

**Critical Decision-1, Approve Alternative Selection and Cost Range
for the Technology and Engineering Development Facility
at the Thomas Jefferson National Accelerator Facility**

**Office of Safety, Security and Infrastructure
Office of Science**

A. Purpose

The purpose of this paper is to document the review by the Office of Science (SC) Energy Systems Acquisition Advisory Board-equivalent for the Critical Decision, “Approve Alternative Selection and Cost Range (CD-1)” for the Technology and Engineering Development Facility (TEDF) project at the Thomas Jefferson National Accelerator Facility (TJNAF).

B. Mission Need

The mission of the Science Laboratories Infrastructure Program within SC is to support the conduct of Departmental research missions at SC laboratories by funding line item construction to revitalize and repair the general-purpose infrastructure.

TJNAF occupies a position of world leadership in the field of nuclear physics. This leadership is built upon the unique properties of the Continuous Electron Beam Accelerator Facility (CEBAF), as well as an outstanding array of experimental facilities and strong theoretical support. It is essential for the continuation of this world leadership that core competencies be maintained and enhanced in:

- Nuclear physics, including experimental, theoretical, and computational physics.
- Accelerator science and technology, including radiofrequency superconductivity, high brightness, polarized electron beams, and cryogenics.

These core competencies enable TJNAF to deliver its mission, to perform a complementary role within the DOE laboratory system, and to attain its vision for scientific excellence and pre-eminence in the structure of nuclear building blocks, the structure of nuclei, and symmetry tests in nuclear physics. In addition to nuclear physics, TJNAF contributes to enabling technologies and emerging fields – photon science and electron-light ion colliders – including advanced radiofrequency superconductivity, 2K cryogenic engineering technology, photon science, advanced high power free electron lasers, energy recovering linacs, and electron-light ion collisions at ultra-high luminosity. These technologies support the ongoing research programs and projects at TJNAF which include 6-GeV, 12-GeV, and Free Electron Laser as well as other DOE national and international projects such as the Spallation Neutron Source, the Relativistic Heavy Ion Collider, and the Facility for Rare Isotope Beams.

This project is needed to support the ability of the laboratory to perform these core competency activities safely and efficiently. The Office of Science believes that these core competencies will enable TJNAF to pursue its vision for scientific excellence and pre-eminence in the following areas of nuclear physics:

- The structure of the nuclear building blocks including: the nucleon’s charge and magnetization distribution; the separation of the individual quark contributions to those distributions of charge and magnetization; the degrees-of-freedom governing the nucleon’s excitation; the internal structure of the nucleon in the valence region, notably the

distribution of momentum and spin on the valence quarks; the nature of quark confinement; and the experimental and theoretical tools necessary to carry out a program of nucleon tomography.

- The structure of nuclei including: the nuclear interior with controlled impurities; the short-range component of the nucleon-nucleon interaction in nuclei; the neutron radius of ^{208}Pb ; and the underlying quark-gluon structure of the nucleus.
- Symmetry tests in nuclear physics, including the weak charge of the proton, to test predictions of the Standard Model.
- Enabling technologies and emerging fields - photon science and electron ion colliders – including advanced radiofrequency superconductivity, 2K cryogenic engineering technology Energy Recovering Linacs (ERL), advanced high power free electron lasers, and electron-light ion collisions at ultra-high luminosity.

This project is needed to eliminate existing overcrowding, and improve workflow and productivity by co-locating the engineering and technical functions currently spread across the lab. It's needed to renovate the 1960's era Test Lab Building thereby providing efficient workflow, a safe and sustainable work environment, functional efficiencies, and removal of inadequate and obsolete work space, including the removal of dilapidated trailers.

C. Project Preliminary Scope Baseline

The facilities will occupy sites that are currently developed or which have previously been identified for development. The footprint for the new Technology and Engineering Development (TED) building is currently a wooded site adjacent to the north-west corner of the accelerator site. The new Test Lab Addition will be located on the south end of the Test Lab where there are currently a small storage and acid processing building and associated roadways. The work outlined in the Conceptual Design Report dated July 2008 forms the preliminary basis for establishing the performance parameters. The Conceptual Design provides for new construction of between 90,000 and 120,000 square feet, including the new TED building and an addition to the Test Lab building. The project will renovate about 90,000 square feet in the existing Test Lab building. The Conceptual Design also includes removal of between 9,000 and 22,000 square feet of inadequate and obsolete work space including the removal of dilapidated trailers. The scope of the project includes design, site work (including parking, fence, and gate relocation), construction of new facilities, renovation of the Test Lab building, commissioning, building demolition, and removal of trailers. The new facilities will consist of laboratories, equipment rooms, offices, and support space. In addition to the technical work space and high-bay space, the facilities will include offices for researchers, small group conference rooms, equipment areas, restrooms, circulation space and needed supporting infrastructure.

D. Project Preliminary Cost and Schedule

The preliminary Total Estimated Cost range is \$66-72.2M. The preliminary Total Project Cost (TPC) range is \$67 to \$73.2M. Table 1 shows the funding profile for this project.

Table 1 – Funding Profile (\$000)

FY	Total Estimated Cost		Other Project Costs	Total Project Cost
	Project Engineering and Design	Construction		
2007			50	50
2008			750	750
2009	3,700		200	3,900
2010		12,800		12,800
2011		16,300		16,300
2012		24,400		24,400
2013		15,000		15,000
Total	3,700	68,500	1,000	73,200

The preliminary schedule baseline is shown in Table 2.

CD-0	Approve Mission Need	September 2007 (A)
CD-1	Approve Alternative Selection and Cost Range	September 2008
CD-2	Approve Performance Baseline	4Q FY2009
CD-3A	Approve Start of New Construction	3Q FY2010
CD-3B	Approve Start of Test Lab Building Renovation	2Q FY2012
CD-4A	Approve Start of Operations (New Construction)	1Q FY2013
CD-4 B	Approve Start of Operations (Renovated Test Lab Building)	4Q FY2014

The Preliminary Schedule is driven by the funding profile. CD-4B, “Approve Start of Operations (Renovated Test Lab Building),” is scheduled for September 30, 2014, which includes 24 weeks of float.

E. 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, will manage and administer a Fixed-Price Architectural-Engineering (A-E) Design subcontract, a Fixed-Price Construction Management (CM) subcontract, Fixed-Price General Contractor (GC) subcontracts, and any other service-type subcontracts required in the execution of this project. 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 recommended the use of a Design-Bid-Build approach, with all design completed by one Architect-Engineering (A-E) firm supported by a CM firm; the A-E subcontract will include a design to cost clause. Construction work will then be phased and performed by one or more GC firms.

Completion of this project will be broken into at least two phases; Phase I will include all new construction with Phase II including the Test Lab Building renovation. The phases may be further subdivided if market research indicates that would provide the best value. All contracts will be managed by the TJNAF M&O contractor. The two phased approach was selected to promote the award of best value contracts focused on the GC’s area of expertise and reduce their exposure to funding risk.

TJNAF'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 TEDF procurements. This practice was employed during the design and construction of the CEBAF and the Free Electron Laser projects and has proven to be very effective for TJNAF as well as small business vendors.

Prequalify of all bidders is expected and 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.

G. Environmental Strategy

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. An Environmental Assessment (EA) including the elements of this project was completed in December of 2006 and a Finding of No Significant Impact (FONSI) was issued. Documentation is currently being developed to address the evolution of the project since the FONSI was issued. This documentation will be completed prior to CD-2. 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. As a LEED registered project, the Technology and Engineering Development Facility construction project will include erosion and sedimentation control plans. Waste management requirements will include recycling and waste minimization actions.

H. Preliminary Hazards Analysis

A preliminary Hazard Analysis (HA) report has been issued; a final HA will be issued for CD-2. It 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.

I. Energy Conservation and Sustainable Design

Decisions regarding the planning, acquisition, siting, design, building, operating, and maintaining the proposed new facilities, as well as the Test Lab renovations, will be based on the DOE Guiding Principles of High Performance and Sustainable Buildings. New equipment and systems

will be selected to maximize energy efficiency and “green” building technologies. Current plans are to meet Leadership in Energy and Environmental Design (LEED) certification requirements for both the new facility and the Test Lab renovation; however, because these facilities will consist of industrial-type space, the feasibility and cost effectiveness of meeting those requirements will be evaluated during preliminary design.

J. 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 includes a risk registry that 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 manageable.

K. Security Considerations

Security of facilities and infrastructure is monitored and managed through the TJNAF Site Security Plan (SSP). The SSP recognizes controlled areas using physical controls and protective personnel. The facilities included in this project are considered by the SSP as controlled areas. TJNAF does not sponsor clearances and does not conduct classified research or generate classified matter.

The initial security requirements for this project have been coordinated with TJNAF Security and the DOE Site Security Program Manager. The project site will be fenced during construction for both safety and protection of property considerations. The new facilities will use card readers for building access control. These security-related costs are included in the project estimate.

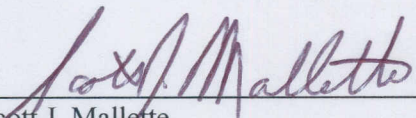
Security considerations will continue to be evaluated and documented as the project moves forward, consistent with DOE G 413.3-3, *Safeguards and Security for Program and Project Management*. In addition, a security representative will be added to the Integrated Project Team.

Technology and Engineering Development Facility at the
Thomas Jefferson National Accelerator Facility
CD-1 Review

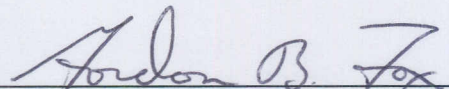
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Office of Science

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Date

Technology and Engineering
Thomas Jefferson National Accelerator Facility
CD-1 Review

Recommendations:

The undersigned "Do Recommend" (Yes) or "Do Not Recommend" (No) approval of CD-1, for the Renovate Science Laboratories. Phase 1 as noted below.

<u>Kim K. Chao</u> ESAAB Secretariat, Office of Project Assessment	<u>9/23/08</u> Date	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<u>David Szymon</u> Representative, Non-Proponent SC Program Office	<u>9/23/08</u> Date	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<u>Kristy Shi</u> For Mike Osinski. Representative, Office of Budget	<u>9/23/08</u> Date	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<u>M.B. W.</u> Representative, Environmental, Safety and health Division	<u>9-23-08</u> Date	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
<u>David Szymon</u> Representative, Security Management Team	<u>9/23/08</u> Date	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
_____ Representative, Laboratory Infrastructure Division	_____ Date	Yes <input type="checkbox"/>	No <input type="checkbox"/>
_____ Representative, Grants and Contracts Division	_____ Date	Yes <input type="checkbox"/>	No <input type="checkbox"/>

Approval:

Based on the information presented above and at this review, Critical Decision-1, Approve Alternative Selection and Cost Range, is approved and authorization is provided to proceed to Preliminary Design.

Marcus E. Jones
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Office of Science

9/23/2008
Date