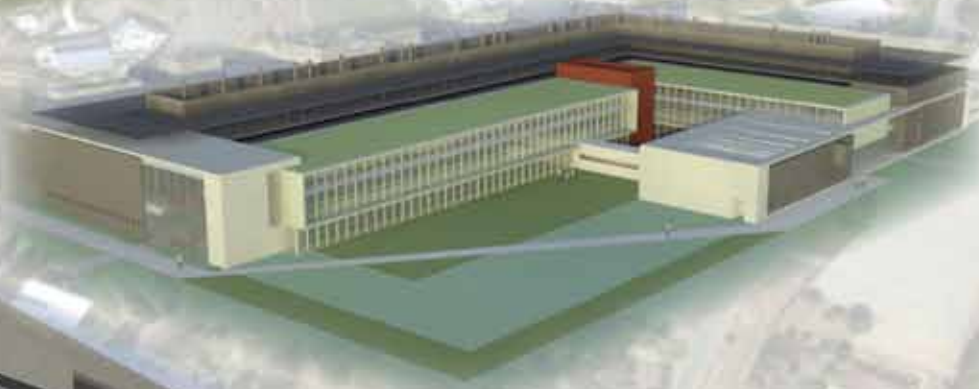
FY13 Twenty-Five Year Site Plan

SEPTEMBER 2012
REVISION 1



National Nuclear Security Administration

Lawrence Livermore National Laboratory

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Front cover shows conceptual renderings of proposed projects (from top): High Performance Computing Center; the Manufacturing Innovation Institute: a component of the Product Realization Infrastructure for Materials & Engineering (PRIME); a replacement office project; and the Livermore Valley Open Campus.

Back cover shows existing facilities at the Livermore site (clockwise from left): Director's Office, Terascale Simulation Facility, High Explosives Applications Facility, and the National Ignition Facility.

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IFM-12-0037 Rev. A

Lawrence Livermore National Laboratory
FY13 Twenty-Five Year Site Plan

July 13, 2012

Approved by:

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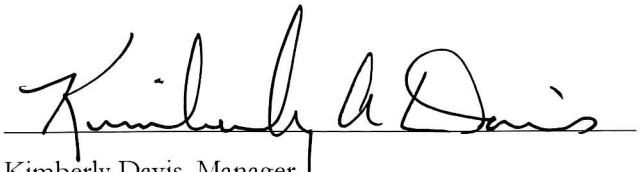
Concurrence:



Kimberly Davis, Manager
U.S. Department of Energy
National Nuclear Security Administration
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List of Acronyms

CAS	Condition Assessment Survey
CIF	Capabilities and Infrastructure Framework
CBFI	Capability Based Facilities and Infrastructure
CMF	Component Maturation Framework
DM	deferred maintenance
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
F&I	facilities and infrastructure
FCI	facility condition index
FIRP	Facility and Infrastructure Recapitalization Program
FYNSP	Future Years Nuclear Security Program
gsf	gross square feet
HE	high explosives
HEAF	High Explosives Applications Facility
HED	high-energy-density
HPC	high-performance computing
HPCIC	High-Performance Computing Innovation Center
IFM	Institutional Facilities Management organization
LEP	Life Extension Program
LLNL	Lawrence Livermore National Laboratory
LVOC	Livermore Valley Open Campus
NARAC	National Atmospheric Release Advisory Center
NCT	nuclear counterterrorism
NIF	National Ignition Facility
NNSA	National Nuclear Security Administration
PCF	Predictive Capability Framework
PRIME	Product Realization Infrastructure for Materials and Engineering
R&D	research and development
RTBF	Readiness in Technical Base and Facilities
SA	Supplement Analysis

SNL	Sandia National Laboratories
SNM	special nuclear materials
SSP	Stockpile Stewardship Program
ST&E	science, technology, and engineering
SWEIS	Site-Wide Environmental Impact Statement
TBSTP	Technical Basis for Stockpile Transformation Planning
TYSP	Twenty-Five Year Site Plan
WMD	weapons of mass destruction

Section 1
Executive Summary

The Lawrence Livermore National Laboratory (LLNL) is dedicated to strengthening U.S. security. By applying world-class science, technology, and engineering (ST&E), LLNL enhances national defense; reduces the global threat from terrorism, weapons of mass destruction, and nuclear proliferation; and, more broadly, responds to scientific issues of national importance. The Laboratory's vision is to lead the nation in nuclear weapons stockpile science, innovation, and sustainment; be the foremost national security laboratory for addressing the nation's most challenging problems; and be the premier destination for the very best scientists and engineers.

This vision for the future of LLNL fully aligns with the NNSA mission and programs plans. It places particular emphasis on the Laboratory's special responsibilities to deliver on national requirements for a safe, secure, and effective nuclear weapons stockpile and to assist the nation in addressing the challenges associated with nuclear nonproliferation through innovation and excellence in ST&E. Sustained investment are required in core capabilities in nuclear weapons design and engineering and high-explosives research and development.

The Laboratory's core capabilities are also applied to develop innovative solutions to major 21st-century challenges in defense and international security, energy and environmental security, bioscience and biotechnology, U.S. economic competitiveness, and fundamental science and engineering. The NNSA Strategic Plan specifically recognizes the need for the laboratories to "expand and apply our science and technology capabilities to deal with broader national security challenges." The activities add depth, breadth, and strength to the laboratories' technical base, which is essential for long-term success in meeting stockpile needs.

The Livermore Valley Open Campus (LVOC) at the LLNL and SNL/CA sites will facilitate expanded external partnerships to help the laboratories meet mission needs, sustain excellence in ST&E, and continue to attract the very best scientists and engineers. A variety of F&I financing options for LVOC development are being considered.

LLNL pursues its innovative multidisciplinary work through three programmatic principal directorates, drawing on expertise from three ST&E discipline directorates and supported by an Operations and Business principal directorate.

Prior Year Accomplishments

Over the past year, LLNL researchers achieved many accomplishments in support of its nuclear security and broader national security missions. Major accomplishments include:

- LLNL and the U.S. Air Force completed the first phase (6.1) of activities to extend the stockpile life of the W78 intercontinental ballistic missile warhead; Phase 6.2/6.2A is beginning.
- Sequoia, the world's most powerful supercomputer, was installed and in FY13 will begin running advanced simulations to assess the performance of nuclear weapons and modification options.
- During FY11, a total of 286 shots were fired on the National Ignition Facility (NIF), with 62 shots for the ignition campaign and 50 shots for the Stockpile Stewardship Program (SSP) and science applications, resolving a major issue about nuclear weapons performance. In March 2012, NIF delivered a record-setting amount of laser energy.
- LLNL researchers developed the first plastic material able to reliably discriminate uranium and plutonium from other radioactive sources, greatly improving nuclear-terrorism portal monitoring at reduced cost.
- Operating 24/7 for 22 days, the National Atmospheric Release Advisory Center (NARAC) provided atmospheric dispersion predictions and radiation dose estimates to agencies in the U.S. and Japan following the Fukushima nuclear reactor disaster.
- LLNL developed simulations for real-time analysis of space-flight safety risks and designed collision-warning mini-sensors for deployment in orbit.
- LLNL combined experiments and simulations to rapidly develop the BLU-129/B, a low-collateral damage munition for the U.S. Air Force.
- Breakthroughs in FY11 made possible sub-three-minute detection of biological agents, chemical detectors that do not require batteries, and a new technique for detecting ultratrace levels of uranium and plutonium isotopes.
- LLNL researchers (working with industry) applied sophisticated computer models to identify three efficacious pharmaceutical candidates in three months (normally a two- to five-year process).
- Livermore researchers discovered a way to use a bacterium's genes against itself, potentially solving the problem of increasing antibiotic resistance.
- Livermore codevelop a retinal prosthesis that can provide partial sight to blind persons—even those who have been sightless for decades.
- Livermore materials scientists and engineers, in collaboration with academic partners, advanced additive manufacturing techniques to fabricate three-dimensional microstructures. When scaled, these microstructures create bulk materials that have previously unobtainable properties.

Figure 1-1. Prior year accomplishments.

Clockwise from top: National Ignition Facility's target chamber, sub-three-minute polymerase-chain-reaction biodetection, energy-saving cool roof installation, National Atmospheric Release Advisory Center's operations center, W78 warhead, a Leadership in Energy and Enivronmental Design–certified facility, Sequoia supercomputer.

Center: Development of plastic material capable of efficiently distinguishing neutrons from gamma rays.

Current State of Site

Sustaining mission-supportive ST&E excellence and LLNL's special multidisciplinary capabilities requires continual reinvestment in facilities and infrastructure (F&I). With Readiness in Technical Base and Facilities (RTBF) support, LLNL has been able to sustain nearly 100% availability of its mission-critical and mission-dependent facilities managed under the RTBF program. RTBF funding has also supported the removal of Security Category I/II special nuclear material (SNM) from the Laboratory site, a process to be completed by the end of FY12. More generally, however, LLNL has not been able to keep pace with the needs for reinvestment in an aging infrastructure. The Laboratory receives less RTBF funds than any other site in the complex.

NNSA Facility and Infrastructure Recapitalization Program (FIRP) investments at LLNL have been used to increase power capacity for high-performance computing, upgrade electrical reliability and safety selected facilities, improve utility systems reliability, and eliminate seismic issues in mission-critical facilities. However, current conditions point to the urgent need for increased funding for deferred maintenance, major system replacements, required recapitalization, and demolition of antiquated and unused facilities. In addition, new or modernized facilities are required to support evolving mission needs. The NNSA Capability Based Facilities and Infrastructure (CBFI) Program will start in FY13 with an emphasis on future facility investment. Complementary institutional F&I reinvestments have suffered from tight overall budgets and funding needs for added scope (e.g., sustainability investments).

Future Plans for the Ten- and Twenty-Year Horizons

To support LLNL's core capabilities needed to achieve NNSA's strategic goals, several significant projects have been proposed to be accomplished in the ten- and twenty-year horizons. In addition to adding new facilities and eliminating antiquated facilities, the site will undergo dramatic changes in its security posture with the development of LVOC and the removal of Security Category I/II SNM. The physical security features required for the Protected Area and Material Access Area will be deactivated.

In 2011, LLNL completed a Supplement Analysis (SA) under the National Environmental Policy Act of the 2005 LLNL Site-Wide Environmental Impact Statement (SWEIS). The SA examined proposed new and modified plans, projects, facilities, and operations through 2015 including those identified in the LLNL *FY12 Ten Year Site Plan*. In August 2011, DOE/NNSA determined that a supplement to the 2005 SWEIS or a new SWEIS was not needed; the proposed modifications were consistent with those analyzed in the 2005 SWEIS.

Changes, Issues, and Concerns

Readiness in Technical Base and Facilities (RTBF)

Based on the current outyear projections of RTBF funding, the Laboratory will be unable to carry out facility risk reduction activities. LLNL capabilities in device fabrication and inspection, HE operations, warhead surveillance, and integral test and evaluation have significantly degraed and, in several areas, atrophied. Investments in both the physical infrastructure and special facilities and equipment will be required to maintain the robust readiness state of the full capabilities for the Laboratory design and certification activities, and future warhead life extension programs. Going forward, the RTBF budget as currently envisioned by NNSA is not consistent with the expected site operational requirements over this time period. Developing a strong RTBF funding profile is critical for RTBF program stewardship of the Laboratory infrastructure.

Facilities and Infrastructure Recapitalization Program (FIRP)

FIRP investments have helped prepare LLNL—a site encumbered by legacy facilities—for future mission opportunities. LLNL's infrastructure is expected to degrade without sustained funding, increasing its deferred maintenance to an unacceptable level. The FIRP concludes at the end of FY12. The CBFI Program that begins in FY13 is critical for future investment in the infrastructure that supports the NNSA mission.

Facility Modernization

LLNL will include modernization consideration in its condition assessment program and the prioritization process for recapitalization to continuingly improve the condition and quality of the real property portfolio supporting mission requirements and maximize the program's cost effectiveness.

Facility Capabilities

In support of LLNL's F&I Five-Year Strategy, the Institutional Facilities Management (IFM) organization is implementing initiatives to help define a robust asset portfolio with adequate flexibility in F&I to support the types of capabilities needed for the current and future missions of the Laboratory.

Section 2
Site Overview and Snapshot

Location: Livermore, California

Type: Multi-Program Site

Website: https://www.llnl.gov

Contract Operator: Lawrence Livermore National Security, LLC

Responsible Field Office: NNSA Livermore Site Office

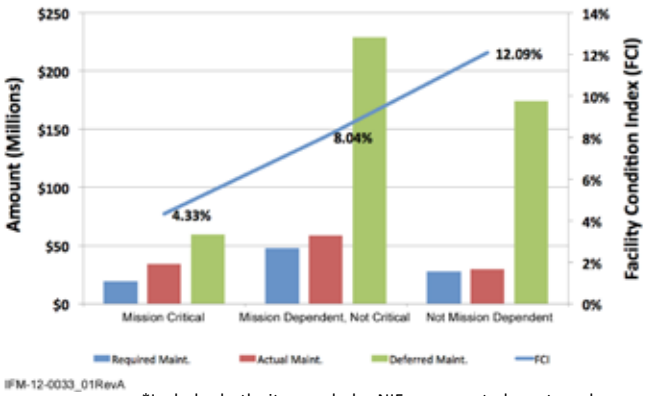
Site Manager: Kimberly Davis

LLNL is located about 50 miles east of San Francisco at the outskirts of the City of Livermore in Alameda County. It has been in operation since 1952 on the one mile-square main site at Livermore (Site 200), and since 1955 at Site 300, a 7,000-acre remote test site 17 miles east of Livermore. LLNL's workforce, including ~3,900 technical staff and ~3,000 support staff, operate within a matrix framework to foster efficient transfer of knowledge among programs, enable staff members to develop wide-ranging sets of skills, and infuse projects with diverse ideas and solutions. LLNL's current NNSA core capabilities include design, certification, testing, surveillance, and an ST&E base; plutonium operations and pit manufacture; tritium production and research and development (R&D); high explosives R&D; infrastructure support facilities; nuclear counterterrorism; nuclear nonproliferation; and support to other sites.

Real Property:*

- 7,727 acres (owned)
- 490 buildings/trailers
  - 6,238,251 gsf active and operational
  - 717,828 gsf non-operational
  - 29,932 gsf leased
- Replacement plant value: $5,667,542,186
- Deferred maintenance: $462,960,976
- Facility condition index (FCI):
  - Mission critical: 4.33%
  - Mission dependent: 8.04%
  - Asset utilization index (overall): 72.69%

Figure 2-1. Maintenance and FCI by mission dependency.

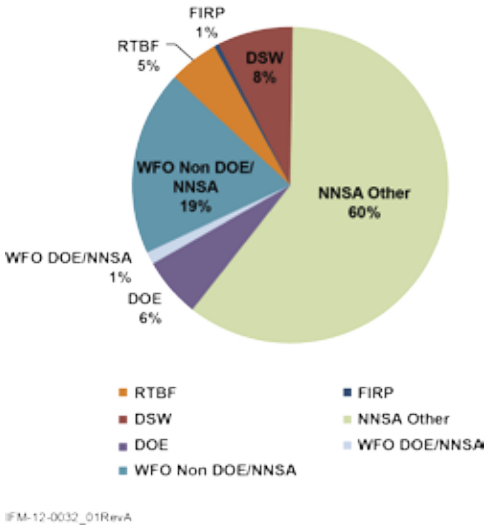


*Includes both sites; excludes NIF nonreported assets and other structures and facilities.

FY2011 Funding by Source:

- FY2011 total site operating cost: $1,614.2M
- FY2011 total NNSA funding: $1,182.1M
- FY2011 total DOE (non-NNSA) funding: $98.3M
- FY2011 total other funding: $324.3M

Figure 2-2. FY2011 funding by source.



Section 3 Assumptions

Program of record is specified by the *FY12 Stockpile Stewardship Management Plan (SSMP)*. Chapter 4 describes the baseline infrastructure lifecycle management requirement and activities for NNSA's eight Managment and Operations sites including LLNL. Key assumptions about the Laboratory's mission and vision for the future that affect F&I planning at the site include:

- LLNL will continue to operate as a multiprogram, continuing mission site, with a primary focus on stockpile stewardship as part of the DOE/NNSA integrated program of surveillance, assessment, and refurbishment of weapons in the nuclear stockpile.
- The Laboratory core competencies have the capability to grow to a workforce comprising 8,000 full-time employees with a $2B budget. As the Laboratory removes legacy substandard facilities, there will also be demands for new replacement office housing.
- As reaffirmed by the *2010 Nuclear Posture Review*, LLNL's mission includes crucial responsibilities to sustain a safe, secure, and effective nuclear deterrent and prevent nuclear proliferation and terrorism; F&I investments are proposed in coordination with the existing RTBF Program and its subprogram CBFI; planned project construction at LLNL will be funded as scheduled.
- Expanding opportunities are expected from non-NNSA federal sponsors of national-security programs; LLNL also expects funding growth from other interagency sponsors and partnerships with U.S. industry to engage LLNL's unique multidisciplinary capabilities in collaborative projects.
- The development of anchor facilities for LVOC is expected to continue as a means for LLNL/SNL to broaden R&D partnerships to help meet national-security mission objectives, stay at the forefront of ST&E, and attract and retain a top-notch workforce. A variety of financing options will be explored for some F&I at LVOC and, in cases, elsewhere at the site.
- As of the end of FY12, Superblock will have fulfilled the requirement of removing Security Category I/II SNM, and the security posture will change to Category III. The plutonium capability within the Superblock is still required for the continuing SSP as well as the growing mission to address nuclear counterterrorism and nonproliferation. Other changes to the security posture will be made to accommodate the need for general access area security within LVOC.
- LLNL will advance its mission and pursue facility improvements while keeping its sustainability goals, as addressed in the *Site Sustainability Plan*, present in the decision-making process.
- The RTBF budget profile for FY13 will increase to mitigate the transition of NIF to a blended overhead rate. However, without further adjustments in RTBF funding, the Laboratory will be unable to carry out facility risk-reduction activities. LLNL has already lost significant capability in device fabrication and inspection, high-explosives (HE) operations, warhead surveillance, and integral test and evaluation. Under current facility sustainment profiles, the facility condition index (FCI) is expected to grow in the next decade.

Section 4
Changes from Prior Year TYSP

Capability and proposed project discussions in Section 5 reflect LLNL programs' updated strategic vision and priorities.

Section 5
Future Vision and Core Capabilities

NNSA Core Capabilities at LLNL	
C1	**Design, Certification, Testing, Surveillance, and ST&E Base**
C2	**Plutonium**
C3	Uranium
C4	**Tritium**
C5	**High Explosives**
C6	Nonnuclear
C7	Weapons Assembly/Disassembly
C8	Transportation
C9	Special Nuclear Material Accountability, Storage, Protection, Handling and Disposition
C10	**Enabling Infrastructure**
C11	**Counterterrorism & Counterproliferation**
C12	**Support of Other Mission/Program Capability**
C13	Federal Management and Oversight

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Figure 5-1. LLNL contributes to seven of NNSA's thirteen core capabilities.

Core Capability: Design, Certification, Testing, Experiments, Surveillance, and Science, Technology & Engineering Base (C1)

This core capability is central to LLNL's historical, current, and future missions to provide the nation a safe, secure, and reliable nuclear weapon system as it supports the NNSA mission. As stated in the *Infrastructure Sustainment and Modernization Report, February 1, 2010*, released by the NNSA Office of Defense Programs, LLNL's mission as a design agency is to develop and sustain design, simulation, modeling, and experimental capabilities and competencies with the required fidelity to ensure stockpile confidence without nuclear testing and to sustain the nation's stockpile consistent with national policy.

Project planning is integrated with SSMP, Predictive Capability Framework (PCF), Component Maturation Framework (CMF), and Capabilities and Infrastructure Framework (CIF) (see Figure 5-2). The PCF is a context for integrating the science investments to support the nuclear design and certification mission with a focus on uncertainty quantification. The tactical investments listed in this section align with investment criteria. The CMF describes the stockpile materials and technology maturation investments needed for life-extension programs and sustainment of the U.S. deterrent. The tactical infrastructure investments listed below are tightly integrated to both of these frameworks through the Integrated Priority List.

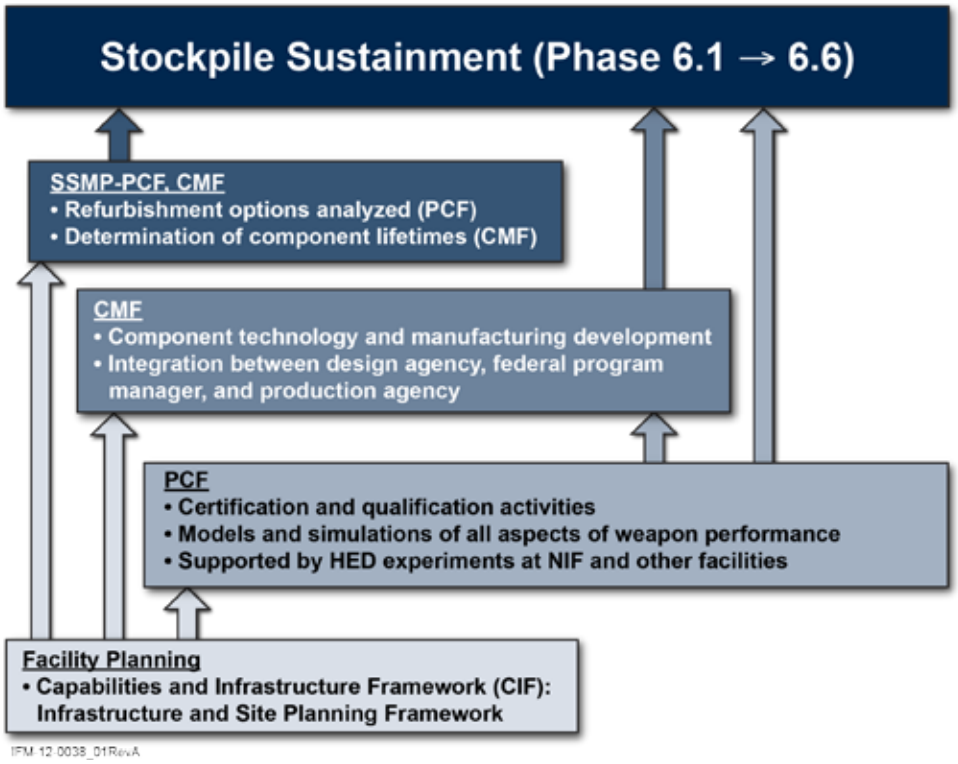


Figure 5-2. The SSMP and its components—PCF, CMF, Technical Basis for Stockpile Transformation Planning (TBSTP) and other elements—provide the detailed flow of information, analysis and certification needed to construct and execute the LEP process.

The NNSA 2008 NNSA Complex Transformation Record of Decision specifies two LLNL centers of excellence: (1) nuclear design and engineering; and (2) high explosives research, development, test, and evaluation (see Core Capability C5 in this section). The core capabilities for the nuclear design and engineering center of excellence are:

- Nuclear design physics
- Advanced physics and engineering simulation
- High-Energy-Density (HED) Science
- Radiochemistry
- Weapons engineering
- Prototyping, manufacturing, and inspection
- Environmental and hydrodynamic testing and evaluation
- Warhead surveillance
- High-performance computing
- Materials synthesis and characterization

The primary objective in the continued advancement of this center of excellence is to enable successful execution of SSP deliverables while simultaneously strengthening the core capabilities. These core capabilities also support other missions, including nonproliferation and homeland security, advanced manufacturing, energy and environmental security, bioscience and biotechnology, and basic fundamental science and advanced technologies.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

LLNL has developed objectives (listed below) to meet our mission goals. Investment into LLNL's infrastructure at both Sites 200 and 300 is essential to the success of meeting these objectives.

Nuclear Weapons Stockpile Stewardship

- Support initial activities for the W78 Life Extension Program (LEP), including the LEP and Warheads Assessment Facilities Revitalization efforts and the thermal and dynamic environmental test facilities for design and certification.
    - LEP and Warhead Assessment Facilities Revitalization
- Invest in infrastructure to support design physics capabilities.
    - High-Explosives Qualification Special Facility Equipment (discussed in Core Capability C5)
    - Flash X Ray Modernization
    - Radiochemistry Laboratories Recapitalization
    - HED Physics Precision Target Facility

- Complement nuclear design with engineering and materials capabilities.
    * Site 300 Revitalization
    * STS Test and Evaluation Laboratory
    * Building 321 and Building 231 Fabrication/Materials Complex Modernization
    * Superblock Recapitalization
    * Diagnostic Development Facility
- Continue infrastructure support for high-performance computing; deploy capacity and capability computing platforms (e.g., Sequoia).
    * Terascale Simulation Facility (TSF) Complex Modernization
- Laser and photon science has a specialized set of requirements and associated facilities and equipment needed to support SSP. Execution of the envisioned experimental program requires enhancements to existing NIF infrastructure in the areas of optics, target fabrication, and diagnostics. Security upgrades and additional infrastructure to support the international NIF user community are also required. In addition, an enhancement of NIF laser energy and radiation shielding is proposed to broaden the range of ignition-related experiments executable at the facility. Proposed projects include a mix of refurbishment and upgrades of current facilities as well as new facilities.
    * NIF Security Upgrades
    * Optical Materials R&D/Production Facility
    * HED Campus Revitalization
    * Enhanced NIF Part 1

Strategic Planning Horizon (FYNSP of last President's Budget + 20 years)

LLNL will continue to rely on its core capabilities as a design agency for its nuclear weapons system and ST&E base to fulfill its role as a national asset, meeting and addressing the nation's security challenges in the 10- to 20-year horizon. The same mission areas are expected to continue with changes anticipated to the focus of each mission.

Nuclear Weapons Stockpile Stewardship

- Retire legacy facility liabilities; transform Superblock security categorization; develop, deploy, and exploit exascale computing.
    * Sustainable High-Performance Computing Infrastructure
- Collocate and integrate program physics and engineering staff in the long term.
    * Nuclear Weapons R&D Complex
    * HED South Science & Engineering Building

- Integrate modern warhead materials and fabrication capabilities to support future stockpile sustainability requirements.
    * Integrate Building 131 Replacement/Recapitalization
- Enhance NIF capability for Part 2: construct a second target chamber to ultimately support 12 experiments per year at yields up to 500 megajoules per experiment.
    * NIF Enhancement Part 2–Second Target Chamber
    * NIF Experimental Operations Center
- Develop advanced radiography technology facility to support hydrodynamic experiments.
    * Diagnostic X

Flagship Facility Proposal

As part of Defense Program's process to develop a long-term strategy for construction of flagship facilities, LLNL has proposed Product Realization Infrastructure for Materials and Engineering (PRIME) to fill a critical gap in current NNSA infrastructure by serving as the NNSA science-based manufacturing testbed, where new manufacturing approaches can be developed and tailored to NNSA missions, and where products deriving from those approaches can be thoroughly assessed and tuned for certification. The proposed research infrastructure investment focuses on core capabilities aligned with LLNL's design agency responsibility in physics design and engineering.

Core Capability: Plutonium (C2)

The LLNL core capability associated with plutonium operations is principally centered within the facility complex referred to as the Superblock. The current budget of record proposal (President's Budget 2013) specifies at least a five-year delay in acquisition of the Chemistry and Metallurgy Research Replacement Facility at Los Alamos National Laboratory. A U.S. interim plutonium plan will feature plutonium capability equities at LLNL in the FYNSP +5. At the end of FY12, Superblock will have fulfilled the requirement of removing Security Category I/II SNM, however, the plutonium capability within Superblock is still required for the continuing SSP as well as the growing mission to address nuclear counterterrorism (NCT) and nonproliferation.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

Following de-inventory in FY12, the security posture for the Superblock will be lowered. Superblock's plutonium capability in material characterization and chemical analysis will be required to support the ongoing Stockpile Stewardship Program. The facility will remain capable and ready to support additional programmatic needs as required.

The other major missions supported with LLNL plutonium capabilities are NCT and nonproliferation. These specific missions will rely on the unique capability within the Superblock for nuclear forensics (pre- and post-detonation), diagnostic/detector developments, and training associated with nuclear materials.

Nuclear Weapons Stockpile Stewardship

- Support the enduring activities of plutonium material property studies, advanced nuclear materials manufacturing, pit surveillance, and surety technology studies with an infrastructure recapitalization project.
    - Superblock Recapitalization

Nonproliferation and Homeland Security

- Use nuclear expertise to meet the increasing global threat of improper use of nuclear materials and technology.
- Address continued growth of NCT requirements.
    - Forensic Science Center

Strategic Planning Horizon (FYNSP of last President's Budget +20 years)

LLNL will continue to rely on its core capabilities as a design agency for its nuclear weapons system and ST&E base to fulfill its role as a national asset, meeting and addressing the nation's security challenges in the 10- to 20-year horizon. The same mission areas are expected to continue with changes anticipated to the focus of each mission. Potential changes to LLNL infrastructure to support these missions with regard to the plutonium core capability are listed below.

Weapons Stockpile Stewardship

- Retire legacy facility liabilities.
- Transform Superblock security categorization.
- Manage recapitalization of SNM facilities.

Nonproliferation and Homeland Security

- Sustain existing facilities to grow capability to address NCT and nonproliferation.

Core Capability: Tritium (C4)

The tritium core capability at LLNL resides in a Hazard Category 3 nuclear facility within the Superblock complex. Its current primary mission is to support high-energy-density experiments. The program also supports the Containers Program with maintenance and recertification of selected containers as well as tritium recovery operations in Work For Others agreements with DoD and the United Kingdom.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

The number and complexity of targets using tritium will continue to increase in support of stockpile and other scientific experiments. To meet this program requirement, existing capabilities and assets as provided by the completed Tritium Facility Modernization Project will need to be maintained and be operational at high reliability. An additional facility capability has been requested through the line-item project submittal process managed by the Construction Working Group (HED Physics Precision Target Facility).

This facility will consolidate and enhance existing capabilities—tritium technology (i.e., chemical, elemental and isotopic purification), target development (see discussions in Core Capability C4), target fabrication and support, and container maintenance and surveillance—into a single location which will improve the quality of target gas, and increase efficiencies of tritium operations.

Strategic Planning Horizon (FYNSP of last President's Budget + 20 years)

With NIF's expected lifetime of 30 years, LLNL will need to maintain target fabrication support and container maintenance and surveillance in support of the ongoing tritium capability.

Core Capability: High Explosive (C5)

LLNL has been designated as a center of excellence for HE R&D including the formulation, processing, and testing of HE and other energetic materials of national interest. Although LLNL's historical interest has always been and continues to be the nuclear stockpile, within recent years a significant national need has existed to perform energetic materials R&D toward other applications. These efforts include conventional and thermobaric explosive materials for DoD applications as well as improvised explosives to support Homeland Security initiatives.

The High Explosives Applications Facility (HEAF) is unique in the world for its collocation of R&D personnel along with a sizeable array of chemistry labs and contained firing tanks capable of up to 10-kilogram detonation experiments. Site 300 provides additional capabilities that complement HEAF including the Contained Firing Facility (CFF) capable of experiments up to 65 kilograms of HE. Site 300 also provides HE capabilities for synthesis, formulation, casting, machining, radiography, assembly, storage, and waste disposal. LLNL capability in this area extends to the Nevada National Security Site (formerly the Nevada Test Site) with the planning and execution of HE experiments.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

LLNL must maintain, sustain, and enhance existing facilities to meet missions and objectives.

Nuclear Weapons Stockpile Stewardship

- Support W78 LEP requirements for new insensitive HE with investments in equipment and integration to facilities for qualification, engineering assessments, and testing.
    - High Explosives Qualification Special Facilities Equipment
- Upgrade electrical and mechanical systems of multiple facilities for large-scale explosives tests, pressing and machining, operations, environmental and hydrodynamic evaluations, and prototyping of HE subassemblies to revitalize this integrated capability of the HE enterprise.
    - Site 300 Revitalization
    - High Explosives Center of Excellence Recapitalization and Consolidation
- Provide stockpile stewardship of existing HE and detonator inventories.
- Develop new materials including thermobaric, conventional, and insensitive HE.
- Provide safety, surety, and physics and engineering performance determination.
- Revitalize and replace existing special facilities and equipment to support stockpile needs.
- Expand HEAF office space to advance and enhance research efforts by collocating appropriate staff.
    - HEAF (Building 191) Extension

Nonproliferation and Homeland Security

- Support the counterterrorism, emergency response, and transportation missions associated with the DoD, Department of Homeland Security, Transportation Security Administration, and Federal Bureau of Investigation.

Fundamental Science and Engineering R&D

- Develop and qualify new explosives.
- Support DoD in conventional weapons including third-generation weapons.

Strategic Planning Horizon (FYNSP of last President's Budget + 20 years)

With continued reliance on LLNL as a center of excellence, revitalization and modernization of existing facilities will be required to support an enduring HE mission. Continued growth in the mission areas of nonproliferation, NCT, and homeland security will require additional capability.

Nuclear Weapons Stockpile Stewardship

- Consolidate and replace facilities with added capabilities to address future mission requirements.
    * HEAF Replacement Project
- Provide stockpile stewardship for existing HE and detonator inventories.
- Qualify new insensitive HE to support stockpile sustainment alternatives and safety initiatives.
- Manage Site 300 real property equities to realize operational efficiencies.
- Recapitalize equipment at HEAF and Site 300 to support mission requirements.

Nonproliferation and Homeland Security

- Support the counterterrorism, emergency response, and transportation missions associated with both national and international stakeholders within an integrated threat(s) definition and problem-solving paradigm regarding HE detection, defeat, and remediation.

Fundamental Science and Engineering R&D

- Develop new explosives.
- Apply innovative explosives.
- Support DoD.

Core Capability: Enabling Infrastructure (C10)

LLNL supports its infrastructure and facilities so that its short- and long-term mission goals can be achieved with little or no hindrance to ongoing and future programmatic missions. LLNL supports identifying the long-term, sustainable benefits to facility and infrastructure endurance, from both a financial and environmental perspective.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

Investments in site-wide infrastructure projects are necessary to enable the accomplishment of programmatic deliverables. Modern, efficient, and sustainable utility systems, facilities, and information technology infrastructure help ensure that the Laboratory can meet mission goals cost-effectively, safely, and securely.

Operations and Business

- Ensure the reliability of utility systems, allow for preventive maintenance without major outages and interruptions to mission-critical facilities, and replace aging equipment with site-wide infrastructure projects.
    - Electrical Capacity and Reliability
    - LLNL City Water System Rehabilitation
    - Low-Conductivity Water System Rehabilitation
    - Site 300 Mechanical Infrastructure Rehabilitation
    - Site 300 Storm Drain Rehabilitation
    - East Site Infrastructure Project
    - Electrical Utility SCADA Modernization
    - Mechanical Utilities SCADA Installation
    - Site-Wide Metering Modernization
- Demolish legacy facilities to clear the site for redevelopment; eliminate maintenance backlog and environment, safety, health, and security risks; reduce surveillance and maintenance costs; support sustainability goals by eliminating the energy and water usage of excess facilities; and improve the site's appearance to attract and retain the next-generation workforce.
    - Decommission and Demolition Projects
- Provide safety compliance retrofit of enduring facilities.
    - Seismic Rehabilitation

- Replace substandard WWII era buildings. Leadership in Energy and Environment Design–certified Institutional General Plant Project replacement facility projects will provide a dual-benefit by eliminating maintenance backlog and provide quality space to accommodate the need for laboratory and office housing. Office prototypes will collocate dispersed groups to improve operational cost and efficiency. Laboratory prototype will be designed and configured for shared limited-term use rather than a multitude of single-use dedicated facilities.
    * Replacement Office Building
    * Shared-Use General Purpose Laboratory
    * Maintenance Operations Center
- Coordinate operations to comply with DOE and all state and federal regulatory requirements, provide interface with NNSA/Livermore Site Office on emergency program issues, plan and execute on-site emergency exercises, and liaise with local community emergency response.
    * Emergency Operations Center
- Replace alarm systems that have reached end of lifecycle and install new life safety alarms infrastructure at Sites 200 and 300.
    * Alarms/Supervisory Control and Data Acquisition Infrastructure Reliability Facility

Information Technology

- Provide big data capability through a distributed-computing model with redundant on-site data centers and redundant off-site recovery centers. The distributed-networking model will have distributed nodes throughout the network.
    * Data Server Facility
    * Data Network Modernization

Strategic Planning Horizon (FYNSP of last President's Budget + 20 years)

The Laboratory intends to pursue the goal of constructing one institutional general-purpose facility per year until housing needs are met. LLNL will continue to rely on its infrastructure support and facilities to meet the long-term challenges facing the nation as well as the world. It is anticipated that, as resources are further constrained, the threats to national and global stability will increase resulting in both state and non-state organizations seeking pre-eminence. The same mission areas are expected to endure; however, changes are anticipated in the specific mission focus within these areas are based upon an evolving social and political landscape.

Core Capability: Counterterrorism and Counterproliferation (C11)

Nuclear Counterterrorism

LLNL has an integrated nuclear counterterrorism program which is part of a national program to address the threat posed by nuclear and radiological devices. LLNL applies its expertise in nuclear weapons design to enable assessments related to all types of nuclear technologies. In keeping with the vision of One NNSA, this program is critically dependent on the infrastructure investments and capability stewardship provided by Defense Programs (NA-10) supporting the programmatic requirements of the Nuclear Counterterrorism Incident Response Program.

Counterproliferation

The Nonproliferation Program at LLNL supports NNSA's nonproliferation mission by providing technical leadership to advance technologies to monitor, detect, and limit or prevent the proliferation of materials, technology, and expertise relating to weapons of mass destruction (WMD) worldwide. The program also provides technical leadership to eliminate or secure inventories of surplus materials and infrastructure usable for nuclear weapons. In keeping with the vision of One NNSA, this program is critically dependent upon the infrastructure investments and capability stewardship provided by Defense Programs (NA-10) supporting the programmatic requirements of Defense Nuclear Nonproliferation. LLNL uses unique capabilities in computing, materials development, and sensor technologies as well as its nuclear weapons expertise to support the nonproliferation mission.

Tactical Planning Horizon (FYNSP of last President's Budget +5 years)

Nuclear Counterterrorism

- Develop, enhance, and apply the expertise and capabilities to analyze nuclear technologies; develop nuclear detection and countermeasures strategies and hardware; provide expertise, analysis and disablement technologies in support of emergency response; and perform the full range of nuclear materials analysis and pre- and post-detonation nuclear forensics to support attribution and consequence management.
    - Nuclear Security Science Center

Counterproliferation

- Eliminate or secure inventories of surplus materials and infrastructure usable for nuclear weapons.
- Advance technologies to monitor and detect the proliferation of WMD worldwide.
    - Nuclear Security Science Center
- Limit or prevent the spread of materials, technology, and expertise relating to WMD.
    - Network Intelligence Research Facility coupled with a Sustainable High Performance Computing Infrastructure

Strategic Planning Horizon (FYNSP of last President's Budget + 20 years)

Nuclear Counterterrorism

Nuclear counterterrorism is only one part of the overall mission of the national program to address the threat, both domestic and international, posed by nuclear technologies in the hands of terrorists. LLNL uses its significant multidisciplinary science and engineering expertise and nuclear weapons design knowledge to create an integrated approach to the broad spectrum of nuclear security challenges. In the long term, a facility is proposed that would integrate diverse teams (e.g., academia, sponsors, end-users) to anticipate threats and to innovate solutions.

Counterproliferation

Nonproliferation and Homeland Security are only parts of the overall mission of Global Security, including countering both domestic and international threats. LLNL utilizes its significant systems engineering expertise to create integrated countermeasures to varied and yet at times coupled threats. In the long term, an integrated facility proposal as mentioned above would bring together diverse teams (e.g., academia, sponsors, end-users) to anticipate threats, innovate solutions and create deployable systems of countermeasures.

* Integrated Global Security Center

Core Capability: Support of Other Mission/Program Capability (C12)

LLNL is a premier applied ST&E laboratory with broad capability in the physical sciences, engineering, and life sciences. The multiprogram missions require complementary infrastructure to support basic energy research, energy security, environmental research, advanced materials research, design and synthesis, manufacturing, atmospheric research, biosciences, and other basic research areas. The appropriate fundamental science and engineering capabilities could be developed in facilities located in a common locality as shared resources.

Near- and Long-Term Mission and Objective

Both the near- and long-term mission and objective capabilities supporting other U.S. Nuclear Security Enterprise sites is captured in the previous six core capabilities.

Fundamental Science and Engineering R&D

- Maintain the wide-ranging expertise needed to meet the challenges in future mission arenas including high-energy-density science; high explosives; actinide science; all-WMD forensic science; nuclear and radiochemistry; biodefense; atmospheric and earth sciences; and explosively driven pulsed-power. LLNL must maintain expertise in fields ranging from materials science and detector and diagnostic development to focused aspects of the fundamental supporting disciplines in physics, chemistry, biology, and earth sciences. Strategic planning initiatives emphasize a science and technology corridor or "hub" having multidisciplinary infrastructure with coordinated facilities investment that would support the widest swath of ST&E and programs at LLNL. This collection of ST&E facilities, along with the PRIME complex, Nuclear Security Science Center, and a stand-alone Forensic Science Center, will provide the science and technology capabilities. LLNL would be poised to meet the demanding needs as well as have the ability to adeptly respond to changing programmatic mission space. To accomplish this vision will require many intermediate steps including the demolition of the old buildings.
    - PRIME represents LLNL's proposal for a future ST&E flagship for a science-based manufacturing testbed (see discussion in Core Capability C1)
    - Pulsed-Power Facility
- Enable LLNL's technical workforce to pursue key scientific challenges in fundamental science and applied technology in conjunction with the LVOC concept of academia/industry collaborations to strengthen U.S. economy though technology transfer and commercialization of LLNL technologies. The LVOC concept will serve as an interface between LLNL and the outside scientific community to enable advances in high-energy-density science, high performance computing (HPC), and engineering fabrication and materials synthesis in other areas within NNSA's mission.
    - HED and Inertial Fusion Energy Center
    - LVOC Initial Proposed Projects
        - High-Performance Computing Innovation Center (HPCIC) Replacement Office Buildings
        - Sustainable High-Performance Computing Center
        - Collaboration Center
        - Office and Light Lab Incubator

- Focus the proposed computing center on sustainability and energy efficiency through flexibility with modules and scalable footprint, allowing it to respond to computational technology. The computing center would also be one of the key enterprises in the LVOC concept to support emerging projects that leverage HPC resources and capabilities at LLNL.
- Continue pursuit of energy-efficient HPC to aid the many lines of research that LLNL is pursuing so that groundbreaking projects in science and engineering can be implemented and visualized.

Counterproliferation and Homeland Security

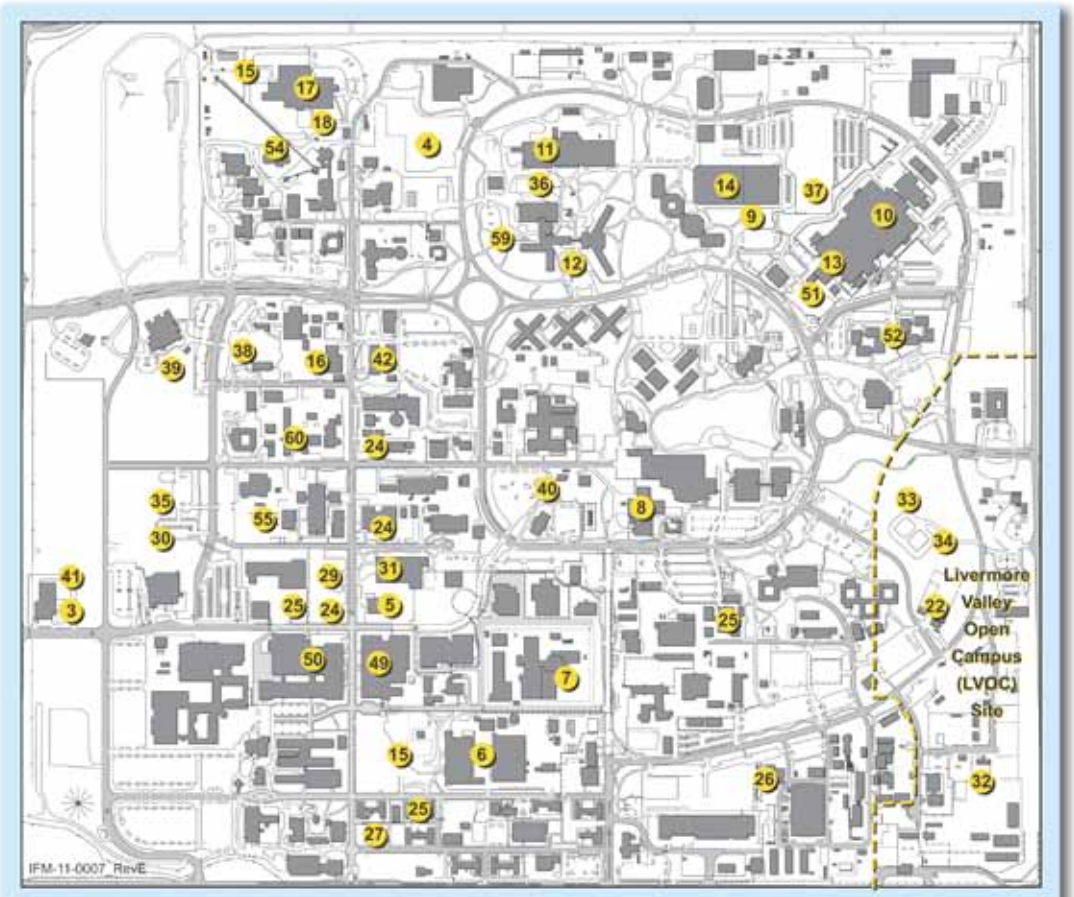
- Continue to leverage capabilities to assist national stakeholders in meeting the challenges posed by threats to national security. In addition to the nuclear threat, the U.S. is faced with other areas of concern including chemical, biological, radiological, high explosives, and cyber attacks which can be addressed through capabilities and expertise developed within the core missions of the Laboratory. LLNL envisions the need for R&D facilities with multiple security levels possessing an experimental and testing infrastructure configured for developmental applications from concept to fabrication through operational prototypes. These facilities would possess the entire suite of R&D capabilities in both laboratory and fabrication technologies.
    * Counterproliferation R&D Laboratory Facility
    * Photon Science R&D Facility

Energy and Environment

- Continue scientific and technical research to form the basis for developing the means to meet the nation's power requirements with sustainable, reliable, and clean energy.
    * Diodes Facility
    * LIFE Integrated Test Facility
    * Energy and Climate Complex
    * Renewable Energy Center
    * 24/7 operational National Atmospheric Release Advisory Center/Interagency Modeling and Atmospheric Assessment Center facility with capability to provide ongoing information on environmental and other hazardous events to stakeholders.
    * Earth Science Facility

Bioscience and Biotechnology

- Leverage LLNL technical and scientific expertise to increase the understanding of disease, and hence disease prevention, including the development of biodefense capabilities.
    * Biosecurity and Biosciences Research Facility



Major Proposed Projects
Map shows conceptual location of proposed facilities; location to be adjusted upon final project scope development. Projects are not listed in priority order.

Tactical Planning Horizon

1. LEP Warhead Assessment Facility Recapitalization*
2. Radiochemistry Laboratories Recapitalization*
3. Emergency Operations Center (EOC)
4. HED Physics Precision Target Facility
5. STS Test and Evaluation Laboratory
6. Buildings 321 & 231 Fabrication/Materials Complex Modernization
7. Superblock Recapitalization
8. TSF Complex Modernization
9. Diagnostic Development Facility
10. NIF Security Upgrades
11. Optical Materials R&D/Production Facility
12. High Energy Density (HED) Campus Revitalization
13. Enhanced NIF Part-1
14. Diodes Facility
15. Product Realization Infrastructure for Materials and Engineering (PRIME) Project Manufacturing Innovation Facility
16. Forensic Science Center
17. High Explosives Center of Excellence Recap and Consolidation
18. HEAF Office Extension
19. Electrical Capacity and Reliability*
20. LLNL City Water System Rehabilitation*
21. LCW System Rehabilitation*
22. East Site Infrastructure
23. Seismic Rehabilitation*
24. Shared-Use General Purpose Laboratory
25. Replacement Office Facility
26. Maintenance Operations Center
27. Data Server Facility
28. Data Network Modernization*
29. Nuclear Security Science Center (NSSC)
30. Network Intelligence Research Facility (NIRF) coupled with HPS Sustainability Unit
31. Pulsed-Power Facility
32. Livermore Valley Open Campus (LVOC) – including Visitor Center
33. Sustainable High Performance Computing Center
34. High Energy Density (HED) and Inertial Fusion Energy (IFE) Center
35. Counterproliferation R&D Laboratory Facility
36. Photon Science Test Facility
37. LIFE – Integrated Test Facility
38. Energy and Climate Complex
39. 24/7 Operational NARAC /IMAAC Facility
40. BioSecurity & BioScience Research Facility
41. Alarms/SCADA Infrastructure Reliability Facility
42. Earth Science Facility

Site 300

43. Site 300 Revitalization
44. High Explosive Qualification SFE
45. FXR Modernization
46. Site 300 Mechanical Infrastructure Rehabilitation
47. Site 300 Storm Drain Rehabilitation

Strategic Planning Horizon

48. Sustainable High Performance Computing Infrastructure*
49. Nuclear Weapons Complex
50. Integration of Building 131 Replacement/Recapitalization
51. NIF Enhancement Part 2 – Second Target Chamber
52. NIF Experimental Operations Center
53. Diagnostic X (location TBD)
54. High Explosives Application Facility (HEAF) Replacement Project
55. Integrated Global Security Center (IGSC)
56. Electrical Utility SCADA Modernization*
57. Mechanical Utilities SCADA Installation*
58. Site-Wide Metering Modernization*
59. HED South Science and Engineering Building
60. Collaborative Science Building

* Site-wide and infrastructure projects not shown on map

Figure 5-3. LLNL proposed major F&I projects—25 year+ projection.

Section 6
Real Property Asset Management

To meet DOE Order 430.1B, Real Property Asset Management and to support NNSA real property performance goals, the Laboratory has established a corporate, holistic, and performance-based real property lifecycle asset management program. LLNL's program links real property asset planning, programming, budgeting, and evaluation to program mission projections and performance outcomes.

The Laboratory's facility management organization is responsible for ensuring that operable and well-maintained infrastructure and facilities assets are in place to support site research missions and objectives.

LLNL's asset management program supports facilities operations and maintenance sustainment that address NNSA's real property performance goals, as noted in Figure 6-1, for FY11 performance. The process includes the prioritization of all real property related to preventive, corrective, and replacement maintenance activities, and ensures that these activities are performed in a safe, secure, compliant, and cost-effective manner that supports and enables world class science and technology. To further enhance LLNL's asset management program, an effort is under way to migrate to a new top-rated off-the-shelf computerized asset management program. The software (InforEAM) functionality is extremely robust and will incorporate all our current capabilities in addition to enhancing functionality. With this system moving forward, LLNL expects to gain efficiencies in the area of asset management.

Replacement Plant Value (RPV)		$ 5,667	Million		
Total Deferred Maintenance (DM)		$ 463	Million		
Site Wide Facility Condition Index (FCI)		8.17%			
		Facility Condition Index (FCI)	Asset Utilization Index (AUI)	# of Assets	Gross Square Feet (GSF) Buildings & Trailers (000's) **
Mission Dependency	Mission Critical	4.33%	82.52%	27	1,665
	Mission Dependent	8.04%	83.52%	257	2,302
	Not Mission Dependent	12.09%	56.70%	393	2,243
Facility Use *	Office	5.18%	73.06%	160	2,384
	Warehouse	7.10%	89.26%	86	258
	Laboratory	6.00%	67.67%	105	2,756
	Housing	0.00%	0.00%	0	0

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Figure 6-1. Real property and asset management. All information in this chart includes both Site 200 and 300 and excludes NIF nonreported assets. "# of assets" column includes buildings, trailers, and other structures and facilities.

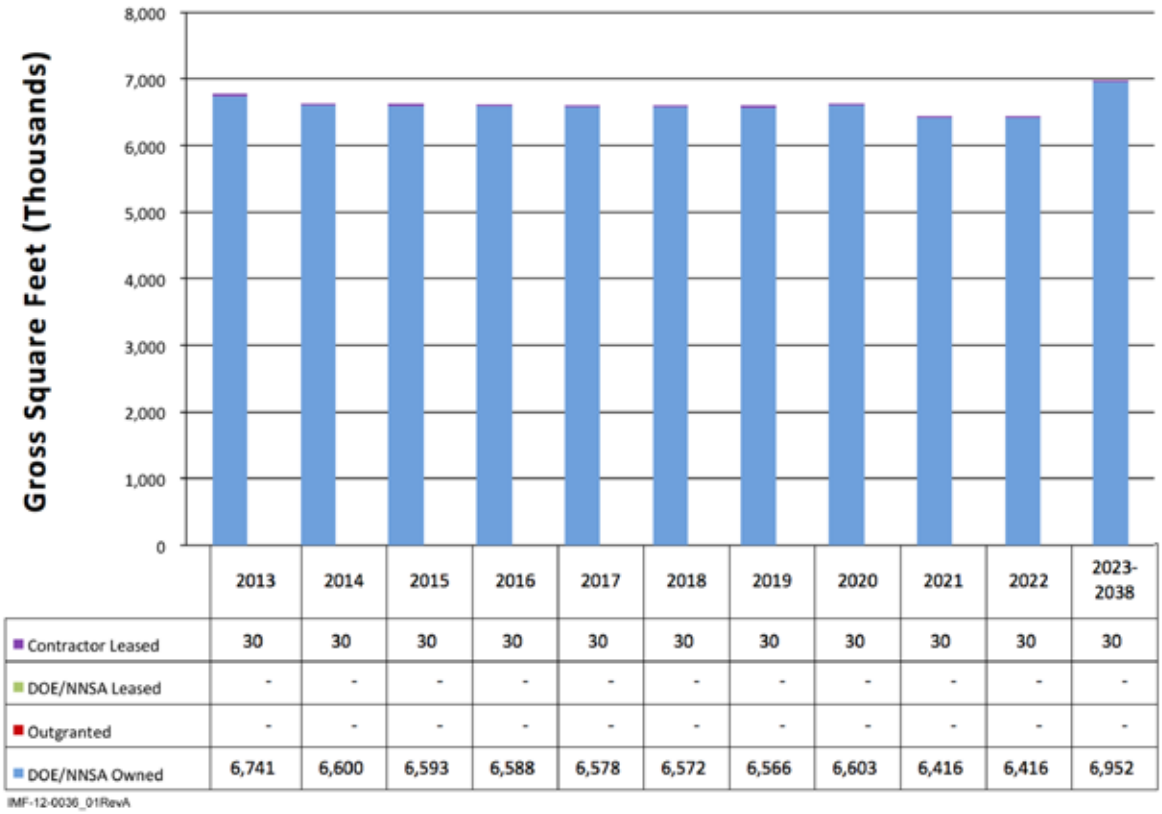
* Not all LLNL facilities are represented by the listed categories.
** Only includes gross square feet for buildings and trailers.

Site Footprint (Current and Future)

The IFM is managing a footprint reduction initiative that includes moving operations out of underutilized and lower-quality, end-of-lifecycle facilities, thus reducing operating costs while improving work efficiency and safety. Pending demolition of vacated facilities, nonessential maintenance is suspended in these vacated facilities. This effort includes deactivating utilities (electrical, communications, gas, and compressed air) and tailoring surveillance to the lowest cost while maintaining safe conditions and regulatory compliance.

The Laboratory has made over-target progress in the aggressive Strategic Space Consolidation Initiative since 2007. From FY08 through FY11, over 900K gross square feet (gsf) have been vacated. However, the recent growth in population and program activities requires reactivation of some facilities to accommodate their business space and storage needs. Because of limited funding, only about 7,700 gsf of space was in FY11.

To address future needs, LLNL continues to consolidate program activities and optimize the use of permanent buildings while targeting temporary vacated and substandard facilities for excess. However, most of the permanent facilities are reaching their end-of-lifecycle, requiring refurbishment, modernization, or replacement. Given the high cost to repair seismic and technological deficiencies, in addition to the size of the backlog in deferred maintenance (DM), building a new facility is proposed as being the most cost-effective solution to providing the needed capabilities while simultaneously reducing the DM backlog.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023-2038
Contractor Leased	30	30	30	30	30	30	30	30	30	30	30
DOE/NNSA Leased	-	-	-	-	-	-	-	-	-	-	-
Outgranted	-	-	-	-	-	-	-	-	-	-	-
DOE/NNSA Owned	6,741	6,600	6,593	6,588	6,578	6,572	6,566	6,603	6,416	6,416	6,952

Figure 6-2. LLNL footprint projection of buildings and trailers.

Among the identified ST&E areas that constitute strategic priorities, state-of-the-art facilities are needed to allow LLNL to draw collaborative partners required to advance capabilities and provide the ability to requisite world-class forensics support in nuclear threat countermeasures. The Laboratory is pursuing new facilities to address the shortage of general office housing and to replace those in substandard conditions beyond the end of construction lifecycle. The long-term strategy is to vacate all WWII barracks and trailer facilities in conjunction with pursuing alternative (lease) space options and line-item projects for seismic upgrades and modernization of permanent enduring facilities.

New projects are proposed with the justification of needs and the envisioned footprint location for site development planning. The IFM assesses the viability for facility consolidation and reassignment or recommends final disposition to await decontamination and demolition funding.

Facility Condition

The best practices developed at LLNL in conjunction with the NNSA FIRP have allowed LLNL to meet and exceed the NNSA corporate goal developed early in FY07 for all mission critical facilities to have an overall FCI of 5% or less. This goal was achieved at the end of FY07 and continues to be maintained. The achievement was noted as a major accomplishment. At the conclusion of FY09, LLNL also met the previous goal for mission dependent, not critical facilities to have an overall FCI of 7% or less, which was well ahead of the NNSA goal of 2012. LLNL's current FCI for mission critical facilities is 4.33%, and the FCI for mission dependent, not critical facilities remains in the 7% range at 8.04%, well below the latest goal of 8% FCI by 2015 (see Figure 6-3). It should be noted that as the NNSA FIRP ends, along with LLNL's limited funding, the ability to reduce and maintain a stabilized DM backlog and NNSA's FCI goals will be significantly impacted. It is anticipated that the CBFI Program would continue to contribute the needed resources to achieve the sustainment.

To maintain the conditions of facilities to meet current and future mission needs, advancements must be made to clearly identify sustainment requirements. LLNL is working with DOE/NNSA in developing new strategies regarding sustainment modeling. LLNL has developed modeling methodologies for inventory requiring maintenance activities for individual facilities based on actual and modeled inventory. This process has been proven to greatly improve the accuracy of estimating sustainment requirements and related costs by assets throughout their lifecycles. LLNL plans to continue to develop, refine, and share this process as a tool, partnering with its DOE sponsors and other DOE sites. This type of modeling has the ability to identify, forecast, and plan preventive, major repair and replacement maintenance requirements. Sustainment modeling holds the key that unlocks the door towards acquiring funding for effective and efficient facility stewardship across the complex. LLNL has also developed a set of time-dependent, full lifecycle models for real property and programmatic equipment. These computer models are used to project infrastructure resource requirements from acquisition through mission lifecycle (operations, maintenance and repair, recapitalization) and transition and disposition.

Deferred Maintenance Reduction

DM is managed by identifying and maintaining a comprehensive deficiency inventory based on condition

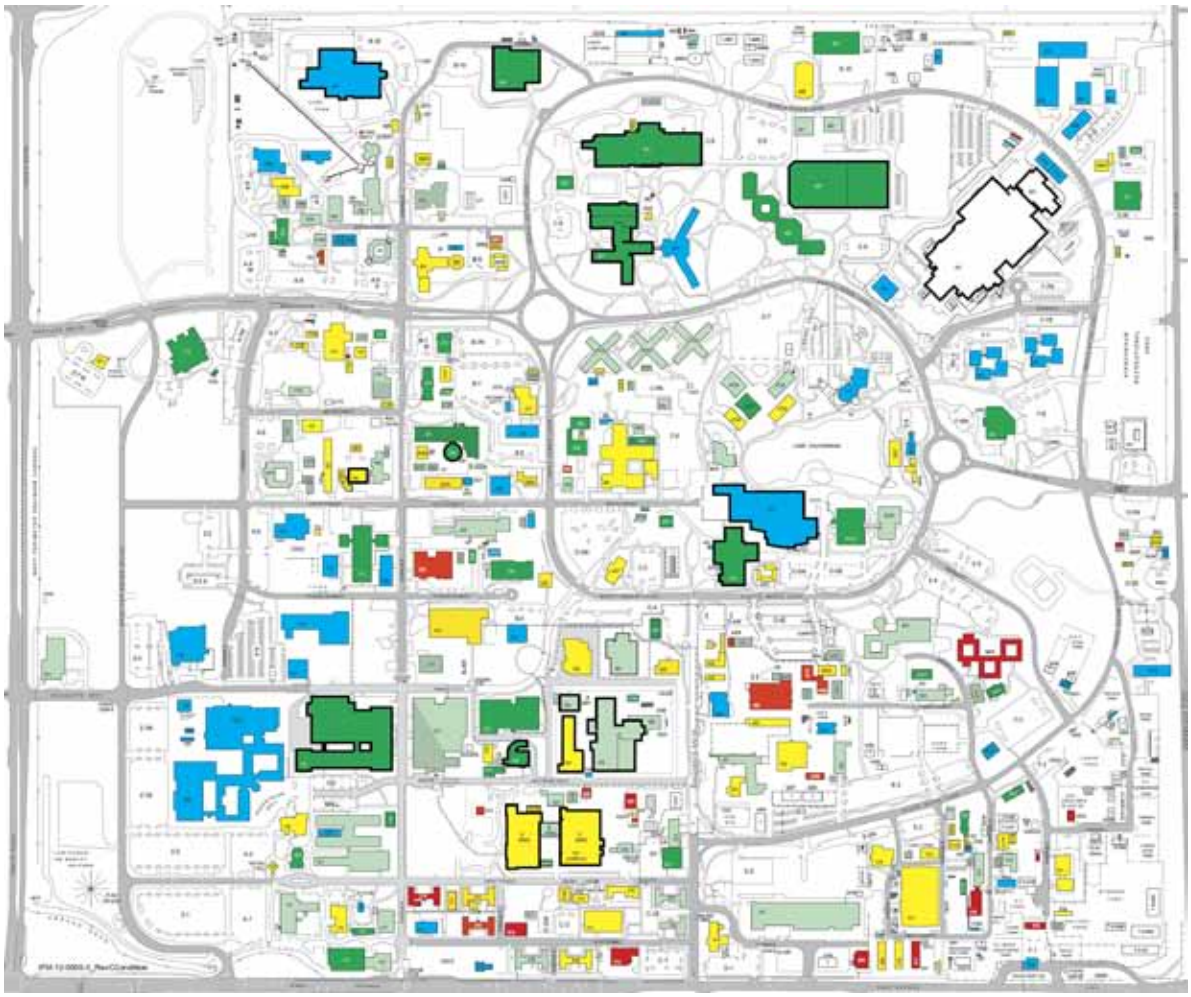
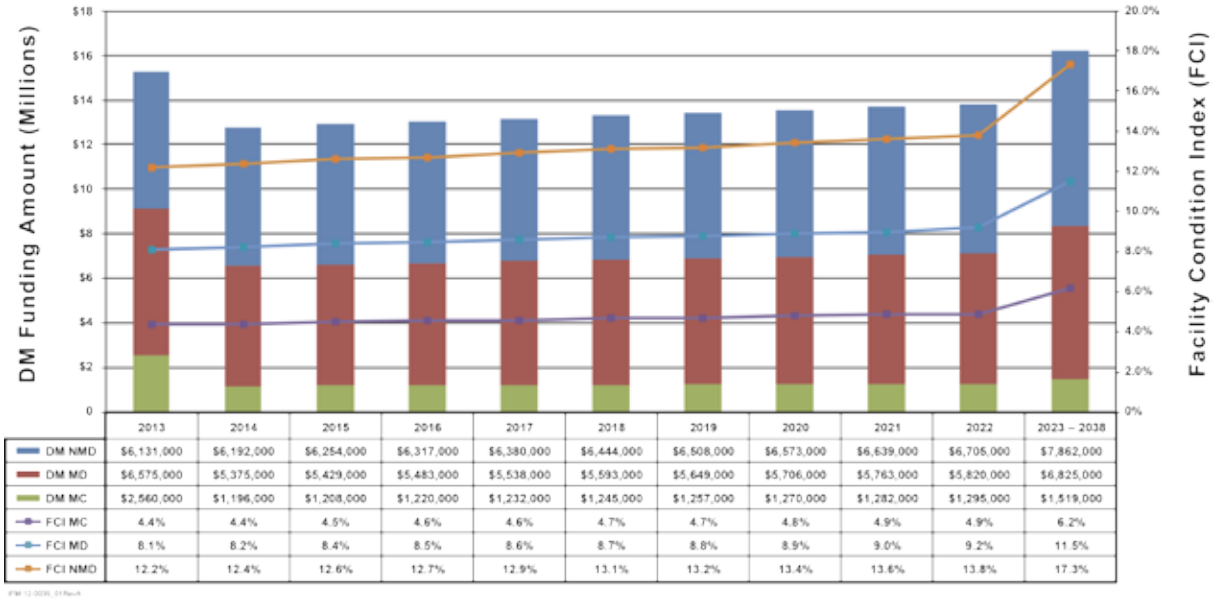


Figure 6-3. Facility condition. FCI only provides metrics on a facility's existing building systems and does not include other negative contributors to facility adequacy such as seismic and contamination issues. Even with adequate resources to keep up the current level of maintenance, facilities face technical obsolescence amidst rapidly advancing technologies. F&I investment must balance cost-effectiveness of new construction against modernization of enduring facilities to ensure efficient sustainment of capabilities and meet mission requirements.

assessments. The Condition Assessment Survey (CAS) process at LLNL, which has been identified as a best practice by the Government Accountability Office and the National Research Council, includes a detailed inspection and evaluation of all facilities on a continuing three-year cycle. Also, nuclear facilities and facilities with special hazards remain on an annual inspection cycle. Each inspected asset is tracked by multidiscipline inspection efforts (i.e., mechanical, electrical, architectural, roofing, and civil surveys).

In the past, LLNL could stabilize its DM through effective facility management practices, including an aggressive reinvestment program that was formalized in 1998. However, current funding constraints are so restrictive that concessions such as operating in breakdown mode versus replacement maintenance are being made. These trade-offs have significant consequences, and many F&I assets are suspect in their ability to support NNSA missions. LLNL continues to annually prioritize every deficiency in its total DM using the same mission-owner rating process with maintenance-specific ranking definitions. This prioritization process has become a best practice that allows LLNL to understand and direct its limited funding to its most important maintenance replacements.

LLNL has been a significant contributor to NNSA's overall FIRP goal to reduce the FY03 DM adjusted baseline by $900M. The projects funded by FIRP at LLNL are linked to specific CAS FY03 baseline DM deficiencies. Of NNSA's $900M, LLNL's total FIRP reductions will reach $137M in FY03 baseline dollars by FY13. When all funding sources are included, LLNL estimates it will contribute over $200M in total reductions to the FY03 DM baseline by the end of FIRP. The information in DOE's Facility Information Management System for LLNL can be verified and is consistent with all reported data elements in this TYSP.



	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023 – 2038
DM NMD	$6,131,000	$6,192,000	$6,254,000	$6,317,000	$6,380,000	$6,444,000	$6,508,000	$6,573,000	$6,639,000	$6,705,000	$7,862,000
DM MD	$6,575,000	$5,375,000	$5,429,000	$5,483,000	$5,538,000	$5,593,000	$5,649,000	$5,706,000	$5,763,000	$5,820,000	$6,825,000
DM MC	$2,560,000	$1,196,000	$1,208,000	$1,220,000	$1,232,000	$1,245,000	$1,257,000	$1,270,000	$1,282,000	$1,295,000	$1,519,000
FCI MC	4.4%	4.4%	4.5%	4.6%	4.6%	4.7%	4.7%	4.8%	4.9%	4.9%	6.2%
FCI MD	8.1%	8.2%	8.4%	8.5%	8.6%	8.7%	8.8%	8.9%	9.0%	9.2%	11.5%
FCI NMD	12.2%	12.4%	12.6%	12.7%	12.9%	13.1%	13.2%	13.4%	13.6%	13.8%	17.3%

Figure 6-4. LLNL planned real property expenditure by mission dependency. All information in this chart excludes NIF nonreported assets.

Space Utilization and Consolidation

Historical, current, and projected space requirements are analyzed and presented using office-space metrics and directorate specific portfolios. This comparison is made within Laboratory organizations and also with other multiprogram continuing mission sites. The facilities portfolio and space utilization data are linked directly to LLNL's Facility Information Tracking System and DOE's Facility Information Management System, which allows updates to be made immediately in the metrics and portfolio for space management.

LLNL uses IFM as a single point of contact for reassignment and re-use of space. It provides overall site-wide space utilization metrics with organization-specific tracking, feasibility studies and guidance, concept drawings, migration planning, and assistance to development of repurposed and new space requests.

Sustainability/Energy

As defined in the LLNL *FY12 Site Sustainability Plan*, the Laboratory vision for site sustainability is to supply its programs with optimal conditions for success, while undergoing continual improvement to existing energy infrastructure; to collaborate with growing mission areas to identify ways to innovate toward more energy-efficient solutions for energy-intensive facilities; to pursue innovative renewable energy generation, both for on-site use and as an ongoing research area; and to incorporate energy efficiency improvements into the ongoing energy management and facility operations of LLNL.

LLNL will continue to identify methods to reduce greenhouse gases (with priority on sulfur hexafluoride [SF_6] emissions in utility components) and to develop "green" buildings: four buildings are currently Leadership in Energy and Environmental Design–certified with seven buildings in the certification process; an additional five buildings have met the guiding principles for the federal High Performance Sustainable Buildings requirements.

It is difficult to overcome LLNL's current contracted low cost of delivered electricity (~$0.06 per kilowatt hour) to justify investments in future energy conservation projects. Nonetheless, LLNL has renewed its efforts to identify private-sector funding for renewable projects to provide power and is committed to executing its Site Sustainability Plan. Land use on site would evolve with opportunities to implement sustainability projects such as solar-array installations at the site perimeter or on other existing land within the boundaries of the Livermore Site and Site 300.

Because no direct funding is available, existing resources will be leveraged as much as possible to achieve LLNL's sustainability goals. Indirect funding will be used to replace and upgrade aged equipment with the most energy-efficient and cost-effective replacements.

LLNL is facing an ongoing energy challenge as the Laboratory is poised to grow in mission areas that are particularly energy-intensive. In support of the new mission growth, LLNL will need to increase its staffing levels in upcoming years. Both of these are indications of the Lab's successful efforts in research and technology development. However, these components will impact LLNL's energy intensity and greenhouse-gas emissions. This scenario will be the case even as new computing centers and prospective new facilities are designed and built to be as efficient as possible.

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