



WBS 1.5 Installation

DØ Run II b Installation

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Outline

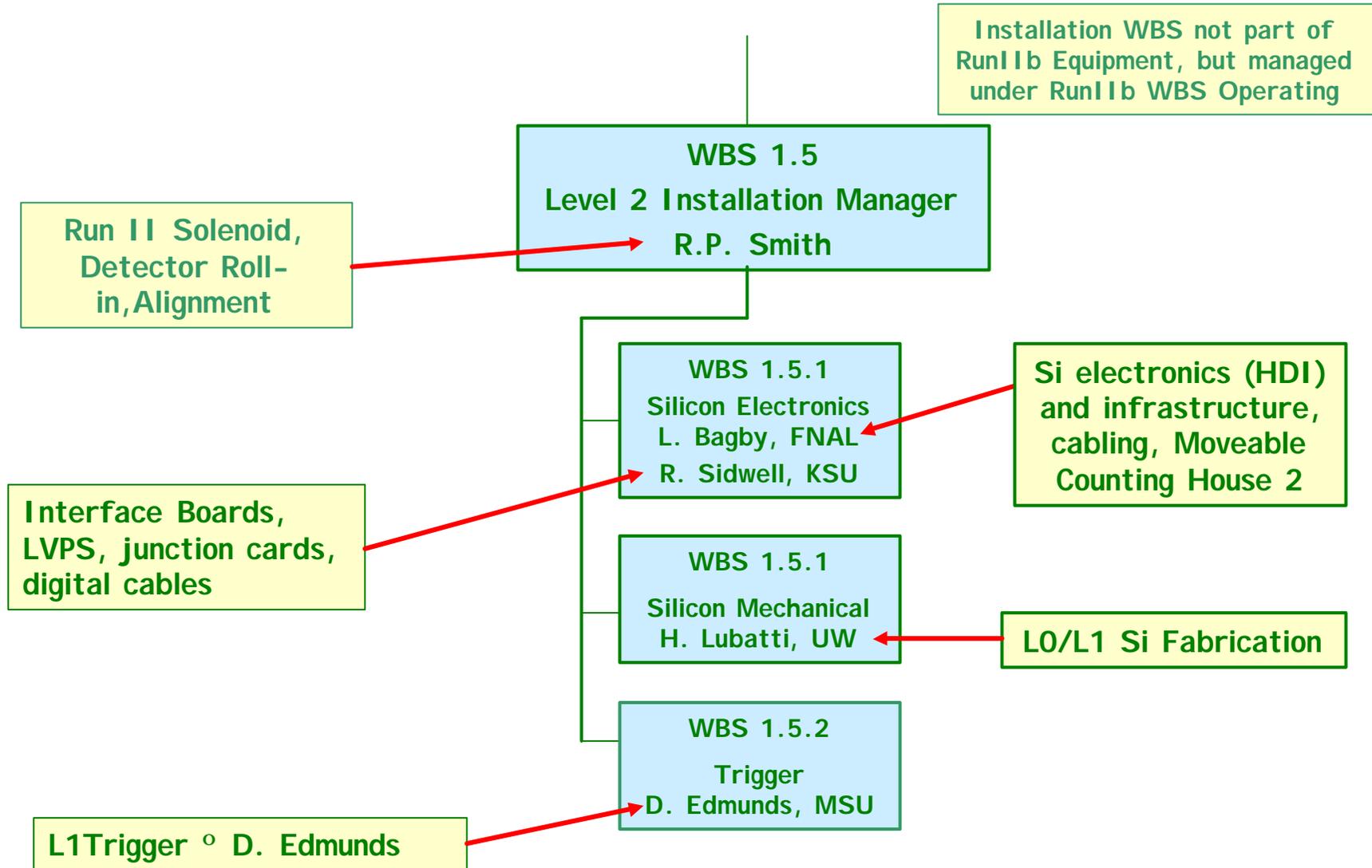
- Installation Management Team
- Installation Principal Elements
- Installation Work Plan
 - ◆ Installation Timeline
 - ◆ Installation Effort, Costs
- Run I I a Experience
- Summary

D0 Detector at Run I I a Roll-in





Installation Project Team





Installation Principal Elements

- **WBS 1.5.1 Silicon**
 - ◆ Delivery from SiDet determines Tevatron shutdown date; installation duration determines resumption of beam
 - ◆ Dominates the effort required in the Platform and Detector
 - ◆ Cable plant, readout system largely re-used
- **WBS 1.5.2 Trigger**
 - ◆ University driven, tested components arrive in advance of shutdown
 - ◆ Dominated by work outside DØ collision hall
 - ◆ L1 Cal installation is major consumer of shutdown time



Installation WBS 1.5.1 Silicon

- 1.5.1 Run II b Silicon Installation

- ◆ 1.5.1.1 Silicon Ready to move to DAB
- ◆ 1.5.1.2 Shutdown for Installation Begins
- ◆ 1.5.1.3 Prepare Silicon Infrastructure at DAB
- ◆ 1.5.1.4 Open Detector (no roll-out!)
- ◆ 1.5.1.5 Uncable Silicon, Remove LVPS and IB Crates
- ◆ 1.5.1.6 Modify Run I a Interface Boards, Test, Reinstall
- ◆ 1.5.1.7 Remove Run I a Silicon
- ◆ 1.5.1.8 Install Run II b Silicon
- ◆ 1.5.1.9--12 Complete Infrastructure, close beampipe
- ◆ 1.5.1.14--15 Commission Silicon
- ◆ 1.5.1.16 Close Detector
- ◆ 1.5.1.17 Silicon System Ready for Beam



Silicon Installation Details

- Drain coolant, flush and dry system
- Remove Beryllium Beam Pipe, disconnect Low Mass Cables
- Disconnect high-mass cables, remove H disks, "Horseshoes"
- Remove Low Voltage PS, Interface Board Crates
- Modify Interface Boards, reinstall
- Install new Horseshoes
- Install Silicon Insertion Fixtures
- Install Silicon, connect Cooling Pipes
- Connect Low-Mass Cables
- Augment HV System
- Install New LV System
- Reconnect High-Mass Cables
- Install Beam Tube
- Perform Technical Commissioning
- Commission Online Software



Silicon Installation Task Duration

Task	Elapsed Time Required
Open Detector	0.8 week
Decable Silicon	2 weeks
Remove Beampipe, H Disks	2.2 weeks
Remove Run I a Silicon	3 weeks
Install new horseshoes	2 weeks
Install Run I b Silicon	3 weeks
Install High-mass cables	4 weeks
Install Beampipe	2 weeks
Technical Commissioning	10 weeks
LV, HV cabling	15,10 weeks
Close Detector	2 weeks

Five shifts per week assumed.

Tasks overlap one another. Total time elapsed: 30 weeks



Installation WBS 1.5.2 Trigger

- **1.5.2 Trigger Installation**
 - ◆ 1.5.2.1 Prepare Infrastructure at DAB
 - ◆ 1.5.2.2 L1 Calorimeter Trigger
 - ◆ 1.5.2.3 L1 Cal Track Matching
 - ◆ 1.5.2.4 L1 Central Track Trigger
 - ◆ 1.5.2.5 L2 β Processors
 - ◆ 1.5.2.6 Silicon Track Trigger
 - ◆ 1.5.2.7 Trigger Upgrades Ready for Beam

**Trigger Installation Largely Outside
Collision Hall**



Installation Infrastructure

- **1.5.1.3 Silicon Infrastructure**
 - ◆ Fabricate Adapter Card Supports (“Horseshoes”)
 - ◆ Test, Label, Bundle all new cable sets
 - ◆ Install Chiller, Piping
 - ◆ Refurbish and augment Dry-Air system
 - ◆ Fabricate Silicon Transportation, Installation Fixturing
- **1.5.2.1 Trigger Infrastructure**
 - ◆ Prepare new L1 Cal Racks, Plan Cable Reordering
 - ◆ Preliminary commissioning of L1 Cal Trig Elements
 - ◆ Install new L1 Cal Track Match Rack in Platform
 - ◆ Install L1 CTM VME and Splitter Crates, Power Supplies
 - ◆ Install L1 CTM Rack services, L1 CTT/CTM cables

Infrastructure Tasks Must Start/Finish On Time to permit Installation Schedule to “hit the ground running”



Major Milestones

Start of Shutdown	May 25, 2005
Silicon Ready for Delivery	July 22, 2005
Silicon installed in Central Fiber Tracker	August 22, 2005
D0 Ready for Beam	Dec 22, 2005

30 weeks shutdown



Installation Costs

	Cost + Contingency
M&S	\$138 K
Labor	\$1,321 K
Total	\$1,459 K

- AY Dollars, Including G&A
- Contingency Held by Project Manager



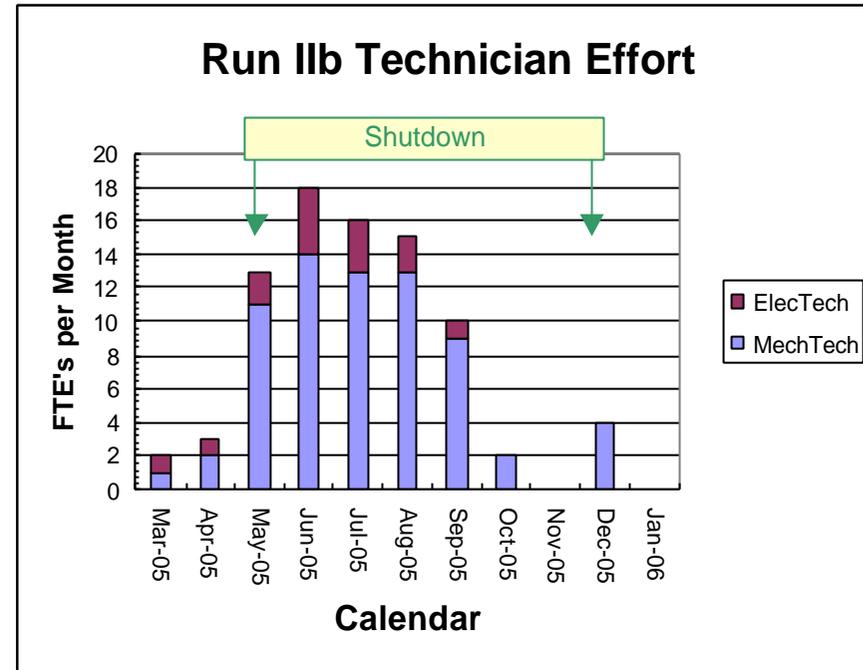
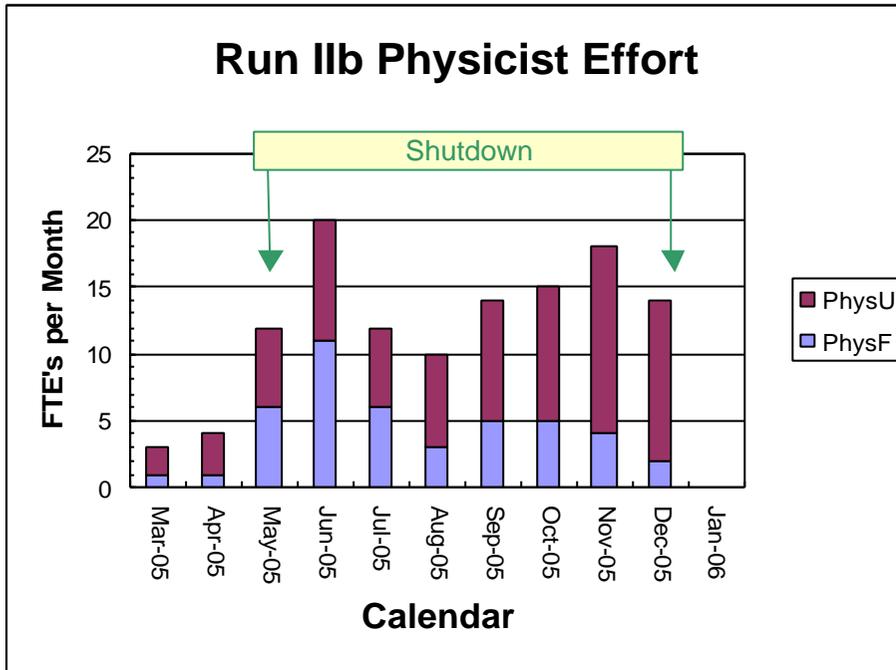
Selected Labor Resources Required

Resource	Peak
FNAL Mechanical Engineer	3
FNAL Electrical Engineer	3
FNAL Technician	18
FNAL Physicist	11
Univ Physicist	14

- DO Operations staff is 12 → must be augmented for ~ 5 months
- "Physicist" includes senior physicists, postdocs, students
- "Technician" includes electrical and mechanical specialists
- Supervision Included (provided by physicists, engineers, senior technicians)



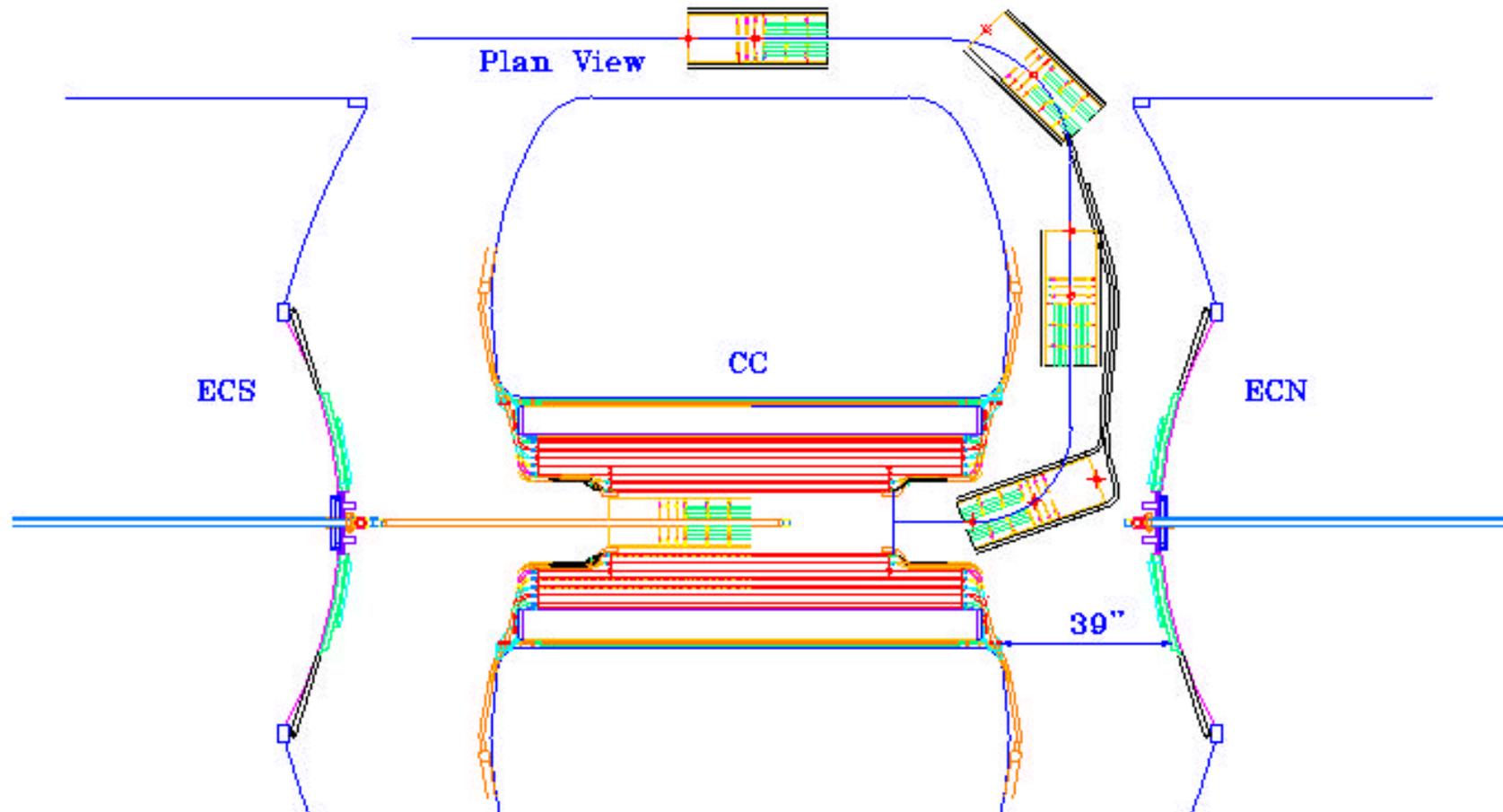
Effort Schedule



Workweek = 40 hours



Guided by Run I I a Experience



Silicon Installation process for Run I I b will be much like Run I I a, Except in Collision Hall Instead of Assembly Hall...

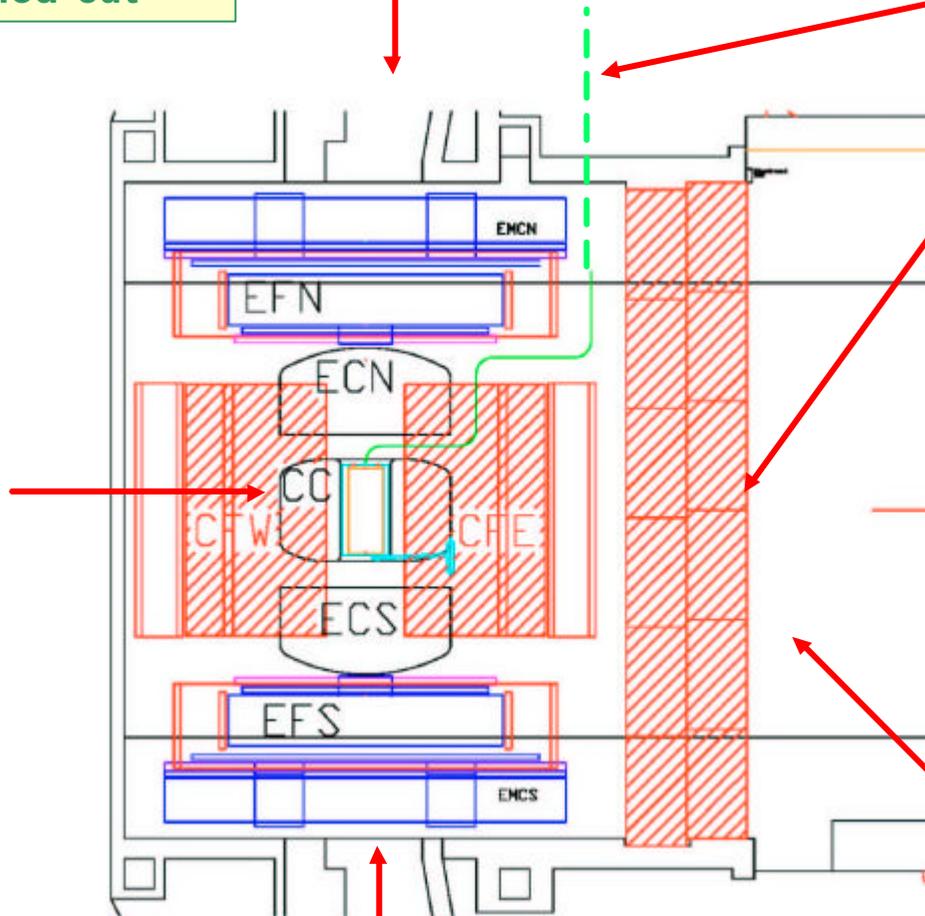


Guided by Run I I a Experience

Detector will not be rolled out

Protons

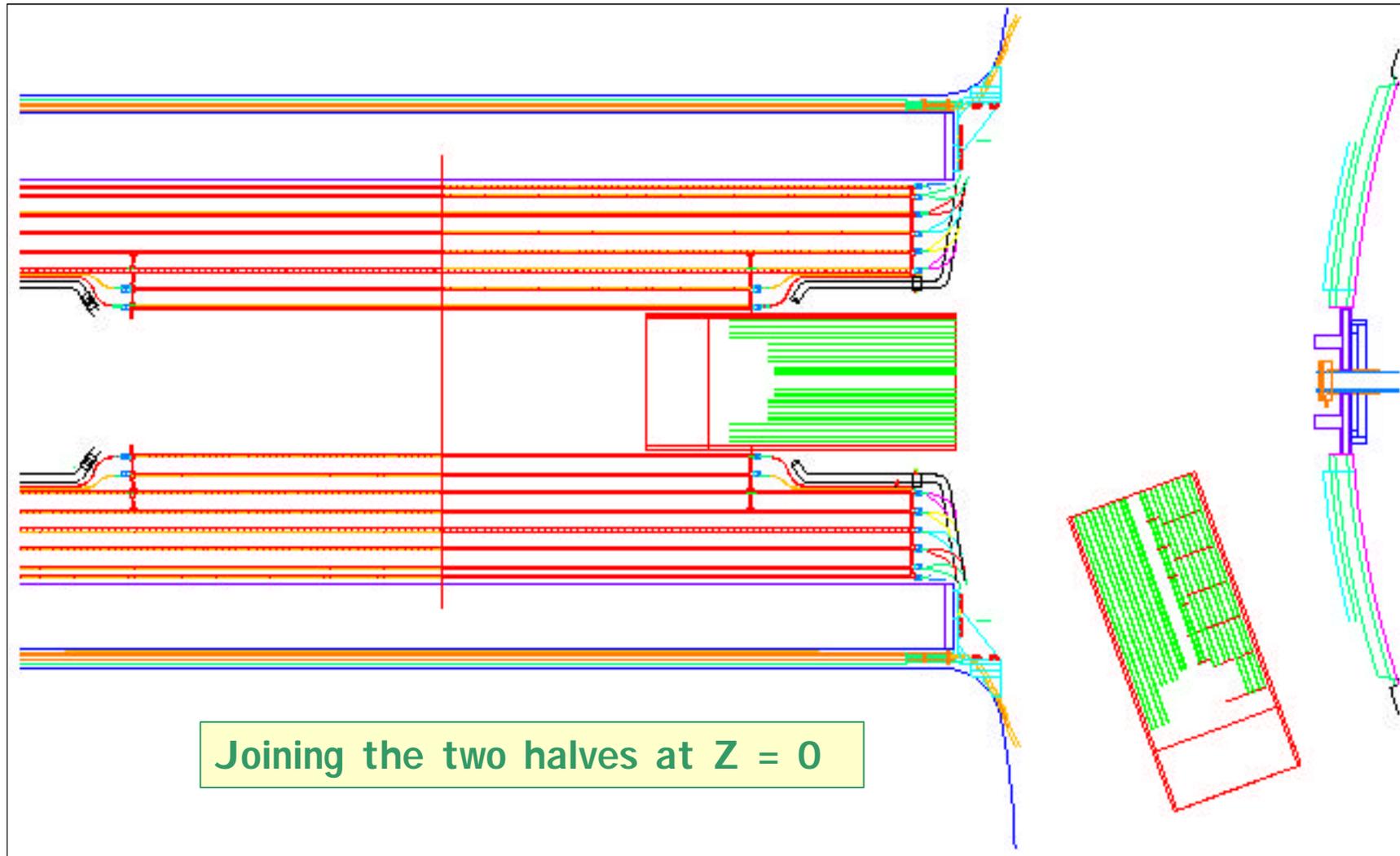
Possible Route into Collision Hall Via First-Floor Radiation Labyrinth, or via plug "door" in shielding wall



Shielding-wall



Planning for Run II b Silicon Installation



Joining the two halves at $Z = 0$



Conclusions

- **WBS Planning Tool In Place**
 - ◆ Tasks detailed to four sublevels
 - ◆ Resources (Effort, M&S) loaded
 - ◆ WBS Dictionary and BOE in place
 - ◆ Risk Assessment underway
- **Installation Management Team in place**
- **Detailed Planning Activities Underway**