Thomas Jefferson National Accelerator Facility

PRELIMINARY PROJECT EXECUTION PLAN

Utilities Infrastructure Modernization

Revision 0
29 July 2010 - Draft

Page Intentionally Left Blank

APPROVALS

Submitted By:

Richard Korynta, Federal Project Director DOE TJSO	Date
Rusty Sprouse, Acting Project Manager JLab Facilities Management and Logistics Division	Date
Rusty Sprouse, Project Director, JLab Facilities Management and Logistics Division	Date
Scott J. Mallette, Acting Site Manager DOE TJSO	Date

Concurrence:

Gordon Fox, Program Manager, Office of Safety, Security and Infrastructure	Date
Daniel R. Lehman, Director Office of Project Assessment	Date

Approved By:

Marcus E. Jones, Associate Director Office of Safety, Security and Infrastructure	Date

TABLE OF CONTENTS

Change Log i

List of Acronyms ii

1. INTRODUCTION 1

1.1. Mission Need 1

1.2. Project Description 3

1.3. Project Objectives and Goals 4

1.4. Alternatives Considered 4

2. ACQUISITION STRATEGY 4

3. PROJECT TEAM AND ROLES AND RESPONSIBILITIES 6

3.1. Integrated Project Team 6

3.2. Department of Energy 7

3.3. Thomas Jefferson National Accelerator Facility 8

3.4. A-E Firm 10

3.5. GC Subcontractor 10

3.6. Tailoring Plan 10

4. RESOURCE REQUIREMENTS 11

5. PERFORMANCE BASELINE AND KEY ELEMENTS 11

5.1. Scope Baseline and Key Performance Parameters 11

5.1.1. Work Breakdown Structure 14

5.2. Project Schedule and Milestones 15

5.3. Cost Baseline 16

5.3.1. Basis of Estimate 16

6. Integrated Safety Management (ISM) 16

6.1. Hazards Analysis 17

6.2. Subcontractor Contracting and Oversight 17

6.3. Environmental Requirements 17

6.4. TJSO ES&H Oversight 18

7. Value Engineering 18

8. Risk Management 18

9. Quality Assurance 19

10. Project Controls Systems and Reporting 19
10.1. Project Performance Measurement 19
10.2. Baseline Change Control Process (BCCP) 20
10.3. Configuration Management 20
10.4. Systems Engineering 21
10.5. Safeguards and Security 22
11. Transition to Operations 22
11.1. Final Inspection and Acceptance 22
11.2. Commissioning 22
11.3. Use and Start of Operations 22
11.4. Lessons Learned 23

TABLE OF FIGURES

Figure 1 - Organization Chart **7**
Figure 2 - UIM Project Site Layout **13**
Figure 3 - Project WBS **14**

TABLE OF TABLES

Table 1 - Funding Profile ($K) **11**
Table 2 - Key Milestones **15**
Table 3 - Cost Estimate ($K) **16**
Table 4 - Baseline Change Control Thresholds **21**

TABLE OF APPENDICES

Appendix A - IPT Charter **24**

Change Log

Rev. No.	Date	Change Description	Pages Modified
0		New Issue	NA

List of Acronyms

Acronyms and Abbreviations

A-E	Architect-Engineer
APS	Advanced Photon Source
BCCB	Baseline Change Control Board
BCP	Baseline Change Proposal
CD	Critical Decision
CDR	Conceptual Design Report
CFR	Code of Federal Regulations
CHL	Central Helium Liquefier
CTF	Cryogenic Test Facility
DOE	Department of Energy
DOE HQ	Department of Energy Headquarters
EA	Environmental Assessment
EIC	Electron Ion Collider
EMS	Environmental Management System
ERLs	Energy Recovery Linacs
ES&H	Environment, Safety & Health
EVMS	Earned Value Management System
FPD	Federal Project Director
FRIB	Facility for Rare Isotope Beams
FY	Fiscal Year
GC	General Contractor
Gsf	gross square feet
HA	Hazards Analysis
ILC	International Linier Collider
IPR	Independent Project Review
IPT	Integrated Project Team
ISM	Integrated Safety Management
KPPs	Key Performance Parameters
JLab	Thomas Jefferson National Accelerator Facility
LEED	Leadership in Energy and Environmental Design
M&O	Management and Operating
NEPA	National Environmental Policy Act
OSHA	Occupational Safety and Health Act
PARS	Project Assessment and Reporting System
PED	Preliminary Engineering and Design

PEP	Project Execution Plan
PPEP	Preliminary Project Execution Plan
PD	Project Director
PM	Project Manager
QA	Quality Assurance
RMP	Risk Management Plan
SC	Office of Science
SNS	Spallation Neutron Source
SRF	Superconducting Radiofrequency
TEC	Total Estimated Costs
TJNAF	Thomas Jefferson National Accelerator Facility
TPC	Total Project Costs
UIM	Utilities Infrastructure Modernization
VA	Virginia
WBS	Work Breakdown Structure

1. INTRODUCTION

This Utilities Infrastructure Modernization (UIM) Preliminary Project Execution Plan (PPEP) summarizes critical information and processes necessary to manage the project. The PPEP is the primary agreement regarding project planning and objectives between the Department of Energy (DOE), Office of Science (SC), Thomas Jefferson Site Office (TJSO), and the Thomas Jefferson National Accelerator Facility (TJNAF or JLab).

The SC Associate Director for the Office of Safety, Security, and Infrastructure has been delegated Acquisition Executive authority for this project. The PPEP will be approved by the Acquisition Executive as an element of Critical Decision (CD)-1. At CD-2 the Project Execution Plan (PEP) will be approved. The PEP is a living document that will be reviewed and revised periodically until the project is complete.

The UIM project received CD-0,"Approve Mission Need" on September 18, 2009. This PPEP shows the request for CD-1 "Approve Alternative Selection & Cost Range", scheduled in the fourth quarter of FY 2010.

1.1. Mission Need

Thomas Jefferson National Accelerator Facility (TJNAF) is a Department of Energy (DOE), Office of Science (SC) Laboratory that supports a growing national and international community of scientific users conducting forefront science, applying core competencies to advance science and national goals, producing annually one third of our nation's nuclear physics PhDs, and enhancing math and science education for our community in support of the DOE mission. TJNAF has a central and unique role in the field of nuclear physics, both in the U.S. and worldwide. TJNAF's present and future program relies on maintaining its role as the world leader in hadronic physics and superconducting accelerator technologies.

The TJNAF cryogenic, power distribution, cooling water, and communication systems are experiencing failure at increasing frequencies and have insufficient capacity to meet current and forecasted need. This project is needed to address performance gaps in respect to providing a work environment that meets safety goals, current code standards and operational efficiency goals.

The current utility system gaps at TJNAF jeopardize its capability to provide the unique competencies to deliver its mission, to perform a complementary role within the DOE laboratory system, and to attain the vision for scientific excellence and pre-eminence in the structure of nuclear building blocks, the underlying quark-gluon structure of the nucleus; and symmetry tests including the weak charge of the proton to test predictions of the Standard Model. In

addition, these gaps jeopardize TJNAF's capability to contribute to enabling technologies and emerging fields in photon science and electron-light ion colliders including advance radiofrequency superconductivity, 2K cryogenic engineering technology, photon science, advanced high power free electron lasers, energy recovering linacs (ERLs), and electron-light ion collisions at ultra-high luminosity. These enabling technologies also support the ongoing research programs and projects at TJNAF including 6 GeV, 12 GeV, and the Free Electron Laser as well as other DOE national and international projects including SNS, FRIB, EIC, APS, and ILC.

The TJNAF cryogenic, power distribution, cooling water, and communication systems are 20 to 40 years old. The cryogenic system has insufficient capacity and despite gains over the past several years on significantly improving the efficiency of major system components, there remains a need for overall system efficiency optimization. Currently the cryogenic capacity is inadequate to support the needs in the Test Lab which is the key facility for Superconducting Radiofrequency (SRF) development and production activities. The lack of adequate cryogenic capacity is a limiting factor on scheduling SRF activities. Cryogenic system operation at TJNAF accounts for over 90% of annual electricity costs. Therefore efficiency gains in this system will significantly contribute to a reduction in overall operating costs. Electricity energy savings from an upgrade to the Cryogenic Test Facility (CTF), a key component in the cryogenic system, are estimated to be 36%.

The capacity of the power distribution system is currently taxed to its limit and will not support future projected needs. The power distribution system does not have the necessary redundancy to maintain operation of critical systems during partial power outages. The most critical element of this gap is the inability to restart the Central Helium Liquefier (CHL) from the alternate power feed when the primary feed has an outage. The CHL is the largest component in the site cryogenic system and critical to maintaining constant cryogenic temperatures in the accelerator cryomodules necessary to prevent degradation of accelerator performance and costly repairs. Electric feeders are at the end of their service life and are near failing. Insulation cracks have been observed on multiple feeders. Recent interruption to accelerator operation due to failed components of the electrical supply heightens this concern.

The cooling water distribution system is suffering frequent failures and has insufficient capacity to support optimal experimental program scheduling, computer center heat loads, and future expected growth. Over the past year, failure of the cooling water distribution system has caused several weeks of down time for the Free Electron Laser facility. Cooling towers are well past their efficient life cycle utilization and are requiring ever increasing amounts of maintenance. In addition, there is an estimated energy savings from addressing

this gap of 10%. The computer center cooling and uninterruptable power supply capacity is insufficient to meet the Lab's growing computing requirements.

Subsurface communications systems are outdated and unreliable. Because some of these systems are over 40 years old, replacement components are often unavailable. Phone switch parts are difficult to locate and no additional cabling capacity is available for telecommunications or data lines. Inadequate capacity is impacting the ability to install communications to support staff growth and replace degraded cables as necessary. This equipment has reached the end of its life cycle. Consequently, instances of phone outages are impacting the efficiency of operations. The underground copper wiring is also past its service life. In addition, installation of an Emergency Broadcast System is necessary to meet safety goals and improve efficiency of response.

These capabilities are essential to operation of TJNAF. Universities have historically come to TJNAF for support because of the unique SRF production capabilities at the Laboratory. Similarly commercial availability for SRF is limited because of the intermittent nature and relatively small quantities of SRF components that are needed nationally. When possible, commercial production capability is used.

1.2. Project Description

The Utilities Infrastructure Modernization (UIM) Project will upgrade the electrical distribution, process cooling, cryogenics, and communications systems at the TJNAF thereby replacing aging infrastructure and providing needed addition capability. The design will emphasize energy efficiency and flexibility to respond to future mission changes.

The scope of the project includes design and construction of:

Accelerator site primary and secondary electrical distribution feeders;

Increased capacity for the electrical transfer feeder between the two on site utility substations;

8-12 cooling tower cell replacements (consolidating as practical);

Additional process cooling and an uninterruptable power supply for the computer center;

The CTF Building expansion and additional cryogenics equipment[1]; and

[1] The space increase from the project will be offset by banked space acquired via a waiver approved by OECM in April, 2010.

An expandable pathway for a fiber ring around the campus to eliminate single points of failure for the core ring.

1.3. Project Objectives and Goals

The project's objective is to replace and upgrade utility infrastructure that supports the scientific program at TJNAF**.** To accomplish this objective, the Utilities Infrastructure Modernization Project has established the following overall goals:

- Replace aging accelerator site electrical distribution system feeders.
- Replace aging cooling towers supporting the accelerator and experimental halls.
- Construct an addition to the Cryogenics Test Facility and upgrade the cryogenics system.
- Upgrade the fiber ring around the campus to eliminate single points of failure for the core ring.
- Plan and design the new facilities to maximize research efficiencies and optimize space usage.
- Emphasize energy efficiency and flexibility in the design to respond to future mission changes.
- Ensure that environmental, safety & health (ES&H), and security requirements are fully incorporated and properly implemented into the project's design and construction.
- Minimize any negative impact to ongoing research operations.
- Implement the Utilities Infrastructure Modernization Project within the baseline cost and schedule.

1.4. Alternatives Considered

A modernized laboratory infrastructure is needed to support the growth and continued operations at TJNAF. Two alternatives are available for obtaining the required infrastructure improvements: 1) expand the CTF & modernize site utilities; or 2) construct a new CTF and provide more limited utilities modernization. For the basis of this analysis the "do nothing" approach (Alternative #3) was not considered viable because of safety concerns and because it would have serious impacts on the ability of the Lab to fulfill its mission. Although the second alternative would provide the improvements needed, it is not the most life cycle cost effective approach.

2. ACQUISITION STRATEGY

The TJNAF Management and Operating (M&O) Contractor, Jefferson Science Associates, LLC (JSA), under the direction, guidance, and oversight of DOE TJNAF Site Office (TJSO), will manage and administer a Fixed-Price Architectural-Engineering (A-

E) Design subcontract, Fixed-Price General Contractor (GC) subcontracts, and any other service-type subcontracts required in the execution of this project. This approach helps to mitigate the major risk of receiving construction bids that are much higher than the construction estimate. Incentives will be included for construction safety performance for the GC and the subcontractors. Project performance metrics for the M&O contractor are included in the annual performance evaluation and measurement plan.

The Integrated Project Team is recommending the use of a Design-Bid-Build approach, with all design completed by one Architect-Engineering (A-E) firm. The A-E subcontract will include a design to cost clause to help mitigate the possibility of high construction bids. Construction work will be performed by multiple GC firms.

The electrical distribution feeder replacement work will need to be accomplished during an accelerator down. Although not mandatory it is also more cost effective to replace the cooling towers during an accelerator down. Separate specialty GC contracts are planned for these work items as well as for the planned communications work. All contracts will be managed by JSA (the TJNAF M&O contractor).

JSA's standard procurement practice is to use firm fixed-price purchase orders and subcontracts for supplies, equipment and services, and to make awards through competitive solicitations. All of the procurements under this project will follow that practice. Drawings and commercial specifications will be sufficiently detailed to allow prospective small business design and construction firms to effectively participate in UIM procurements. This practice was employed during the design and construction of multiple TJNAF construction projects and has proven to be very effective for TJNAF as well as small business vendors.

It is the intent of JSA to prequalify all bidders. Contracts will be awarded on the basis of best value. An evaluation plan will include a technical review of each proposal as well as a review of business and cost factors (e.g., past performance, management, and environment, health and safety factors). All contractors will be ranked against one-another, with the top three being selected for interview. The selection will be made after ranking these top candidates.

A need for special contractual provisions is not anticipated. The procurement strategy will utilize multiple procurements to maximize discounts, enhance standardization, and reduce idle time. Technical, schedule and cost controls will be enforced by the project team.

Separate solicitations will be sought for an Architect -Engineering design subcontractor and for General Contractor subcontractors. This acquisition approach is recommended because the pace of construction on this project will be constrained by the funding profile. It reduces the amount of risk that a single general sub-contractor would experience due to that constraint.

3. PROJECT TEAM AND ROLES AND RESPONSIBILITIES

This section presents the organizational structure and roles and responsibilities for project participants of the UIM Project.

3.1. Integrated Project Team

The Integrated Project Team (IPT) for the UIM project consists of personnel from the TJSO and from TJNAF. The objective of the IPT is to provide professional management and subject matter expertise to assure the safe, timely, and cost-effective completion of the project. The IPT supports the Federal Project Director (FPD) during DOE oversight and review. The Integrated 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 program manager for the Office of Safety, Security and Infrastructure, to assure that the project execution is consistent with program goals and objectives and to ensure the Acquisition Executive and appropriate DOE Headquarters (DOE HQ) personnel are apprised of the project status. This will be accomplished through routine conference calls, site visits, reviews, and other formal and informal communications.

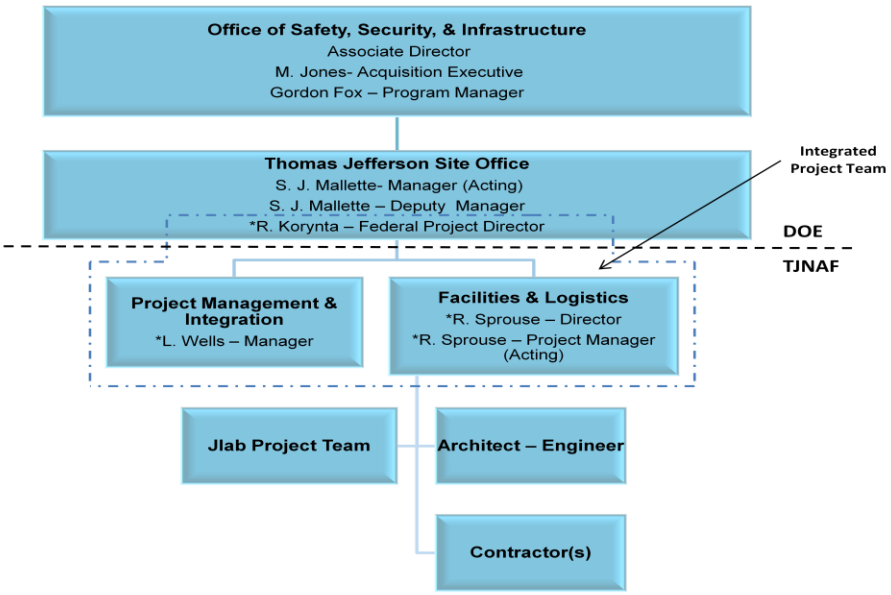

Figure 1 - Organization Chart

3.2. Department of Energy

Associate Director, Office of Safety, Security and Infrastructure

The Associate Director, Office of Safety, Security and Infrastructure, will serve as the Acquisition Executive.

Office of Safety, Security and Infrastructure Program Manager

The DOE/SC Program Manager reports to the Acquisition Executive. The Program Manager serves as the primary interface between the FPD and the program. The Program Manager's role and responsibilities are summarized as follows:

- Communicates direction from the Acquisition Executive to the FPD.
- Oversees development of project definition, scope, and budget.
- Defines mission requirements and objectives.
- Prepares, defends, and provides the project budget with support from the field and SC Headquarters organizations.
- Reviews and provides recommendations to the Acquisition Executive on Level-0 and Level-1 baseline changes.
- Functions as the primary point-of-contact at DOE HQ for project matters to all parties external to the project team and SC.

- Develops project performance measures, and monitors and evaluates project performance throughout the life cycle of the project.
- Organizes reviews as necessary.
- Ensures that ES&H requirements are implemented by the project.
- Coordinates with other SC offices and the DOE Office of Engineering and Construction Management as needed to execute the project.

DOE TJSO – FPD

The TJNAF Site Office (TJSO) reports to SC and administers the M&O contract with JSA, which includes day-to-day oversight of JLab. The execution of the Utilities Infrastructure Modernization Project is the responsibility of the FPD. The FPD's responsibilities and authorities include the following.

- 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).
- Approve changes in accordance with the PEP change control process.
- Manage project contingency funds.

3.3. Thomas Jefferson National Accelerator Facility

The project director will be supported by a project team that includes a Project Manager, Facility User Representative, Procurement, Environmental Safety and Health Representative, Construction Field Representative and other JLab support.

JLab Project Director (JLab PD or PD)

The UIM Project will be executed by a JLab project team that is headed by the PD. The JLab PD has established a project organization to accomplish the Technology and Engineering Development Project which includes the project manager, engineering support, ES&H, Quality Assurance (QA), construction oversight and safety, procurement, project controls, and finance personnel.

The project director provides senior management oversight, chairs the Baseline Change Control Board (BCCB) and approves Level 3 Baseline Change Proposals (BCPs).

JLab Project Manager (JLab PM or PM)

The project manager is responsible for the design, construction, testing and turnover to operations of the completed systems/facilities and provides support to the JLab PD. Specific responsibilities of the PM include:

- Manages day-to-day execution of the project at JLab.
- Establishes technical and administrative controls to ensure the project is executed within approved cost, schedule, and technical scope.
- Implements an Earned Value Management System (EVMS) to track performance against the approved project baseline.
- Ensures that project activities are conducted in a safe and environmentally sound manner.
- Ensures ES&H responsibilities and requirements are integrated into the project.
- Participates in management meetings and communicates the project status and issues.
- Identifies and manages project risks.
- Prepares and provides recommendations for baseline change control proposals.
- Leads the JLab project engineering team.

Procurement

A representative from Procurement provides subcontract administration and contractual support. The representative will:

- Solicit sources and administer subcontracts.
- Assist in source selection.
- Direct preparation of the Request for Proposal.
- Perform price and cost analysis.
- Ensure all contractual provisions are approved and met.

- Negotiate terms, recommends 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 subcontract closeout.

Safety and Health

A Safety and Health team member will:

- Review the design and participate in the oversight of construction activities.
- Provide advice and support to the PM and CM on continuous improvement of safety throughout the project.
- Approve the construction subcontractor hazard assessment and safety plans.

Project Engineering Team

The project engineering team, made up of JLab Facilities Management and Logistics (FM&L) engineers as well as members from cryogenics and information technology groups will provide technical and engineering support and review of the design, construction, testing and startup of the facility.

3.4. A-E Firm

An A-E firm will prepare the preliminary and final design, and the construction documentation (i.e., technical Request for Proposal). The A-E will also provide construction support including submittal review, and field change resolution.

3.5. GC Subcontractor

The fixed-price GC subcontractor(s) will perform all general field construction related to the project. The GC(s) shall provide all labor, material, and equipment necessary to construct the new facilities, complete all renovations and associated site work in accordance with the final approved construction documents; demonstrate the proper operation of all equipment, and restore any disturbed areas. Equipment will also be procured via fixed price subcontracts.

3.6. Tailoring Plan

Tailoring requirements have been determined to effectively manage the acquisition and all other project processes commensurate with the risk,

complexity, safety, cost, and schedule factors of this project and consistent with the DOE 413.3A. Tailoring activities include:

- The conceptual design was developed by the A-E and the design was reviewed by the JLab project team and Fermi Lab for CD-1.
- The design reviews for CD-2 and CD-3 will be performed by an independent review team.
- There will be a single CD-3 with authority to award construction provided in phases once bids are received.

4. RESOURCE REQUIREMENTS

The Total Project Costs (TPC) range of this project is $25M – $29.9M, and the Total Estimated Cost (TEC) range is $24.3M - $29.2M. The project schedule and milestone dates are based on receiving project funds as described in the funding profile shown in Table 1.

FY	2010	2011	2012	2013	**TOTAL**
PED		3,100			**3,100**
Construction		4,728	7,700	13,672	**26,100**
TEC		7,828	7,700	13,672	**29,200**
OPC	700				**700**
Total Project Cost	700	7,828	7,700	13,672	**29,900**

Table 1 - Funding Profile ($K)

5. PERFORMANCE BASELINE AND KEY ELEMENTS

5.1. Scope Baseline and Key Performance Parameters

The structures and facilities will occupy sites that are currently developed or which have previously been identified for development. The footprint of all structures and facilities are individually small. The work areas of the project are depicted in Figure 2. The work outlined in the Conceptual Design Report (CDR), dated July 2010 forms the preliminary baseline for establishing the performance parameters.

The scope of the project includes design and construction of the replacement of existing utilities including the addition of 1,000-7,000 gsf of new facilities. Table 2 shows the Threshold and Objective values for new construction. The difference between the objective and threshold values are scope alternates. All items identified as scope alternate items will be designed and included in the construction bid packages as add alternate items. The project will maintain scope alternates equivalent to 10% of the baseline budget for risk mitigation. Based on the available budget contingency, the project will decide which, if any scope alternate items will be executed within the project baseline.

Element	Threshold Value (Minimum)	Objective Value (Maximum value)
Electrical Distribution System	Replace accelerator primary and secondary feeders with copper	Threshold value plus Increase size of the tie line between substations
Process Cooling	Replace existing cooling towers at North and South Access plus Central Helium Liquefier Buildings Construct a 2,500 SF addition to the TEDF chiller plant building and a 800 ton chiller for the computer center	Threshold value plus • Replace the ESR cooling tower • Replace Building 92 cooling tower • Add a 1 MW UPS system for the computer center
Cryogenics Test Facility	1,000 SF addition	2,500 SF addition Upgrade cryogenic piping and support systems
Communications System Upgrade	Create an expandable pathway for a fiber ring around the campus to eliminate single points of failure for this core ring.	Threshold value plus • Establish redundant network path for major facilities. • Establish two demarcation communication utility facilities from off-site (2,000 SF)

Table 2 – Threshold and Objective Values

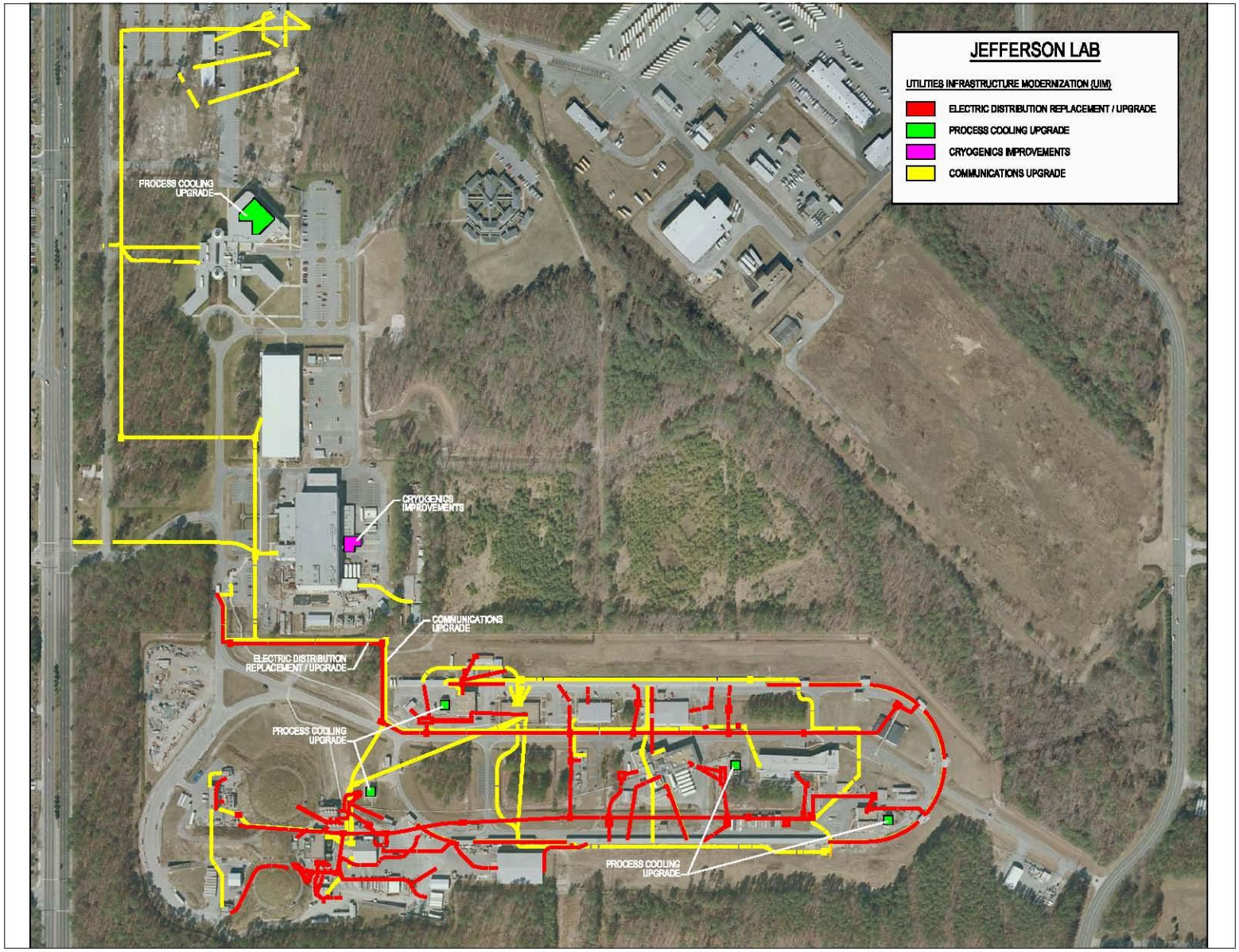

Figure 2 - UIM Project Site Layout

5.1.1. Work Breakdown Structure

The project work has been organized into a Work Breakdown Structure (WBS) for purposes of planning, managing, and reporting project activities. Figure (3) represents the planned WBS for the Utilities Infrastructure Modernization project. Lower levels of the WBS will be developed during the preliminary design phase. The WBS reflects all scope defined in the project baseline and represents a family tree relationship of all work necessary to project accomplishment. The WBS provides a common framework to define and integrate project scope, schedule and cost.

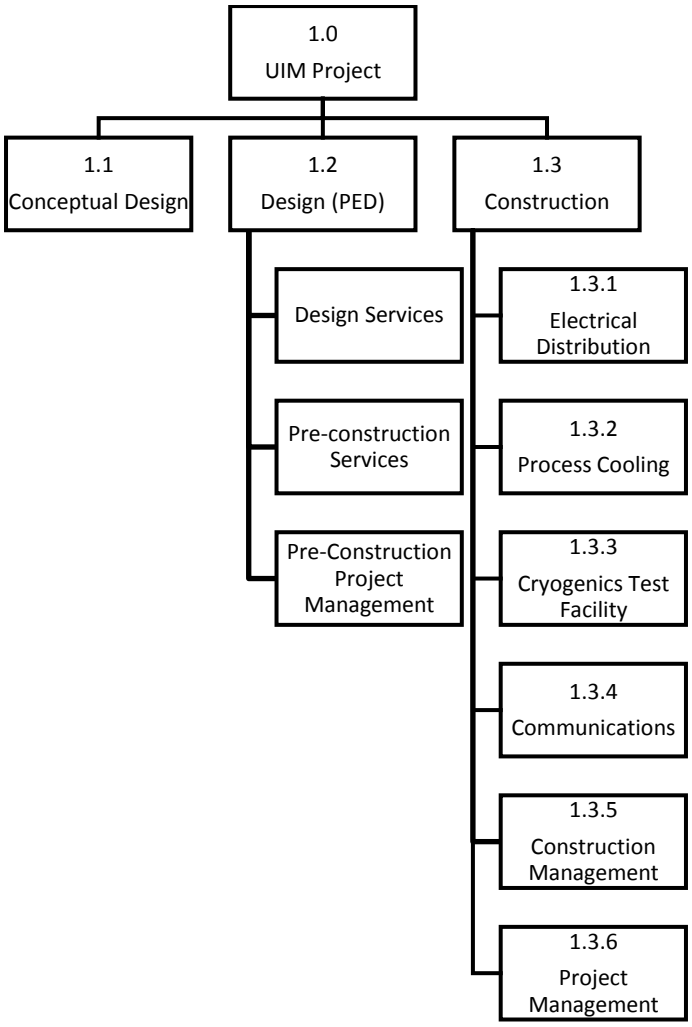

Figure 3 - Project WBS

Each WBS element will be described in a written narrative and collected in a project WBS Dictionary. This clarifies original scope composition and intent and serves as a common reference for the project team. The WBS dictionary helps avoid work duplications or omissions.

The WBS 1.1 Conceptual Design scope includes all of the activities necessary to complete the conceptual design and documents required to achieve CD-0 and CD-1 per DOE Order 413.3A.

The WBS 1.2 Design scope includes all of the activities necessary to complete the preliminary and final design of the project. WBS 1.1 includes the preparation of drawings, specifications, calculations, schedules, estimates and the final procurement package. These activities are defined as Project Engineering and Design (PED) in DOE Order 413.3A.

The WBS 1.3 Construction scope includes all of the activities necessary following PED to complete the construction and turnover of the project to operations. All management, labor, material and equipment for construction activities and management, inspection, testing and oversight of these activities are included.

5.2. Project Schedule and Milestones

The Project Schedule is a dynamic document that is used to plan and track progress over the life of the project. The baseline schedule has been developed using critical path methodology applied to project work activities representative of this project. The schedule contingency for the CD-4 completion milestone is 120 working days. Table 3 shows project milestones and major activities derived from the project schedule.

Level	Milestone Description	Date
1	**CD-0, Approve Mission Need**	**9/18/2009 (actual)**
1	**CD-1, Approve Alternative Selection and Cost Range**	**4th Qtr FY10**
3	**Award A/E Subcontract and Notice to Proceed**	**2nd Qtr FY11**
3	**Award CM Subcontract**	**2nd Qtr FY11**
2	**National Environmental Policy Act (NEPA) Documentation Completed**	**2nd Qtr FY11**
1	**CD-2, Approve Performance Baseline**	**3rd Qtr FY11**
2	**Complete Design**	**3rd Qtr FY11**
1	**CD-3; Approve Start of Construction**	**4th Qtr FY11**
2	**Award Electric Distribution GC Subcontract**	**4th Qtr FY11**
3	**Start Electric Distribution Construction**	**4th Qtr FY11**
2	**Award Cooling Tower & CTF Bldg Subcontracts**	**2nd Qtr FY12**
3	**Start Cooling Tower & CTF Bldg Construction**	**2nd Qtr FY12**
2	**Award Remaining Subcontracts**	**2nd Qtr FY13**
3	**Start Remaining Construction**	**2nd Qtr FY13**
3	**Electrical Distribution Construction Beneficial Use**	**4th Qtr FY13**
3	**Cooling Tower Construction Beneficial Use**	**1st Qtr FY14**
3	**Remaining Construction Beneficial Use**	**2nd Qtr FY14**
2	**Construction Complete**	**3rd Qtr FY14**
1	**CD-4, Project Completion**	**4th Qtr FY14**

Table 3 – Key Milestones

5.3. Cost Baseline

The TEC of $24,300,000 to $29,200,000, with other project costs of $700,000 outlined in the CDR, dated July 2010 will be the preliminary cost baseline for this project. Table 4 shows the current project cost estimate.

Cost Categories	Cost	Total Costs
1.1 Project Planning –Other Project Costs (OPC)	700	700
1.2 Project Engineering and Design (PED)	2,818	3,100
Contingency –10.0%	282	
1.3 Construction Phase	21,515	26,100
Contingency –21.3%	4,585	
Total Estimated Cost (TEC)	24,333	29,200
Contingency – 20.0%	4,867	
Total Project Cost (TPC)	29,900	29,900

Table 4 - Cost Estimate ($K)

5.3.1. Basis of Estimate

Design

The preliminary engineering and design phase cost estimate is based on a percentage of the construction cost. Detail design and estimate reviews will be conducted at the 35%, 60%, 100% and final stages.

Construction

The construction estimate is based on a conceptual design provided by the A-E and reviewed by the JLab project team. All costs have been escalated to the mid-point of construction.

Project Costs

In addition to design and construction the estimate includes planned costs for project management; design support; construction management; procurement and ES&H support; testing; and inspection. These project costs were estimated using percentages from cost data on recent projects at TJNAF.

6. Integrated Safety Management (ISM)

The JLab ISM System will be utilized for the design and execution of the Utilities and Infrastructure Modernization Project. Subcontractors will be required to demonstrate both safety philosophy and practices through binding subcontract language.
Proposed project work will be performed under the standards and codes set forth in the TJNAF DOE JSA contract Necessary and Sufficient Work Smart Standards. These include the Federal Occupational Safety and Health Act (OSHA), 29 Code of Federal Regulations (CFR) 1926, 10 CFR851, and Virginia OSHA which dictate the minimum baseline requirements for safe work on the project.

6.1. Hazards Analysis

A preliminary Hazard Analysis (HA) report has been issued; a final HA will be issued for CD-2. The HA identifies construction hazards and operational hazards and mitigation plans for the hazards. The operational hazards are due to work activities and building design features associated with the usage of the new buildings. The preliminary HA report serves as the basis for planning physical and administrative controls to protect the health and safety of workers, contractors, and the environment. A project specific ES&H Plan per 10 CFR 851 will be prepared for the construction phase.

6.2. Subcontractor Contracting and Oversight

JLab will employ a Best Value procurement policy that includes ES&H performance as a critical parameter to assure that subcontractors can meet these requirements. The JLab ES&H Manual is utilized as the basis for this evaluation. Subcontractors must have a safety record with demonstrated performance in similar construction activities. Their management team must have a strong commitment to the safety program, in particular in applying the principles and core functions of ISM, to assure outstanding worker and ES&H and safety performance. Subcontractor management is held accountable for the safety performance of their workers, and will be responsible for ensuring all work is done safely.

To ensure that ES&H oversight is maintained on a continual basis for all activities, the CM and GC will be responsible for ES&H oversight of the construction subcontractors. The CM ES&H professionals will have the authority to assist subcontractor management in the enforcement of subcontract agreement safety requirements.

6.3. Environmental Requirements

No environmental issues have been identified that would significantly impact this project. The environmental risk is low. The project will comply with all requirements of the NEPA and its implementing regulations. A NEPA Categorical Exclusion is anticipated for this project. No permits are thought to be required, however, this is being confirmed. Construction of the new facilities and renovation has been coordinated with JLab operations and will not impact ongoing research at TJNAF.

TJNAF has implemented an Environmental Management System (EMS). Requirements of the EMS flow down to construction subcontracts. Oversight of construction activities will be conducted by JLab to ensure subcontractors are in compliance with EMS requirements. Throughout construction, environmentally sensitive construction practices will be followed to reduce site disturbance, minimize construction waste, and improve indoor air quality.

While not a LEED registered project, the Utilities Infrastructure Modernization construction project will include as many of LEED elements as practical. Waste management requirements will include recycling and waste minimization actions.

6.4. TJSO ES&H Oversight

The FPD is the primary point of contact for the TJSO ES&H oversight activities and will maintain cognizance of all project activities. TJSO oversight activities are designed to ensure that the planned JLab ESH&Q oversight is being performed in an effective manner and that ESH&Q oversight is being conducted in accordance with the JLab and the TJSO Project Specific Oversight plans.

Oversight activities during construction include participation in site walkthroughs and contractor work planning meetings, and safety meetings. TJSO oversight will be conducted primarily by TJSO staff, but additional resources will be obtained if necessary.

7. Value Engineering

Consideration of sustainable design and energy savings will be made during the design phase of the project. A value engineering study will be completed during preparation of the preliminary design to evaluate the effectiveness of possible alternative design approaches, sustainability, and energy conservation features. The purpose of the study will be to evaluate the impacts to the project initial and life cycle cost as well as schedule of any suggested changes to the design. Value engineering principles will be applied throughout the life of the project.

8. Risk Management

The Preliminary Risk Management Plan (RMP) has been issued that identifies the potential risks and provides a comprehensive strategy for management of these risks. The objective of this plan is to proactively identify and manage project related risks throughout the project's life cycle. The mitigation of risks minimizes their impact on the project's cost and schedule as well as on the facility's operational performance. Adequate contingency will be provided for these risks.

The RMP consists of a risk registry and indicates assigned responsibilities of the project personnel in performing the risk management actions. The RMP will be maintained to ensure that the project incorporates appropriate, efficient and cost-effective measures to handle project risk.

The risks anticipated during construction of the proposed facilities are typical of standard building design and construction. The risks associated with this project and acquisition strategy are judged to be low and manageable.

9. Quality Assurance

This project will follow the JLab established quality assurance program. This project falls under Standard industry Quality Level 3; therefore no formal QA plan is required. The industry standard practices for industrial construction projects will apply.

Specific quality control requirements involving program requirements; personnel training and qualifications; documentation and record keeping; work process; design; procurement; inspection and testing; and independent assessment will be addressed in the procurement documents. Division 1 General Requirements of the construction documents will identify the general requirements of the subcontractor's quality control program. The technical specifications (Divisions 2 – 44) will identify the specific technical requirements.

TJNAF QA procedures will be implemented during project development, design, and construction to ensure that all safety, operational, and subcontract requirements are met. Design reviews will include consideration of safety, reliability, maintainability, and operability. The facilities and systems will be inspected during construction to ensure that the building is constructed in accordance with the approved construction documents. In addition an independent commissioning agent will test the operation of the building systems to ensure systems perform in accordance with the design specifications.

10. Project Controls Systems and Reporting

10.1. Project Performance Measurement

The project is being conducted in accordance with the project management requirements in DOE Order 413.3A, "Program and Project Management for the Acquisition of Capital Assets". The PM is responsible and accountable for management of the project's scope, schedule and budget. Earned value analysis will be performed and reported on a monthly basis.

The DOE TJSO and the M&O contractor (JSA) have implemented a certifiable EVMS that is in compliance with American National Standards Institute/Economic Impact Area-(Electronic Industries Alliance)-748-AB-2007. This system, as described and implemented in the JLab Project Control System (PCS) Manual will be used to monitor and evaluate project progress and performance for the duration of the project.

The earned value process will be flowed down through the JLab contract documents to the A-E and GC(s). The A-E will submit a monthly progress report in sufficient detail to monitor and track design progress. Each month the GC(s) will provide, for approval, a Schedule-of-Values Progress Report which directly correlates to the construction schedule. The PM will perform field verification to verify the progress reported by the GC(s).

Technical scope 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 status update meetings will be held monthly and chaired by the PM. The PM will send a monthly status report to JLab Management as well as DOE TJSO, the DOE HQs Program Manager and Project Team Members. Corrective actions for significant variances will be included in the report. Earned Value status will be reported monthly by the FPD using PARS. The overall project performance will be documented in the FPD's Quarterly Report and presented by the FPD in quarterly reviews with DOE HQ to evaluate the project performance.

10.2. Baseline Change Control Process (BCCP)

The change control process will be governed by DOE O 413.3, Project Management for the Acquisition of Capital Assets. During design, periodic reviews will be held to assure that the technical baseline is maintained; quality assurance is maintained; the design is in compliance with engineering standards and the requirements of the specifications; and the design is adequate for the intended purpose. The JLab Project Manager (JLab PM) will address potential changes that originate in the design process. After CD-2, change control will be handled in accordance with authorities established in Table 5.

10.3. Configuration Management

Configuration of the project baseline documents will be maintained through a formal baseline change control process described in Section 10.2 above. Configuration defining documents for the project consist of the following:

- Project Data Sheet
- Project Execution Plan (PEP)
- Final Design Packages

The JLab PM, acting under the direction of the JLab PD, will be responsible for implementing a necessary and sufficient approach to configuration management for the project and will identify and implement actions that affect the baseline.

Routine Project Changes: Project changes which DO NOT modify the Performance Baseline.			
Routine Project Change Authority			
	Acquisition Executive[2] (Associate Director)	**Federal Project Director**	**JLab Project Director**
Scope	Any change in the KPPs as referenced in the PEP section 5	Any change at WBS Level 2 as referenced in PEP section 5	Any change at WBS Level 3 and below as referenced in PEP section 5
Schedule	Any change to a Level 1 milestone (except CD-4 project completion) as referenced in the PEP Table 2.	Any change to a Level 2 milestone as referenced in the PEP Table 2.	Any change to a Level 3 milestone and below as referenced in PEP table 2.
Cost	A change to TEC or OPC, or A cumulative use of greater than $ 4M in contingency. [2]	Any cumulative change of ≥ $2M or 50% to each level 3 WBS element BAC as defined in Table 3 – Cost Estimate. Or A cumulative use of ≥ $500k of contingency. (i.e., Management Reserve).[3]	Changes to cost below the FPD thresholds.

Performance Baseline Deviations: Project changes which DO modify the Performance Baseline.	
Performance Baseline Change Authority[4]	
Secretarial Acquisition Executive (SAE)	**Under Secretary (Program Secretarial Officer, if delegated)**
A change in scope that affects the ability to satisfy the mission need, an inability to meet a KPP, or nonconformance with the current approved PEP, which must be reflected in the PDS.	A change in scope that affects the ability to satisfy the mission need, an inability to meet a KPP, or nonconformance with the current approved PEP, which must be reflected in the PDS.
A delay of 6-months or greater (cumulative) from the original project completion date.	A delay of less than 6-months cumulative from the original project completion date.
An increase in excess of the lesser of $25M or 25% (cumulative) of the original CD-2 cost baseline.	An increase that is less than $25M or 25% (cumulative) of the original CD-2 cost

Table 5 - Baseline Change Control Thresholds

10.4. Systems Engineering

[2] With the exception of CD-0, the Acquisition Executive still approves the Critical Decisions. These tables only apply to baseline change controls.

[3] After the cumulative threshold has been reached and the change has been approved, the cumulative threshold will reset. The DOE FPD must approve any use of contingency.

[4] New performance Baselines to be established as a result of a deviation must be validated by OECM if the new TPC exceeds $100M.

System engineering principles will be employed by including all users and stakeholders in the development of the project from conceptual design through construction and turnover to operations.

10.5. Safeguards and Security

Initial requirements for this project have been coordinated with TJNAF Security and DOE TJSO. Security needs of this project are adequately covered by the existing site security arrangements. TJNAF access requirements and procedures will be written into project contract documents and will be followed by all project personnel accessing the site. The construction contractor will be required to fence the project site for both safety as well as security considerations.

11. Transition to Operations

11.1. Final Inspection and Acceptance

The JLab project team shall evaluate the building, equipment, and systems to ensure that:

- Equipment, systems, and facility checkouts.
- Inspections and walk downs have been completed and a punch list has been developed for incomplete work.
- The assigned building managers have received building equipment operational training and manuals.
- An inspection of corrective actions has been conducted and punch list work has been completed.
- JLab FM&L Personnel have inspected all the life safety systems for proper operation.

11.2. Commissioning

A third party commissioning agent will be engaged to review design documents to ascertain performance and operational test requirements for all major systems. A commissioning plan to test and evaluate system performance both individually and collectively as compared to approved design criteria will be prepared and completed prior to the start of construction. Functional performance tests will be established and all designated systems will be tested against the performance criteria. Results will be recorded, and corrective actions initiated if required.

11.3. Use and Start of Operations

Beneficial use may occur prior to the completion of all of the commissioning and punch list items but all life safety systems must be operational prior to any use. A readiness assessment will be completed when the construction is complete, prior to use. Training of the TJNAF Facilities Management 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 use the responsibility for the operation and safety of the facility will transfer to the TJNAF Facilities Management and Logistics Division (FM&L).

11.4. Lessons Learned

During the project all lessons learned will be distributed through the FDD Lessons-Learned System. All project lessons learned will be documented, collected and issued as a final project lessons learned report.

Appendix A - IPT Charter

Integrated Project Team
Utilities Infrastructure Modernization
Thomas Jefferson National Accelerator Facility

Mission Statement:

Provide strategic planning, coordination and communication for the Utilities Infrastructure Modernization (UIM) project that ensures project objectives are achieved on schedule, within budget and fully capable of meeting the mission goals, quality, environment, safety, and health standards. Ensure that project management is carried out with integrity and in compliance with applicable laws.

Purpose/Goals:

1. Support the Federal Project Director and JLab Project Manager in performance of their project management responsibilities.
2. Develop and implement an appropriate project contracting strategy.
3. Assure all project interfaces are identified, completely described/defined and managed to completion.
4. Identify, define and meet appropriate and adequate project performance parameters.
5. Perform quarterly reviews and assessments of project performance and status against established performance parameters, baselines, milestones and deliverables; taking corrective action as appropriate.
6. As necessary, plan and participate in project reviews, audits and appraisals.
7. Support development of all Critical Decision (CD) packages.
8. Review and comment on applicable project deliverables, e.g., drawings, specifications, procurement and construction packages.
9. Review baseline change requests (as appropriate) and support change control boards as requested.
10. Plan and participate in coordinating vacating structures and occupation of the new or updated facilities.
11. Support the preparation, review and approval of project completion and closeout documentation.
12. Delivery of a quality, cost effective project.

Members:

Core Members:

DOE TJSO Federal Project Director – Richard Korynta
JLab Project Director – Rusty Sprouse
JLab Project Manager – TBD

Members

DOE TJSO Contracting Officer – Wayne Skinner
DOE TJSO Acting Site Manager (Observer) – Scott Mallette
JLab Subcontracting Officer – Mark Waite
JLab Environmental Health and Safety Rep – Bob May
JLab Environmental Specialist – Bill Rainey
JLab Engineering Support
    Carroll Jones – Mechanical
    Paul Powers – Electrical
    David Kausch – Fire Protection and Plumbing
JLab Cryogenics Engineering – Dana Arenius
JLab Information Technology – Bryan Hess
JLab Project Management Office – Dennis Miner
JLab Chief Operating Officer (Observer) – Mike Dallas

Primary Team Interfaces:

Multiple interfaces are necessary for the Utilities Infrastructure Modernization Integrated Project Team (IPT) to ensure well coordinated, timely project performance. These include the Science Laboratory Infrastructure (SLI), HQ Program Manager for TJNAF, other DOE Headquarters Programs and Project Management organizations, Jefferson Lab management, the project performance teams and other affected Jefferson Lab personnel.

The Federal Project Director will be the primary point of contact with the SLI Program Manager for coordination and submittal of CD documentation. The Federal Project Director will also routinely contact the SLI Program Manager to communicate project status and discuss issues or concerns. Input will also be solicited from the SLI Program Manager on institutional developments that may impact project performance.

For CD approvals and project reviews it may be necessary for the Federal Project Director to interface with other DOE Headquarters Program and Project Management organizations. However the SLI Program Manager will be the point of contact for day-to-day IPT interface with DOE Headquarters.

Interface with Jefferson Lab management and affected personnel will be necessary for coordination with site activities that may impact project performance or where project

activities may have broader site impacts. The JLab Project Director/Manager will be the IPT point of contact for day-to-day interfaces with Jefferson Lab management and other affected personnel to obtain input for coordination of project activities.

The project teams will be responsible for implementing project elements of work. The JLab Project Manager and/or IPT team members directly associated with the elements of work being performed will be the primary points of contact with the project teams.

Team Member Responsibilities:

DOE TJSO Federal Project Director (FPD)

The FPD will lead the IPT and will be 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).
- Approve changes in accordance with the Project Execution Plan (PEP) change control process.
- Manage project contingency funds.

DOE TJSO Contracting Officer

The Contracting Officer (CO) provides any contracts-related support to the IPT to include, but not be limited to, the review of any project related subcontracts submitted for DOE approval.

JLab Project Director

The UIM Project will be executed by a Jefferson Science Associates project team that is headed by the JLab PD. The JLab PD has established a project organization to accomplish the UIM Project which includes the project manager, engineering support, ES&H, Quality Assurance (QA), and safety, procurement, project controls, and finance personnel.

The project director provides senior management oversight, chairs the Baseline Change Control Board (BCCB) and approves Level 3 Baseline Change Proposals (BCPs).

JLab Project Manager

The project manager is responsible for the design, construction/renovation, testing and turnover to operations of the Utilities Infrastructure Modernization. Specific responsibilities of the PM include:

- Manages day-to-day execution of the project at TJNAF.
- Establishes technical and administrative controls to ensure the project is executed within approved cost, schedule, and technical scope.
- Implements an Earned Value Management System (EVMS) to track performance against the approved project baseline.
- Ensures that project activities are conducted in a safe, healthful and environmentally sound manner.
- Ensures ES&H responsibilities and requirements are integrated into all phases of the project.
- Participates in management meetings and communicates the project status and issues.
- Identifies and manages project risks.
- Prepares and provides recommendations for BCPs.

JLab Engineering Support

JLab Engineering Support will provide technical and engineering support and review of the design, construction, testing and startup of the facility.

JLab Subcontracting Officer

The Subcontracting Officer is responsible for subcontract administration and contractual support. Specific responsibilities include:

- Solicit sources/vendors and administer subcontracts.
- Assists in source selection.
- Directs preparation of the Request for Proposals.

- Performs price and cost analysis.
- Ensures all contractual provisions are approved and met. Negotiates terms, recommends award of contract and prepares necessary justification documentation.
- Prepares subcontract modification changes in scope of work, funding and schedules.
- Monitors expenditures and reviews invoices.
- Recommends resolution of disputes and subcontractor claims.
- Upon completion performs subcontract closeout.

Meetings:

The Integrated Project Team shall meet as necessary to accomplish the stated goals and mission. Team members shall meet with each other and external interfaces as necessary to address and/or resolve specific issues.

Integrated Project Team Life:

This charter will expire when CD-4, Project Closeout, has been approved by the Acquisition Executive. The charter is a living document and the IPT membership may change during the life of the project. The FPD will issue revisions to the charter as necessary.

Approved:

_____	**6/1/2010**
Rusty Sprouse, JLab Project Director	Date
_____	**6/1/2010**
Richard Korynta, TJSO Federal Project Director	Date