Conventional Facilities Overview (WBS 121.06)

Breakout Session

Steve Dixon

PIP-II IPR

4-6 December 2018

In partnership with:
India/DAE
Italy/INFN
UK/STFC
France/CEA/Irfu, CNRS/IN2P3

Charge Questions Addressed

1. Is the project making adequate technical progress to ensure that the completed project will perform as planned and meet the key performance parameters?
2. Will execution of PIP II design plans and planned R&D program activities ensure most major technical risks will be appropriately mitigated or retired prior to CD-3?
3. Has the project made adequate progress on its resource-loaded schedule to complete it by the time of CD-2?
4. Are preparations for defining, documenting, and managing the international in-kind contributions suitable to ensure their timely delivery and technical fidelity?
5. Is the proposed CD-2 timeline reasonable and consistent with the current project status?
6. Is ESH&Q being handled appropriately?
7. Are the proposed risk mitigation strategies reasonable and are the proposed contingencies acceptable?
8. Has the project satisfactorily responded to the recommendations from previous reviews?
9. Are there any other significant issues that require HEP or project's attention?

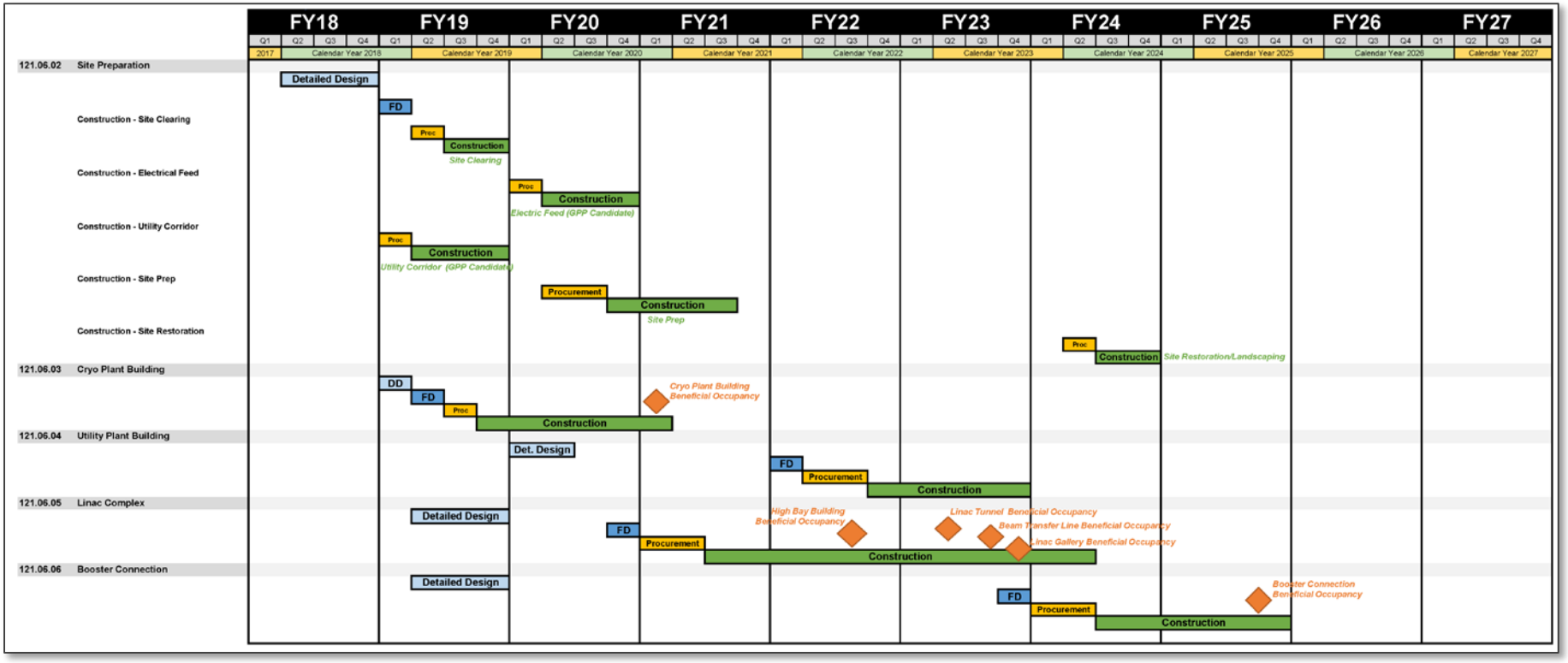
Outline

- Technical Progress
- Interfaces
- Risks and Mitigations
- ESH&Q
- Previous Review Recommendations
- Summary

About Me:

- PIP-II Level 2 Manager for Conventional Facilities
- Relevant Experience
  - Licensed Architect;
  - Project Management Professional (PMP);
  - LEED Accredited Professional;
  - 26+ years at Fermilab;
  - NOvA Project L2 Manager for Site and Buildings;
    - 2014 CD-4
    - 2015 U.S. DOE Secretary's Award for Excellence
  - General Plant Project Manager for 15+ years
    - Short Baseline Neutrino (SBN) Near Detector Building;
    - Short Baseline Neutrino (SBN) Far Detector Building;
    - Experimental Operations Center;

CF Schedule Overview

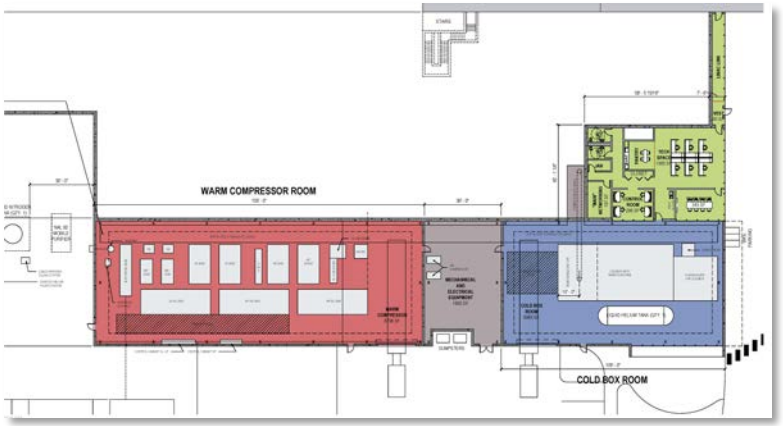


[1] Definitions from WBS Dictionary, PIP-II-doc-599

Technical Progress

Charge #1

- Site Preparation (WBS 121.06.02) – 90% Design Maturity
  - Site Clearing package[1]
  - Site Work package[2]
  - Electrical Feeder package[2]
  - Site Restoration/Landscaping package[2]
- Cryogenics Plant Building (WBS 121.06.03) - 40% Design Maturity
  - Technical Requirements Complete [3]



Cryogenic Plant Building Plan


View Looking Southwest

[1] See TeamCenter ED0008374
[2] See TeamCenter ED0008459
[3] See TeamCenter ED0008373

Technical Progress

Charge #1

- Utility Plant Building (WBS 121.06.04)
  - ~30% Design Maturity based on Conceptual Design
- Linac Complex (WBS 121.06.05)
  - Combined into one WBS
    - High Bay Building
    - Linac Tunnel
    - Linac Gallery
    - Beam Transfer Line
  - ~30% Design Maturity based on Conceptual Design
- Booster Connection (WBS 121.06.06)
  - ~30% Design Maturity based on Conceptual Design
  - Discussion of interface point between Linac Complex and Booster Connection based on accelerator shutdowns

30% Design Maturity based on Conceptual Design

Interfaces

Charge #2,7

- Project Interfaces *(Managed through PIP-II processes)* [1]
  - ED0007698 – Interface Control Document
  - WBS 121.02 - SRF & Cryo Systems
    - WBS 121.02.05 – Cryo Plant (B. Hansen)
    - WBS 121.02.06 – Cryogenic Distribution (A. Dalesandro)
- Fermilab Interfaces
  - Infrastructure Connections *(Managed through FESS processes)*
  - General Plant Projects *(Managed through FESS processes)*
- International Interface *(Managed through WBS 121.02)*
  - Cryogenic plant is Indian partner deliverable

As a reminder, Subproject Requirement Changes is the highest Conventional Facilities risk

FESS is the Facilities Engineering Services Section

[1] See PIP-II Systems Engineering Management Plan at PIP-II-doc-1539

Interfaces

43: High Power RF

88: Linac Installation

67: Building Infrastructure

Risk Management

Charge #2,7

Conventional Facilities Risks

- **0** High Risks
- **15** Medium Risks
- **31** Low Risks

Top 3 Risks

- RT-121-06-001 – Subproject Requirement Changes
- RT-121-06-002 – Accelerator Shutdown Schedule
- RT-121-06-003 – Construction Bids Exceed Estimates

Link to Risk Register:
https://fermipoint.fnal.gov/organization/ocoo/ippm/Lists/Risk%20Register/all-risks.aspx

Environment Safety and Health (ES&H)

Charge #6

Consider and plan for ES&H issues throughout the project life cycle

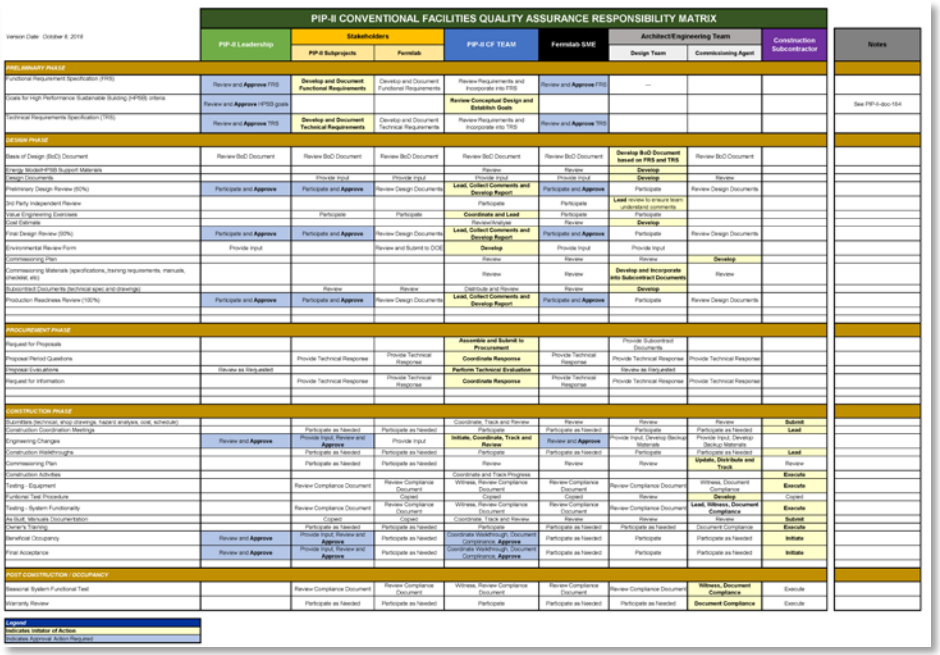
- Conceptual Design Phase
  - ES&H input includes review of the design, input from Tritium Task Force and Life Safety Analysis [1]
- Design Phase
  - ES&H is considered in A/E selection process;
  - ES&H is included in design reviews;
  - Implement Safety by Design process;
  - Incorporate Hazard Analysis Report hazards in the design process [2]
- Procurement/Construction Phase
  - Include safety performance as part of the subcontractor selection process;
  - Detail the responsibilities for team members including the Construction Subcontractor and Fermilab Construction Coordinator;
  - Independent oversight by ESH&Q Section

[1] Life Safety Analysis can be found at PIP-II-doc-120
[2] Hazard Analysis Report can be found at PIP-II-doc-140

Quality Management

Charge #6

- Process to date include:
  - Requirement and Specification Review (PIP-II process) [1]
  - Comment and Compliance Review (FESS/E process)
  - QAQC Process Report (A/E process)



PIP-II CONVENTIONAL FACILITIES QUALITY ASSURANCE RESPONSIBILITY MATRIX

	PIP-II Leadership	Stakeholders: PIP-II Subprojects	Stakeholders: Fermilab	PIP-II CF TEAM	Fermilab SME	Architect/Engineering Team: Design Team	Architect/Engineering Team: Commissioning Agent	Construction Subcontractor	Notes
PRELIMINARY PHASE									
Functional Requirement Specification (FRS)	Review and Approve FRS	Develop and Document Functional Requirements	Develop and Document Functional Requirements	Review Requirements and Incorporate into FRS	Review and Approve FRS	--			
Goals for High Performance Sustainable Building (HPSB) criteria	Review and Approve HPSB goals			Review Conceptual Design and Establish Goals					See PIP-II-doc-164
Technical Requirements Specification (TRS)	Review and Approve TRS	Develop and Document Technical Requirements	Develop and Document Technical Requirements	Review Requirements and Incorporate into TRS	Review and Approve TRS				
DESIGN PHASE									
Basis of Design (BoD) Document	Review BoD Document	Review BoD Document	Review BoD Document	Review BoD Document	Review BoD Document	Develop BoD Document based on FRS and TRS	Review BoD Document		
Energy Model/HPSB Support Materials				Review	Review	Develop			
Design Documents		Provide Input	Provide Input	Provide Input	Provide Input	Develop	Review		
Preliminary Design Review (60%)	Participate and Approve	Participate and Approve	Review Design Documents	Lead, Collect Comments and Develop Report	Participate and Approve	Participate	Review Design Documents		
3rd Party Independent Review				Participate	Participate	Lead review to ensure team understand comments			
Value Engineering Exercises		Participate	Participate	Coordinate and Lead	Participate	Participate			
Cost Estimate				Review/Analyse	Review	Develop			
Final Design Review (90%)	Participate and Approve	Participate and Approve	Review Design Documents	Lead, Collect Comments and Develop Report	Participate and Approve	Participate	Review Design Documents		
Environmental Review Form	Provide Input		Review and Submit to DOE	Develop	Provide Input	Provide Input			
Commissioning Plan				Review	Review	Review	Develop		
Commissioning Materials (specifications, training requirements, manuals, checklist, etc)				Review	Review	Develop and Incorporate into Subcontract Documents	Review		
Subcontract Documents (technical spec and drawings)		Review	Review	Distribute and Review	Review	Develop			
Production Readiness Review (100%)	Participate and Approve	Participate and Approve	Review Design Documents	Lead, Collect Comments and Develop Report	Participate and Approve	Participate	Review Design Documents		
PROCUREMENT PHASE									
Request for Proposals				Assemble and Submit to Procurement		Provide Subcontract Documents			
Proposal Period Questions		Provide Technical Response	Provide Technical Response	Coordinate Response	Provide Technical Response	Provide Technical Response	Provide Technical Response		
Proposal Evaluations	Review as Requested			Perform Technical Evaluations		Review as Requested			
Request for Information		Provide Technical Response	Provide Technical Response	Coordinate Response	Provide Technical Response	Provide Technical Response	Provide Technical Response		
CONSTRUCTION PHASE									
Submittals (technical, shop drawings, hazard analysis, cost, schedule)				Coordinate, Track and Review	Review	Review	Review	Submit	
Construction Coordination Meetings		Participate as Needed	Participate as Needed	Participate	Participate as Needed	Participate	Participate as Needed	Lead	
Engineering Changes	Review and Approve	Provide Input, Review and Approve	Provide Input	Initiate, Coordinate, Track and Review	Review and Approve	Provide Input, Develop Backup Materials	Provide Input, Develop Backup Materials		
Construction Walkthroughs		Participate as Needed	Participate as Needed	Participate	Participate as Needed	Participate	Participate as Needed	Lead	
Commissioning Plan		Participate as Needed	Participate as Needed	Review	Review	Review	Update, Distribute and Track	Review	
Construction Activities				Coordinate and Track Progress				Execute	
Testing - Equipment		Review Compliance Document	Review Compliance Document	Witness, Review Compliance Document	Review Compliance Document	Review Compliance Document	Witness, Document Compliance	Execute	
Functional Test Procedure			Copied	Copied	Copied	Review	Develop	Copied	
Testing - System Functionality		Review Compliance Document	Review Compliance Document	Witness, Review Compliance Document	Review Compliance Document	Review Compliance Document	Lead, Witness, Document Compliance	Execute	
As-Built, Manuals Documentation		Copied	Copied	Coordinate, Track and Review	Review	Review	Review	Submit	
Owner's Training		Participate as Needed	Participate as Needed	Participate	Participate as Needed	Participate as Needed	Document Compliance	Execute	
Beneficial Occupancy	Review and Approve	Provide Input, Review and Approve	Participate as Needed	Coordinate Walkthrough, Document Compliance, Approve	Participate as Needed	Participate	Participate as Needed	Initiate	
Final Acceptance	Review and Approve	Provide Input, Review and Approve	Participate as Needed	Coordinate Walkthrough, Document Compliance, Approve	Participate as Needed	Participate	Participate as Needed	Initiate	
POST CONSTRUCTION / OCCUPANCY									
Seasonal System Functional Test		Review Compliance Document	Review Compliance Document	Witness, Review Compliance Document	Review Compliance Document	Review Compliance Document	Witness, Document Compliance	Execute	
Warranty Review		Participate as Needed	Participate as Needed	Participate	Participate as Needed	Participate as Needed	Document Compliance	Execute	

Legend
Indicates Initiator of Action
Indicates Approval Action Required

[1] PIP-II Quality Assurance Plan is at PIP-II-doc-142
See PIP-II-doc-2291 for Quality Assurance Responsibility Matrix

Response to Recommendations

Charge # 8

- Director's CD-1 Review (October 2017) [1]
  - 2 Recommendations, both closed
- DOE CD-1 Review (December 2017) [2]
  - 3 Recommendations, all closed
- P2MAC Review (March 2018) [3]
  - 3 Recommendations, all closed

Link to iTrack database: https://www.esh.fnal.gov/pls/cert/iTrackRPT.html

[1] Review ID 47866
[2] Review ID 48107
[3] Review ID 48469

Summary

- Focus of Technical Progress has been the Cryogenics Plant Building (CD-3A request) and the associated site work required.
- The Site Preparation work is 90% complete and on track for completion in December 2019;
- Project Management functions (ES&H, Quality, Interfaces and Risk) processes are in place and functioning;
- Previous review recommendations have been incorporated
- Thanks for your time.

END