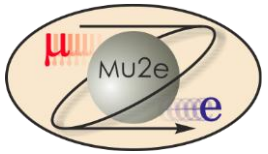
Fermilab

U.S. DEPARTMENT OF ENERGY Office of Science

WBS 475.04.09 Ancillary Equipment



Thomas Page
Project Engineer
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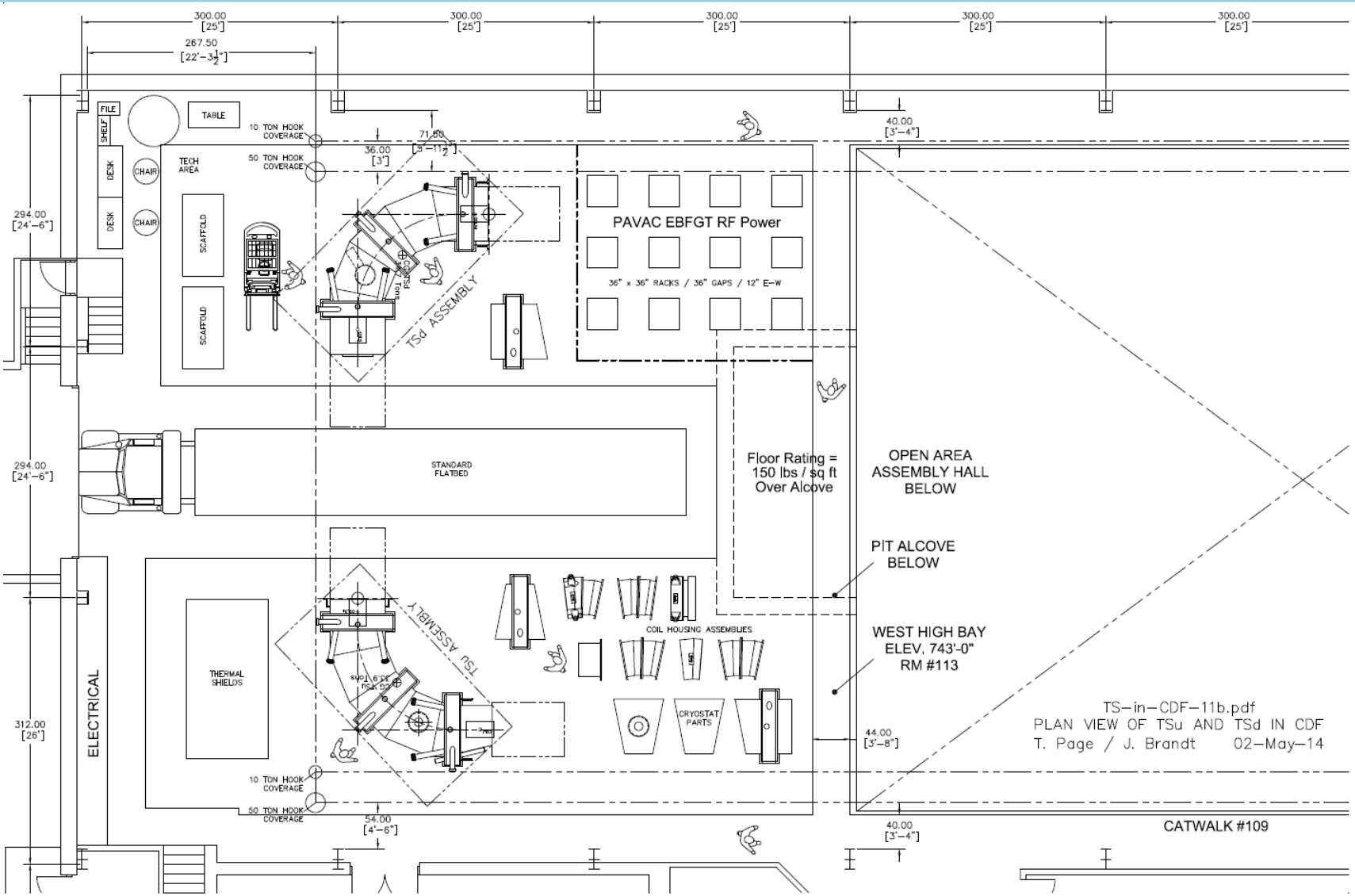
Requirements

- Transport Solenoid Magnet Assembly Area
  - Assembly area must have minimum 40 T crane, 18 ft hook clearance.
  - Enough room for TSu and TSd assembly in parallel with staging area for components.
- Below-the-Hook (BTH) Lifting fixtures
  - Capacity: 60T, using two tandem cranes in Mu2e building.
  - Must fit through hatches in Mu2e building.
- Installation equipment capable of moving magnets around within the lower level of the Mu2e building without crane coverage.

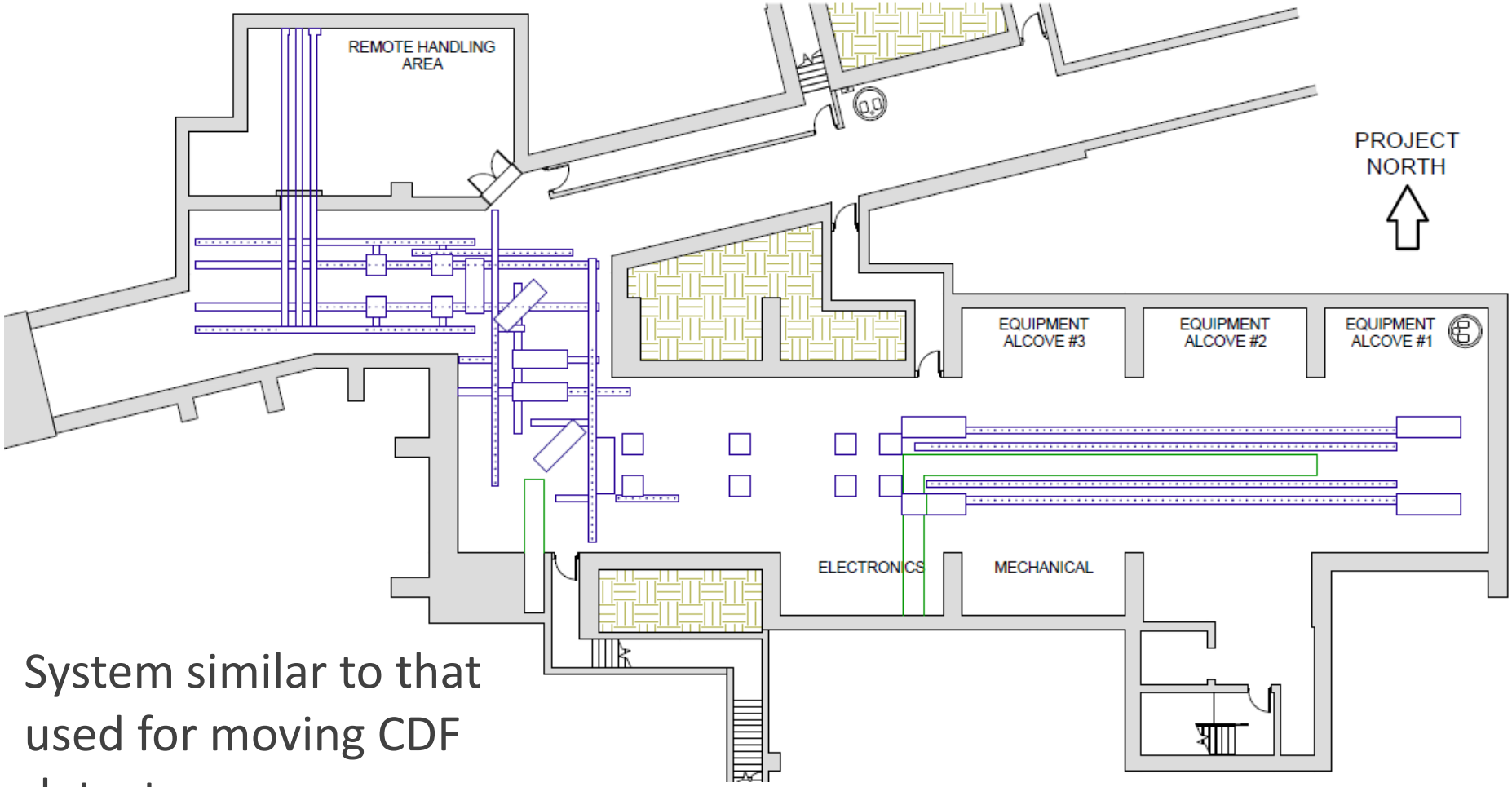
Transport Solenoid Magnet Assembly

- TSu and TSd final assembly will take place in the Heavy Assembly Building (HAB, formally CDF), west end.
  - TS coil modules and cryostat components procured from industry.
  - Final magnet assembly completed at Fermilab.
- Workflow for TS coil modules
  - Coil modules arrive at FNAL in IB4.
  - After initial QC, coils will be moved to Industrial Building 2.
  - Magnetic measurements and testing preparations are performed in Industrial Building 2.
  - Coil modules are moved to the Solenoid Test Facility for testing.
  - After testing, coil modules will be moved to HAB for assembly preparation and staging.

HAB (formally CDF) TS Assembly Layout



Mu2e Building Transport Rail Layout



System similar to that used for moving CDF detector.

Changes since CD-1

- Production Solenoid lowered through TS hatch instead of separate outside hatch.
- Assembly space was moved from the Industrial Center Building to HAB.

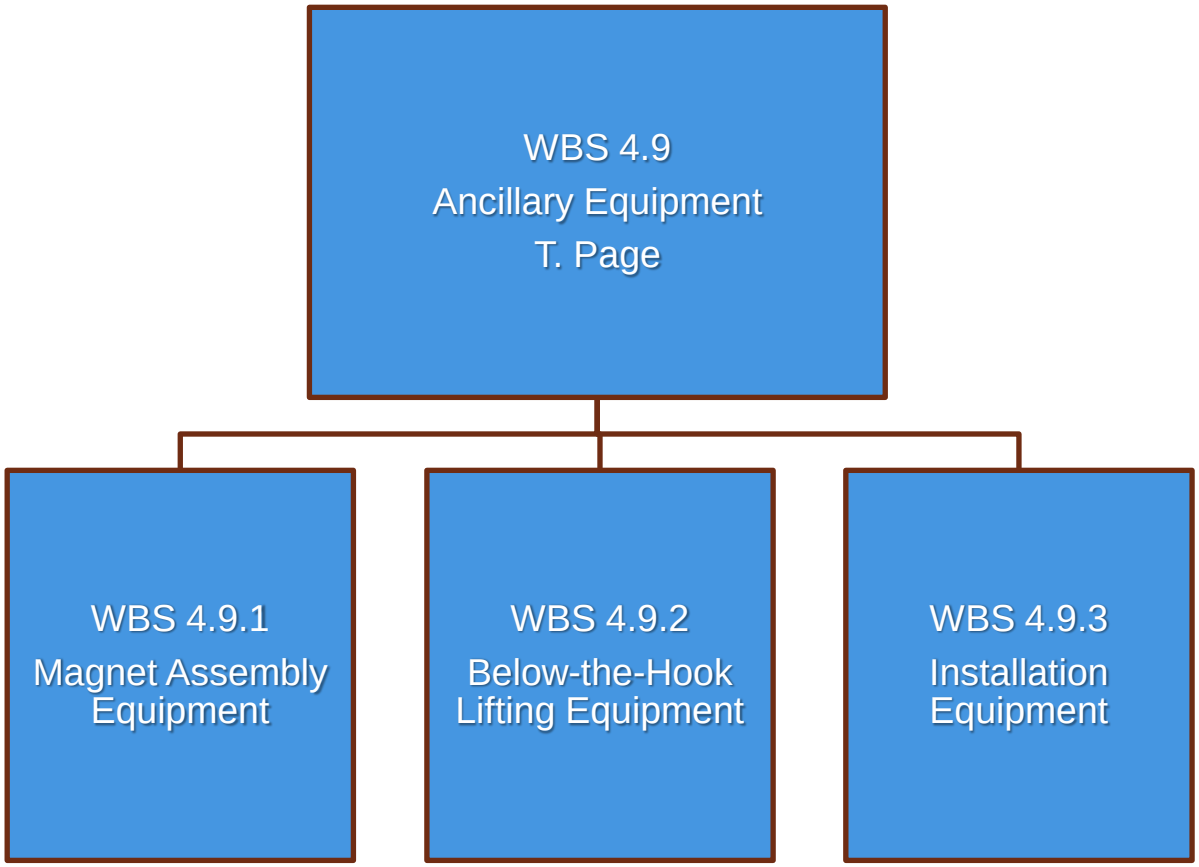
Value Engineering since CD-1

- Muon Beamline is using a similar rail system to allow for sharing of the magnet installation tooling.

Remaining work before CD-3

- Final tooling designs need to be completed when the magnet details are known.

Organizational Breakdown



Quality Assurance

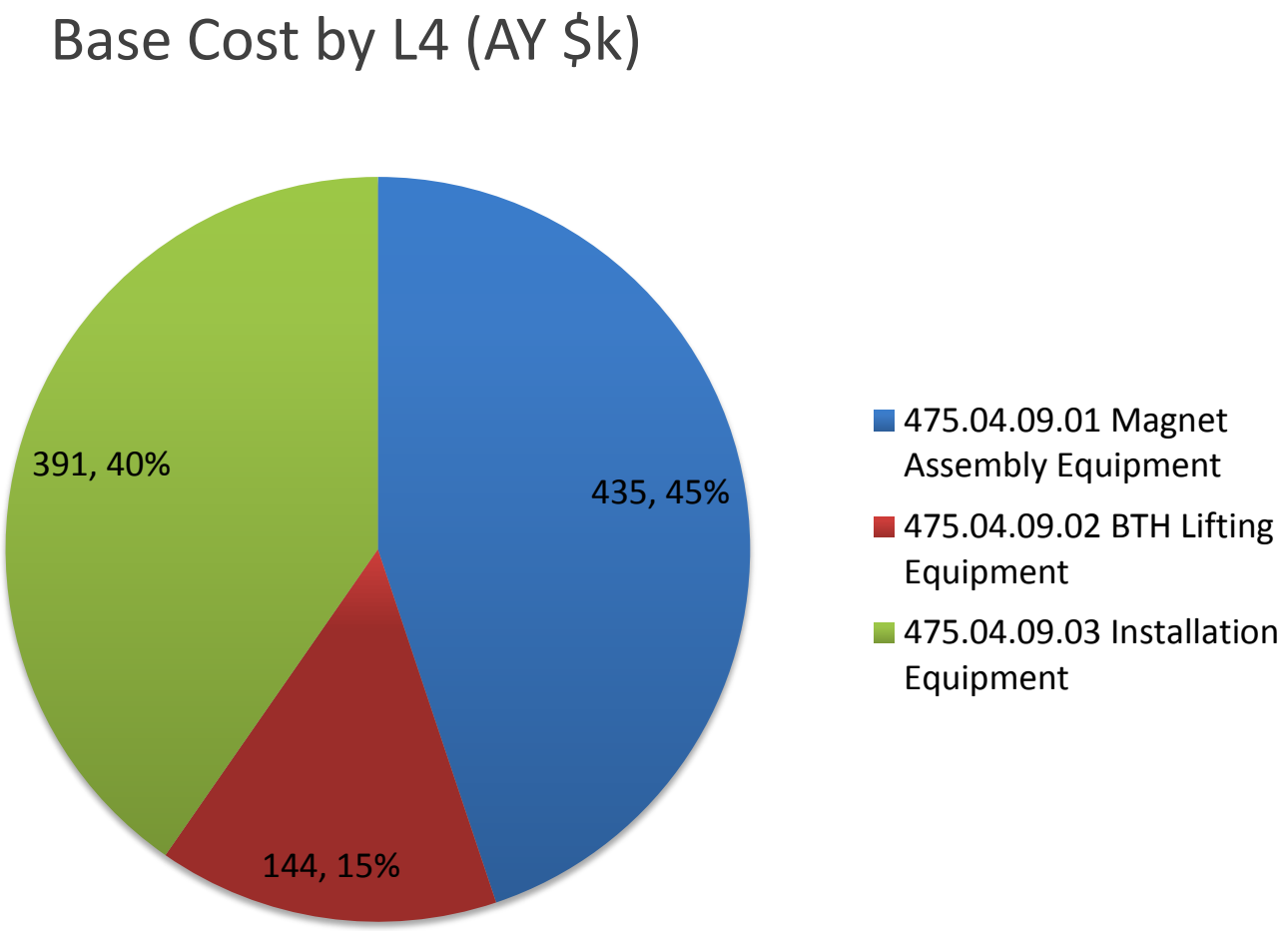
- Tooling components will be fully tested and qualified before use in production.
- BTH lifting fixtures will be load tested to 125% of capacity per FESHM 5022.

ES&H

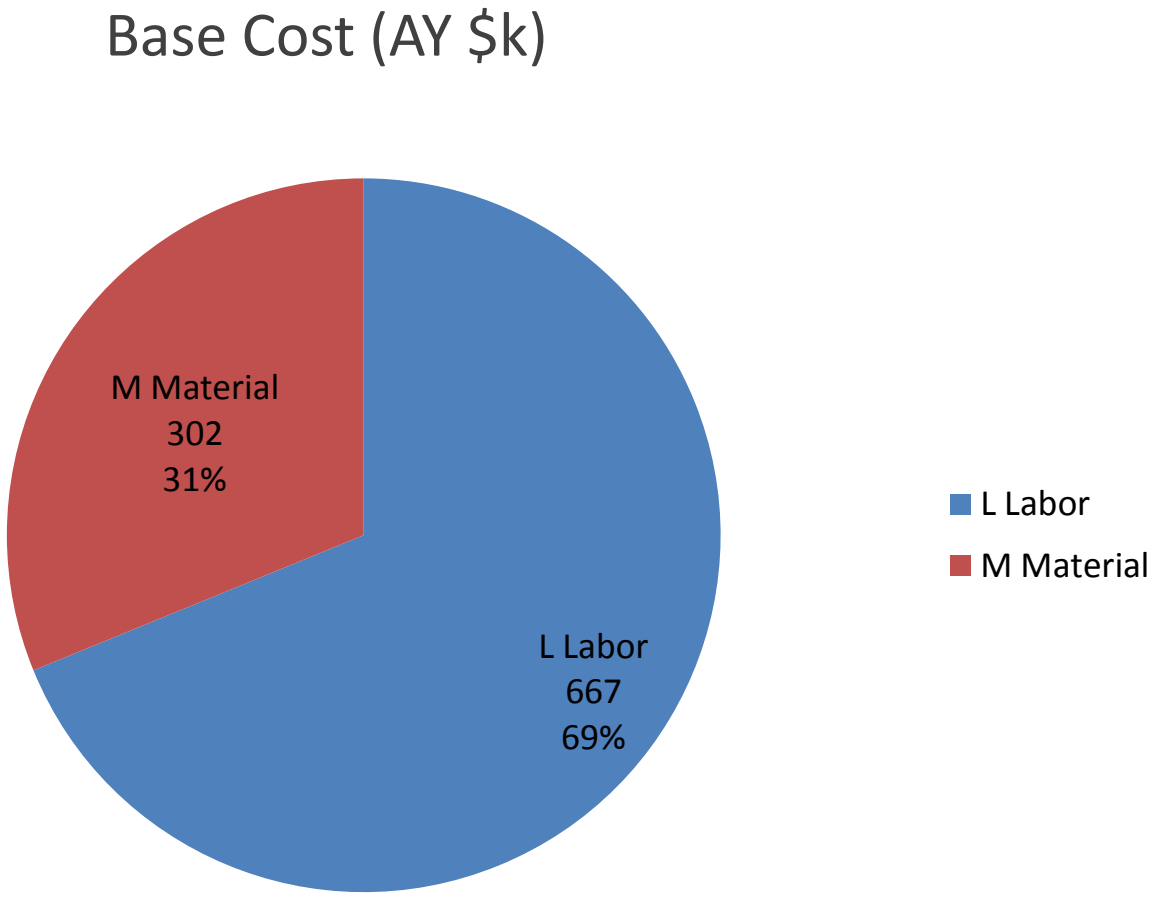
- BTH Lifting Fixtures will comply with the Fermilab ESH&Q Manual, Chapter 5022.

- HA's will be written and followed by workers covering the following:
  - Manipulating heavy objects
  - Personnel allowed to operate cranes
  - Personnel allowed to operate fork trucks
  - Proper PPE
  - Any special considerations

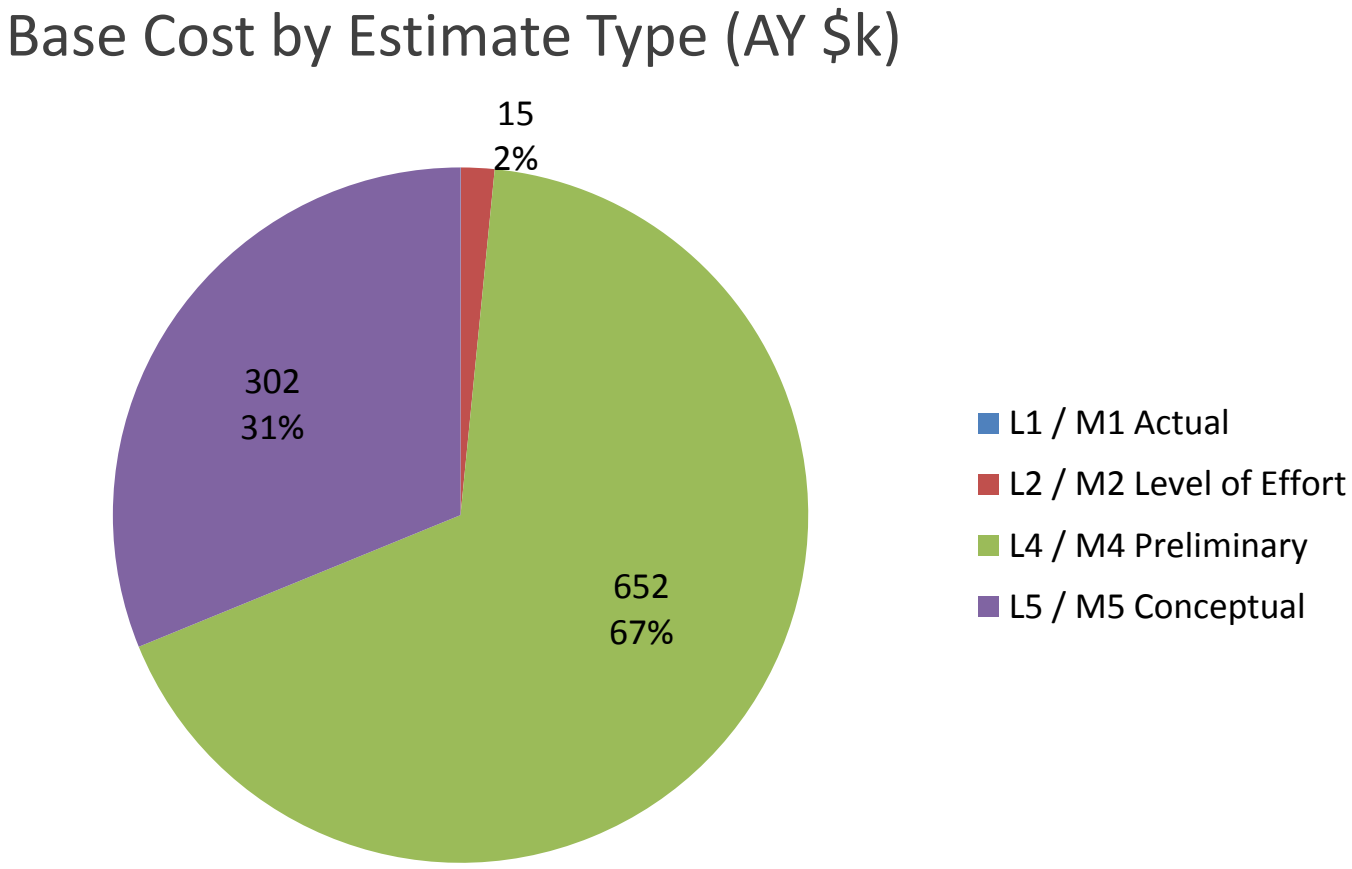
Cost Distribution by L4



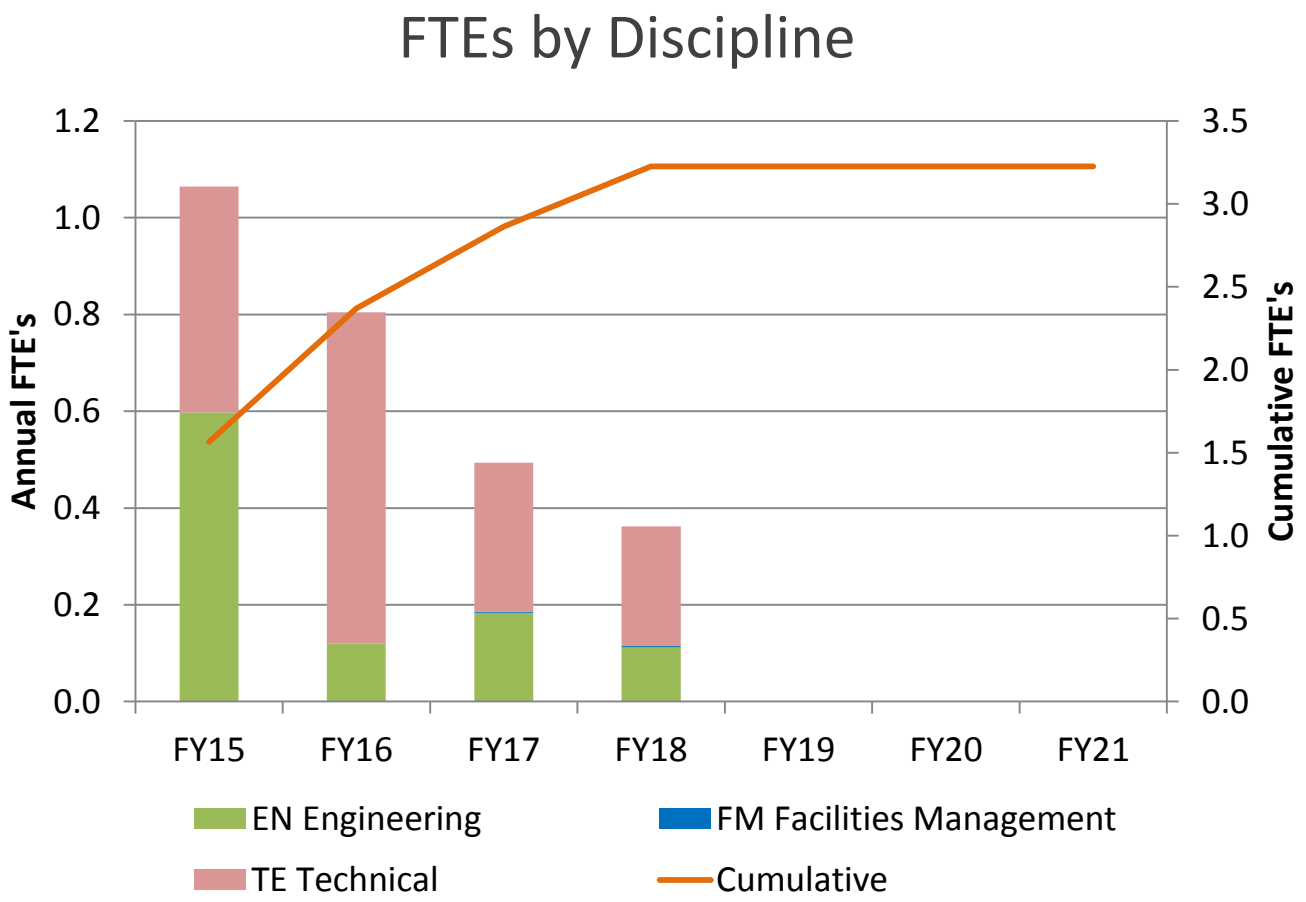
Cost Distribution by Resource Type



Quality of Estimate



Labor Resources



Cost Table

WBS 4.9 Ancillary Equipment

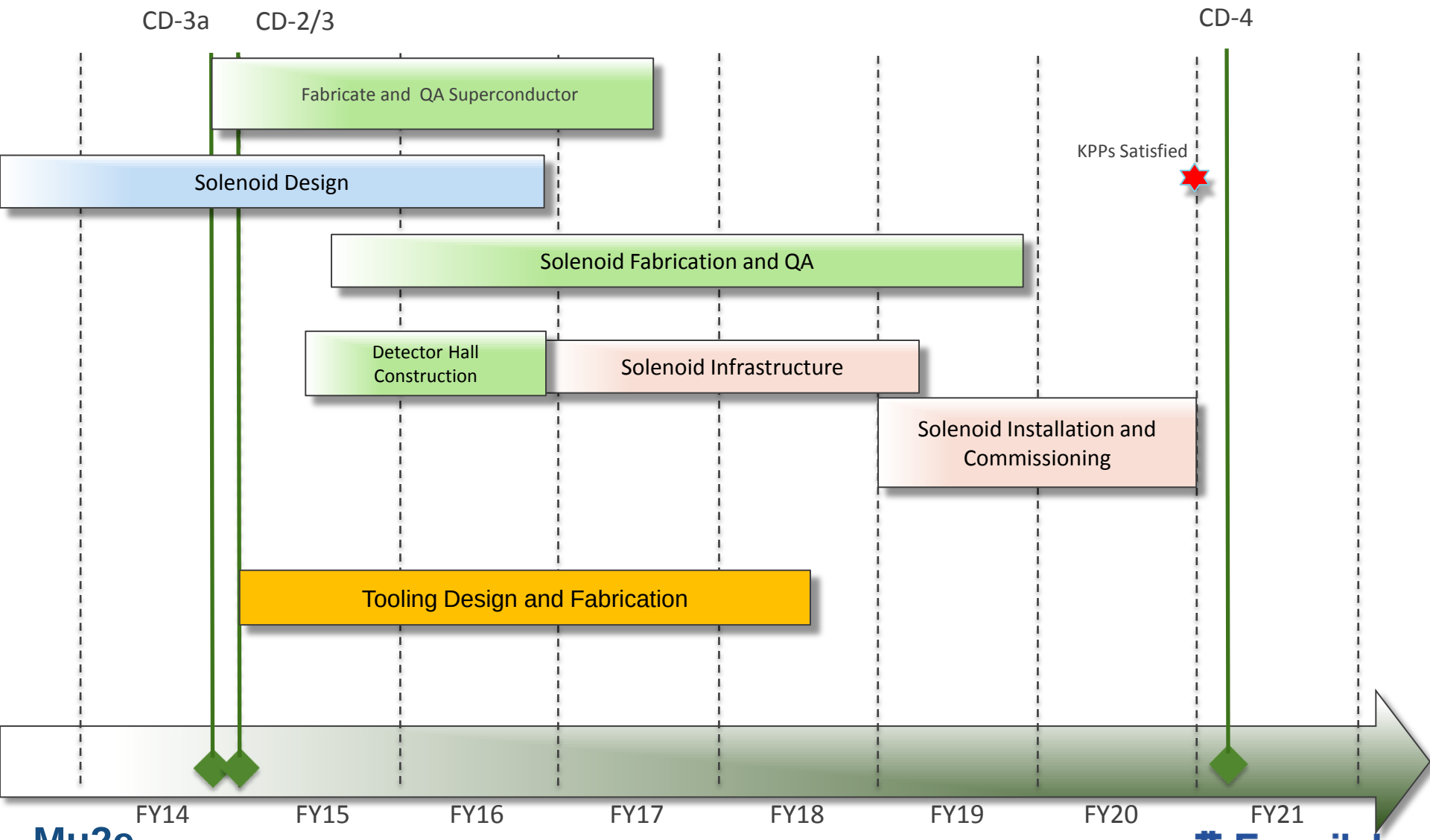
Costs are fully burdened in AY $k

	Base Cost (AY $k)					
	M&S	Labor	Total	Estimate Uncertainty (on remaining costs)	% Contingency on ETC	Total Cost
475.04 Solenoids						
475.04.09 Ancillary Equipment						
475.04.09 Ancillary Equipment				17		18
475.04.09.01 Magnet Assembly Equipment	105	330	435	184	44%	619
475.04.09.02 BTH Lifting Equipment	50	94	144	62	43%	205
475.04.09.03 Installation Equipment	147	244	391	171	44%	562
Grand Total	302	667	970	435	45%	1,404

Major Milestones

- Final Designs Complete

Schedule


CD-3a
CD-2/3
CD-4
Fabricate and QA Superconductor
KPPs Satisfied
Solenoid Design
Solenoid Fabrication and QA
Detector Hall Construction
Solenoid Infrastructure
Solenoid Installation and Commissioning
Tooling Design and Fabrication
FY14
FY15
FY16
FY17
FY18
FY19
FY20
FY21

Summary

- Components will comply with all applicable FESHM Chapters.
- Tooling components are ready for CD-2.