SANFORD UNDERGROUND RESEARCH FACILITY

SURF Future Science Infrastructure Capabilities

Theia Site Visit

December 1, 2025

Future Science Planning

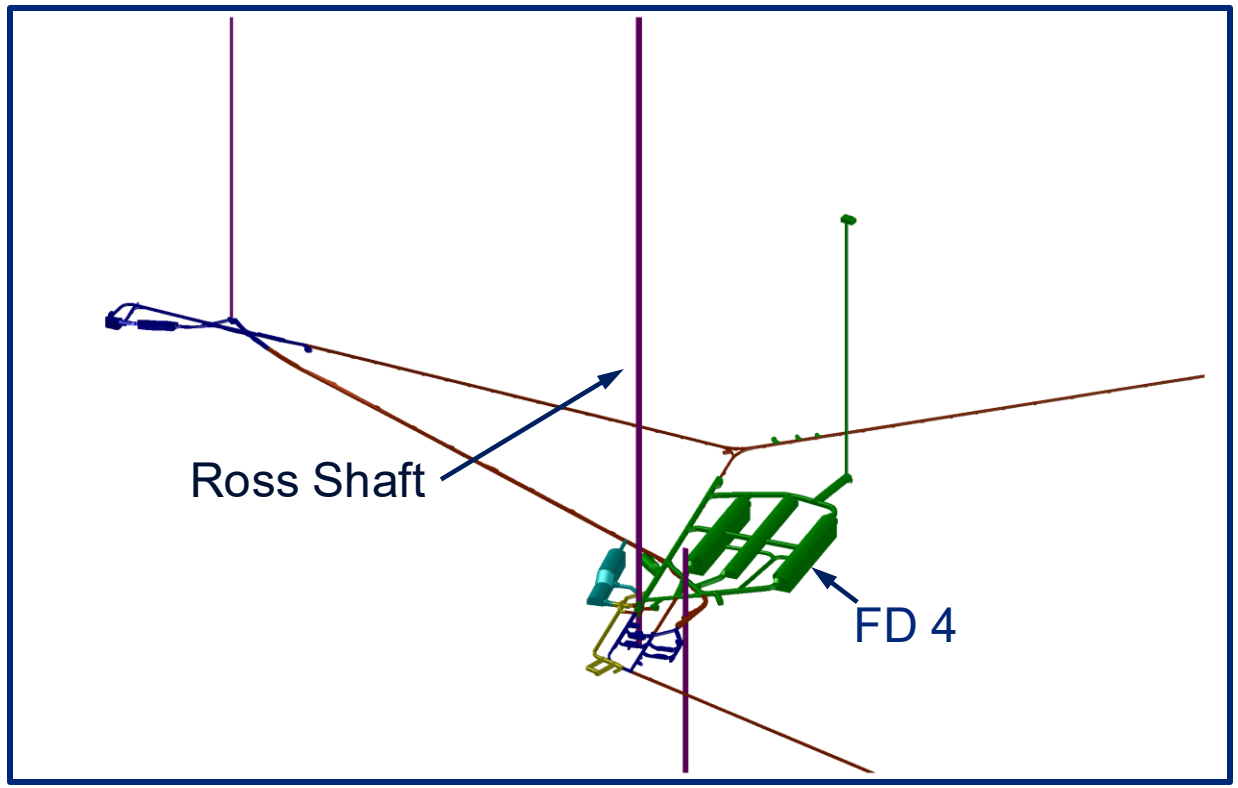
- SURF is the only viable US based underground research laboratory.

- DUNE FD4 Module
  - Completely excavated with shotcrete walls
  - Finished concrete floors
  - Monorail in place
  - Electrical service supporting the cavern being installed presently
  - HVAC being installed to cool the cavern from west to east

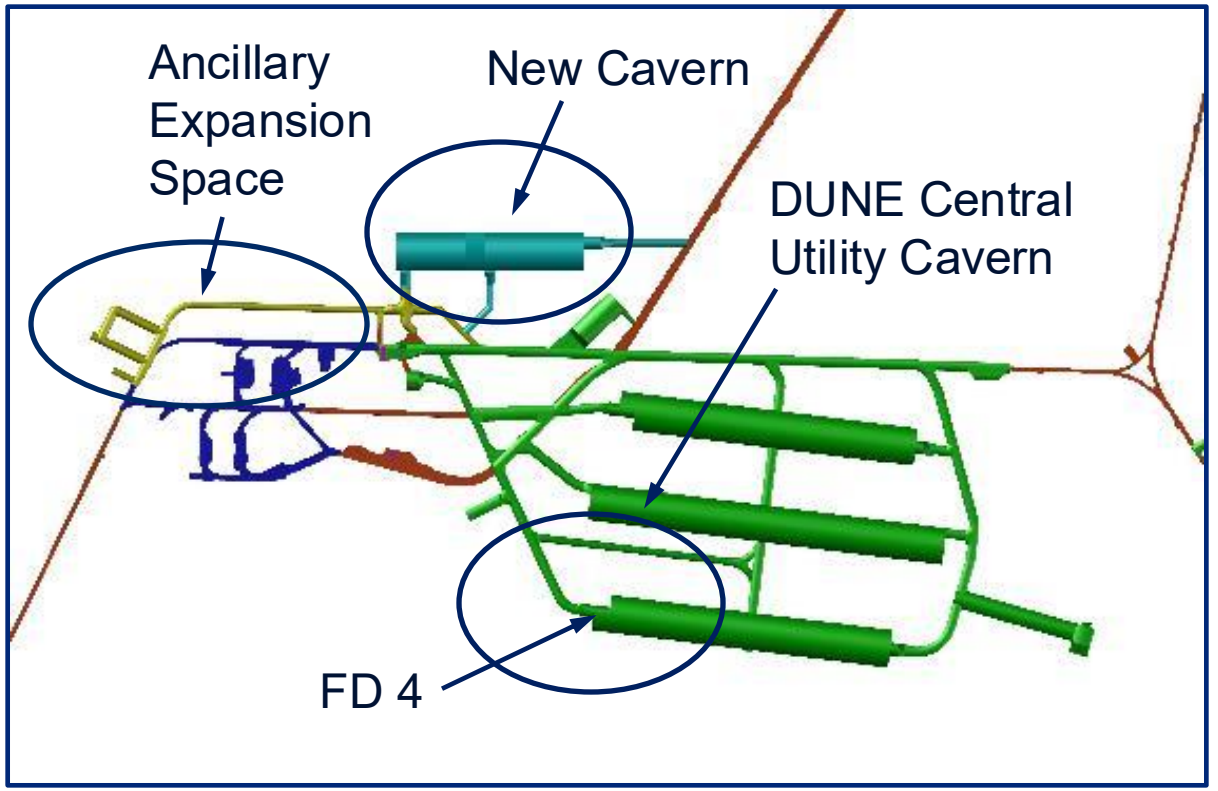
- SDSTA (Shafts, Crews, Logistics Support) currently demonstrating capabilities for movement of large scientific equipment

Proposed Major Science Program Locations

- FD 4 Module or New Cavern and the Ancillary Expansion Space available for deployment

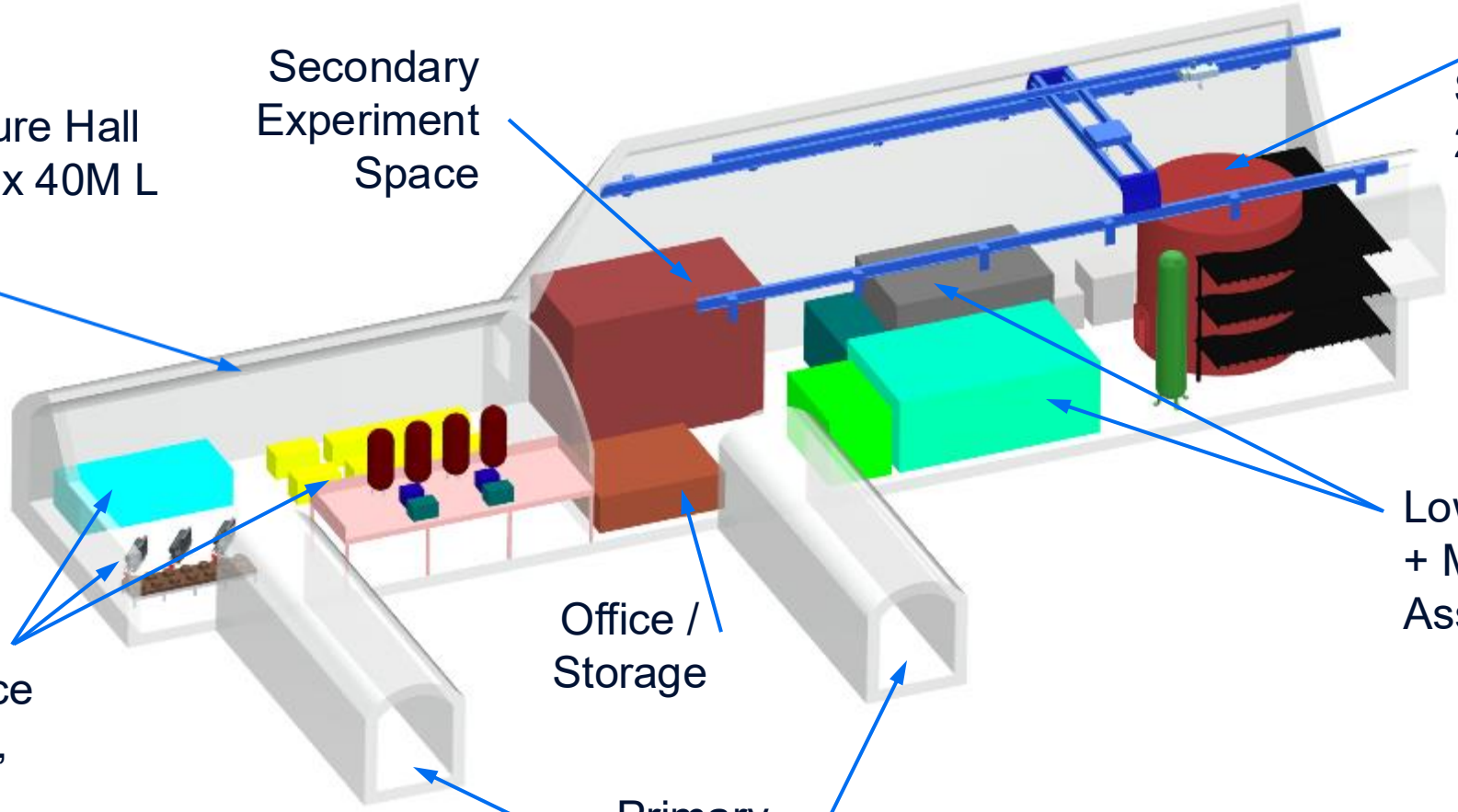


Isometric View of 4850

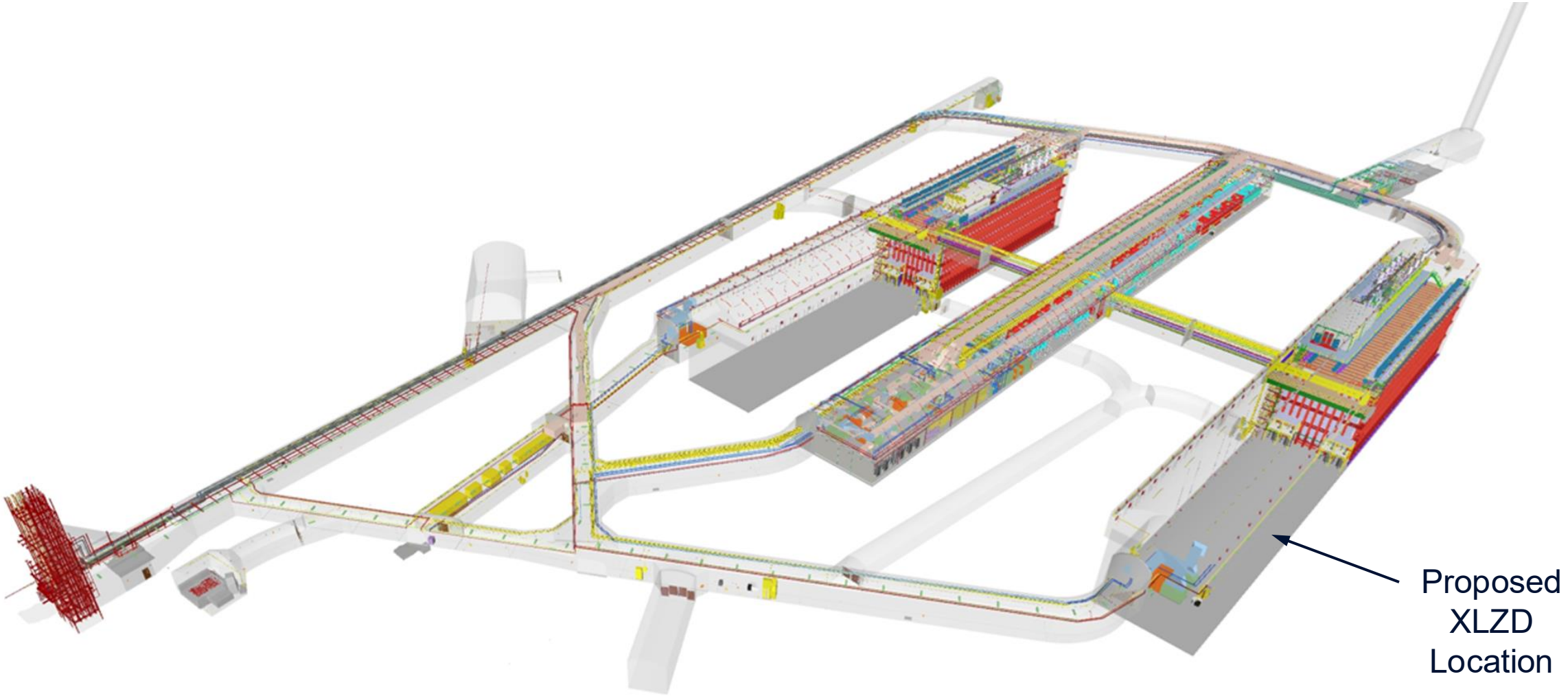


Plan View of Ross Campus
Highlighting New Cavern & FD4 Module

New Cavern Concept – Equipment Layout



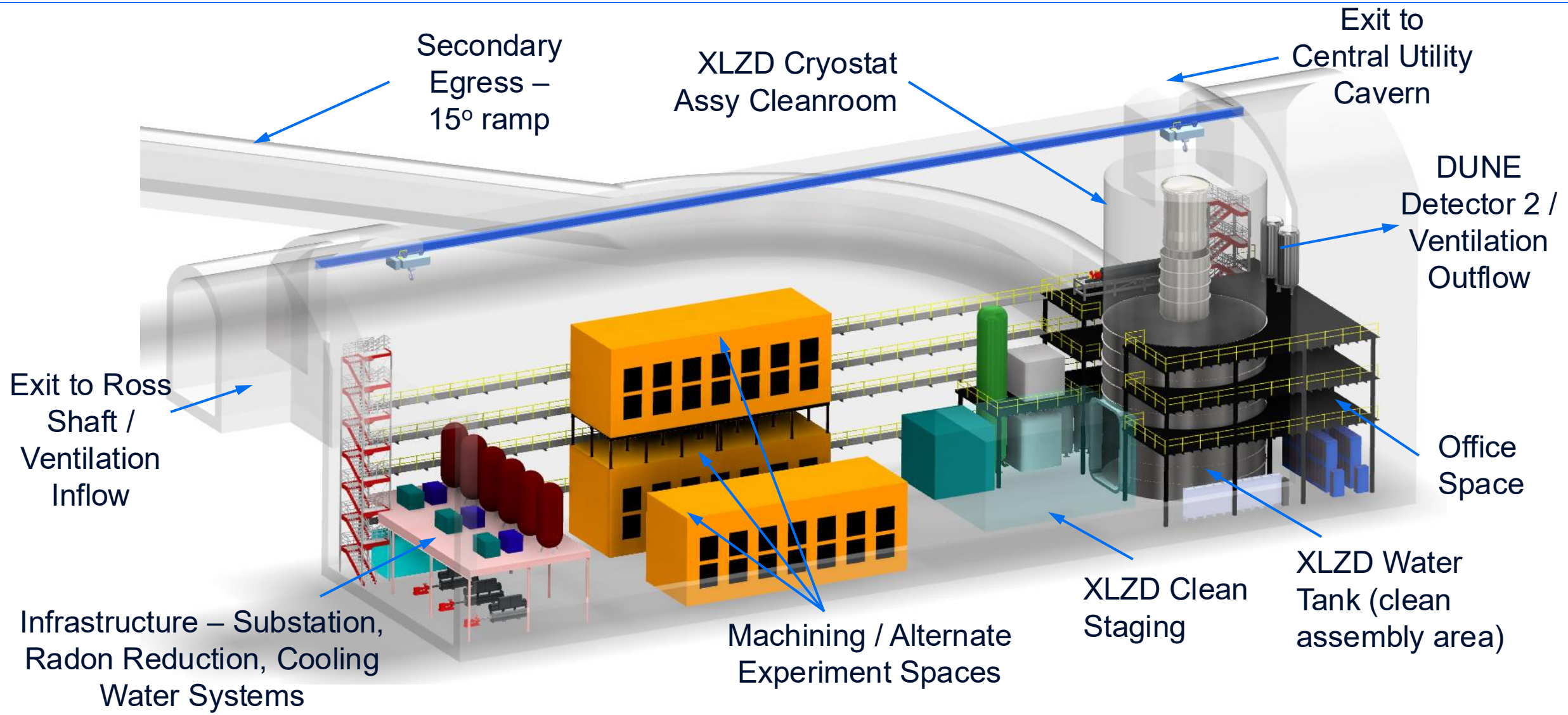
LBNF / DUNE Footprint



FD4 Module Details

- Size – 20m W x 28m H x 75m L
- Power – 500 kW installed
- HVAC – 15 m^3/s (30 kcfm) filtered flowthrough air with 7.2^o C dewpoint

Conceptual Experiment Layout

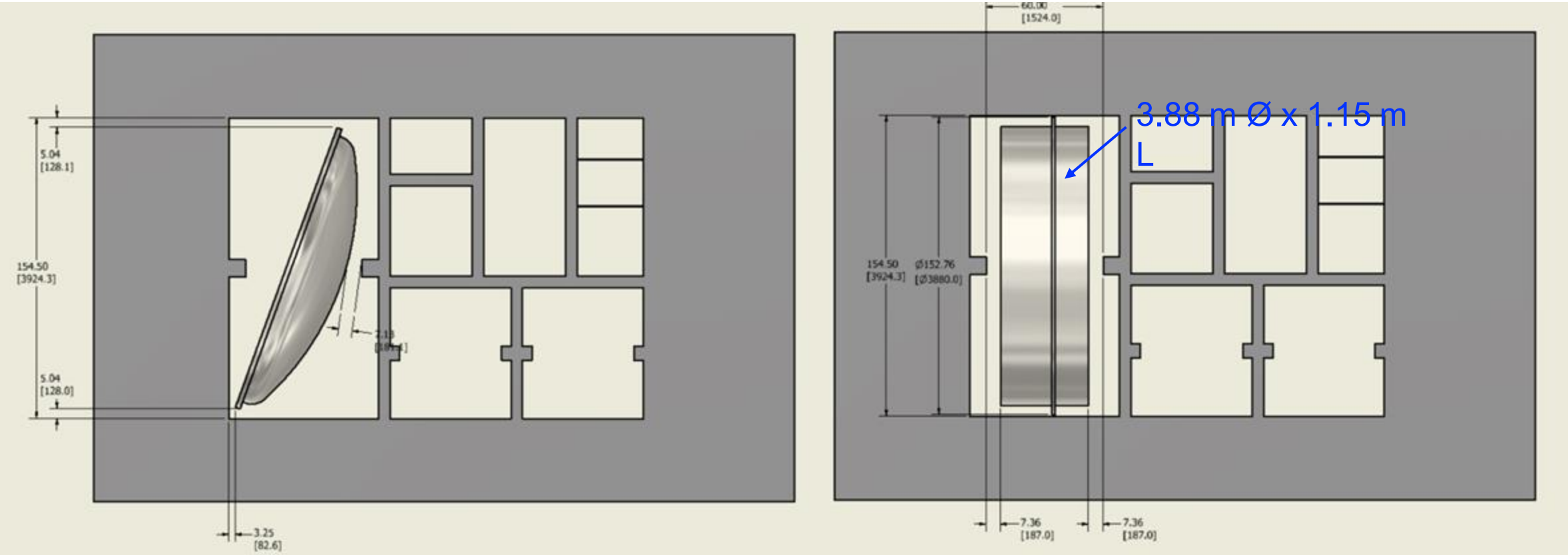


Underground Infrastructure Requirements

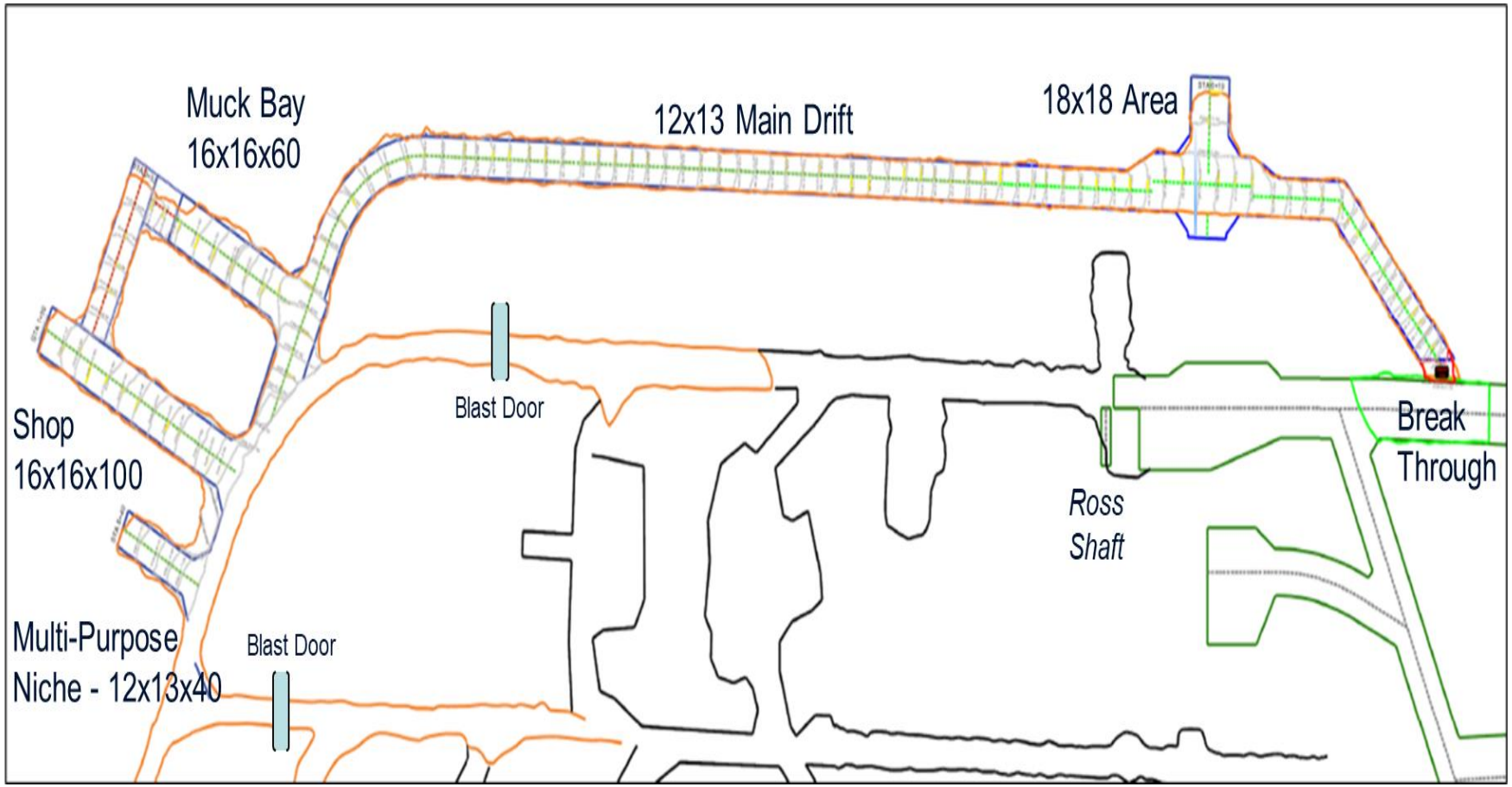
- Office Space
- Equipment Space – 567-1007 m^2
- Overhead Traveling Crane – 15-tonne w/ 19.5m hook height
- Electrical Load of 470-500 kW + design margin
- Radon mitigated cleanroom spaces @ <0.2 Bq/m^3
- Backup Power @ 400 kW
- Underground Workshop
- Clean Storeroom

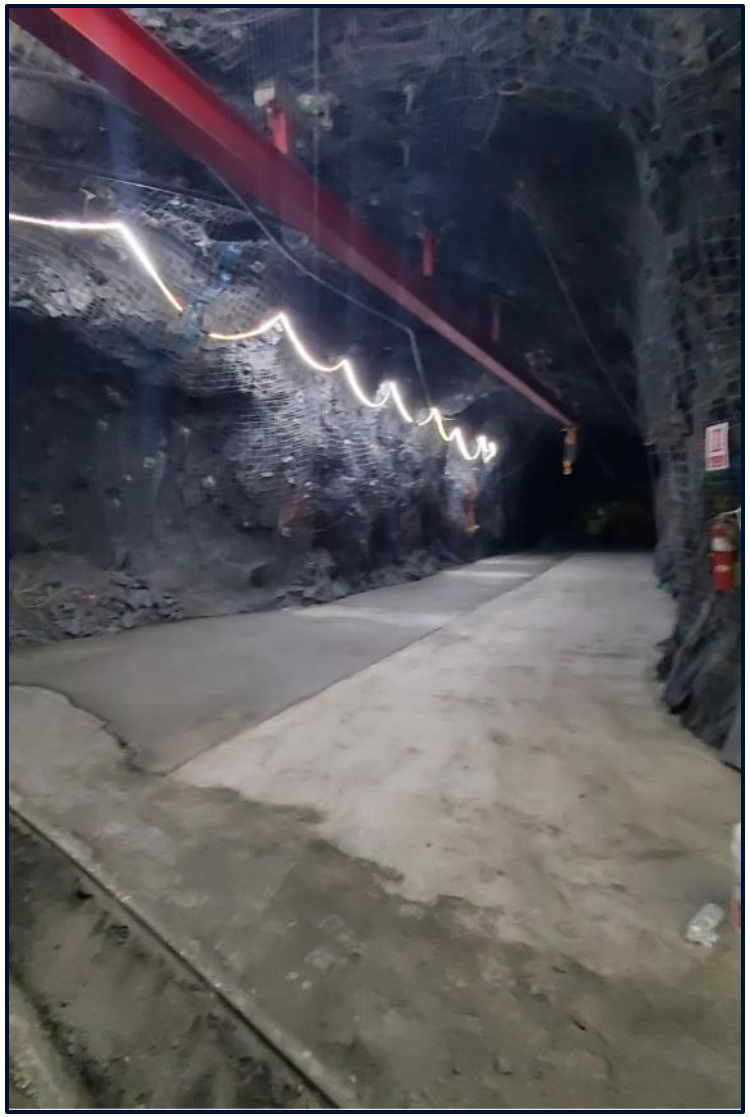
4850 Access – Ross Shaft

- Large Components are Slung Under the Cage Similar to LZ Detector
- Cylindrical OV Sections in the Cage Compartment



Expansion Drift Capabilities





Leveraging FD4 Module for Future Science

Benefits of Utilization

- Excavated Space is Complete
  - Installed cranes meet the same requirements for lifting capacity and hook height
- Electrical, Ventilation, and Mechanical Infrastructure Are Under Construction
  - There is sufficient margin on conventional utilities
- Total cost to DOE for Science program deployment would be reduced with already costed space utilized

Questions?