Fermilab | U.S. DEPARTMENT OF ENERGY | Office of Science

WBS 121.06 Conventional Facilities

S. Dixon

Director's Review for CD-2/3a

30 July 2019

In partnership with:

India/DAE

Italy/INFN

UK/STFC

France/CEA/Irfu, CNRS/IN2P3

About Me

- PIP-II Level 2 Manager for Conventional Facilities
- Relevant Experience
  - Licensed Architect;
  - Project Management Professional (PMP);
  - LEED Accredited Professional;
  - 27+ 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 17+ years
    - Short Baseline Neutrino (SBN) Near Detector Building;
    - Short Baseline Neutrino (SBN) Far Detector Building;
    - Experimental Operations Center;

Agenda

Scope/Deliverables

Organization/Team

Performance Requirements

Technical Progress to Date

Cost and Schedule

Risks and Mitigations

Quality

Breakout Sessions

Summary

Charge Questions Addressed

1. Does the proposed technical design satisfy the performance requirements? Do the key performance parameters provide a satisfactory indication of the project's completeness?
2. Is the resource-loaded schedule complete, consistent and credible so that it can serve as the cost and schedule part of the project's performance baseline? Is it compatible with the funding guidance provided by HEP? Have the project's risks been fully analyzed and accounted for in the contingency estimate?
3. Is the technical scope contributed by international partners sufficiently understood and documented to support the baseline cost and schedule? Does the project have a credible plan for managing and accepting these deliverables, including the associated ESH, Procurement, and QA elements? Is associated risk management strategy appropriate?
4. Is the scope of the CD3a package appropriate and justified? Are the associated designs sufficiently mature to support the requested CD3a cost and schedule? Have the appropriate design and/or readiness reviews occurred, or, if not, does the project have a credible plan for completing these reviews in a timely manner?
5. Is the scope of work associated with upgrades to the existing accelerator complex appropriate and necessary to achieve PIP-II KPPs? Are interfaces to the existing accelerator complex identified and defined? For the planned hardware upgrades, final designs rely on understanding the performance of the complex using a new operating mode. Does the project plan include the appropriate simulation and/or performance studies to ensure the complex will be capable of 1.2 MW operation?
6. Is the project team properly staffed with individuals that have the required skills to deliver the proposed technical scope within the baseline budget and schedule?
7. Does the project utilize a certified EVMS system and have they demonstrated their ability to utilize it as an effective project management tool?
8. Is the documentation required by DOE Order 413.3B for CD-2/CD-3A complete and in good order?
9. Are ES&H aspects being properly addressed given the project's current stage of development?
10. Has the project responded satisfactorily to the recommendations from previous reviews?

PIP-II

Scope/Deliverables

Charge #3

- Conventional Facilities includes the design, procurement and construction of the utilities, roads, structures, enclosures and buildings to support the installation, assembly and operation of the technical components. [1]
- WBS
  - 121.06.01 – Project Management and Coordination
  - 121.06.02 – Site Preparation
  - 121.06.03 – Cryogenics Plant Building (28,300 square feet)
  - 121.06.04 – Utility Plant
  - 121.06.05 – Linac Complex (88,600 square feet)
  - 121.06.06 – Booster Connection (7,800 square feet)

[1] See WBS Dictionary in PIP-II-doc-599 for complete description

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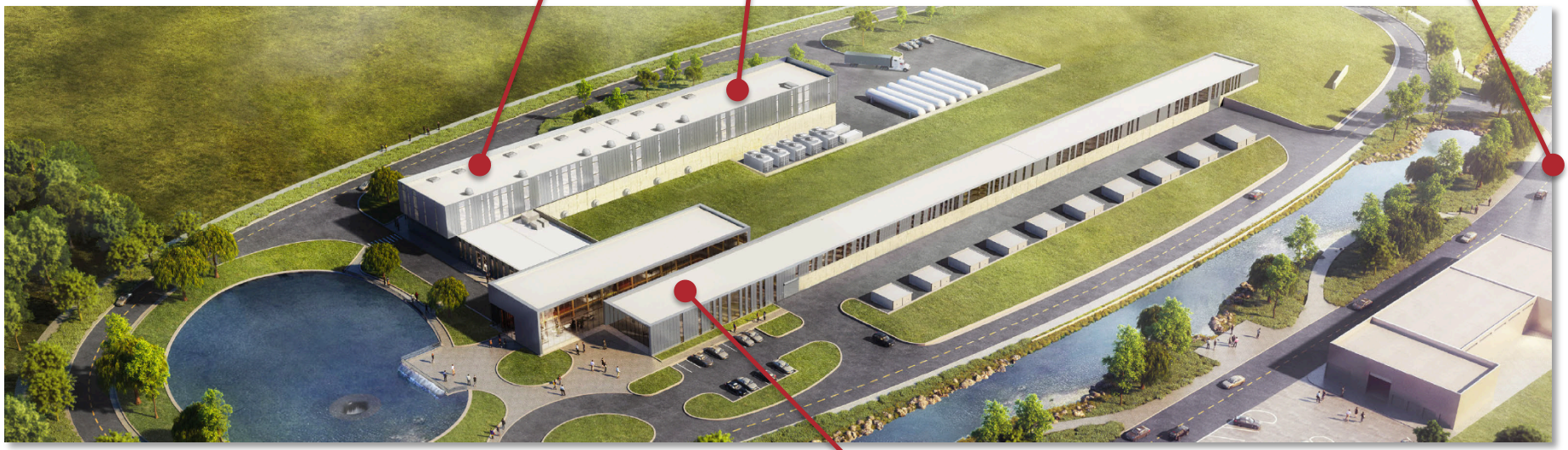
Scope/Deliverables

Cryogenics Plant Building (WBS 121.06.03)

Utility Plant (WBS 121.06.04)

Booster Connection (WBS 121.06.06)



Site Preparation (WBS 121.06.02)

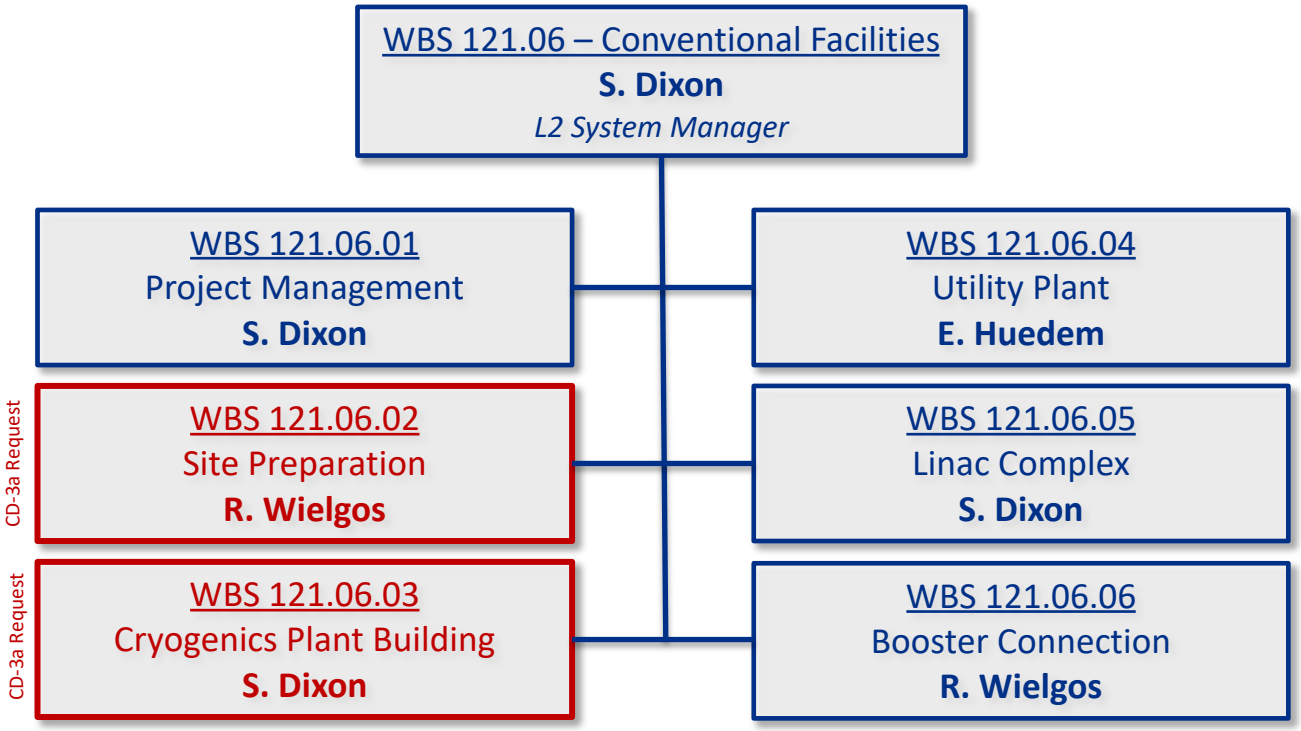
- Site Clearing
- Site Work
- Site Restoration and Landscaping

Linac Complex (WBS 121.06.05)

- High Bay Building
- Linac Tunnel
- Linac Gallery
- Beam Transfer Line

Organization/Team

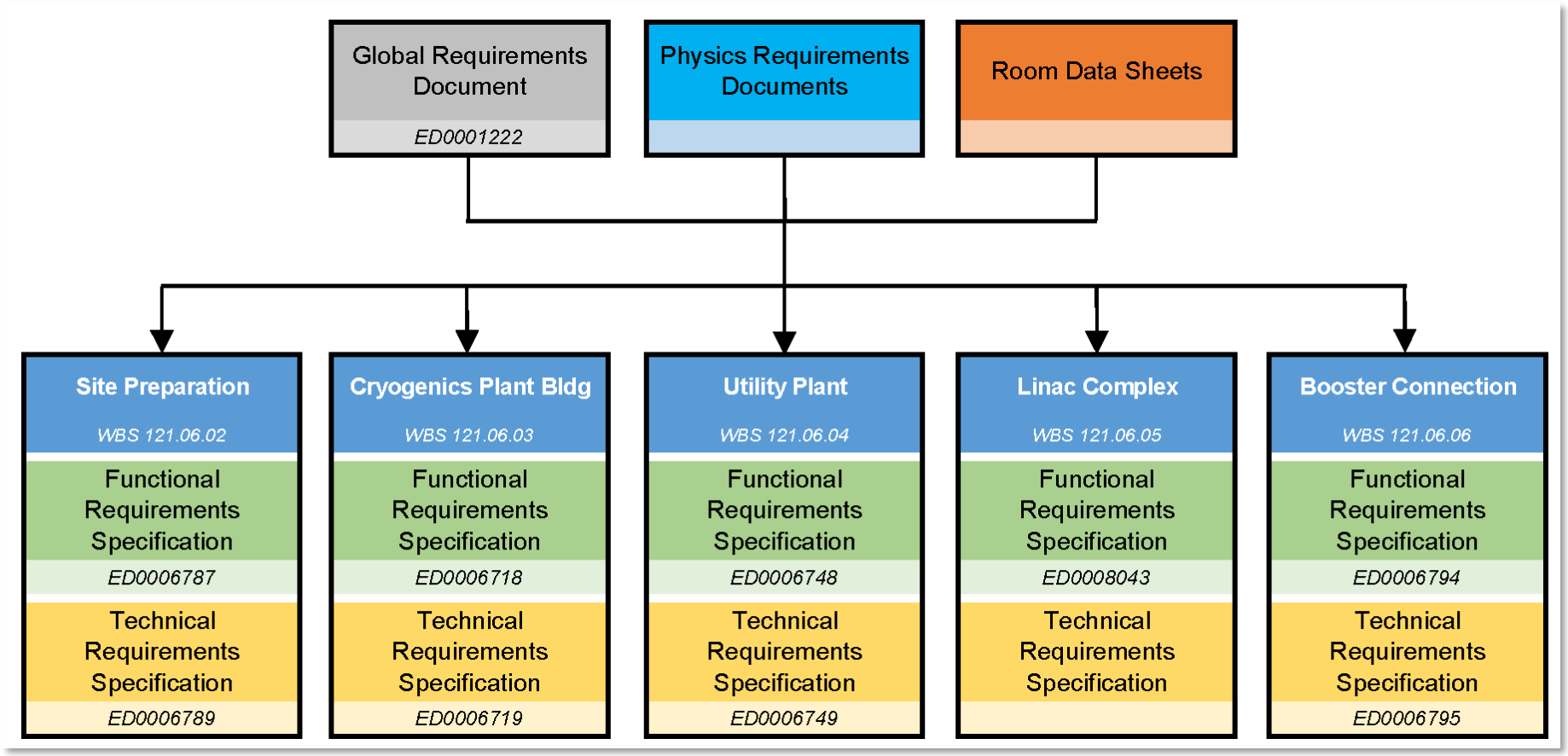
Charge #6



Architect/Engineer Team
Gensler (architecture), IMEG (mechanical, electrical, plumbing), TGRWA (structural), CMT (civil), Jensen Hughes (life safety), Syska Hennessy (commissioning), Hoerr Schaudt (landscaping)

Performance Requirements

Charge #1



Technical Progress to Date

Charge #1

- General Progress Milestones
  - January 2018 - Value Engineering Workshop [1]
  - April 2018 – Received updated cost/schedule estimate [2]
  - June 2018
    - Completed Geotechnical Engineering Investigation [3]
    - Chartered and held the first meeting of the PIP-II Architectural Advisory Board [4]
  - July 2018 - Received favorable wetland determination for the US ACOE [5]
  - December 2018 – Completed the A/E selection process
  - January 2019 – Finding of No Significant Impact [6]

[1] See PIP-II-doc-1377
[2] See PIP-II-doc-333
[3] See PIP-II-doc-1533
[4] See PIP-II-doc-1308 and PIP-II-doc-1548
[5] See PIP-II-doc-1630
[6] See PIP-II-doc-1151

PIP-II

Technical Progress to Date – WBS 121.06.02

Site Preparation

- Design
  - Started design in April 2018
  - Completed design in January 2019
- Construction Packages
  - Site Clearing
  - Site Preparation **SC4-Dixon**
  - Site Restoration

Technical Progress to Date – WBS 121.06.02

Site Clearing Construction Package

- Consists of erosion control measures, temporary access road, tree removal and topsoil stockpiling
- Completed design in October 2018[1]
- DOE Authorization for PIP-II Project-Related Site Clearing Work Prior to CD-2/3 in November 2018 [2]
- Received General NPDES[3] Permit from IEPA[4] in March 2019
- Construction
  - Began in March 2019
  - Completed in July 2019

[1] See PIP-II-doc-2524
[2] See PIP-II-doc-2524
[3] NPDES is National Polluant Discharge Elimination System, See PIP-II-doc-1151
[4] IEPA is Illinois Environnemental Protection Agency, See PIP-II-doc-1151

Technical Progress to Date – WBS 121.06.02


Looking Southeast From Wilson Hall – Fall 2016


Looking East From Wilson Hall – July 2019

Technical Progress to Date – WBS 121.06.03

Cryogenics Plant Building

SC4-Dixon

- Design
  - Technical Requirements refinement started in May 2018
  - Design began in January 2019
  - Completed design in July 2019
- Overview
  - Includes the functions of the Utility Plant Building
  - 28,300 square foot building
  - Shallow concrete foundation
  - Structural steel frame
  - Precast/Metal Siding
  - Two 25 Ton Cranes

PIP-II

Technical Progress to Date

Utility Plant (WBS 121.06.04)

- The utility plant space incorporated in the Cryogenics Plant Building.
- This package will outfit the space with mechanical equipment and utilities.

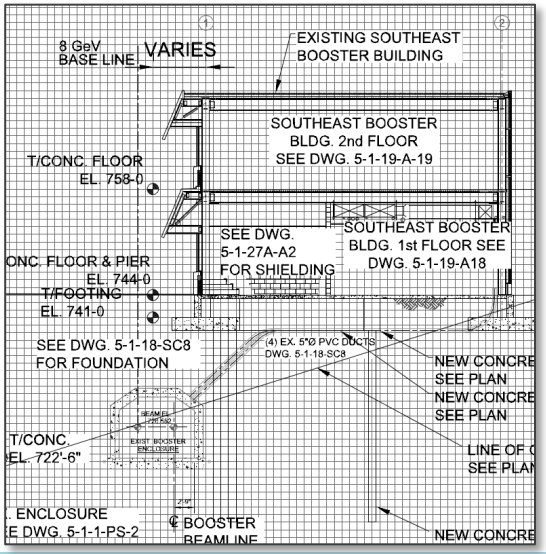
Linac Complex (WBS 121.06.05)

- Conceptual Design Update
  - Coordination meetings with subprojects to understand requirement changes since the conceptual design.
  - Started in March 2019
  - Scheduled to be complete in November 2019
  - Used for the basis for the final design scope and cost/schedule update.

Technical Progress to Date

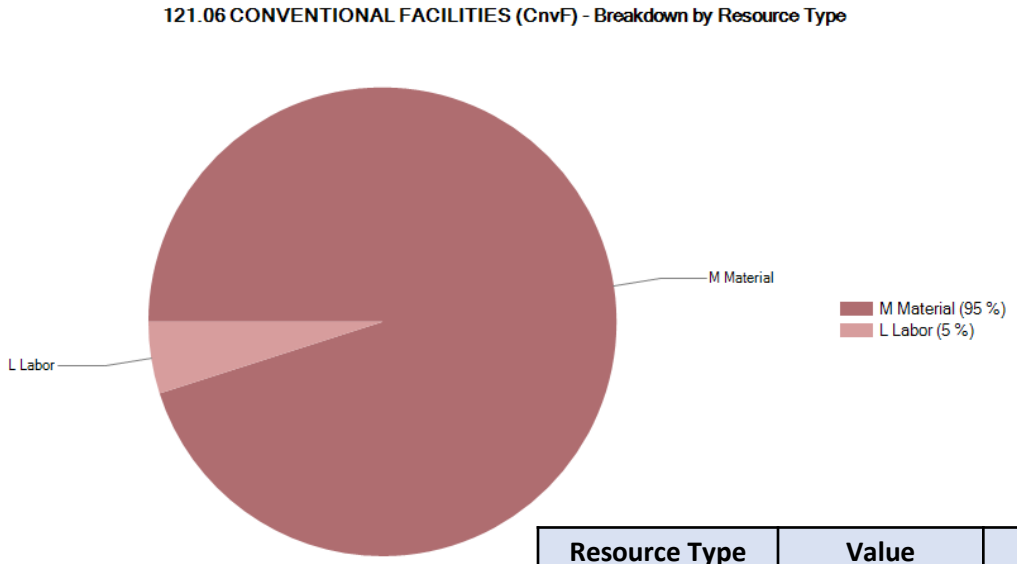
Booster Connection (WBS 121.06.06)

- Also part of the Conceptual Design Update
- Construction strategy change
  - Original design removed the Booster Tower Southeast and utilized open cut construction
  - Based on concerns about impact to the Booster Enclosure, an alternate strategy will an utilize earth retention system and connect with a beam pipe.



Cost Estimate

Charge #2



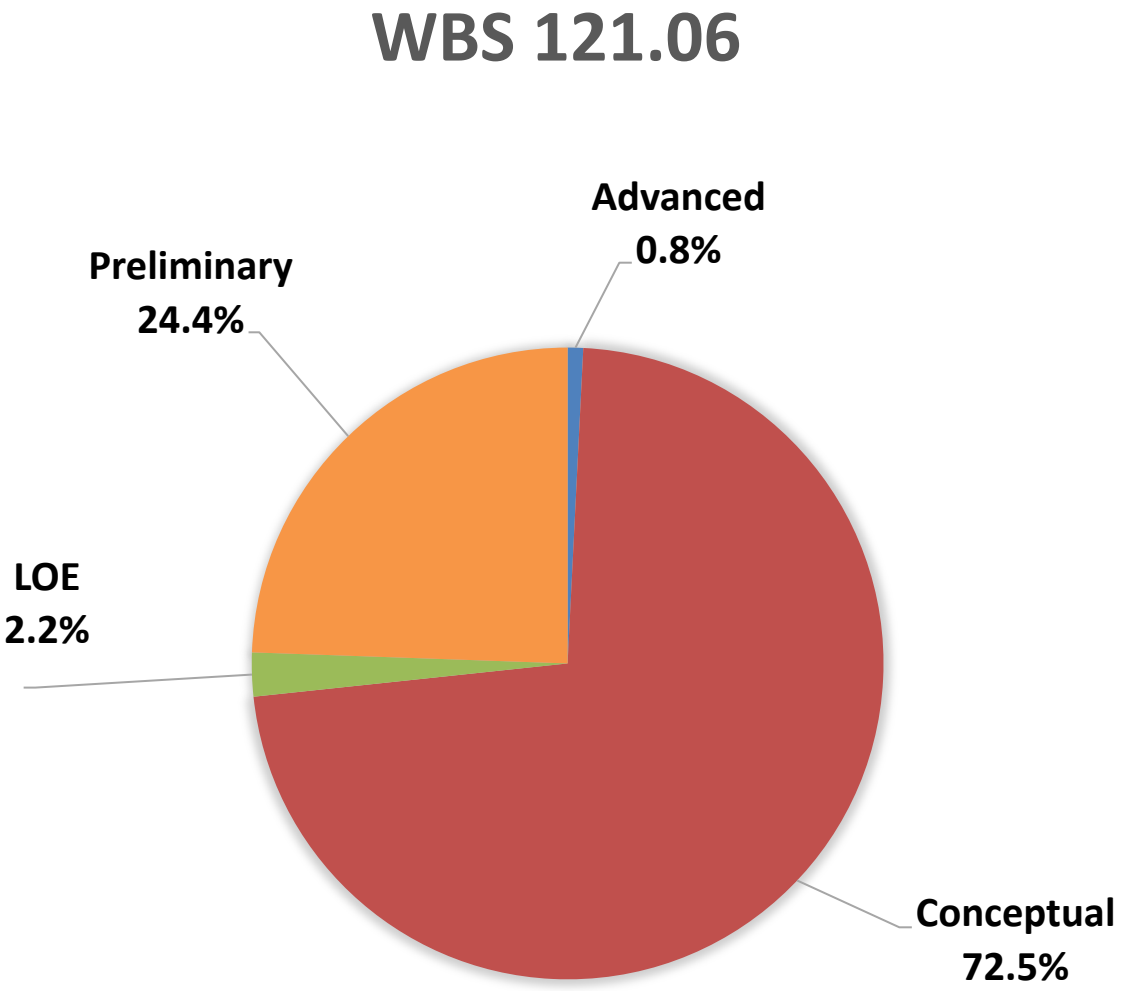
Resource Type	Value	%
M Material	$161,679,733	95%
L Labor	$8,408,055	5%

Managed Amount

WBS	Direct Hours	Direct M&S	Full Burden + ESC	EUC	% EU	Total Cost
121.06.01 CnvF - Project Management and Coordination (PM)	17,187	$ 17 K	$ 3,095 K	$ 263 K	8.5%	$ 3,358 K
121.06.02 CnvF - Site Preparation (SitePrep)	6,324	$ 17,608 K	$ 21,037 K	$ 3,768 K	17.9%	$ 24,805 K
121.06.03 CnvF - Cryoplant Building (CryoB)	3,155	$ 18,092 K	$ 21,254 K	$ 5,115 K	24.1%	$ 26,369 K
121.06.04 CnvF - Utility Building (UtilB)	3,787	$ 10,626 K	$ 13,533 K	$ 3,933 K	29.1%	$ 17,466 K
121.06.05 CnvF - Linac Complex (Cmplx)	7,011	$ 81,203 K	$ 98,997 K	$ 37,800 K	38.2%	$ 136,797 K
121.06.06 CnvF - Booster Connection (BstrC)	7,444	$ 8,138 K	$ 12,172 K	$ 5,437 K	44.7%	$ 17,610 K
Total	44,908	$ 135,684 K	$ 170,088 K	$ 56,316 K	33.1%	$ 226,404 K

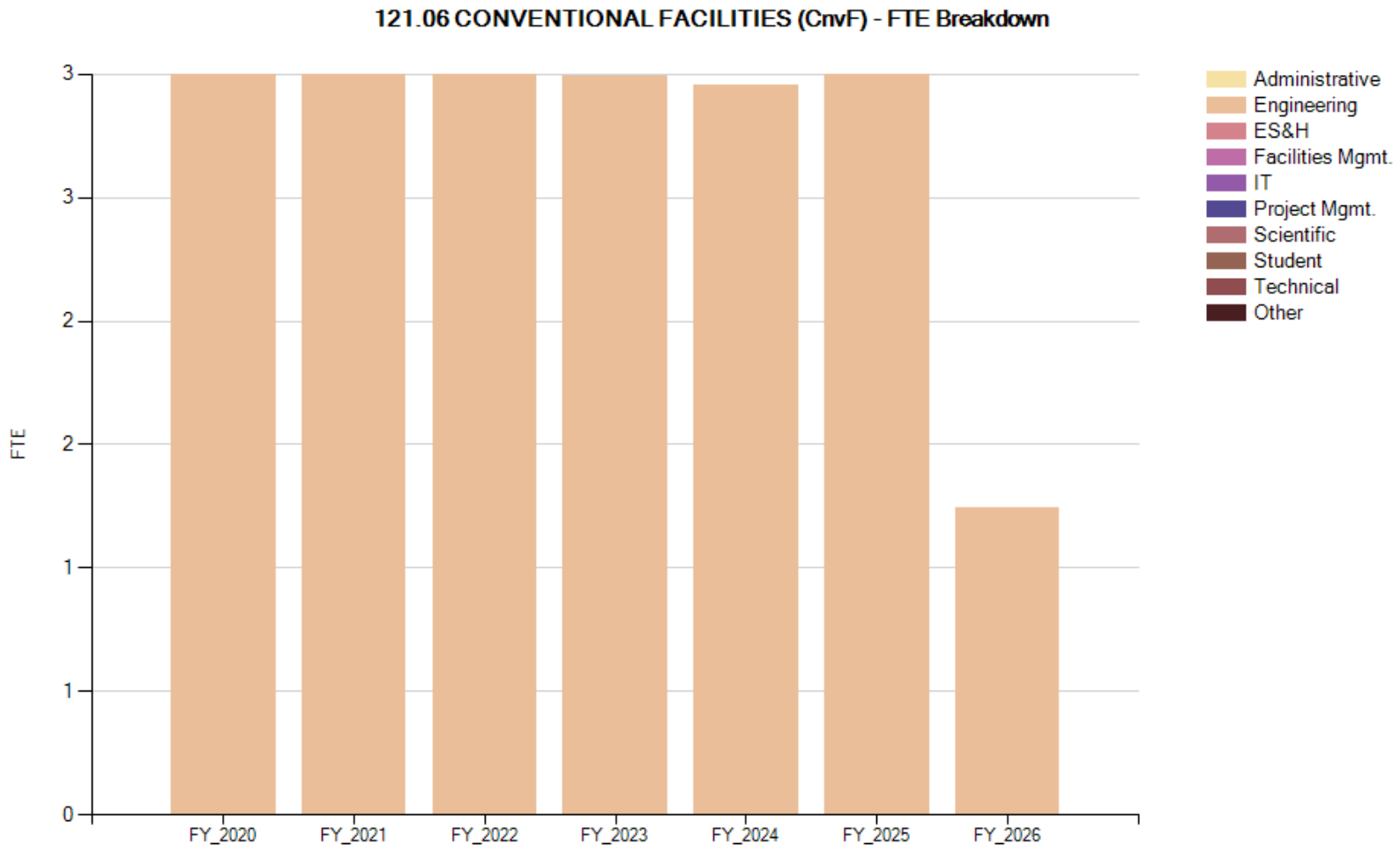
Estimate Quality

Charge #2



FTE Breakdown

Charge #2



Schedule

Charge #2

Risks and Mitigations

Charge #2,3

- Following the procedures contained in the PIP-II Risk Management Plan [1]
- 21 currently managed risks

Type	Quantity
High	1
Medium	6
Low	12
Negligible	2
Opportunity	2

Closed	23

Top Five Risks

Risk Type	RI-ID	Title	Probability	Cost Impact
Threat	RT-121-06-008	CnvF: Cryoplant industrial cooling water capacity is insufficient	40.00%	750 -- 1000 -- 2000 k$
Threat	RT-121-06-001	CnvF: Changes in subproject requirements affect Conventional Facilities	30.00%	250 -- 600 -- 2000 k$
Threat	RT-121-06-005	CnvF: Cryoplant design requirements insuffiently well defined	25.00%	10 -- 150 -- 500 k$
Threat	RT-121-06-010	CnvF: Interfaces between subprojects and conventional construction	25.00%	25 -- 150 -- 300 k$
Threat	RT-121-06-042	CnvF: Booster Impacts	20.00%	500 -- 1200 -- 2000 k$

[1] – Risk Management Plan can be found in PIP-II-doc-163

ES&H and Quality

Safety

SC4-Wielgos

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

- Design Phase, including Safety by Design
- Procurement
- Construction Phase
- Includes Sustainability Goals and Requirements

Quality Integrated Team Approach

SC4-Wielgos

- PIP-II Project Processes [1]
- A/E Design Processes *
- A/E Commissioning * Processes
- FESS Subject Matter Experts
- Laboratory Experts
- Construction Subcontractor *

[1] PIP-II Quality Assurance Plan is at PIP-II-doc-142

(*) Quality requirements are incorporated into consultant selection and subcontract terms and conditions

Breakout Sessions

Tuesday Afternoon

- Conventional Facilities Overview — SC4-Dixon
- CD-3a Scope – Site Preparation

Wednesday Morning

- CD-3a Scope - Cryogenics Plant — SC4-Dixon
  (Joint session with SC 3)
- Plan to CD-3 — SC4-Dixon
- Quality Assurance Strategy — SC4-Wielgos
- ES&H Strategy — SC4-Wielgos
- Lab Interfaces — SC4-Wielgos
- Review Recommendations — SC4-Dixon

Summary

- Cost and Schedule is understood.
- Design is complete for the Site Preparation and Cryogenics Plant Building (CD-3a requests).
- Plan in place for CD-3.
- Project Management processes (ES&H, Quality, Risks and EVMS) are in place and functioning.
- We are ready for CD-2 and CD-3a work authorization.
- Thank you for your time.