Space and Infrastructure of Near Site

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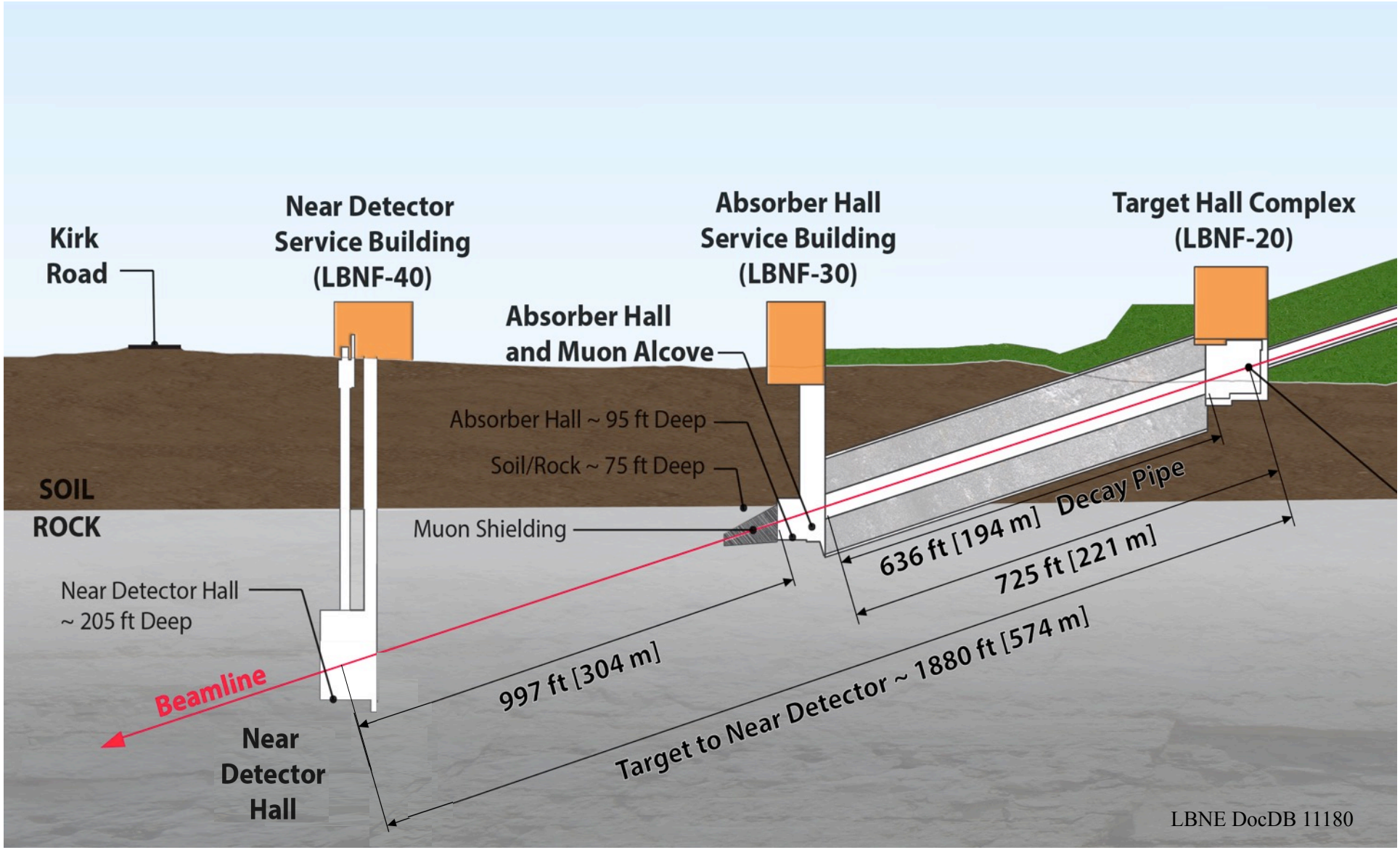
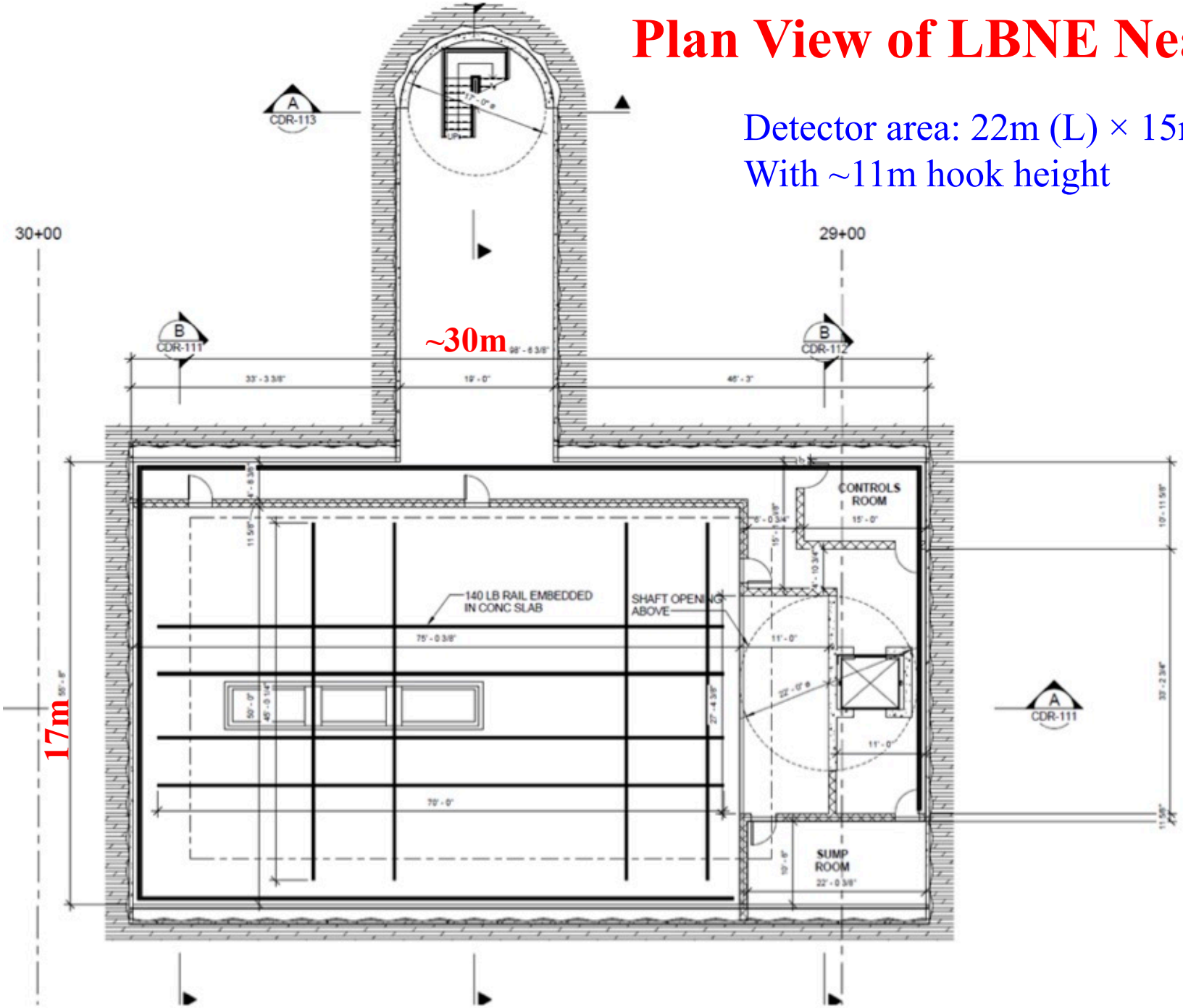
DUNE ND Workshop, Fermilab
23 March 2018

Near Site


Kirk Road
Near Detector Service Building (LBNF-40)
Absorber Hall Service Building (LBNF-30)
Target Hall Complex (LBNF-20)
Absorber Hall and Muon Alcove
Absorber Hall ~ 95 ft Deep
Soil/Rock ~ 75 ft Deep
SOIL
ROCK
Muon Shielding
Decay Pipe
636 ft [194 m]
725 ft [221 m]
Near Detector Hall ~ 205 ft Deep
997 ft [304 m]
Target to Near Detector ~ 1880 ft [574 m]
Beamline
Near Detector Hall
LBNE DocDB 11180

Plan View of LBNE Near Hall

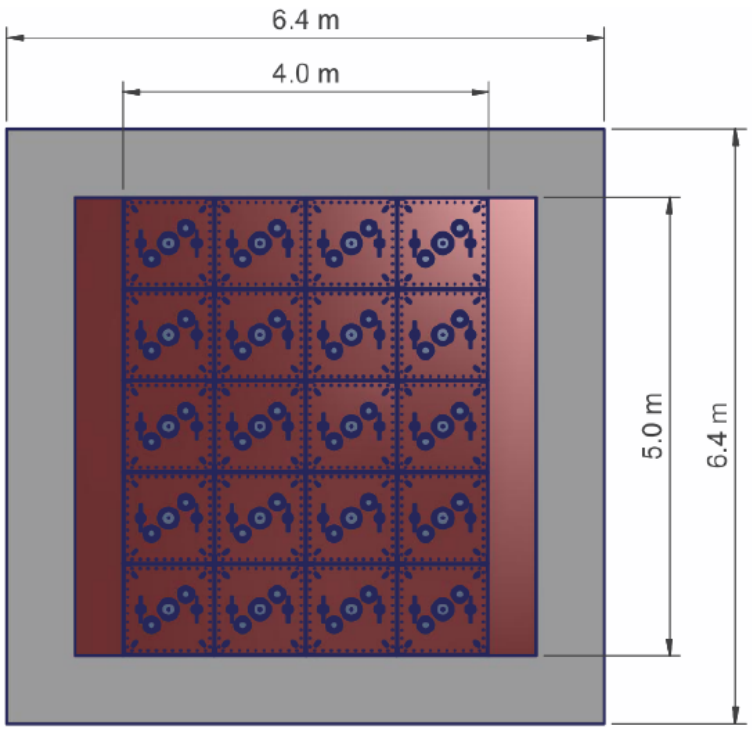
Detector area: 22m (L) × 15m (W)
With ~11m hook height

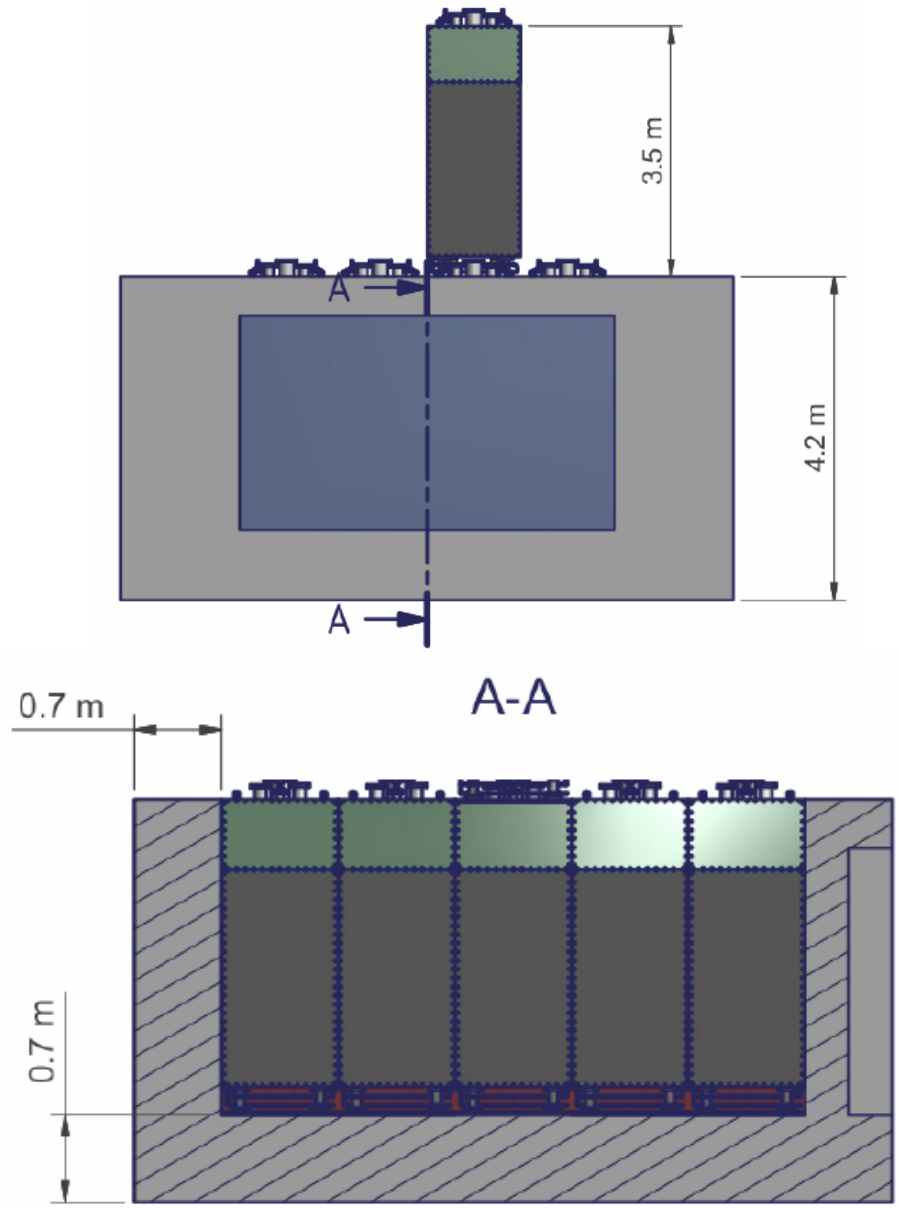


Near Hall For DUNE ND

- Is the current design tall enough for DUNE ?
- Agreed to increase the LBNE's by 50% for DUNE
  - LBNE: ~510 m^2
  - DUNE: ~760 m^2
- How to optimize the floor plan to accommodate a LAr TPC and MPT as well as PRISM ?
- Is there room for future detectors ?

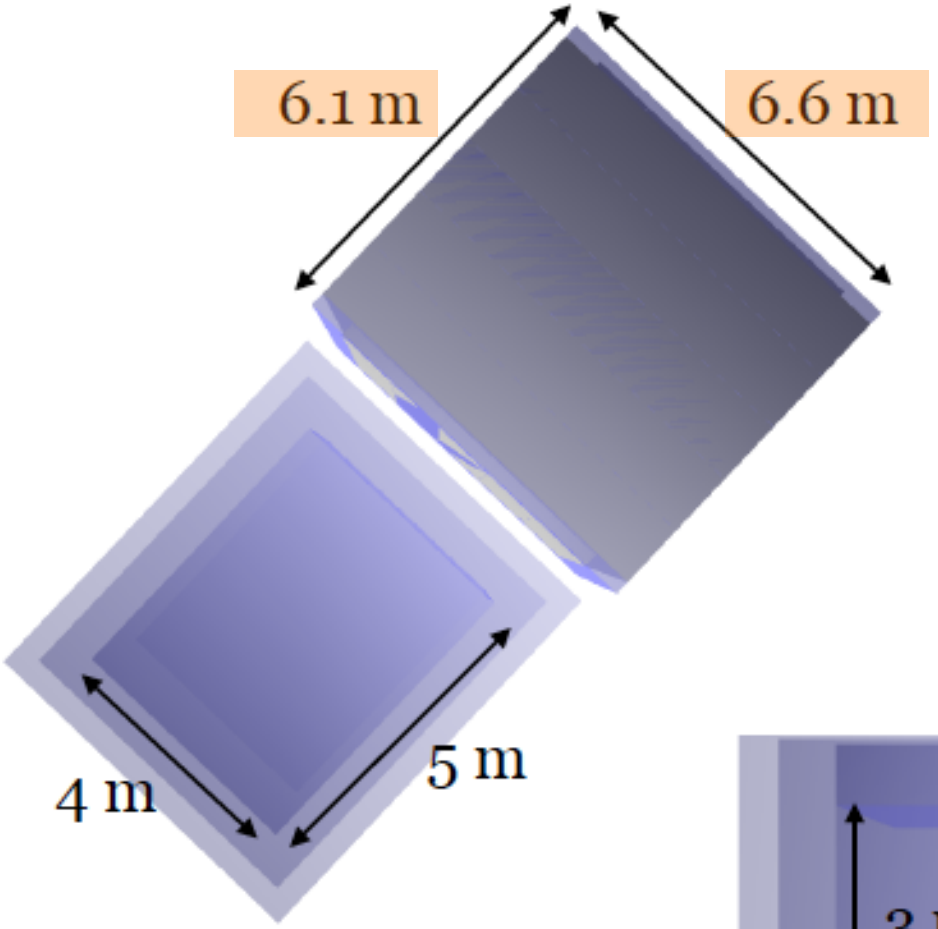
Dimensions of LAr TPC



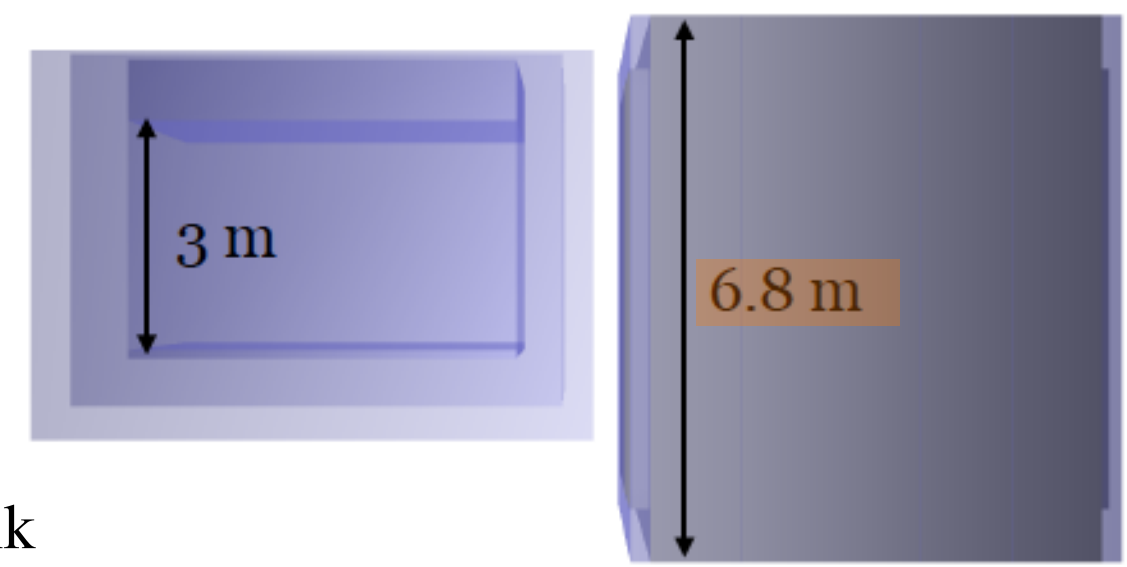


From James Sinclair's talk

Dimensions of HPg TPC



Coded by Mike Kordosky, José Palomino and Guang Yang



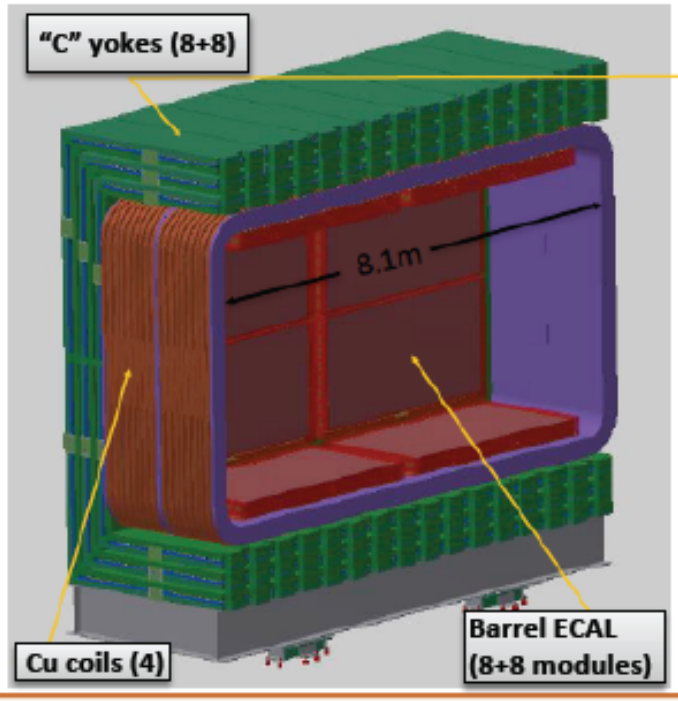
From Justo Martin-Albo's talk

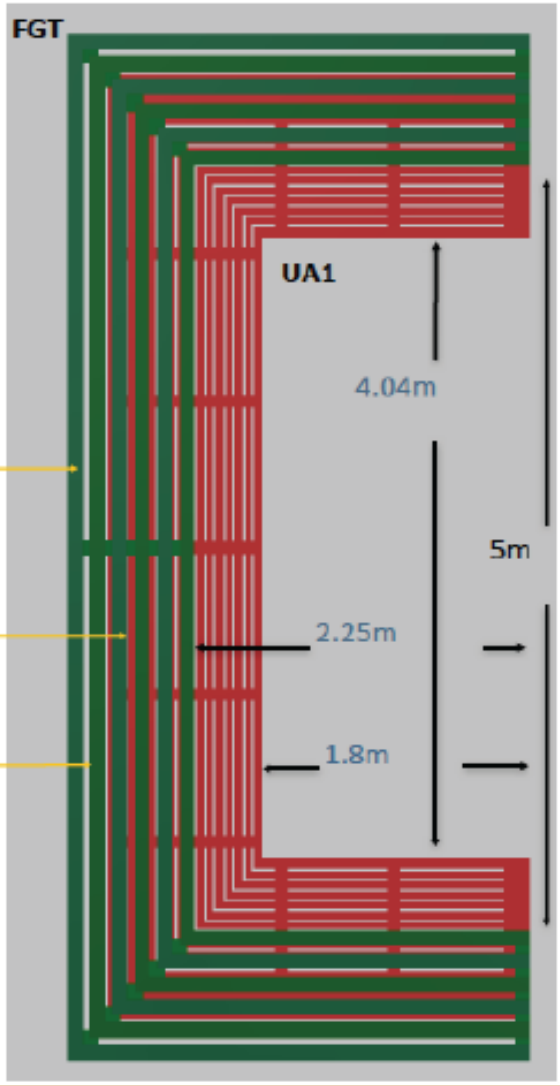
Dimensions of FGT

The Dipole Magnet

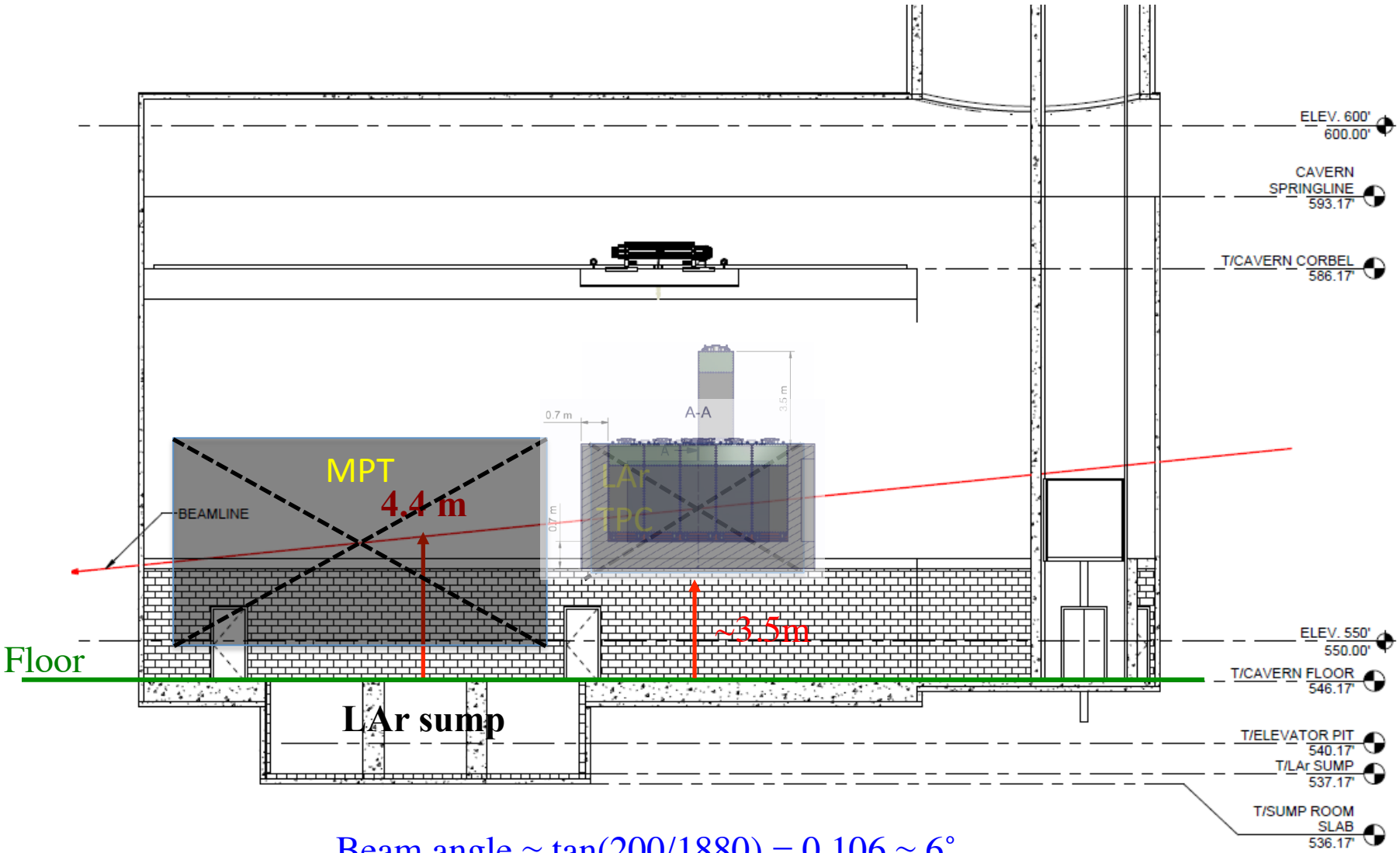
Outer dimensions: 6m (w) × 6m (h) × 11m (l)

- Design based on UA1/NOMAD/T2K magnet
- Magnetic volume: 4.5 m x 4.5 m x 8.1 m, nominal B = 0.4T
- Return yoke with 8+8 "C" section:
  - 6 x 100 mm steel plates, 50 mm gaps (960 tons)
- 4 vertical Cu coils (168 tons) made of 8 double pancake
- Power requirement for nominal field 2.43 MW, water flow for coil cooling: 20 l/s





Profile of Near Hall

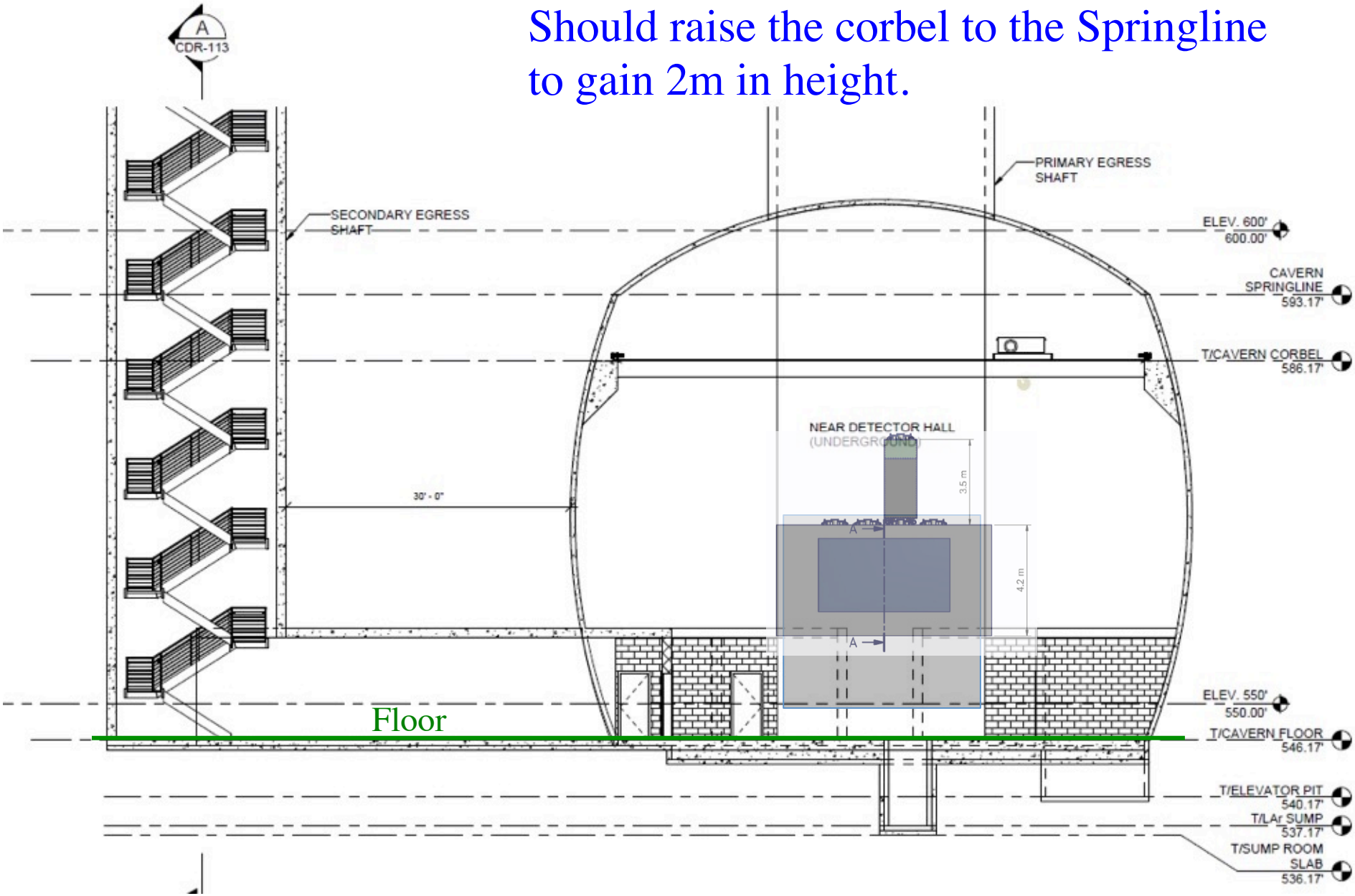


Beam angle ≈ tan(200/1880) = 0.106 ≈ 6°

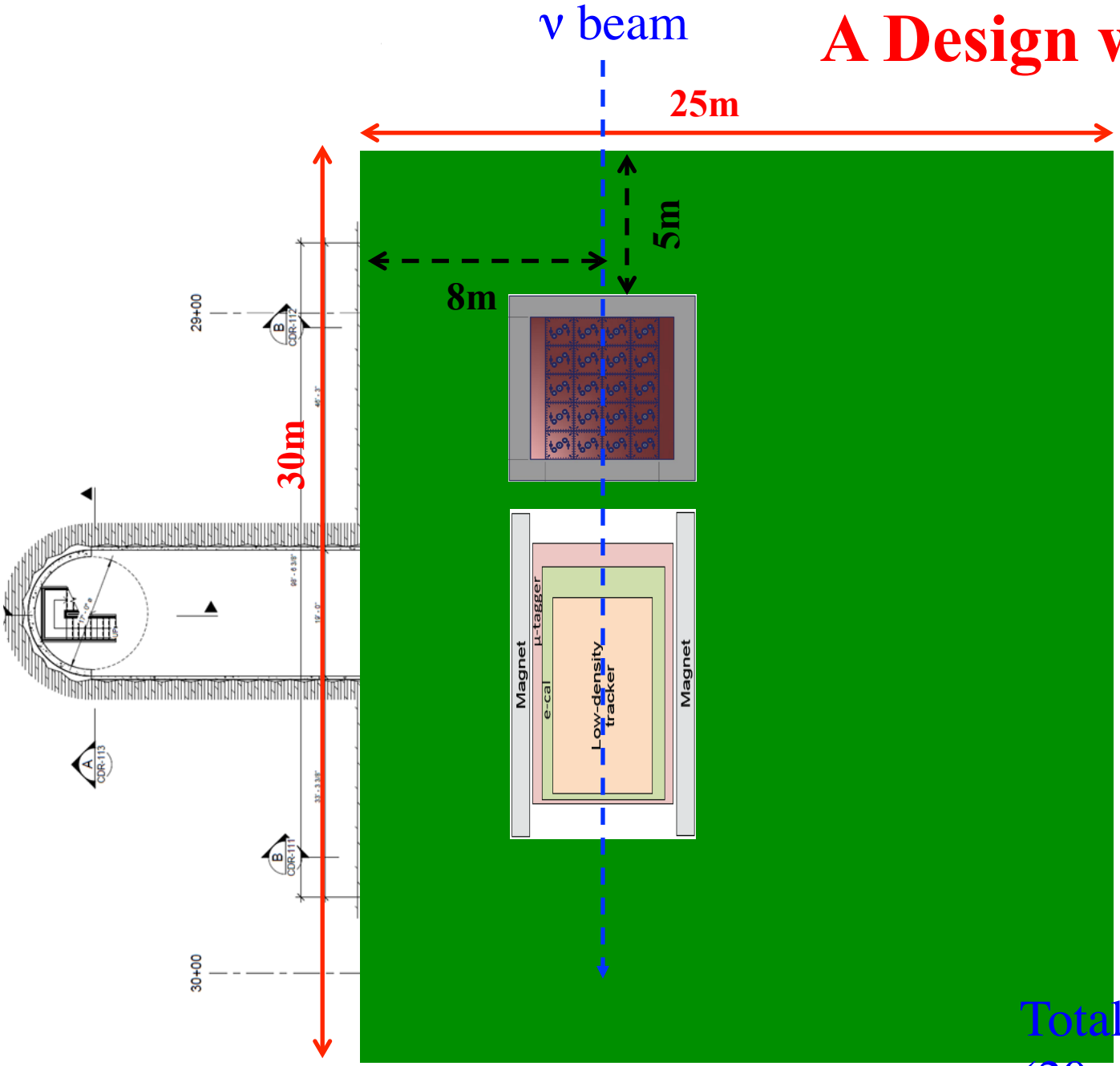
Floor elevation set so that beam is 4.4m above center of LAr sump.

Cross Section of Near Hall

Should raise the corbel to the Springline to gain 2m in height.

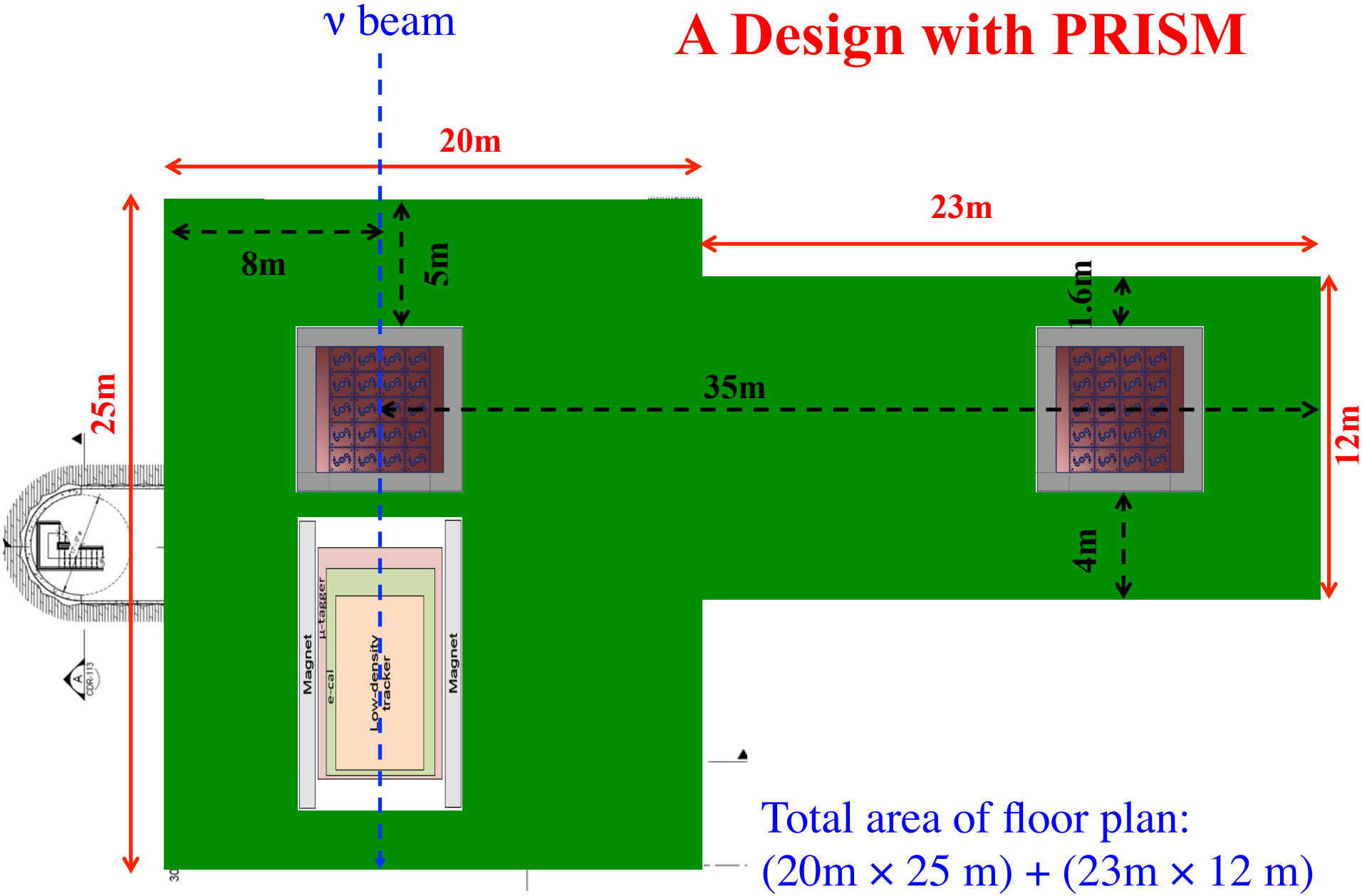


A Design w/o PRISM



Total area of floor plan:
(20m × 25 m) = 750 m^2

A Design with PRISM



Total area of floor plan:
(20m × 25 m) + (23m × 12 m)
= 776 m^2

Questions

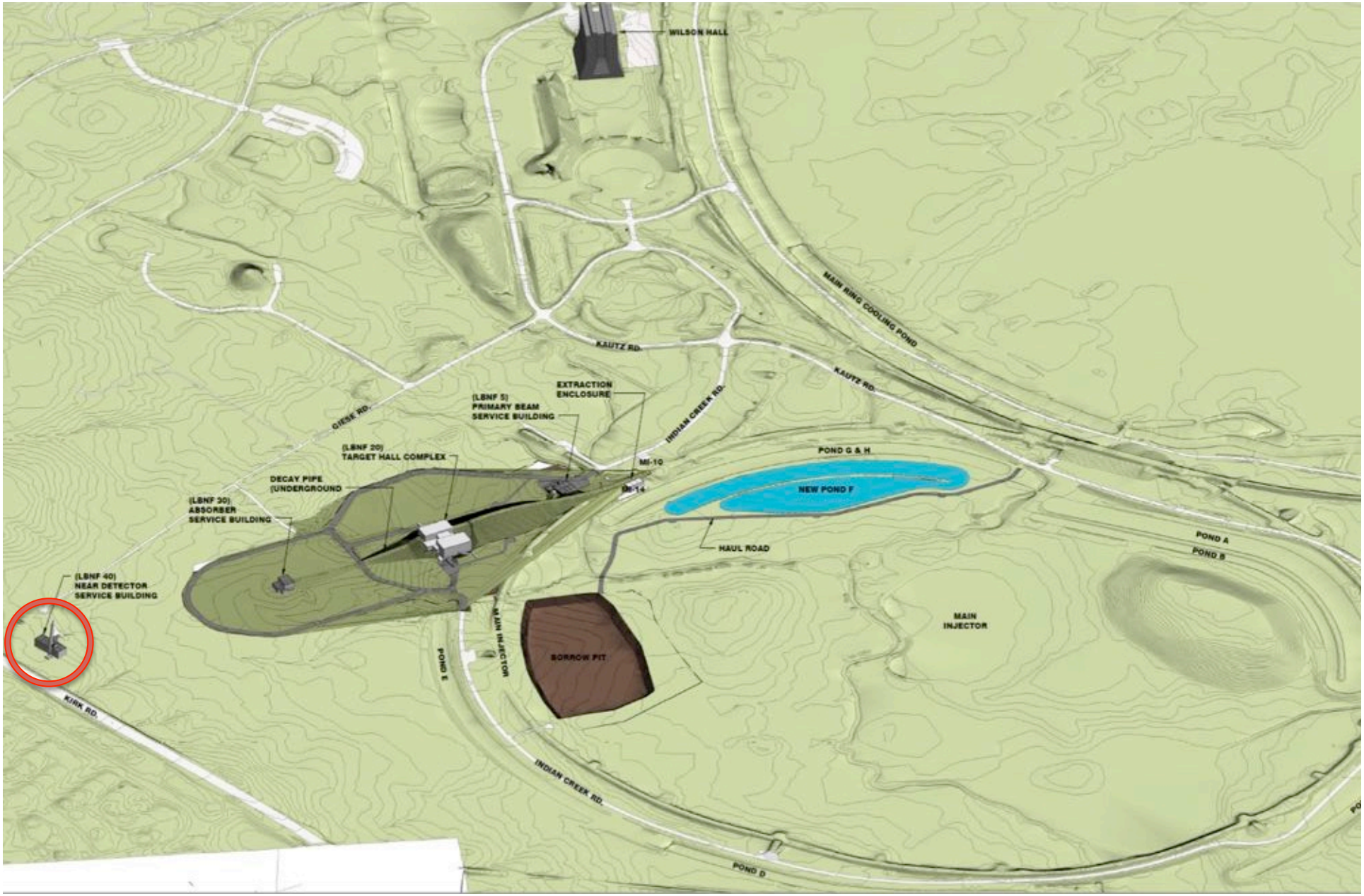
- What should be the size of the primary egress shaft?
- What are the needs of the cryogenic systems?
- Primary egress shaft, sump room and control room should be away from the upstream (front) wall?
- Liquid-argon sump pit should be off to one side, closer to the secondary egress shaft?
- Can the corbel be raised to Springline?

Back Up

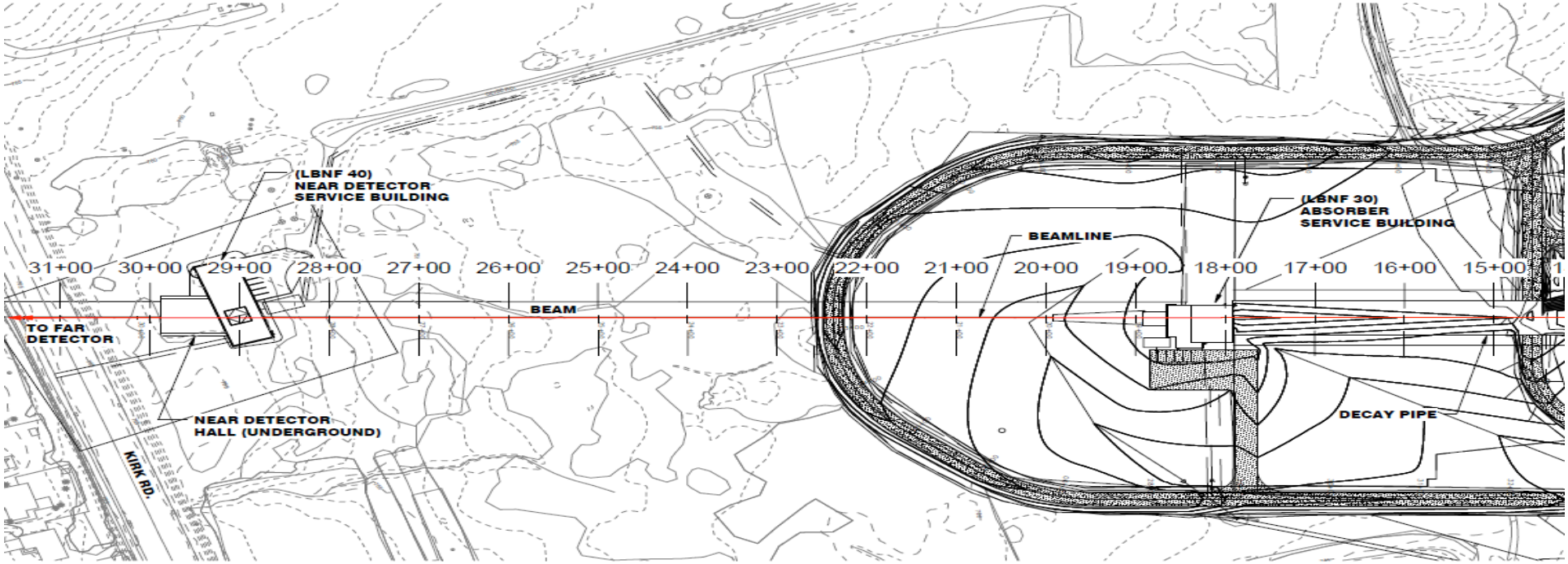
Current Schedule of Near Site

- Geotechnical Investigation Start – November 2017
  - Need to have location of halls and shafts prior to starting
- Preliminary Design Start – March 2018
  - Need preliminary DUNE Near Detector requirements and interfaces 4 months prior to starting Preliminary Design
  - Need updated requirements and interfaces at the start of Preliminary Design
- Final Design Start – March 2019
  - Need FINAL requirements and interfaces at the completion of Preliminary Design / start of Final Design
- Construction Notice-To-Proceed – March 2022
- Final Completion – November 2024

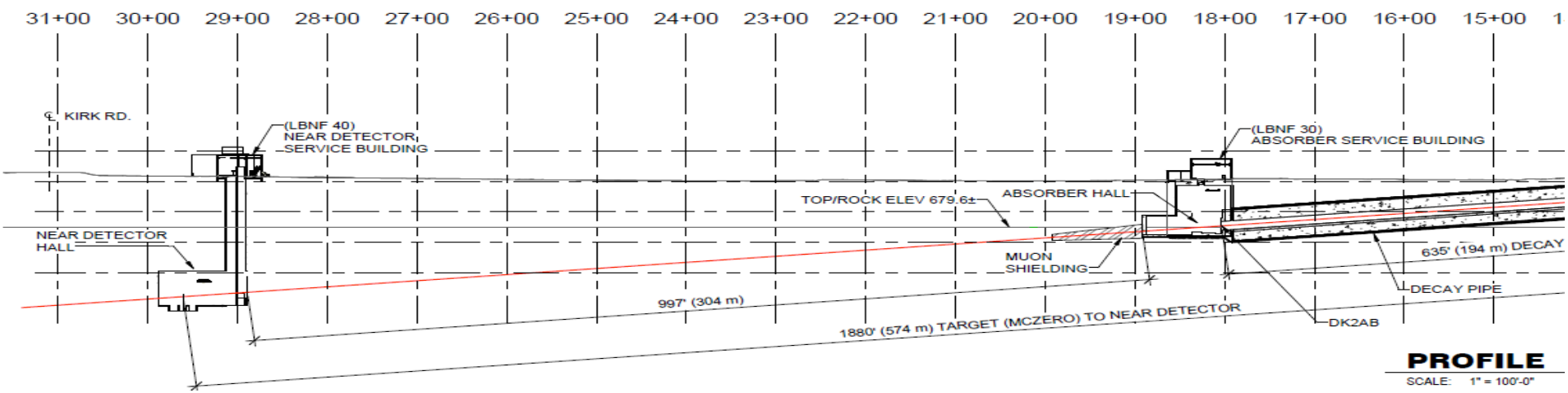
Overview of Near Site



Topographic View & Profile



PLAN
SCALE: 1" = 100'-0"



PROFILE
SCALE: 1" = 100'-0"