | **3,000** | **14,600** | **14,000** | | | |
| Genomics: Genomes To Life (GTL) Facility - BER* | **0** | **95,000** | **0** | | | | | **20,000** | **50,000** | **30,000** | |
| Next Generation Light Source (NGLS) - BES | **tbd** | **150,000** | **tbd** | | | | | | **20,000** | **70,000** | **50,000** |
| * - To be determined after review of DOE BER mission documents anticipated during the summer of 2006. | | | | | | | | | | | |
| **Subtotal 1.3** | | **370,692** | **-15,200** | | **9,510** | **3,257** | **14,600** | **34,000** | **70,000** | **100,000** | **50,000** |
| **Subtotal Line Item Projects (1.1 +1.2+1.3)** | | **372,442** | **-15,200** | | **13,252** | **10,757** | **21,600** | **36,500** | **70,000** | **100,000** | **53,125** |
| **2.0 General Plant Project (GPP)** (Include project number & identify Funding Program) | | | | | | | | | | | |
| **2.1 New Construction (facilities and additions)** | | | | | | | | | | | |
| Seismic Safety - New Animal Care Facility | **0** | **5,005** | **0** | **4,900** | **2,823** | **200** | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Seismic Safety Relocations - Construct 20,000 gsf Two-story Office Structure to Accommodate Staff in Hazardous Situations | **0** | **20,000** | **0** | **4,900** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Seismic Safety Relocations - Construct 15,000 gsf Two-story Laboratory/Office Structure to Accommodate Staff in Hazardous Situations | **0** | **15,000** | **0** | **4,900** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Seismic Safety Surge Relocations - Construct 15,000 gsf Two-story Laboratory/Office "Surge" Structure to Temporarily Accommodate Staff as Required during Building Repair | **0** | **15,000** | **0** | **4,900** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 71B - Construct addition of Light-frame Structure to Address Over-crowding and Allow Demolition of Sub-standard Mission-Critical Structures | **0** | **12,000** | **0** | **4,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 72 - Provide Office and Collaboration Space for the TEAM Microscope Users | **0** | **15,000** | **0** | **4,250** | | tbd | tbd | tbd | tbd | tbd | tbd |
| **Subtotal 2.1 New Construction GPP** | | **82,005** | **0** | **28,350** | **2,823** | tbd | tbd | tbd | tbd | tbd | tbd |
| **2.2 All Other GPP Projects (recap including alterations and improvements)** | | | | | | | | | | | |
| Building 2 - Convert Space for Laboratory Use | **0** | | | **470** | **470** | | | | | | |
| Upgrade Bldg. 72A for TEAM 0.5 Microscope (SC Facilities for Future) | **0** | | | **850** | **800** | **50** | | | | | |
| Install Cooling Coils in West-facing 70A-4th Fl. Labs - Phs 1: Rms. 4413/4419 | **0** | | | **120** | **120** | | | | | | |
| Upgrade Seaborg Center Radiation Laboratory (70A-2217/2217A) | **0** | | | **175** | **175** | | | | | | |
| Building 76 - Upgrade Structural Elements for Seismic Safety | **0** | | | **310** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 72 - Upgrade Structural Elements for Seismic Safety | **0** | | | **530** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 54 - Upgrade Seismic Safety | **0** | | | **550** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 25A - Upgrade Structural Elements for Seismic Safety | **0** | | | **600** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 58 - Upgrade Structural Elements for Seismic Safety | **0** | | | **600** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Seismic Safety Allocation | **0** | | | **TBD** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Upgrade B72B for TEAM 1.0 Microscope | **0** | | | **950** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 62 Modernize and Upgrade Mechanical and Electrical Infrastructure | **0** | | | **4,700** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 71 Modernize and Upgrade Mechanical and Electrical Infrastructure | **0** | | | **4,700** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 74 Modernize and Upgrade Research Spaces | **0** | | | **4,900** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Construct Superconducting Detector Lab (Clean Room) | **0** | | | **250** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 50 Modernize and Upgrade Research Spaces | **0** | | | **4,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 70 Modernize and Upgrade Research Spaces (Air Supply) | **0** | | | **4,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 70A Modernize and Upgrade Research Spaces (Air Supply) | **0** | | | **4,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Upgrade Old-standard Wet and Dry Laboratories to Meet Expectations of Modern Research Science | **0** | | | **25,000** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Upgrade Sanitary Sewer Monitoring Station | **0** | | | **250** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Electrical Utility System - Power Factor Correction Upgrade | **0** | | | **1,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Electrical Utility System - System Upgrades | **0** | | | **600** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 62 Utility Infrastructure Upgrade | **0** | | | **2,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 6 - Electrical Power Upgrade | **0** | | | **75** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 54 - Upgrade Food Service Area and Kitchen | **0** | | | **1,900** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Upgrade Mechanical Utility Distribution | **0** | | | **12,000** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Upgrade Computer/Communications Network Fiber Utility | **0** | | | **870** | | tbd | tbd | tbd | tbd | tbd | tbd |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Convert Building 50 Library to Offices | **0** | | | **500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Convert Building 25A from Shop to Offices | **0** | | | **1,500** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Convert Building 71B Shop to Offices | **0** | | | **800** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 64 - Construct New Laboratory Suites | **0** | | | **2,400** | | tbd | tbd | tbd | tbd | tbd | tbd |
| Building 64 - Convert Room 131 to Laboratory Use | **0** | | | **600** | | tbd | tbd | tbd | tbd | tbd | tbd |
| | | | | | | | | | | | |
| **Subtotal 2.2 All Other (recap) GPP** | **0** | | | | **1,565** | tbd | tbd | tbd | tbd | tbd | tbd |
| **Subtotal GPP (2.1 + 2.2)** | **0** | **164,010** | **0** | **112,050** | **4,388** | **4,065** | **4,065** | **4,065** | **4,065** | **4,065** | **4,065** |
| **3.0 Institutional General Plant Project (IGPP)** | | | | | | | | | | | |
| **Subtotal IGPP Projects** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **4.0 Operating/Expense for Excess Elimination and Other** | | | | | | | | | | | |
| **4.1 Excess Elimination** (demolition, sale, lease, transfer) Show area eliminated in Gross Area column | | | | | | | | | | | |
| Bevatron / Bldg. 51 deconstruction | | **0** | **-126,500** | | **10,900** | **14,000** | **6,145** | **7,204** | **14,000** | **14,000** | **14,000** |
| **4.1 Subtotal** | | | | | | | | | | | |
| **4.2 All Other (List direct O&E maintenance under 5.1)** | | **0** | **-126,500** | | | | | | | | |
| | | | | | | | | | | | |
| **4.2 Subtotal** | | | | | | | | | | | |
| **Subtotal 4.0 Operating/Expense Projects (4.1 + 4.2)** | | | | | | | | | | | |
| **TOTAL Capital & Operating Investment:** | | **536,452** | **-141,700** | | **17,640** | **14,822** | **25,665** | **40,565** | **74,065** | **104,065** | **57,190** |
| **TOTAL Overhead Investments (IGPP)** | | **0** | **0** | | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

## ***Blocks 5 – 6***

| **2006 Integrated Facilities and Infrastructure Budget Data Sheet (IFI) - 2006 TYSP Guidance & Format** 6 4 06 | **Gross Sq Ft.** | **FY 06 Approp. ($000)** | **FY 07 Approp ($000)** | **FY 08 Budget ($000)** | **FY 09 Budget ($000)** | **FY 10 Budget ($000)** | **FY 11 Budget ($000)** | **FY 12 Budget ($000)** |
|---|---|---|---|---|---|---|---|---|
| **SITE NAME** | | | | | | | | |
| **PROGRAM:** | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **5.0 Maintenance & Repair** | | | | | | | | |
| **5.1 Direct Funded (by HQ or Site Program)** | | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Subtotal 5.1 Total Direct Maintenance & Repair** | | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **5.2 Indirect (from Overhead or Space Charges)** | | | | | | | | |
| DM and Renewal Projects | | **0** | **870** | **0** | **0** | **0** | **0** | **0** |
| Preventive Maintenance | | **4,500** | **4,500** | **6,902** | **7,141** | **7,158** | **7,551** | **9,500** |
| Corrective, Routine and Emergency Repairs | | **4,250** | **5,100** | **5,400** | **5,400** | **6,000** | **6,000** | **6,300** |
| Electrical Distribution Component Replacements | | **4,250** | **3,400** | **3,600** | **3,600** | **4,000** | **4,000** | **4,200** |
| **Subtotal 5.2** | | **13,000** | **13,000** | **15,902** | **16,141** | **17,158** | **17,551** | **20,000** |
| **Subtotal Total Maintenance & Repair (5.1 + 5.2)** | | **13,000** | **13,000** | **15,902** | **16,141** | **17,158** | **17,551** | **20,000** |
| **5.3 Direct Funded Deferred Maintenance (by HQ or Site Program)** | | | | | | | | |
| Upper Pump House B66 HP Line Replacement | | **329** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Subtotal 5.3 Total Direct Deferred Maintenance** | | **329** | **0** | **0** | **0** | **0** | **0** | **0** |
| | | | | | | | | |
| | | | | | | | | |
| **5.4 Indirect Funded Deferred Maintenance (from Overhead or Space Charges)** | | | | | | **ACI .95 Reached** | | |
| Roof Replacement Bldg 77 | | **0** | **870** | **0** | **0** | **0** | **0** | **0** |
| Roof Replacement Bldg 6 | | **0** | **820** | **0** | **0** | **0** | **0** | **0** |
| Lighting Replacements | | **0** | **150** | **250** | **500** | **0** | **0** | **0** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Electrical Distribution Component Replacements | | 0 | 200 | 1,500 | 2,500 | 0 | 0 | 0 |
| HVAC & Controls Replacements | | 0 | 138 | 1,000 | 1,500 | 0 | 0 | 0 |
| Fire Alarm and System Replacements | | 0 | 0 | 710 | 775 | 0 | 0 | 0 |
| Boiler Replacements | | 0 | 0 | 500 | 500 | 0 | 0 | 0 |
| **Subtotal 5.4 Total Indirect Deferred Maintenance** | | 0 | 2,178 | 3,960 | 5,775 | 7,590 | 7,590 | 7,590 |
| **Total Deferred Maintenance (5.3 + 5.4)** | | 329 | 2,178 | 3,960 | 5,775 | 7,590 | 7,590 | 7,590 |
| **Total Maintenance (5.1 + 5.2 +5.3 +5.4)** | | 13,329 | 15,178 | 19,862 | 21,916 | 24,748 | 25,141 | 27,590 |
| **6.0 Indirect O&E** | | | | | | | | |
| **6.1 Excess Elimination (demolition, sale, lease, transfer) Show area eliminated in Gross Area column** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6.1 Total Indirect Excess Elimination** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | | |
| **6.2 Other Indirect Funded (includes modifications, additions, improvements, etc. that does not qualify as GPP or maintenance)** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6.2 Total Other Indirect O&E** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **6.0 Total Indirect O&E** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## ***Block 7***

| **2006 Integrated Facilities and Infrastructure Budget Data Sheet (IFI) - 2006 TYSP Guidance & Format** 6 4 06 | Gross Building Area | FY 06 Sq Ft | FY 07 Sq Ft | FY 08 Sq Ft | FY 09 Sq Ft | FY 10 Sq Ft | FY 11 Sq Ft | FY 12 Sq Ft |
|---|---|---|---|---|---|---|---|---|
| **SITE NAME** | | | | | | | | |
| **PROGRAM:** | | | | | | | | |
| **7.0 Summary of Area Added & Eliminated** | | | | | | | | |
| **7.1 Total Area to be Eliminated Each Year** (List of projects, by type of funding, with project number, and AREA eliminated by fiscal year accomplished). | | | | | | | | |
| **Line Item** | | | | | | | | |
| Building 10 - Demolition | **-15,200** | **0** | **0** | **0** | **-15,200** | **0** | **0** | **0** |
| **Subtotal Line Items** | **-15,200** | **0** | **0** | **0** | **-15,200** | **0** | **0** | **0** |
| **GPP** | | | | | | | | |
| | | | | | | | | |
| **Subtotal GPP** | tbd | **0** | **0** | tbd | tbd | tbd | tbd | tbd |
| **IGPP** | | | | | | | | |
| **Subtotal IGPP** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Operations/Expense** | | | | | | | | |
| Demolition of Building 51-complex | **-126527** | | | | | | | **-126527** |
| **Subtotal Operations/Expense** | **-126527** | **0** | **0** | **0** | **0** | **0** | **0** | **-126527** |
| **Indirect Operations/ Expense** | | | | | | | | |
| **Subtotal Indirect Operations/Expense** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Transfer by sale or lease, or transfer to an outside federal agency** | | | | | | | | |
| **Subtotal transfer by sale or lease, or transfer to an outside federal agency** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **-** |
| **Subtotal 7.1 Excess Facility Area Eliminated** | **(141,727)** | **-** | **-** | **-** | **(15,200)** | **-** | **-** | **(126,527)** |
| **7.2 Total Area to be Added by GPP, IGPP, and LIP Construction** ((List of projects, by type of funding, with project number, and AREA add by fiscal year accomplished). | Gross Building Area | FY 06 Sq Ft | FY 07 Sq Ft | FY 08 Sq Ft | FY 09 Sq Ft | FY 10 Sq Ft | FY 11 Sq Ft | FY 12 Sq Ft |
| **Line Item** | | | | | | | | |
| Building 77 - Rehabilitation of Bldg. Structures & Systems, Phase 2 | **1,750** | **0** | **1,750** | **0** | **0** | **0** | **0** | **0** |
| Molecular Foundry | **95,692** | **0** | **95,692** | **0** | **0** | **0** | **0** | **0** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| User Support Building - BES | **30,000** | **0** | | | | **30,000** | **0** | **0** |
| Genomics: Genomes To Life (GTL) Facility - BER* | **95,000** | **0** | | | | | | **95,000** |
| Next Generation Light Source (NGLS) - BES Compl. FY 2013 | **150,000** | **0** | | | | | | |
| **Subtotal Line Items** | **372,442** | **0** | **97,442** | **0** | **0** | **30,000** | **0** | **95,000** |
| **GPP** | | | | | | | | |
| To be Determined with annual Triage Prioritization | | | | | | | | |
| **Subtotal GPP** | tbd | tbd | tbd | tbd | tbd | tbd | tbd | tbd |
| **IGPP** | | | | | | | | |
| **Subtotal IGPP** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Subtotal 7.2 Area Added** | **372,442** | **0** | **97,442** | **0** | **0** | **30,000** | **0** | **95,000** |

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# Appendix 4 Prioritized list of Line Items Projects

Recapitalization/Modernization SLI LIPs are included in the lower portion of this list as "informational" items, it is not anticipated that these projects will be initiated during the term of this TYSP as the serious seismic safety issues must first be addressed.

Note: TEC's are FY 2007 dollars.

| SLI LIP Project Title | TEC - Mid Point | Project Description |
|---|---|---|
| **Seismic & Structural Safety of Buildings Phase 1** | $17,000 | *Anticipated FY 2007 start.* **Seismic & Structural Safety of Buildings Phase 1 - Buildings 74 & 50** Unacceptably high life-safety risks have been identified in recent seismic safety evaluations of Buildings 50 and 74. These buildings are occupied by over 300 personnel in the Life Sciences Division, Nuclear Science Division, Physics Division and Laboratory Administration. Relocation of personnel to life-safe space is not possible because of Berkeley Lab's critical space shortage. This project will correct the following structural deficiencies:<br>• Building 50: Reduces unacceptably high seismic demand capacity ratios in concrete spandrel beams and shear walls, reinforces a column supporting a discontinuous shear wall and rehabilitates inadequately anchored non-structural elements.<br>• Building 74: Strengthens vertical bracing, eliminates an inadequate seismic gap, resolves diaphragm discontinuities and a discontinuous shear wall, and retrofits a compromised shear wall. |
| **Seismic & Structural Safety of Buildings Phase 2 - Buildings 64 & 46** | $25,000 | **Seismic & Structural Safety of Buildings Phase 2 - Buildings 64 & 46** Life-safety risks have been identified in recent seismic safety evaluations of Buildings 64 and 46. These buildings are occupied by over 200 personnel in the Life Sciences Division, Physical Biosciences Division, Earth Sciences Division, Advanced Light Source Division, Accelerator & Fusion Research Division, Environmental Energy Technologies Division and Engineering Division. Relocation of personnel to life-safe space is not possible because of Berkeley Lab's critical space shortage. These buildings are 29,374 gsf and 60,364 gsf respectively. This project will correct the structural deficiencies, upgrade the utility infrastructure in these 55-year old buildings and modernize approximately 20,000 sf of laboratories in these buildings so these assets will provide many additional decades of service. The CAMP rating is 67 based on the seriousness of the current risks and an expectation that this work will be performed in the first decade of the 21st Century. |

| | | |
|---|---|---|
| **Seismic & Structural Safety of Buildings Phase 3 - Building 55 Demolition & Replacement** | $25,000 | **Seismic & Structural Safety of Buildings Phase 3 - Building 55 Demolition & Replacement** This building is a partial collapse hazard and can not be cost-effectively upgraded. Replacement is the most cost effective method to address the seismic issues with this structure. This project will demolish the 19,000 gross square foot laboratory/office building and construct replacement 25,000 gross square foot laboratory/office building at the same site. The new building will contain approximately 60% research laboratory space, with the balance of the space providing offices for the research teams, and both formal and informal meeting spaces for collaboration and use by the research groups and visitors. The new building is somewhat larger in order to better accommodate the larger apparatus and equipment used by modern research teams. The CAMP rating is 67 based on the<br><br>seriousness of the current risks and an expectation that this work will be performed in the first decade of the 21st Century. |
| **Seismic & Structural Safety of Buildings Phase 4 - Building 25 Demolition & Replacement** | $25,000 | **Seismic & Structural Safety of Buildings Phase 4 - Building 25 Demolition & Replacement** This building is a partial collapse hazard and can not be cost-effectively upgraded, replacement is the most cost effective method to address the seismic and operational issues with this structure. This project will demolish the 21,000 gross square foot heavy & wet lab/office building and construct a 25,000 gross square foot laboratory/office building at the same location. The new building will contain approximately 60% research laboratory space, with the balance of the space providing offices for the research teams, and both formal and informal meeting spaces for collaboration and use by the research groups and visitors. The new building is slightly larger in order to better accommodate the larger apparatus and equipment used in modern research. The<br><br>CAMP rating is 67, 65 with a management adjustment to 67, based on the seriousness of the current risks and the fact that life safety risks have been partially mitigated this building, and an expectation that this work will be performed and all engineering functions and storage uses relocated in the second decade of the 21st Century. |

| | | |
|---|---|---|
| **Seismic Safety of Roadways & Utilities Upgrade** | $22,000 | **Seismic Safety of Roadways & Utilities Upgrade** Critical portions of the Laboratory roadway must be upgraded to survive an earthquake of foreseeable intensity and ensure egress and ingress to the Laboratory site after the seismic event. Associated critical sub-roadway utility infrastructure must be upgraded in order to reduce impacts from a seismic event, support rapid response and recovery efforts, and to provide the reliable and adequate utility services that are fundamental to modern laboratory research in the 21st Century. This project will modify and strength the roadways to ensure safe ingress/egress during and after a seismic event, and will install seismically appropriate retaining structures at two locations where the ground below the roadway (and sub-roadway utilities) will otherwise fail and slip down slope isolating portions of the Laboratory and leading directly to failure in the major utilities site wide. This project will comprehensively address deficiencies in the Water Distribution, Natural Gas, Sanitary Sewer, Storm Sewer, Electrical and Network &<br><br>Communication utility systems and ensure necessary reliability and capacity to support 21st Century science. These systems were first constructed in the late 1930's and have been incrementally modified to meet specific needs over the past six and a half decades. This project will comprehensively upgrade the core utility distribution systems in order to reduce the impact on research while all systems in a particular area are upgraded to ensure adequate and reliable services to research facilities in the 21st century. The CAMP rating is 67 based on the seriousness of the current risks and an expectation that this work will be performed in the first decade of the 21st Century. |
| **Research Building Modernization - Bldg. 50-complex** | $20,000 | **Research Building Modernization - Bldg. 50-complex** This is the second of six projects in the Berkeley Lab Research Facilities Modernization Program, a program designed to ensure that research laboratory facilities designed and constructed to met the needs and requirements of !940-1970 science are modernized as necessary to address the needs of modern 21st Century science and that these basically sound buildings continue to serve the DOE mission for many additional decades. The first sections of the 199,000 gross square foot Building 50 complex were constructed in the 1940's. This upgrade will correct deficiencies and upgrade the facilities to modern research conventions and standards, systems to be upgraded include the electrical, HVAC, Laboratory gases, Laboratory |

| | | |
|---|---|---|
| **Research Building Modernization - Bldg. 70-complex** | $15,000 | **Research Building Modernization - Bldg. 70-complex** This is the third of six projects in the Berkeley Lab Research Facilities Modernization Program, a program designed to ensure that research laboratory facilities designed and constructed to met the needs and requirements of !940-1970 science are modernized as necessary to address the needs of modern 21st Century science and that these basically sound buildings continue to serve the DOE mission for many additional decades. The first sections of the 131,000 gross square foot Building 70 complex were constructed in the 1950's. This upgrade will correct deficiencies and upgrade the facilities to modern research conventions and standards, systems to be upgraded include the electrical, HVAC, Laboratory gases, Laboratory<br><br>benches, Laboratory exhaust, in addition, architectural/life safety modifications will be made where required by Codes and Standards. The CAMP rating is 65 based on the operational issues with this building and the ability of it's 1950/early 1960's infrastructure to meet modern research laboratory expectations, and an expectation that this work will be performed in the second decade of the 21st Century. |
| **Research Building Modernization - Bldg. 62** | $11,000 | **Research Building Modernization - Bldg. 62** This is the fourth of six projects in the Berkeley Lab Research Facilities Modernization Program, a program designed to ensure that research laboratory facilities designed and constructed to met the needs and requirements of !940-1970 science are modernized as necessary to address the needs of modern 21st Century science and that these basically sound buildings continue to serve the DOE mission for many additional decades. The first sections of the 56,000 gross square foot Building 62 complex were constructed in the early 1960's. This upgrade will correct deficiencies and upgrade the facilities to modern research conventions and standards, systems to be upgraded include the electrical, HVAC, Laboratory gases, Laboratory benches, Laboratory<br><br>exhaust, in addition, architectural/life safety modifications will be made where required by Codes and Standards. The CAMP rating is 65 based on the operational issues with this building and the ability of it's early 1960's design and infrastructure to meet modern research laboratory expectations, and an expectation that this work will be performed in the second decade of the 21st Century. |

| | | |
|---|---|---|
| **Research Building Modernization - Bldg. 66** | $11,000 | **Research Building Modernization - Bldg. 66** This is the fifth of six projects in the Berkeley Lab Research Facilities Modernization Program, a program designed to ensure that research laboratory facilities designed and constructed to met the needs and requirements of !940-1970 science are modernized as necessary to address the needs of modern 21st Century science and that these basically sound buildings continue to serve the DOE mission for many additional decades. The first section of the 44,000 gross square foot Building 66 was constructed in the early 1960's. This upgrade will correct deficiencies and upgrade the facilities to modern research conventions and standards, systems to be upgraded include the electrical, HVAC, Laboratory gases, Laboratory benches, Laboratory exhaust.<br><br>The CAMP rating is 63 based on the operational issues with this building and the ability of it's 1970's design and infrastructure to meet modern research laboratory expectations, and an expectation that this work will be performed in the second decade of the 21st Century. |
| **Research Building Modernization - Bldg. 2** | $17,000 | **Research Building Modernization - Bldg. 2** This is the sixth of six projects in the Berkeley Lab Research Facilities Modernization Program, a program designed to ensure that research laboratory facilities designed and constructed to met the needs and requirements of !940-1970 science are modernized as necessary to address the needs of modern 21st Century science and that these basically sound buildings continue to serve the DOE mission for many additional decades. The first section of the 44,000 gross square foot Building 2 was designed in the early 1970's. This upgrade will correct deficiencies and upgrade the facilities to modern research conventions and standards, systems to be upgraded include the electrical, HVAC, Laboratory gases, Laboratory benches, Laboratory exhaust.<br><br>The CAMP rating is 63 based on the operational issues with this building and the ability of it's 1970's design and infrastructure to meet modern research laboratory expectations, and an expectation that this work will be performed late in the second decade of the 21st Century. |

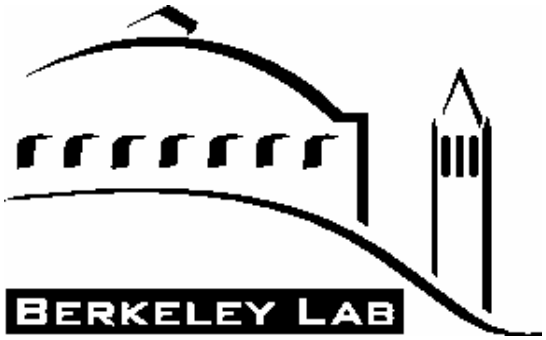
# Appendix 5 List of Facilities Anticipated to be Formally Declared Excess

| Building Number | Gross Sq. Feet | RPV | Year Built | Anticipated Excess Year | Deferred Maintenance Needs ($) | Rehabilitation & Improvement Needs ($) |
|---|---|---|---|---|---|---|
| **Buildings** | | | | | | |
| 004 | 10,176 | 2,541,963 | 1944 | 2012 | 1,095,219 | 24,000 |
| 005 | 7,176 | 2,050,259 | 1950 | 2011 | 436,456 | 14,000 |
| 010 | 15,200 | 4,352,285 | 1944 | 2008 | 15,035 | 19,875,923 |
| 014 | 4,201 | 1,197,927 | 1944 | 2007 | 329,955 | 11,000 |
| 016 | 11,808 | 3,244,660 | 1943 | 2010 | 1,066,928 | 17,000 |
| 025 | 20,304 | 5,071,884 | 1947 | 2005 | 309,056 | 0 |
| 040 | 993 | 252,362 | 1947 | 2008 | 0 | 39,720 |
| 041 | 995 | 252,870 | 1948 | 2008 | 0 | 39,800 |
| 051 | 96,562 | 37,667,829 | 1950 | 2005 | 0 | 41,040,550 |
| 052 | 6,425 | 1,739,272 | 1943 | 2009 | 444,249 | 14,000 |
| 016A | 339 | 27,047 | 1960 | 2010 | 2,822 | 13,560 |
| 025B | 360 | 28,722 | 1963 | 2005 | 752 | 14,400 |
| 050C | 2,768 | 443,139 | 1980 | 2012 | 44,627 | 39,343 |
| 050D | 4,959 | 793,904 | 1979 | 2005 | 19,193 | 303,634 |
| 051A | 28,478 | 7,961,686 | 1958 | 2002 | 0 | 12,096,350 |
| 052A | 516 | 41,169 | 1961 | 2009 | 2,706 | 20,640 |
| 073A | 403 | 126,037 | 1961 | 2003 | 0 | 16,120 |
| **Trailers** | | | | | | |
| 029A | 1,751 | 310,496 | 1978 | 2001 | 0 | n.a. - trailer |
| 029B | 1,440 | 255,348 | 1978 | 2001 | 0 | n.a. - trailer |
| 029C | 1,440 | 255,348 | 1978 | 2002 | 0 | n.a. - trailer |
| 044A | 481 | 85,293 | 1979 | 2006 | 107,471 | n.a. - trailer |
| 044B | 1,441 | 255,525 | 1979 | 2006 | 104,561 | n.a. - trailer |
| 051F | 1,499 | 529,259 | 1979 | 2006 | 37,903 | n.a. - trailer |
| 067B | 1,238 | 219,528 | 1978 | 2005 | 72,218 | n.a. - trailer |
| 067C | 1,237 | 219,351 | 1978 | 2005 | 69,382 | n.a. - trailer |
| 071E | 513 | 90,968 | 1973 | 1995 | 0 | n.a. - trailer |
| 075E | 410 | 72,703 | 1978 | 2006 | 19,049 | n.a. - trailer |

# Appendix 6 List of Excess Facility Projects

| Building Number | Gross Sq. Feet | RPV | Year Built | Anticipated Excess Year | Deferred Maintenance Needs ($) | Rehabilitation & Improvement Needs ($) |
|---|---|---|---|---|---|---|
| **Buildings** | | | | | | |
| 004 | 10,176 | 2,541,963 | 1944 | 2012 | 1,095,219 | 24,000 |
| 005 | 7,176 | 2,050,259 | 1950 | 2011 | 436,456 | 14,000 |
| 010 | 15,200 | 4,352,285 | 1944 | 2008 | 15,035 | 19,875,923 |
| 014 | 4,201 | 1,197,927 | 1944 | 2007 | 329,955 | 11,000 |
| 016 | 11,808 | 3,244,660 | 1943 | 2010 | 1,066,928 | 17,000 |
| 025 | 20,304 | 5,071,884 | 1947 | 2005 | 309,056 | 0 |
| 040 | 993 | 252,362 | 1947 | 2008 | 0 | 39,720 |
| 041 | 995 | 252,870 | 1948 | 2008 | 0 | 39,800 |
| 051 | 96,562 | 37,667,829 | 1950 | 2005 | 0 | 41,040,550 |
| 052 | 6,425 | 1,739,272 | 1943 | 2009 | 444,249 | 14,000 |
| 016A | 339 | 27,047 | 1960 | 2010 | 2,822 | 13,560 |
| 025B | 360 | 28,722 | 1963 | 2005 | 752 | 14,400 |
| 050C | 2,768 | 443,139 | 1980 | 2012 | 44,627 | 39,343 |
| 050D | 4,959 | 793,904 | 1979 | 2005 | 19,193 | 303,634 |
| 051A | 28,478 | 7,961,686 | 1958 | 2002 | 0 | 12,096,350 |
| 052A | 516 | 41,169 | 1961 | 2009 | 2,706 | 20,640 |
| 073A | 403 | 126,037 | 1961 | 2003 | 0 | 16,120 |
| **Trailers** | | | | | | |
| 029A | 1,751 | 310,496 | 1978 | 2001 | 0 | n.a. - trailer |
| 029B | 1,440 | 255,348 | 1978 | 2001 | 0 | n.a. - trailer |
| 029C | 1,440 | 255,348 | 1978 | 2002 | 0 | n.a. - trailer |
| 044A | 481 | 85,293 | 1979 | 2006 | 107,471 | n.a. - trailer |
| 044B | 1,441 | 255,525 | 1979 | 2006 | 104,561 | n.a. - trailer |
| 051F | 1,499 | 529,259 | 1979 | 2006 | 37,903 | n.a. - trailer |
| 067B | 1,238 | 219,528 | 1978 | 2005 | 72,218 | n.a. - trailer |
| 067C | 1,237 | 219,351 | 1978 | 2005 | 69,382 | n.a. - trailer |
| 071E | 513 | 90,968 | 1973 | 1995 | 0 | n.a. - trailer |
| 075E | 410 | 72,703 | 1978 | 2006 | 19,049 | n.a. - trailer |

# Appendix 7 Contract Facilities Performance Measures for LBNL




## FY 2006

## *Facilities and Infrastructure:*

## *Real Property and Construction Project Management*

## *Performance Assessment Model*

***Lawrence Berkeley National Laboratory***

***University of California Laboratory Management Office***

***Department of Energy - Berkeley Site Office***

***October 01, 2005***

**Rev A**

**April 14, 2006**

## Background Information

Contract No.: DE-AC02-05CH11231

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Effective Approval Date: October 01, 2005

Rev A April 14, 2006

## Introduction

The Facilities Management Functional Managers from the Lawrence Berkeley National Laboratory (LBNL), the Department of Energy (DOE) Berkeley Site Office, and the University of California Laboratory Management Office have agreed to assess the Performance Measures in Appendix B according to the methodology described below.

**Performance Objectives:**

Goal #7: Sustain excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs.

Objective 7.1: Manage Facilities and Infrastructure in an efficient and Effective manner that optimizes usage and minimizes Life Cycle costs. (50 pts)

7.1.1 Maintenance and Utility Reliability- Effectiveness and efficiency of maintenance activities to maximize the operational life of facility systems, structure and Components. (24 points)

7.1.1.1-The MII expressed as a percentage, is defined as the actual maintenance expenditure divided by the Replacement Plant Value (RPV) for conventional Facilities at the Site. (10 pts)

$$MII = \frac{\text{Actual Maintenance Expenditures}}{\text{RPV}}$$

| | | |
|---|---|---|
| A+ | 4.3 | MII of 2.15 or greater |
| A | 4.0 | MII of 2.10 – 2.14 |
| A- | 3.7 | MII of 2.05 – 2.09 |
| B+ | 3.4 | MII of 2.0 – 2.04 |
| B | 3.0 | MII of 1.93 – 1.99 |
| B- | 2.7 | MII of 1.85 – 1.92 |
| C+ | 2.4 | MII of 1.77 – 1.84 |
| C | 2.0 | MII of 1.70 – 1.77 |
| C- | 1.7 | MII of 1.63 – 1.69 |
| D | 1.0 | MII of 1.55 – 1.62 |
| F | 0.7 | MII of 1.55 or less |

7.1.1.2 – The ACI is (1) one minus the Facility Condition Index (FCI). FCI is the ration of Deferred Maintenance (DM) to Replacement Plant Value (RPV). (5 pts.)

$$ACI = 1 - FCI \quad \text{or} \quad ACI = 1 - \frac{DM}{RPV}$$

| | | |
|---|---|---|
| A+ | 4.3 | ACI of .98 or greater |
| A | 4.0 | ACI of .97 - .979 |
| A- | 3.7 | ACI of .95 - .969 |
| B+ | 3.4 | ACI of .92 - .949 |
| B | 3.0 | ACI of .89 - .919 |
| B- | 2.7 | ACI of .86 - .889 |
| C+ | 2.4 | ACI of .84 - .859 |
| C | 2.0 | ACI of .82 - .839 |
| C- | 1.7 | ACI of .80 - .819 |
| D | 1.0 | ACI of .79 - .799 |
| F | 0.7 | ACI of.79 or less |

7.1.1.3 – Control electric, steam, gas and water demand to control costs and mitigate supply disruptions. Peak Load Management/Emergency Conservation Plans are developed / updated, as defined in Objective 3 in the EMPA, to minimize the effects of supply disruptions and control costs. (4 pts)

| Task # | Task | Weighting |
|---|---|---|
| 1 | An Assessment of Load and Energy Reduction Techniques (ALERT) assessment and training conducted at the site; and | 20% |
| 2 | A Site Specific Peak Load Management/Emergency Conservation Plan is updated | 20% |
| 3 | Develop work plans to implement peak Load Management/ Emergency Conservation Plans and Alert Assessments recommendations by end of FY. | 20% |
| 4 | Demonstrate that total costs for demand charges and/or actual peak demand is reduced from the previous year at the site; and | 20% |
| 5 | Work plan items from Alert Assessments/Peak Load Management Plans accomplished/work plan items scheduled to be accomplished > 0.50. | 20% |

| | | |
|---|---|---|
| A | 4.0 | Compete all 5 Tasks |
| B+ | 3.4 | Complete 4 of 5 Tasks |
| B- | 2.7 | Complete 3 of 5 Tasks |
| C | 2.0 | Complete 2 of 5 Tasks |
| D | 1.0 | Complete 1 of 5 Tasks |
| F | 0.0 | Complete 0 of 5 Tasks |

7.1.1.4 – Completion of RPAM- required reports (5 pts.)

| Task # | Task | Weighting |
|---|---|---|
| 1 | FY06 Condition Assessment Summary Report (20% required per year) (Due May 31, 06) | 40% |
| 2 | FY05 By Building Maintenance Report (Due Oct 31, 05)<br><br>FY06 Required Maintenance Report ( Due Oct 31, 05) | 40% |
| 3 | FY06 By Building Site Deferred Maintenance Backlog Projects Plan | 20% |

| | | |
|---|---|---|
| A- | 3.7 | Complete all 3 Tasks |
| C+ | 2.4 | Complete 2 of 3 Tasks |
| D | 1.0 | Complete 1 of 3 Tasks |
| F | 0.0 | Complete 0 of 3 Tasks |

7.1.2 Energy Management – Effective execution of goals within the Energy Performance Management Agreement. (11 Points)

7.1.2.1 - Energy Management initiatives are managed consistent with a Comprehensive Energy Management Program and Plan that includes the minimum requirements of Department of Energy (DOE) O 430.2A, Departmental Energy and Utilities Management. The Energy Management Performance Agreement (EMPA) has been updated to include minimum requirements of DOE O 430.2A and major facilities contracts contain the Contractor Requirements Document (CRD) of DOE O 430.2A. This task is Objective 1 of the EMPA. (4 pts.)

| Task # | Task | Weighting * |
|---|---|---|
| 1 | Evaluate project for use of alternative funding/EPSCs | 10% |
| 2 | Conduct Retro-commissioning studies on at least 1 building | 10% |

| | | |
|---|---|---|
| 3 | Review energy efficient and low-standby power procurement processes | 10% |
| 4 | Identify low-cost operational/maintenance conservation deficiencies | 10% |
| 5 | Provide study(s) on off-grid systems | 10% |
| 6 | Document training of staff members | 10% |
| 7 | Document availability of trained energy managers | 10% |
| 8 | Meet quarterly and annual reporting requirements | 10% |
| 9 | Review and update Outreach Program | 10% |
| 10 | Accomplish 30% of the water efficiency retrofit/replacement options | 10% |

| | | |
|---|---|---|
| A | 4..0 | Complete all 10 Tasks |
| A- | 3.7 | Complete 9 of 10 Tasks |
| B+ | 3.4 | Complete 8 of 10 Tasks |
| C | 2.0 | Complete 7 of 10 Tasks |
| D | 1.0 | Complete 6 of 10 Tasks |
| F | 0.0 | Complete less than 6 Tasks |

* Partial credit for tasks can be awarded

7.1.2.2 - Energy Use Reductions and Green House Gas reductions show continuous improvement and are on target toward meeting the DOE, energy efficiency leadership goals consistent with DOE O 430.2A and the new Energy Act requirement. As defined in Objective 2 of the EMPA (3 pts.)

| Task # | Task | Weighting |
|---|---|---|
| 1 | Energy use per gross square foot is 2 percent less than the previous year. Calculated on Base Year of FY 2003 per EPACT 2005. | 100% |

| | | |
|---|---|---|
| A | 4.0 | Far exceed (greater than or equal to 3% savings) |
| A- | 3.7 | Exceed (greater than or equal to 2.5% savings) |
| B+ | 3.4 | Meets (greater than or equal to 2% savings) |
| C+ | 2.4 | (greater than or equal to 1% savings) |
| C | 2.0 | Needs improvement (less than 1% savings) |
| F | 0.0 | 0% less than Previous year |

7.1.2.3 - Application of sustainable design principles to new buildings. Sustainable design principles, including energy efficiency, are applied to all new building designs (i.e., Conceptual Design, Title I, and Title II) as defined in Objective 4 of the EMPA. (2 pts.)

| Task # | Task | Weighting |
|---|---|---|
| 1 | Sustainable design principles are applied to all new building designs as evidenced by the submission to FEMP of Energy Efficiency/Sustainable Design Reports for buildings of 10,000 gross square feet or greater, after completion of Title II Design; and | 50% |

| | | |
|---|---|---|
| 2 | Demonstrate that at least one new building design will be Leadership in Energy and Environmental Design (LEED) certified by having a site register the project with the U.S. Green Buildings Council before Title I Design begins. | 50% |

| | | |
|---|---|---|
| A+ | 4.3 | Far exceeds (All new building (>10000 sq ft) designes submitted to FEMP and 3 buildings registered) |
| A | 4.0 | Exceed expectations (All new building (>10000 sq ft) designes submitted to FEMP and 2 buildings registered) |
| B+ | 3.4 | Meets expectations or N/A (All new building (>10000 sq ft) designes submitted to FEMP and 1 building registered) |
| C | 2.0 | Needs improvement (0 new building (>10000 sq ft) designes submitted to FEMP and 0 buildings registered) |
| D | 1.0 | Minor accomplishments |
| F | 0.0 | No accomplishments |

* If no Conceptual Designs or Title I Designs are developed during the performance period, then these performance expectations will receive no rating. The Departmental Energy Management Program encourages sites to apply for Model Program funds to register buildings with the U.S. Green Buildings Council.

If no Task #1 or Task #2 the extra point will be reassigned as follows:

- 7.1.1.4 Task#3.

If no Task #1 and Task #2 the two points will be reassigned as follows:

- One Point to 7.1.1.4 Task #3
- One Point to 7.1.1.1

7.1.2.4 President's Directive on Energy Conservation following Hurricanes Katrina and Rita. In response to the President's September 26, 2005, Directive on Energy Conservation, Secretary Bodman's October 4, 2005, Guidance Memorandum and Jerry Hanley's October 13, 2005, memo from the DOE Personal Property Management Division, LBNL has compiled a list of measures

that will be implemented, as defined in the Short Term Objectives of the FY 2006 LBNL EMPA. (2 pts.)

| Task # | Task | Weighting |
|---|---|---|
| 1 | Implement 20 conservation activities (from November 1, 2005 to April 30,2006) and generate a report documenting the savings by June 30, 2006 | 100% |

Conservation Activities:

- Turn off all unnecessary lights, exterior and interior.
- Turn off computers, monitors, sound systems, desktop UPSs, etc. at the surge protector. Turn off printers, copiers, scanners, etc. after work hours.
- Encourage increased use of car pools or public transportation.
- Telecommute if job performance is not affected.
- Turn off personal appliances such as coffee pots, radio, etc.
- If feasible, turn off general lighting, use natural and/or task lighting.
- Turn off display and decorative lighting.
- Ensure fume hood sashes are maintained in the closed/lowered position.
- Turn off other unneeded equipment in labs and shops.
- Don't idle engines of motor vehicles.
- Enable power-down features of computers and monitors.
- Use stairs rather than elevators.
- Close all doors and windows to retain heat within buildings.
- Use only cold water at sink areas.
- Suspend using showers at the laboratory.
- Thermostats on domestic hot water heaters will be lowered from 140°F to 120°F except Buildings 26 and 54 where hygiene needs to be maintained.
- Lower the indoor temperatures to 68F for Buildings 4, 5, 7, 10, 14, 17, 27, 40, 41, 42, 44, 45, 47, 50 Complex, 53, 58, 58A,62, 64, 65, 75, 80, 88 and 90. The indoor temperatures of Buildings 2, 6, 26, 55, 56, 70, 70A, 74, 74B, 77, 83, 84 will not be adjusted.
- Standby generator testing will be suspended until June, 2006.
- Utilize Bio-diesel for all LBNL diesel vehicles.
- Require that all flex-fuel vehicles use E85 exclusively.

| | | |
|---|---|---|
| A | 4.0 | Far Exceed – 15 activities implemented and savings of 100% or more of projections |
| A- | 3.7 | Exceed - More than 11 activities implemented and savings exceeding 75% of projections |
| B+ | 3.4 | Meets -11 activities implemented with savings exceeding 50% of projections |
| C | 2.0 | Needs improvement - savings less than 50% |

| | | |
|---|---|---|
| | | of projections |
| D | 1.0 | Minor accomplishment - Savings less that 25% of projections |
| F | 0.0 | No savings |

7.1.3 Real Property Management Space/Facility Utilization - Effectively managed consistent with mission, requirements, and DOE direction. Intent is to measure the effectiveness, completeness, and timeliness of implementation of Real Property management using Facilities Information Management System (FIMS) office space utilization, facilities asset and utilization index (AUI), and real property leases. (15 Pts.)

| Task # | Task |
|---|---|
| 1 | Populate FIMS with Executive Order 13327 required data elements |
| 2 | Document underutilized or unsuitable excess space and AUI, and recommend its inclusion in FIMS and the Ten-Year Site Plan. |
| 3 | Explore and recommend off-site leased opportunities. List off-site lease options in satisfying space requests. |
| 4 | Ensure FIMS consistency with other DOE databases. Produce documentation that shows quarterly reconciliation between FIMS and Management and Analysis Reporting System (MARS). |
| 5 | Ensure FIMS supports Space Banking Reporting. Prepare annual memo to DOE regarding Space Banking, reflecting FIMS archived square footage, facilities flagged as excess and excess years. |

| | | |
|---|---|---|
| A | 4.0 | Compete all 5 Tasks |

| | | |
|---|---|---|
| B+ | 3.4 | Complete 4 of 5 Tasks |
| B- | 2.7 | Complete 3 of 5 Tasks |
| C | 2.0 | Complete 2 of 5 Tasks |
| D | 1.0 | Complete 1 of 5 Tasks |
| F | 0.0 | Complete 0 of 5 Tasks |

Objective 7.2: Provide Planning for and acquire the Facilities and Infrastructure required to support Future Laboratory Programs. (50 Points)

7.2.1 Integrated Site Planning - The Laboratory develops, documents, and maintains an integrated site planning process that is aligned with DOE mission needs and the Laboratory strategic/business plan. Intent is to measure the effectiveness of integrated site planning activities using any related site development planning documents. Each task is assessed individually. (15 points)

| Task # | Task | Weighting |
|---|---|---|
| 1 | Develop and document necessary plans. Prepare DOE planning documents, such as the 10 year site plan. | 55% |
| 2 | Review all proposals for NEPA/CEQA compliance. Review and process research, construction, maintenance, and operations proposals for NEPA/CEQA compliance. | 45% |

| | | |
|---|---|---|
| A | 4.0 | Exceed expectations |
| B+ | 3.4 | Meets expectations |
| C | 2.0 | Needs improvement |
| D | 1.0 | Minor accomplishments |
| F | 0.0 | No accomplishments |

7.2.2 Construction/Project Management - Activities and requirements related to Line Item projects are complete within preliminary performance baselines for scope, schedule and cost (established at CD-1) or performance baselines (established at CD-2). Each task is assessed individually. (25 Points)

| Task # | Task | Weighting |
|---|---|---|
| 1 | Building 51 and Bevatron Demolition Project: CD1/CD2 Approval (Provided EIR report received | 26% |

| | | |
|---|---|---|
| | within 3 weeks of review) | |
| 2 | Molecular Foundry: CD4a Approval | 20% |
| 3 | B77 Phase 2: CD2 Approval | 20% |
| 4 | General Plant Projects (GPP) Program. Managed in accordance with LBNL's GPP priority list and associated cost and schedule. | 10% |
| 5 | Non Capital Alternations Program: Managed in accordance with LBNL's Non Capital priority list and associated cost and schedule. | 10% |
| 6 | User Support Building: Submit CD1 documentation to BSO | 14% |

| | | |
|---|---|---|
| A | 4.0 | Exceed expectations. Performance against one of the project/program's baselines (scope, schedule or cost) is clearly exceeded. |
| B+ | 3.4 | Meets expectations. Performance baselines are met. |
| C | 2.0 | Needs improvement. Performance against one of the project/program's baselines (scope, schedule or cost) is not achieved. |
| D | 1.0 | Minor accomplishments. Performance against two of the project/program's baselines (scope, schedule or cost) is not achieved |
| F | 0.0 | No accomplishments. Project/program requires HQs intervention (re-base lining) due to performance deficiencies. |

7.2.3 Seismic Safety Planning - Activities and requirements related to Seismic Safety are accomplished. (10 Points)

| Task # | Task |
|---|---|
| 1 | Seismic and Structural Safety Upgrade Phase 1 Project: Submit CD1 documents (5 pts) |
| 2 | FEMA 310 Seismic evaluations: Complete 80% of bldg inventory (5 pts) |

| | | |
|---|---|---|
| A | 4.0 | Exceed expectations |
| B+ | 3.4 | Meets expectations (CD1 Documents submitted and 80% of bldg inventory) |
| C | 2.0 | Needs improvement |
| D | 1.0 | Minor accomplishments |
| F | 0.0 | No accomplishments |

## Grade Conversion Table

| Letter Grade | GPA |
|---|---|
| A+ | 4.1 - 4.3 |
| A | 3.8 - 4.0 |
| A- | 3.5 - 3.7 |
| B+ | 3.1 - 3.4 |
| B | 2.8 - 3.0 |
| B- | 2.5 - 2.7 |
| C+ | 2.1 - 2.4 |
| C | 1.8 - 2.0 |
| C- | 1.1 - 1.7 |
| D | 0.8 - 1.0 |
| F | 0.0 - 0.7 |

**DISCLAIMER**