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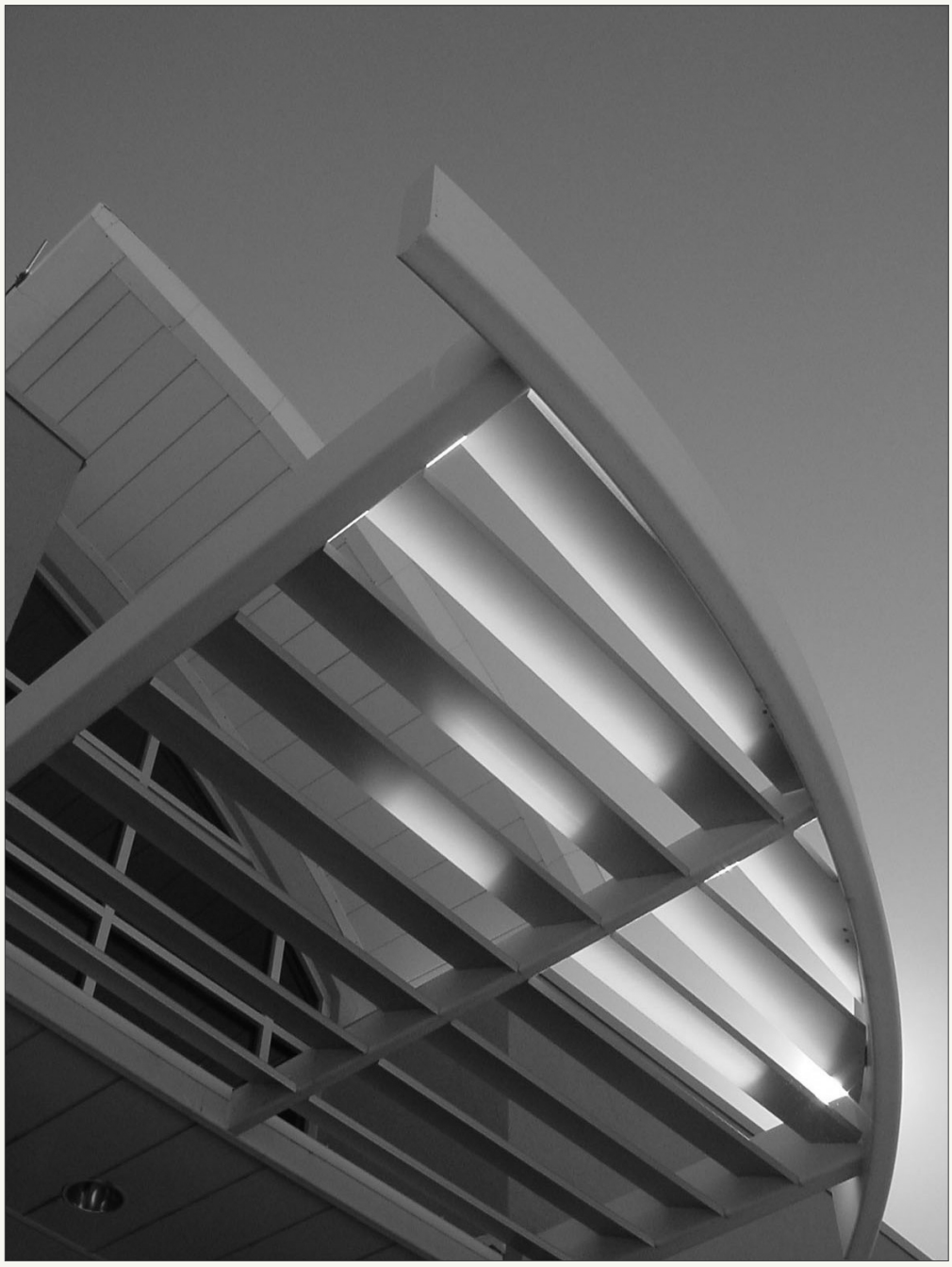

SNL Five-Year Facilities & Infrastructure Plan

FY 2015-2019

Sandia National Laboratories

National Nuclear Security Administration

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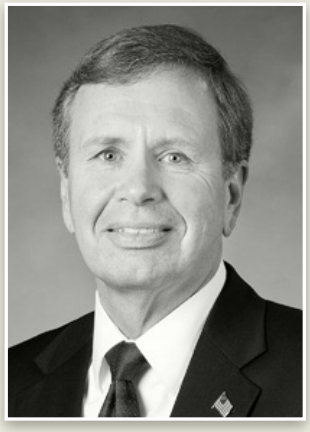


I am pleased to release the SNL Five-Year Facilities and Infrastructure (F&I) Plan for FY 2015-2019. We have developed a proactive approach to keep up with our dynamic and ever-changing planning environment. This year's Five-Year F&I Plan has been placed in the form of a brief document that provides a context for the plan and is reflective of a recent effort to elevate facilities and infrastructure planning to a more strategic level.

In support of Sandia's FY 2014-2018 Strategic Plan, which continues to move toward its capabilities-based and mission-focused goals, we must plan for the facilities and infrastructure that will be required to support our future.

This year, as a major first step, my team held discussions with each Vice President to better understand the Divisions and Mission Areas and to envision future facilities and infrastructure needs. New capabilities may require unique facilities and infrastructure that require considerable lead time for planning, securing funding and executing, so I believe these discussions will move us from a reactive stance to a proactive planning strategy. I really appreciate the time and effort that our leadership and my team dedicated to these discussions.

As traditional funding sources for facilities and infrastructure are reduced, disappear or become more competitive to obtain, Sandia must do more with less. Preliminary assessments of our assets identify real opportunities to support mission while minimizing major capital outlays for new construction in the long term.

This plan includes: 1] an acknowledgment of the need to continue to pursue Line Item funding from both Defense Programs and other funding sources for major capital investments beyond Sandia's ability to fund internally, 2] indirect funded recapitalization, modification and limited new construction; a focus on completing projects already underway or in the pipeline, 3] continued examination of alternative facilities acquisition approaches from non-NNSA and public-private partnership sources, and 4] a drive toward reduced overall development footprint and greater space utilization through elimination of excess facilities and innovative workplace design.

The Five-Year F&I planning process will continue to evolve to align with programmatic futures envisioned by our Divisions and Mission Focus Areas. The Five-Year F&I planning process will enable new ideas, concepts and approaches to be implemented in order to better support mission work at Sandia.

Michael W. Hazen
Vice-President, Infrastructure Operations

Optimize our F&I assets: ■ Renovate ■ Reuse ■ Consolidate ■ Remove

Position for the future: ■ Align investments with capabilities ■ Pursue alternative acquisition approaches

Purpose of Five-Year Facilities & Infrastructure Planning

Sandia's development vision is to provide an agile, flexible, safer, more secure, and efficient enterprise that leverages the scientific and technical capabilities of the workforce and supports national security requirements in multiple areas.

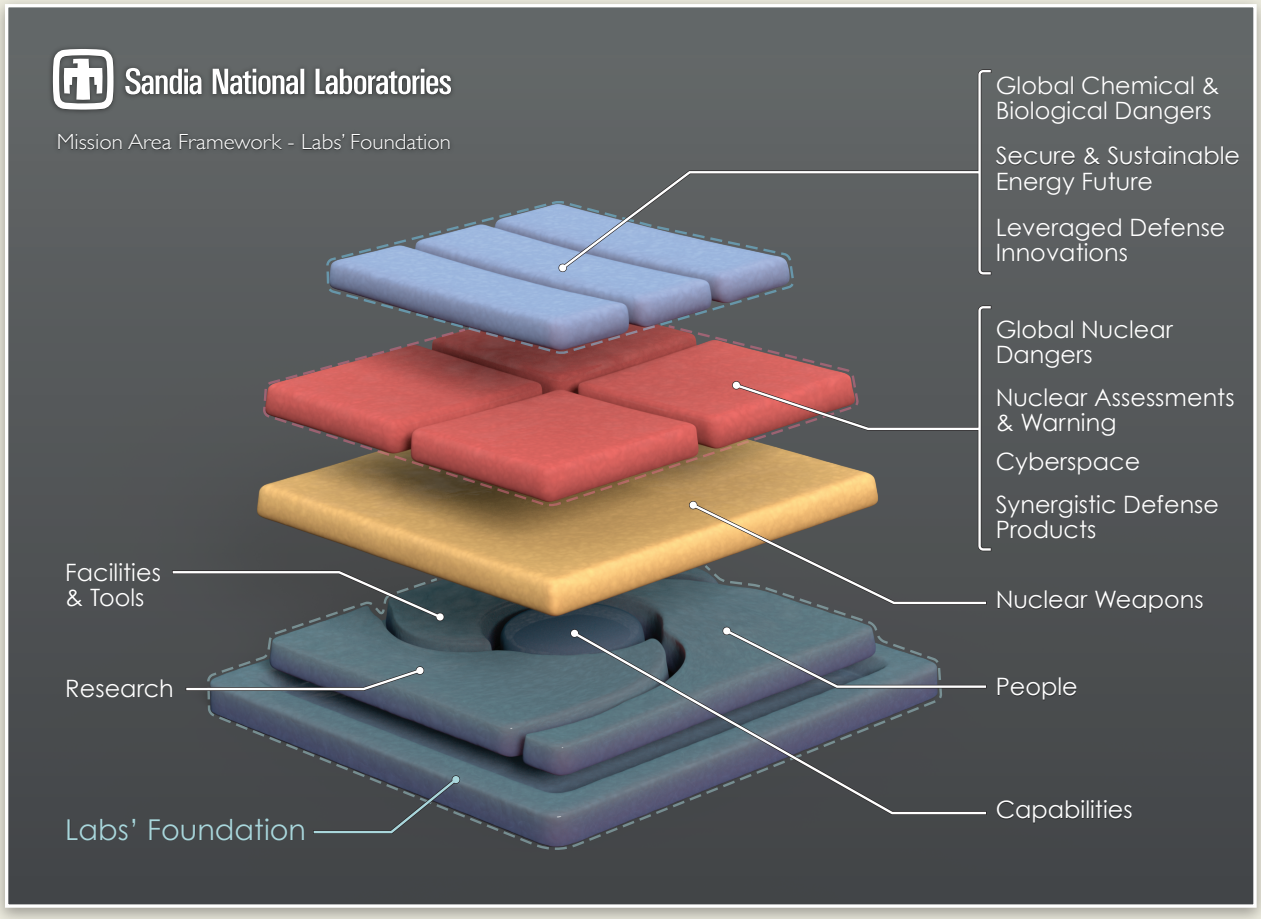
Sandia's Five-Year Facilities & Infrastructure Planning program represents a tool to budget and prioritize immediate and short-term actions from indirect funding sources in light of the bigger picture of proposed investments from direct-funded, Work for Others and other funding sources. As a complementary F&I investment program, Sandia's indirect investment program supports incremental achievement of the development vision within a constrained resource environment.

The Foundation for SNL's Facilities & Infrastructure Planning

Sandia National Laboratories' primary capabilities supporting mission work are comprised of Facilities & Tools, People and Research (See Figure 1 below). The focus of the Five-Year F&I Plan is to address facilities and infrastructure that will support mission work most effectively and efficiently. The Five-Year F&I Plan concentrates on merging the life-cycle condition of facilities and infrastructure with mission capability needs and budget forecasts to assure mission-ready facilities and infrastructure. Sandia is a complex, multiprogram institution, with the nuclear weapons (NW) program at the foundation of its work, as depicted in the Sandia Mission Area Framework. This framework provides another lens for Sandia's facilities and infrastructure planning. Within this model, Sandia aims to meet the F&I needs of all work at the Laboratories while simultaneously maximizing and improving mission readiness of its sites' facilities and infrastructure.

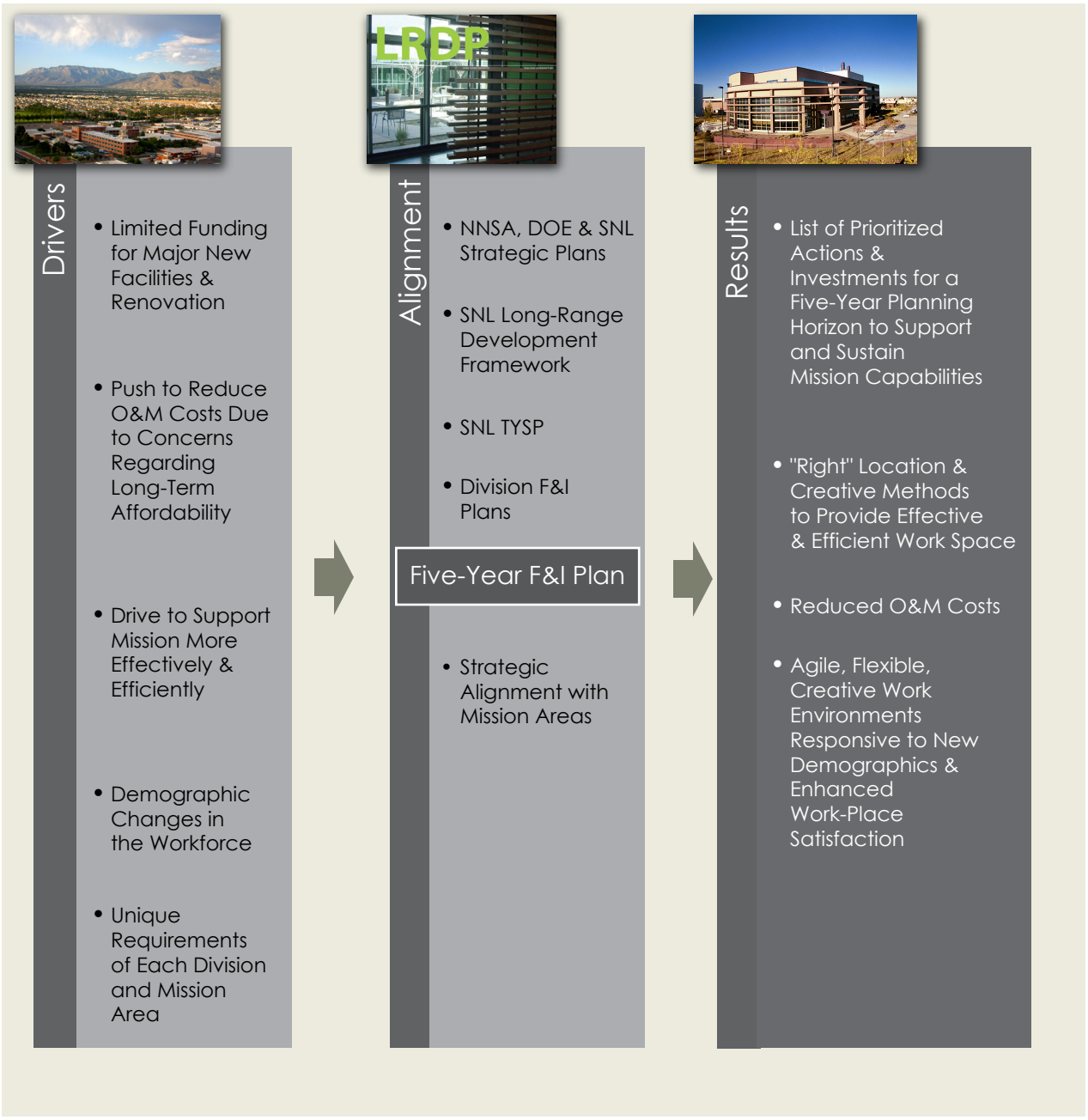
To meet identified needs and optimize mission readiness, Sandia must invest in and address all types of improvements, including acquisition, operations and maintenance (O&M), recapitalization, and decontamination and demolition. By investing in all types of improvements, the F&I investment strategy supports the corporate FY 2012–2016 Strategic Plan. Sandia's real property asset portfolio currently comprises 6 million gross square feet (gsf) at the New Mexico site and 900,000 gsf at the California site, presenting major challenges in managing and improving its assets.

Figure 1 - Foundational Elements of Sandia National Laboratories

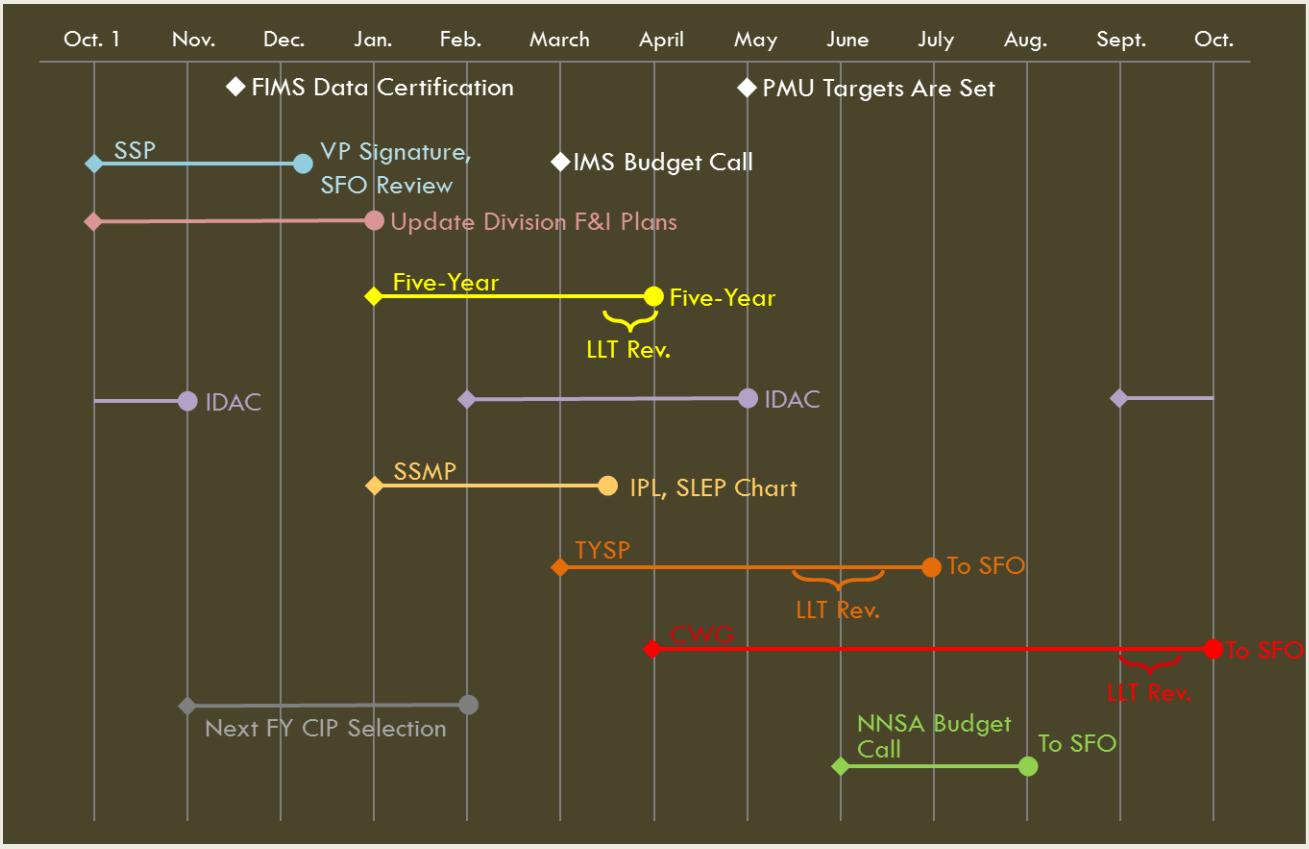


Drivers/Alignment/Results Associated with the Five-Year F&I Plan

Figure 2 - Plan Drivers/Alignment/Results

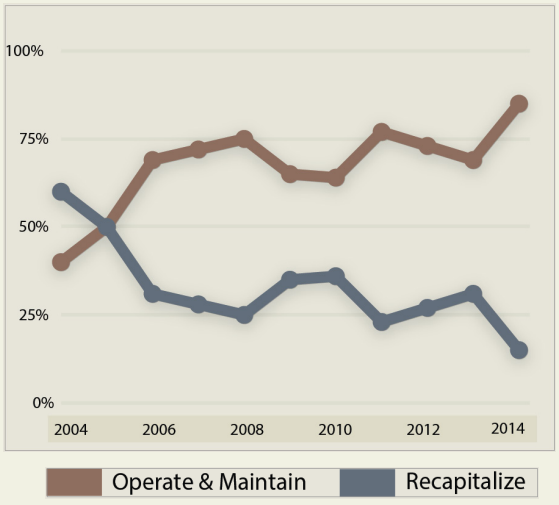


Five-Year F&I Plan's Position in the Annual Planning Cycle

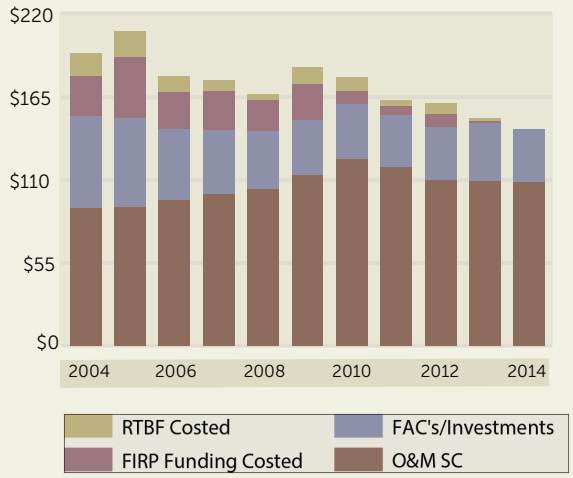


Major Long-Term F&I Challenges

Decreased Recapitalization Investments



Reduced F&I Funding Base



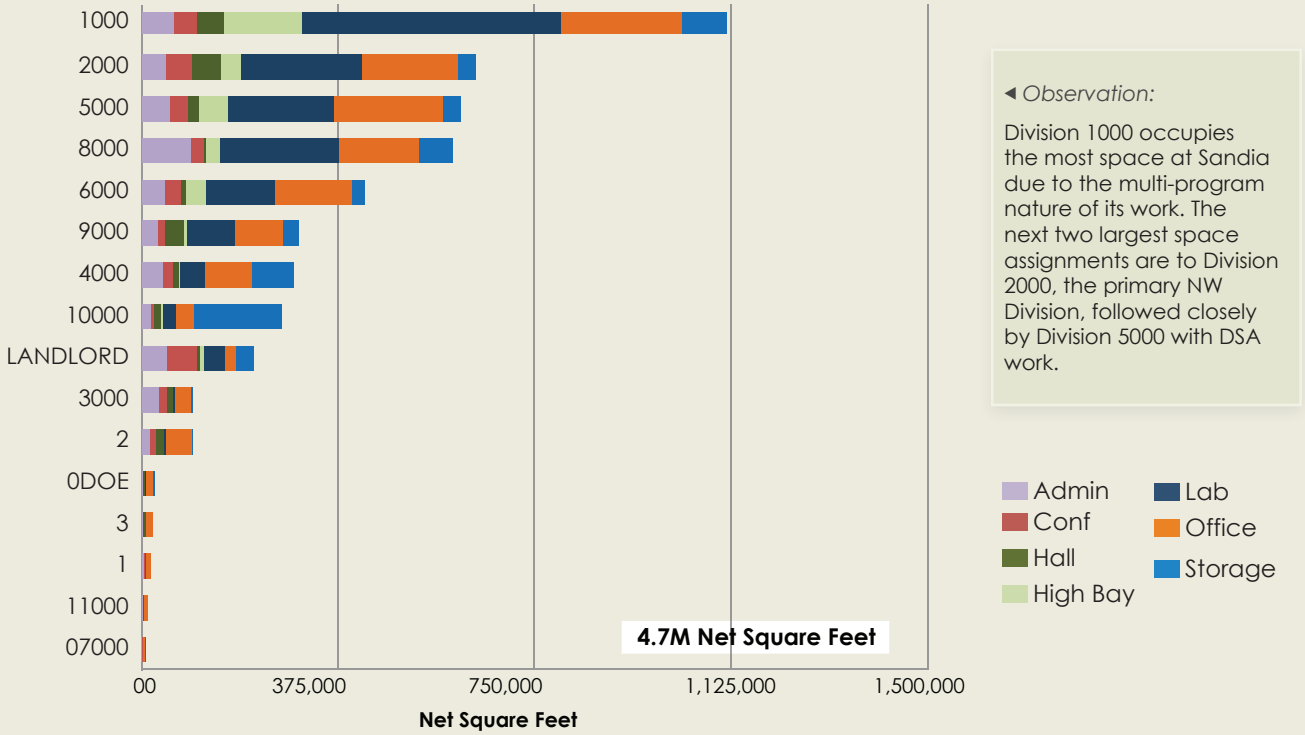
A Large, Diverse and Complex Asset Portfolio

Sandia has a large and complex facilities and infrastructure asset portfolio to support mission work at its four primary sites. To minimize new construction capital outlays and long-term operations and maintenance costs, it is essential that the enterprise optimize its use of existing assets. In addition to the large size of the portfolio, the unique nature of many facilities required for research and testing (See Mission Unique Capabilities Summary in Appendix A) results in management and maintenance complexity. Primary Assets have been identified for most capabilities in the Mission Unique Capabilities Summary. This represents a starting point and shift toward a more capabilities-based F&I investment analytical framework. The information and data identified in the following sections provides a snapshot of the characteristics of each site and allocation, utilization, and opportunities to respond to space needs.

Figure 3 - Site Profiles

Sandia Location	# of Buildings/Trailers	# of Other Structures	Acres	Gross Square Feet
Albuquerque, NM	549	242	13,758	5,774,523
Livermore, CA	66	44	410	885,790
TTR, NV	60	82	179,200	120,925
KTF & Maui, HI	56	53	133	61,778
Leases	20	1	19	399,316
Sandia Total	**751**	**422**	**193,520**	**7,242,332**

Figure 4 - Assigned Space by Division



◂ *Observation:*

Division 1000 occupies the most space at Sandia due to the multi-program nature of its work. The next two largest space assignments are to Division 2000, the primary NW Division, followed closely by Division 5000 with DSA work.

What We Heard - Capabilities and Risk to Mission as a Primary Focus

The 2015-19 Five-Year F&I Plan will continue to evolve from a tactical list of indirectly funded projects to a more comprehensive plan that focuses on risk to Sandia's Primary and Specific Capabilities in recommending specific investments. In the future, working with Divisions and Mission Areas, five-year planning will identify trend lines that pose risk to capabilities & determine F&I investment programs to most appropriately address the identified risks. In preparing this document, staff interviewed Vice Presidents wearing dual hats as Division leaders and Mission Area leads. The personal interviews provided an initial high-level assessment of critical facilities and investment needs. The results of those interviews are summarized in Figure 5.

Figure 5 - Major F&I Needs Identified by Vice Presidents

	Sustainment & Reinvestment					New Capital Construction	
Science and Technology							
Division 1000	MESA - Tool set upgrades, next generation FAB	TA-V Facilities reinvestment as the center of radiation effects capability	ETF Upgrades - Recent building refurbishments well position Sandia for test capabilities	Interim Z Machine Refurbishments	Life-cycle issues associated with HERMES III, Saturn and Radiographic Integrated Test Stand (RITS); all require refurbishments & upgrades due to age	Investments in Cyber are probable; an anchor facility is needed for this capability; HSB need will be growing	Next Generation Z Machine - Set of new technologies being developed for future pulsed power research; next generation design unknown at the present
Weapons Engineering and Product Realization							
Division 2000	TTR: Address under-capitalization of TTR	Address overcrowding of Building 905 by constructing addition	Pursue funding for Weapons Engineering Facility	Condition of key facility places Power Sources Technology capability at risk			
Nuclear Assessments and Warning; Synergistic Defense Products; Leveraged Defense Innovations							
Division 5000	Renovation of Building 840 is the Division's highest priority; investment by WFO customers is being maligned by the current governance model					The Division is pursuing strategies to bring funding to the labs to construct facilities; no approved policy/procedures in place to utilize external funding for facilities - current process is cumbersome; Sandia not well positioned to affect positive change	

(Continued)

Sustainment & Reinvestment						New Capital Construction	
Global Nuclear Dangers; and Global Chemical and Biological Dangers							
Division 6000	Overall age/ condition of facilities requires major reinvestment	Require agile/ flexible space for fast & inexpensive modifications to house evolving programs	Critical to update & renovate Building 823 which represents a major asset			Seek an alternative to the IPB Lease – while the facility is acceptable, the cost over the long term is very expensive	
California Laboratory							
Division 8000	Key building, targeted to be the principal NW facility, requires space modernization & control system upgrades	Require agile/ flexible space for fast & inexpensive modifications to house evolving programs	Require seismic retrofitting for multiple structures			In general, lack of high security space; Building 916 requires replacement to ensure material science capabilities are sustained	Need new facilities to support attraction/ retention of staff in a highly competitive employment market
Cyberspace							
Division 9000						Mid-term plans to expand Building 725, and long-term proposal to build a new data center to replace the annex	Need to further examine mission concerns & growth in the NM Remote Areas
Chief Technology Officer							
Division 7000	Within an enduring NW environment, it is difficult to appreciate the need to refresh core capabilities on a regular, shorter schedule, than many NW capabilities	In a research environment, it is critical to have buildings designed & configured to support both intentional & serendipitous staff interactions - we need more communities of practice that encourage unlikely interactions	Configurations of CERL and Building 704 pose a cultural and generational issue for Sandia	A considerable amount of equipment is being held on to companywide – a discarding system similar to that employed for legacy chemicals should be applied to equipment			

Image: Center for Integrated Nanotechnologies (CINT)

FY 2015-2019 Five-Year Facilities & Infrastructure Plan
Moving Forward and Gradually Changing Course

Essence of the Plan

The Five-Year Facilities & Infrastructure Plan is comprised of 1] a Five-Year Facilities and Infrastructure Recapitalization and Sustainment (FIRSt) Plan, 2] IMS Principles guiding the FY 2015 through FY 2019 IMS Investment Wedge allocated to FMOC, 3] five-year investment focus areas, and 4] recommended supporting actions and initiatives which could leverage major investment funding sources for maximum benefit. The Plan seeks to maintain long-term affordability of real property assets to support mission effectively by managing the amount and condition of the inventory and by renovating, consolidating, replacing and removing unneeded assets. Reinvestment in facilities and infrastructure will be based to a greater extent in the future on prioritized mission direction and risk to capabilities.

The Five-Year Facilities and Infrastructure Recapitalization & Sustainment Plan (FIRSt Plan)

Embrace an Enduring IMS Recapitalization Program*

- Address major building and institutional infrastructure modernization/sustainment/D&D
- Address capability enhancements (Explosives consolidation, secure space SNL/CA, high bay space within TA-1, seismic upgrades, records storage, etc.)
- Ensure the program is strategically aligned with Mission Areas
- Identify sustainable funding from multiple sources

Optimize Utilization of Existing Space

- Accommodate near-term growth w/existing office space capacity
- Recognize and treat space as a lab-wide asset
- Partner with capability owners to identify lab and storage space opportunities
- Improve facilities operational efficiency

Effectively Manage Laboratory Footprint

- Vacate and prep substandard space for removal from inventory
- Consider full life-cycle cost when adding footprint (Initial investment + O&M)
- Conduct long-range planning

The FIRSt Plan:

Continues to fund projects from previous Five-Year F&I Plans in FY 2015

Funds new investments:

- Design and begin construction on Building 756 IGPP at NM to replace substandard trailers and provide flex space
- Design and begin construction on the CA General Access Area IGPP building in support of locating classified and unclassified work for mission work and LVOC
- Provide baseline decontamination and demolition funding for overall condition improvements
- Support Explosives Activity Consolidation to address safety issues
- Prepare for a renovation strategy of major buildings and systems
- Plan within the $15M expected allocation, unless otherwise negotiated

*** Essential if we are to execute complex, expensive renovations, such as the clone buildings discussed on page 25.**

FY 2015-2019 IMS Investment Wedge (Facilities)

The FY 2015-2019 F&I Plan recognizes that the Indirect IMS wedge is the one source of capital revenue that Sandia can most control and budget. The IMS Funding Strategy recognizes the need to be both strategic and balanced in the use of these resources. Facilities uses Indirect IMS funding to focus on renovation of enduring facilities, optimal space utilization, removal of substandard assets, utility system sustainment and upgrades to existing facilities.

The IMS investments in total represent a complementary investment program to the much larger Direct-funded and Work for Others investments in facilities and infrastructure. To obtain the greatest benefit from all investments, a coordinated and integrated investment program from all funding sources is required. The current integrated investment program is described in Appendix C.

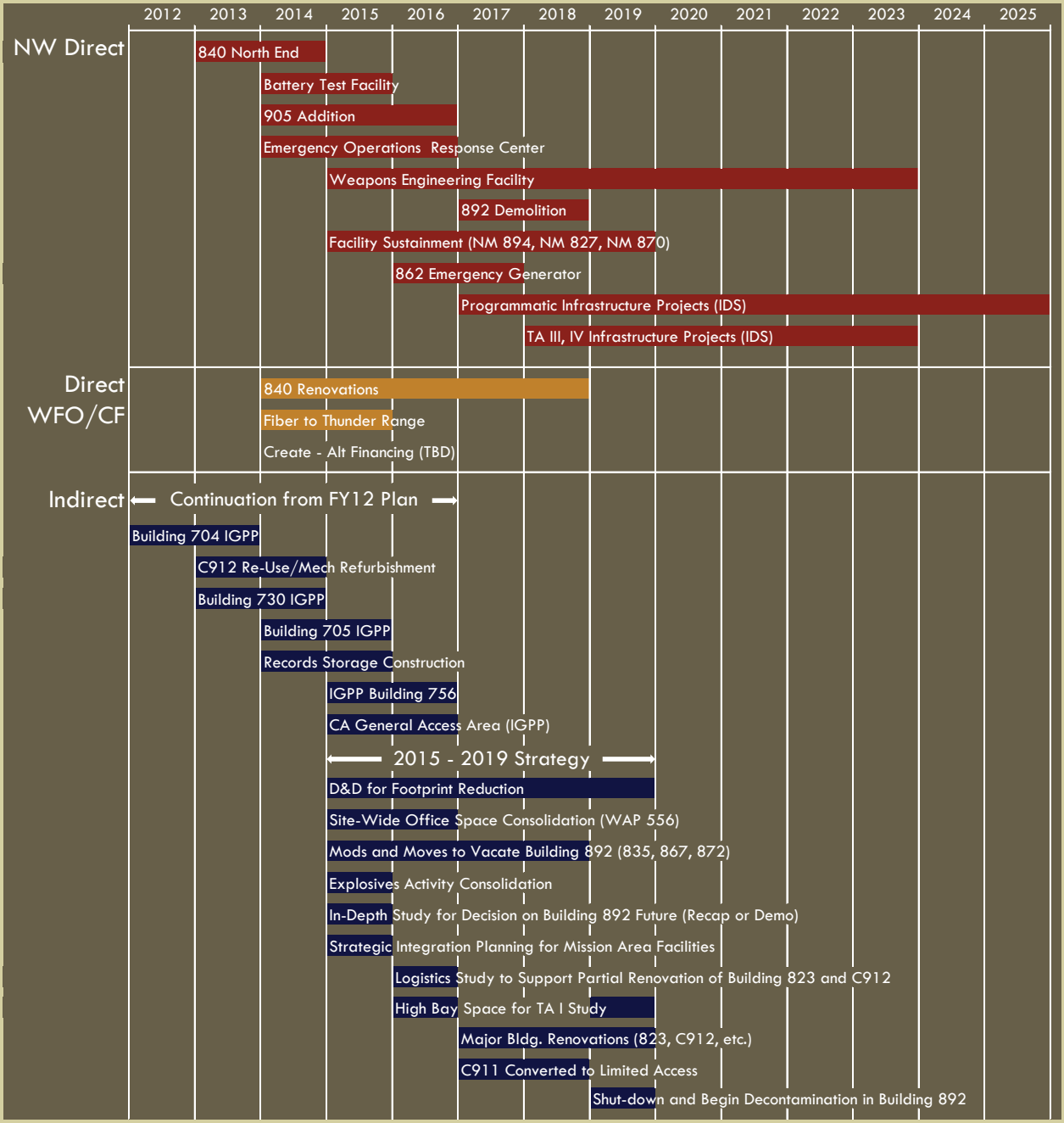
	Integrated Mission Support (IMS) Investment Projects	FY14	FY15		FY16	FY17	FY18	FY19	Total
	Project Description	$M	$M		$M	$M	$M	$M	Spend
Continuation from FY12 Plan	*C912 Re-use/Mechanical Refurbishment (IGPP)*	***4.5***							
	Building 730 (IGPP) construction & occupancy	***6.6***							
	Building 705 (IGPP)	***1.2***	***8.5***						9.7
	Records Storage Construction	***2.8***	***1.2***						3.5
	IGPP Building 756			***4.0***	***5.7***				9.7
	CA General Access Area (IGPP)			***5.0***	***4.7***				9.7
	Subtotal Remaining from FY12-16 Plan	***15.1***	***9.7***						
2015 - 2019 Strategy	Decontamination & demolition for footprint reduction			**1.5**	**1.0**	**1.0**	**2.0**	**2.0**	**2.0**	9.5
	Site-wide office space consolidation (WAP 556)			**1.0**		**1.0**				2
	Modifications & moves to vacate Bldg 892 (to 835, 872, 867, and others)			**2.0**		**1.0**	**7.0**	**1.0**		11
	Explosives Activity Consolidation			**0.5**						0.5
	In-depth study for a decision on building 892 future (recap or demo)			**0.5**						0.5
	Strategic Alignment Planning for Mission Area Capabilities			**0.5**						0.5
	Logistics study to support renovation of Building 823 and C912					**0.3**				0.3
	High bay space for TAI study					**0.3**			**4.0**	4.3
	Major Bldg. Renovations (823, C912, etc.)						**5.0**	**8.0**	**5.0**	18
	C911 converted to limited access						**1.0**	**4.0**		5
	Shut-down and begin decontamination in building 892								**4.0**	4
	IMS 'Investments' Total	***15.1***	**24.7**		**11.4**	**3.6**	**15.0**	**15.0**	**15.0**	

Completion of FY12-16 Five Year Plan

FY15 through FY19 Strategy

Approved ⟷ **Pending approval**

F&I Funding Strategy Overview



Supporting Actions & Initiatives

Overall

Going forward, Facilities will continue to work with Mission Area leadership to prioritize activities that most effectively mitigate risk to mission due to condition of critical facilities and infrastructure.

Funding

Continue to seek external funding (Line item, RTBF, other) to make fundamental improvements and develop policies/procedures to support achievement of FY 2014 Strategic Objective M2.2.4 "Prepare business model options that enable and entice interagency work infrastructure investment at Sandia"

Develop Line Item proposals for general infrastructure based on life-cycle asset management

Continue to use RTBF to recapitalize NW equipment & programmatic GPPs

Continue to use O&M Service Center for management of funding for deferred maintenance and restoration

Continue to use IMS funding for space improvements that result in improved mission efficiency and effectiveness by: 1) Creating more usable space; 2) Undertaking major renovations, 3) Executing planning and required moves for staging and transitions

Continue to annually invest in energy projects that will drive down utility costs substantially in the long term

Seek dedicated Federal funding for D&D program

Develop proposal(s) for multi-year, institutionally-funded renovation programs to revitalize aging facilities

Supportive Policy Environment

Update Corporate policies and procedures to require maintenance of the current development footprint or possible reductions

Consider implementing a centralized space management model

Mandate lower office space per capita allocations based on industry best practices when undertaking renovations and new construction

Continue to engage Sandia Security in addressing design requirements for secure environments to support shifting the culture away from the single office mentality for classified work

Seek to reduce annual cost of "churn" (personnel moves)

Facilities & Space

Sustain key mission critical capabilities for all PMUs

Continue to advance removal of deteriorated, expensive to maintain, space

Continue to use IMS funding to create transitional space (Third IGPP) for organizations to be temporarily housed until a new Programmatic Line Item (WEF) is completed; Upon completion of WEF, use IGPPs as turn-around space for renovation of clone buildings (821, 823, 890, 891, 897) over next decade

Using IMS funding, create space at Sandia CA to house indirect functions and use existing secure space for program use eliminating many trailers

Continue to pursue funding and construction of WEF to consolidate NW functions for more efficient workflow

Ensure that all future new construction and renovation projects comply with space guidelines to increase capacity and occupant density

Pursue solutions for the replacement of C916 Material Sciences laboratory at Sandia CA

Repositioning to Plan Around Capabilities

Our facilities and infrastructure planning must support future mission work by anticipating long-term changes, recapitalization and investment required to provide enabling infrastructure. A first major step in undertaking this type of long-range planning is seeking information from the Divisions and Mission Areas regarding the evolving nature of their missions and work. The framework for future five-year planning efforts focused on capabilities is depicted in Figure 6 below. Figures 7 and 8 show the geographic distribution of primary capabilities at the NM and CA sites.

Figure 6 - Capabilities-Based Planning Framework

Overall Capabilities

- High-reliability engineering
- Sensors and sensing systems
- Cyber technology
- Reverse engineering
- Micro & nano electronics and systems
- Modeling & simulation and experiment
- Natural & engineered materials
- Pathfinders
- Safety, risk, and vulnerability analysis

Corporate Strategic Planning Integration with Facilities Planning

Capabilities of Divisions

Division 1000
- Computational Science & engineering
- Conceive, construct, and use experimental platforms and diagnostics
- High Performance Computing
- Create high performance Computing environments
- Major Environmental Test and Evaluation
- Design and operate high hazard facilities safely and compliantly
- Materials Science and Engineering
- Synthesis, processing, properties and performance of materials
- Integrate theory, experimentation, modeling and analysis
- Micro and Nano Devices and Systems
- Invent, design, produce and test trusted microsystems
- Radiation Effects and High-Energy Density Science
- Radiation hardened electronic and microelectronic nuclear weapon components

Division 2000
- Research, design, and qualify
- Nuclear weapon systems
- Firing systems and other high voltage analog electronics
- Mechanisms and environmental sensing devices
- Test software and secure processing systems
- Research, design, qualify, and produce:
- Nuclear weapon handling gear, testers, and trainers
- Batteries, thermal batteries, and radioisotopic thermoelectric generators
- Explosive components
- Precision opto-mechanical systems
- Systems for flight test data acquisition, transmission, and analysis
- Neutron tubes for neutron generators
- Calibrate equipment for the NW complex
- Surveil and assess nuclear weapon systems, subsystems and components
- Develop technical manuals and train military customers
- Train the nuclear weapons workforce
- Create 2D and 3D design definition
- Respond to emergencies involving nuclear weapons

Division 5000
- Electronic and RF systems
- Sensing technologies
- Satellite, atmospheric, and ground systems
- Execute proliferation and tho·eat assessments
- Create and deliver technologies and systems to discern, defeat, and attribute cyber-attacks
- Execute forensic analysis of and reverse engineer devices, systems, and events impacting national security
- Advances offensive and defensive military systems

Division 6000
- Risk management systems
- Develop technologies for energy production systems, fuel cycles and distribution systems from transportation to electricity.
- Develop complex systems models and design, test, and field systems
- Develop understanding of earth materials, structure, and processes foundational

Division 7000
- Translate inventions into intellectual property and exploit it
- Understand the business environment, cultivate strategic partnerships

Division 8000
- Systems Engineering & Analysis for Nuclear Weapons
- Systems integrator for CA nuclear weapon systems
- Solutions for security, gas transfer, & joint-test assembly telemetry systems
- World class expertise in hydrogen/tritium
- Cross-cutting cyber security expertise for secure weapon systems
- Systems analysis to inform BW policy decisions
- CBRN Defense
- Systems analysis expertise
- Microfluidics for detection diagnostics
- Definition and detection of biological and chemical material
- Radiation detection systems
- System and ConOp for the detection of CBRN attacks
- Systems for neutralization & disposal of chemical munitions and agents
- 24/7/365 reachback for rad and bio events
- Defense Against Cyber Threats
- Internet-scale network emulations and analysis tools
- Communication systems that enable national security missions
- Advanced security concepts for contested environments (operate in enemy territory)
- Algorithms and computing architectures for large-data analysis
- Formal methods for hardware/software verification
- LVOC internship program
- Transportation, Fuels, & Engines and their Impacts
- Combustion Research Facility and the Joint BioEnergy Institute
- Deconstruction of cellulose and lignocellulose into usable fuels
- Deep, fundamental knowledge of engine/fuel behavior
- In-situ laser diagnostics applied to high-temperature and high-pressure chemically reacting flows
- Gas-phase combustion chemistry involving short lived intermediates
- Hydrogen in metals expertise for safe storage, transportation, and utilization

Division 9000
- Design and provide modeling/simulation se1vices and software
- Create and deliver cyber security solutions
- Provide enterprise business services
- Design and operate efficient and secure IT infrastructure solutions

Capabilities Associated with Specific Facilities

- Centrifuge Facilities
- Thermal Test Facilities
- Cross Wind Test Facility
- Vibration Test Facility
- Dynamic Shock Test Facility
- Gamma Irradiation Facility
- ACRR
- Pulsed Reactor Facility
- Complex Wave Test Facility
- Radiography Buildings
- Light Initiated High Explosive Test
- Impact Test Facility
- Environmental Test Facility
- Aerothermodynamics Lab
- Explosive Component Facility
- Aerial Cable Test Facility
- High Pressure Test Facility
- 10,000 Ft Test Track
- Radio Frequency Facility
- Hot Cell Facility
- Laser Optical Test Facility
- Shock Tube Facility
- 3,000 Ft Test Track
- 300 Ft Drop Tower
- Ion Beam Laboratory
- Simulation Technology Lab
- Particle Beam Fusion Lab
- Component Development Lab
- CINT
- Super Computing Facilities
- INSRC
- Weapons Systems Labs
- Weapons Engineering And Drafting Facilities
- Neutron Initiation Technology Facilities
- Development Shops
- NG & Microsystems Facility
- Micro-Fab and Micro-Lab Facilities
- Rad-hardened Integrated Circuit Facilities
- NG Production Facilities
- Advanced Manufacturing Prototype Facilities
- Process Development Labs

Sandia NM & CA Primary Capabilities

Figure 7 - Sandia NM Site

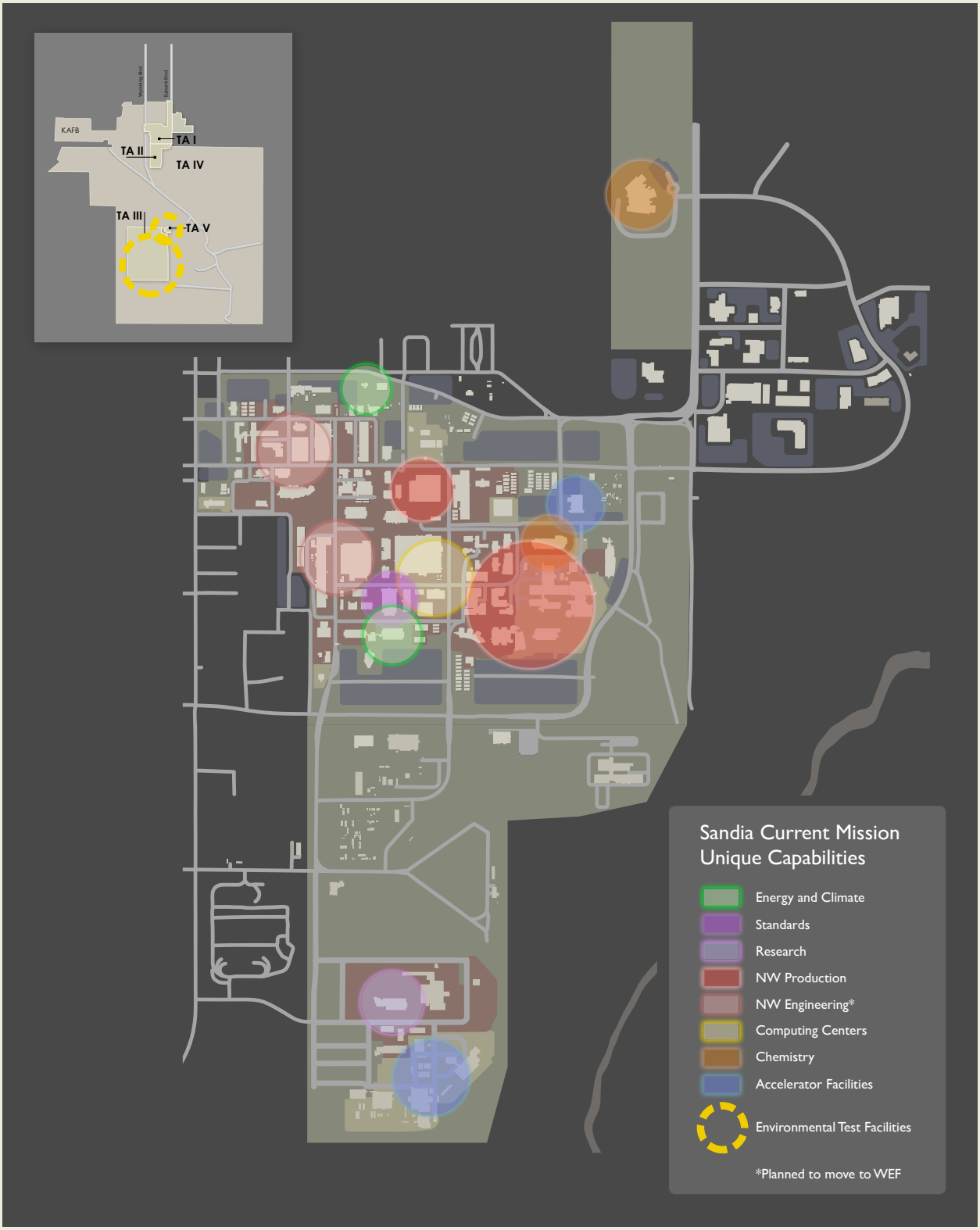
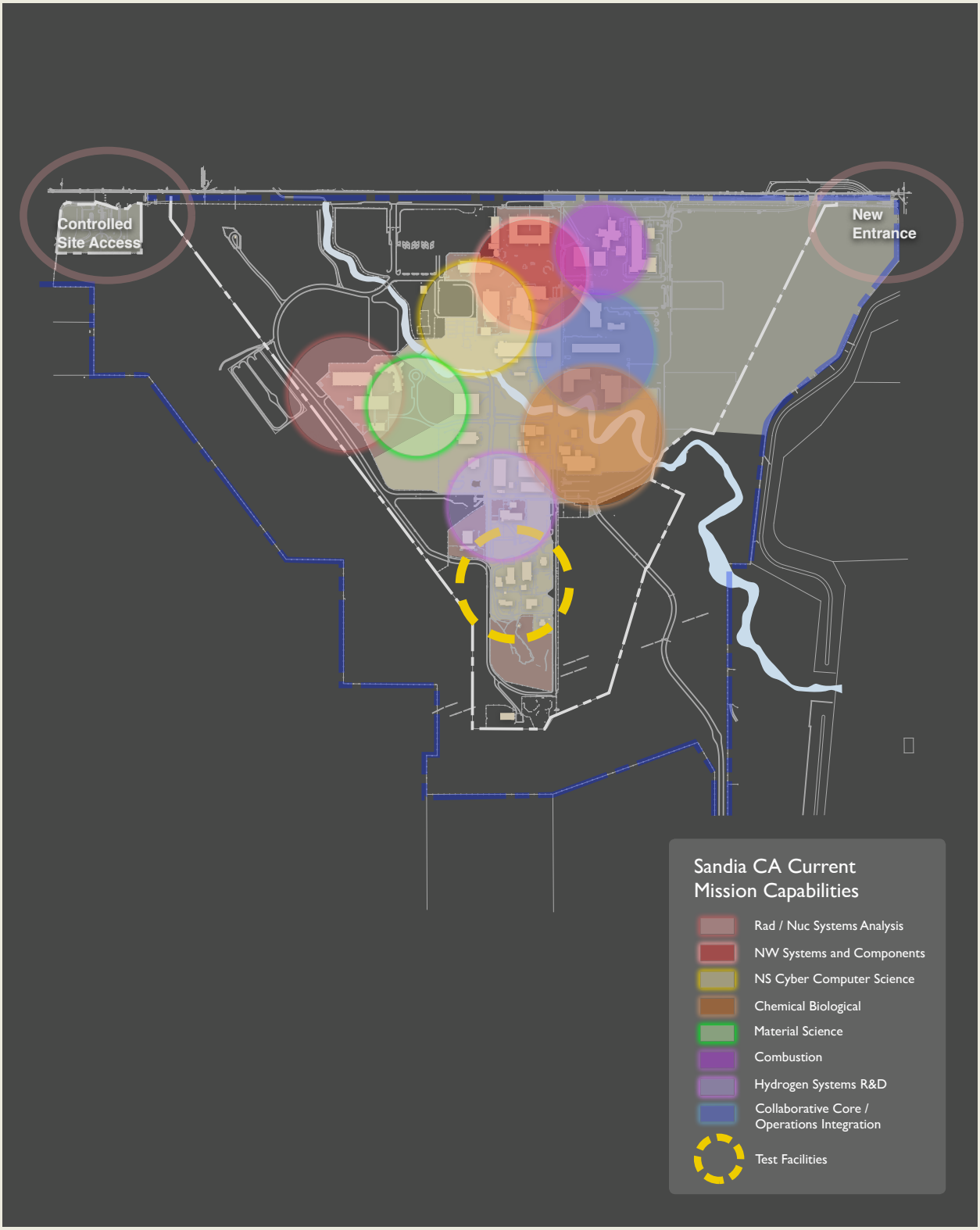


Figure 8 - Sandia CA Site



The Five-Year F&I Plan Supports the Long-Term Visions for the NM and CA Sites

The vision for the NM site provides a flexible and sustainable framework for development that allows for continual refinement to respond to the changing programmatic environment. To accomplish that goal, the vision contains the following design elements:

- It balances the diverse and conflicting need for both secure and open environments by radically rethinking Sandia's Site Security Framework. The Plan proposes a series of clearly communicated security protocols along with state-of-the art system automation. Also, defined campus security zones balance security regulations and work requirements with quality-of-life needs, and help attract non-NNSA and Work for Others programs.
- The strategy relocates the KAFB boundary to provide general access areas for the public in order to enhance collaboration opportunities, help reduce land ownership restrictions, and provide opportunities for private development investment.
- It creates a land use framework that accommodates and expands opportunities for programs to grow, redevelop, modernize, consolidate and collaborate.
- The strategy develops Sandia's "front door" on Eubank Boulevard to manage what visitors experience as they approach and enter the site.
- It establishes a Campus Commons as the heart and soul of the Albuquerque site and the new focal point for development within Technical Area I. The Campus Commons would provide amenities and services for staff and visitors. The Plan identifies other public spaces for collaborative work, informal interactions, and special event areas throughout Technical Area I.
- It encourage collaboration and interaction through new state-of-the-art "team science" facilities and/or pre-provisioned/flexible buildings that can accommodate multidisciplinary workplace needs.
- It upgrades roadways and walkways to improve site access, circulation and internal logistics. The Plan creates a new a gateway and entry to the Campus Commons for the public, extends Eubank Boulevard, develops a new entry gate into Sandia for staff and visitors and provides a new service access and heavy-vehicle inspection facility on Eubank Boulevard. The Plan promotes a college-like, pedestrian-oriented environment through numerous landscape and pathway improvements.

The CA site vision includes the following elements:

- Create a new Entry for the site that does not rely on East Avenue and that brings visitors and new employees directly to a Visitor Badge Office from where they may walk to their destination
- Facilitate the immediate expansion of the General Access Area on the east side of the site to open selected programs and activities to unrestricted collaboration with the private sector. This is the first phase of the development of the Livermore Valley Open Campus at Sandia/CA
- Make proposals for the expansion of the Limited Area on site to accommodate growth in the classified programs
- Make alternate proposals for expanding the Limited Area that do not rely on new construction on site
- Consolidate capability groups on campus
- Improve pedestrian and bicycle circulation on campus
- Improve the landscape at Arroyo Seco and improve recreational opportunities on site
- Integrate site sustainable principles in the site design

Major Planning Concepts Being Advanced or Considered for Future Implementation

Reshaping the NNSA Albuquerque Campus

This framework positions Sandia to balance diverse security requirements from highest security to open environments. The reshaping concept redesigns TA-I to improve vehicular access, circulation, logistics and parking, with the goal of reducing SNL's overall security footprint. Functions such as laser applications and Fleet Services which are not appropriate for this area will be relocated. The reshaping considers repositioning deliveries and shipping activities and access to the perimeter of TA-I along the Eubank Corridor. The restructured campus framework supports and promotes sustainable site development, balances security and work requirements with quality-of-life needs, and provides the capacity and flexibility to support a wide spectrum of national security mission programs.

Figure 9 - Conceptual Revision of KAFB Boundary

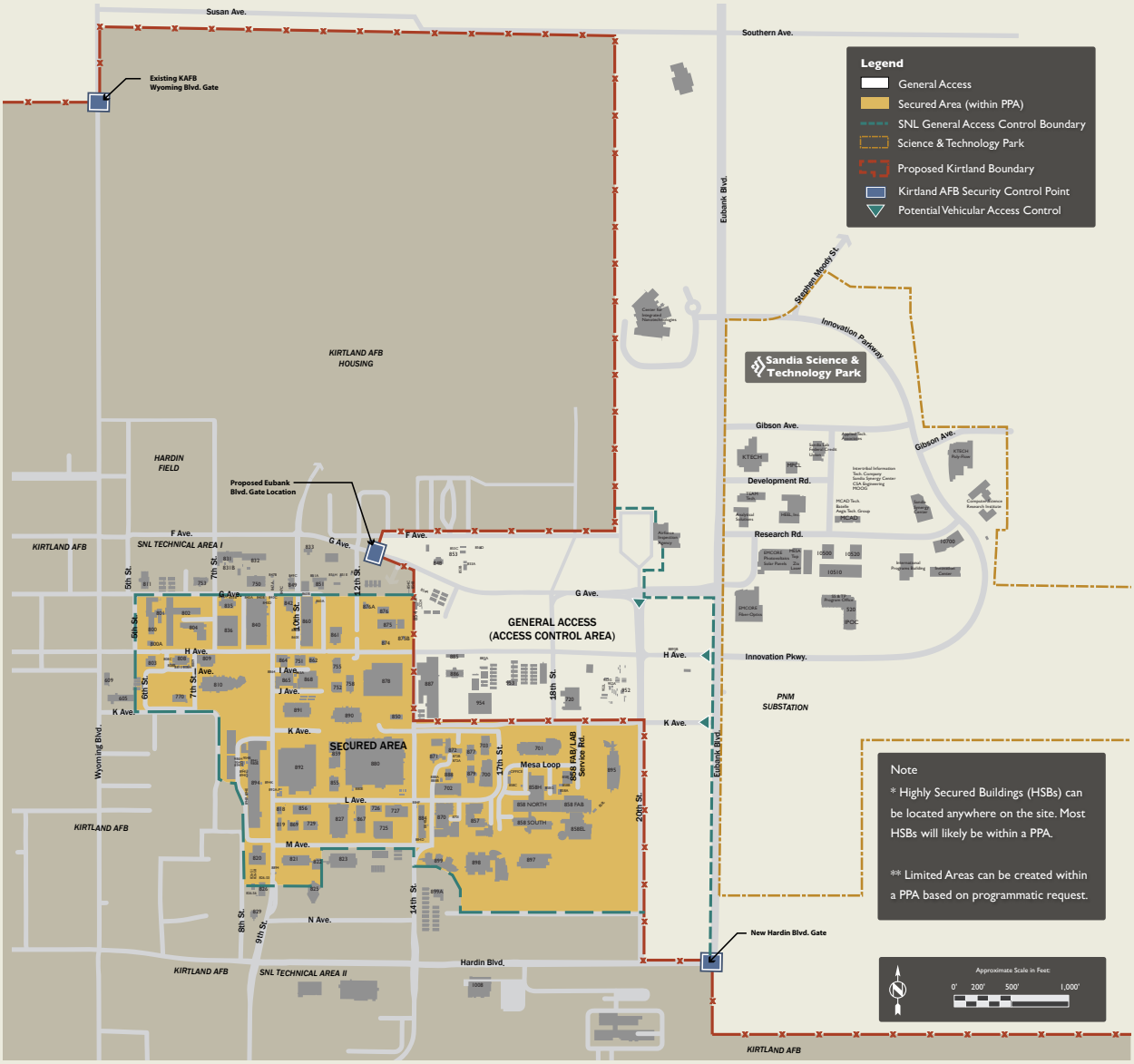
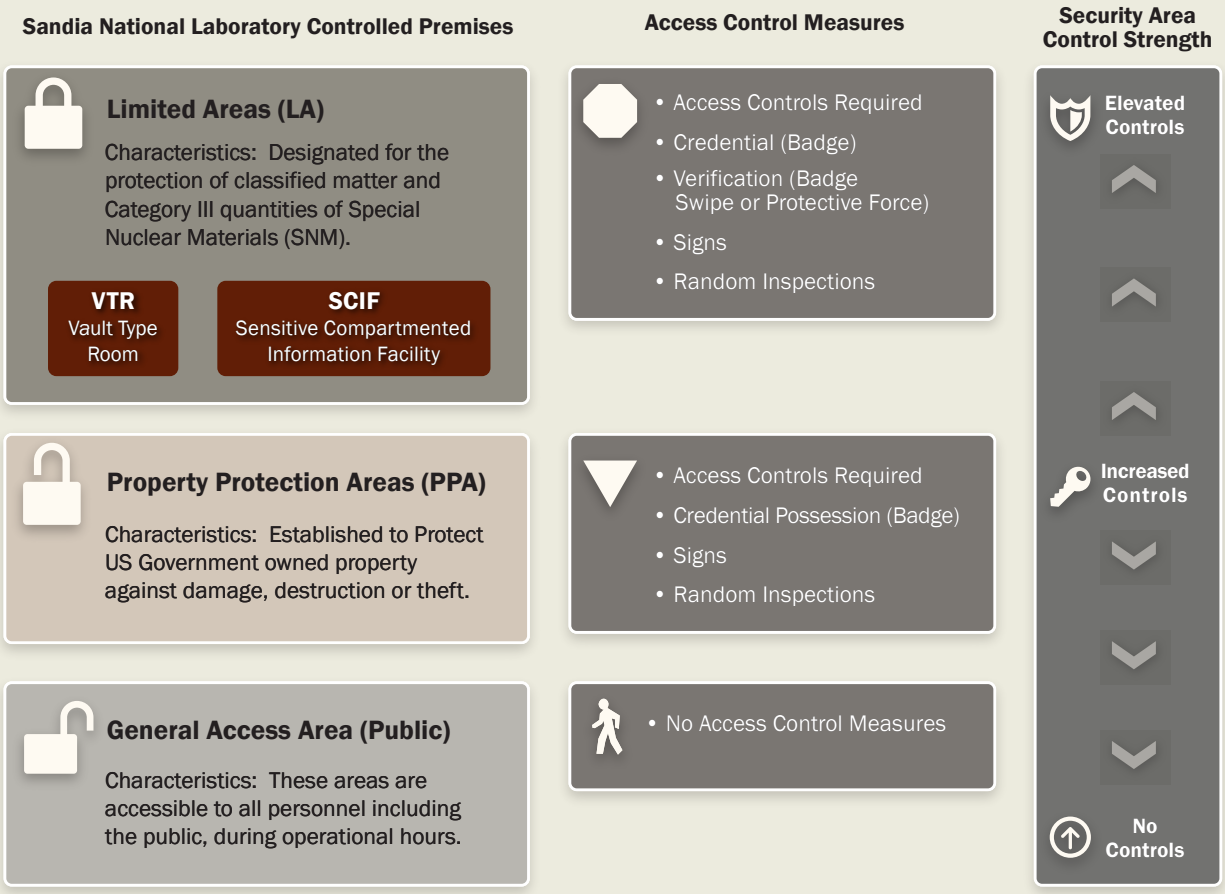


Figure 10 - Conceptual Design for Heavy Vehicle Inspection and Shipping/Receiving Facilities

Figure 11 - Concept for Hierarchical Physical Security Framework

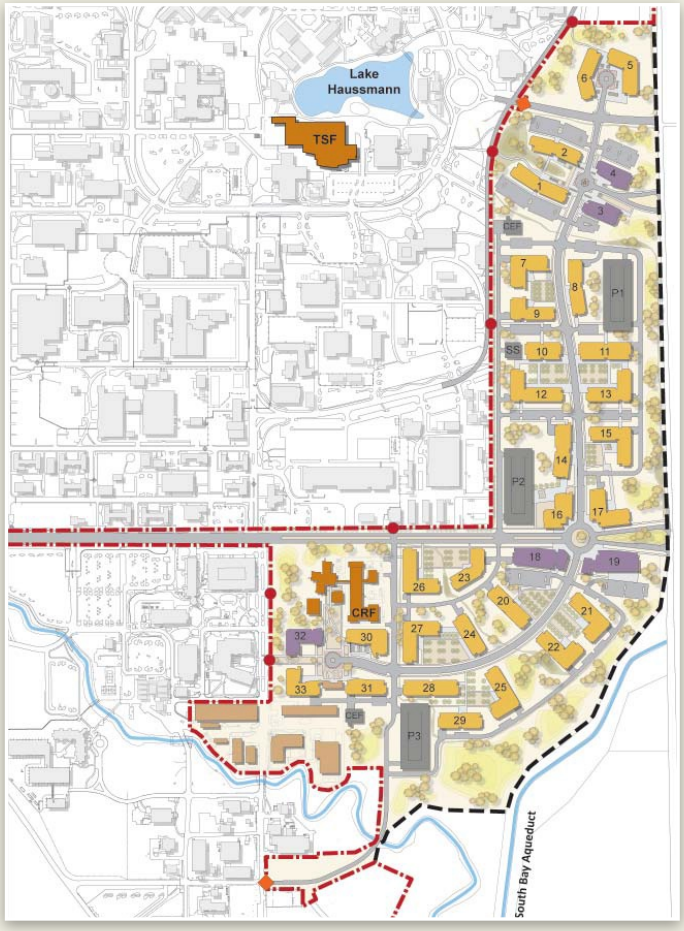


Creating the Livermore Valley Open Campus

Focused on the Livermore Valley Open Campus (LVOC) mission of advancing science and technology in areas of synergistic interest to NNSA and external partners, two new LVOC facilities—Collaboration in Research and Engineering for Advanced Technology and Education (CREATE) and High Performance Computing Innovation Center (HPCIC)—will increase external collaborations that enhance the national security mission and attract and train new talent for the national labs.

Figure 12 - Concept for Hierarchical Physical Security Framework

Figure 13 - The Livermore Valley Open Campus on the east side of the LLNL and SNL sites at full development

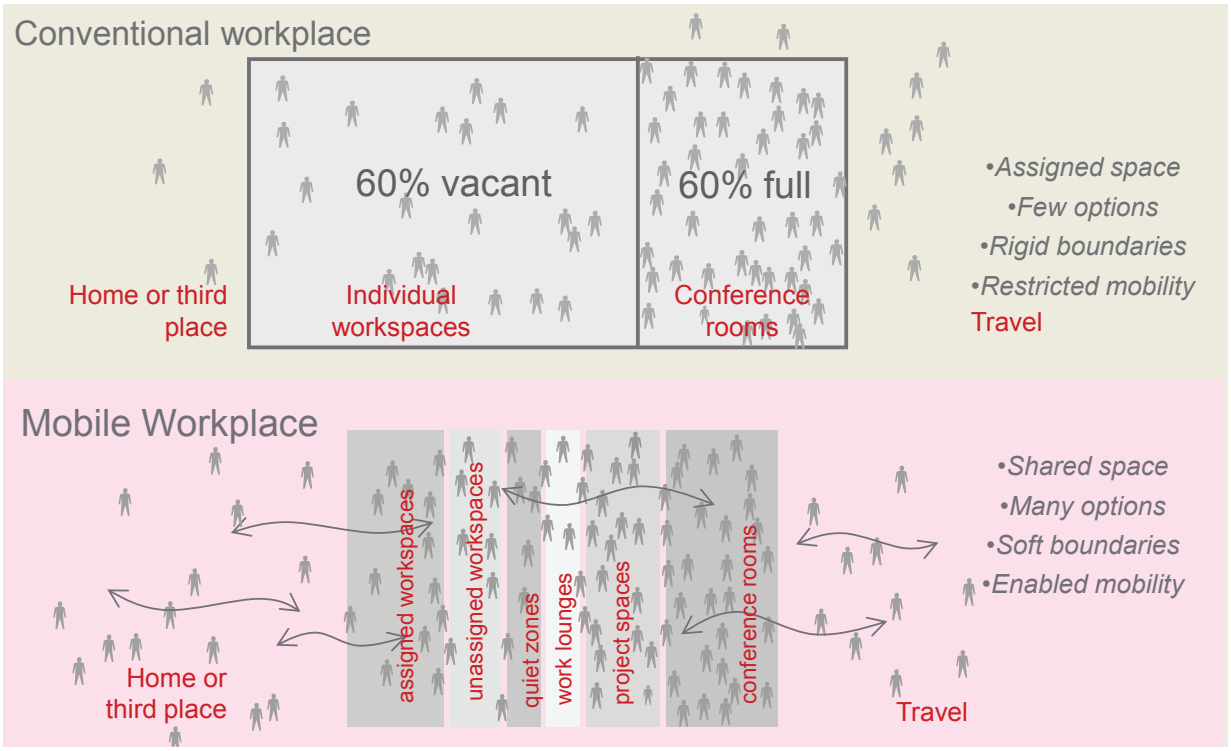


Creating Flexible, Innovative Workplaces at Every Opportunity

Sandia should provide creating work environments that support the current workforce effectively and demonstrate sustainability in all of its aspects. Various strategies and design concepts should be examined when opportunities to renovate existing space arise, or new construction is contemplated.

A major consideration when designing and allocating space should be workplace employee mobility. Internal mobility is defined as being periodic movement between work settings, whether natural or induced. Considering how employees move about in their daily routines combined with knowledge of the frequency of their movement, will allow Sandia to analyze its long-term space needs within the framework of a "Mobile Workplace" rather than a "Conventional Workplace". The two analytical frameworks are noted in the following graphic.

Figure 14 - Considering the Mobile Workplace when Designing Office / Conference Space



Examples of Adaptable Work Environments

Positioning Sandia to Undertake Major Renovations

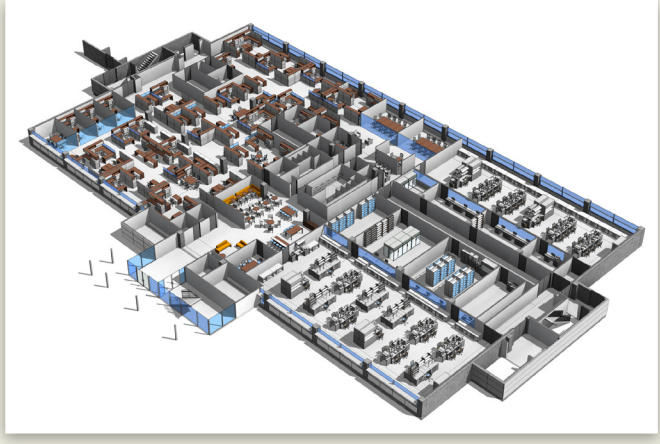
A Clone Building Strategic Planning Study was conducted in FY 2012 and provides a high-level assessment for the redevelopment of buildings 810, 821, 823, 890, 891, 897, 960, 962, and 910 (SNL/CA). The study focused on approaches to extend their lifespans and provide a more modern, efficient work environment for building occupants. These buildings are considered "Clones" because they were designed and constructed utilizing the same basic principles and concepts. Building 823 was the initial clone building, constructed in 1981. Construction of the remaining buildings followed over the course of the next 15 years and concluded with the construction of Building 897 in 1995. As a result of the long construction duration and changing needs of the occupants, each building has developed unique characteristics.

The Clone Buildings provide approximately 1,000,000 combined square feet of building area and represent one of the most significant facility assets at Sandia. Sandia acknowledges this asset and has identified clone redevelopment as a critical component for continued long-range mission success.

Renovation and redevelopment of the clones will be both costly and logistically complex to undertake to ensure uninterrupted mission work. The Five-Year Plan recommends development of a proposal(s) for multi-year, institutionally-funded renovation program to revitalize aging facilities such as the clones. Further work focusing on interim space for those affected by renovation of specific structures needs to be undertaken in the near future.

Successful renovation of the clones will:
Support and advance current Strategic Objectives of the Laboratory and NNSA
Improve facilities & infrastructure for a variety of mission enabling capabilities
Provide flexible & adaptable infrastructure and spaces
Improve safety
Reduce O&M costs, life-cycle costs, and deferred maintenance
Extend the useful life of the clones
Support recruitment & retention of the most technically capable workforce
Improved space utilization & operational efficiencies

Clone Building Redevelopment Design



Clone Building Exterior Design Example

Appendices

West view of MESA building

Appendix A – Current Mission Unique Capabilities Summary

The capabilities listed in the following table are based on input to the FY 2014 Laboratory Operations Board (LOB) effort and are presented in lieu of corporate capabilities still being defined at the time this document was published.

Mission Capability	Asset Capability
Environmental Test Facilities	• 25-Ft Centrifuge
	• Thermal, Crosswind, Vibration, Dynamic Shock, Complex Wave, Light-Initiated High Explosive, Impact, Lightning, High Pressure, and Laser Optic Test Facilities
	• Gamma Irradiation Facility (GIF)
	• Annular Core Research Reactor (ACRR)
	• Sandia Pulsed Reactor (SPR)
	• Radiography
	• Aerothermodynamics
	• Explosives Components
	• Aerial Cable
	• 10,000 Ft and 3,000 Ft Sled Tracks
	• Radio Frequency
	• Hot Cell
	• Shock Tube
	• Drop Tower
Accelerator Facilities	Ion Beam Lab
	Simulation Lab
	PBFA Heavy Lab (Saturn accelerator)
	Particle Beam Fusion Lab Component Development
	Z accelerator
	Z-backlighter laser
	High-Energy Radiation Megavolt Electron Source (Hermes) III accelerator
	Radiographic Integrated Test Stand (RITS) accelerator
Chemistry	Center for Integrated Nanotechnology (CINT)
	Processing and Environmental Technology Laboratory (PETL)
Computing Centers	High Performance Computing
	Supercomputing
	Integrated Network Security and Reliability (INSRC)
NW Engineering	Power Supplies
	Military Liaison Training
	Development and Machining shops
	Neutron Initiation Technology
	Weapons Systems Labs
	Weapons Engineering & Drafting Labs
NW Production	Neutron Generator, Microsystems & Production
	Microelectronics, MESA MicroFab and MicroLab
	Rad-Hard Integrated Circuits
	Process Development Lab
	Advanced Manufacturing Prototype
Research	Radar Cross Section (RCS)
	Combustion Research
	Lazar Lab
	Strategic Defense Facility

Mission Capability	Asset Capability
Rocket Test Range	Launch Pads, Towers
Standards	Primary Standards Lab
Defense Systems	Reverse Engineering
	Crypto
	Mobile computing
	Quantum Information Processing
	Cyber Threat Analysis
	Vulnerability Assessment
	High Fidelity Simulation
	Advanced Materials
	Advanced Electronics Design and Fabrication
	Computational Simulation
	Thermal Vacuum Environmental Testing
	Complex Electronic Module Product Realization
	Large Instrument Processing
	Large-Scale Ground Segment Integration
	Synthetic Aperture Radar
	Radar and Advanced RF
Energy & Climate	Phenomenological Modeling
	Defense Waste Management and Nuclear Energy Safety Technologies
	Atmospheric Radiation Measurement
	Energy Grid Modernization
	Military Energy Systems
	Renewable Energy Technologies (National Solar Thermal Test Facility, Distributed Energy Technologies Laboratory, Photovoltaic Systems Evaluation Laboratory)
	1 MW Supercritical CO2 Brayton Cycle System
	Scaled Wind Farm Technology (SWIFT) Facility
	Cylindrical Boiling Vessel (CYBL)
	Surtsey Direct Heating Test Facility
	Geomechanics Complex
Non-Proliferation and High-Consequence Security	Intelligent Systems, Robotics, and Cybernetics (Robotic Vehicle Range)
	Risk Analysis and Assessment
	Security System Design and Engineering (Sensor Test and Evaluation Center)
	Physics and Chemistry Threats
	Simulation-Based Engineering of Threats and System Performance
	Reliability and Materials Science
	Complex Systems for National Security
	Transportation Safeguards and Security
	Cooperative Monitoring Center
	Center for Global Security and Cooperation
	Airworthiness Assurance NDI Validation Center (AANC)
	International Security Programs Outdoor Test Facility (OTF)
	Joint Conflict And Tactical Simulation (JCATS)
	Integrated Security Facility (ISF)
	U.S. Air Force and Navy Nuclear Security
	Advanced Threat Analysis and Response

Appendix B – Progress Review of FY 2012-2016 Goals & Targets

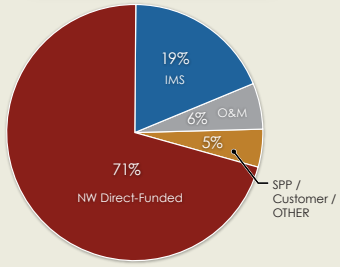
FY 2012 Plan Goal	Target	Progress

• Remove substandard space from service	• Vacate buildings 892 & C927	• IGPP Strategy in progress
		  • 704 constructed & occupied
		  • 730 to be occupied in early FY 2015
		  • 705 to be occupied by FY 2015
		• 892 largely vacated
		• C927 has been demolished
		• Various MOs at NM & TTR ready for D&D

• Improve mission productivity through collocation and improvements in space quality	• Baseline specific project for people/product movement between buildings for project work	• Village concept development in progress identifying opportunities for better site configuration • Consolidation of activities/people to support LEPs mostly completed in FY 2013 • Strategic Space Management Plan to be completed in FY 2014
• Improve F&I condition	• Reduce deferred maintenance (DM) by $50M	• Indirect funds continue to be applied to reducing DM as possible • D&D of 892 & C927 offer the greatest current potential to reduce DM
• Increase space utilization (e.g., office, lab, and storage)	• Ensure office utilization at 90% • Improve lab and storage utilization	• Office utilization remains 91%; lab utilization baseline complete; all lab space has been assessed; less than 10% of storage space has been assessed • Continue to investigate new ways of using space • All recent and planned construction employs more efficient space utilization features where appropriate
• Accelerate major facility construction and building improvement	• Develop prioritized plan with funding options identified for capital construction/clone facility renovation	• Clone renovation study complete • Pursuing WEF CD-0 • CA CREATE CD-0 complete • CA Seismic Upgrades Program in progress • WFO, NW, IMS investments in 840 • EORC & Battery Test Facility being advanced
• Invest utility savings to reduce energy use and improve sustainability	• Reduce energy consumption by 12.1% in FY 2014 and 25% by FY 2017 (FY 2011 baseline) • 15% of existing buildings > greater than 5,000 GSF are compliant with Guiding Principles for High Performance Sustainable Buildings (HPSB) by FY 2015	• Reduction was 9.2% during the first two quarters of FY 2014 (In progress) • 10.1% in FY 2013; plan to meet 15% by FY 2015

Appendix C – Proposed Project Investments from All Funding Sources*

FY 2015-2019 Total Investments (as %) ▼



NW Direct-Funded Investments ($M)*	FY14	FY15	FY16	FY17	FY18	FY19
NM 840 – North-End Renovation	$2.3					
TTR MDH – Main Distribution Hub - Central Communications Bldg.	$0.5	$1.5				
NM EORC – Emergency Operations and Response Center (EORC)	$0.4	$4.2	$4.2			
NM 1012 – Battery Test Facility	$0.3	$4.6				
NM 905 – Addition and Renovation	$0.2	$6.0	$3.3			
NM WEF – Weapons Engineering Facility (WEF)			$4.0		$32.8	$66.5
TTR 03-57 – Control Tower Electrical and Mechanical Upgrades		$1.0	$5.1			
Facility Sustainment (NM 894, NM 827, NM 870)		$5.2	$4.0	$7.1	$1.1	$1.1
NM 862 – Recapitalization - Emergency Backup Generators			$0.5	$6.0	$2.0	
NM 878 – Refurbishments					$0.5	$8.0
SNL/NM – Construct New LAZAP Facility			$0.6	$8.0	$1.4	
SNL/NM – International Center for Lab Risk Management				$0.5	$4.7	
SNL/NM – NSEC (Formerly NRAD)						$10.0
SNL/NM – Microelectronics Fabrication Programmatic Infrastructure Projects			$3.0	$3.0	$3.0	$3.0
SNL/NM – TA-IV District Chilled Water System					$8.0	$11.0
SNL/NM – TA-III and Remote Areas Utility Infrastructure Refurbishment					$6.0	$15.0
SNL/NM – Major Environmental Test Programmatic Infrastructure Projects			$3.0	$3.0	$3.0	$3.0
SNL/NM – SSiFR (MESA Recapitalization)	$25.0	$25.0	$25.0	$25.0	$25.0	
SNL/NM – NM 895 – Staging/Storage Addition				$0.8	$6.8	
CA 914 – Seismic Upgrade				$0.6	$4.0	$4.4
SNL/CA – Programmatic F&I Projects			$3.0	$3.0	$3.0	$3.0
SNL/CA – Sanitary Sewer & Potable/Fire Water Improvements						$1.2
Total	**$28.7**	**$52.8**	**$63.7**	**$64.5**	**$107.3**	**$126.2**

SPP/Customer/OTHER Funded Investments ($M)*	FY14	FY15	FY16	FY17	FY18	FY19
CA TBD – CREATE – Alt Financing						
NM 9965 – Fiber to Thunder Range & CAGE Facility	$2.3	$1.8				
CA 910 – Security Upgrade (PIR)	$3.5					
NM 840 – Renovations	$0.4	$4.8	$8.4	$2.3		
NM 965 – Laser Lab Modification	$1.9					
CA 906/907 Renovations				$2.0	$1.0	$1.0
AMRDEC Inertial Terrain Aided Guidance (ITAG) Modifications					$0.3	$3.3
EMS Ground Facility				$0.2	$3.3	
Total	**$8.1**	**$6.6**	**$8.4**	**$4.5**	**$4.6**	**$4.3**

FY 2015-2019 Total Investments (in $M) ▼

	Integrated Mission Support (IMS) Investment Projects	FY14	FY15		FY16		FY17	FY18	FY19	Total
	Project Description	$M	$M		$M		$M	$M	$M	Spend
Continuation from FY12 Plan	C912 Re-use/Mechanical Refurbishment (IGPP)	4.5								
	Building 730 (IGPP) construction & occupancy	6.6								
	Building 705 (IGPP)	1.2	8.5							9.7
	Records Storage Construction	2.8	1.2							3.5
	IGPP Building 756			4.0	5.7					9.7
	CA General Access Area (IGPP)			5.0	4.7					9.7
	Subtotal Remaining from FY12-16 Plan	15.1	9.7							
2015 - 2019 Strategy	Decontamination & demolition for footprint reduction			1.5	1.0	1.0	2.0	2.0	2.0	9.5
	Site-wide office space consolidation (WAP 556)			1.0		1.0				2
	Modifications & moves to vacate Bldg 892 (to 835, 872, 867, and others)			2.0		1.0	7.0	1.0		11
	Explosives Activity Consolidation			0.5						0.5
	In-depth study for a decision on building 892 future (recap or demo)			0.5						0.5
	Strategic Alignment Planning for Mission Area Capabilities			0.5						0.5
	Logistics study to support renovation of Building 823 and C912					0.3				0.3
	High bay space for TAI study					0.3			4.0	4.3
	Major Bldg. Renovations (823, C912, etc.)						5.0	8.0	5.0	18
	C911 converted to limited access						1.0	4.0		5
	Shut-down and begin decontamination in building 892								4.0	4
	IMS 'Investments' Total	15.1	24.7		11.4	3.6	15.0	15.0	15.0	

Completion of FY12-16 Five Year Plan

FY15 through FY19 Strategy

Approved ⟷ Pending approval

*** Information current as of 10/1/2014**

Focus of FY 2015-2019 NW Direct-Funded Real Property Investments

Sandia's largest investments and most significant initiatives supporting the NW Program as noted in the Ten-Year Site Plan are as follows:

- Plan, design, and construct the Weapons Engineering Facility (WEF) to collocate core NW organizations in modern facilities and excess major building that are at the end of their designed service lives. Design start has been slipped to FY 2018.
- Sustainment of facilities critical to LEP completion.
- Implement the $150 million Sandia Silicon Fabrication Revitalization (SSiFR) initiative to replace and modernize facilities and capital equipment to sustain outdated processes in the microsystems and engineering sciences applications (MESA) complex.
- Plan, design, and construct the Emergency Operations and Response Center (EORC) to provide emergency-incident management from a modern facility that serves and supports both local and national response teams. Design start has been set for FY 2015.
- Complete construction of three light laboratory/office buildings to facilitate the deactivation and eventual demolition or reuse of NM 892, a 60-year old facility rapidly approaching functional obsolescence with $68 million in calculated deferred maintenance. These buildings will serve as turnaround space for future renovations when the WEF is complete and occupied.

Focus of FY 2015-2019 WFO/Customer/Other-Funded Real Property Investments

Sandia supports NW, other NNSA, other DOE, and several non-DOE programs, making it a true multi-program national laboratory focused on national security. For the last decade, nearly half of Sandia's operating funds came from non-NW activities. Programmatic growth, evolution, and diversification is expected across many Sandia mission areas, which is critical to Sandia's vitality, synergy, and national security contributions. However, there is a higher degree of funding uncertainty associated with many of the non-NW programs, which has implications for planning and resultant project execution. Based on successes in small scale programs within Sandia's Work for Others (WFO) projects and agreements, there is interest from the customer base to invest in Sandia's facilities for a longer-term benefit. Potential investments include lab build-outs in one of the older buildings to consolidate existing activities that are currently spread around several buildings. Other improvements include increasing the security capability of other buildings to take advantage of Sandia's talent and knowledge-base in a compartmentalized environment.

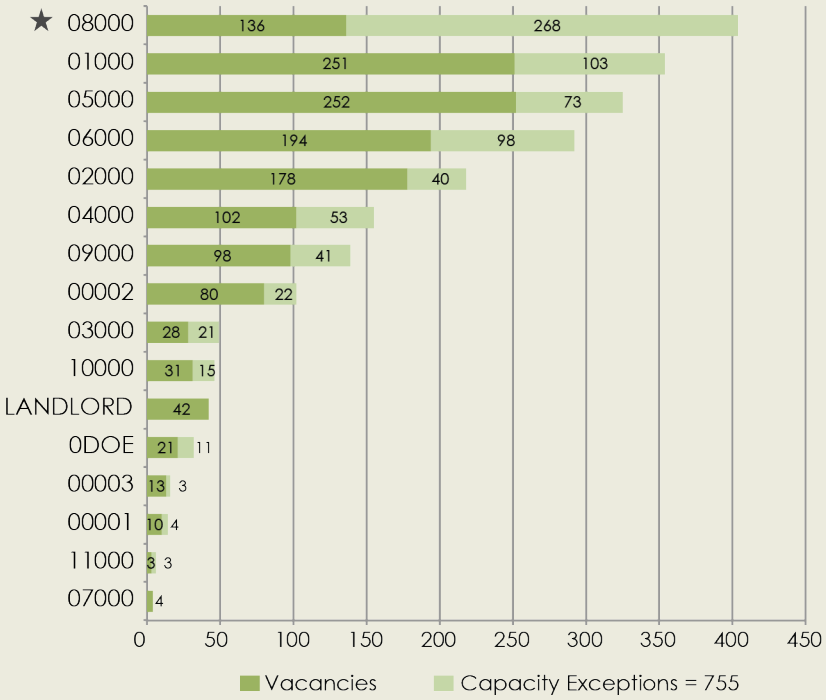
Sandia and NNSA will continue working together to explore and develop improved approaches for WFO sponsored investments in facilities and operations that support national security.

With respect to Alternative or Third Party Financing, Sandia will continue to expand the Livermore Valley Open Campus (LVOC) in conjunction with Lawrence Livermore National Laboratory, in the near term focusing on acquisition of the Collaboration in Research and Engineering Advance Technology and Education (CREATE) building through alternative financing.

Appendix D – Additional Space Metrics

as of 10/2014

Total Office Capacity Available if Space Were Fully Optimized



◂ *Observation:*

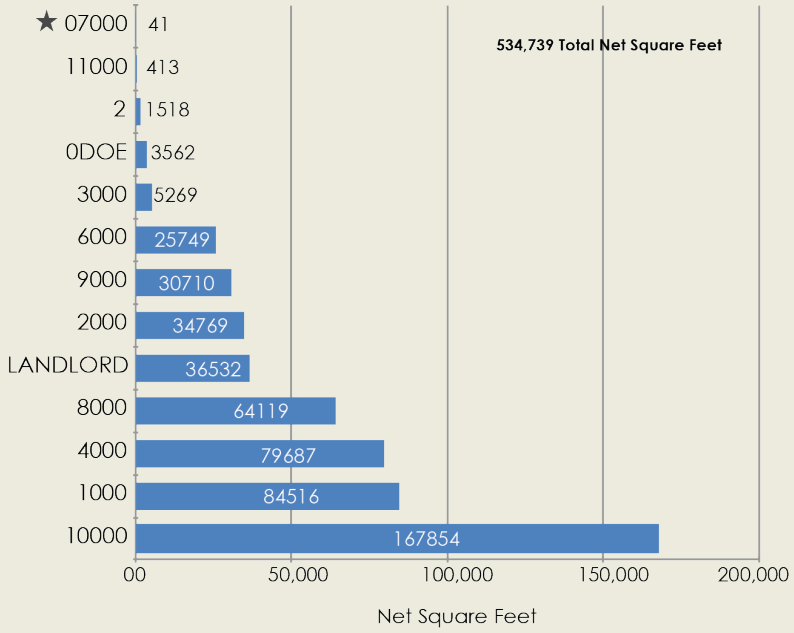
Office vacancies vary between Divisions; while not all of these vacancies can be easily utilized, there is opportunity to optimize use of existing space. Logically, the Mission Divisions have more vacancies for agility, and the Mission Support Divisions have fewer. Less than 1% of vacancies are Landlord controlled.

Vacancies and office space not fully utilized represent a value of approximately $202 million if the equivalent number of workspaces were newly constructed.*

*This $202 million figure assumes that 2,198 new workspaces will be constructed at a cost of $92,000 per workspace.

★ Division 8000 includes 134 "under construction" capacity exceptions for Building's C905, C910 and C912.

Division Assigned Storage Space (Included in Space Chargeback)



◂ *Observation:*

As indicated in the chart to the left, a vast amount of Division-assigned Storage Space exists at Sandia. An additional 300,000 square feet of storage space is comprised of sheds, transportainers and other small structures. Rigorous assessment of the content and relevancy of what is being stored would likely reveal extensive opportunities to remove or better utilize a considerable amount of this space.

★ Corporate storage.

Current Lab Capability

▾ *Observation:*
Currently, 83% of Labs are fully utilized and 85% of Labs either meet expectations or are optimized for mission use. Considerable opportunities exist to reassign underutilized Lab space or space not being used for mission recently estimated at 125,000 net square feet.

Assuming the cost of $739 per SF for new lab space, currently under-utilized lab space represents a $92 million asset.

Lab Statistics

Lab NSF	
Lab Count	2,715
Lab NSF	1.75M
Annual Lab Space Cost	$ 45.1M

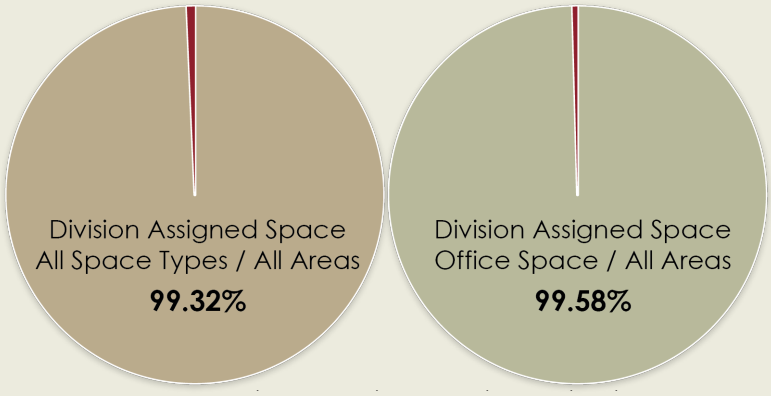
Lab Utilization Status (% of Labs)	
Fully	83%
Partially	5%
Seldom	5%
Vacant	5%
No Response	2%

Lab Conditions	
Optimized for mission use	30%
Meets expectations for mission use	55%
Does not meet expectations for mission use	5%
Mismatched or not being used for mission use	5%
No Response	5%

Lab Types and NSF Details

Lab Type	Count	NSF	Underutilized NSF
Chemical/Bio/Nano Lab	310	149,821	3,879
Fieldwork Staging Center/Control or Command Center	71	47,901	4,167
Laser/Optics Lab	130	81,264	4,351
Light Electrical Lab	424	215,230	9,489
Machine Shop	85	73,707	5,007
Modeling/Simulation Lab	125	77,449	3,731
Special Lab	549	459,815	21,942
Other	793	588,686	72,073
No Response	87	54,404	-
Grand Total	**2,574**	**1,748,277**	**124,639**

Division vs. Corporate Space



◂ *The current space management model is ineffective*

Almost every major healthcare, academic and research institution in the Nation entrusts management of space with a central landlord or organization. The traditional method of space management at Sandia, passed on to the Divisions, makes it more challenging, difficult and sometimes virtually impossible to achieve space management objectives. The infinitesimal amount of space that is directly managed by Division 4000 in behalf of the corporation shown as "hairline" slices of the pie charts to the left illustrate this situation.

Appendix E – Acronyms and Definitions

Acronym	Definition
ACRR	Annular Core Research Reactor
AHW	Advanced Hypersonic Weapon
ALT	Alteration
ARG	Accident Response Group
CA	California
CAS	Condition Assessment Survey
CBFI	Capability-Based Facilities and Infrastructure
CHIPP	Center for Heterogeneous Integration Packaging and Processes
CREATE	Collaboration in Research and Engineering Advanced Technology and Education
D&D	Decontamination and Demolition
DM	Deferred Maintenance
DoD	Department of Defense
DOE	Department of Energy
DOS	Department of State
DSA	Defense Systems and Assessments
ECIS	Energy, Climate, and Infrastructure Security
EORC	Emergency Operations and Response Center
ETG	Explosives Technology Group
F&I	Facilities and Infrastructure
FCI	Facility Condition Index
FIMS	Facilities Information Management System
FIRP	Facilities and Infrastructure Recapitalization Program
FMOC	Facilities Management and Operations Center
FY	Fiscal Year
FYNSP	Future Years Nuclear Security Plan
GPP	General Plant Project
GSF	Gross Square Feet
HE	High Explosive
IAW	Interagency Work
IGPP	Institutional General Plant Project
IHNS	International, Homeland, and Nuclear Security
IPB	International Programs Building
IM	Information Management
IT	Information Technology
JTOT	Joint Tactical Operations Team
KTF	Kauai Test Facility

Acronym	Definition
LEP	Life Extension Program
LI	Line Item
LRDF	Long-Range Development Framework
LVOC	Livermore Valley Open Campus
M&O	Management and Operating
MESA	Microsystems and Engineering Sciences Applications
NG	Neutron Generator
NM	New Mexico
NNSA	National Nuclear Security Administration
NSE	Nuclear Security Enterprise
NW	Nuclear Weapons
NWC	Nuclear Weapons Council
OMB	Office of Management and Budget
OSF	Other Structures and Facilities
OST	Office of Secure Transportation
PSL	Primary Standards Laboratory
R&D	Research and Development
RPA	Real Property Asset
RPV	Replacement Plant Value
RTBF	Readiness in Technical Base and Facilities
S&T	Science and Technology
SCIF	Sensitive Compartmentalized Information Facility
SGT	Safeguards Transporter
SMU	Strategic Management Unit
SNL	Sandia National Laboratories
SPARC	Scalable Pulsed Accelerator and Reactor Center
SPP	Sandia Partnership Program
SSiFR	Sandia Silicon Fabrication Revitalization
SSP	Site Sustainability Plan
SSPP	Strategic Sustainability Performance Plan
STE	Science, Technology, and Engineering
TA	Technical Area
TTR	Tonopah Test Range
TYSP	Ten-Year Site Plan
U.S.	United States
WEF	Weapons Engineering Facility
WMD	Weapons of Mass Destruction

View of Sandia New Mexico Site