

**Critical Decision-2, Approve Performance Baseline
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 Performance Baseline (CD-2)” 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.

This project is needed to ensure TJNAF facilities can reliably support production of advanced cryomodules and develop enabling technologies with the quality required for 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, the Facility for Rare Isotope Beam, and the International Linear Collider, and sustain the current high demand for mounting numerous unique large scale particle detectors.

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.

C. Project Scope Baseline

The Technology and Engineering Development Facility (TEDF) Project is located on the TJNAF site and will provide modern, 21st century technical work space, high-bay space, office space, and associated space for support functions. The design of the facility will emphasize more open, collaborative environments and flexibility to respond to future mission changes.

The scope of the project includes design, site work (including fence, parking, 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. The key performance parameters for the project are:

- Construction of a new 65,000 to 80,000 gsf Technology and Engineering Development (TED) building.
- Construction of a new 25,000 to 40,000 gsf Test Lab building Addition.
- Renovation of the Test Lab building (approximately 90,000 gsf).
- Demolition of 7,000 to 10,000 gsf of inadequate and obsolete work space in and adjacent to the Test Lab building, and 2,000 to 12,000 gsf of dilapidated trailers.

D. Project Cost and Schedule

The Total Project Cost is \$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		
2008			300	300
2009	3,700		700	4,400
2010		27,687		27,687
2011		20,800		20,800
2012		20,013		20,013
Total	3,700	68,500	1,000	73,200

The schedule baseline is shown in Table 2.

Table 2

CD-0	Approve Mission Need	September 2007 (A)
CD-1	Approve Alternative Selection and Cost Range	September 2008 (A)
CD-2	Approve Performance Baseline	November 2009
CD-3A	Approve Start of Construction - Early Construction Package	March 2010
CD-3B	Approve Start of Construction - General Construction	September 2010
CD-4A	Approve Start of Operations – New Construction	March 2012
CD-4B	Approve Start of Operations – Renovation	March 2014

The Schedule is driven by the funding profile. CD-4B, “Approve Start of Operations - Renovation,” is scheduled for March 2014, which includes 15 months of schedule contingency.

The cost estimate is shown in Table 3.

Table 3 - Cost Estimate (\$)

WBS	Description	Cost	Total Cost
1.1	Project Planning		\$ 1,000,000
1.1.1	Conceptual Planning	\$ 800,000	
1.1.2	Planning	\$ 200,000	
1.2	Engineering and Design		\$ 3,350,000
1.2.1	Design Services	\$ 2,791,000	
1.2.2	Pre-Construction Services	\$ 422,000	
1.2.3	Pre-Construction Project Management	\$ 137,000	
1.3	Construction		\$ 56,672,000
1.3.1	Conventional Facilities Construction	\$ 47,723,000	
1.3.2	Furnished Furniture/Equipment	\$ 1,966,000	
1.3.3	Construction Management Services	\$ 6,258,000	
1.3.4	Project Management	\$ 726,000	
	Total Contingency (20.3%)		\$ 12,178,000
	Engineering and Design Contingency	\$ 350,000	
	Construction Contingency	\$ 11,828,000	
	Total Estimated Cost		\$ 72,200,000
	Other Project Cost		\$ 1,000,000
	Total Project Cost		\$ 73,200,000

E. Acquisition Strategy

The JLab Management and Operating (M&O) Contractor, Jefferson Science Associates, LLC (JSA), under the direction, guidance, and oversight of DOE Thomas Jefferson Site Office (TJSO), is managing a Fixed-Price Architectural-Engineering (A/E) Design subcontract, and will manage and administer a Fixed-Price Construction Management/General Contractor (CM/GC) subcontract that will consist of two phases

(described below). JSA will also manage any other service-type subcontracts required by JLab in the execution of this project. The CM/GC 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 CM/GC and the subcontractors. Project performance metrics for the M&O contractor are included in the annual TJNAF Performance Evaluation and Measurement Plan.

The A/E was awarded a fixed price subcontract that utilizes the design-to-cost clause to help mitigate the possibility of high construction bids. The subcontract is inclusive of all materials, equipment, labor, etc. necessary to perform the work, which includes delivery of technical specifications, drawings and bills of materials. The A/E firm selected (EwingCole) has experience in the design-to-cost approach for laboratories and fully familiar with and utilizes the Green Building Rating System – LEED, in their designs. The A/E has completed the preliminary design and will perform the final design. The A/E will prepare all drawings, calculations, and specifications for the construction activity. The A/E will coordinate with the CM/GC during the final design phase and provide support during the construction phase.

The subcontract with the CM/GC will be for two phases of fixed-price work. Phase 1 will be for the CM/GC to provide support services to the A/E, including input regarding material selection, equipment, construction feasibility, and factors relating to construction, and cost estimates including cost estimates of alternative designs or materials. The CM/GC will also provide cost validation and schedule validation services, and provide recommendations designed to minimize adverse effects of labor or material shortages; and time requirements for procurements, installation and construction completion to JLab. Phase 2 will be to execute the construction project, including the management, ES&H oversight, and the administration of construction subcontracts. Phase 2 will be inclusive of all material, labor, equipment, etc. necessary to perform the work in accordance with the contractual requirements in order to meet the defined scope and schedule.

JLab will procure most services utilizing a best value solicitation process. For the CM/GC procurement an extensive list of qualified bidders was developed based on responses to an Expression of Interest (EOI) posting. Only those bidders responsive to the EOI posting were provided the Request for Proposal (RFP) for pricing. The RFP was issued on 6/26/2009 and the CM/GC subcontract was awarded on 10/27/2009.

All work performed by the CM/GC will be monitored by JLab personnel, with support from the A/E. The TJSO will provide oversight to ensure safety, quality, and baseline performance.

F. 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 in January of 2007. A NEPA Analysis was completed in May of 2009 to address the evolution of the project since the FONSI was issued. The NEPA Compliance Officer made a determination that additional NEPA

documentation is not required. 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.

G. Hazards Analysis

A Hazard Analysis (HA) report has been issued for the TEDF project. 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 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.

H. Energy Conservation and Sustainable Design

Consideration of sustainable design and energy savings will be made during the design phase of the TEDF project to comply with DOE Order 430.2B, "Departmental Energy, Renewable Energy and Transportation Management." Decisions regarding the planning, acquisition, siting, designing, building, operating, and maintaining facilities are based on the DOE Guiding Principles of High Performance and Sustainable Buildings. New equipment and systems will be selected to maximize energy efficiencies and "green" building technologies. The new construction and renovation have been registered for Leadership in Energy and Environmental Design (LEED) Certification.

I. Risk Management

A Risk Management Plan (RMP) has been issued for the TEDF project that identifies the potential risks and provides a comprehensive strategy for management of these risks. The objective of the 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.

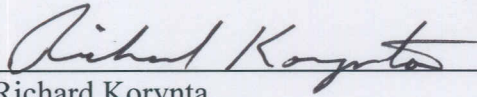
The RMP includes a risk registry that indicates assigned responsibilities of the project personnel in performing the risk management actions. The risk registry will be updated to contain all comprehensive risk information as the project progresses. The RMP will be maintained to ensure that the project incorporates appropriate, efficient and cost-effective measures to handle project risk and to address and successfully manage any new risks that may surface during the execution of the project.

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.

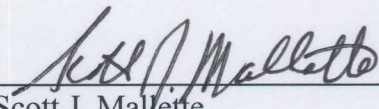
Quantitative risk analysis, including Monte Carlo simulation, was utilized to assess the impact of the identified risks on the project cost and schedule, and provide an evaluation of the level of confidence in achieving the project cost and schedule objectives. The probability of success of the TEDF project is considered high based on these analyses. The analysis indicated that adequate schedule and budget contingency exists for the successful completion of the project within the desired objectives.

Technology and Engineering Development Facility at the
Thomas Jefferson National Accelerator Facility
CD-2 Review


Submitted by:


Richard Korynta
Federal Project Director
Thomas Jefferson Site Office

11-3-09
Date


Scott J. Mallette
Deputy Manager
Thomas Jefferson Site Office

11-3-09
Date

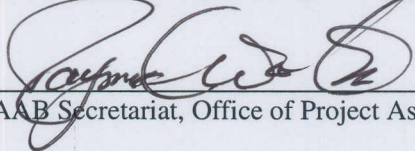

Gordon Fox
Program Manager
Office of Safety, Security and Infrastructure
Office of Science

11/4/09
Date

**Technology and Engineering Development Facility at the
Thomas Jefferson National Accelerator Facility
CD-2 Review**

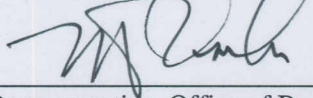
Recommendations:

The undersigned "Do Recommend" (Yes) or "Do Not Recommend" (No) approval of CD-2, for the Technology and Engineering Development Facility as noted below.

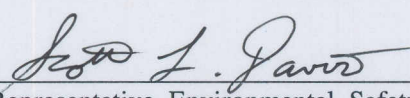


 ESAAB Secretariat, Office of Project Assessment 11/12/09 Yes No
 Date

 Representative, Non-Proponent SC Program Office Date Yes No

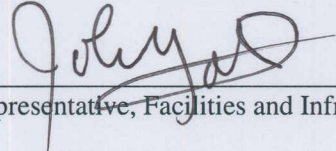


 Representative, Office of Budget 11/12/09 Yes No
 Date



 Representative, Environmental, Safety and Health Division 11/12/09 Yes No
 Date

 Representative, Safeguards and Security Division Date Yes No

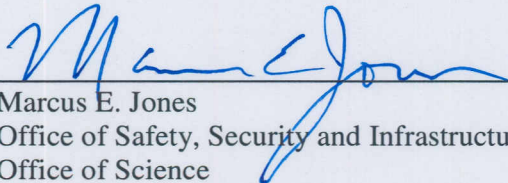


 Representative, Facilities and Infrastructure Division 11/12/09 Yes No
 Date

 Representative, Grants and Contracts Division Date Yes No

Approval:

Based on the information presented above and at this review, Critical Decision 2, Approve Performance Baseline, is approved and authorization is provided to proceed to Final Design.



 Marcus E. Jones 11/12/2009
 Office of Safety, Security and Infrastructure Date
 Office of Science