ACCELERATOR INTEGRATION AND DESIGN MEETING

CONVENTIONAL FACILITIES AND SITING GROUP

CFS Status Report

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Overview

- CFS AD&I Effort
- Status of CFS AD&I Document
- Current Outstanding Issues
- Preparations for AAP Review

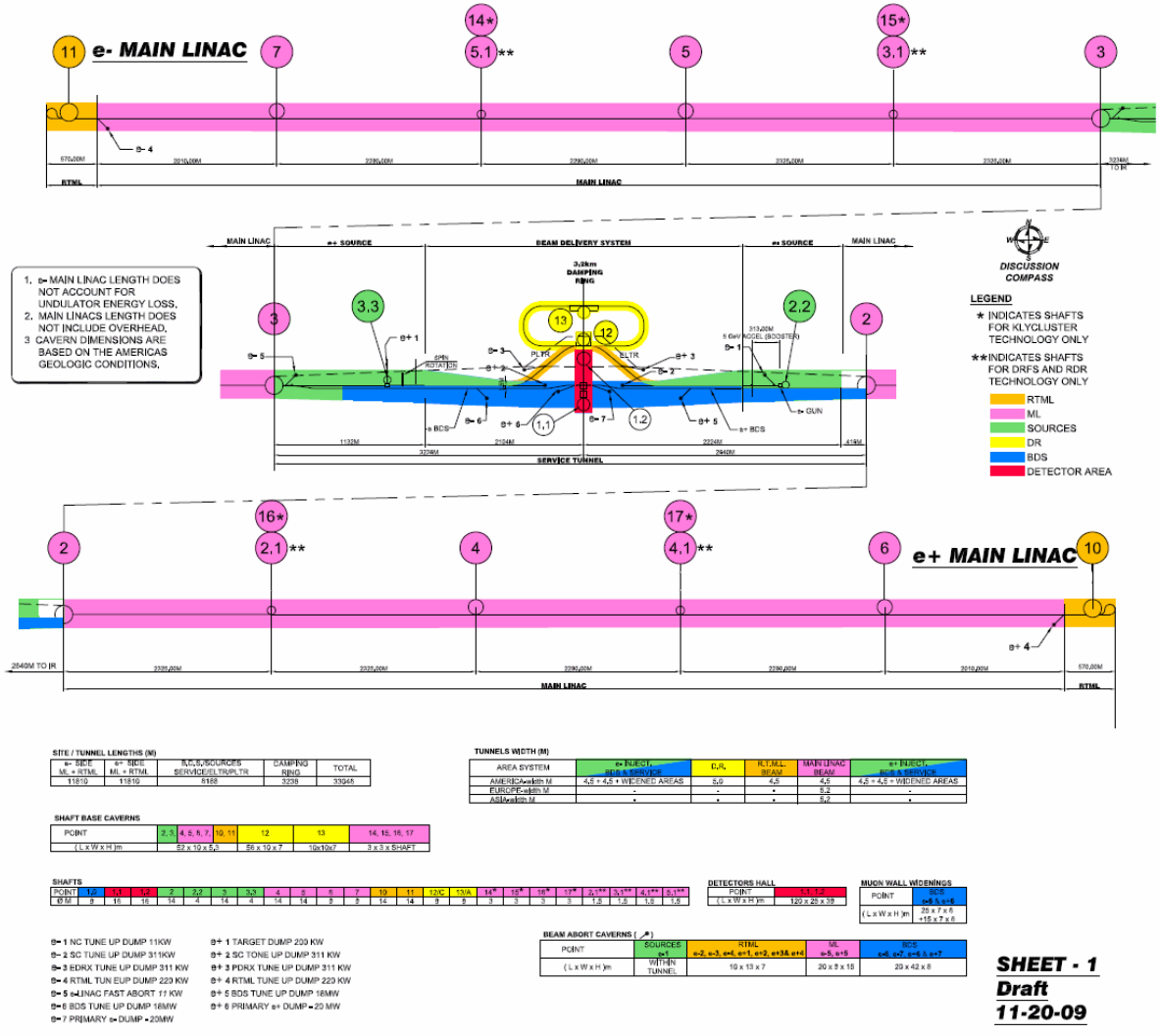
CFS AD&I Effort

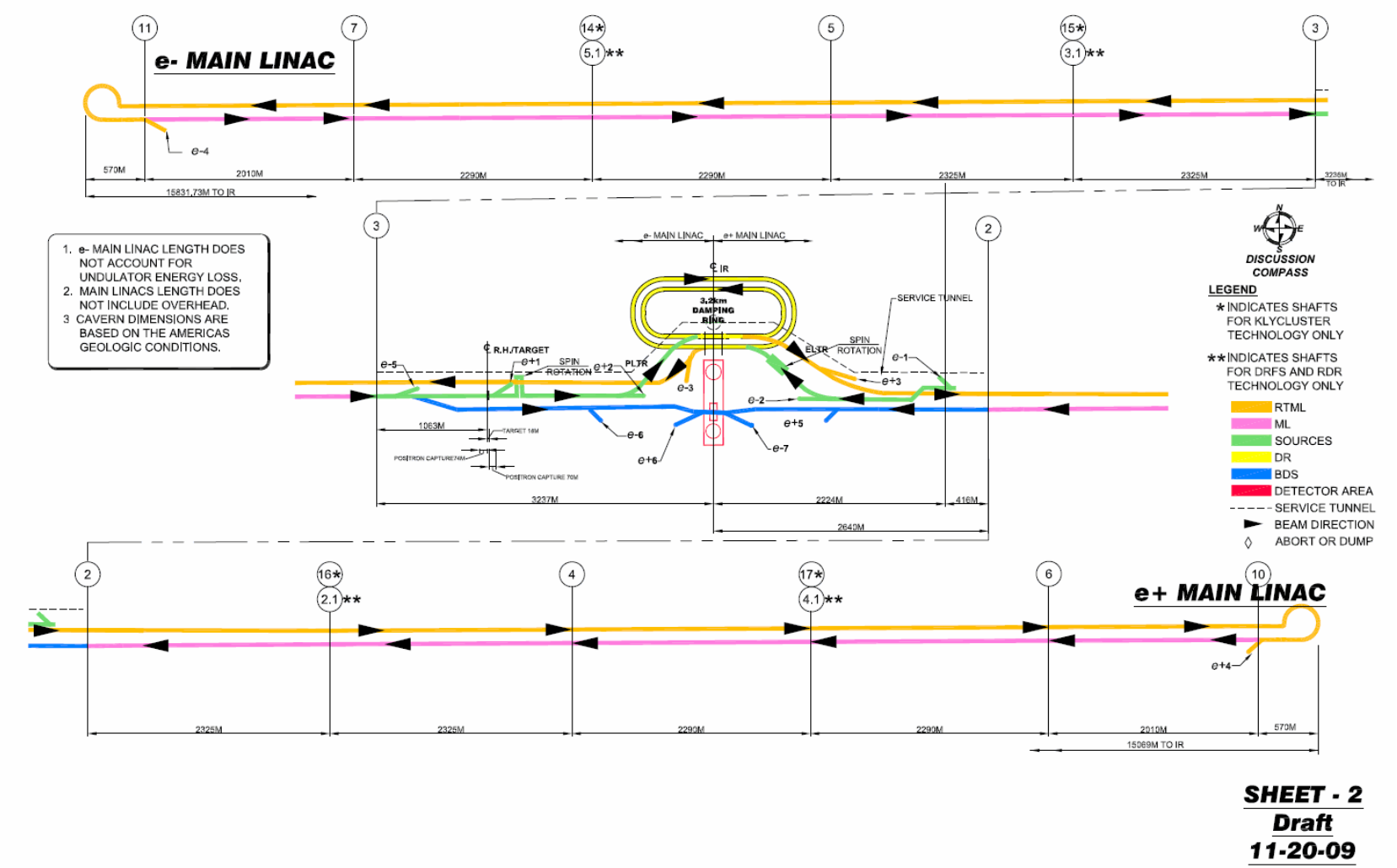
- Since the Previous AD&I Meeting in May, 2009 the CFS Group has had Several Direct Meetings with the Various Area System Groups
  - CFS Weekly Video/Webex Meetings were Devoted to Specific Area Systems with AS Representatives
  - A CFS 2-Day Workshop was Held at SLAC in July, 2009
  - A Second CFS 2-Day Workshop was Held at the Daresbury Laboratory in September, 2009
  - Both CFS Workshops Allotted Time for Each Area System with Direct and/or Webex Participation with AS Representatives
- From These Meetings Criteria were Developed for the Layout of Each Area System and Combined into a Single Complete Machine Layout Which did Undergo Several Iterations

CFS AD&I Effort cont.

- The CFS Group Would Like to Thank All of the AS Representatives for Their Help to Establish a Comprehensive Set of Beamline Criteria
- We Would Also Like to Thank Norbert Collomb for His Efforts to Combine all of the Area System Technical Criteria into a Complete Beam Layout
- After Several iterations a Complete Technical Beamline Layout was Established in Mid-October, 2009
- This Layout was Used by the CFS Group at FNAL to Develop the Final 2D Layout for the Tunnels and Enclosures to Match the Technical Beamline Layout
- These Drawings Were Posted on the EDMS System in Mid-November, 2009 and are Currently Being Reviewed by the AS Representatives

CFS Overall Machine Layout Drawing

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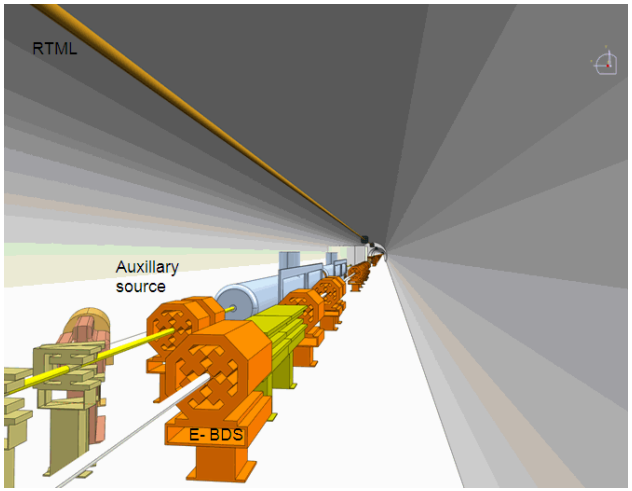
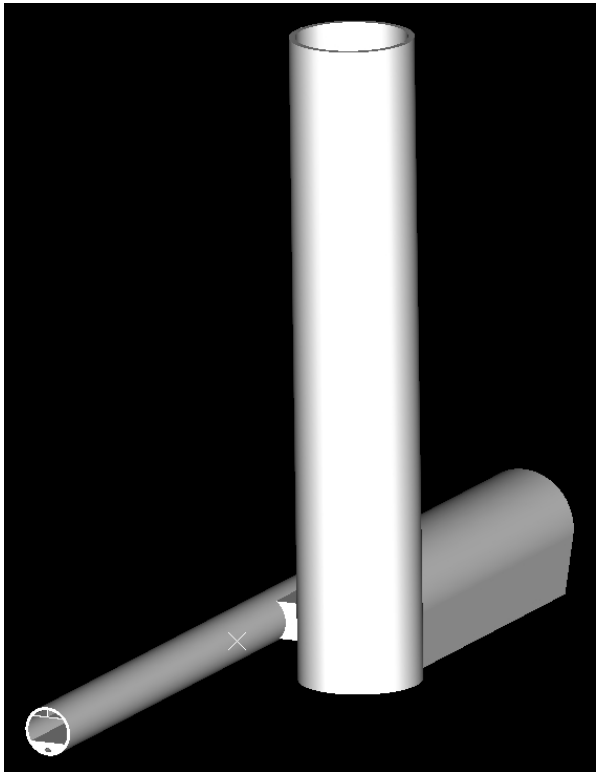
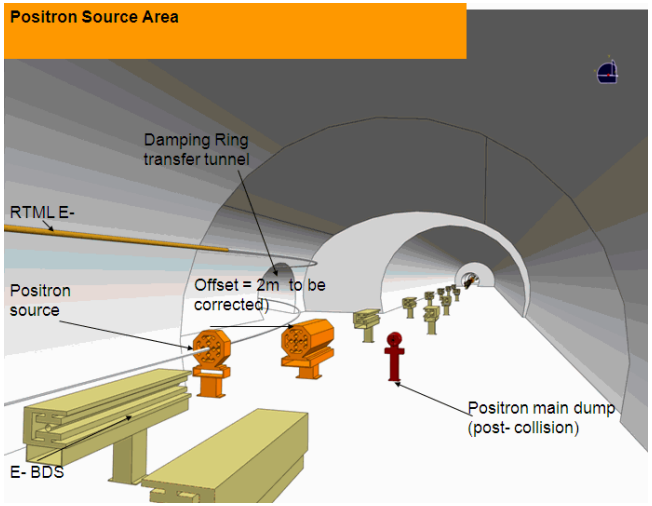
e+ MAIN LINAC
1. e- MAIN LINAC LENGTH DOES NOT ACCOUNT FOR UNDULATOR ENERGY LOSS.
2. MAIN LINACS LENGTH DOES NOT INCLUDE OVERHEAD.
3 CAVERN DIMENSIONS ARE BASED ON THE AMERICAS GEOLOGIC CONDITIONS.
DISCUSSION COMPASS
LEGEND
* INDICATES SHAFTS FOR KLYCLUSTER TECHNOLOGY ONLY
** INDICATES SHAFTS FOR DRFS AND RDR TECHNOLOGY ONLY
RTML
ML
SOURCES
DR
BDS
DETECTOR AREA
SERVICE TUNNEL
BEAM DIRECTION
ABORT OR DUMP
3.2km DAMPING RING
SERVICE TUNNEL
R.H.TARGET
SPIN ROTATION
PLTR
ELTR
15831.73M TO IR
15069M TO IR
SHEET - 2
Draft
11-20-09

CFS AD&I Effort cont.

- The 2D Machine Layout Drawing is the Basis for the 3D CFS Enclosure Drawing that is Being Developed by the CFS Effort at CERN Using the European Cavern Configuration (More to Come on This Issue)
- The 2D Machine Layout Drawing is also the Basis for the 3D Support Utility Drawings that are Being Developed by the CFS Effort at FNAL (M+W Zander)
- 3D Drawings are Being Forwarded to DESY for Inclusion into the Complete ILC 3D Model as They Progress
- Currently the Focus of the 3D Effort are Two 100m Sections of the Machine Layout as a Starting Point







European CFS Group 3D Drawing Examples

Status of CFS Cost Estimates

- The Americas Region has Developed the Following Cost Estimates and Provided Them to the Cost Group:
  - Full Cost Estimate Based on the Machine Layout Developed Based on the Current AD&I Machine Layout Drawings
  - Main Linac Klystron Cluster High Power Option
  - Main Linac Klystron Cluster Low Power Option
  - Main Linac DRFS High Power Option
  - Main Linac DRFS Low Power Option
  - Main Linac Tunnel Alternative Study
- All of These Cost Estimates are Based on the Current Technical Beamline Layout and the Current 2D CFS Enclosure Layout Posted on the EDMS System
- The Asian Region has Developed a Preliminary Cost Estimate for the DRFS High Power Option
- The European Region will Begin to Develop Cost Estimates as Resources Become Available

Status of CFS AD&I Proposal Document

- Text for the CFS Portion of the AD&I Proposal Document as been Developed, Reviewed and Iterated
- Version 4 has been Provided to the N. Toge with Minor Revisions Added
- All Illustrations have been Added to the Text
- A Couple of Issues Still Remain
  - CFS Will Work with Nobu Toge to Finalize the Text for Life Safety and Egress Descriptions
  - A Remaining Question is Whether to Append the Various Life Safety Support Documents to the AD&I Proposal Document
    - "Fire Safety for ILC Single Tunnel" (Asia)
    - "Life Safety/Fire Protection Analysis for International Linear Collider – Single Deep of Near Surface Tunnel Options" (Americas)
    - "Security and Workplace Safety Concepts for the Construction, Installation and Operation of the XFEL Research Facility" (Europe)
    - CLIC and LHC Safety Documents (Europe)

Current Outstanding Issues

- From the CFS Perspective, the Following Issues Need Attention so that Some Position and Plan Can be Developed for Presentation at the AAP Review in January and to Address Early in the TDP II Process
  - Regional Differences in Tunnel Diameter
  - Regional Impacts for the CFS Effort
  - Regional Impact on the 3D Drawing Effort
  - Regional CFS Cost Estimates
  - Installation and Maintenance Aspects of the Current Design
  - Main Linac Overall Length Considerations
    - Added Tunnel Length for Energy Overhead
    - Added Tunnel Length for Undulator Energy Reduction
    - Added Tunnel Length for Adjustment of Accelerating Gradient

Regional Differences in Tunnel Diameter

- The Asian Solution Uses a 5.2 m Main Linac Diameter for the Distributed RF System and the Klystron Cluster RF System
- The Americas Solution Uses a 4.5 m Main Linac Tunnel Diameter for the Klystron Cluster RF System and has Taken the Asian Configuration (5.2 m Main Linac Tunnel Diameter) for the Distributed RF System
- The European Region Uses a 5.2 m Tunnel Diameter for the Klystron Cluster RF Systems and the Distributed RF System
- It Should be Noted that Each Region is Concentrating It's Design Efforts on a Regional Preference for RF System

Regional Impacts for the CFS Effort

- Asian Region
  - Design Focus is on Distributed RF System
  - Physical Size of DRFS Components
  - Supply and Exhaust Duct Size w/Respect to the Compartmentalized Approach to Life Safety and Egress Issues
  - Cavern and Enclosure Shape Due to Geologic Conditions (Ceiling Profiles are Elliptical in Shape)
  - Optimization of Horizontal Access Tunnels May Result in a Limited Parallel Egress Tunnel in Portions of the Main Linac

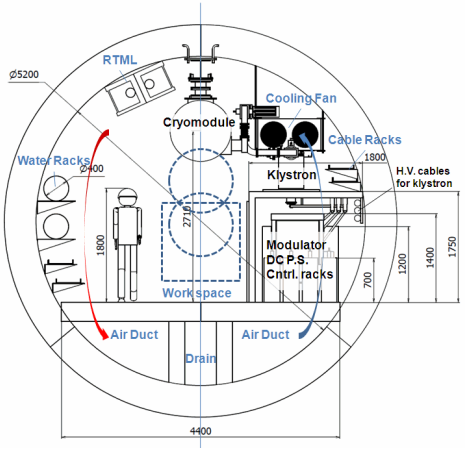
Regional Impacts for the CFS Effort

- Americas Region
  - Either RF System Can Be Used, However the Current Design Focus is on the Klystron Cluster RF System Which Can Fit into a 4.5 m Tunnel
  - The Americas Region has Currently Adopted the Asian Solution for the Distributed RF System Which Requires a 5.2 m Tunnel . This Solution has not yet been Optimized in the Americas Region
  - Most Klystron Cluster RF Equipment is Located on the Surface
  - Life Safety and Egress Requirements do not Require Tunnel Compartmentalization and Consequently Large Air Supply and Exhaust Ducts are not Required
  - Cavern and Enclosure Shape Due to Geologic Conditions (Ceiling Profiles are Relatively Horizontal in Shape)

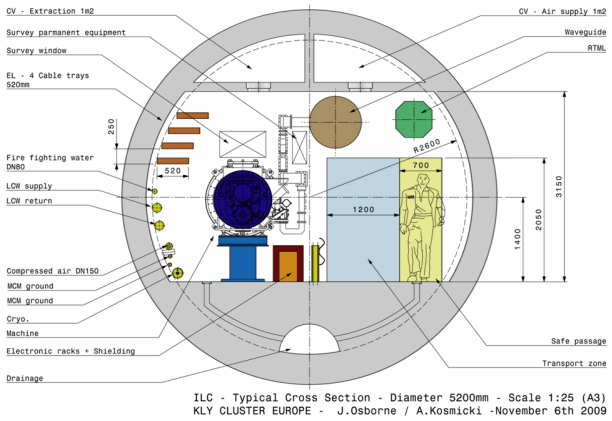
Regional Impacts for the CFS Effort

- European Region
  - Focus is on the Klystron Cluster RF System (Geology is not Conducive to Ceiling Mounted Loads)
  - Most Klystron Cluster RF Equipment is Located on the Surface
  - Supply and Exhaust Duct Size w/Respect to the Compartmentalized Approach to Life Safety and Egress Issues Requires the 5.2 m Tunnel Diameter
  - Cavern and Enclosure Shape Due to Geologic Conditions (Ceiling Profiles are Semicircular in Shape)

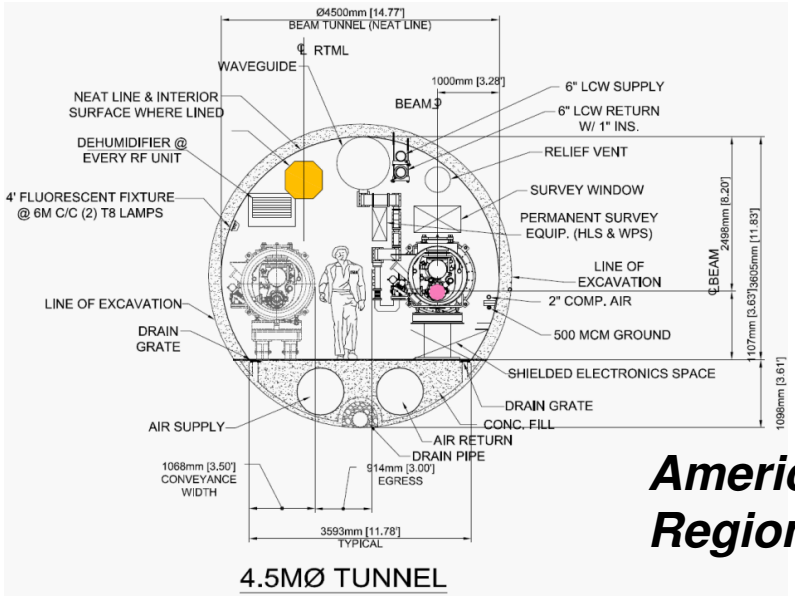
Global Design Effort - CFS



Asian Region



European Region



Americas Region

Regional Tunnel Comparison

Regional Impact on the 3D Drawing Effort

- The Asian Region has Focused on the Distributed RF System While the Americas and European Regions have Focused on the Klystron Cluster RF System
- For Reasons Stated Before, the Asian and European Regions have 5.2 m Main Linac Tunnel Diameter and the Americas Region Uses a 4.5 m Main Linac Tunnel Diameter
- The European CFS Group is Developing a 3D Enclosure Model Based on the 5.2 m Tunnel
- The Americas Region is Developing a 3D Mechanical Support Model Initially for a 4.5 m Tunnel which has to be Redrawn to a 5.2 m Tunnel so it Fits into the Overall DESY 3D Model
- It is Likely that Each Region will Develop a Separate 3D Model During the TDP II Effort
- This will Require an Increased Level of Resources

Regional CFS Cost Estimates

- The RDR had Three Distinct CFS Cost Estimates, One for Each Region
- Civil Construction Portion of Each CFS RDR Cost Estimate was Developed Independently in Each Region
- All Other Parts of the CFS RDR Cost Estimates were Developed in One Region and Used by All Three Regions
- As CFS Design Maturity and Level of Detail Increases, the Distinctions of the Regional Designs Become More Apparent
- This is Likely to Preclude Any Common CFS Cost Estimating and Require Complete Independent CFS Cost Estimates in TDP II
- This will Also Require an Increased Level of Resources

Installation and Maintenance Aspects

- The Current 2D CFS Machine and Enclosure Drawing Does Reflect and Initial (and Cursory) Consideration for Aisle Spacing and Continuity to Accommodate Installation and Maintenance of Beamline Components
- It is Not Comprehensive in Nature
- No Work on Installation Issues has been Completed by the CFS Group Since Before 2008
- A Separate Study for Both Installation and Maintenance Issues Needs to be Conducted to Identify Problem Areas and Develop Further Criteria for Tunnel and Enclosure Adjustments to Accommodate Installation and Operational Considerations
- CFS Can Help in this Effort, But Resources will be Required and Technical Systems Must Take the Lead in this Effort

Main Linac Overall Length Considerations

- Added Tunnel Length for Energy Overhead
- Added Tunnel Length for Undulator Energy Reduction
- Added Tunnel Length for Adjustment of Accelerating Gradient
- These are Listed for Information
- The CFS Group Can Respond with Drawing and Cost Estimate Changes Once Decisions are Made

Preparation for the AAP Review

- The CFS Group Is Prepared to Present the Basis and Process of Work that Went Into the Preparation of the AD&I Proposal Document
- We will Respond to Further AAP Direction as it Becomes Available
- We will Also Continue to Work Directly with the CFS Assigned Project Manager, Marc Ross, to Provide the Information Needed for an Productive Exchange with the AAP

Summary

- The CFS Group has Completed a Comprehensive Interaction with the Various Area Systems in Order to Develop a Complete Machine and Enclosure Layout for the ILC
- Cost Information Reflecting the SB 2009 Working Assumptions has been Provided to Peter Garbincius and the Cost Group
- Both the Machine Layout Drawings and Cost Information have been Iterated Several Times to Correct Discrepancies
- A Final Draft of the CFS Portion of the AD&I Proposal Document has been Provided to Nobu Toge
- Some Issues Remain to be Resolved Prior to the Start of the TDP II Process
- Resources, as Always, will have to be Carefully Assigned to Maximize the TDP II Effort