



## Fermilab's Helen Edwards Engineering Research Center: Designing for the Unknown

**ARUP** Perkins&Will

# Helen Edwards



## Fermilab's Helen Edwards Engineering Research Center: Designing for the Unknown



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Arup



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Laboratory Planner  
Perkins&Will



# Learning Objectives

**Analyze** strategies for designing research facilities that balance present needs with long-term adaptability.

**Understand** the architectural and engineering principles behind the design of a flexible, interdisciplinary research facility.

**Examine** the challenges and solutions in designing a facility adjacent to a historic structure while maintaining aesthetic and functional coherence.

**Assess** the role of interdisciplinary collaboration in shaping adaptable research environments.



# Agenda

01 — Fermilab Campus & Design

02 — Equipment Chase

03 — Project Labs

04 — Argon Cube



# 01 — Fermilab Campus & Design



# Purpose of the Project

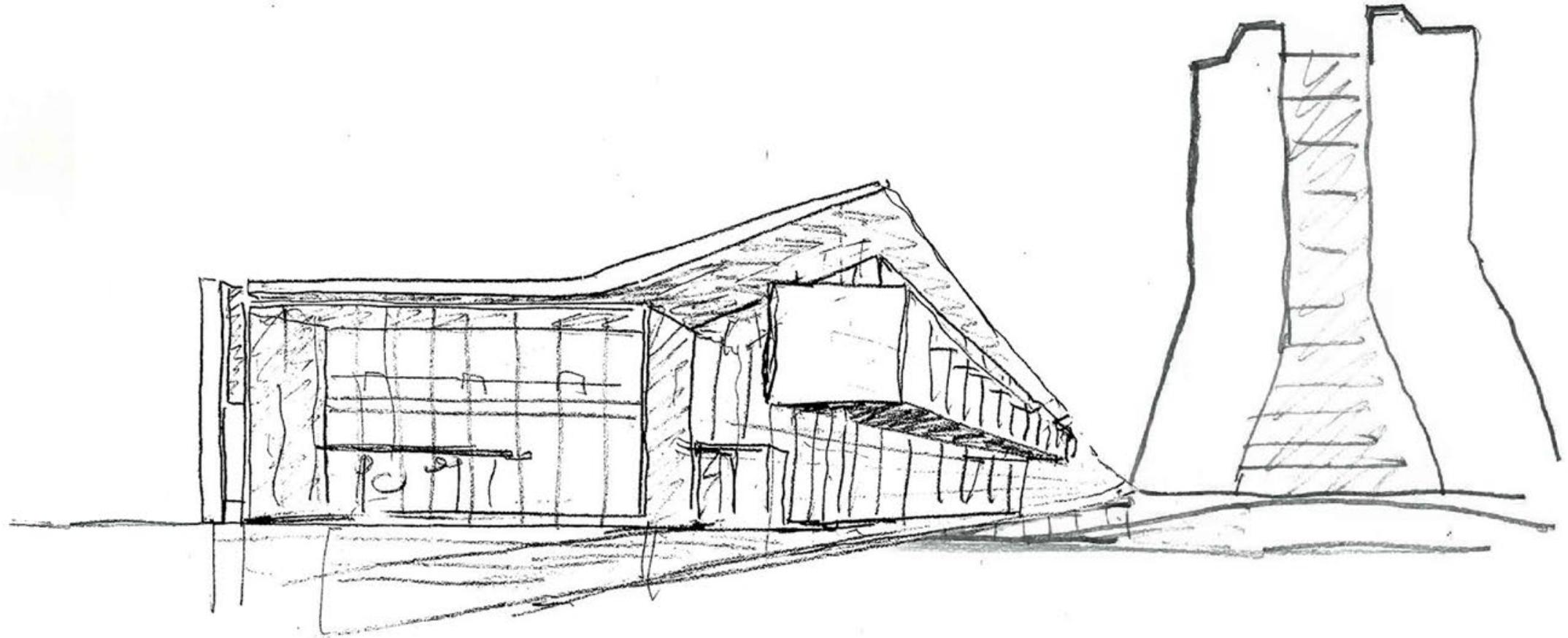
PUT TECHS, ENGRS, +  
SCIENTISTS IN CLOSE  
ENOUGH PROXIMITY SO  
THAT THEY INTERACT  
FREQUENTLY DESPITE  
THEIR VANISHINGLY SMALL  
SOCIAL CROSS-SECTIONS

TO BEGIN THE  
Tangible Transition  
TO THE NEXT 50  
YEARS OF FERMILAB.

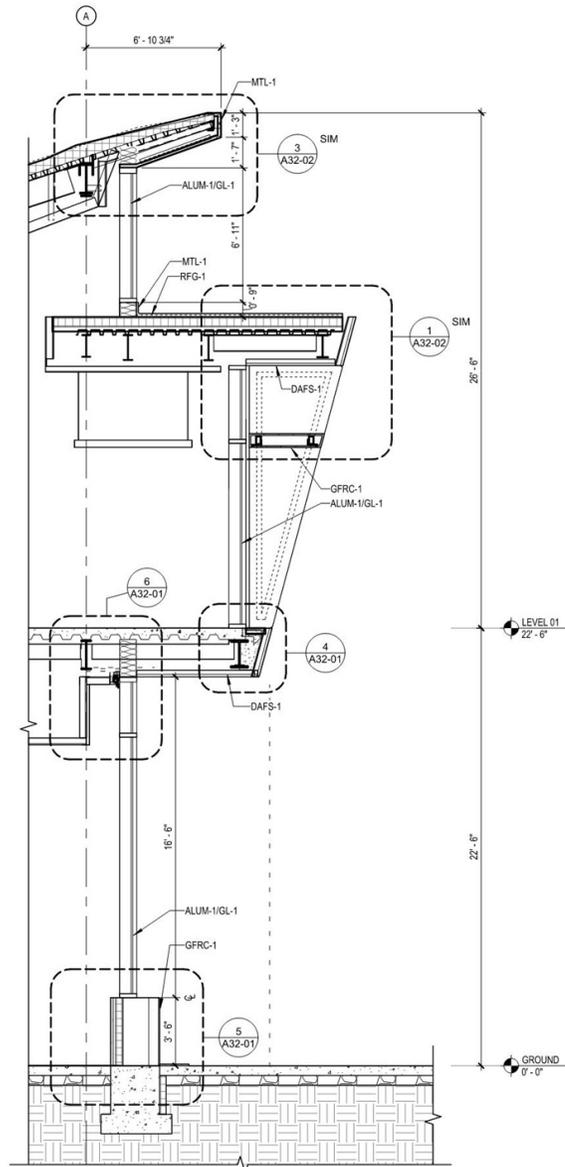
PROVIDE A NEW STATE OF  
THE ART FACILITY TO HOUSE  
ENGINEERS AND TECHNICIANS  
CURRENTLY SCATTERED ACROSS  
THE SITE IN DISPARATE AND  
OBSOLETE FACILITIES. THE NEW  
BUILDING WILL COLLECT THEM  
TOGETHER INTO A COMBINED FACILITY  
CONNECTED TO WILSON HALL.  
THE OVERALL GOAL IS TO PROVIDE  
A PLACE TO IMPROVE SCIENCE  
VIA THIS NEW OPTIMIZED  
SETTING.

The new facility aims to bring technicians, engineers, and scientists into close proximity to foster frequent interaction and collaboration; despite their traditionally limited overlap. By consolidating staff currently dispersed across the site into a state-of-the-art building connected to Wilson Hall, the project represents a tangible step toward Fermilab's next 50 years. The ultimate goal is to create an optimized environment that enhances scientific innovation and efficiency.

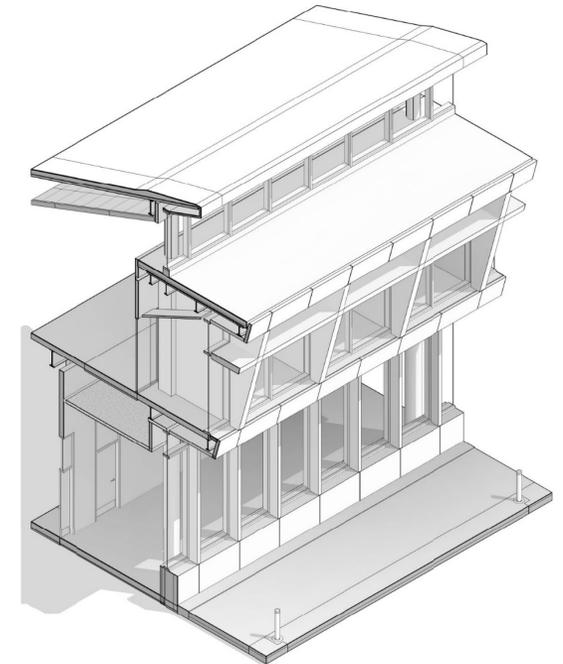
# Concept



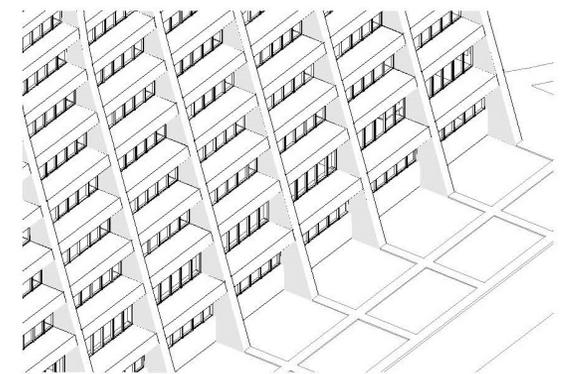
# Tectonics



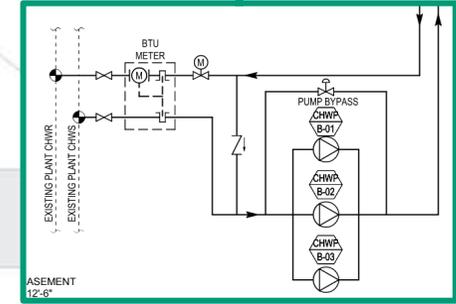
Hood Wall Section



Hood Detail Axon



Wilson Hall Facade Inspiration



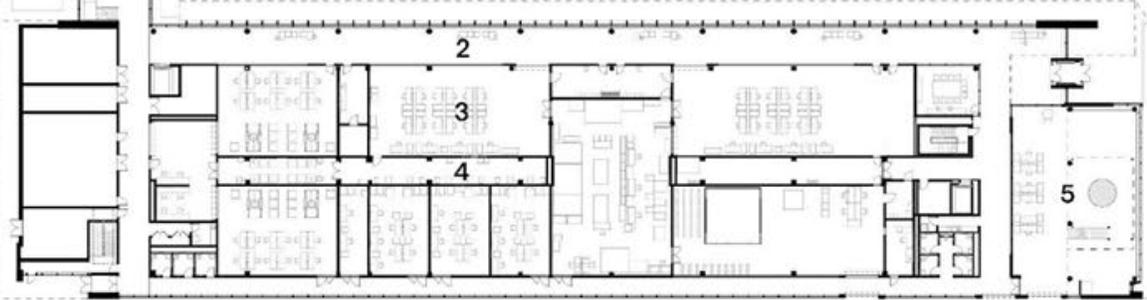
Chilled Water Connection to existing System



New Piping Connection to HEERC

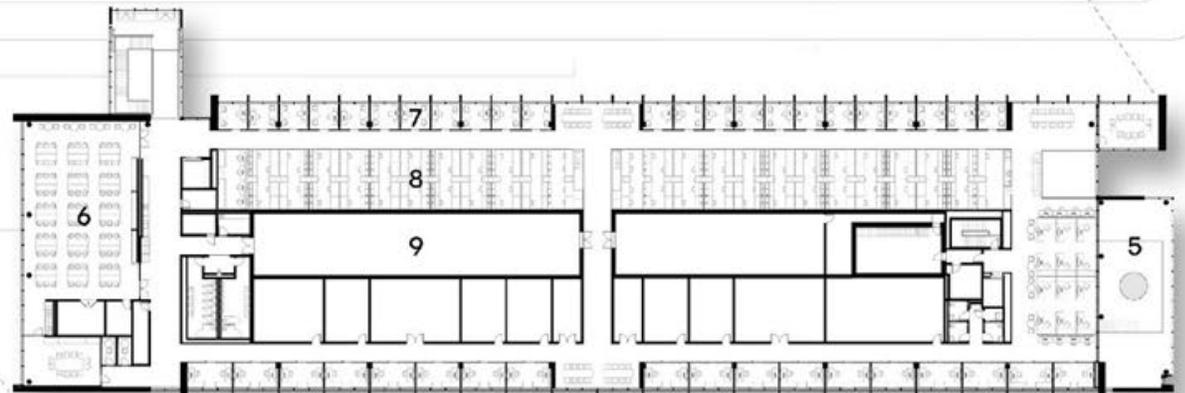
- 1. Existing Wilson Hall
- 2. Connecting Corridor
- 3. Labs
- 4. Support
- 5. Argon Cube

Ground Floor Plan

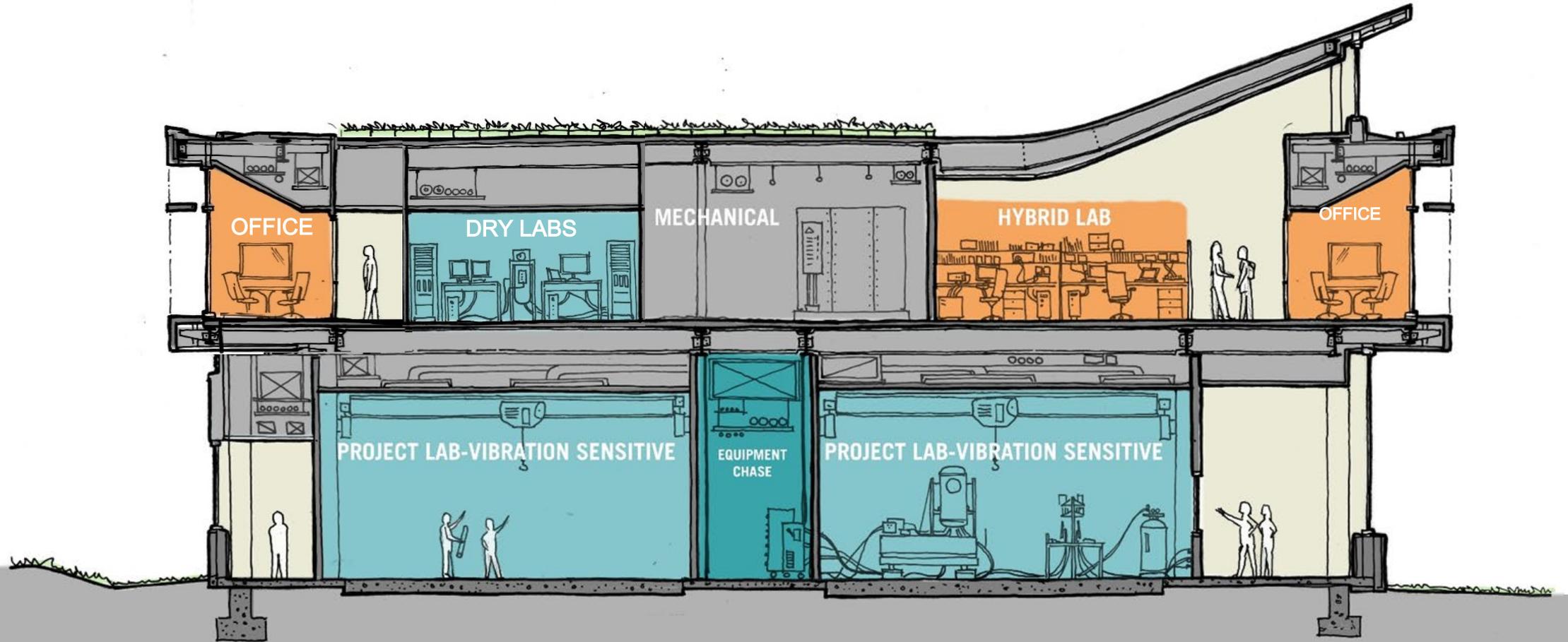


- 5. Argon Cube
- 6. Quantum Science
- 7. Offices
- 8. Hybrid Lab
- 9. Mechanical/Support

First Floor Plan



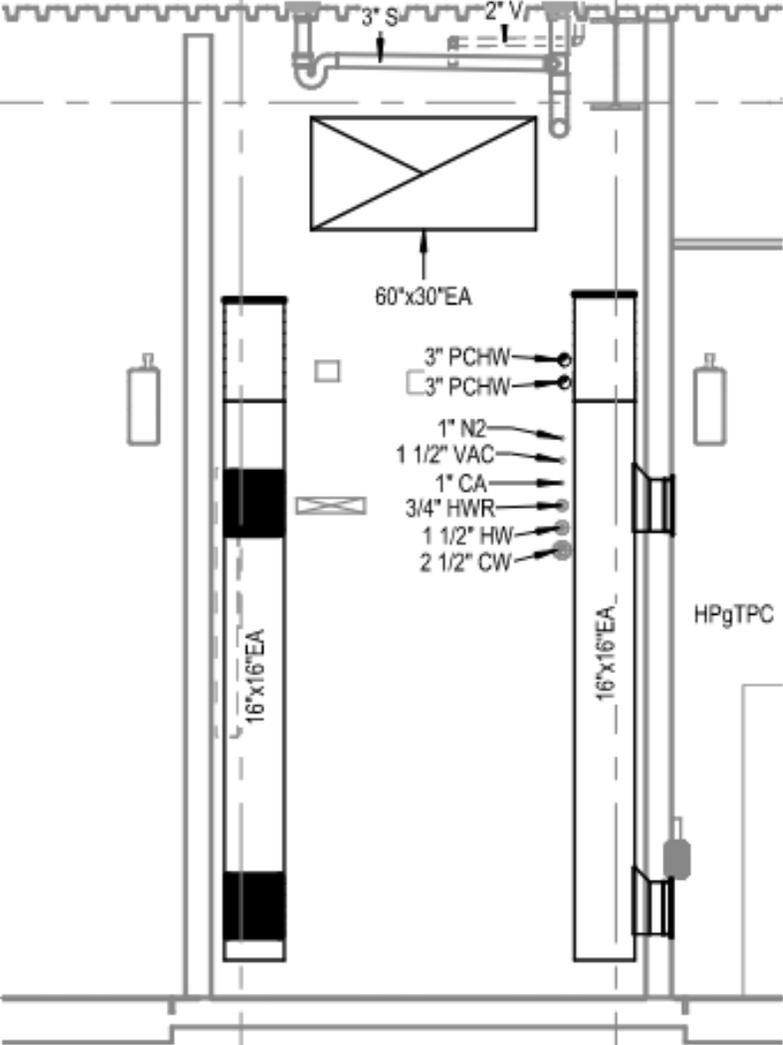
# Building Section



## 02 — Equipment Chase



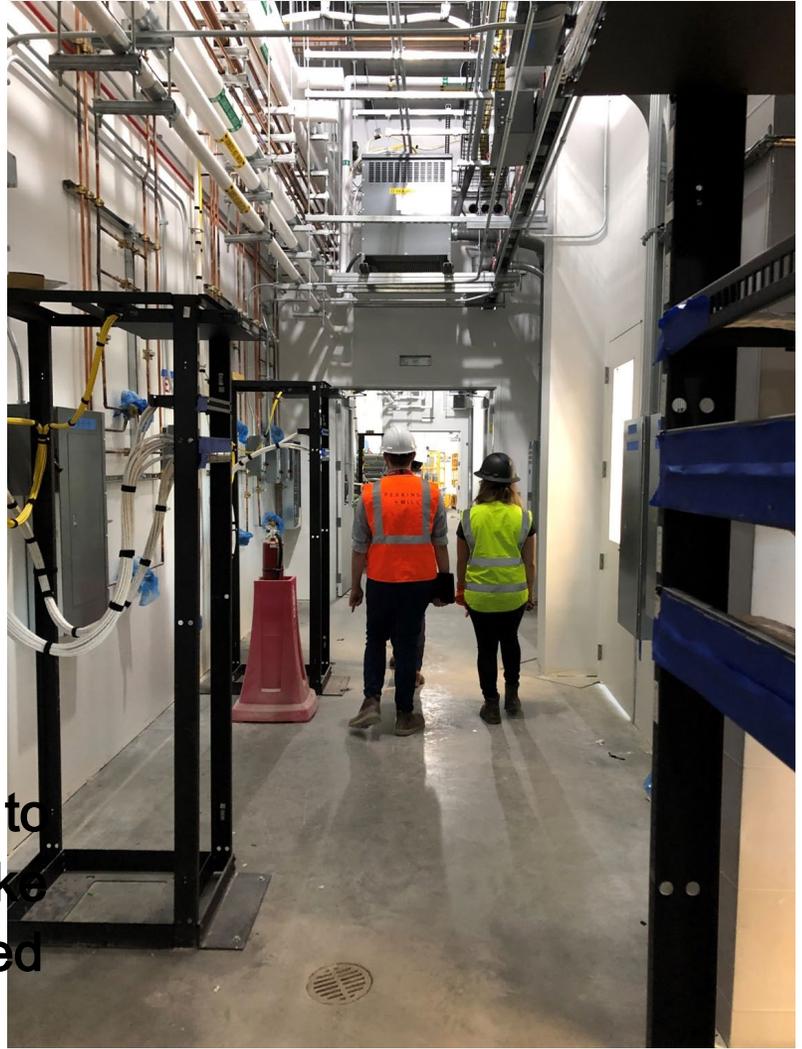
# Equipment Chase



Equipment Chase created as a central spine for all engineered system infrastructure



Users had access to infrastructure to flexibly make changes as needed

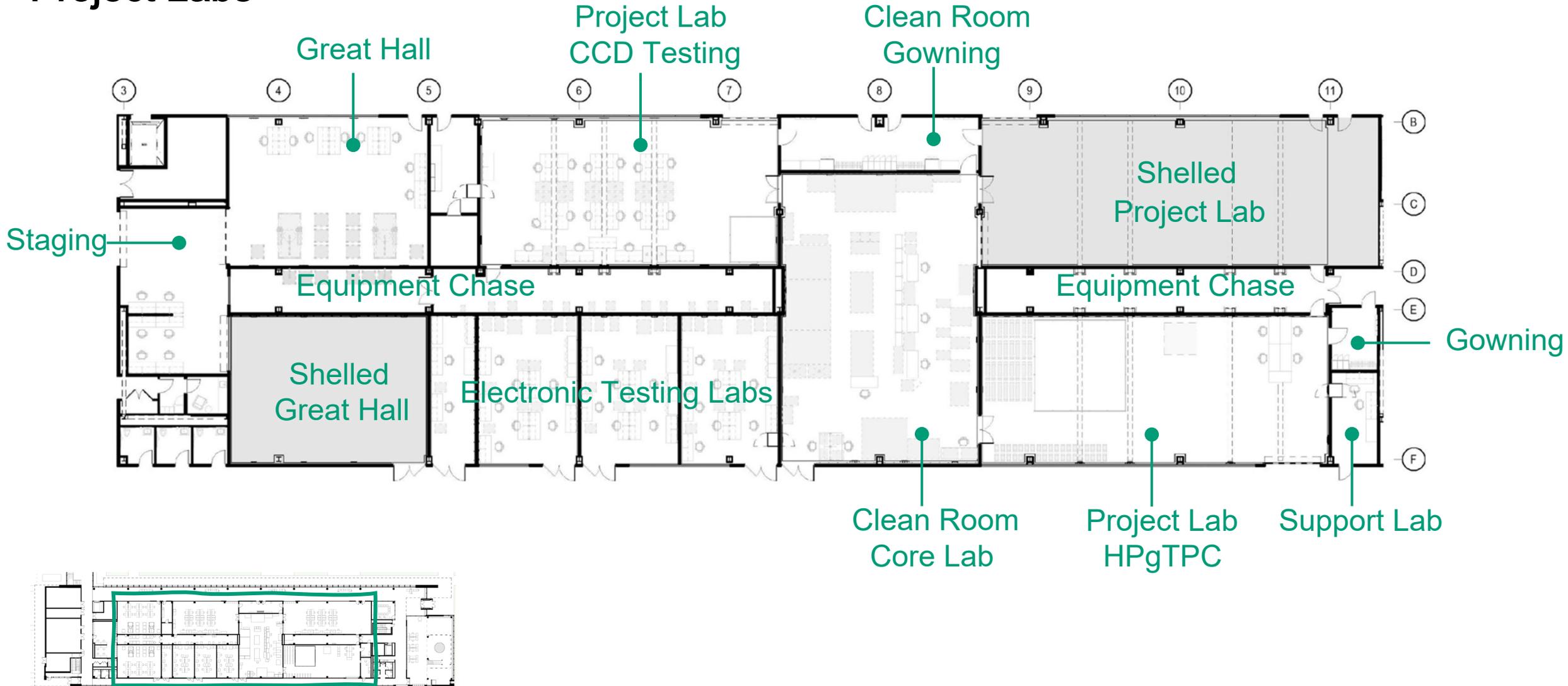


# 03 — Project Labs

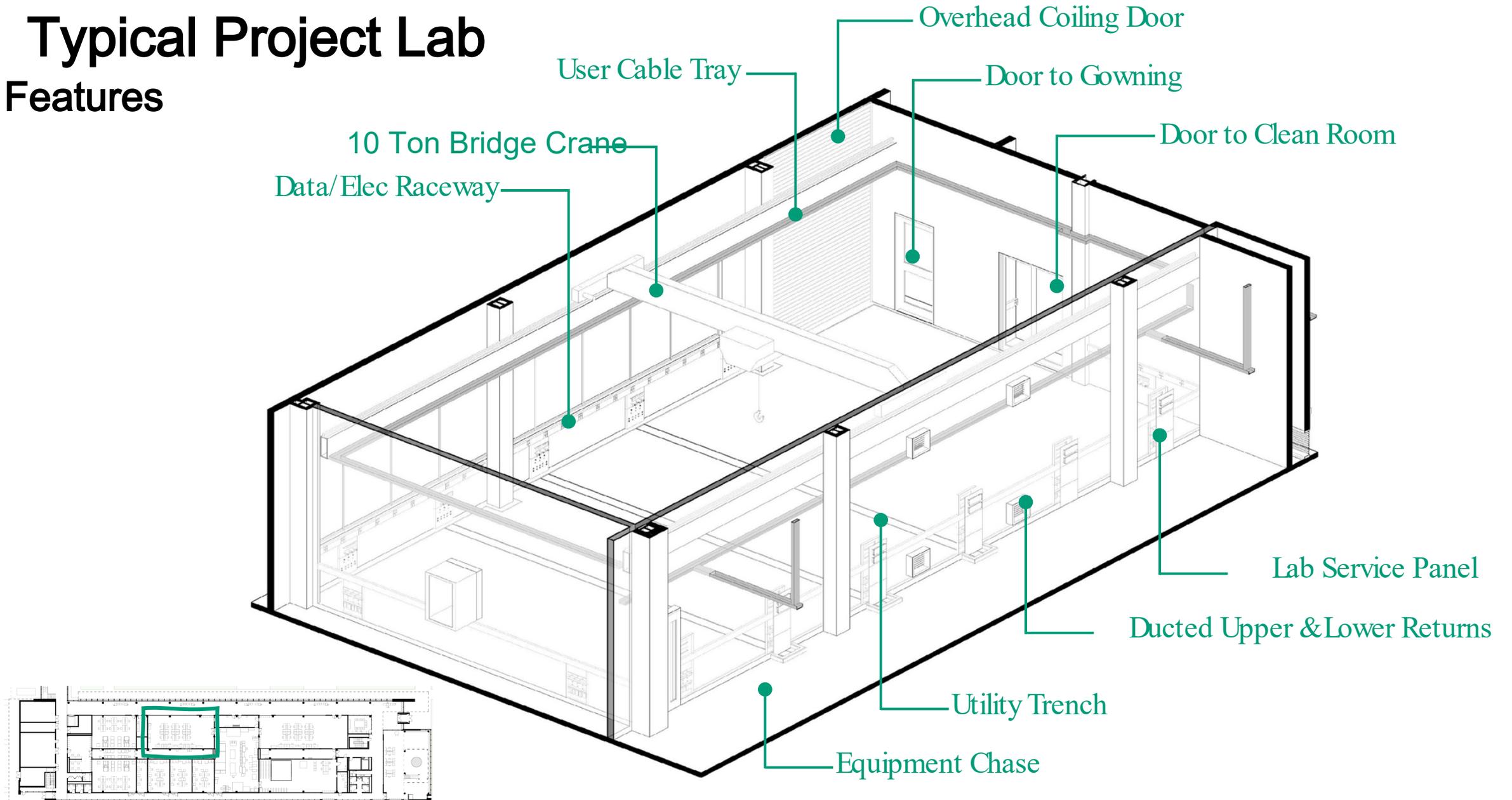


# Enlarged Ground Floor Plan

## Project Labs

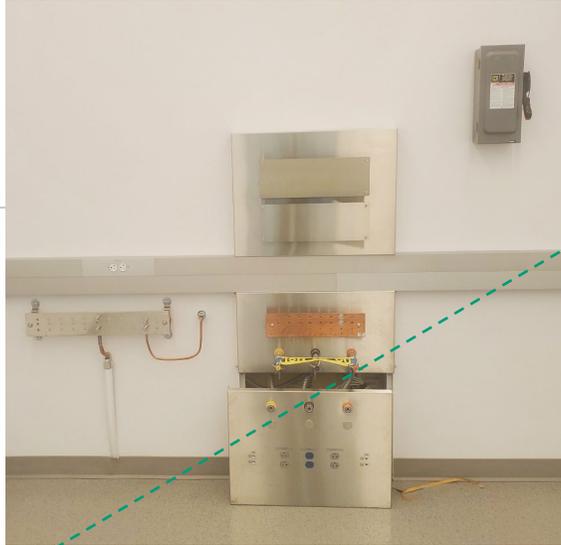


# Typical Project Lab Features

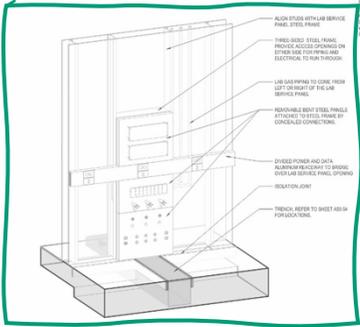


# Project Lab

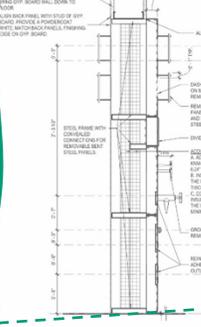
## Lab Service Panel



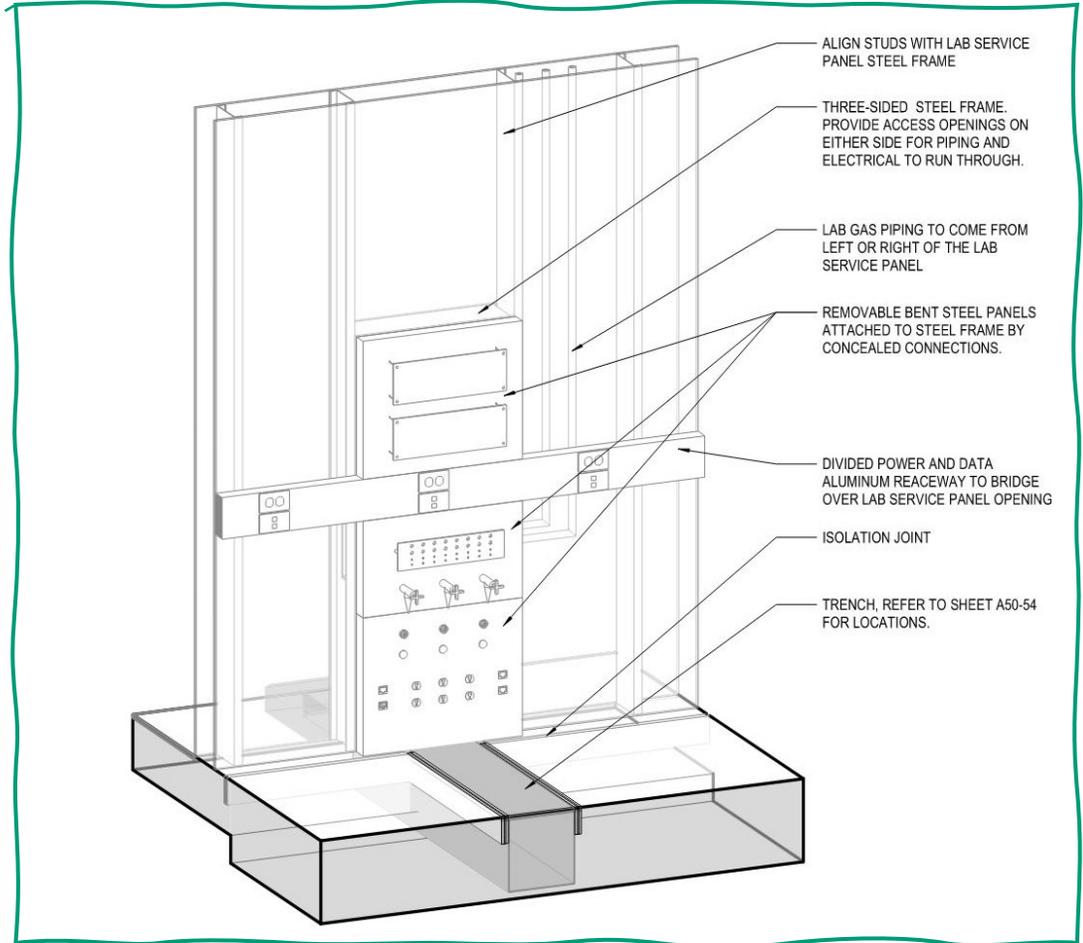
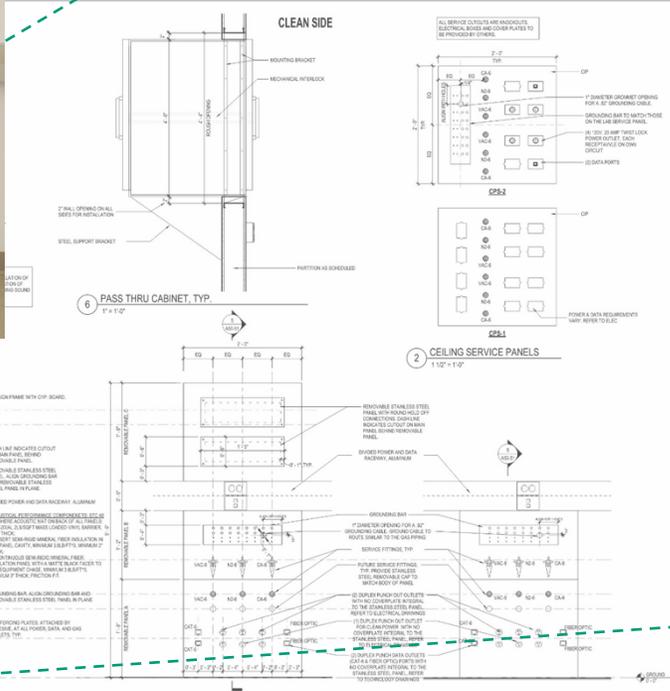
8 LAB SERVICE PANEL, TYP. EQUIPMENT CHASE SIDE



7 LAB SERVICE PANEL, TYP. LAB SIDE



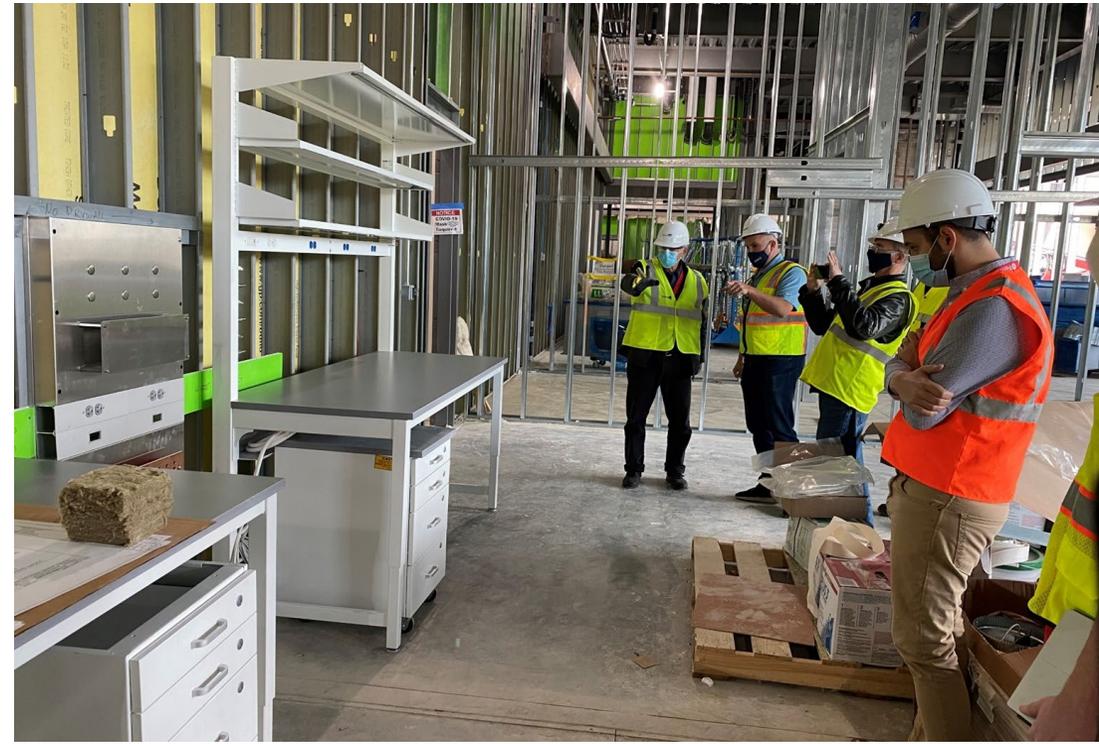
5 LAB SERVICE PANEL SECTION



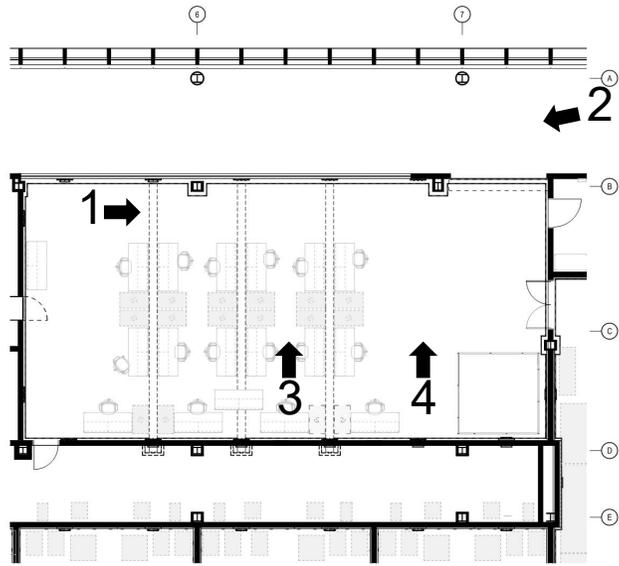
DATE / CONSULTANT		DATE	KEYPLAN	CONSULTANTS			TERRA			CCS			FERMI NATIONAL ACCELERATOR LABORATORY		
DESIGNED	PKW			2100 North Ridge Road	1101 North Ridge Road	1101 North Ridge Road	1101 North Ridge Road								
DRAWN	PKW			1101 North Ridge Road	1101 North Ridge Road	1101 North Ridge Road									
CHECKED	ASG			1101 North Ridge Road	1101 North Ridge Road	1101 North Ridge Road									
APPROVED	NJZ			1101 North Ridge Road	1101 North Ridge Road	1101 North Ridge Road									

# Project Lab

## Lab Service Panel Mockup



# Typical Project Lab



# Typical Project Lab Engineered System

## Mechanical

- Medium temperature chilled water system provide supplemental cooling flexibility
- Overhead air distribution with mains routed within Equipment Chase



## Electrical

- Walkercell in Hybrid Labs
- Utility trenches in labs
- "House" and "Clean" power provided at lab service panels throughout the labs
- Power connections reserved in Utility Chase for future equipment connections for labs
- DALI protocol lighting controls

# Typical Project Lab

## Engineered System

### Structured Cabling

- User focused cable tray system to allow user groups to make cable infrastructure modifications to meet their data capacity needs for experiments
- Decentralized fiber and copper cabling strategy to allow for complex flexibility



### Plumbing

- Compressed Air and Vacuum Air; Nitrogen piping distribution w/ bulk system
- Piping mains sized for future connections with capped connections

# Typical Project Lab Engineered System

## Structural / Vibration Analysis

- Isolation joints designed to address various laboratory vibration requirements
- 10 ton capacity hoist system allow users to move large equipment to other areas of space



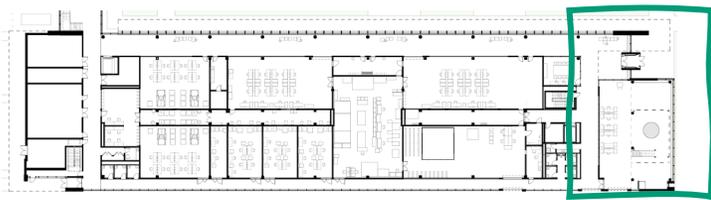
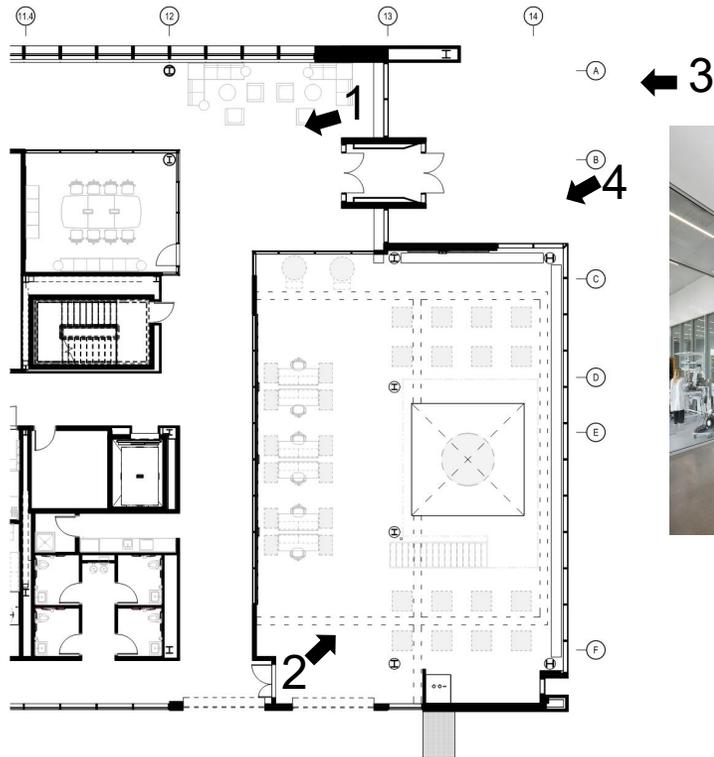
## Controls

- Cascaded pressurization control throughout the labs. Flexible to move large equipment yet maintain relative pressurization
- Project designed to move campus towards more agnostic controls approach

# 04 — Argon Cube

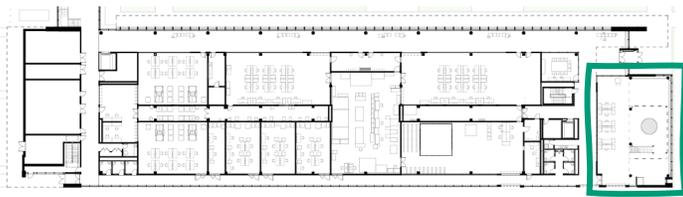
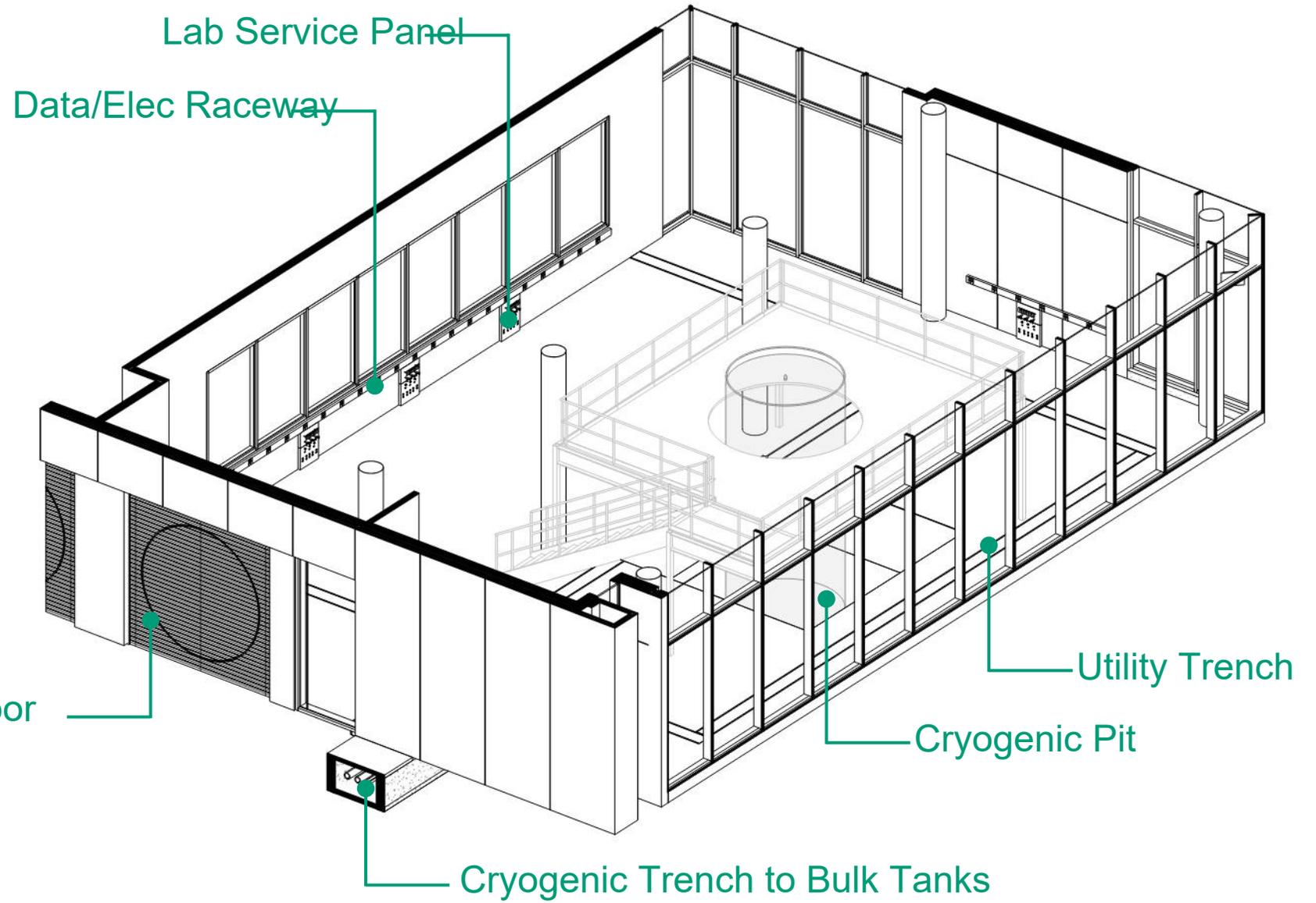


# Argon Cube

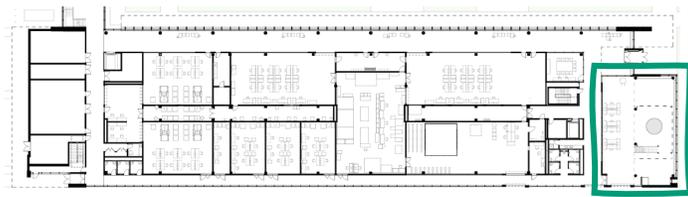
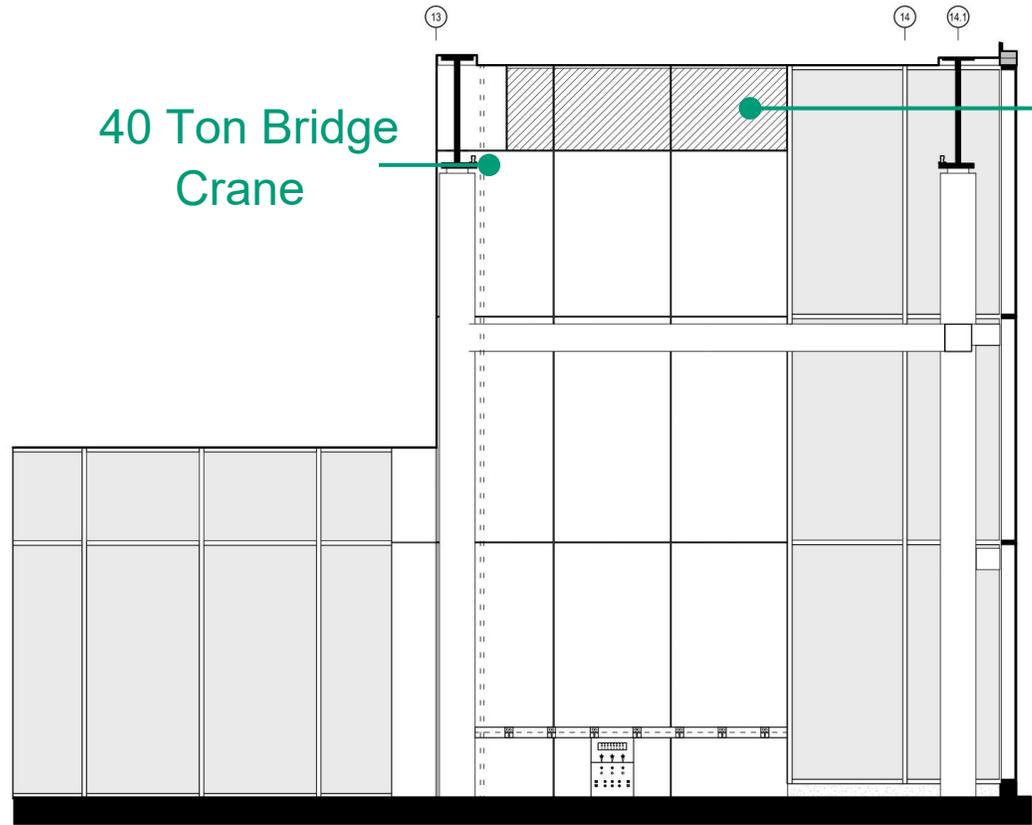


# Argon Cube

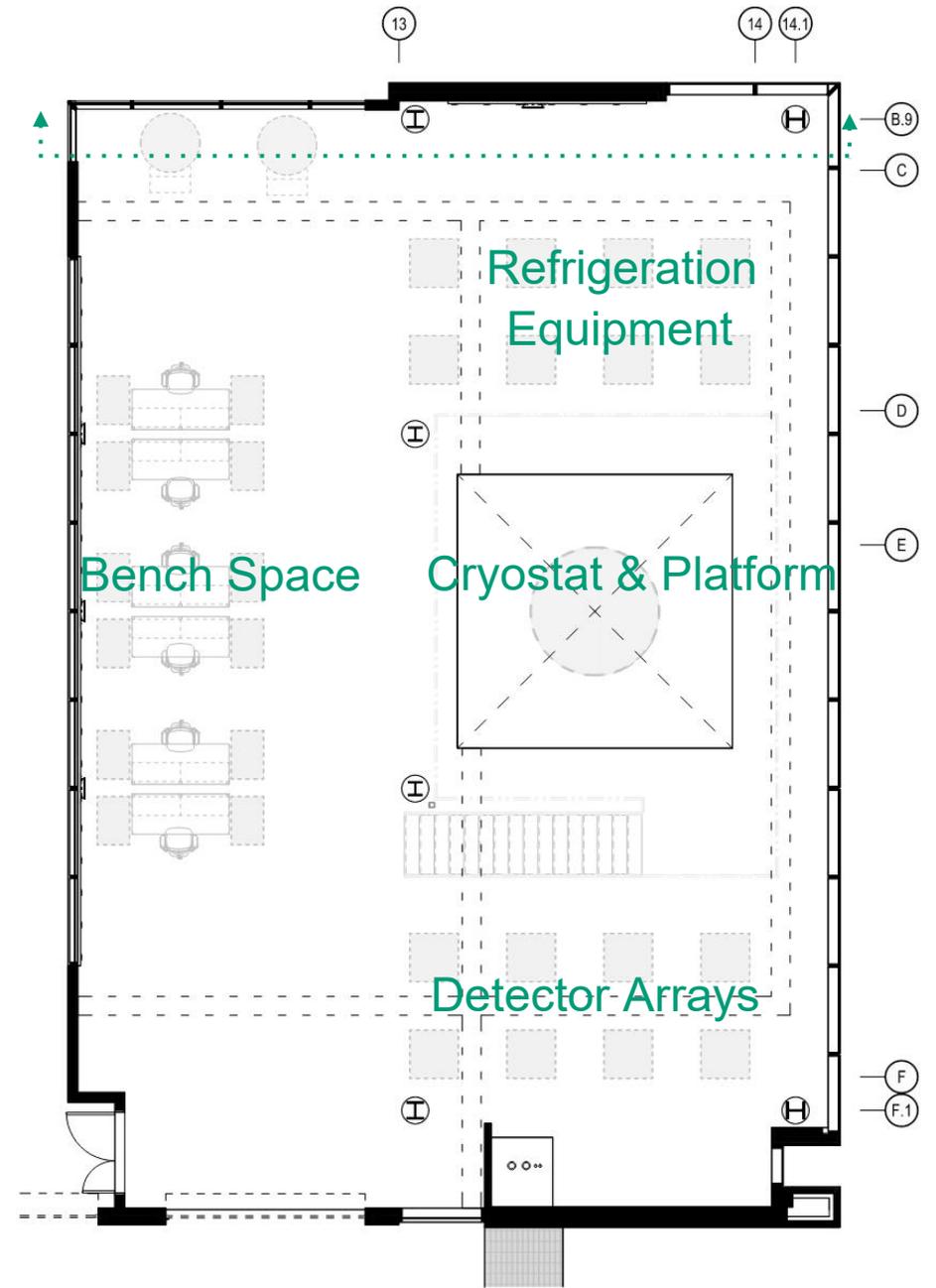
## Features



# Enlarged Ground Floor Plan Argon Cube

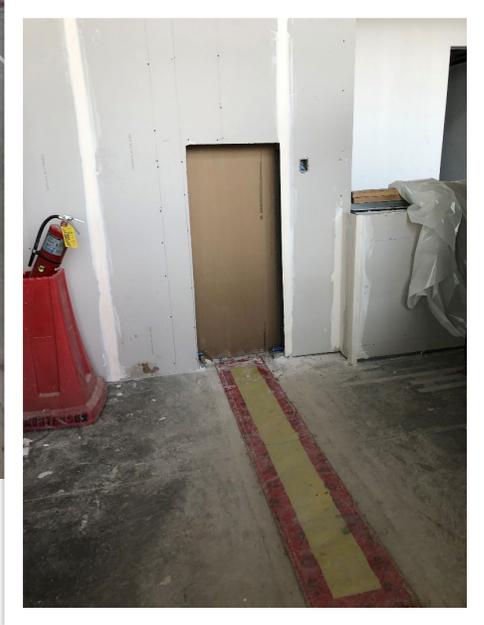


ODH  
Fresh Air Intake



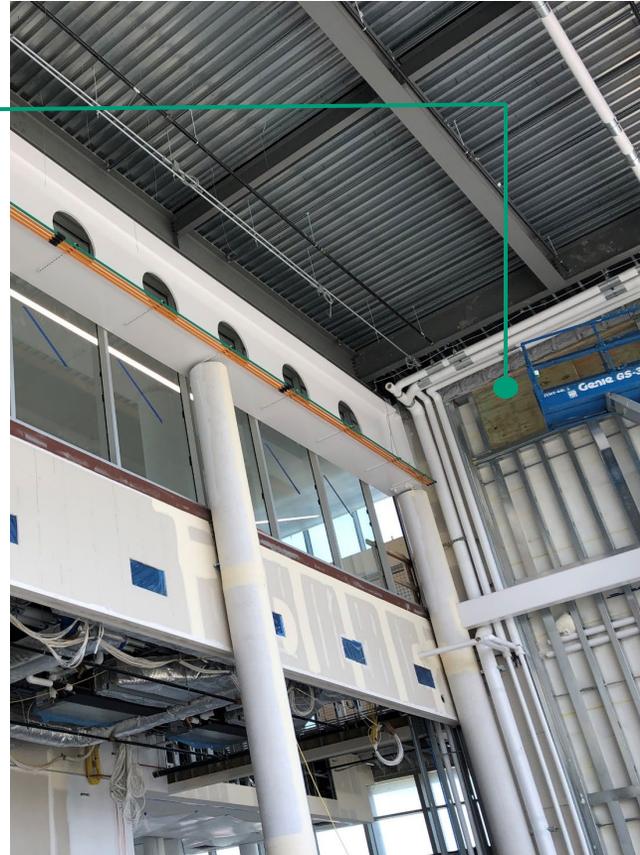
# Engineered Systems on Cube

Utility Trenches



Oxygen Depletion Hazard System

ODH  
Fresh Air



ODH  
Exhaust  
Air



# Questions

