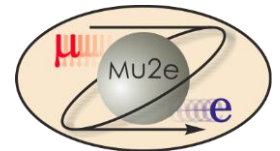




CD-2 & CD-3 DOE Checklists Conventional Construction

T. Lackowski
L2 Manager
10/22/2014



CD-2 Checklist

TOTAL PROJECT COST (TPC)		Less than \$400M to \$100M	
DECISION / REQUIREMENTS ¹ / APPROVAL ²			
CD-2--APPROVE PERFORMANCE BASELINE		SC-2	
PRIOR TO CD-2--PRELIMINARY DESIGN	Approve updated Acquisition Strategy if changes are major	SC-1 with SC-28 concurrence	AS Mu2e-doc 1074 AAP 4127
	Establish a Performance Baseline (PB)	FPD	Baseline Cost /Schedule
	Approve updated PEP	SC-2	PEP Mu2e-doc 1172
	Prepare a Baseline Fund. Profile & reflect in budget docs. & PEP. Consider full funding if TPC < \$50M	SC-2	NA
	Approval of Long-Lead Procurement	SC-2	4317 3a for conductor purchase
	Develop Project Management Plan, if applicable	N/A	PMP Mu2e-doc 508
	Complete Preliminary Design	Project	Drawings 2956
	Incorporate High Perf. & Sustainable Bldg. & Sustainable Environmental Stewardship	Project	GP Mu2e-doc 2081
	Conduct a Preliminary Design Review	Team external to project	Dir. Review 4404 Replies 4405
	Complete Preliminary Design Report	Project	T D R Mu2e-Doc 4299
	Perform Baseline Validation Review	ICE by OEMC with OPA	Ice Review 8/26-28/2014
	Conduct a Project Definition Rating Index analysis as part of an EIR	N/A	NA
	Conduct a Technical Readiness Assessment & develop a Technical Maturation Plan	N/A	NA
	Employ an EVMS compliant with ANSI/EIA-748A, or as defined in the contract	Contractor	Certification Letter
	Prepare a Hazard Analysis Report	Site Office or Lab	HA Mu2e -Doc 4229
	Continue with Quality Assurance Program	Site Office or Lab	QMP Mu2e-doc 677
	Conduct Preliminary Security Vulnerability Assessment, if necessary	Site Office or Lab	SVA Mu2e-doc 676
	Issue Final NEPA determination (i.e., FONSI)	SC-1 or Site Office	NEPA 2274
Update budget documents and Exhibit 300 if applicable	SC-AD	NA	

Post CD-2 Checklist

POST CD-2	Submit approved CD or equivalent documents to OECM. If applicable, any PB BCP to OECM	SC-28
	Submit budget request for the remainder of TPC	SC-AD
	Funding profile changes that negatively impact project	SC-2
	Update PARS II with monthly status	Prog. Mgr., FPD, and Contractor
	Continue with Monthly or Quarterly Project Reporting/Meeting	SC-AD Invite SC-2 and SC-28
	SC-AD Request Annual Project Peer Review by PMSO	SC-28

- PM as needed.

CD-3 Checklist

TOTAL PROJECT COST (TPC)		Less than \$400M to \$100M
DECISION / REQUIREMENTS ¹ / APPROVAL ²		
CD-3--APPROVE START OF CONSTRUCTION		SC-2
PRIOR TO CD-3--FINAL DESIGN	Approve updated CD-2 Project Documentation (PEP, AS, PDS, etc) if major changes	Reviewed by SC-28 Approved by SC-2
	Complete Final Design	Project
	Incorporate High Performance & Sustainable Bldg. & Sustainable Env. Stewardship	Project
	Conduct a Final Design Review	Team external to project
	Complete Final Design Report	Project
	Employ a certified EVMS compliant with ANSI/EIA-748A, or as defined in the contract	Certified by SC-28
	Execution Readiness Review	ICE by OEM if warranted or IPR by OPA
	Conduct a Technology Readiness Assessment, where significant CTE modification occurs	N/A
	Update the Hazard Analysis Report	Site Office or Lab
	Prepare Construction Project Safety and Health Plan	Site Office or Lab
	Update the Quality Assurance Program	Site Office or Lab
	Finalize the Security Vulnerability Assessment Report, if necessary	Site Office or Lab

[1074](#), [1172](#)

RFP Contract Doc. [3494](#) [3620](#)

GP Mu2e-doc [2081](#)

* See below

RFP Contract Doc. [3494](#)

[Certification Letter](#)

Ice backup data [4487](#)

NA

Mu2e –Doc [4229](#)

Conventional Const. [4432](#)

Mu2e-doc [677](#)

Mu2e-doc [676](#)

- * AON [1314](#); Comment and Compliance Review [4416](#); Mu2e Experimental Area Preliminary Shielding
- Assessment approval [4313](#); Middough Cleveland Office Review [4506](#);
- Dir. Review [4404](#); Dir. Review Replies [4405](#); This review

Preliminary Design

- Complete Preliminary Design
 - Incorporate High Performance & Sustainable Environmental Stewardship
 - Mu2e-doc-2081
 - Conduct a Preliminary Design Review
 - 30% drawing issued to project team for review
 - 30% technical review by Middough Cleveland Office
 - CD2/3b Directors Review
 - Report Mu2e-doc 4404; Response Mu2e-doc 4405
 - Complete Preliminary Design Report
 - Technical Design Report

- Prepare a Hazard Analysis Report
 - Mu2e-doc-[4229](#) , dated July 16, 2014, signed.
 - CFS Contributed to Mu2e Hazard Analysis mainly mechanical, fire, environmental, and construction.
 - Design also responded to hazards identified by others such as ODH and Radiation.
- Update final NEPA determination -Approved Nepa on 6/8/2012 with an approved CX (B1.15,B3.10)

- Prepare Construction Project Safety and Health Plan
 - Project Document posted in DocDB [4432](#)
 - Developed with input from Conventional Construction

Exhibit A defines to the subcontractor, Fermilab's expectation and requirements, for their Safety and Health Plan

Mu2e Site Specific Construction Safety and Health Plan

**Principles
for the
Conventional Construction**
at
Fermi National Laboratory



Office of
Science

July 14, 2014

ICE Review

- The ICE team developed and estimate that was within 2% of the engineer's estimate for the Mu2e Conventional Facilities contract.
 - Several differences were noted that would reduce the difference
 - Example: Engineer's estimate for concrete unit cost was higher to account for the robust forming and more difficult placement than the standard RS Means costs used by the ICE team.
 - There were larger differences at the CSI division level. This was due to packaging.
 - Example: ICE Team including concrete duct bank in Div. 16, electrical: Engineer's estimate included the duct bank in Div. 2 Site.
- The ICE and project estimates were .4% different on the remaining work, including EDIA and procured items.

From Draft **Report of Independent Cost Estimate**

- For the conventional facilities, the ICE was performed using a bottom-up technique—a DOE Type V-ICE as defined in reference (a). The CF ICE is structured using the same WBS developed by the Project Team, for ease of comparison. In addition, the major assumptions used by the Project Team were reviewed and adopted, as appropriate, by the ICE Team, again for consistency and to ensure an accurate comparison. The ICE Team identified no concerns with the WBS structure or assumptions that needed to be reconciled before starting the estimate process.
- The escalation rates used for the project estimate are reasonable, based on comparison with other DOE projects and independent studies
- The ICE for conventional facilities is within 0.4% of the project estimate, so there is excellent agreement.
- The results of the CF portion of this ICE have been provided to the Project Team for review. Because the difference between the CF estimates is negligible, DOE-APM determined that a formal reconciliation between the two parties is not needed. This decision was also supported by the fact that the project has received bids for the CF portion.

Complete Final Design

- Complete Final Design
 - Mu2e Conventional Facilities
 - Contract documents complete, RFP issued and proposals received.
 - Delivery Ring Upgrade
 - Drawings complete and shelved.
 - Most procured items are ordered using standard specifications or model numbers. The specification for the 30 ton cranes are 90% complete.

Conduct a Final Design Review

- The design has been reviewed by various entities in order to insure that the final product meet or exceed the environmental and organizational requirements.
 - Life safety – Rick Glen of AON reviewed the final drawings for compliance with the applicable fire protection/life safety requirements of the 2009 International Building Code (IBC), the 2009 Life Safety Code, NFPA 101 and for compliance with the mu2e Fire Protection/ Life Safety Assessment dated June 12, 2013.
 - The Fermilab Radiological Control Manual requires the approval of the a shielding assessment prior to issuing an RFP. The AD/ESH Department reviewed and approved on June 9, 2014 the Mu2e Experimental Area Preliminary Shielding Assessment.

Conduct a Final Design Review

- Middough Inc., the entity responsible for the design of the Mu2e Conventional Facilities, employed State of Illinois licensed professional which have affixed their seal to the documents. Civil, Architectural, Structural Mechanical , Plumbing and Electrical disciplines are covered. At the 30%, 60% and final design levels the home office of Middough in Cleveland Ohio used senior design architects and engineers to accomplish an independent review. These reviews were technical, focusing on the adherence and compliance with applicable material codes, building codes, corporate standards and good design standard of practice. This review included spot checks of calculations.
- Middough is liable for the adequacy of the design to meet or exceed building and material codes.

Conduct a Final Design Review

- Director’s Independent Design and CD-2/3 Review of the Mu2e Project, July 8-10, 2014. Reviewed contract documents for completeness and appropriateness. Review the status of the required permits required to proceed with construction. Provided recommendation to the “requirements, responsibilities, and expectation” of the construction contractor staff.
- Comment and Compliance Review is distributed to a broad spectrum of Fermilab personnel including ESH&Q, Fermilab section and division management, FESS Operations, FESS Roads and Grounds and FESS Engineering. These groups are independent from the project team and review the project for organizational requirements.

Conduct a Final Design Review

- Within the project but separate from the Conventional Construction team the technical team used the 30, 60, 90, and final drawings to input and maintain a 3D model in NX software. This is also the software used for the technical components, allowing for physical checks with the technical equipment to be made.
- This review.