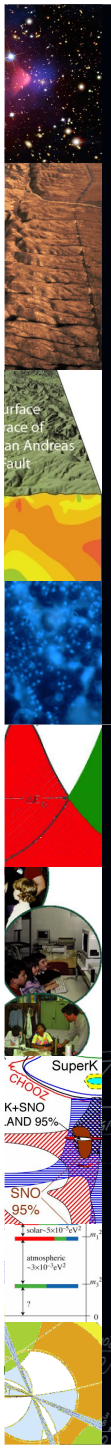
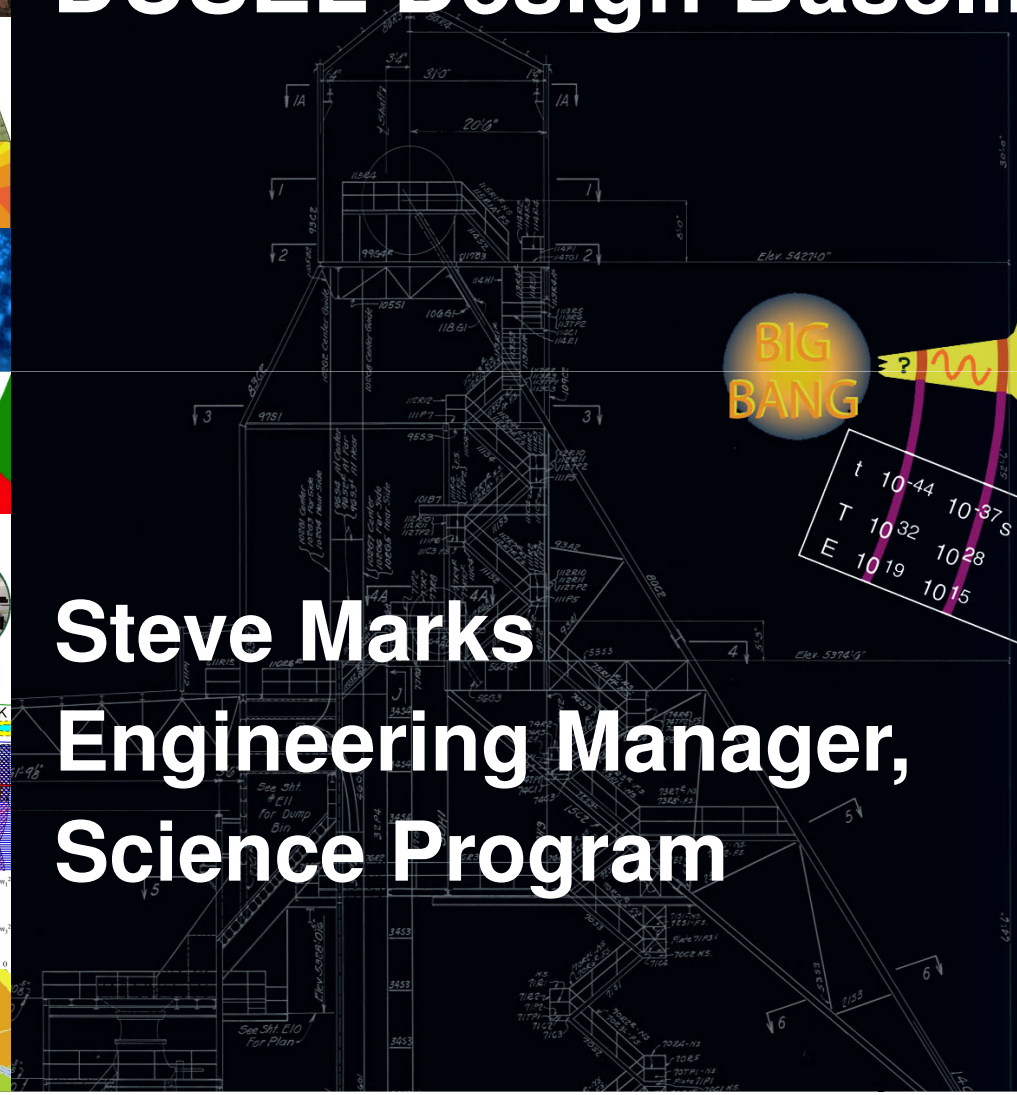
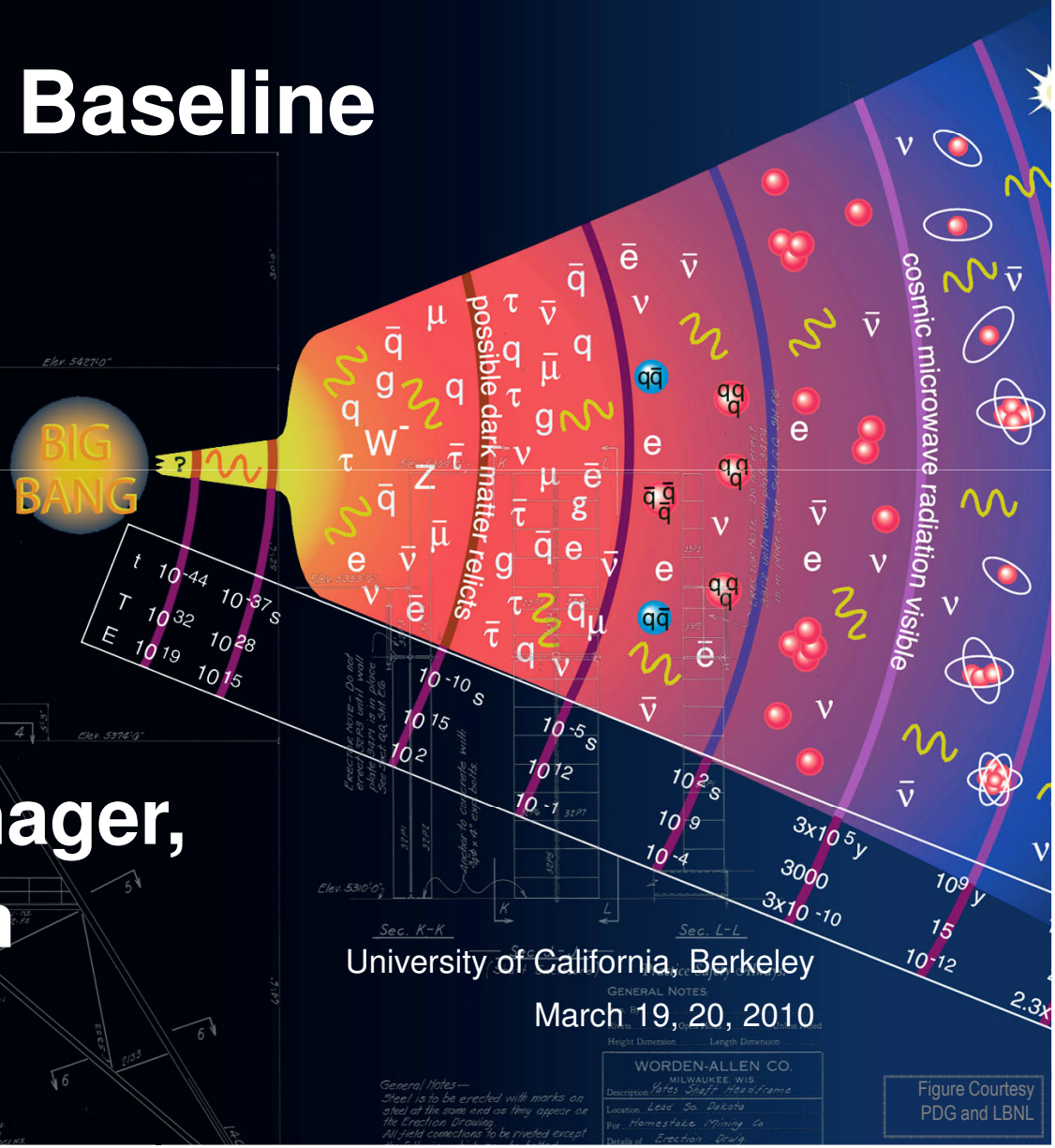
FAARM's In Berkeley?

DUSEL Design Baseline







Steve Marks
Engineering Manager, Science Program

University of California, Berkeley

March 19, 20, 2010

Figure Courtesy PDG and LBNL

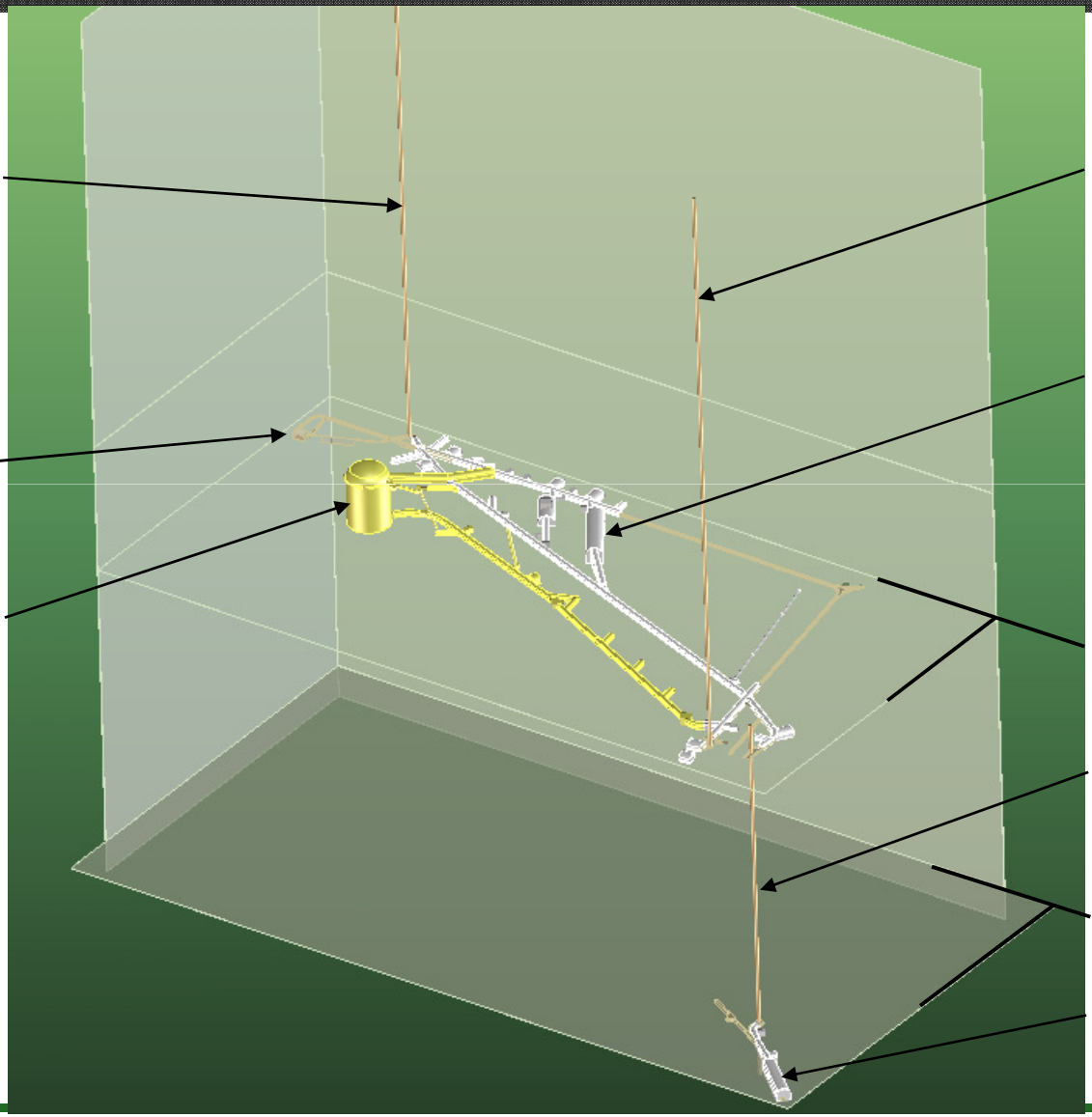
Agenda

- Description of DUSEL Design Baseline
- Assumed ISE Configuration Basis of Design
- Schedule
- Issues for FAARM to Consider

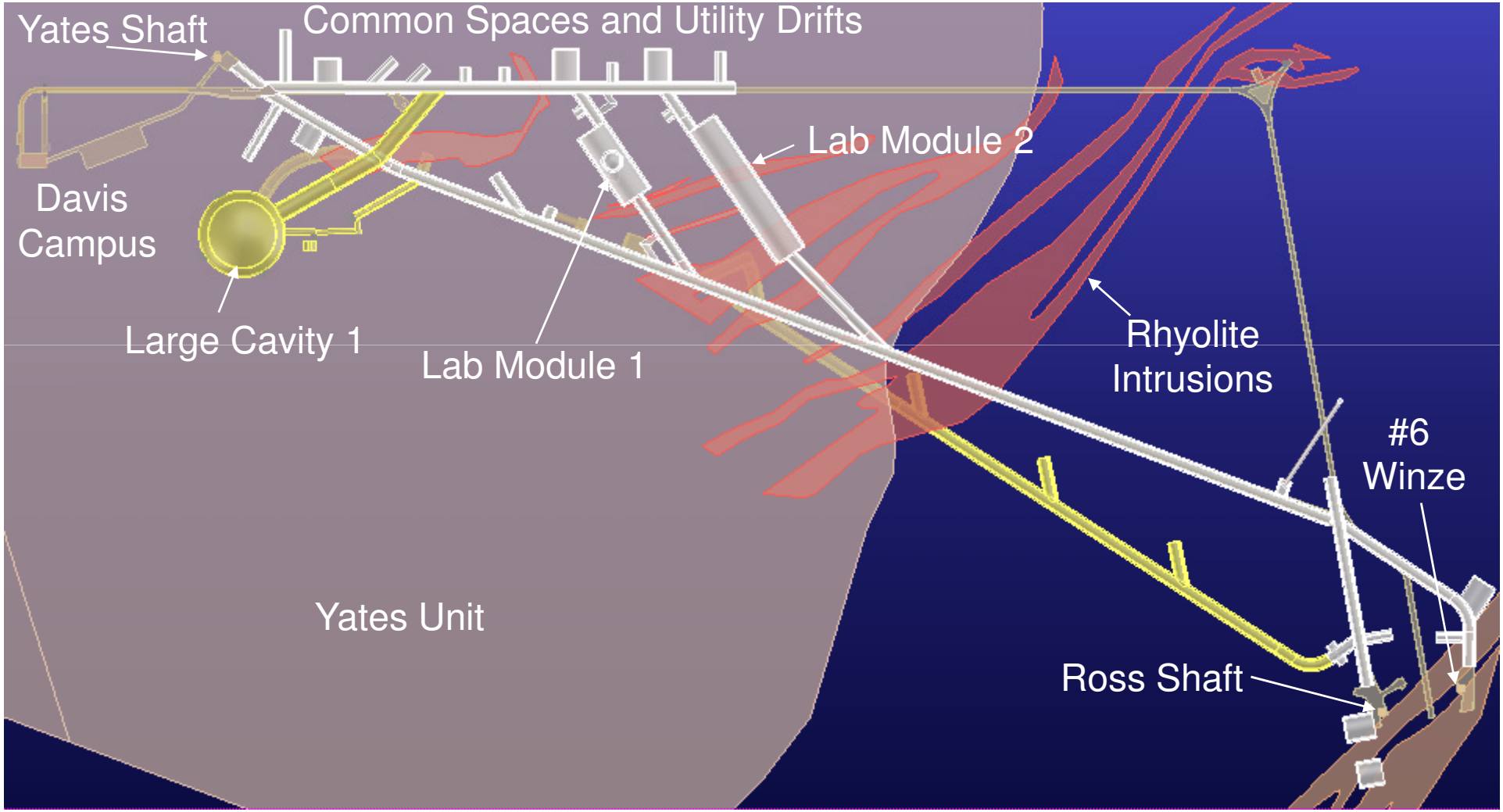
NSF Guidance

- Design to cost: $750M (FY09$) including 35% Contingency
- DUSEL Facility (including mid-level and deep campuses)
- Diverse and Compelling Suite of Experiments
  - Long Baseline Neutrinos
  - Proton Decay
  - Neutrinoless Double Beta Decay
  - Dark Matter Searches
  - Additional Compelling Physics Experiments
  - Biology, Geology, Engineering Experiments
  - Education and Outreach Program

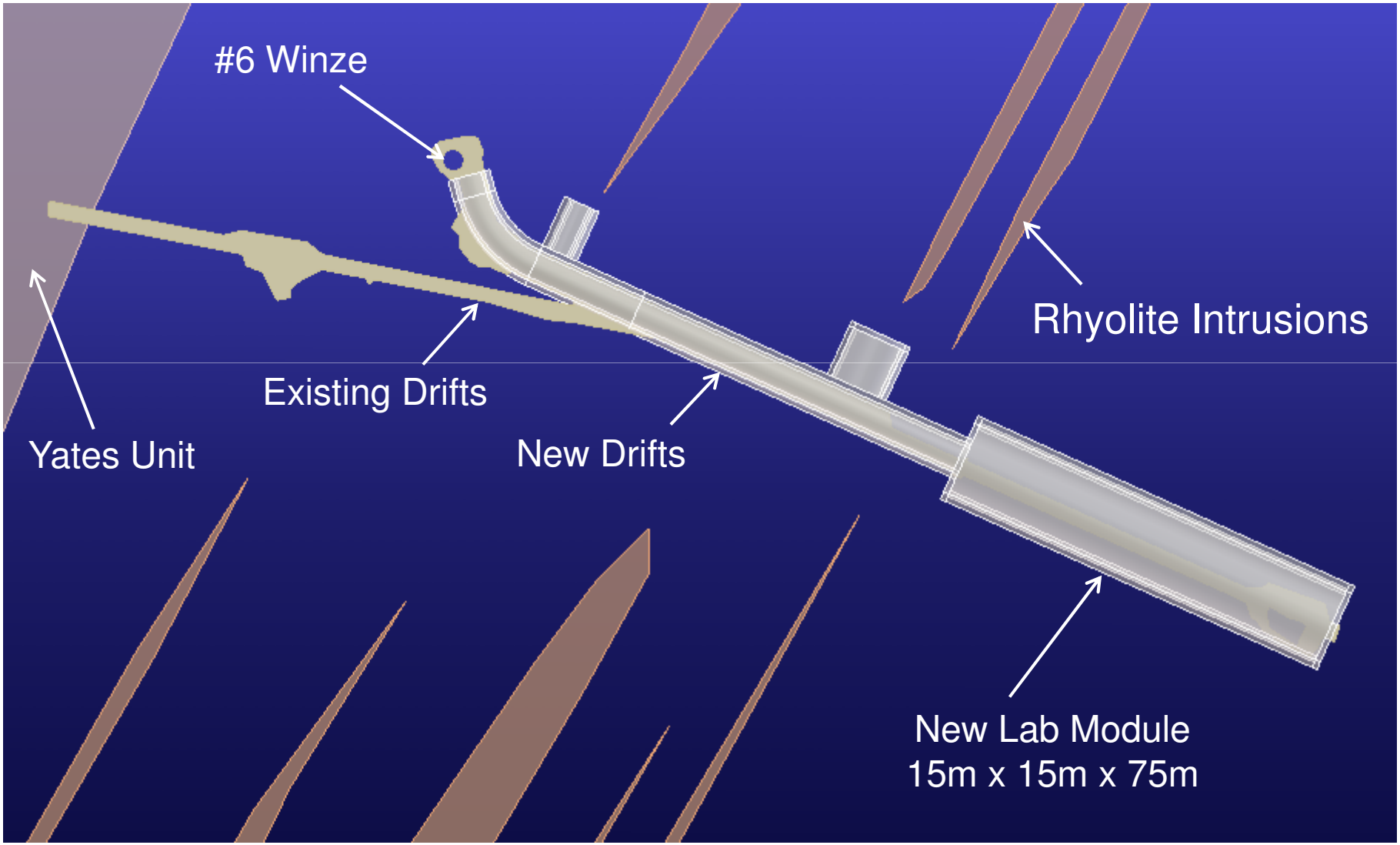
Laboratory Design Baseline



Laboratory Design Baseline – MLL Campus



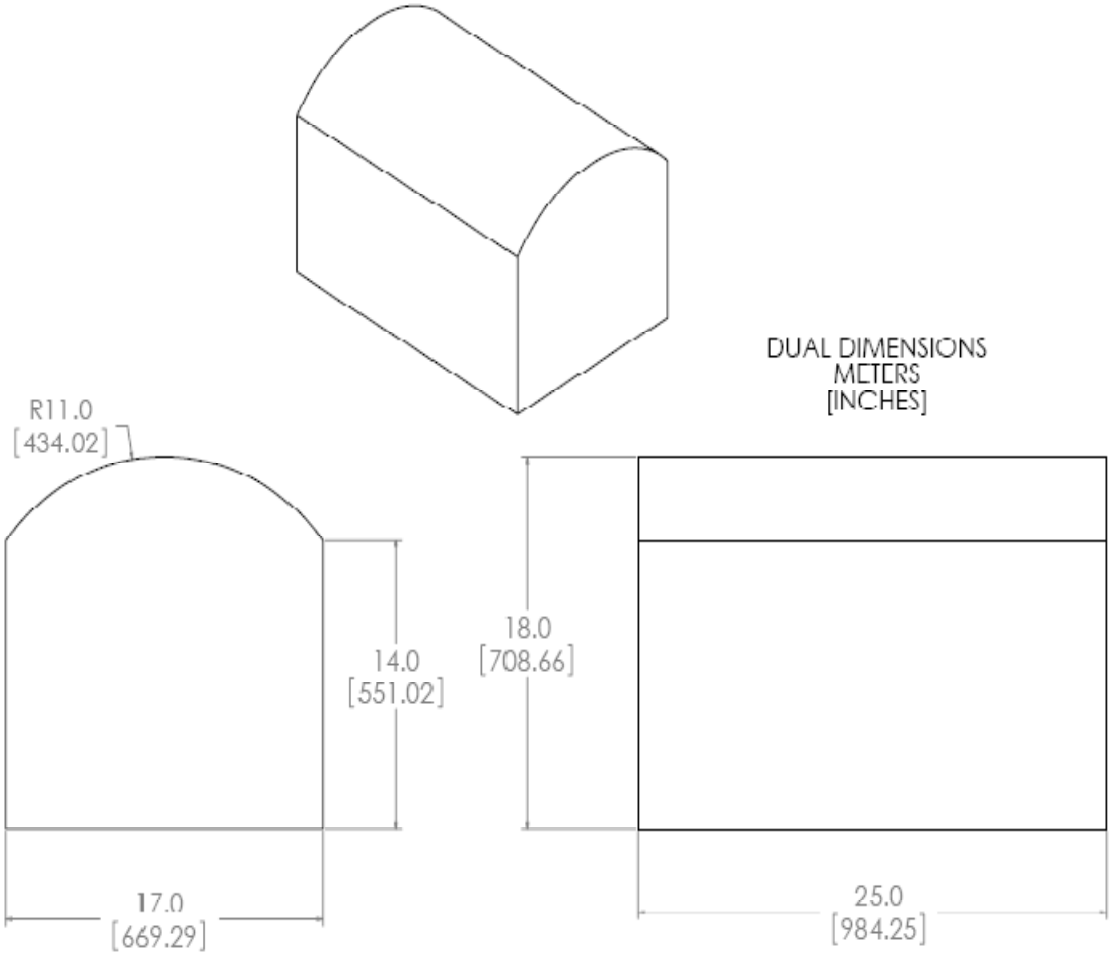
Laboratory Design Baseline – DLL Campus



Laboratory Design Baseline – Constraints

Assumptions for MLL:

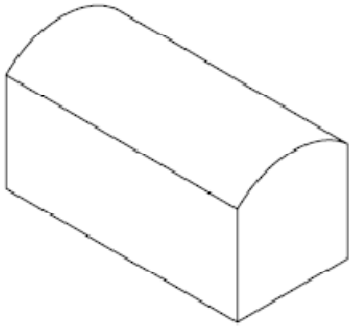
- Three experiments of about equal size.
- Lay-down and assembly space equal to the allotted space of a single experiment
  - Must be shared.
  - Will require phased installation of experiments.
- 2m for crane hook clearance.
- Width allowance of 3m for utilities and egress.

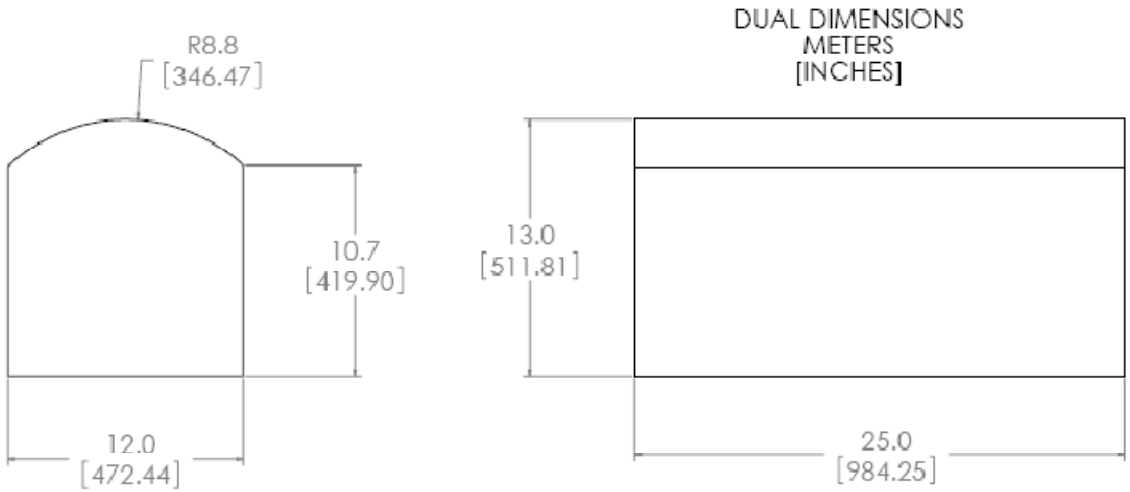


Laboratory Design Baseline – Constraints

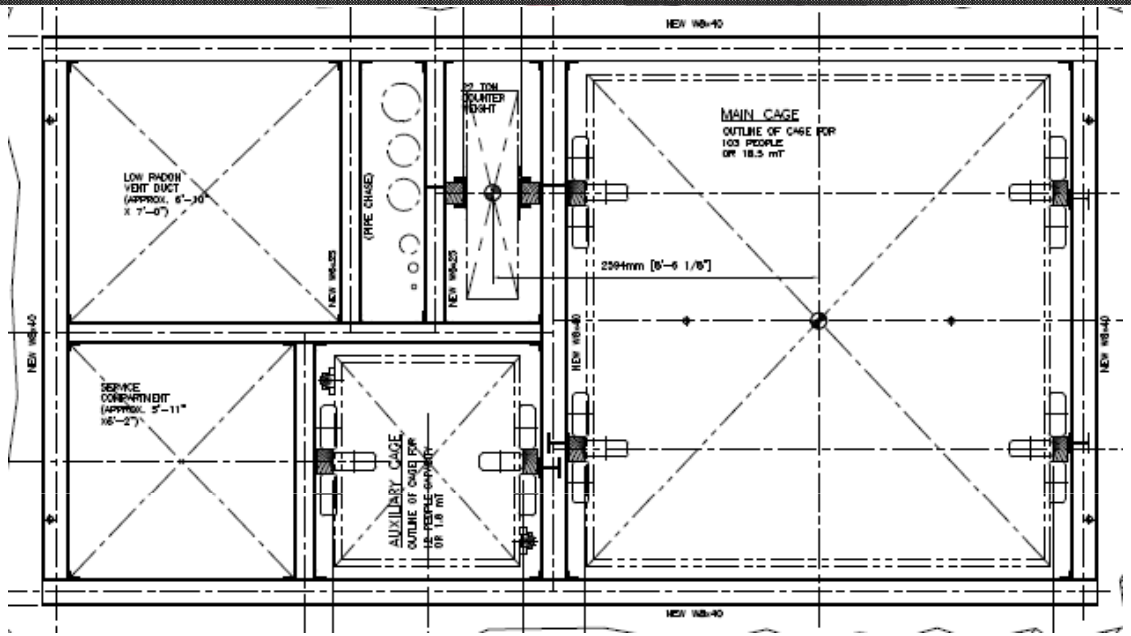
Assumptions for DLL:

- Two experiments of about equal size.
- Lay-down and assembly space equal to the allotted space of a single experiment
  - Must be shared.
  - Will require phased installation of experiments.
- 2m for crane hook clearance.
- Width allowance of 3m for utilities and egress.





Laboratory Design Baseline - Hoists



Access	Height [m]	Length [m]	Width [m]	Capacity [kg]
Ross cage	2.2	3.8	1.3	6100
Yates Super-cage	4.9	4.1	3.2	18,000
Yates personnel lift	2.5	1.5	1.3	2000
#6 Winze cage	2.2	3.7	1.3	6400

Draft ISE Configuration Assumed for Lab Design

- Neutrino oscillation, proton decay
  - Water Cherenkov detector(s)
  - LAr TPC detector(s)
- Two dark matter experiments
  - Multi-Ton Cryogen (LZD, MAX)
  - Solid State (GEODM)
  - Multiple Bubble Chamber Modules (COUPP)
- Two double beta decay
  - Multi-Ton Cryogen (EXO, 1TGE cryo option)
  - Solid State (1TGE)
- Nuclear astrophysics - DIANA
- Low background counting - FAARM

Assumed Physics Experiment Configuration

- Mid-Level (4850L) Campus
  - Lab Module 1, 50m
    - **Single isolated experiment**
      - **DIANA**
    - Or one or two other experiments:
      - DM, DBD, FAARM
  - Lab Module 2, 100m
    - **Three experiments**
      - **Cryo DM, Cryo DBD, FAARM**
      - Or Other combination of DM (any), DBD (any), FAARM

Assumed Physics Experiment Configuration

- Mid-Level (4850L) Campus
  - Davis Campus – Pre-DUSEL Outfitting
    - Cavern:
      - **3T Cryo Detector**
      - Or Other DM, DBD, FAARM
    - Auxiliary Room
      - **Currently outfitted for electroforming, clean machining and assembly, mechanical support**
      - Or COUPP, FAARM
- Deep-Level (7400L) Campus
  - Lab Module 1, 75m
    - **DM (GEODM, COUPP), SS DBD (1TGe)**
    - Or smaller Cryo DM, DBD

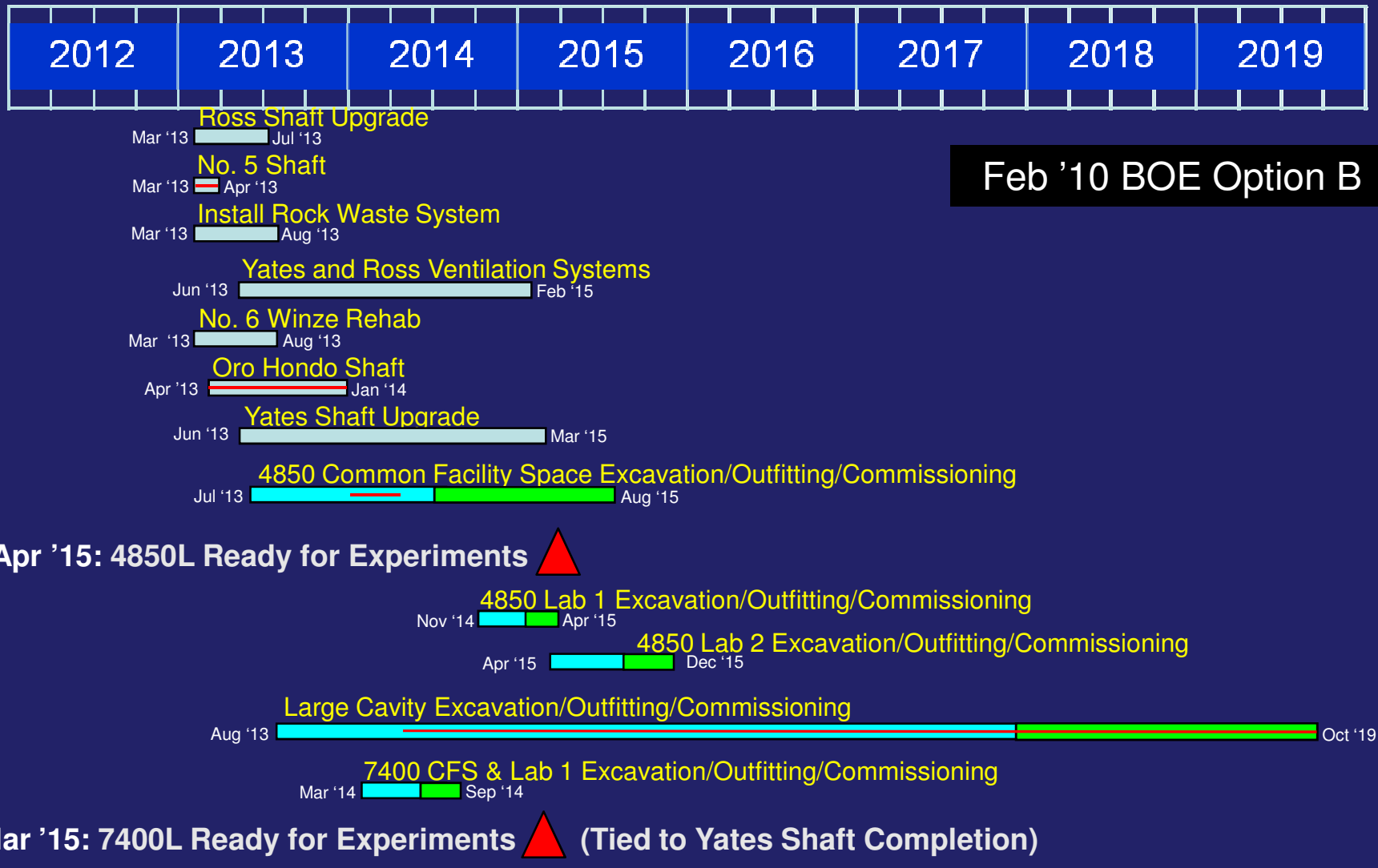
BGE Experiment Configuration

- Candidate Locations Identified
- CO_2 Sequestration: Surface - ~1250L
- Coupled Processes: 4850L
- Fracturing: 4850L
- Deep Drilling: 7400L
- Variety of distributed sensor and sampling experiments
  - Transparent Earth
  - Optical Fiber Sensors

Schedule Overview to MREFC

- PDR – Dec. 2010
  - ISE PDR Tasks
    - CDR level cost and schedule estimates – 3/31/10
    - April ’10 – June ’10: Refine layouts, cost, schedule to fit in “box”
  - Draft PDR – Sept. ’10
- NSB Presentation – Spring 2011
- FDR – 2011, 2012
- MREFC, Begin Construction - 2013

Construction Schedule Estimate - Optimistic



Feb '10 BOE Option B

Some Issues for FAARM to Consider

- How will this be phased?
  - Connection with Early Science?
  - Initial Screening for Construction of other Experiments
  - Next Generation R&D
- Concentrate on Counting and Screening Functions
- DUSEL Responsible for Other General Purpose, Related Functions
  - Clean machining
  - Clean assembly
  - R&D Space