

# Culminating Project Building 596 – Robotic & Manufacturing Science and Engineering Laboratory

## Cal Poly Fire Protection Engineering



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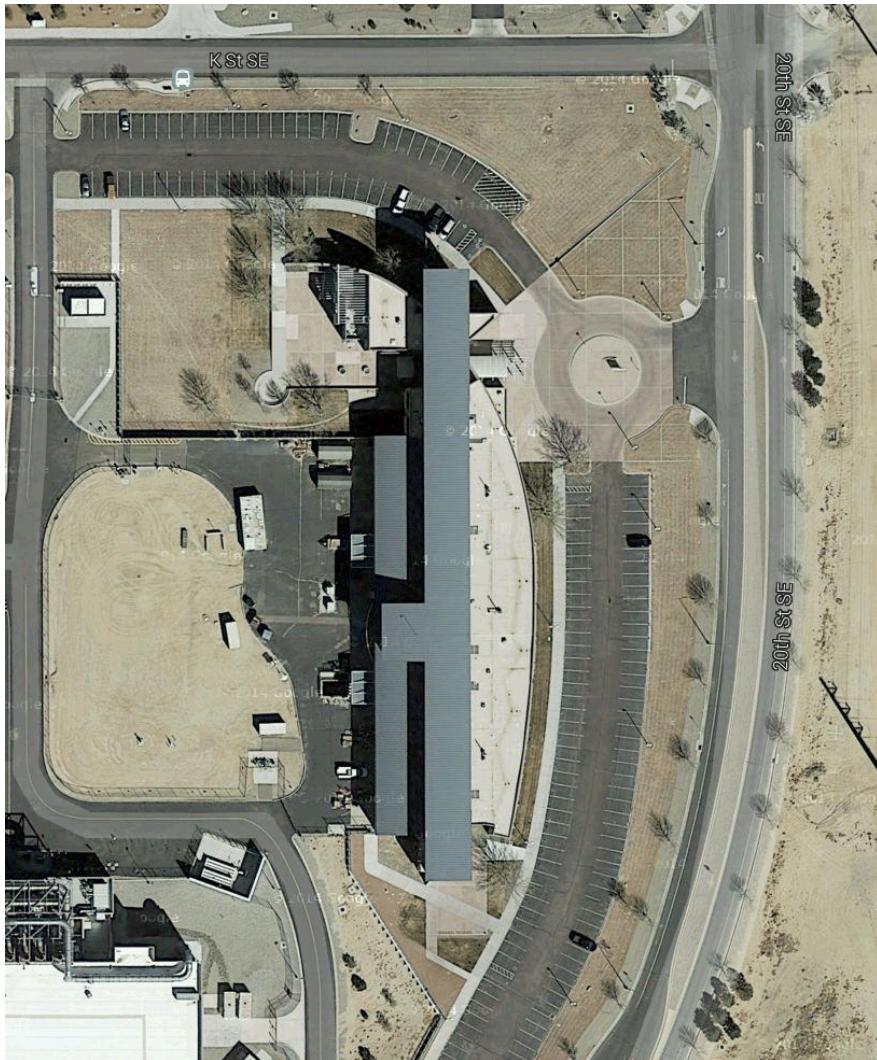
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# Topics

- RMSEL Overview
- Prescriptive Design
  - Occupancy
  - Structural Fire Protection
  - Suppression
  - Alarm System



# RMSEL Overview



- Robotic & Manufacturing Science and Engineering Laboratory
  - Sandia National Laboratories / U.S. Department of Energy
  - House office space, laboratories, and conference rooms
  - Three story with atrium requiring smoke control system
    - Stairwell pressurization as well
  - Large high bay space
  - Large conference rooms

# Applicable Codes

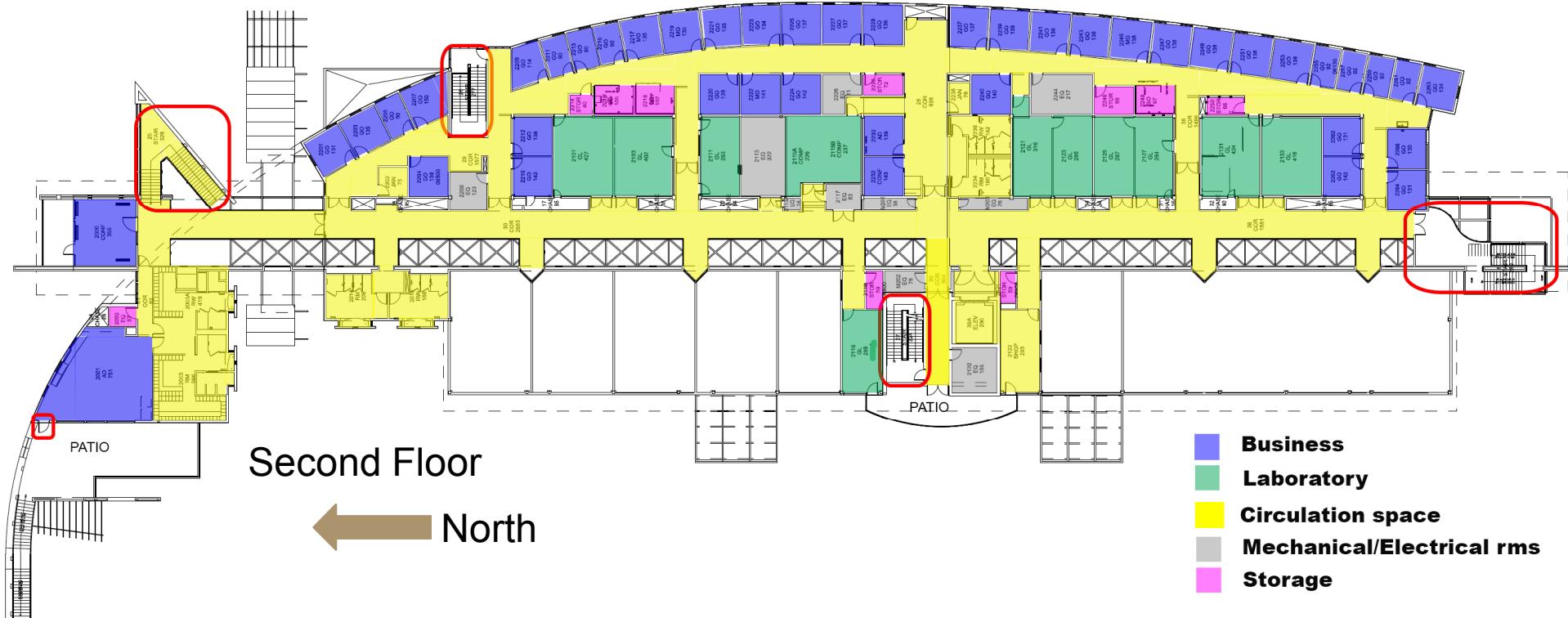
- Regulatory Drivers
  - U.S. Department of Energy (DOE) Order 420.1B, *Facility Safety*
  - 2012 International Building Code (IBC)
  - 2012 International Fire Code (IFC)
  - National Fire Protection Association (NFPA) 101-2012, *Life Safety Code* ®
  - NFPA 13-2013, *Standard for the Installation of Sprinkler Systems*
  - NFPA 72-2013, *National Fire Alarm Signaling Code*
- Guidance
  - DOE Standard (STD) 1066-2012, *Fire Protection*
  - NFPA Fire Protection Handbook (20<sup>th</sup> Edition)
  - SFPE Handbook of Fire Protection Engineering (4<sup>th</sup> Edition)
  - Sandia Corporation (Sandia) Construction Specifications

# Occupancy

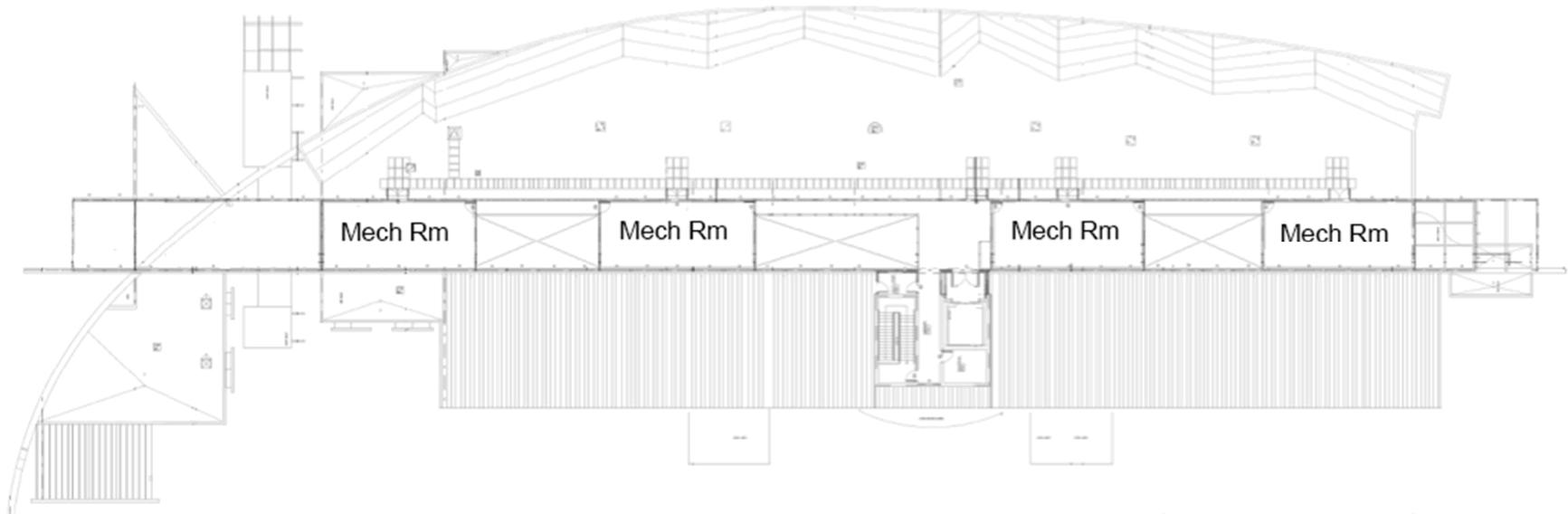


Space	IBC	LSC
Office	Business	Business
Conference	Assembly (A-3)	Assembly
Laboratories	Business	General Industrial
Storage	Storage	Storage

# Occupancy (cont.)



# Occupancy



# Construction

- Constructed in 1995
  - 1991 Uniform Building Code
  - NFPA 101-1991, *LSC*
- Construction Type
  - Type II-N (1991 UBC)
  - Type II-B (2009 IBC)
  - Approved Automatic Sprinkler Systems

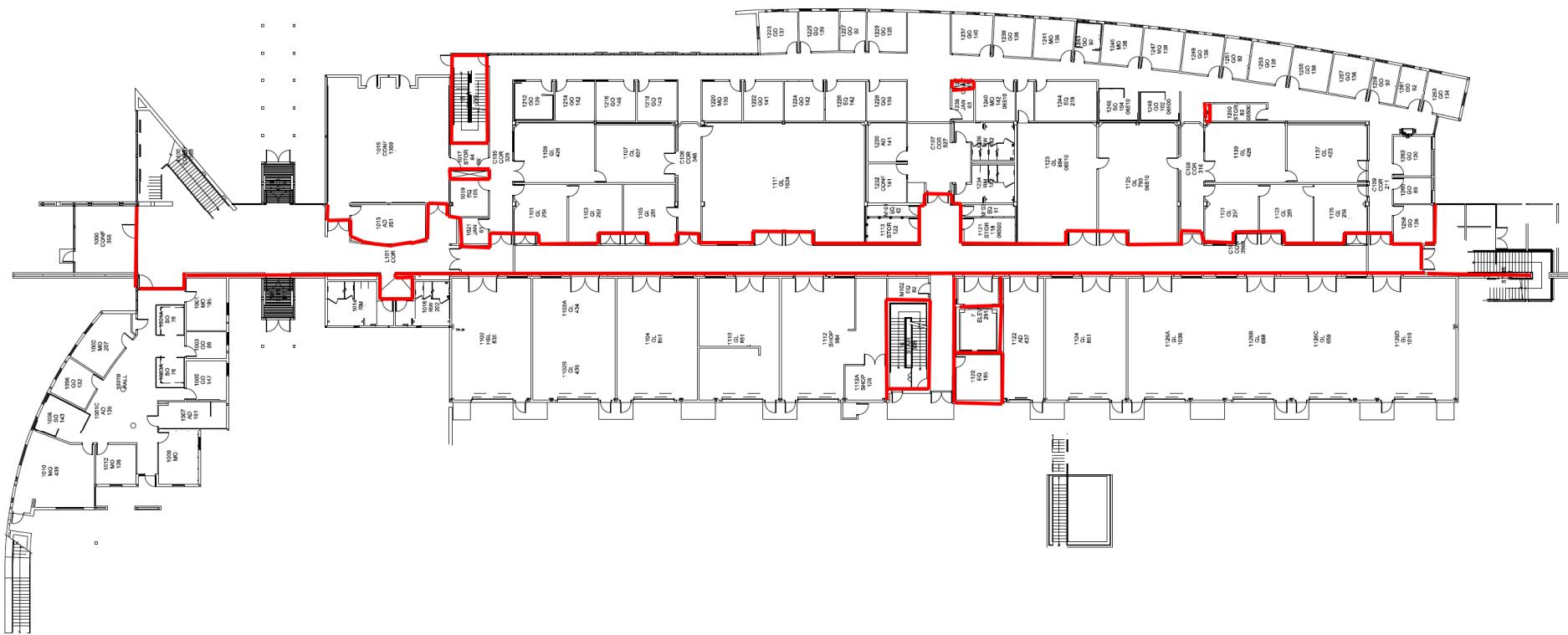
## Building Characteristics

Level	Approximate Floor Area [ft <sup>2</sup> ]
Bsmnt	4,500
First	36,000
Second	24,000
Third	6,500
<b>Total</b>	<b>71,000</b>

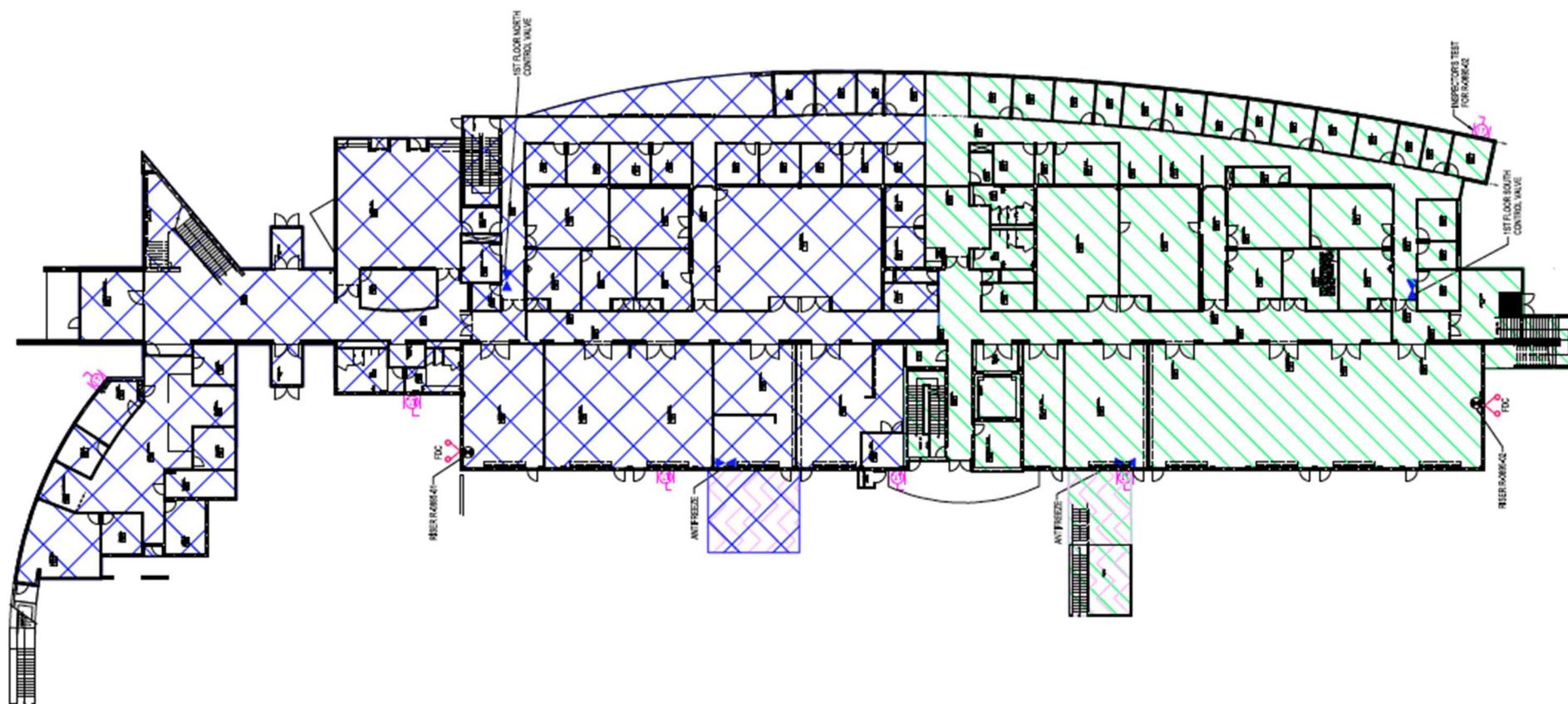
Direction	Length [ft]
N-S	~430 ft
E-W	~110 ft

# Fire Barriers

- Section 404.6 of the IBC requires atrium spaces be separated from adjacent by 1-hour fire
- 2009 IBC - Table 508.4, *Required Separation of Occupancies*
  - 1-hour separation between A-3 and Business



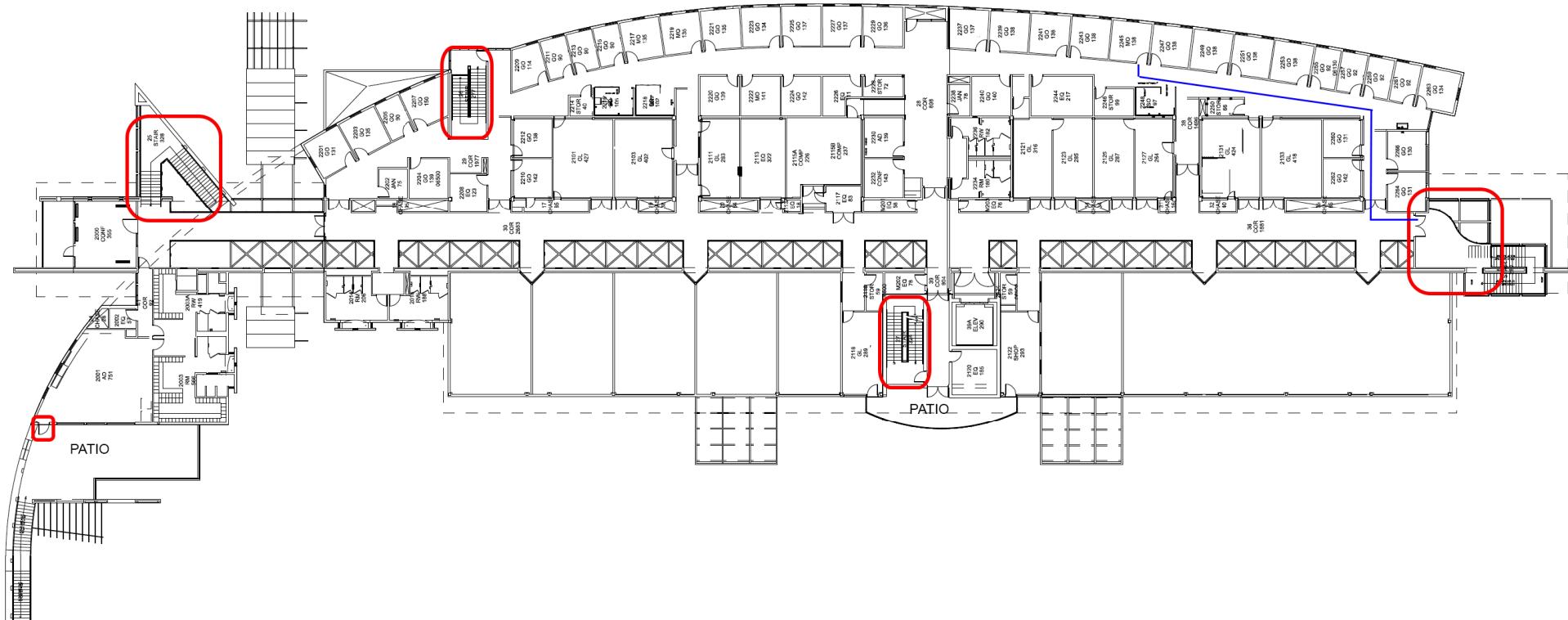
# Fire Suppression



# Travel Distance

Occupancy	LSC [ft]	IBC [ft]
Business/B	300	300
Assembly/A-3	250	250
General Industrial	250	250

Longest travel distance is  
130 ft (office 2245)



# Fire Alarm System

- Fire Alarm Control Panel – EST Quickstart
- Class A Circuits
- Photoelectric Smoke Det.
- Manual Pull Stations
- Intelligent Heat Det.
- Horn/Strobe – Wheelock
- Magnetic hold open devices for
- Reports to a Proprietary Central Alarm
  - Monitored by KAFB/FD and Sandia Emergency Management

# Fire Alarm System – Activation

Medium  $t^2$  fire;  
Standard Response Sprinklers

Fast  $t^2$  fire;  
Quick Response Sprinklers

