DRAFT
RESEARCH SUPPORT BUILDING AND INFRASTRUCTURE MODERNIZATION

PRELIMINARY PROJECT EXECUTION PLAN

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Revision History

Rev. No.	Date	Revision Description	Pages Modified
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SLAC National Accelerator Laboratory Approval

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List of Acronyms

AE	Acquisition Executive
A/E	Architect/Engineer
AS	Acquisition Strategy
Bxxx	Building Number
BCCB	Baseline Change Control Board
BES	Basic Energy Sciences
CBC	California Building Code
CD	Critical Decision
CD-0	Approve Mission Need
CD-1	Approve Alternative Selection and Cost Range
CD-2	Approve Performance Baseline
CD-3	Approve Start of Construction
CD-4	Approve Start of Operations
CDR	Conceptual Design Report
CX	Categorical Exclusion (NEPA)
DOE	Department of Energy
EA	Environmental Assessment
EAC	Estimate at Completion
E&D	Engineering & Design
EIR	External Independent Review
ES&H	Environmental Safety and Health
ESAAB	Energy Systems Acquisitions Advisory Board
FPD	Federal Project Director
FY	Fiscal Year
GC	General Contractor
GSF	Gross Square Feet
HVAC	Heating Ventilation and Air Conditioning

IPR	Independent Project Review
ISEMS	Integrated Safety Environmental Management
LIC	Line Item Construction
Linac	Linear Accelerator
LCCA	Life Cycle Cost Analysis
MEP	Mechanical, Electrical, Plumbing
NEPA	National Environmental Policy Act
OSHA	Occupational Safety & Health Act
PARS	Project Assessment and Reporting System
PED	Project Engineering and Design
PEP	Project Execution Plan
PPEP	Preliminary Project Execution Plan
RMP	Risk Management Plan
SLAC	SLAC National Accelerator Laboratory
SSO	DOE SLAC Site Office
TEC	Total Estimated Cost
TPC	Total Project Cost
UTR	University Technical Representative
VE	Value Engineering
WBS	Work Breakdown Structure

1.0 Introduction

In accordance with DOE Order 413.3A, this Preliminary Project Execution Plan (PPEP) sets forth the management approach that will be taken in order to successfully execute the design and construction of the Research Office Building and Infrastructure Modernization (RSB) project. This PPEP is the primary agreement regarding project planning and objectives between the Office of Science (SC), DOE SLAC Site Office (SSO) and SLAC National Accelerator Laboratory (SLAC). This plan covers the management and organization for this project the integrated project team, roles and responsibilities, authorities, as well as communication and approval procedures. This PPEP is a living document and will be reviewed and revised as appropriate.

1.1 Mission Need

SLAC is an Office of Science (SC) Laboratory that supports a large national and international community of scientific users performing cutting edge research in support of the Department of Energy mission. Success of that mission is directly coupled to the general purpose infrastructure necessary to conduct this research. At SLAC, accomplishment of that mission is currently at-risk given substandard buildings that do not provide the appropriate environment to conduct world class science or mission support functions.

SLAC has moved from a single program to a multi-program Laboratory; this transition, combined with the condition and age of SLAC facilities, drives the need to consolidate core research functions and modernize key support buildings. The most pressing infrastructure gaps are the lack of appropriate space to house and co-locate accelerator scientists and key mission support staff who are currently spread across the Laboratory in outdated and inefficient facilities.

To correct these deficiencies, a new building is proposed, to house the Laboratory's accelerator scientists. This new building will replace many 40 year old trailers that currently support the Laboratory's accelerator scientists. This will enable integration of the accelerator science and technology community across programmatic boundaries, allowing these scientists to better support the science missions at the Laboratory. In addition, renovation of three buildings is proposed (i.e., 003, 024, and 041). These buildings house key mission support functions, and were part of the original construction of the Laboratory in the mid 1960s. Although the basic core and shell construction are sound, their interior spaces and utility system are obsolete. Overall, the proposed project will upgrade working conditions for over 20% of the Laboratory staff in a way that supports the Laboratory vision of a unified culture with a strong sense of community between all scientific and support functions across the Laboratory.

In summary, SLAC currently lacks appropriate space to effectively support the Mission of the Laboratory and to house accelerator scientists and engineers that are spread across the Site in outdated facilities. These capability gaps need to be addressed in order to:

- Provide staff with safe, energy efficient, fully compliant spaces that support cutting edge 21st-century science.
- Provide general purpose research and institutional facilities to allow the collocation of related groups with shared interests and mission objectives.
- Collocate accelerator scientists to enable interaction among researchers and graduate students who have complementary interests that will support the accelerator based research programs at the Laboratory and optimize cross-program collaboration.
- Strengthen ties and interactions between related areas of research and support functions.

1.2 Project Objective and Goals

The desired outcome will be obtained when construction of new space, renovation of three existing buildings, and the demolition of excess facilities outlined under Project Description below are completed in accordance with the contract drawings and specifications, safety requirements and within the approved schedule and cost baseline. According to current estimates, new construction is anticipated to be in the range of 53,000 – 58,000 square feet; approximately 83,000 square feet of existing space will undergo renovation, and demolition of approximately 20,000 square feet will be completed to provide the site for the new construction.

1.3 Alternatives Considered

The following project alternatives were analyzed to ensure the proposed strategy is the most cost-effective method of meeting the identified mission need. The advantages and disadvantages for each of these four alternatives were considered and are described below.

As stated in the Mission Need document for the SLAC Research Support Building and Infrastructure Modernization Project (RSB), the following alternatives were proposed for further analysis during conceptual design.

A. **Maintaining the Status Quo (no action)** – Under this alternative, SLAC will continue to operate the current facilities.

B. **Improving Existing Structures** – Under this alternative, no new construction will be performed; instead, existing facilities will be remodeled to eliminate deferred maintenance and address compliance issues.

C. **Decommissioning and Demolishing Current Facilities and Building New Ones to Replace Them** – Under this alternative, all of the facilities currently housing these staff will be demolished and replaced with new construction.

D. **Replacing and Renovating** – This alternative will renovate existing facilities that are structurally and functionally sound, and will replace those that are not with new space.

E. **Performing This Work at Another Location** (i.e., another laboratory or a university).

Three alternatives (A, C, and, D) were selected for the Life Cycle Cost (LCC) analysis. For comparison purposes, Alternative A was carried forward in the quantitative LCC analysis even though this alternative did not address the identified capability gaps. Alternatives B and E were not analyzed due to the fact that neither alternative satisfied the fundamental gaps identified in the Mission Need Statement.

In Alternative B the research groups remain in the same widely separated structures as currently exist and in Alternative E these research groups relocate off site, which is even further away from their peers and the unique support networks that exist at SLAC. Therefore, as previous stated, these options were not carried forwarded. The alternative selected produced reductions in deferred maintenance, renewal costs and energy use. The table below identifies the savings associated with the selected alternative.

Table 1: Project Life Cycle Cost Savings

Project Life Cycle Cost Specific Cost Savings	
Reduction of Deferred Maintenance ($k)	$30,052
Reduction in Infrastructure renewal cost ($k)	$10,543
Reduction of Annual Energy use ($k)	$399
Simple Payback	5.5 years
ROI	18.1%

1.4 Project Description

SLAC National Accelerator Laboratory (SLAC) proposes the construction of a new energy efficient and environmentally sustainable research support building, the renovation of existing space and the demolition of substandard buildings at SLAC to provide progressive space for furthering the scientific programs at SLAC. The design will use efficient space planning benchmarks as the basis for determining the size and configuration of space types. The design of the new facility will also emphasize open, collaborative environments, with flexibility to respond to future mission changes. The facilities will include office spaces for researchers, small group collaboration spaces, equipment areas, restrooms, circulation space, and supporting infrastructure. These facilities will permit co-location of accelerator scientists and engineers which will promote efficiency and enhanced synergy amongst collaborators. Likewise, the renovations to the existing buildings will group like functions together, improve work spaces and provide an efficient and reliable working environment.

The objective of the proposed Research Support Building and Infrastructure Modernization project (i.e., the RSB Project) is to provide sufficient space in one new building to allow the collocation of SLAC accelerator science staff, and to renovate three existing structures to ensure they are suitable for lab-wide support groups with shared interests and mission objectives.

The scope of the project includes design, construction, and start-up of the new facility, demolition of 13 trailers that occupy the future site of the new building and renovation of existing spaces in

Linac Operations Auxiliary Building (B003), the ES&H Building (B024), and the Engineering and Administration Building (B041).

2.0 Acquisition Strategy

SLAC, under the direction, guidance and oversight of DOE SLAC Site Office (SSO), will have the primary responsibility for oversight of design and construction subcontracts, LEED®, commissioning, and estimating services necessary to execute the project scope. SLAC has extensive experience in the management and oversight of contracts of equal or greater complexity than the proposed RSB project. Various acquisition alternatives were considered for this project in relation to the schedule, size, and risk and, at this stage, the use of traditional Design-Bid-Build approach is deemed reasonable. However, SLAC will continue to assess the feasibility and logic of Design-Build approach during the preliminary phase.

Figure 1 below, graphically identifies the acquisition strategy for procurement for the service on the RSB Project.

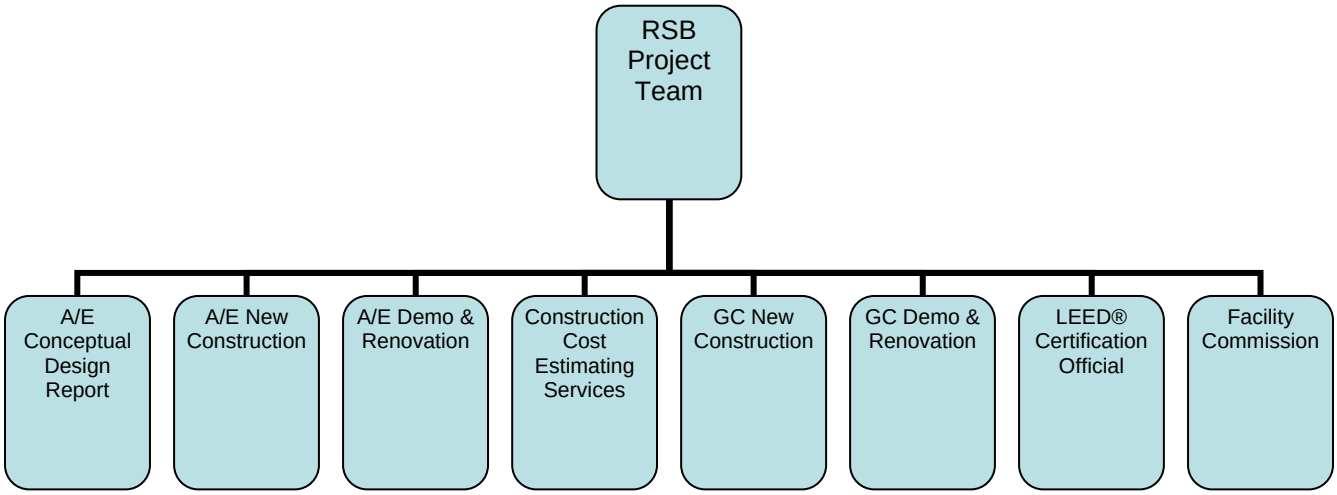

Figure 1: Acquisition Approach for Services

SLAC will oversee design performance by A/E firms. The solicitation for the A/E will be a qualifications-based selection, firm fixed-price subcontract that utilizes the design-to-cost approach. The subcontract will be inclusive of all material, bonds, equipment, labor, etc. necessary to perform the work. The contract specifications will describe required quality and performance parameters.

The A/E firms selected will be experienced in the design-to-cost approach and application of the U.S. Green Building Rating System (i.e., LEED®) in their designs. The design effort will include ~10% scope contingency provisions to mitigate the risks associated with changing market conditions and of reduced budget authority. The project anticipates hiring two firms that provide A/E services to complete the final design. One A/E firm will be hired to complete final design for the demolition of 13 trailers that occupy the future site of the new building and renovation of existing spaces in buildings 003, 024, 041. The second A/E firm will be hired to complete final

design for the new construction of the RSB. Each firm will be responsible for delivery of technical specifications and plans, and construction support for shop drawing reviews; the A/E firms will also develop preliminary cost estimates, and provide support during the construction phase of the project for their specific scope.

This approach will require additional coordination by the SLAC project team, but, separating the new construction from the demolition/renovation design, provides additional assurances that the firms selected can focus on discrete scopes of work and ensure adequate resources are available to complete the final designs within the milestones outlined herein.

3.0 Management Organizations and Responsibilities

This section presents the organizational structure and roles and responsibilities for the Research Support Building and Infrastructure Modernization (RSB) project.

3.1 Integrated Project Team

The IPT for the RSB Project consists of personnel from the DOE SLAC Site Office and the SLAC National Accelerator Laboratory. The objective of the IPT is to provide professional management and subject matter expertise to assure the safe, timely, and cost-effective project execution and completion. The Project Team Charter describes the organization, and designates members, operating principles and roles and responsibilities; a copy of the charter is included as Appendix A.

The FPD will work closely with the DOE Office of Science, Office of Security and Infrastructure Support (SC-31) Program Manager to assure that the project execution is consistent with program goals and objectives. Together they will ensure the Acquisition Executive and appropriate DOE Headquarters (DOE HQ) stakeholders are apprised of the project status. This will be accomplished through project reporting, IPT conference calls, site visits, reviews, and other formal communications. The Integrated Project Team is outlined in Figure 2.

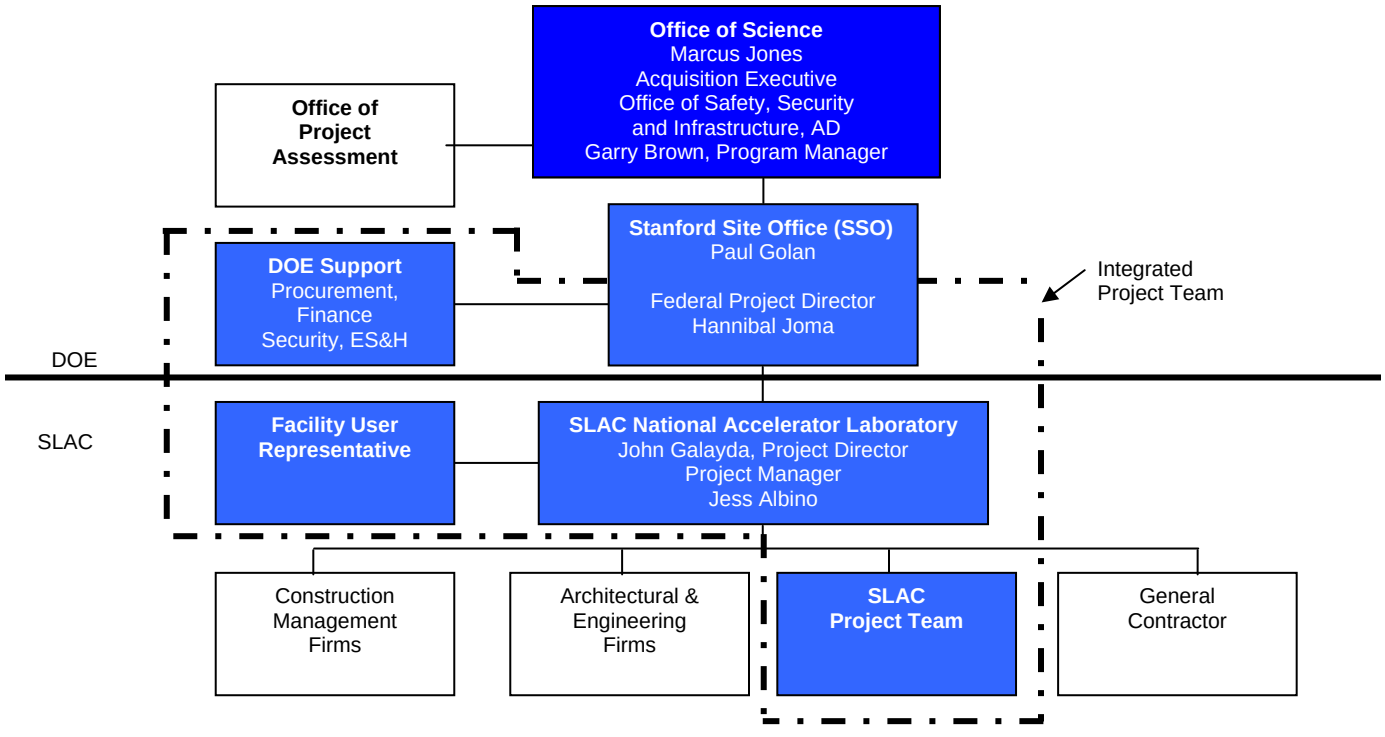

Figure 2: Organization Chart

3.2 Department of Energy Headquarters

Associate Director, Office of Safety Security and Infrastructure

The Associate Director, Office of Safety Security and Infrastructure, will serves as the Acquisition Executive. The key responsibilities of the Acquisition Executive include:

- Approve Critical Decisions and key project documentation.
- Appoint advisory boards to provide advice and recommendations on key project decisions.
- Approve the selection of the Federal Project Director (FPD).
- Approve project changes in accordance with change control levels described in the Baseline Change Control Table.

Program Manager, Office of Safety Security and Infrastructure

The Office of Safety Security and Infrastructure Program Manager reports to the Acquisition Executive as the primary interface between the FPD and the program. The Program Manager's role and responsibilities are summarized as follows:

As an IPT member, the DOE Program Manager responsibilities are as follows:

- Represents SC-31 on the IPT.
- Initiate definition of mission need based on input from Sites, Laboratories, and Program Offices.
- Oversee development of project definition, technical scope, and budget to support mission need.
- Initiate development of the Acquisition Strategy before CD-1.
- Monitor and evaluate project performance throughout the project's life cycle.
- Assist the Acquisition Executive (AE) with determinations on the Level 1 Baseline Change Requests in accordance with the PEP Change Control Process.
- Oversee the project line-management organization and ensure the line project teams have the necessary experience, expertise, and training in design engineering, safety and security analysis, construction, and testing.

3.2.1 DOE SLAC Site Office (SSO)

The DOE SLAC Site Office (SSO) provides the direct Federal oversight and reports to the Office of Science. The DOE SSO Site Manager has recommended and assigned a Federal Project Director to the RSB project in accordance to the roles and responsibilities listed in DOE Order 413.3A.

3.2.2 DOE SLAC Site Office (SSO) Federal Project Director

The Federal Project Director (FPD) establishes and leads the IPT and is the primary point of contact for communication and coordination with entities external to the IPT. The FPD is responsible, with the assistance of the IPT members, for the following tasks:

- Develop, staff, and issue the IPT charter.
- Single point of contact between federal and contractor staff.
- Plan, implement and complete the project using a systems engineering approach.
- Tailor DOE project management requirements to the project.
- Develop and implement the Acquisition Strategy and the Project Execution Plan.
- Define project objectives and technical, schedule, and cost scopes.
- Ensure timely completion and quality of required project documentation.
- Assess contractor project performance versus contract requirements.
- Proactively identify and resolve critical issues within Federal control.
- Integrate and manage the timely delivery of government reviews, approvals, property, services, and information.
- Ensure the design, construction, environmental, safety, health, and quality efforts performed are in accordance with the contract, public law, regulations, and Executive Orders.
- Evaluate and verify reported progress and report project performance in the Project Assessment and Reporting System (PARS).
- Review and make determination on level 2 Baseline Change Requests in accordance with the PEP change control process.
- Manage project contingency funds.
- Oversee the management and mitigation of project risks

3.2.3 DOE SLAC Site Office (SSO) Deputy Federal Project Director

The Deputy Federal Project Director (FPD) is the secondary point of contact for communication and coordination with entities external to the IPT. The Deputy FPD is responsible, with the assistance of the IPT members, for the following tasks:

- When so delegated, act as the single point of contact between federal and contractor staff.
- Support the development and implementation of the Acquisition Strategy and the Project Execution Plan.
- Support the project objectives and technical, schedule, and cost scopes.
- Assist the FPD to ensure timely completion and quality of required project documentation.
- In conjunction with the FPD, assess contractor project performance.

- Support the FPD and IPT by proactively identify and resolve critical issues within Federal control.
- Participate in identification and management of project risks.
- Support the integration and management of timely delivery of government reviews, approvals, property, services, and information.
- Ensure the project efforts are in accordance with the contract, public law, regulations, and Executive Orders.
- Evaluate progress for the Project Assessment and Reporting System (PARS).
- In conjunction with the FPD, review and provide feedback on changes in accordance with the PEP change control process.

3.2.4 DOE SLAC Site Office Contracting Officer

The SLAC Site Office Contracting Officer (CO) provides contract related support to the IPT to include, but not be limited to, the review of any project related subcontracts submitted for DOE approval. In general, the CO has the authority to enter into, administer, or terminate contracts and make related determinations and findings. Only the CO is authorized to modify the Statement of Work and issue written modification(s) to the contract; accept non-conforming work; waive any requirement of the contract; or modify any term or condition of the contract.

3.3 SLAC National Accelerator Laboratory

Under the prime contract between DOE and Stanford University (DE-AC02-76SF00515), the contractor, Stanford University, is responsible for ensuring implementation of the RSB project at the SLAC National Accelerator Laboratory. SLAC has appointed a Project Director who is supported by a project team that includes a Project Manager, Deputy Project Manager, Facility User Representative, Subcontracting Officer, Financial Representative, Engineer Manager, LEED Officer, Environmental Safety and Health Representative, Construction Manager, Construction Safety Officer and other SLAC support.

3.3.1 SLAC Chief Operating Officer

The SLAC Chief Operating Officer, has been delegated authority, by the SLAC Director, responsibility for general oversight of the infrastructure of the site, including but not limited to revitalization of the infrastructure, environmental remediation and restoration, seismic remediation, routine and preventive maintenance, repair, and such other infrastructure-related activities as may be necessary to ensure the continued viability and vitality of SLAC. This responsibility encompasses overseeing facility renovation project activities at the SLAC site.

3.3.2 SLAC Project Director

The Research Support Building and Infrastructure Modernization (RSB) Project will be executed by a SLAC project team that is headed by the SLAC Project Director (PD). The SLAC PD has

established a project organization to accomplish the RSB Project which includes the project manager, deputy project manger, engineering support, ES&H, Quality Assurance (QA), construction oversight and safety, procurement, project controls, and finance personnel.

The project director provides senior management oversight, direct access to SLAC National Accelerator Laboratory Associate Laboratory Directors and Laboratory Director and chairs the Baseline Change Control Board (BCCB) and approves Level 3 Baseline Change Requests (BCRs).

3.3.3 SLAC Project Manager

The Project Manager is responsible for directing the day to day project activities including design and construction. The Project Manager is responsible for overall technical, cost and schedule performance. The Project Manager is the ultimate decision maker within SLAC for the project. Specific responsibilities include:

- Day-to-day execution of project and successful completion.
- Establishment of technical and administrative controls to ensure the project is executed within approved cost, schedule, and technical scope.
- Direct oversight of design, construction and acceptance.
- Responsible and accountable for implementing ES&H on the project.
- Representation of the project in interactions with the DOE.
- Preparation and submittal of monthly and quarterly progress reports to the Federal Project Director.
- Execution of project in compliance with NEPA and other applicable ES&H rules and regulations. Integration of ES&H into the project.
- Review and Approval of Level 3 change control proposals.
- Active identification and management of risks.
- Review the proposed project construction schedule with the Project Team and coordinate the events with SLAC Divisions/Departments/Users.
- Implement and Earned Value Management System (EVMS) to track performance against the approved project baseline.
- Participate in management meetings and communicates the project status and issues.
- Work with Subcontracting Officer on selecting subcontractors and awarding contracts.
- Appoint Control Account Managers (CAM) for the project including managing bid package(s), daily technical and managerial oversight of specific assigned WBS tasks from design through construction and preparing change requests in conformance with Baseline Change Control described in Section 9.7.

3.3.4 SLAC Deputy Project Manager

The Project Manager is responsible for assisting Project Manager on the design, construction and renovation, testing and startup building systems and close out project. The responsibilities of Deputy Project Manager include, but not limited to, the following:

- Assist Project Manager to manage day-to-day execution of the project.
- Support Federal Project Director to initiate Project Charter and to develop preliminary project scope statement.
- Assist Project Manager on balancing the demand for project quality, scope, time and cost.
- Assist Project Manager on establishing clear and achievable project objectives.
- Monitor and control project works and integrate change control.
- Assist Project Manager to communicate with SLAC Management, other affected SLAC personnel for different concerns and expectation and project coordination.
- Identify and manages project risks.
- Assist Project Manager to ensure that safety, environmental, quality assurance, safeguards and security responsibilities and requirements are integrated into all phases of the project.

3.3.5 SLAC Project Engineer Manager

The Project Engineer Manager is responsible for leading the Engineering Support Team in implementing all the relevant reviews and changes during design, construction/renovation, testing and startup of the facilities. The Principal Engineer will be the technical POC between SLAC and the sub-contractors. Specific responsibilities include:

- Assist the PM with resource allocation.
- Lead design and engineering reviews.
- Lead construction progress reviews.
- Monitor and report on Budget, schedule, and earned value.
- Provide equivalent project management support in the absence of or as delegated by the Project Manager.

3.3.6 RSB User Representative

User Representative will act as the only liaison between RSB project team and future occupants of the RSB, buildings 003, 024 and 041. The User Representative will be involved with all stages of conceptual planning, design, and construction of this renovation project to ensure the program needs are addressed and that User driven “proposed” changes are effectively controlled and communicated to the project manager for consideration and determination as dictated by performance baseline and change control process established in the PEP.

3.3.7 SLAC Construction Manager

The Construction Manager plans and directs all the construction activities and is responsible for managerial oversight of subcontractors; responsibilities include:

- Monitor work progress to ensure compliance with architectural and engineering drawings and specifications.
- Function as the primary interface with all SLAC craft and ES&H personnel in coordinating utility shutdowns, permits, and activity specific Hazards Analysis.
- Assist the PM with determinations related to subcontractor's means and methods, cost-effective work planning and scheduling as well as tracking cost.
- Support contractors by addressing questions and providing relevant information and clarifications.
- Review the proposed project construction schedule with the Project Team and coordinate the events with SLAC Divisions/Departments/Users.
- Coordinate the scheduled outages for mechanical, electrical and utility tie-ins and re-energization of the utilities with SLAC Divisions/Departments/Users.

3.3.8 SLAC Budget/Schedule/Cost Control Coordinator

The Budget/Schedule/Cost Control Coordinator assists the Project Manager to establish, maintain, update, and track the project budget, finance, costs, and schedule.

3.3.9 SLAC ES&H Representative

The ES&H Representative is responsible for providing guidance and support to the Federal Project Director and the Integrated Project Team in the areas of ES&H to include, but not limited to, participation in the review of the project documentation, and oversight of contractor activities in the ES&H area (project walkthrough and assessments). The Representative as designated may send other individuals on his staff to perform the functions described depending on the particular needs of the situation.

The Project ES&H Representative is matrixed from the SLAC ES&H Division and is responsible for monitoring the project's adherence to SLAC ES&H policies. Responsibilities include:

- Assist in the write up of the Project's Hazard Analysis Report.
- Review proposed designs, procedures and practices for environment, safety and health considerations.
- Act as a liaison for this project in dealings with the SLAC ES&H Division to ensure that laboratory-wide ES&H policies are followed.
- Represent this project in ES&H reviews conducted by the DOE and/or the ES&H Division.
- Recommend to the Project Manager corrective actions for situations where ISEMS improvements are required.

3.3.10 SLAC Construction Safety Officer

The Construction Safety Officer is responsible for construction oversight, for construction subcontractor safety required document review, approval or disapproval.

3.3.11 SLAC Subcontract Officer

The Subcontracting Officer is responsible for subcontract administration and contractual support. Specific responsibilities include, but not limited to, the following:

- Solicit sources/vendors and administer subcontracts.
- Assist in source selection.
- Direct preparation of the Request for Proposals.
- Perform Price and cost analysis.
- Ensure all contractual provisions are approved and met negotiates terms, recommend award of contract and prepares necessary justification documentation.
- Prepare subcontract modification changes in scope of work, funding and schedules.
- Monitor expenditures and reviews invoices.
- Recommend resolution of disputes and subcontractor claims.
- Upon completion perform subcontractor closeout.

3.4 Architect and Engineering Firm

The Architect and Engineering (A/E) firm will prepare the preliminary and final design, and construction documentation. The A/E will also provide construction administration support including submittal reviews, RFI responses, and field change resolution.

3.5 Construction Manager Subcontractor

A fixed-price Construction Manager (CM) will perform two major tasks. Task 1 will be preconstruction CM support services during the design phase. Duties during the design phase include constructability reviews, developing independent cost and schedules, performing feasibility studies and qualification and award of construction subcontractors. In Task 2, during the construction phase, the CM Subcontractor will provide specific personnel to support oversight of the contractors for the project.

3.6 General Contractor Subcontractor

A fixed-price General Contractor (GC) will oversee the management and administration of all construction subcontracts for the project.

3.7 Deconstruct Subcontractor

The Deconstruct Subcontractor will perform the demolition work for existing Trailers within Research Support Building footprint, including utility isolation plan. The demolition plan will be developed by A/E firm.

4.0 Resource Requirements

The preliminary Total Estimated Cost (TEC) range is $80.0 to $96.0 million, with other project costs estimated at $1.4 million. The Total Project Cost (TPC) range is $81.0 – $97.4 millions. This estimate includes design; building construction; environment, safety, and health (ES&H); quality; safeguards and security; construction and project management; contract administration; commissioning and building start-up; and contingency. Adequate SLAC resources have been allocated to the RSB project which will be complemented through acquisition of specific technical services in accordance with the RSB Advance Procurement Plan. The funding profile, and its break-down for the major project elements, is provided below in Table 2. The TEC includes the Project Contingency which will be established at CD-2.

Table 2 Funding Profile (K$)

	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	Total
OPC	0.5		0.2	0.2	0.3	0.2	1.4
PED		8.9					8.9
Construction			33.1	19.7	34.3		87.1
Total TEC[1]		8.9	33.1	19.7	34.3		96.0
Total TPC	**0.5**	**8.9**	**33.3**	**19.9**	**34.6**	**0.2**	**97.4**

[1] Based on SLI Budget Adjusted for Omnibus Conference Mark, February 2009

5.0 Preliminary Baseline and Key Elements

This section presents the preliminary baseline and key elements for the Research Support Building and Infrastructure Modernization (RSB) project.

5.1 Project Scope and Key Performance Parameters

The construction areas for this project are shown below on Figure 3. The technical scope as outlined in this PPEP identifies the preliminary baseline for establishing the performance parameters. The outline technical scope of this project at the conceptual stage is:

1. Construct an new facility (RSB) in the range of 53,000 – 58,000 square feet;
2. Building 003; demolition and reconstruction of entire ~7,000 square feet;
3. Building 024; demolition and reconstruction of ~32,000 square feet;
4. Building 041; demolition and reconstruction of ~44,000 square feet (half of building); and
5. Demolition of ~20,000 square feet of trailers currently on the future RSB site.

Figure 3: Project Site

5.2 Work Breakdown Structure (WBS)

The work breakdown structure is the organizing element for the RSB project. The elements of work associated with the project are identified, tracked and reported by WBS. Table 3 shows the major elements of the project WBS.

Table 3: WBS Structure – Research Support Building

WBS Number L1	L2	L3	Title
1			**RSB Project – TEC**
1	01		Project Office
1	01	01	ES&H
1	01	02	Project Management
1	01	03	Project/Finance Support
1	01	04	Procurement Support
1	01	05	Quality Management
1	01	06	Risk Management
1	01	07	Facility user Representative
1	02		Project Engineering & Design (PED) Titles 1 & 2
1	02	01	Research Support Building – PED
1	02	02	Building 003 – PED
1	02	03	Building 024 – PED
1	02	04	Building 041 – PED
1	03		Construction
1	03	01	Research Support Building - Construction
1	03	02	Building 003 - Construction
1	03	03	Building 024 - Construction
1	03	04	Building 041 - Construction
2			**RSB Project – OPC**
2	01		Conceptual Planning
2	01	01	Project Support
2	01	02	Conceptual Design Report
2	02		Commissioning/Start-Up and Operations
2	02	01	Commissioning
2	02	02	Start-Up and Operations

Each WBS element is described in a written narrative and collected in a project WBS Dictionary. The WBS dictionary decomposes the scope of work and serves as a common reference for the project team. The WBS dictionary helps avoid work duplications or omissions. The WBS Dictionary is provided in Appendix D. Lower-level WBS elements have been defined to Level 5 and are described in a written narrative and collected in a project WBS Dictionary. The WBS dictionary clarifies original scope and serves as a common reference for the entire project team. The WBS dictionary helps avoid work duplications or omissions.

The WBS Title 1 and 2 Design scope includes all of the activities necessary to complete the preliminary and final design of the project and prepare documentation for Critical Decision phases

and external reviews. It also includes the preparation of drawings, specifications, calculations, schedules, estimates, and the final procurement package.

The WBS Construction scope includes all of the activities necessary following PED to complete all construction and demolition work. All management, labor, materials, and equipment for construction activities and management, inspection, testing, and oversight of these activities are included in the WBS.

The WBS RSB Project – Other Project Costs includes the initial conceptual planning and the conceptual design report as well commissioning, start up and testing activities necessary to turn the facilities over to operations.

The WBS RSB Project – SLAC Funding Project Costs includes the initial conceptual planning, necessary design and preparation of final procurement package, construction work for Trailer demolition outside new Research Support Building footprint to make up the one-to-one replacement. It also includes the project support for monitoring the removal of control rack in Building 003. The removal work of control rack in Building 003 is planned, prepared and executed by PPS Control Group in SLAC.

5.3 DOE O 413.3A Tailoring

Considering Project size and funding profile, certain DOE O 413.3A requirements are tailored to allow for the optimization of the project execution. The design and construction is phased such that to accommodate the RSB Migration Plan. Specifically, Critical Decision for approval of Performance Baseline (CD-2) is combined with start of construction of phase A (CD-3A) to expedite the design and construction of the RSB and renovation of B003, well in advance of the start of renovation of buildings 024 and 041 (CD-3B).

5.4 Work Authorization

In accordance with DOE Order 413.3A, the Critical Decision (CD) process formalizes the determinations at specific points in the project phase that allows the project to proceed to the next phase and to commit resources. For the RSB project, the Critical Decision points have been tailored to the specific conditions and schedule needs to allow for optimization of project execution.

This section describes the basis of each critical decision for the project and specifies the DOE authority required for approval of each decision.

- **Critical Decision 0: Approve Mission Need**

Authority: Assistant Secretary, Director, Office of Sciences (SC)
The Acquisition Executive (AE) approved the Justification of Mission Need for the project in October 2008.

- **Critical Decision 1: Approve Alternative Selection and Cost Range**

Authority: Associate Director, Office of Safety, Security and Infrastructure,(SC)

Approval will allow the project authorization to begin the project execution phase allowing Project Engineering and Design funds to be used.

- **Critical Decision 2/3A: Approve Performance Baseline and start of Construction for Phase A**

Authority: Associate Director, Office of Safety, Security and Infrastructure,(SC)
Approval of CD-2 and CD-3A will establish the Performance Baseline for all design and authorize start of construction for phase A.

- **Critical Decision 3B: Approve Start of Phase B Construction**

Authority: Associate Director, Office of Safety, Security and Infrastructure, (SC)
Approval of CD-3B will allow expenditure of funds for phase B construction.

- **Critical Decision 4: Approve Start of Operations**

Authority: Associate Director, Office of Safety, Security and Infrastructure, (SC)
Approval of CD-4 marks the project completion and beginning of normal operations of the facility.

5.5 Project Schedule and Milestones

The preliminary major project milestones are shown in Table 4. Major milestones are the DOE Critical Decisions dates and these are shown as Level l. The significant design completion, construction start, and construction completion milestones for each building are shown as Level 2. Note that these milestones are preliminary. The project schedule will be refined during preliminary design, and final milestones will be established at CD-2. Status of these milestones will be included in the monthly EVMS updates.

Table 4 : Project Management and Control Milestones

Milestone Description	Planned Schedule	Control Level
CD-0 ESAAB: Approval	OCT 20, 2008 (Actual)	L1
CD-1 ESAAB: Approval	1Q FY 2010	L1
CD-2/CD-3A ESAAB: Approval	2Q FY 2011	L1
Demo Trailers, Construction of RSB, Renovation of B003	3Q FY 2011	L2
B003 Renovation Complete	4Q FY 2011	L2
CD-3B ESAAB: Approval[1]	2Q FY 2012	L1
Start construction of B041/B024[2]	2Q FY 2013	L2
RSB Construction Complete	1Q FY 2013	L2
B024/B041 Renovation Complete	3Q FY 2014	L2
CD-4 Readiness Review	4Q FY 2014	L2
CD-4 ESSAB; Project Complete/B.O.	1Q FY 2015	L1

[1] Completes the 'design' within 18 months allowing allocation of funds in 2011 to start construction of RSB and Bldg 03.

[2] Current funding profile, and the risk registry assumption of Continuing Resolution in 2013, does not allow start of construction of B041/B024 earlier than 2Q FY 2013. A revised funding profile to optimize B041/B024 construction schedule has been proposed to SC-31.

5.6 Preliminary Cost Estimate

The current Total Estimated Cost (TEC) range is $80.0 to $96.0 million, with other project costs estimated at $1.4 million. The total estimated cost range is $81.0 – $97.4 million. The funding profile, for the major project elements, is provided in Table 5.

Table 5: Preliminary Cost Summary by WBS ($K)

WBS #	WBS Name		Contigency		TPC
		Budget	Dollars	%	
1	**Research Support Building**				
1.1	**Project Office**	**$12,796**	**$1,919**	**15%**	**$14,715**
1.2	**Project Engineering and Design (PED)**				
1.2.01	Project Engineering and Design - RSB	$4,034	$807	20%	$4,841
1.2.02	Project Engineering and Design - Building 003	$303	$61	20%	$364
1.2.03	Project Engineering and Design - Building 024	$605	$121	20%	$726
1.2.04	Project Engineering and Design - Building 041	$1,288	$258	20%	$1,546
1.2	**RSB Project Engineering and Design**	**$6,230**	**$1,246**	**20%**	**$7,476**
1.3	**Construction**				
1.3.1	Construction - RSB	$36,407	$7,281	20%	$43,688
1.3.2	Construction - Building 003	$2,800	$560	20%	$3,360
1.3.3	Construction - Building 024	$4,750	$950	20%	$5,700
1.3.4	Construction - Building 041	$17,550	$3,510	20%	$21,060
1.3	**Construction**	**$61,507**	**$12,301**	**20%**	**$73,808**
	Total Estimated Cost (TEC)	**$80,533**	**$15,467**	**19%**	**$96,000**
2	Research Support Building Project OPC				
2.1	Conceptual Planning	$900	$150	17%	$1,050
2.2	Commissioning/Startup and Operations	$300	50	17%	$350
2	**Other Project Costs (OPC)**	**$1,200**	**$200**	**17%**	**$1,400**
Total Project Costs (TPC)		**$81,733**	**$15,667**	**19%**	**$97,400**

5.6.1 Basis of Estimate

This section presents the basis for costs estimates for the design, construction and other project activities associated with the Research Support Building and Infrastructure Modernization (RSB) project.

5.6.1.1 Design

The Title 1 and 2 design phase cost estimate is based on: WBS 1.2.1, 1.2.2, 1.2.3 and 1.2.4 is based on the estimated A/E costs for Preliminary and Final design. This is based on an estimated percentage of the construction cost.

5.6.1.2 Construction

The construction estimate under WBS 1.3.1, 1.3.2, 1.3.3 and 1.3.4 is based upon the conceptual design cost estimate provided by the RMW. Their estimate has been reviewed by the SLAC project team and an independent cost estimate was completed by TBD Consultants. Research Support Building and Infrastructure Modernization

The project office (WBS 1.1) estimates are derived, as above, with an estimate of the actual percentage time anticipated that each SLAC team member will spend on this project, escalated by 4.0% per year.

Allowances have been made for consultant services such as geotechnical support, testing services, environmental support, etc.

5.6.1.3 Other Project Activities

The conceptual planning estimate (WBS 2.1) is based on similar efforts done on conceptual designs for previous projects. Commissioning (WBS 2.2.1) and Start-up and Operations costs (WBS 2.2.2) are based on similar efforts done for previous projects.

5.6.2 Escalation

This section describes how the escalation rates were determined for the construction and SLAC labor costs associated with the Research Support Building and Infrastructure Modernization (RSB) project.

5.6.2.1 Construction

Davis Langdon estimators, under RMW, developed the construction estimate for this project. An annual escalation factor of 4% was used in the calculation. The estimates were prepared for (1) Construction of the Research Support Building, (2) Renovation of Building 003, (3) Renovation of Building 024, (4) Renovation of Building 041, and (5) Demolition of existing trailers on the future RSB site. Escalation was calculated to the mid-point of construction for each of these work packages.

6.0 Environment, Safety and Health

Environment, Safety, and Health Assurance will be managed in compliance with the appropriate federal regulations and in accordance with the SLAC "Environment, Safety, and Health Manual, SLAC—I-720-70100-00". This document requires job specific information that will be developed by completing a Site Specific Safety Plan (SSSP) for each principal activity. The SSSP for each principal activity will cover all tasks by the subcontractor and sub-tier subcontractors. Subcontractors are also required to submit and receive acceptance of a Health and Safety Plan prior to starting work on site. This Plan will be in accordance with California State laws governing worker health and safety. ES&H Safety and Environmental Personnel will review and accept these documents prior to the start of the project. In addition each subcontractor and sub-tier subcontractor will fill out and submit a Safety Qualification Form (SQF). The SQF provides SLAC the subcontractors OSHA Recordable rate, their experience modification rate, and other specific environmental, safety, and health information. Appropriate site specific ES&H training will be provided to all subcontractors. Site work will be monitored by the UTR(s), Directorate Safety Coordinators, Construction Safety Coordinators, and ES&H Personnel to ensure compliance with safety and environmental regulations.

6.1 National Environmental Policy Act

All work at the Laboratory site will be performed in accordance with Federal, State, and local guidelines and standards. RSB Project will be designed, constructed, and operated in a manner to protect the safety of workers, the public, and the environment. DOE SSO has approved a Categorical Exclusion (CX) under DOE National Environmental Policy Act (NEPA).

6.2 Environmental Requirements

As required by DOE Order 430.2B, the construction of New Research Support Building and the major renovation of building 024 and 041 will achieve Leadership in Energy and Environmental Design (LEED®) "Gold" Certification. The project team intends to meet the 30% better than American Society of Heating, Refrigerating and Air-Conditioning Engineer (ASHRAE) requirement during the design process. The renovation of building 003 is not considered a major renovation; therefore, this scope will adhere to the Federal Leadership in High Performance and Sustainable Building Memorandum of Understanding.

As part of the certification, the project will include erosion and a sedimentation control plan, a construction waste management plan, and a construction Indoor Air Quality Management Plan. Waste management requirements will include recycling and waste minimization actions. The Project's environmental impact will be minimized through sensitive site development, the use of appropriate building materials, waste minimization, minimization of energy use and atmospheric impact, and water use efficiency.

The pollution prevention of the project will focus on minimizing the use of portable generators for demolition, construction lighting, welding, and tool use. Containments will be use to prevent spills during refueling of onsite equipment. Electrical spider boxes will be used throughout the project to utilize SLAC normal power to support construction site and minimize the use of portable generators. Subcontractors will be required to use environmental friendly and benign products for glues, adhesives, primers, etc. Subcontractor diesel powered vehicles (on road and off road) will be required to use bio-diesel as a percentage of the fuel.

In order to meet Federal and State regulations, Executive and DOE orders, and the requirements and goals of the Waste Minimization and Pollution Prevention Program (WM&P2) at SLAC, the project will incorporate into the acquisition strategy, design, demolition, and construction the policies contained within Chapter 22 of WM&P2. Environmentally sensitive construction practices will be followed to reduce site disturbance, minimize construction waste, and improve indoor air quality. The project efforts will focus on Reduce, Reuse, and Recycle. SLAC Purchasing and Subcontractors will make efforts to reduce the amount of material purchased, reuse existing materials where possible, and recycle materials. Recycling efforts will include individual bins for wood, metal, and other construction debris. Subcontractor documents will include instruction on what materials to separate and recycle such as paper, bottle, and can recycling bins in subcontractor site offices, field offices, Break areas. Compostable cups and towels will be required in the contract.

6.3 Integrated Safety Management System (ISMS)

Environmental, safety and health requirements are systematically integrated into management and work practices at all levels so that the SLAC work in support of the RSB project is executed while protecting the public, the worker, and the environment. The SLAC Safety Management System document and policies make it clear that the responsibility for safety and environmental protection starts with the Director. It then flows through the management chain to Associate Directors, Department Heads and Group Leaders, line supervisors, and finally to the workers. The RSB project will be executed in accordance with SLAC ES&H policies to ensure hazards are identified and mitigated, work is authorized after ES&H analysis is completed, and oversight of work is conducted by RSB project management and staff.

6.4 Preliminary Hazards Analysis Report

As part of the ISEMS efforts at SLAC the Project has performed a preliminary hazard assessment of the work associated with this project. The preliminary hazard assessment was performed in compliance with the ISMS guide, DOE G 450.4-1A, dated May 27, 1999. The work to be performed in support of the RSB project will be by subcontractor labor.

The Preliminary Hazards Analysis Report (PHAR) will serve as the basis for design safety criteria, remedial action needs, unique and routine construction ES&H requirements, and facility startup ES&H requirements. As design efforts continue, a Hazard Analysis Report (HAR) will be prepared for submittal at the CD-2 stage.

Not every ES&H hazard can be addressed through design alone; therefore, hazards must be identified, evaluated, and controlled at every operation and operational sub-task level. Job Safety Analysis (JSA) by the UTR, subcontractor supervision, subcontractor safety oversight, and crafts will be required of construction personnel and then by operational personnel once start up and normal facility operations commence. For construction Subcontractors, these task- and job-specific hazard analyses are contractual requirements. For facility operational personnel, SLAC Divisional ISM and other institutional safety requirements mandate graded levels of task and job hazard analysis.

A Preliminary Hazard Analysis Report was completed for this project. Refer to RSB Project Preliminary Hazard Analysis Report, SLAC-I-050-07050-003.

7.0 Value Management

The Project Team will follow value management principles during the design phase.

A formal Value Engineering (VE) assessment of this project will be absolutely necessary to be performed during the Preliminary Design phase. Alternative design approaches, construction techniques and materials, as well as the flexibility of the design for present and future research, will be evaluated and incorporated into the project design as appropriate. Results of the study will be documented in a formal Value Engineering Report. Value management will continue through the life of the project.

8.0 Risk Management Plan

This section presents processes in place to manage risk factors throughout the life of the Research Support Building and Infrastructure Modernization (RSB) project.

8.1 Risk Management Plan

A Risk Management Plan (RMP) and a Risk Registry have been developed for this project. The RMP details how risk will be managed throughout the life of the project. It serves as a guideline and communication tool for project management team and IPT members. The plan defines the strategy that will be used to identify and manage project related risks throughout the project's life cycle and ensure minimal impact on the project's cost and schedule. The scope of this RMP includes establishing guidelines for risk management and analysis, defining and describing the Risk Registry, describing the roles and responsibilities of project personnel in performing the risk management functions, and defining the reporting and tracking requirements for risk related information for updates to the Risk Registry. Risk Registry will be reviewed and updated monthly.

8.2 Project Risk

The scope of the RMP includes establishing the process for analyzing and managing risk as well as developing and maintaining a Risk Registry. The RMP describes the role and responsibilities of project personnel and defines reporting and tracking requirements for updates to the Risk Registry. The Project Team has identified the potential risk areas of all phases of the project, analyzed the probability and level of each risk, assigned potential costs and schedule impacts and developed a risk handling plan and approach for each credible risk. These risks were analyzed using Crystal Ball techniques to determine the summary cost and schedule impact anticipated on the project. The results are documented in the Risk Registry.

9.0 Project Implementation

SLAC procedures will be implemented during project development, design, and construction to ensure that all safety, operational, and subcontract requirements are met. Design reviews will be conducted to include consideration for reliability, maintainability, and operability to ensure the development of systems that are reliable, safe, easy to operate, and maintainable with minimal resources. The building and systems will be inspected during construction to ensure that the building is constructed accurately based on the approved drawings and specifications. In addition, an independent commissioning agent will test the operation of the building systems to ensure accurate operations based on the design.

Design reviews also will be conducted to include consideration for the space migration strategy during the life time of RSB project, the temporary medical facility during Building 41 renovation, and the temporary ES&H laboratory facilities during Building 24 renovation.

9.1 Reliability, Maintainability, Operability, and Quality Assurance

The SLAC Project Team, along with SLAC Facilities, assisted by selected consultants, will provide quality control and assurance measures during design and construction These designs will be reviewed for reliability, maintainability, and operability with the focus of these reviews will be to ensure the development and design of building systems will meet the operational criteria to be reliable, safe, easy to operate, and maintainable with minimum resources.

- Design and cost estimates will be prepared by the A/E and reviewed by the Project Team during the development of the Preliminary and Final Design's. The project team reviews for the modernization of building 003, 024 and 041 will focus on the electrical and mechanical system, along with ADA access and other associated requirements, as appropriate.
- Plans and specifications will also be reviewed by the SLAC Fire Marshal, Environment, Health and Safety (EH&S) representative, and Facilities at each stage of design development.
- A consulting geotechnical firm will provide appropriate geotechnical data and review during the design and construction phases of the RSB project.
- A consulting seismic firm will provide appropriate data and review during the design and construction phases of the all projects.

9.1.1 Engineering

The SLAC Facilities Engineering Group, ES&H team members, and Quality Assurance Manager provide quality control and assurance measures during design and construction. Design and cost estimates are prepared by the A/E and subcontractors and reviewed by the project team. Plans and specifications are reviewed and approved by the SLAC Building Inspection Officer, Fire Marshal, ES&H team members and Engineering Support team.

9.1.2 Construction

Subcontract documents will be reviewed by SLAC Engineering and Construction Management Team for compliance with design criteria. The Project Manager and the Construction Manager review and accept or reject all materials and workmanship in accordance with subcontract documents.

The Project Management and Construction Management Team (UTR) will inspect for conformance to the drawings and specifications during daily job site walks, maintain a submittal control system for materials, shop drawings, reports, and certifications assures that all necessary reviews for compliance with specifications, codes, environmental measures, and other requirements have been conducted.

The Procurement Subcontract Administrator (from the SLAC Procurement Department) will review contract documentation for compliance with subcontract provisions.

Safety Engineers (SLAC ES&H and UTR) and the Fire Marshal will make frequent periodic inspections of construction to ensure compliance with safety and fire codes and regulations.

The FS&BIO Building Inspector will perform inspections as needed to ensure compliance with building codes and construction quality.

The ES&H Environmental Department will perform inspection to verify compliance with environmental regulations, permits, and requirements.

The subcontractors will co-sign with SLAC a Site Specific Safety Plan. The plan will be reviewed and accepted by the Project Manager, UTR, subcontractor management and safety personnel, and ES&H.

9.1.3 Quality Assurance

The RSB Project Quality Implementation Procedure (QIP) SLAC-I-050-07010-000 has been planned and managed consistent with "SLAC Institutional Quality Assurance Program Plan, SLAC-I-770-0A17M-001" prepared in accordance with DOE order 414.1C, "Quality Assurance". The RSB Quality Assurance Manager has overall authority for project quality assurance related activities.

9.1.4 Inspection and Acceptance

The following items will be accomplished by the IPT members, the Fire Marshal, and the A/E, working together:

1. Preliminary inspection and list of incomplete work.
2. Final inspection walk-through and punch list.
3. Inspection of corrected and completed work (punch list).

9.1.5 Management

Project status is regularly monitored through internal reviews and meetings including:

1. Weekly meetings with Federal Project Director and IPT members.
2. Bi-weekly briefings with HQ program office (Office of Science, Basic Energy Sciences).
3. Weekly meetings with SLAC Associate Laboratory Director for Engineering and Support.

9.1.6 Subcontract Change Orders

The project manager and project engineer will review any proposed changes and act upon them in accordance with Change Control process established in this PEP. The subcontractor's bid is evaluated relative to SLAC's internal cost estimate and 3rd party independent cost estimates, and a subcontract price is negotiated. If all project and subcontract requirements are met, and the PD and subcontract administrator concur, a Change Order could be executed.

9.1.7 Final Inspection and Acceptance

The items listed below are completed together by the Project Team and the A/E:

- Equipment testing and operational instruction of SLAC facilities staff.
- Preliminary inspection and identification of incomplete work.
- Final inspection and development of punch list items.
- Walkthrough and inspection of corrected and completion of punch list items.
- Inventory and handoff of all operational manuals, instruction books and warranties.
- Internal sign-off acknowledging completion and acceptance of all work under construction subcontract by the Project Manager, Inspector, Fire Department, and EH&S Representative.

9.1.8 Commissioning

The independent Commissioning Agent will work with the A/E, General Contractor, Project Manager and SLAC Maintenance and Operations staff, to coordinate:

- Facility equipment pre-start check, start up, testing and balancing.
- Fine tune all systems for proper coordination between systems and for efficient operation under all anticipated conditions.
- Operational directions, instructions and assembly of the O&M manuals.

9.1.9 As Build Construction Document

The Project Manager and Principal Engineer will ensure the Project as-build drawings and specifications entering SLAC Document Control System.

9.1.10 Project Closeout

After CD-4, approve start of operations, SLAC finance will review and ensure that all charges and costs are in proper accounts. SLAC will send the cost closing statement to the Federal Project Director for authorization to close. The project authorization is closed by SSO and submitted to DOE Headquarters for final closeout.

9.2 Project Performance Measurement

SLAC has received the DOE certification of its Earned Value Management System (EVMS) in July 2008. The Project will implement its earned value management in accordance with the SLAC EVMS. Project performance will be tracked each month based on the updated monthly and cumulative cost, schedule, and earned value data. The project manager and project budget/cost control coordinator will prepare an activity, cost and schedule status report and submit to the Federal Project Director each month. The status report will include a variance analysis on actual versus planned expenditures. The report will identify the nature and cause of the variance, the expected impact on the project, and a recovery plan.

The schedule, which also contains a critical path network, is maintained as a project planning and measurement tool. At the end of every month, the Project Manager will provide a schedule update to the Federal Project Director which includes changes to planned activity duration, changes to planned start and completion dates, actual start and completion dates, additions and deletions of activities, logic changes, and budget changes. Any changes to the baseline are subject to a Baseline Change Control review and approval as described in Table 6 in Section 9.7.

On a quarterly basis, the project manager shall review the Estimate-At-Completion (EAC) for the project. If the current EAC does not accurately reflect the forecasted total cost for the work, the project manager will update the estimate through the project controls. EAC estimates will include any cost variances to date as well as estimates for known pending changes and mitigation of known risks.

Project status update meetings will be held monthly. A monthly status report will be sent to SLAC Management as well as SSO, Project Team Members, and the Program Manager. The overall project performance will be documented in the FPD's Quarterly Report and presented in quarterly reviews with DOE-HQ to evaluate the project performance. The monthly meetings will concentrate on project details and discuss specific project issues, problems and corrective actions, while the quarterly review includes a high-level summary of all schedule and cost data for the quarter, which will be used to evaluate current progress compared to scheduled progress. Corrective actions for any variances will be included in the report.

Technical performance will be monitored throughout the project to assure conformance to approved project requirements. Design reviews, inspections) and performance testing of completed systems will be used to ensure that the facility meets all project requirements.

Project controls include activities which support project management and cost and schedule performance management. The project controls team maintains the project management system and baseline, generates cost and schedule performance data, and interfaces with project team control account managers (CAMs) to affect a coordinated effort. Earned Value status will be reported by the FPD using PARS.

9.3 Procurement

A advance procurement plan was developed and will be tracked on a weekly. A total of 16 major procurements have been identified to date and additional procurements will be added as they are identified.

The project long lead equipment list is developed and addressed in the Conceptual Design Report. Preparing this list early will identify possible additional procurements and will assist in mitigating potential schedule risks.

9.4 Space Migration Strategy

The project space migration strategy will be based on the following key elements:

a. Balance project schedule to maximize new construction to relocate staff.

b. Analyze SLAC campus space to identify surge space for temporary offices, labs and work space.

c. Evaluate cost and benefit of providing new temporary space or leasing space at offsite facility.

The overriding criteria will be to minimize the impact on staff due to multiple relocations, provide suitable temporary work space, and continue to provide all current on-site services. The preliminary space migration schedule will be developed early on during the project preliminary design phase.

9.5 Subcontractor Schedule-of-Value Requirements

The subcontractor will submit a schedule and schedule-of-values (SOV) for approval by the Project Manager prior to the preconstruction meeting. Each month the subcontractor will update the construction schedule and provide, for approval, a Schedule-of-Values Report which directly correlates to the construction schedule. The following elements, at a minimum, will be incorporated in the report:

- On-site work activities clearly defined in specific terms and quantified using appropriate units-of-measure and outlined by the approved WBS.
- On-site work activities broken down in a logical manner by WBS and type of activity, to accurately assess scheduled progress.
- Each work activity will be assigned an earned value method in the schedule-of-values and will include weighted percentage of the total subcontract dollars with the weighted percentages for all work activities totaling 100%.
- Activities that are behind schedule per the current approved construction baseline schedule will be identified on all schedules until such time as the behind-schedule activity is current or completed.

9.6 Schedule Management

At a minimum, the project schedule will be updated monthly. The Project Controls personnel will collect activity progress data from the control account managers (CAM's). Actual start dates will be recorded for activities that started since the last update. Likewise, actual finish dates will be recorded for activities that were completed since the last update in addition to any new forecast dates. The amount of work completed will be calculated (expressed as a percentage) for activities in progress that are not complete. The updated schedule will be used to determine the Budgeted Cost of Work Performed (BCWP) as of the end of each month. The subcontractor will be responsible for initiating schedule recovery actions when required.

9.7 Estimate-at-Completion

On a monthly basis, each CAM shall review the Estimate-at-Completion (EAC) for the elements of his or her control account. If, in the judgment of the CAM, the current EAC does not accurately reflect the forecasted total cost for the work in the control account, the CAM will update the estimate and submit it to Project Controls. CAMs will include in the EAC any cost variances to date as well as estimates for known pending changes and mitigation of known risks.

9.8 Reporting

Monthly Project Progress Status Report - A monthly report will be prepared by SLAC for submittal to the FPD. Monthly reports begin on the first of the month after project authorization and will continue until the first draft of the project close out report is issued. The following items shall be addressed in the Monthly Status Report:

- Major accomplishments
- Developments affecting cost and schedule
- Brief assessment of overall project
- ES&H status

- Work performance
- Project schedule
- Project costs and contingency
- Project Baseline changes
- Variance discussion

Additionally, at a minimum the following reporting will be completed by the Project Team:

Quarterly Project Report – The quarterly reports are prepared by the Federal Project Director with SLAC input. The reports summarize the three previous months' project status. Information provided follows the program office specific guidance.

Project Assessment and Reporting System (PARS) – The Federal Project Director will ensure project status is updated monthly in the DOE PARS database.

Project Close Out Report - After the project is completed, the RSB Project Manager will provide a Project Closeout Report detailing the final scope and punch list, approved changes, total cost of the project, and lessons learned.

9.9 Baseline Change Control

The project baselines and control thresholds are defined in a hierarchical manner that provides change approval authority at the appropriate management level. The highest level of baseline change control authority is defined as Level 0. The baseline change control process will be governed by the thresholds listed in Table 6.

A change control log will be maintained by the Project Budget Cost Control Coordinator.

Change requests will be processed based on approval thresholds identified in Table 6.

Table 6: RSB Building Renovation Project Change Control Approval Thresholds++

	DOE-Acquisition Executive (Level 1)	DOE-Federal Project Director (Level 2)	SLAC Project Manager (Level 3)
Technical Scope	Any change affecting the overall project scope potentially impacting RSB Operation	Any change to scope as described in section 5.0 of this document.	Any change to scope at WBS Level 4 and below.
Schedule	3-month or more delay of a Level 1 milestone date **	Any schedule change for a Level 1 or >1 month change for a Level 2 Milestone as defined in section 5.5 of this document.	Any schedule change at or below Level 3 milestones.
Cost	Any increase to the TPC	The smaller cumulative cost increase of WBS Level 2 by 10% or allocation >$500K.	Cumulative cost increase of < $500K.

++Changes must be approved at all applicable lower levels before being forwarded to the next higher level for consideration.

***If there is any proposed change to the CD-4 the A/E will be promptly notified.*

9.9.1 Baseline Change Control Board (BCCB)

A Baseline Change Control Board (BCCB) consisting of members of the Integrated Project Team will be established. The board will be convened at the discretion of the Federal Project Direct and SLAC Project Manager to review and make determination on proposed changes in accordance with the change control levels specified in Table 6.

9.10 Contingency

This section presents processes in place to manage cost and schedule contingency for the Research Support Building and Infrastructure Modernization (RSB) project. The Contingency (cost, schedule, and scope) will be controlled and managed at the Project level by the DOE FPD and the SLAC Project Manager based on the Change Control thresholds established Table 6.

9.10.1 Cost Contingency

Contingency for the project is developed by engineering expert assessment at WBS level 4 for major work elements. The "Crystal Ball" software package was used to provide Monte Carlo analysis against the risks identified in the project's revised Risk Registry. Optimistic, Pessimistic, and Most Likely dollar cost values were used for Risk Items of Severity Level two (2) or greater as defined in the RSB Risk Management Plan. Monte Carlo Simulation was run with 100,000 trials using the values from the revised risk registry. The software determined with an 80% confidence that risk will fall below the expert calculated contingency.

9.10.2 Schedule Contingency

Schedule contingency will be integrated into the project master schedule. Once the baseline is established, the schedule contingency will be controlled and utilized in accordance with the approval thresholds specified in Table 6.

The RSB project schedule contingency was established using the following methodology: A task based, bottoms-up schedule contingency assessment yielded a recommendation of 1 month for each year of construction for project schedule contingency. This task based contingency assessment was evaluated against a risk based crystal ball Monte Carlo analysis which will forecast a time period of critical path project schedule contingency at an 80% confidence level.

9.10.3 Scope Contingency

Project scope contingency will be identified for each building (RSB, B003, B024, B041). In general, each building will include scope-reduction items that represent roughly 10% of the estimated construction cost. In addition, each building may include items that can be added to the scope should the construction bids represent favorable results.

9.11 Configuration Management

Documents defining the configuration of the project baseline will be maintained through a formal baseline change control process, as described in the Configuration Management Plan for the project and will consist, at a minimum of the following:

- Project Data Sheet
- Critical Decision Record Documents
- Project Execution Plan
- Systems Requirements Document
- Approved Baseline Changes (through the BCP process)
- Hazard Analysis Report
- Transition to Operations Plan

9.12 System Engineering

The building systems will be reviewed as a whole and interaction between various systems will be reviewed to validate the most efficient holistic solution. This systems approach was employed in the conceptual design and will be incorporated throughout the preliminary and final designs by the entire SLAC design team.

The design team also will review the existing utility conflicts created by RSB Project and coordinate with SLAC Divisions/Departments/Users to develop proper resolution during preliminary design phase of the project.

9.13 Safeguards and Security

Safeguards and Securities requirements are coordinated with SLAC Security and addressed in the Preliminary Securities Vulnerability Assessment Document SLAC-I-050-07050-002. Access requirements and procedures are written into project contract documents and will be followed by all project contractors accessing the site. SLAC is not a classified DOE facility; therefore, no Q or L clearances will be required. The contractor will be required to fence the project site for safety as well as security considerations.

10.0 Transition to Operations

This section outlines tasks associated with transitioning to operations and final project closeout activities for the Research Support Building and Infrastructure Modernization (RSB) project.

10.1 Final Inspection and Acceptance

The SLAC project team and the FPD shall complete the following building readiness assessment at the completion of the project:

- Equipment, systems and facility checkouts
- Preliminary inspection and list of incomplete work
- Inspection walk-through and punch-list
- Inspection of corrective activities and completion of punch-list work
- Inventory of operations manuals, instructions, and guarantees
- Internal sign-off sheet; Acknowledgment of completion and acceptance of work under subcontract by the Inspector, Project Manager, Fire Marshal, ES&H, and ALD for Engineering
- Complete and approve the Final Safety Analysis

10.2 Construction Complete

Construction completion will be defined as beneficial occupancy of the work done under the construction subcontract. Beneficial occupancy is documented by the Project Manager when the progress of the work allows release for use or occupancy.

10.3 Commissioning

A commissioning plan to test and evaluate system performance both individually and collectively as compared to approved design criteria will be prepared during the design period. Functional performance tests will be established and all designated systems will be tested against the performance criteria. Systems will be adjusted for optimal performance under anticipated load conditions from the initial complement of equipment. Results will be recorded, and corrective actions initiated when required.

10.4 Occupancy and Start of Operations

Beneficial occupancy may occur prior to the completion of all of the commissioning and punch list items but all building life safety systems must be operational prior to any occupancy. A readiness assessment will be completed when the construction is complete, prior to occupancy. Training of

the facility operations staff on the use of all building equipment and systems will be performed as the equipment and systems become operational.

At the point of beneficial occupancy the responsibility for the operation and safety of the facility will transfer to the SLAC Facilities Management.

The building occupants, not this project, will be responsible for relocating all personnel and program equipment into the newly constructed and renovated facilities and for their transition to operations costs.

10.5 Lessons Learned

Throughout the project, instances of right and wrong approaches will be documented as lessons learned. At the conclusion of the project, the project manager and FPD will analyze these lessons learned and review them with the IPT. The results of this review will be distributed through the SLAC and DOE Lessons-Learned System. The Lessons Learned Assessment is anticipated to be grouped into the following Topics.

- Scope
- Cost
- Schedule
- ES&H
- Procurement
- Construction
- Management

APPENDICES

Appendix A: Integrated Project Team (IPT) Charter

Appendix B: Categorical Exclusion under DOE NEPA

Categorical Exclusion under DOE NEPA Regulations:

Proposal Fiscal Year 2009

Research Support Building and Infrastructure Modernization at the SLAC Stanford Accelerator Laboratory

Appendix C: Organization Chart

Appendix D: WBS Dictionary