FAARM ENGINEERING
FALL 2011 UPDATE

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Itasca Consulting Group

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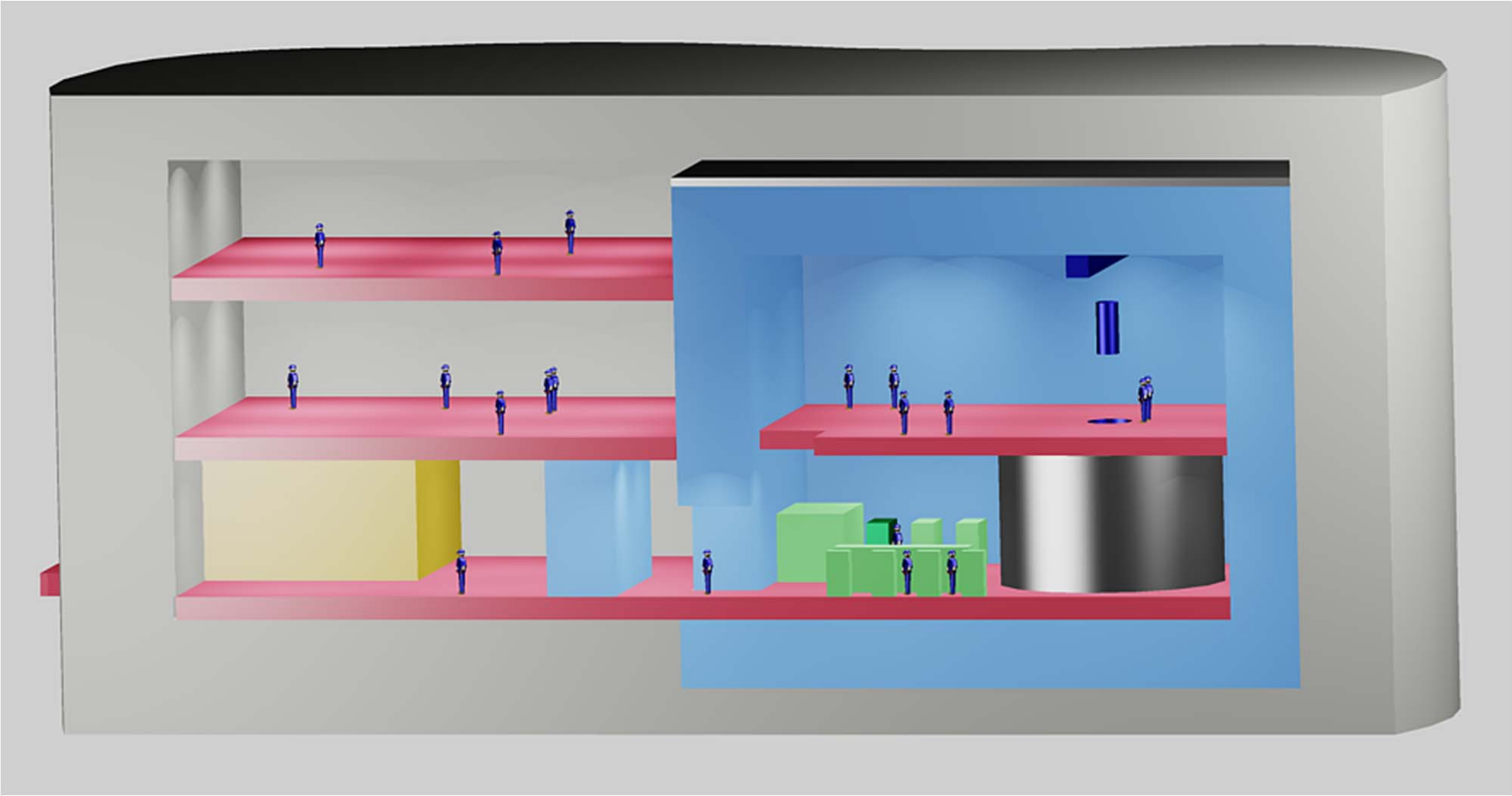
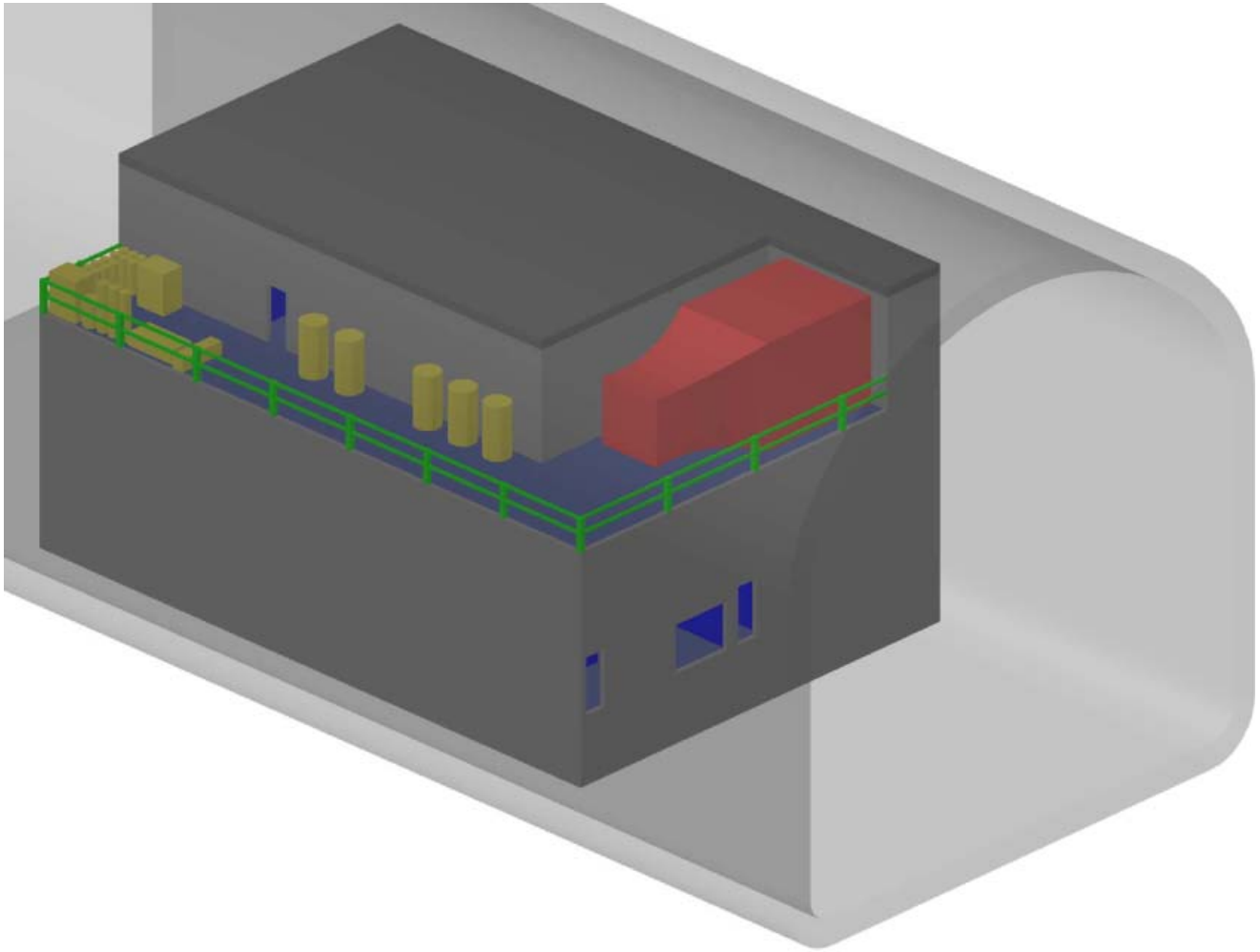
Topic

CONCEPT HISTORY & CURRENT CONCEPTS

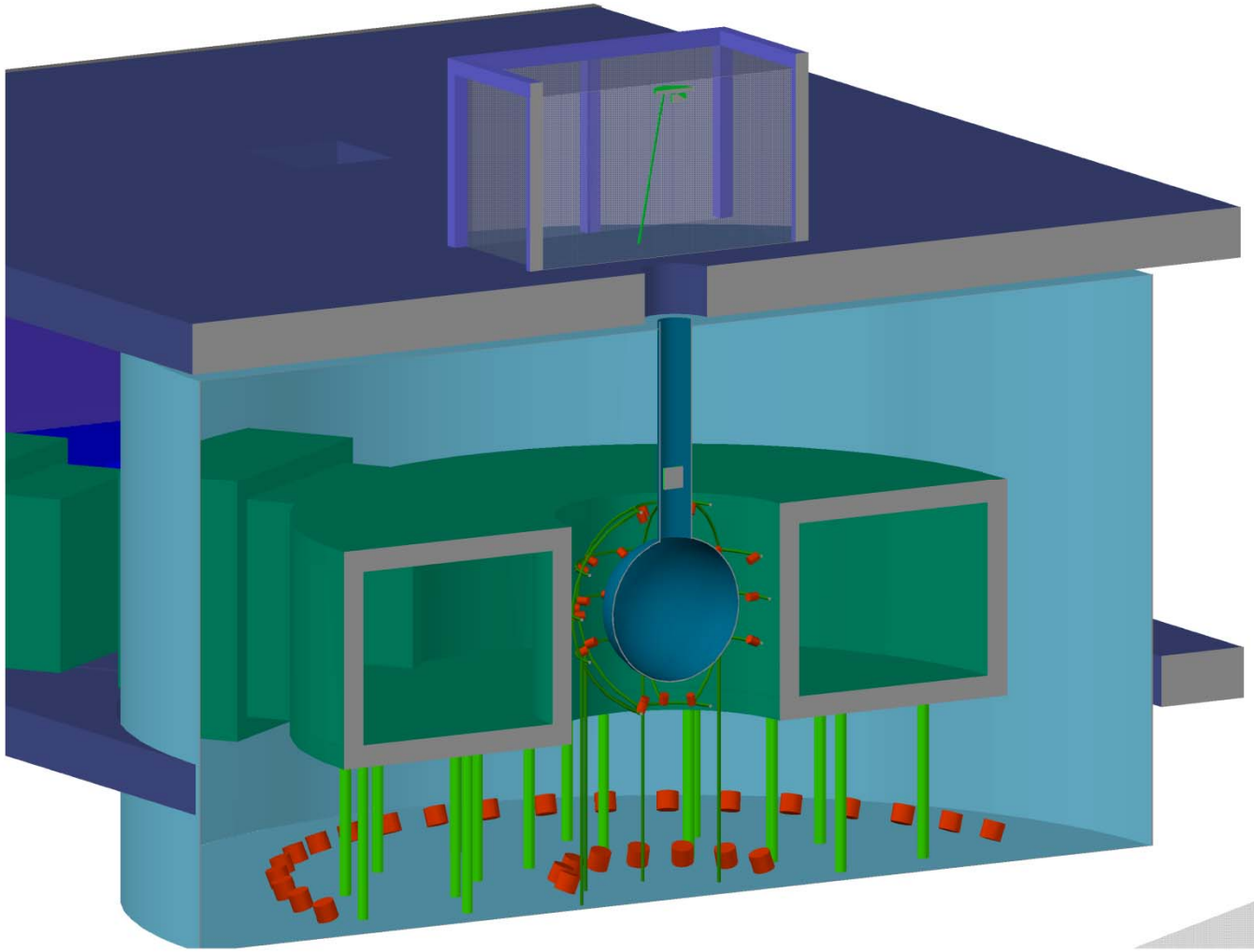
Concept History, T minus 28 months



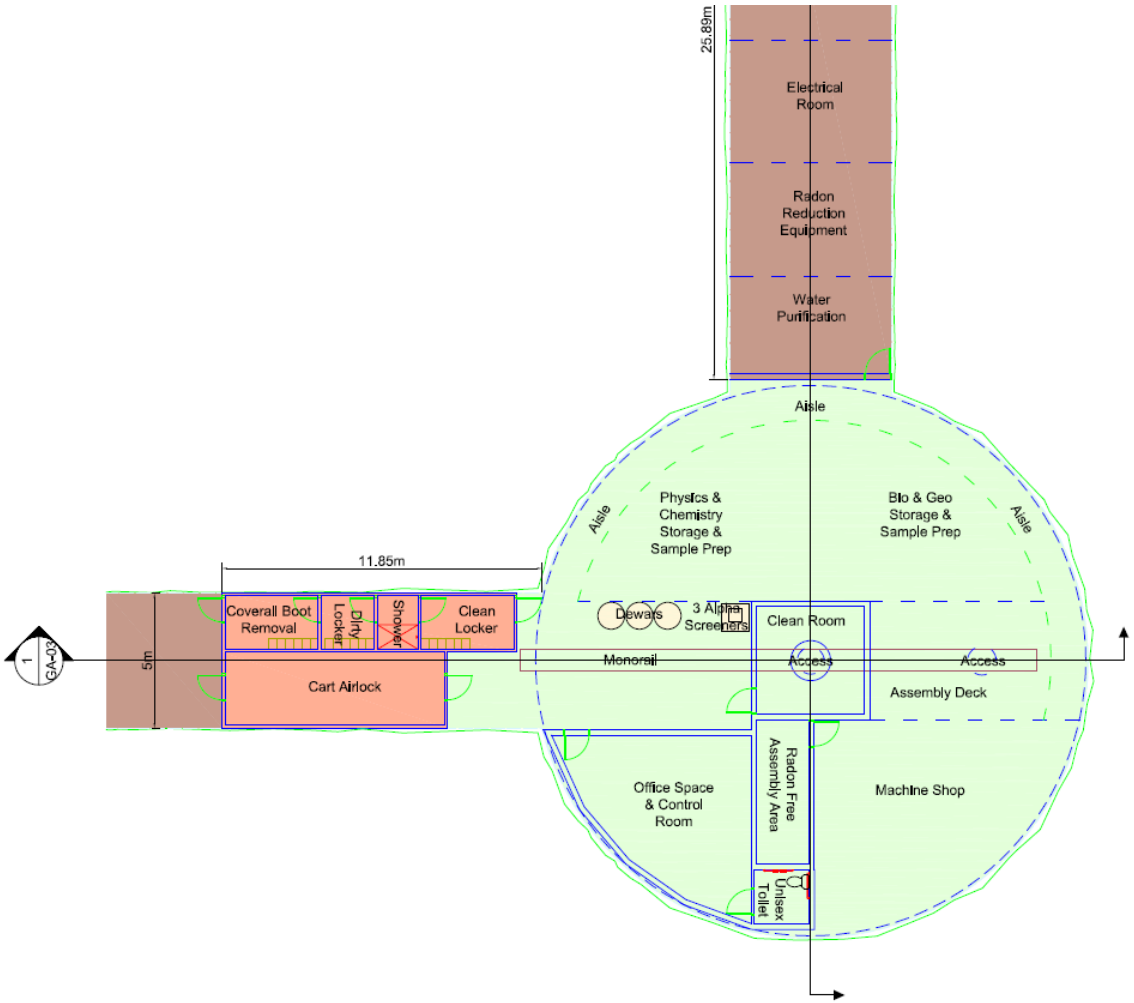
Concept History, T minus 16 months



Concept History, T minus 16 months



Concept History, T minus 4 months



Cavern Option Comparison

- Standard Lab module
  - 17 m wide (usable) in a 20 m finished cavern
  - 25 m long, use ~14 m height of a larger cavern
- Custom rectangular cavern
  - Use full width of a ~21 m finished cavern
  - 37.5 m long, use ~14 m height for a smaller length
  - Structural steel deck is shorter
- Custom circular cavern with side drifts
  - ~21 m finished diam. cavern with full deck
  - Two wing drifts

Concept Future

- Pursue two concepts during FY2012:
  - Compatible with a custom circular cavern at SUL
  - Compatible with Soudan MINOS cavern (with add'l excavation
- Advance design in these areas:
  - Layout
  - Structural
  - Architectural (building code and FLS)
  - Mechanical & electrical

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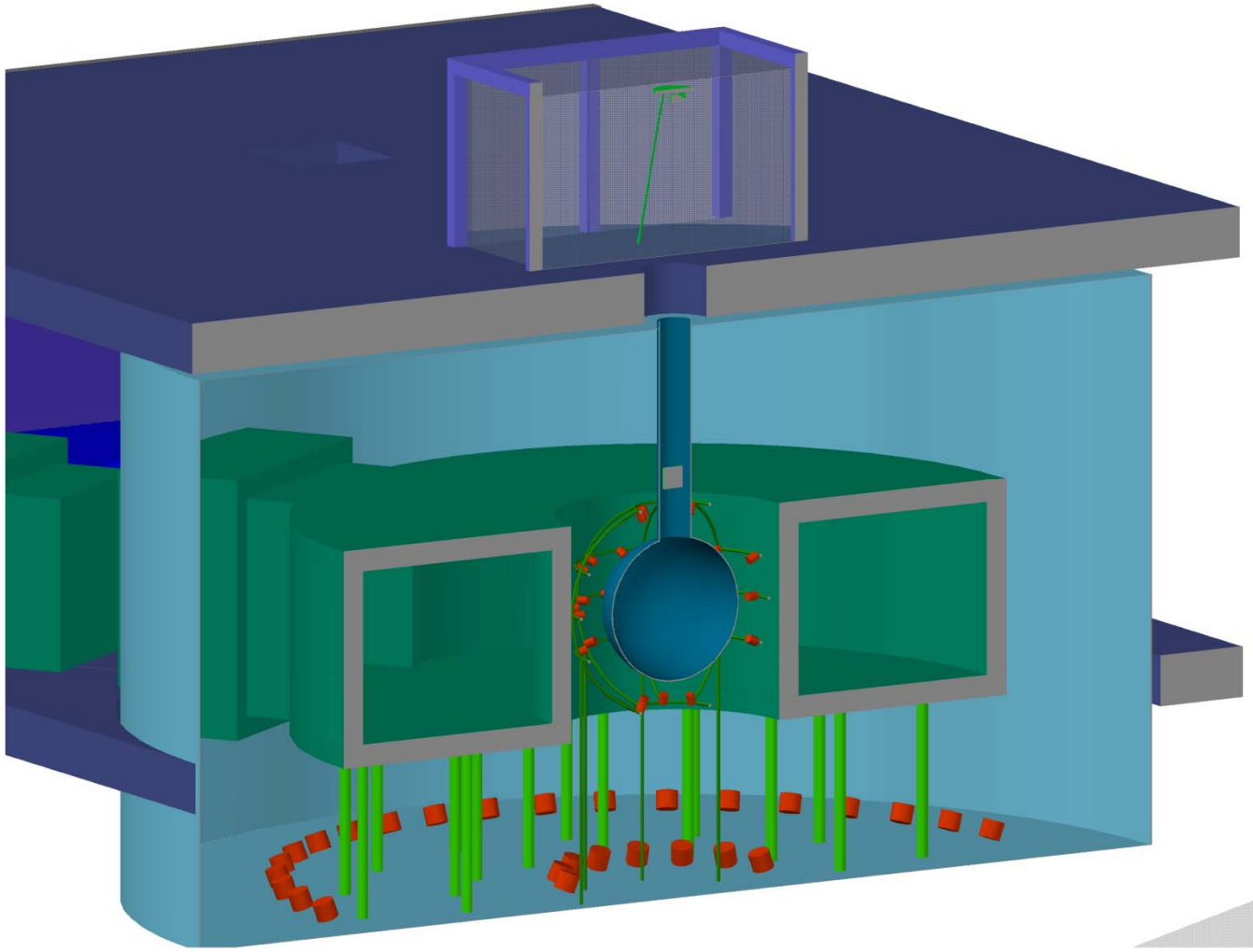
COMMON FEATURES

Common Features



Immersion Tank for Screening

- Water shield becomes outer shroud & veto
- Low radioactivity QUPIDs can be placed closer to LS
- Bigger 2 m diam. nylon bag filled with LAB liquid scintillator

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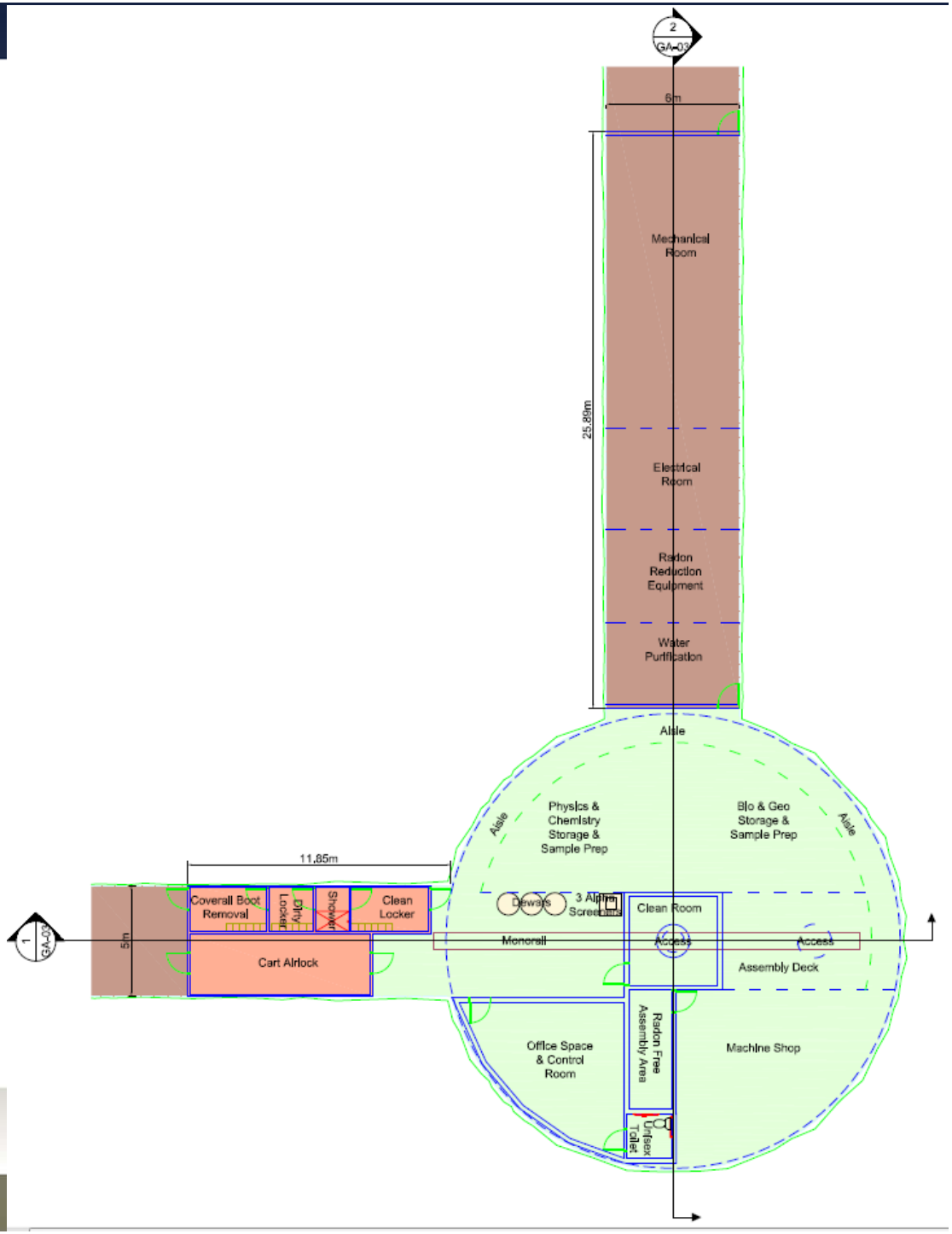
CUSTOM CAVERN

Custom Cavern Plan View



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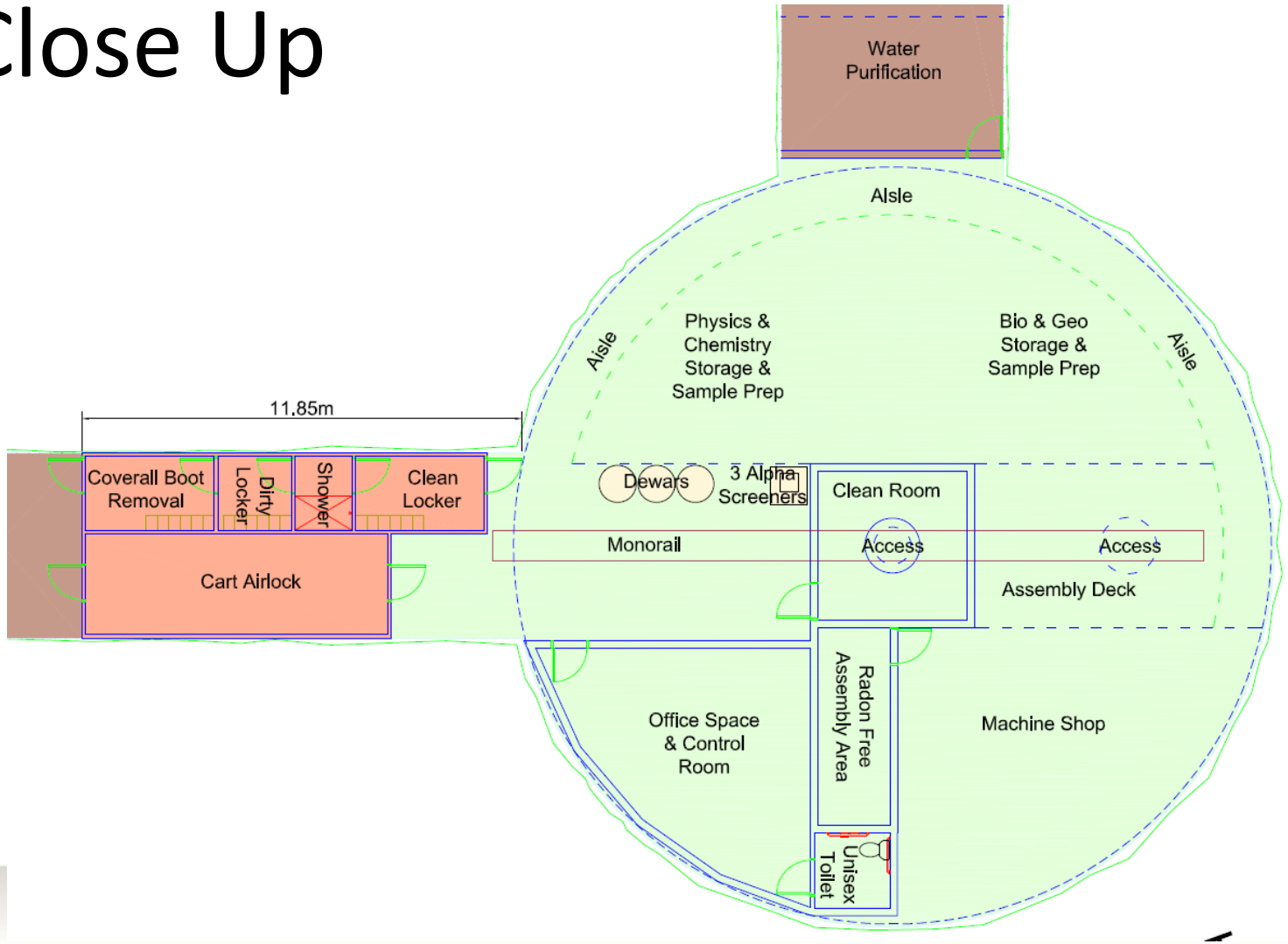
Custom Cavern Close Up



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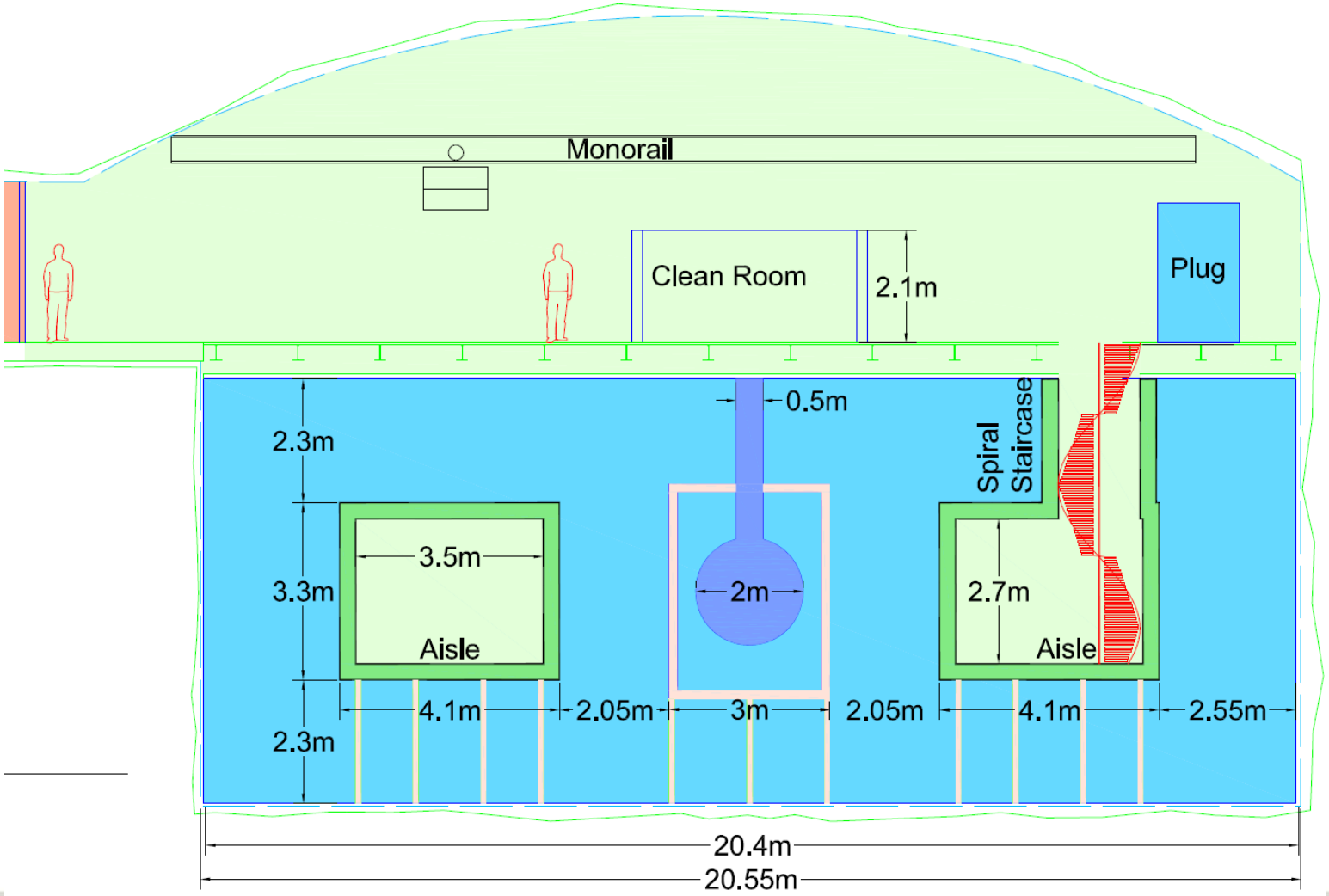
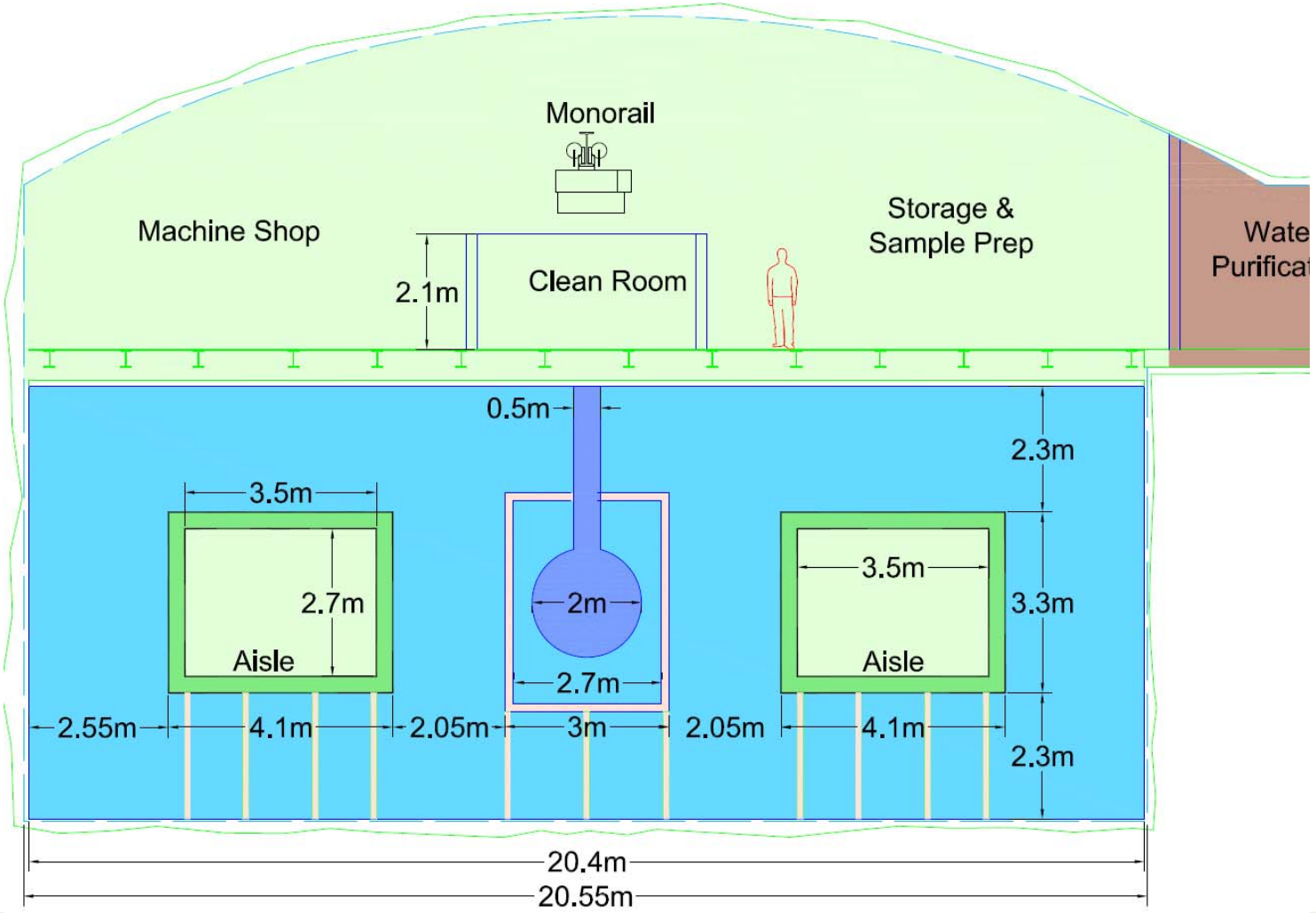
Section Thru Clean Entrance



Section Thru Mechanical Entrance



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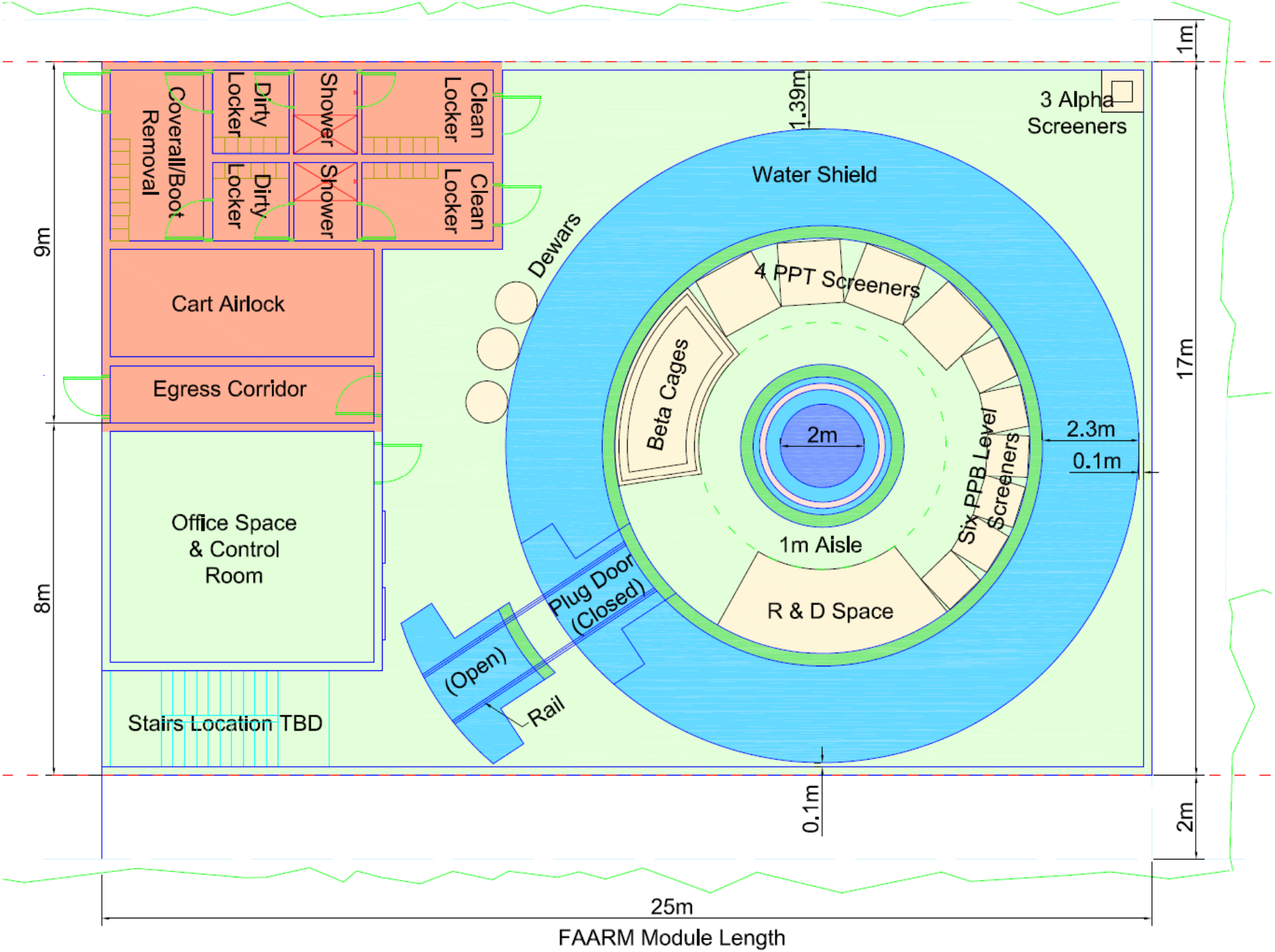
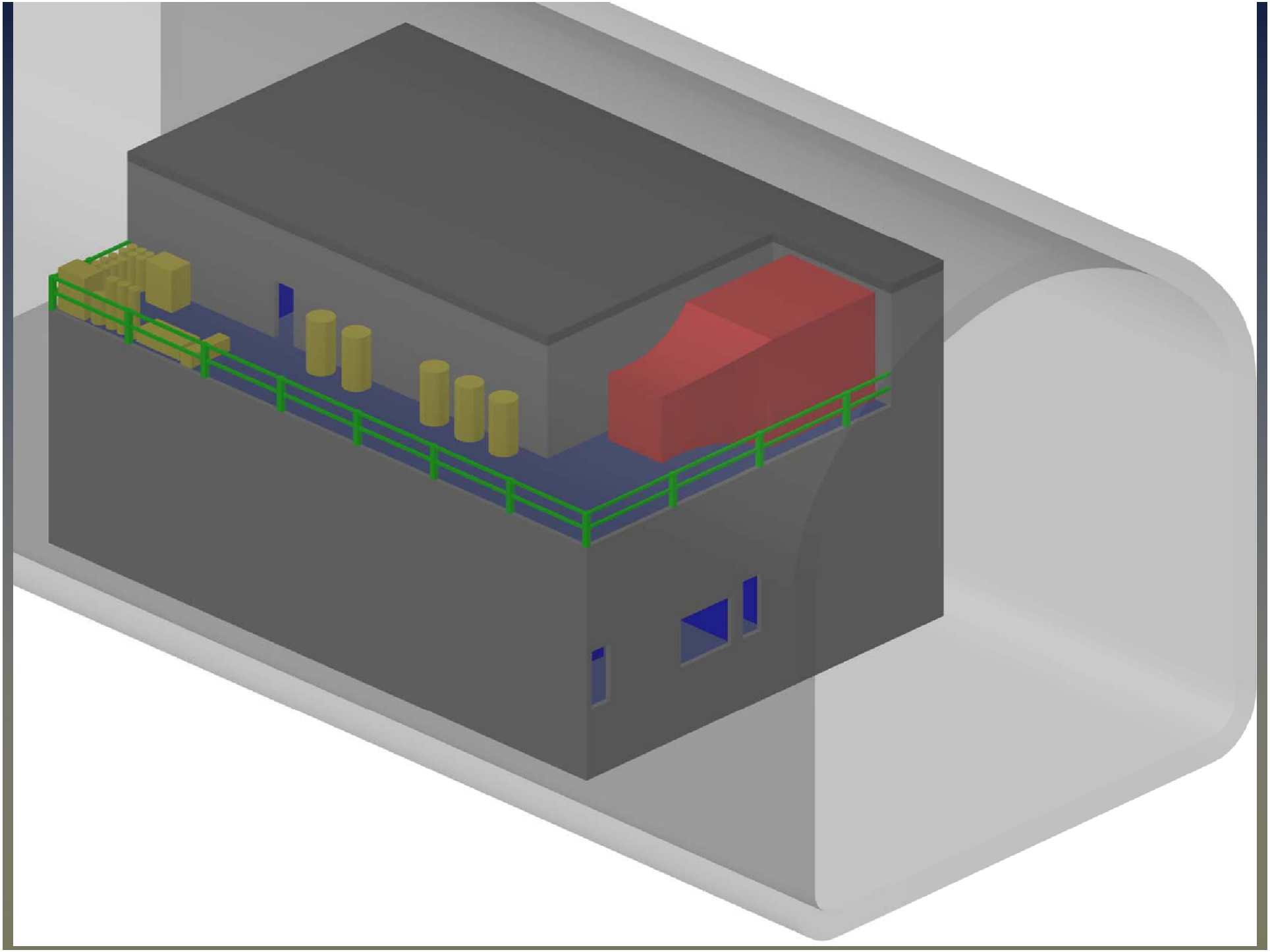
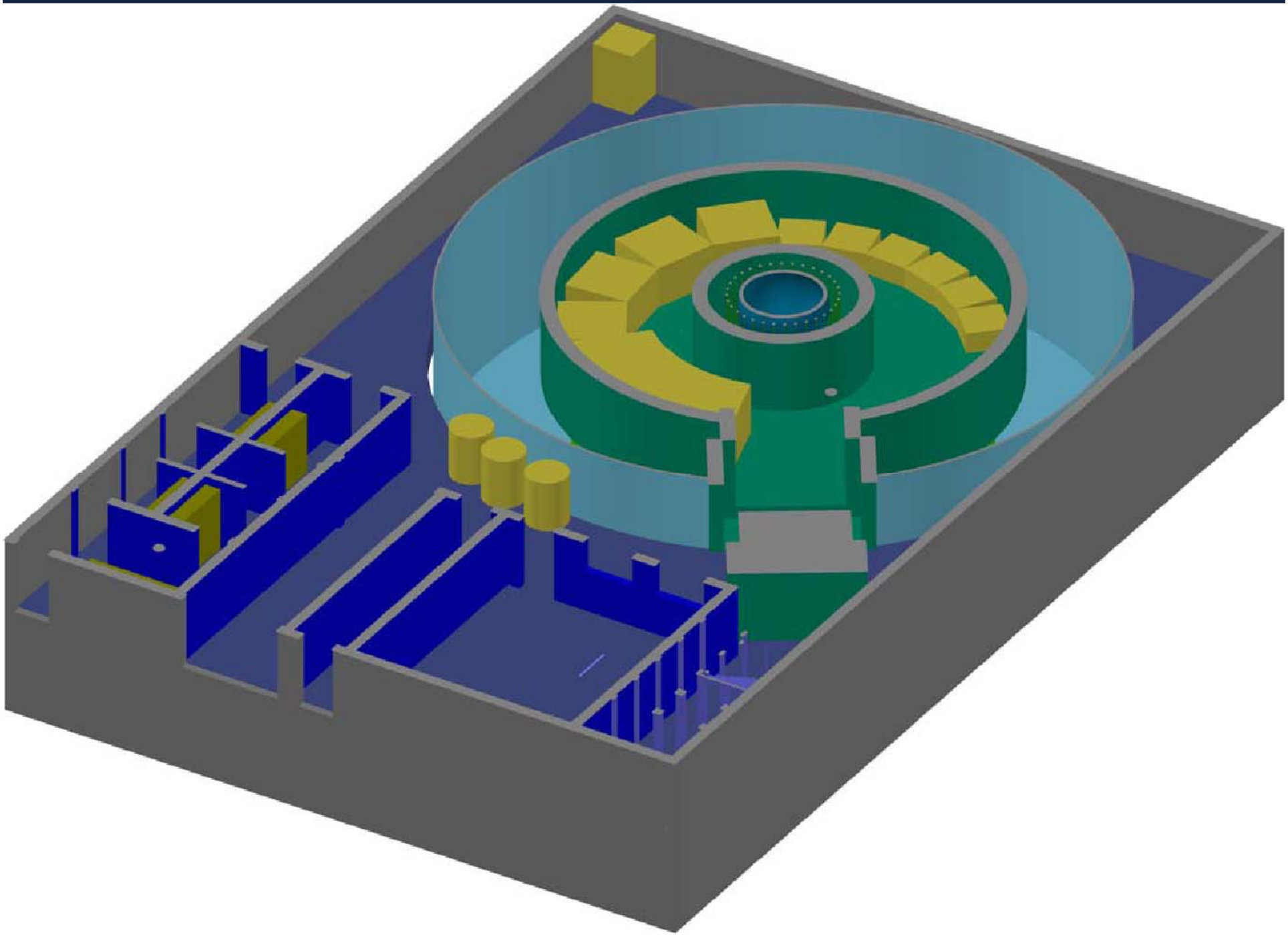
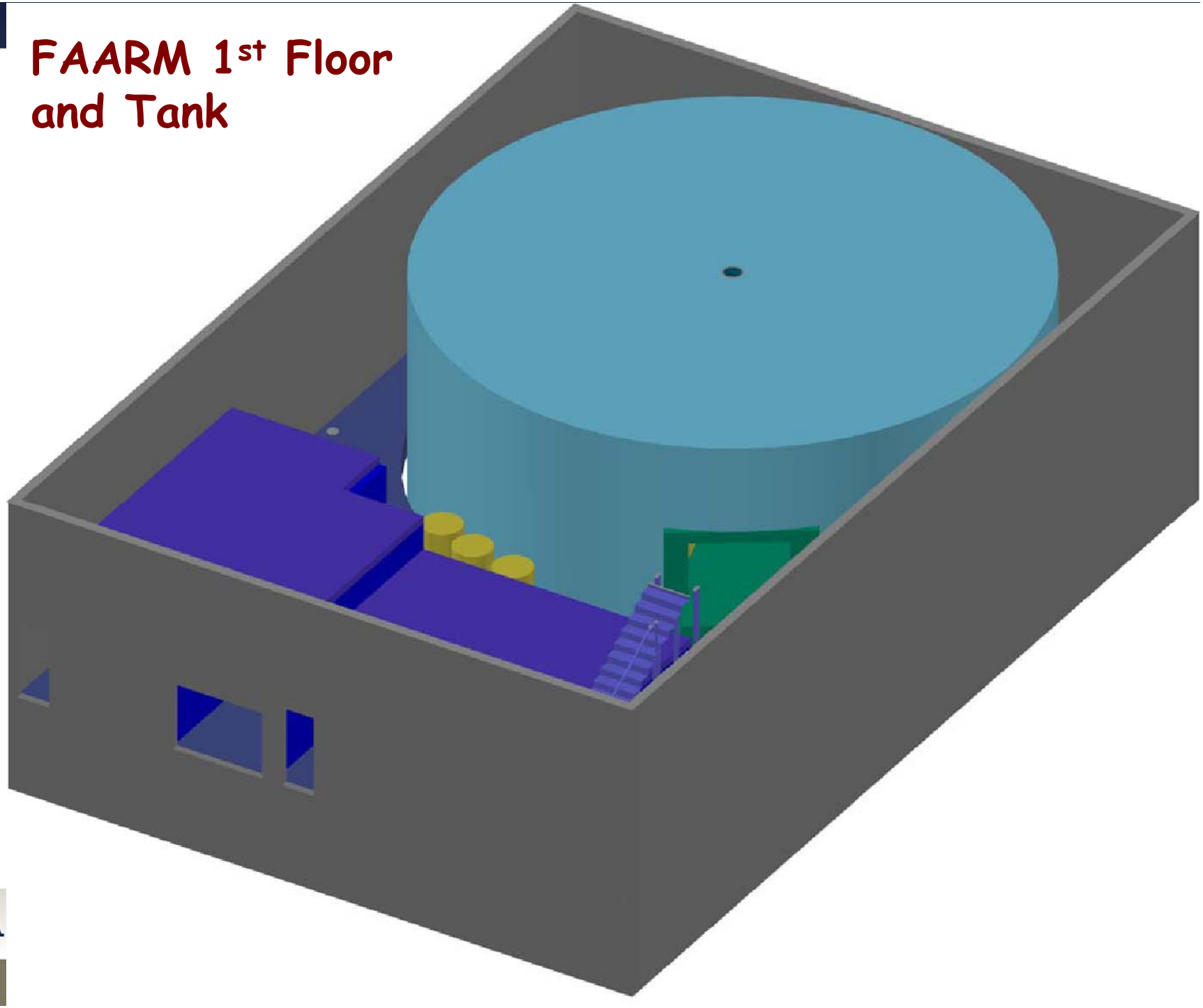
RECTANGULAR MODULE


Coverall/Boot Removal
Dirty Locker
Shower
Clean Locker
Dirty Locker
Shower
Clean Locker
Cart Airlock
Egress Corridor
Office Space & Control Room
Stairs Location TBD
9m
8m
Dewars
1.39m
Water Shield
3 Alpha Screeners
4 PPT Screeners
Beta Cages
2m
Six PPB Level Screeners
2.3m
0.1m
1m Aisle
R & D Space
Plug Door (Closed)
(Open)
Rail
0.1m
1m
17m
2m
25m
FAARM Module Length





FAARM 1st Floor and Tank



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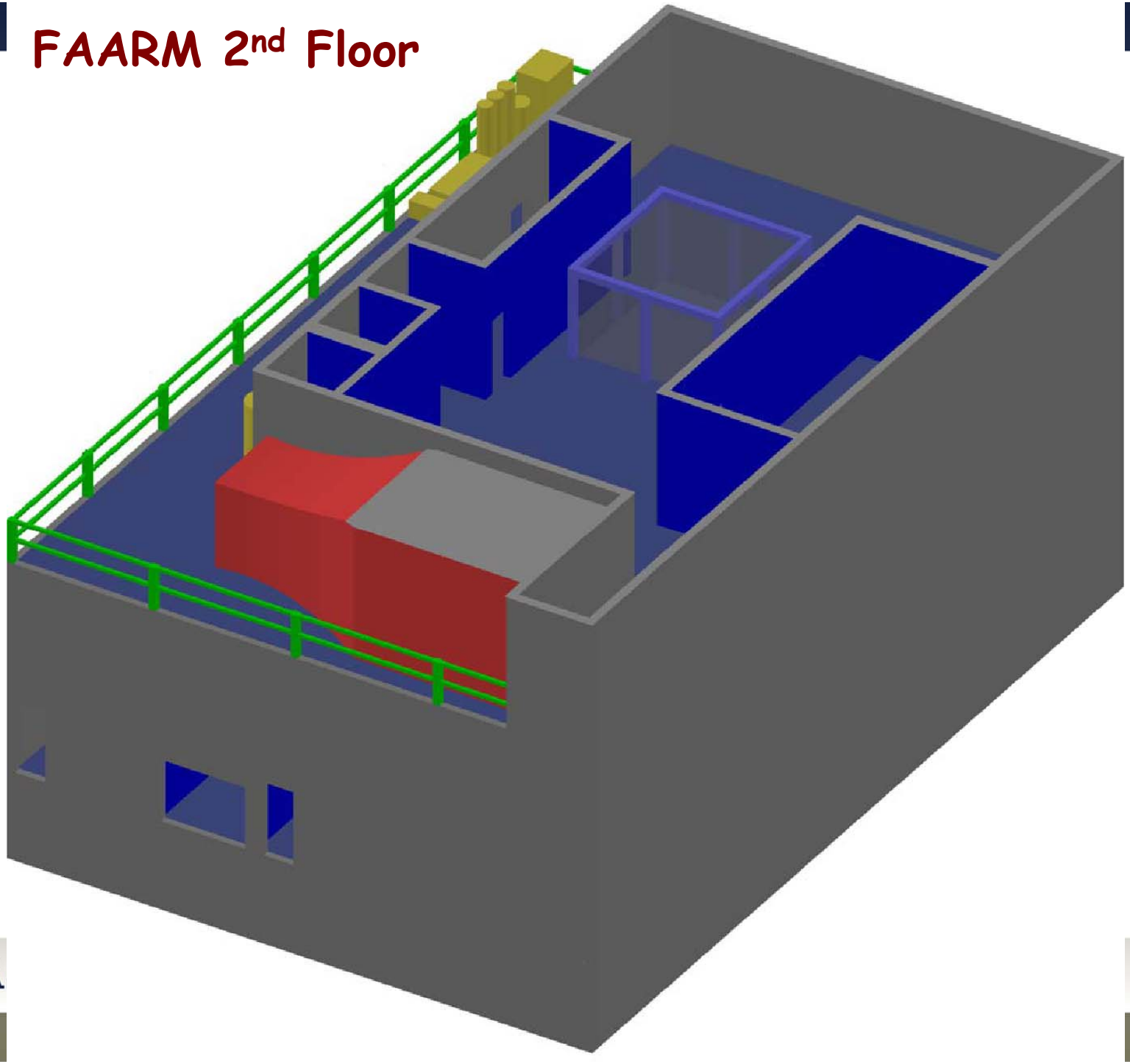
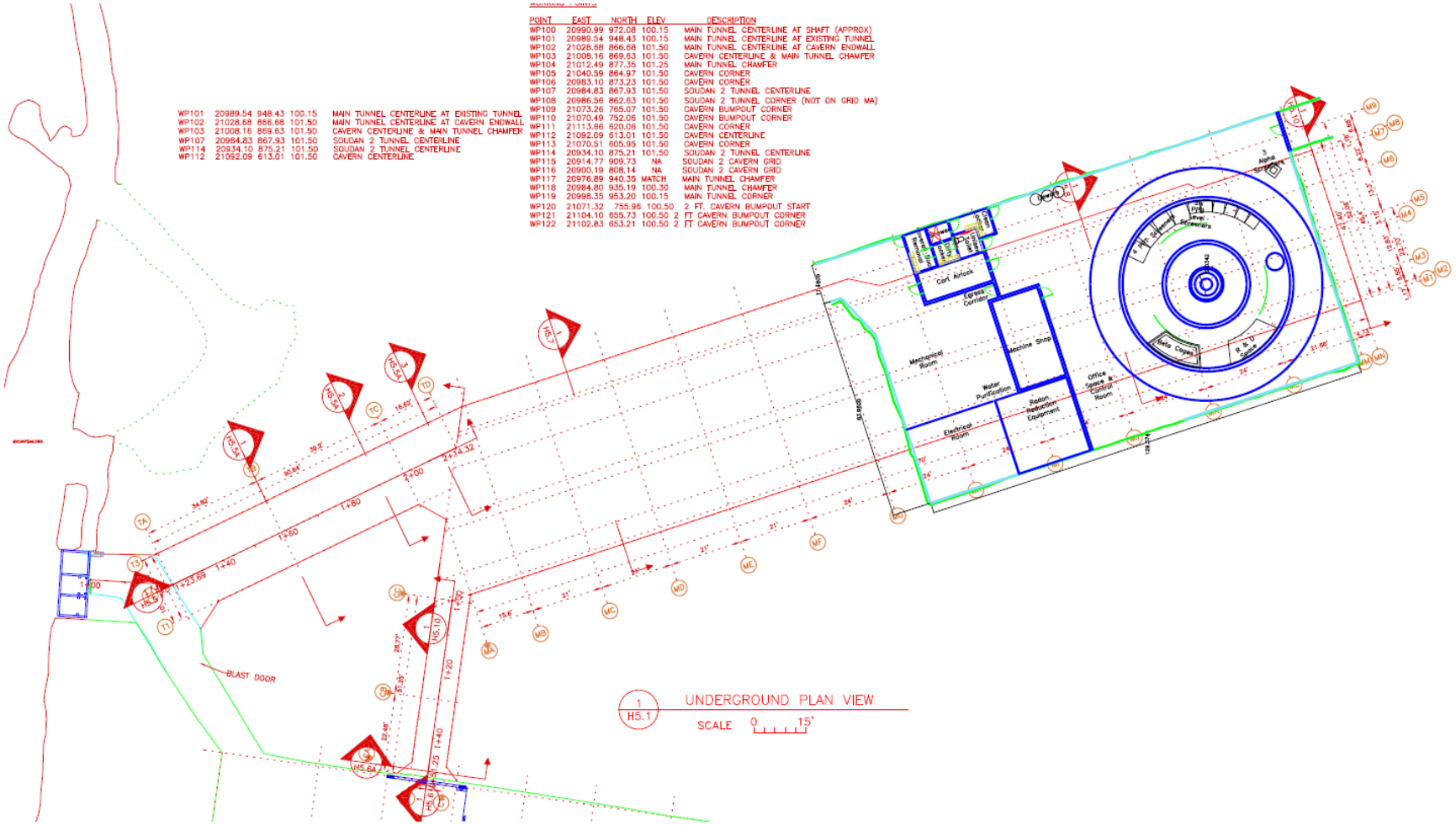
FAARM 2nd Floor



FAARM at Soudan in MINOS



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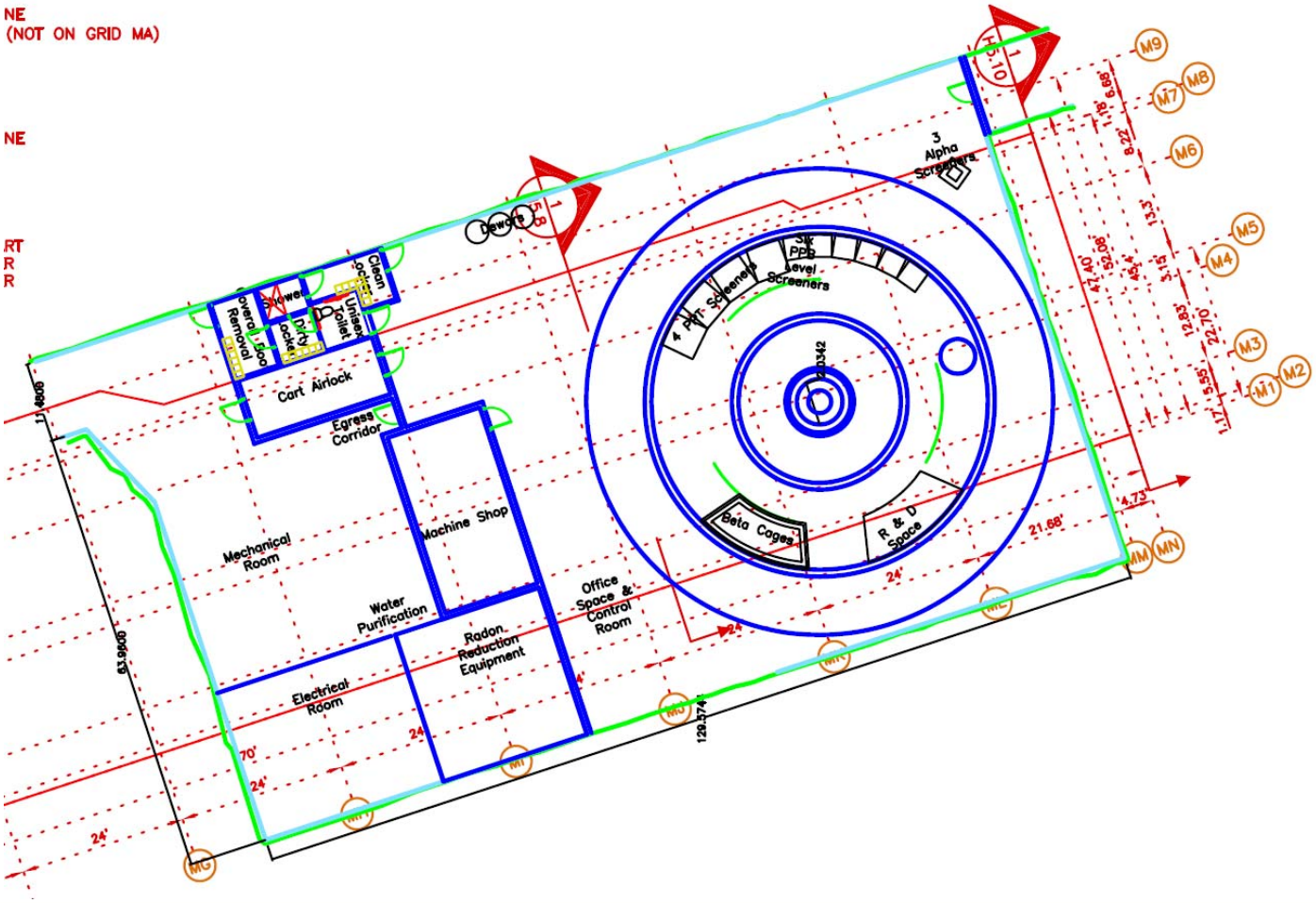
MINOS Close Up



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FY 2012 WORK PLAN

FY2012 Engineering Work Plan

- Update conceptual design (as necessary)
- Occupancy, layout details and FLS review
- Building Code considerations
- Mechanical-electrical systems
- Some detailed design topics
  - Detail means for torus person and utility access
  - Tank-torus design
  - Ventilation conceptual design
  - WBS update

Building Code & OSHA Classifications

- What are the possible categories of space?
  - Would be classified as a “B” occupancy, unless chemical quantities would change it to an “H”. “H” is more restrictive.
- How does the occupancy affect the classification?
  - The chemicals affect the classification more than the occupancy.
- What are the triggers for classifying this space as confined space?
  - See attached definitions.

OSHA Confined Space

UNITED STATES DEPARTMENT OF LABOR

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OSHA

SAFETY AND HEALTH TOPICS

Confined Spaces

Introduction

Many workplaces contain spaces that are considered "confined" because their configurations hinder the activities of employees who must enter, work in, and exit them. A confined space has limited or restricted means for entry or exit, and it is not designed for continuous employee occupancy. Confined spaces include, but are not limited to underground vaults, tanks, storage bins, manholes, pits, silos, process vessels, and pipelines. OSHA uses the term "permit-required confined space" (permit space) to describe a confined space that has one or more of the following characteristics: contains or has the potential to contain a hazardous atmosphere; contains a material that has the potential to engulf an entrant; has walls that converge inward or floors that slope downward and taper into a smaller area which could trap or asphyxiate an entrant; or contains any other recognized safety or health hazard, such as unguarded machinery, exposed live wires, or heat stress.

Confined space hazards are addressed in specific standards for the general industry and shipyard employment.

Contents

Page last reviewed: 08/14/2007

Highlights

- Permit-Required Confined Spaces in General Industry [53 KB PDF*, 2 pages]. OSHA QuickCard. Explains what workers should do before entering a confined space, such as an underground vaults, tanks, storage bins, silos or manholes.
- Confined Spaces in Construction; Proposed Rule. OSHA Federal Register Proposed Rules 72:67351-

Confined Space Definition

"Confined space" means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

Permit vs. Non-Permit Confined Spaces

"Non-permit confined space" means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

"Oxygen deficient atmosphere" means an atmosphere containing less than 19.5 percent oxygen by volume.

"Oxygen enriched atmosphere" means an atmosphere containing more than 23.5 percent oxygen by volume.

"Permit-required confined space (permit space)" means a confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

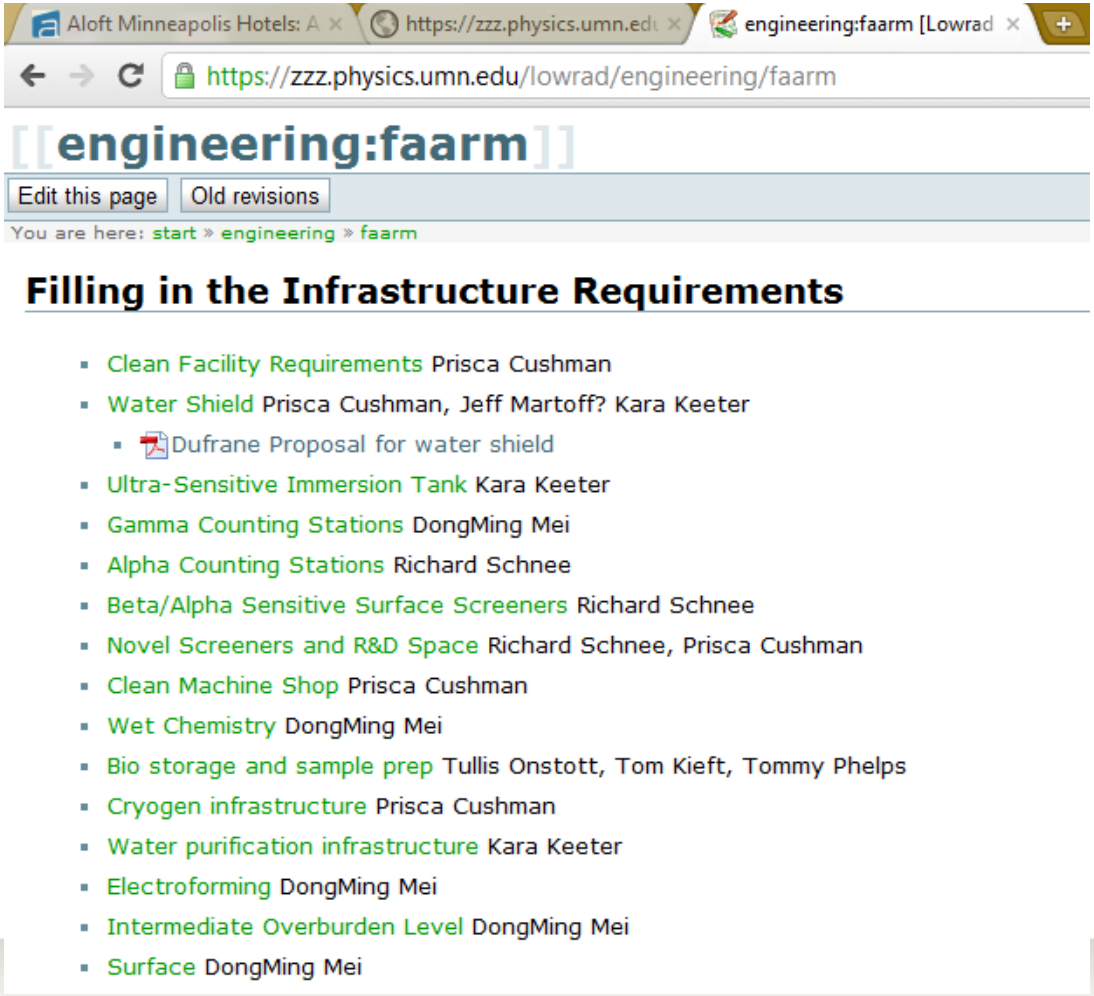
(4) Contains any other recognized serious safety or health hazard.

"Permit-required confined space program (permit space program)" means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

"Permit system" means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Infrastructure Definitions

- Developed 20 months & 3 generations ago
- Better definitions for the screeners & chemicals inside are critical



THANK YOU!
QUESTIONS?