Integration and Milestones

Elton Smith

Hall D Detector Review

October 20-22, 2004

Focus on the following questions from the charge

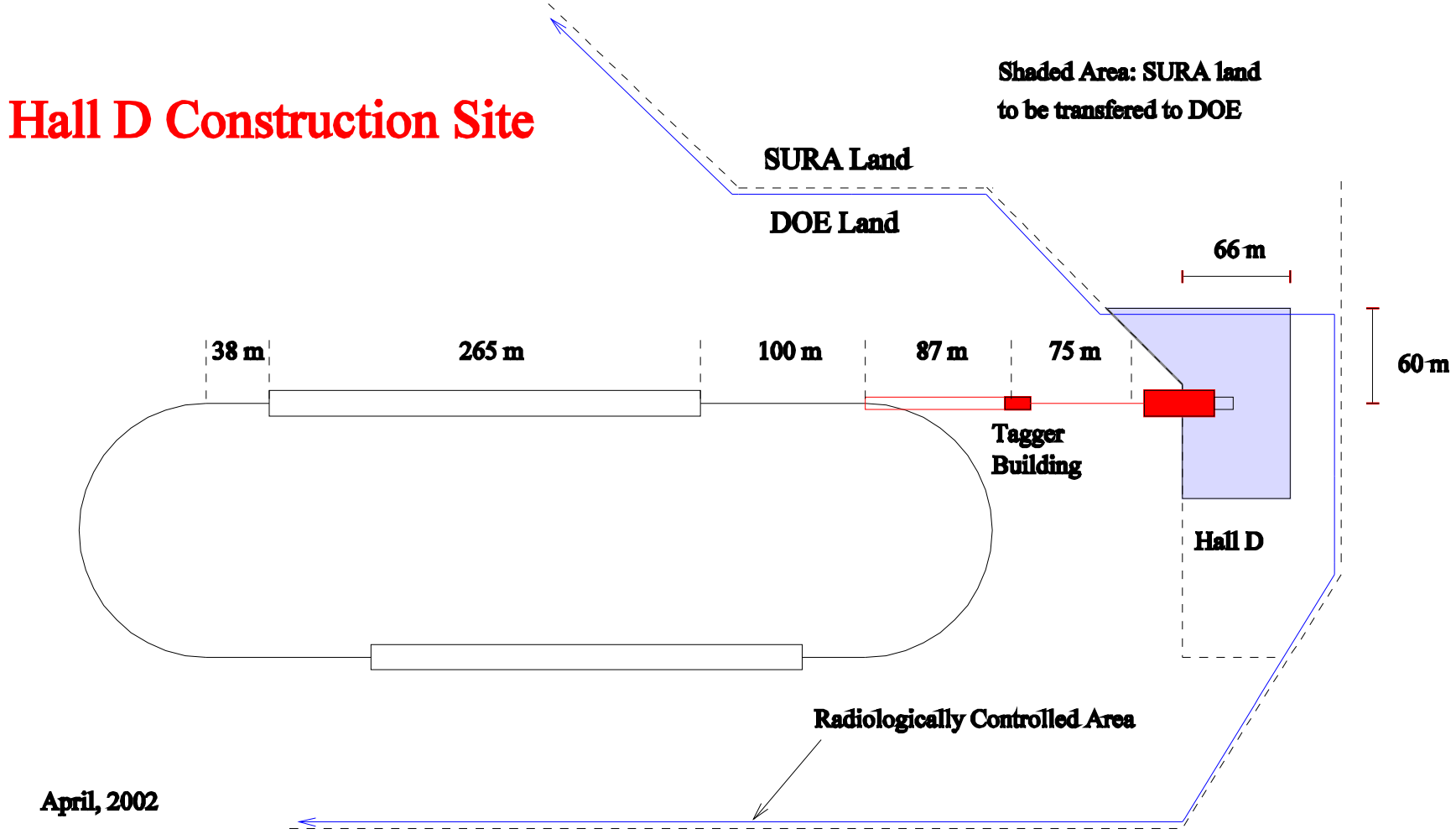
Does the collaboration have a plausible plan for assembly and maintenance of the detector? Is the collaboration properly addressing issues of subsystem integration?

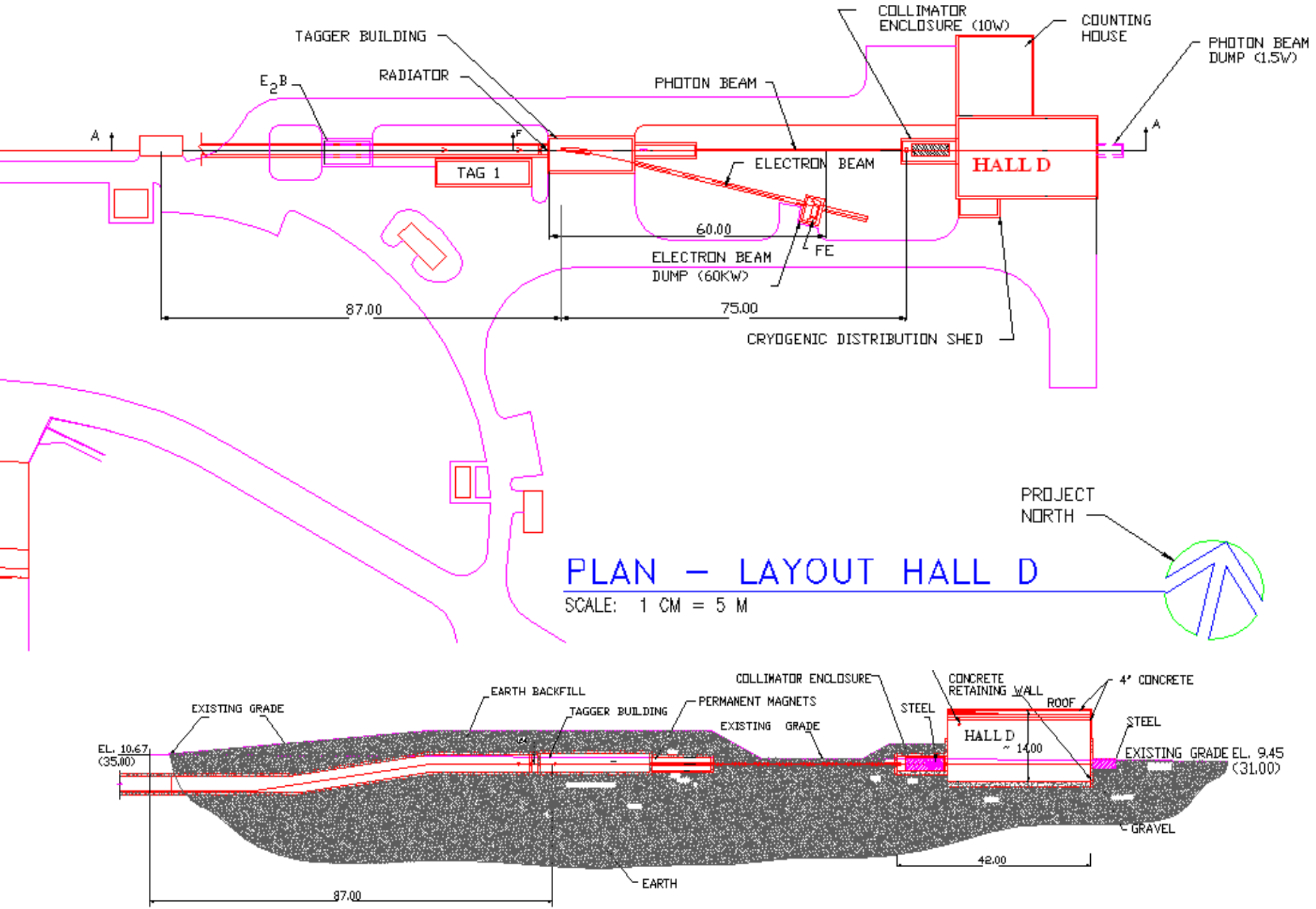
Does the collaboration have a sensible plan for management and are their estimates of manpower needs realistic? Also, does the collaboration have realistic milestones as they prepare for the CD-1 “Lehman” review and beyond to construction?

Matrioshka (Russian nesting dolls)

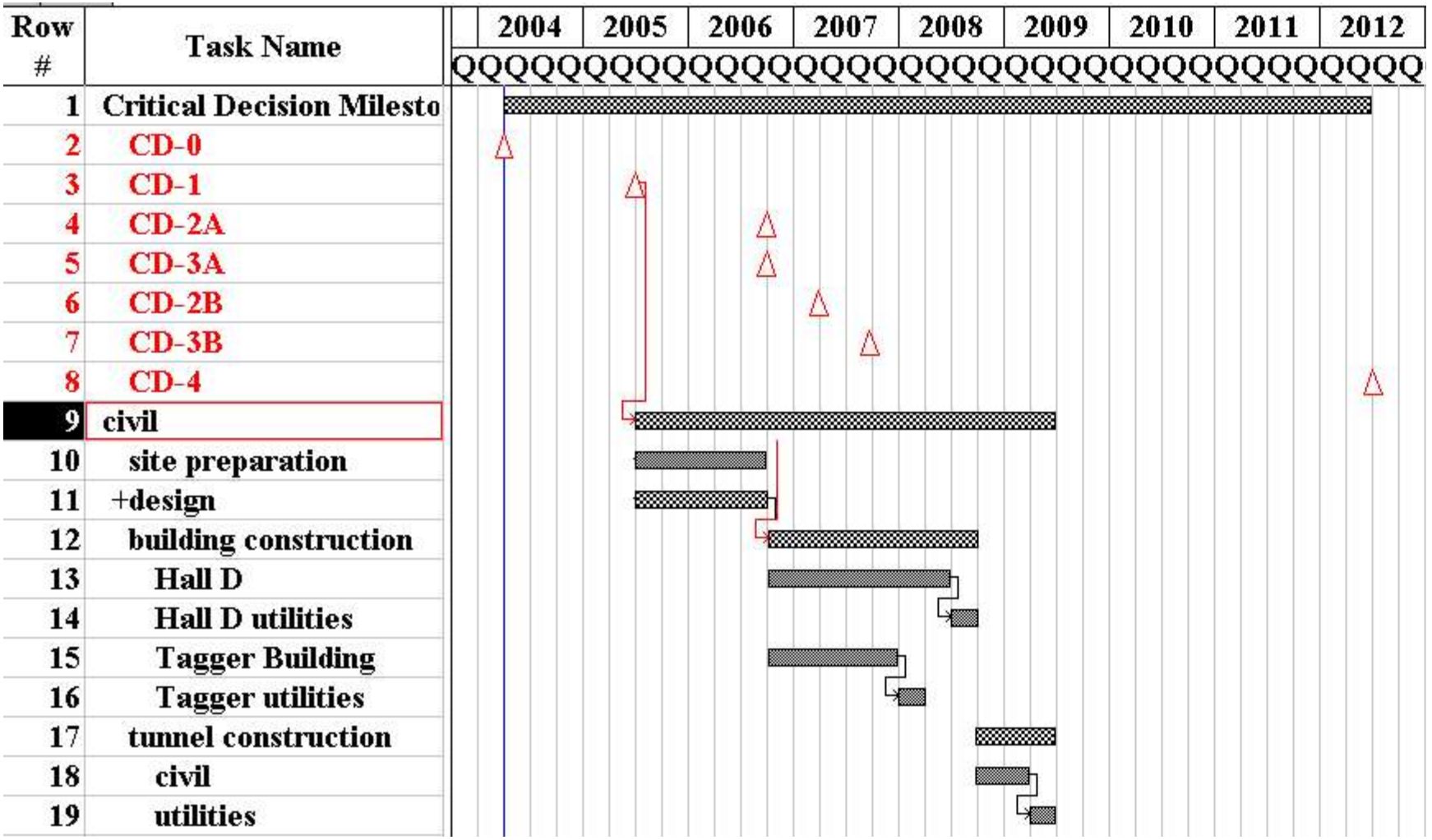
If they fit, can they make music together?

Schematic layout

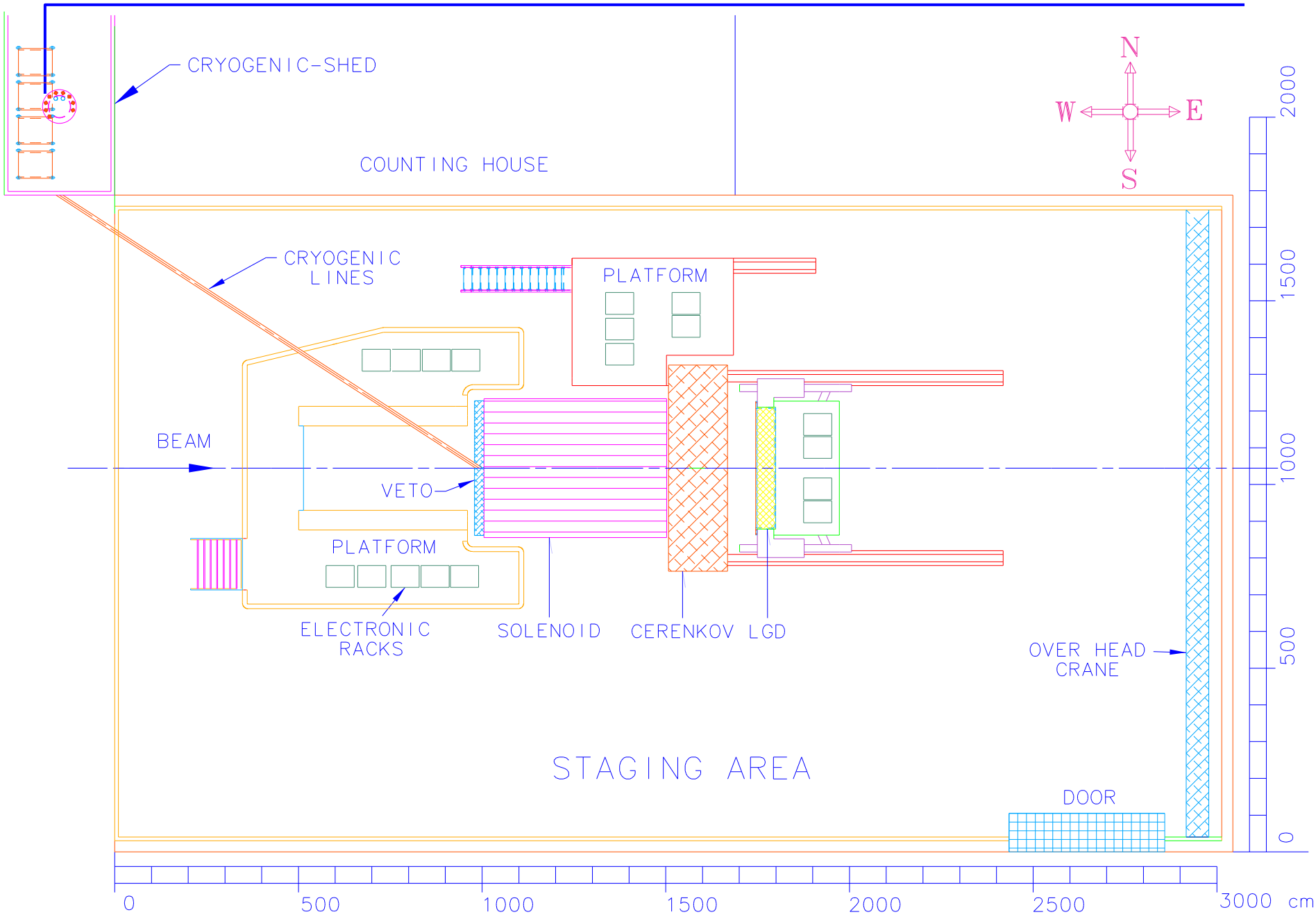



TAGGER BUILDING
RADIATOR
E_2B
A
F
TAG 1
PHOTON BEAM
COLLIMATOR ENCLOSURE (10W)
COUNTING HOUSE
PHOTON BEAM DUMP (1.5W)
ELECTRON BEAM
HALL D
60.00
FE
ELECTRON BEAM DUMP (60KW)
87.00
75.00
CRYOGENIC DISTRIBUTION SHED
PROJECT NORTH
PLAN – LAYOUT HALL D
SCALE: 1 CM = 5 M
EXISTING GRADE
EARTH BACKFILL
TAGGER BUILDING
PERMANENT MAGNETS
EXISTING GRADE
COLLIMATOR ENCLOSURE
CONCRETE RETAINING WALL
ROOF
4' CONCRETE
STEEL
STEEL
HALL D
~ 14.00
EXISTING GRADE EL. 9.45
(31.00)
EL. 10.67
(35.00)
GRAVEL
42.00
EARTH
87.00

Civil construction timeline



Row #	Task Name
1	Critical Decision Milesto
2	CD-0
3	CD-1
4	CD-2A
5	CD-3A
6	CD-2B
7	CD-3B
8	CD-4
9	civil
10	site preparation
11	+design
12	building construction
13	Hall D
14	Hall D utilities
15	Tagger Building
16	Tagger utilities
17	tunnel construction
18	civil
19	utilities


CRYOGENIC-SHED
COUNTING HOUSE
N
W
E
S
CRYOGENIC LINES
PLATFORM
BEAM
VETO
PLATFORM
ELECTRONIC RACKS
SOLENOID
CERENKOV LGD
OVER HEAD CRANE
STAGING AREA
DOOR
0
500
1000
1500
2000
2500
3000 cm
0
500
1000
1500
2000

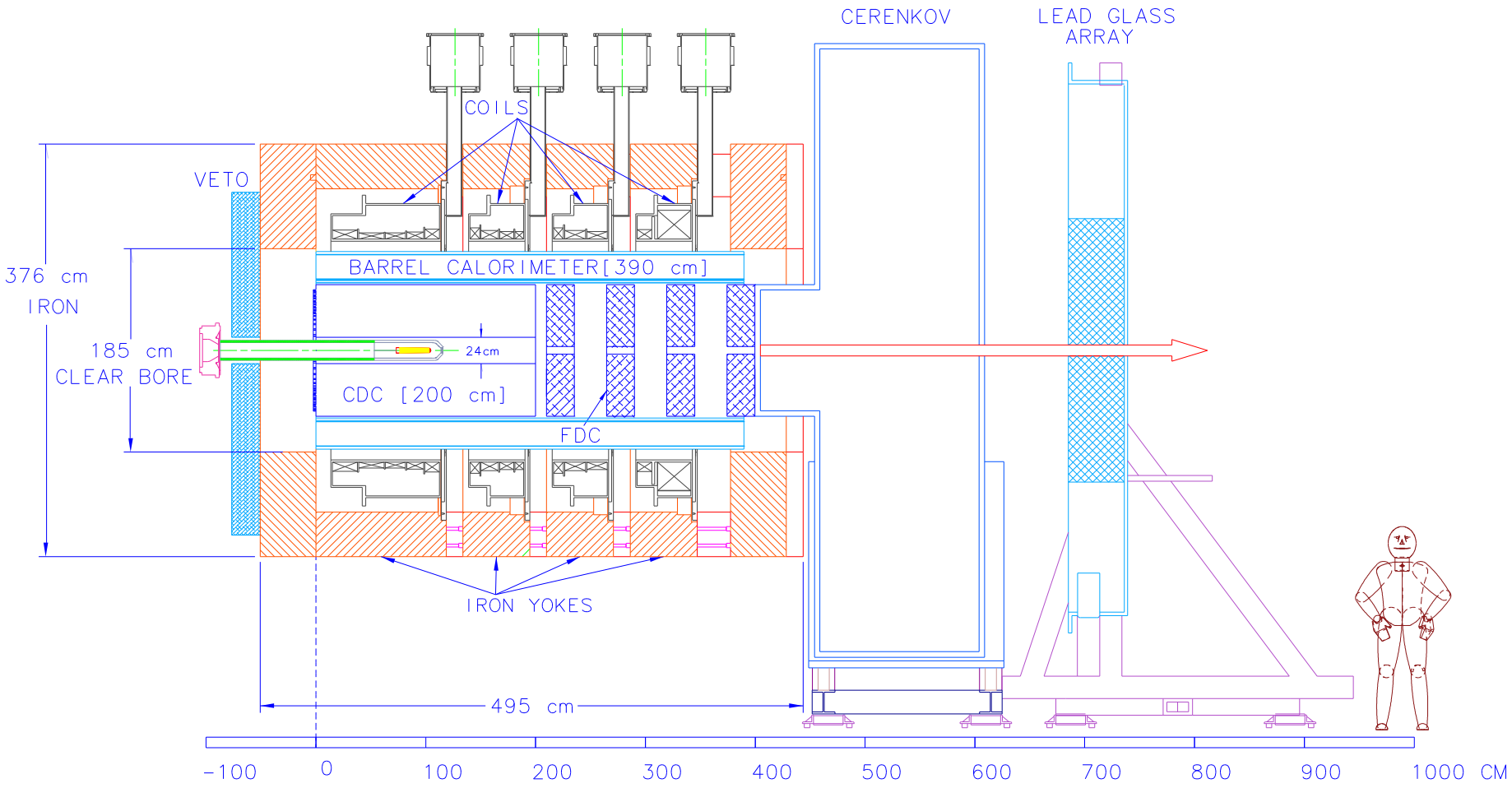
Space allocation for detectors

Some regions are more tightly constrained than others

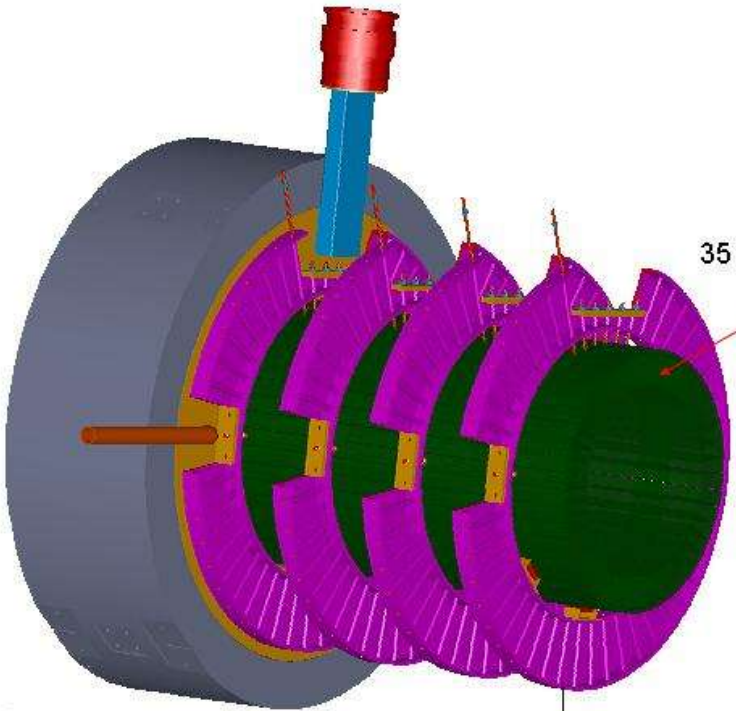
In allocating space for each subsystem, we have grouped the detector into four regions, mostly independent

- Upstream region – backwards veto
- Target region – start counter, target
- Inside magnet – Bcal, FDC and CDC
- Downstream – Cherenkov, TOF and LGD

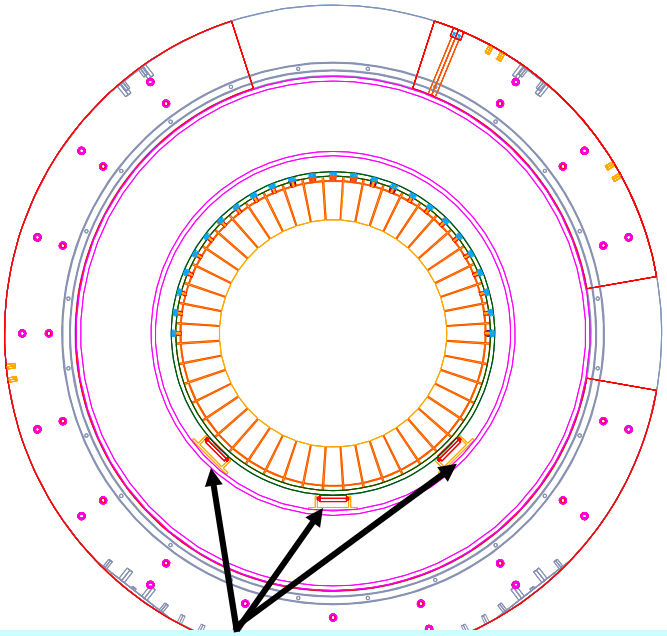
GlueX detector side view



Two concepts for Bcal installation

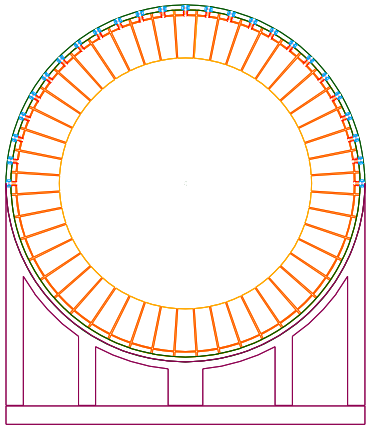


Assembly in place
Attached to yoke
using ring-girders



Assembly outside

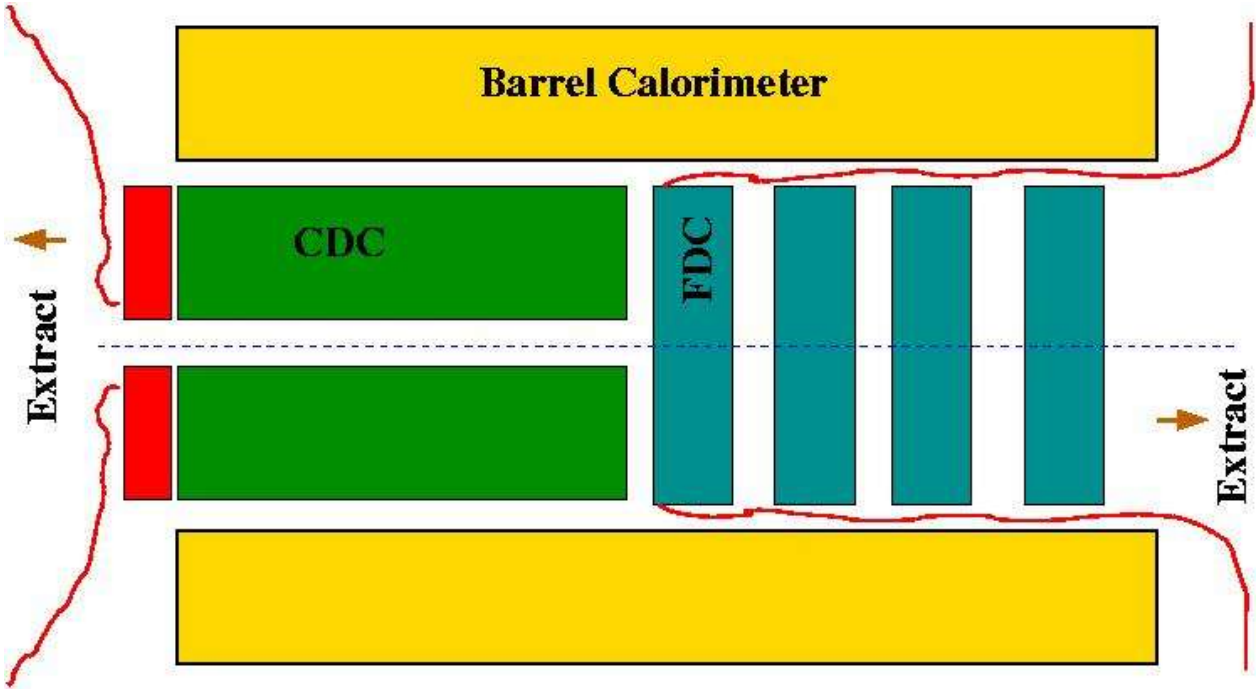
of magnet



3 Rollers Bolted to the Ring-girder

Details by Ravi Anumagalla

Chamber Extraction



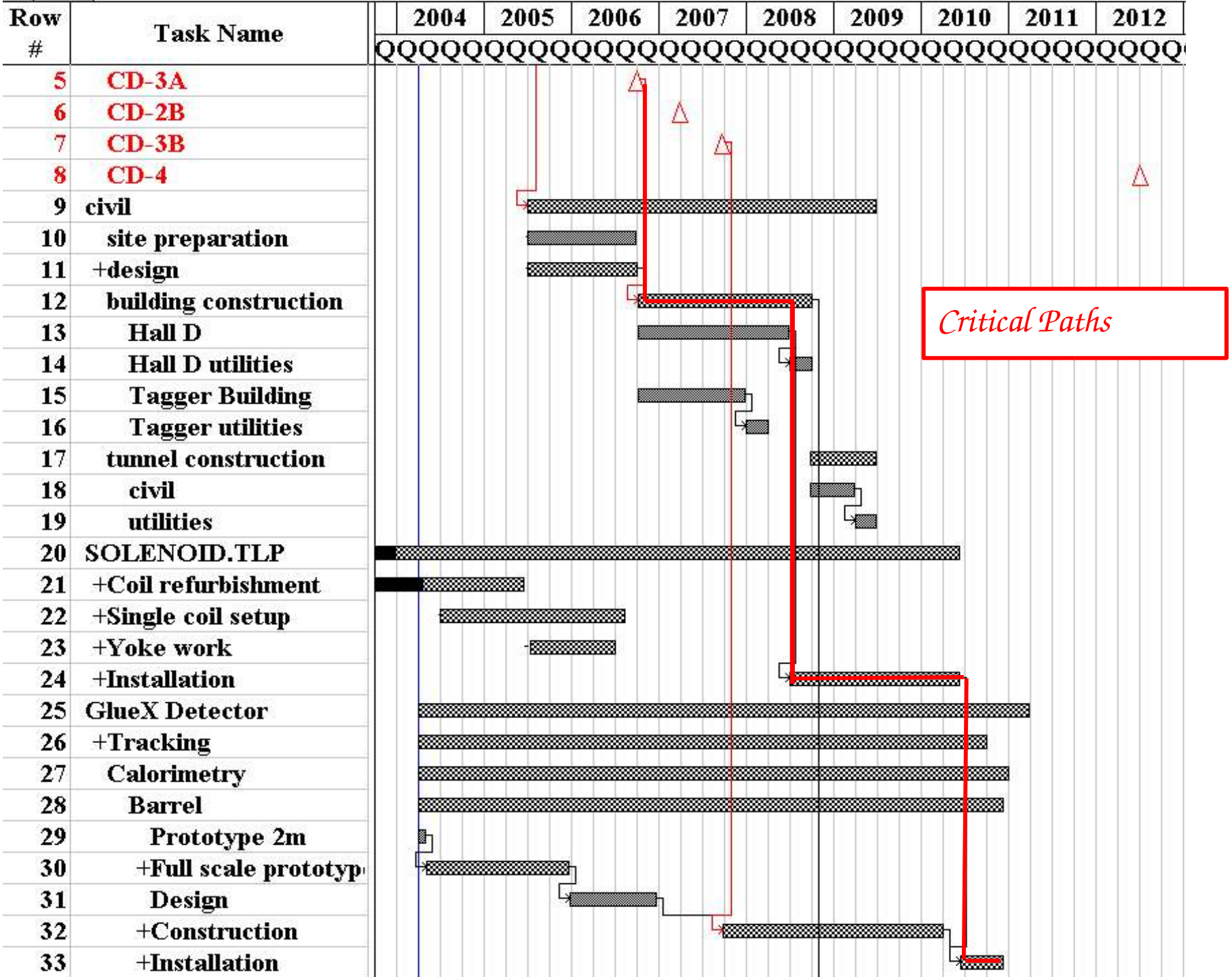
The chambers will come out of opposite ends of the magnet. Cable detectors accordingly.

Alignment

We need to maintain the relative alignment of tracking packages at the 100μ level.

We need a system that verifies the alignment. (Note that in zero-field, the chamber calibrations will be significantly different than in full field.)

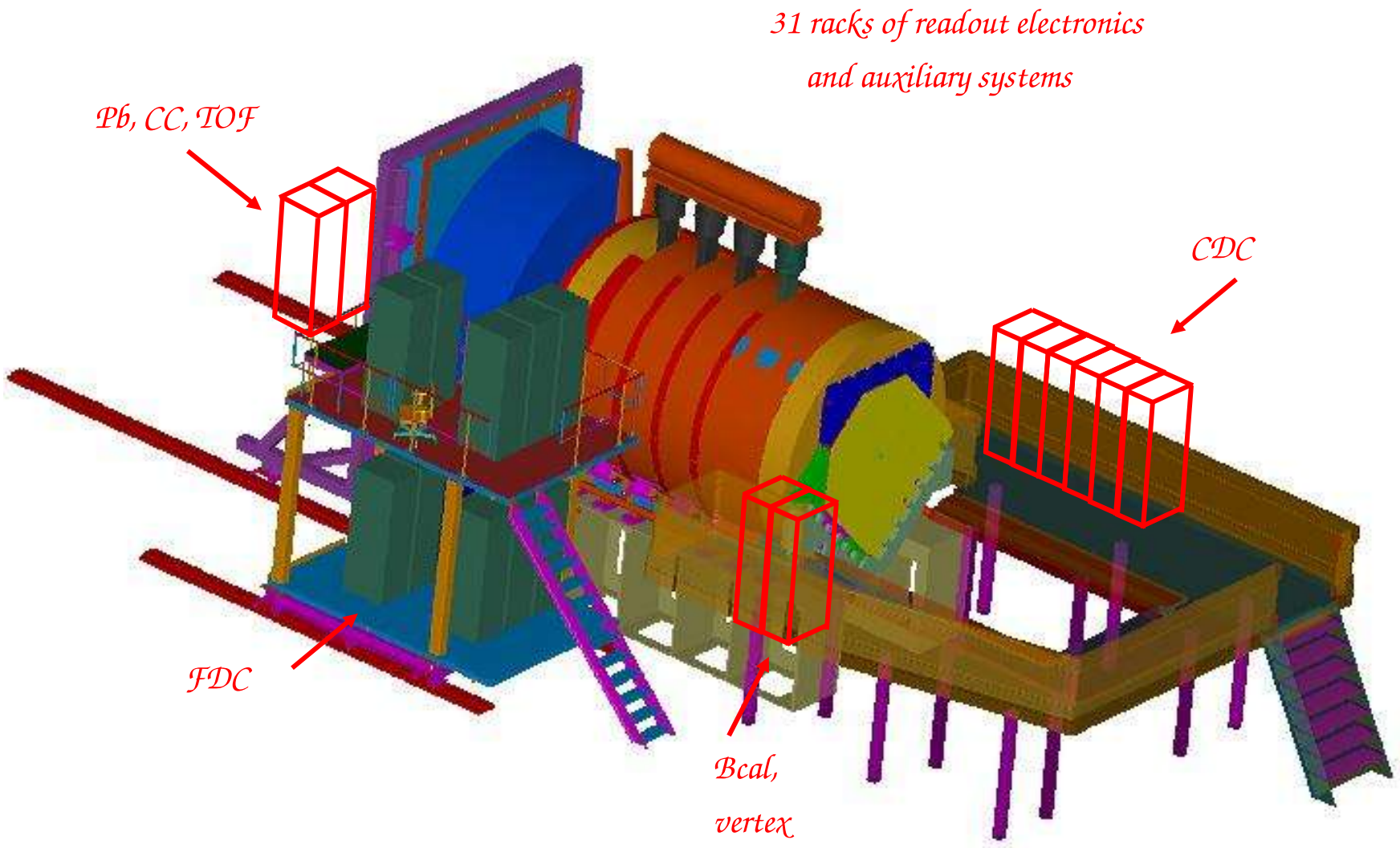
Details still need to be worked out!


Row #
Task Name
2004
2005
2006
2007
2008
2009
2010
2011
2012
5 CD-3A
6 CD-2B
7 CD-3B
8 CD-4
9 civil
10 site preparation
11 +design
12 building construction
13 Hall D
14 Hall D utilities
15 Tagger Building
16 Tagger utilities
17 tunnel construction
18 civil
19 utilities
20 SOLENOID.TLP
21 +Coil refurbishment
22 +Single coil setup
23 +Yoke work
24 +Installation
25 GlueX Detector
26 +Tracking
27 Calorimetry
28 Barrel
29 Prototype 2m
30 +Full scale prototyp
31 Design
32 +Construction
33 +Installation
Critical Paths

Interface issues

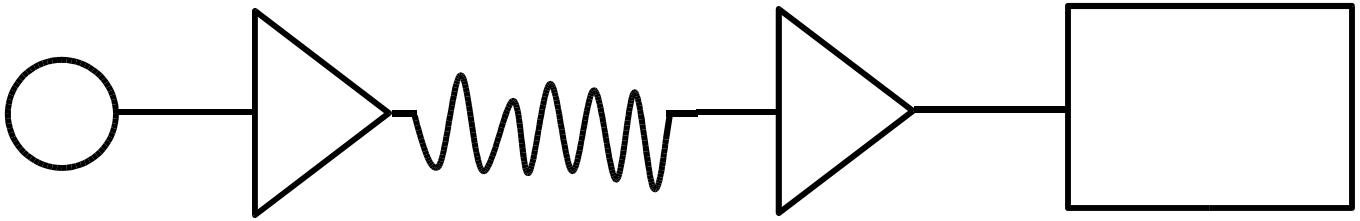
- Mechanical
  - Detectors must fit together
- Electrical
  - Grounding, power consumption, E&M waves
- Environmental
  - Heat production, settling over time
- Magnetic
  - Fringe field from solenoid, magnetic shielding effect on other detectors
- Physics
  - Production of backgrounds

Electronic racks



Signal interfaces

detector *electronics*



source pre-amp cable post-amp / shaper Readout FADC or Disc, TDC

Example:

SiPMs amplifier in base cable shaper

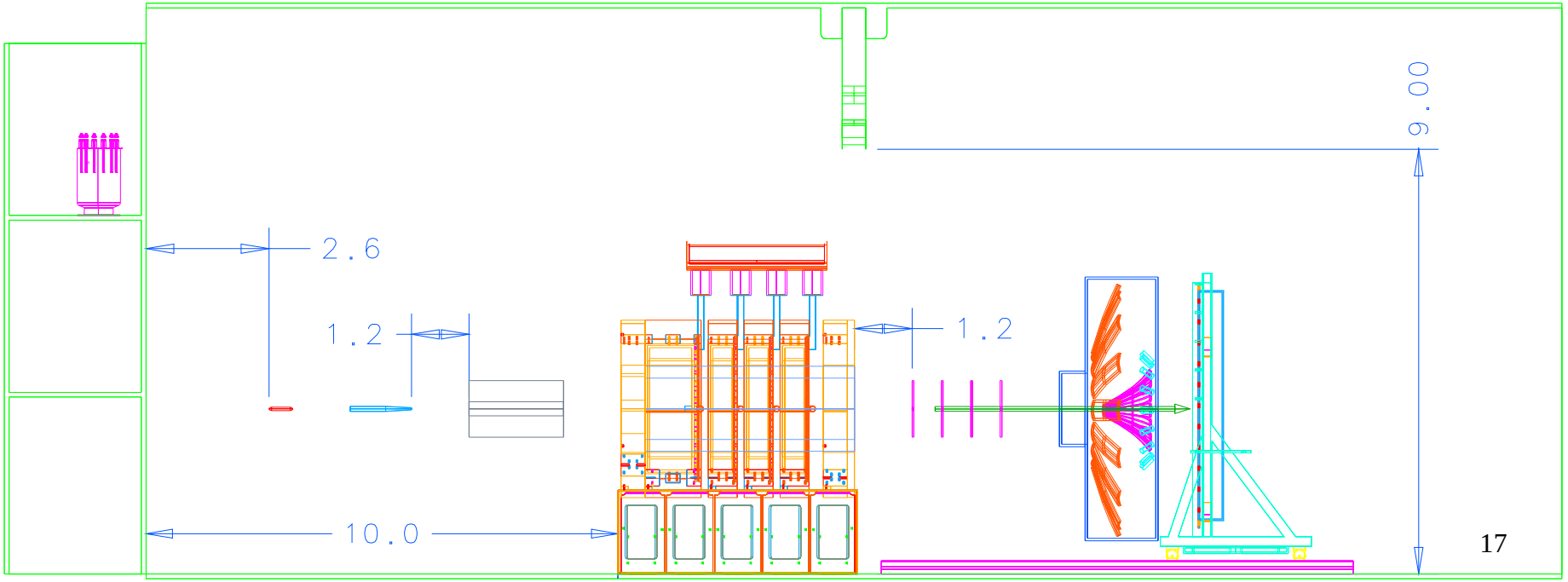
Need interface documents for each detector

Guidelines for maintenance

Identify and mitigate failure scenarios that require difficult access

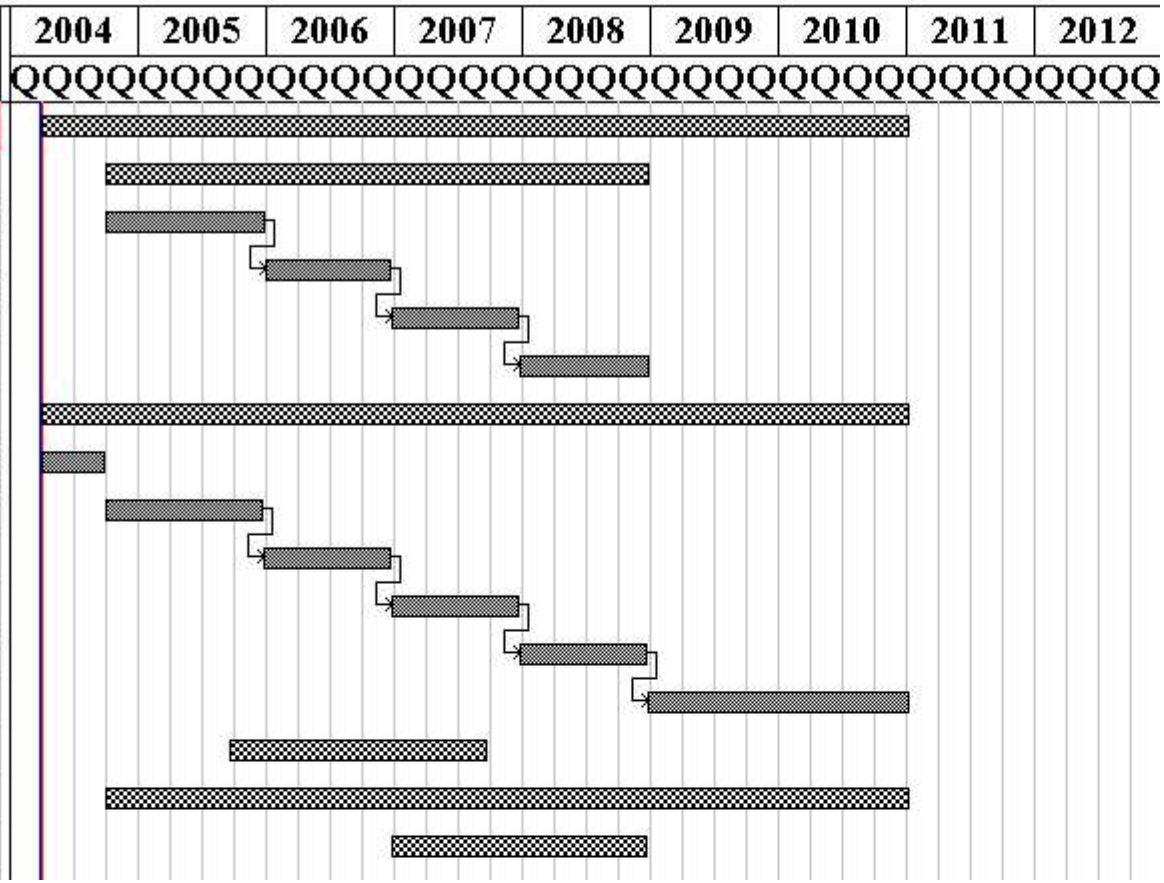
Allow access to all systems without uncabling

Goal is to allow access to all systems in less than one day



Electronics TDCs, ADCs timeline

Row #	Task Name
1	Electronics
2	TDC
3	version I: install in e:
4	version II: design an
5	version II: test, evalı
6	F1 TDC fabrication
7	FADC
8	single channel protot
9	version I: multi chan
10	version I: test, evalu
11	version II: design
12	version II: test, evalı
13	FADC fabrication
14	+Trigger
15	+power, crates, racks
16	+HV

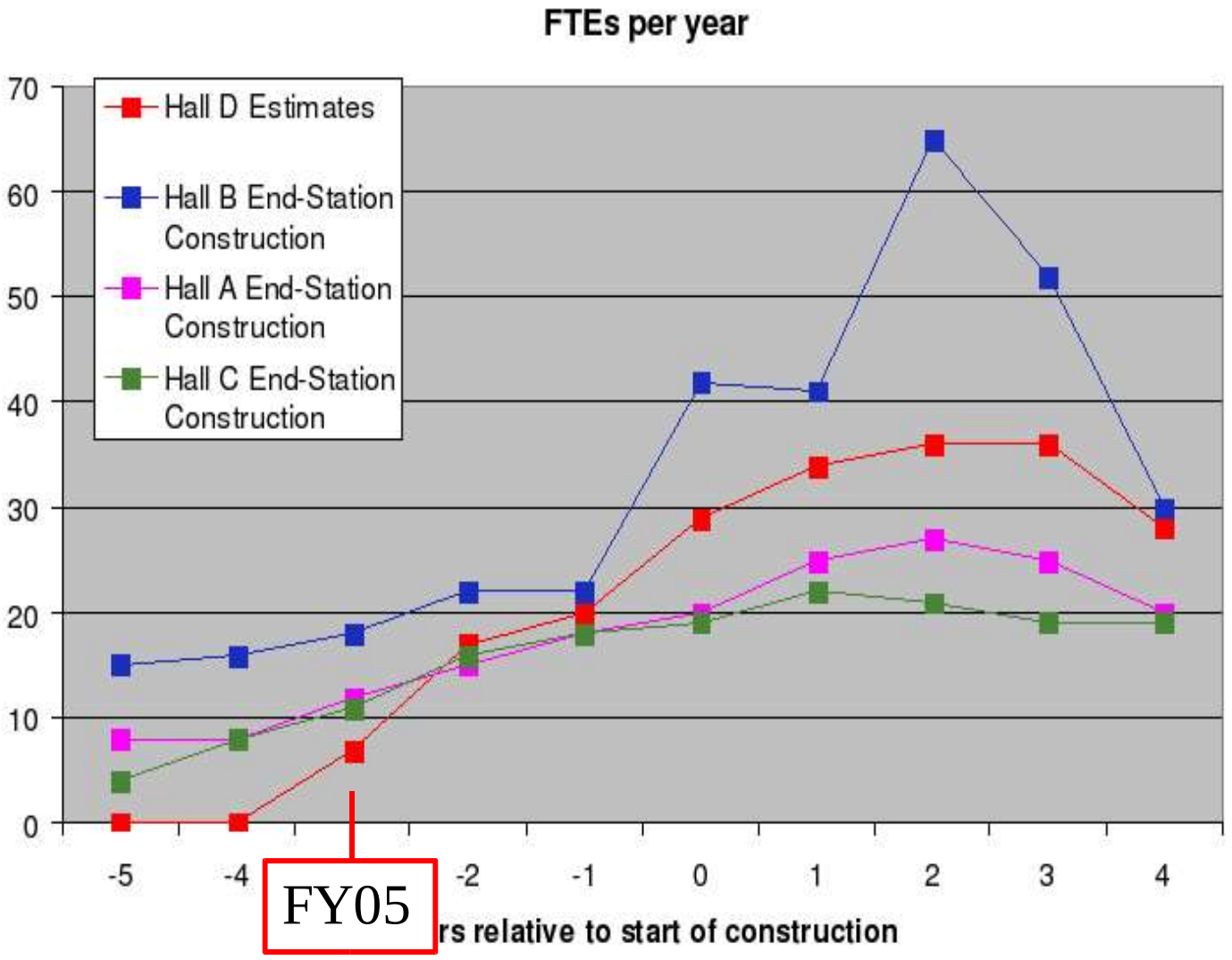


*** Electronics Review Estimate ***

Manpower

- GlueX collaboration is well organized and welcoming new members
- Manpower at JLab
  - Plans for a Hall D group is under discussion at the highest levels
  - Support groups at the lab contribute substantial resources
    - Data-acquisition
    - Fast electronics
    - Computing center
    - Detector
    - Target

Staffing for Hall D



12-GeV Project near-term schedule

Oct 20-22	GlueX detector review
Oct 29	Cost/schedule update
Mar 29	Submission of CDR to DOE-NP
Apr	Cryomodule design review
Jun 27	Documents to Lehman Review
Jul 11-14	Lehman review

Note: DOE review of 12 GeV program unscheduled

List of milestones?

Short term

Long term

Summary

- Conservative technology choices for all systems – no showstoppers
- Detector definition is (almost) complete
  - Space for Cherenkov detector allocated, but no final decisions on technology
- Each aspect of the experiment is being reviewed in turn (electronics, detectors, magnet, …)
- Budget profile for 12-GeV project is required as input to schedules and staffing plan

Extras

Charge to the review commitee

Is the GlueX detector design sound? Are there any special areas of concern that deserve special study?

Does the collaboration have a sensible plan for management and are their estimates of manpower needs realistic? Also, does the collaboration have realistic milestones as they prepare for the CD-1 “Lehman” review and beyond to construction?

Are there design studies and/or prototyping efforts that, if undertaken in a timely manner, could strengthen the estimates of performance and cost of the planned experiment? Are each of the studies currently in progress given the appropriate priority at this stage?

Does the collaboration have a plausible plan for assembly and maintenance of the detector? Is the collaboration properly addressing issues of subsystem integration?

Are there technologies or developments which we have overlooked that may allow cost savings and/or improved technical performance?

Preliminary cost estimates

	CD-0	CD-1	CD-2	CD-3			CD-4	Total	Constr
Civil Construction	50	50	1100	4420	4440	0	0	10060	8860
Beamline	0	0	0	1157	1755	988	611	511	4511
Solenoid	100	100	150	520	410	145	0	1425	1075
Detector									
Tracking	40	40	200	595	1433	45	494	3647	3367
Start Counter	40	40	140	564	805	100	0	1689	1469
Barrel Calorimeter	20	80	180	943	1513	780	267	3782	3502
Cerenkov Counter	40	40	170	248	252	254	118	1122	872
Forward Calorimeter	40	40	160	06	36	130	0	1111	871
Time-of-Flight Wall	26	26	126	514	515	38	0	1244	1066
Computing	80	80	180	130	130	573	768	1942	1602
Electronics	148	100	50	80	1040	1147	803	4268	3770
Hydrogen Target	0	0	0	0	0	117	39	156	56
Photon Tagger	45	45	145	1286	946	289	0	2756	2521
Assembly	0	0	0	0	0	975	975	1950	1950
Total	629	641	2801	11462	13674	6380	4076	39662	35591