

Boundary Conditions:

Designing and operating
laboratory access controls for
safety

Joseph Pickel

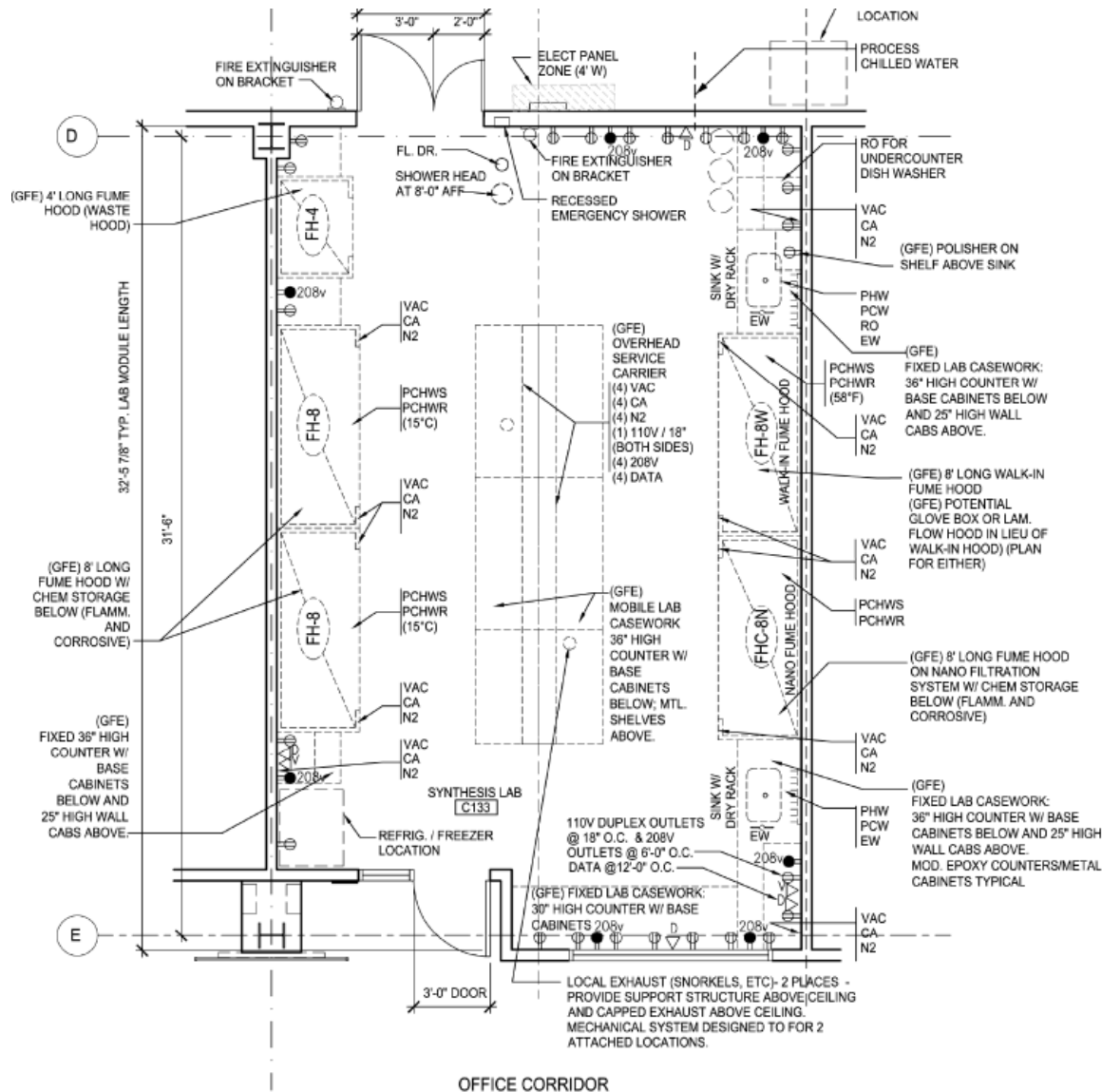
August 22, 2022

ORNL is managed by UT-Battelle, LLC for the US Department of Energy



U.S. DEPARTMENT OF
ENERGY

Boundaries contribute to lab functionality



- Difference between “Designed for...” and “Can accommodate...”
 - Dimensions - area, length, ceiling height
 - Specifications - floor loading, vibration
- Boundaries can be designed for
 - Ventilation controls (maintain negative to halls)
 - Fire protection boundary (fire rated walls)
 - Radiological, biological, laser, etc. containment/control
 - Security
- “Virtual” Boundaries

The most banal topic ever?

Lab doors and windows

- What do you have to keep in?
 - Hazardous materials
 - Stray laser light, noise, fields
 - Intellectual property/sensitive info
- What do you want to keep out?
 - Unqualified/untrained personnel
 - Uncontrolled environments
 - Food and drink
- What needs to pass through?
 - People
 - Equipment
 - Communications (alarms?)



Does your organization permit...

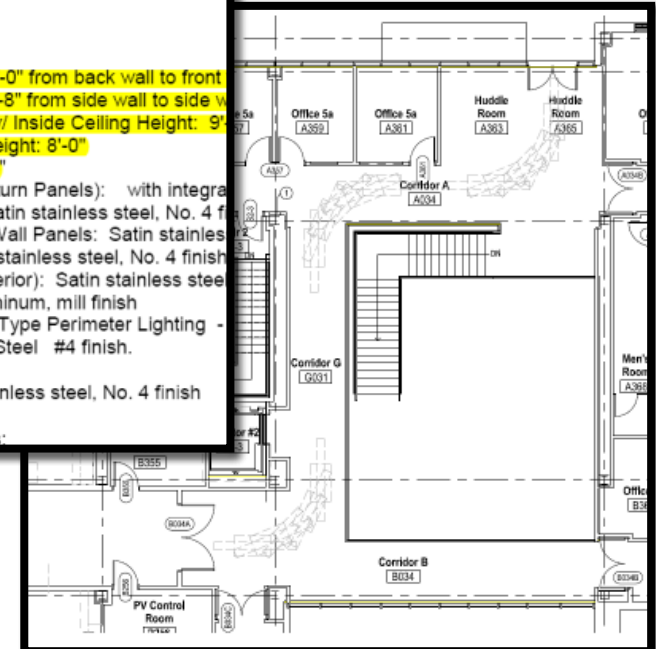
- covering of windows?
- propping of doors?

(Just) Passing through

- Routine use considerations
 - Frequency of use
 - What are they carrying / pushing?
 - Where does it lead (conflicts?)
- Non-routine
 - Equipment addition or removal
 - Emergency use (postings, crash bars...)
- Other considerations
 - Doorways leading to the doorways
 - Wood/stainless door near magnetic fields; hermetic seals



1. Basis-of Design: ThyssenKrupp Conventional Series
2. **Rated Load: 5000 lb.**
3. Rated Speed: 100 fpm
4. Car Enclosures:
 - a. **Inside Depth: 9'-0" from back wall to front**
 - b. **Inside Width: 5'-8" from side wall to side wall**
 - c. **Extended Cab w/ Inside Ceiling Height: 9'-0"**
 - d. **Custom Door Height: 8'-0"**
 - e. **Door Width: 4'-6"**
 - f. Front Walls (Return Panels): with integrated lighting
 - g. Car Fixtures: Satin stainless steel, No. 4 finish
 - h. Side and Rear Wall Panels: Satin stainless steel, No. 4 finish
 - i. Reveals: Satin stainless steel, No. 4 finish
 - j. Door Faces (Interior): Satin stainless steel, No. 4 finish
 - k. Door Sills: Aluminum, mill finish
 - l. Ceiling: Island Type Perimeter Lighting - Satin Stainless Steel #4 finish.
5. Hall Fixtures : Satin stainless steel, No. 4 finish
6. Additional Requirements:



To lock or not to lock?

- Are administrative controls sufficient?
- Are there requirements (institutional or regulatory?)
- Will administration of system be a burden?
- What happens when power fails?
- Will emergency access be hindered?



Types of Access Controls

Lock Type	Access Mode	Pros	Cons
None	No controls or administrative	No direct cost	No control
Standard lock	User possesses key	Resilient	Key control burdensome Loss of keys
Cipher / keypad	User knows code	Sharing of codes	Process to change codes Sharing of codes
Electronic (wired / Wireless)	User possess digital code	Easy to modify access Ability to track access/usage Integrate with systems (training)	Highest upfront cost Maintenance
Interlocked	Logically connected to system	Safety of worker (or equipment	Complexity?



- Fundamental hazard communication
 - Significant hazards
 - Required controls
 - Contact points
- Quick guide for unfamiliar persons
 - Consistent labeling allows for universal use
 - Use of images / icons (GHS) for ready recognition
- Diminishes in value for routine users
 - Sign blindness – Changes must be significant

KEEP OUT! (or *Come on in*)

Controlling who gets in or not

Personnel

- Researchers
- Managers / ESH
- Facility support
- Vendors / Repair
- Emergency personnel

Access Modes

- Unrestricted
- Escorted
- Limited

Processes

- Work Scope
- Training / Qualification
- Entry/Exit Protocol

Who controls the controls?

- Traditionally assigned to organization's security / police or facilities
 - Focus on property protection
 - Authority based
- For laboratory – individual responsible for space should control (PI, Space Manager,...)
 - Focus includes safety and security
 - Qualification based – integrates with work
- Processes/Logic required
 - Providing/revoking access
 - Identifying control points
 - Periodic reviews

		Site-Spec	Export Control Awareness	Low Power Laser Hazard Awareness Training	General Hazard Communication	Lab Hood User Safety Training	ORNL Chemical Hygiene Plan	ORNL Lead Level I Training	Pressure System Custodian	Electrical Safety Outside the Office	Electrical Worker (EW)
Name	Badge	098511	Curricula #1328	Curricula #2900	Curricula #2135	Curricula #1470	Curricula #2144	Curricula #1600	Curricula #2945	Curricula #2677	Curricula #2684
Ay	3078412	07/27/2021	07/13/2021	11/30/2021	07/21/2021	07/21/2021	07/21/2021	01/31/2022	NA	07/21/2021	03/21/2022
Eo	3093671		09/21/2021	NP	12/29/2021	11/23/2021	12/22/2021	NP	Incomplete	11/23/2021	NP
Ku	3072615		03/22/2022	03/13/2022	03/13/2022	03/13/2022	03/13/2022	03/13/2022	NA	02/27/2022	03/22/2022
Mc	907020	06/14/2020	05/06/2022	06/21/2019	06/29/2018	06/29/2018	06/29/2018	05/03/2017	07/19/2022	07/19/2016	03/31/2022
Ms	700685	09/18/2020	05/10/2022	NA	12/14/2013	05/10/2022	12/14/2013	03/11/2013	07/07/2022	01/27/2015	NA
Ng	3057194		04/19/2021	NA	NA	Incomplete	Incomplete	NA	NA	03/09/2022	Not Assigned
Ra	3023840	06/14/2020	06/17/2022	03/10/2020	03/10/2020	03/10/2020	03/10/2020	03/10/2020	NA	03/04/2020	05/23/2022
Ra	3083810	09/18/2020	05/31/2022	07/02/2020	07/03/2020	07/02/2020	07/04/2020	07/05/2020	NA	07/02/2020	03/30/2022
Sas	3067174	07/27/2021	11/22/2021	NA	06/25/2020	NA	06/25/2020	NA	NA	06/25/2020	NA
Sur	3078389	09/18/2020	08/18/2020	08/18/2020	08/18/2020	08/18/2020	08/18/2020	08/18/2020	NA	08/18/2020	03/30/2022
Var	35071	06/24/2020	11/08/2021	10/18/2005	08/02/2013	NA	09/03/2013	12/14/2006	NA	08/29/2017	10/21/2020

Summary

- Labs are typically designed for a specific function
 - Workflows / Use cases often overlooked
- Access controls can be engineered controls for defining safety and security envelope of laboratory
- Well thought lab boundaries can enhance the functionality and flexibility of laboratory spaces



Questions?

