Trash Talk

STRATEGIC PLANNING & MEDICAL WASTE REGULATIONS

INTRODUCTION

SPEAKERS

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Vice President

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Principal | Senior Medical Planner

LEARNING OBJECTIVES

1. Describe the **importance of early discussions** between healthcare facility leadership and the design team regarding medical waste handling/treatment/disposal

2. Identify the **types of medical wastes**, how they are handled/treated/disposed of, and avoiding pitfalls of the ambiguities within medical waste regulations

3. Assess the impact of **medical waste handling/treatment/disposal** on mechanical systems design & and health facility planning

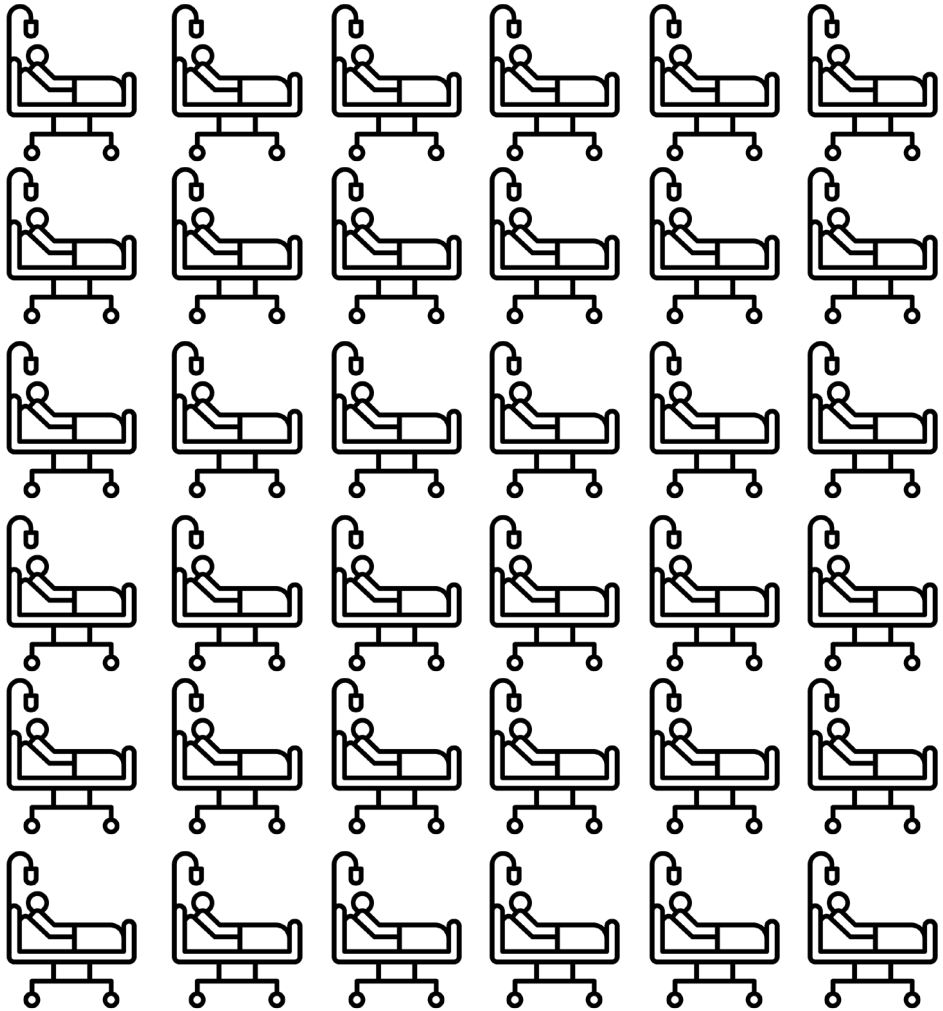
4. Present a **case study** of 93-year-old critical access hospital and how the discussion of medical waste handling/treatment/disposal shaped planning of their new facility

AGENDA

1. Understand the Importance of Early Discussions
2. Review Types of Waste & Facility Planning
3. Discuss Ventilation Requirements for Waste Storage
4. Address Safety, Risk, & Compliance

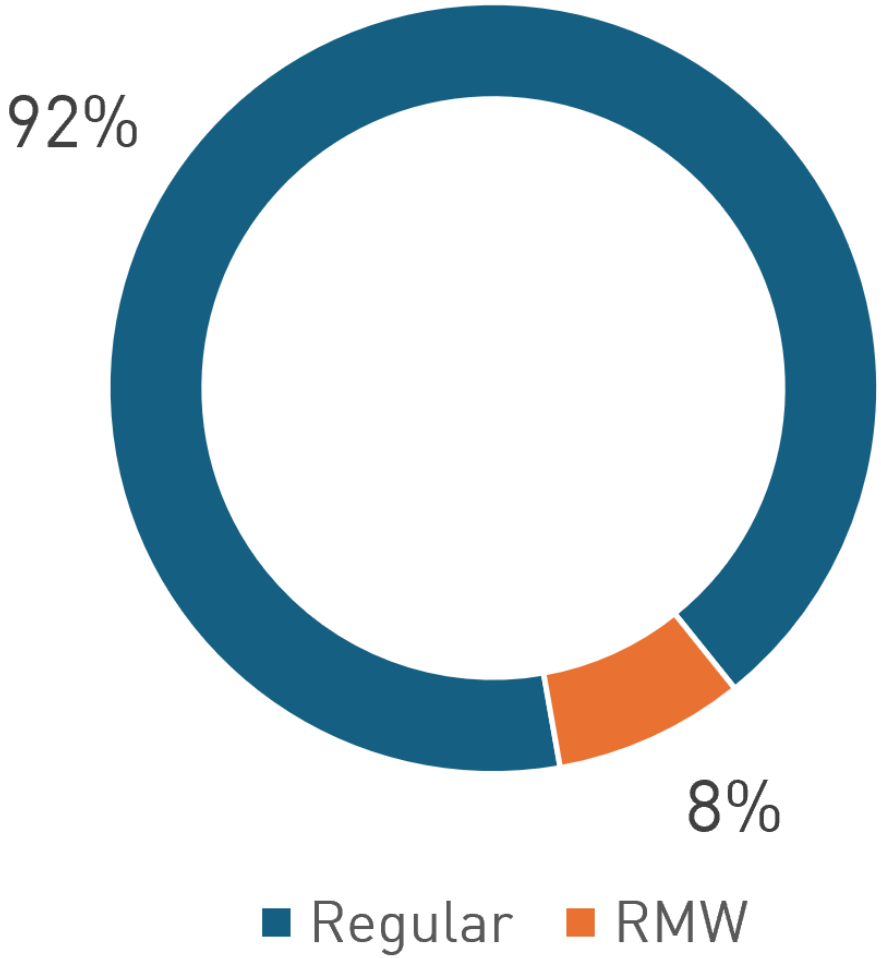
IMPORTANCE OF EARLY DISCUSSIONS

HOW MUCH WASTE?

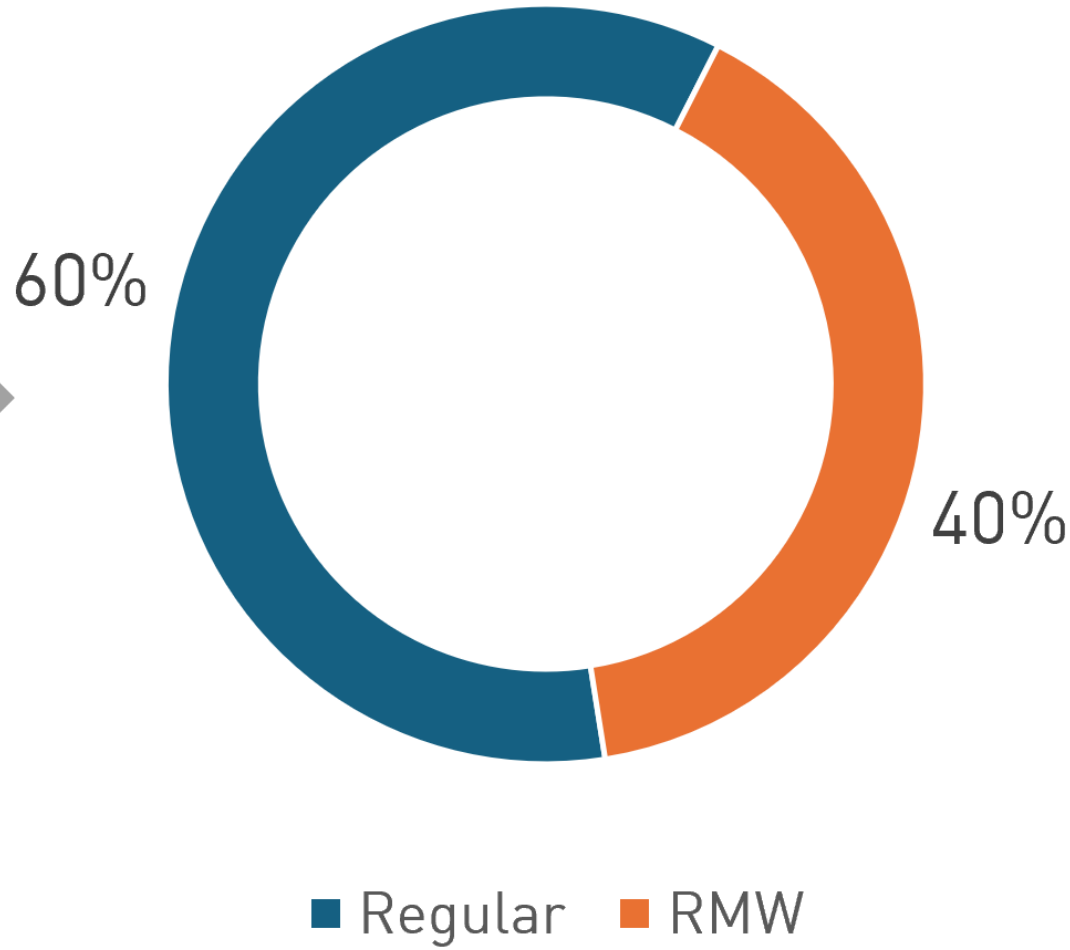


x **30** lbs / bed = **½ ton** of waste per day

Types of Trash



Waste Processing Budget



PROPER SEGREGATION OF WASTE

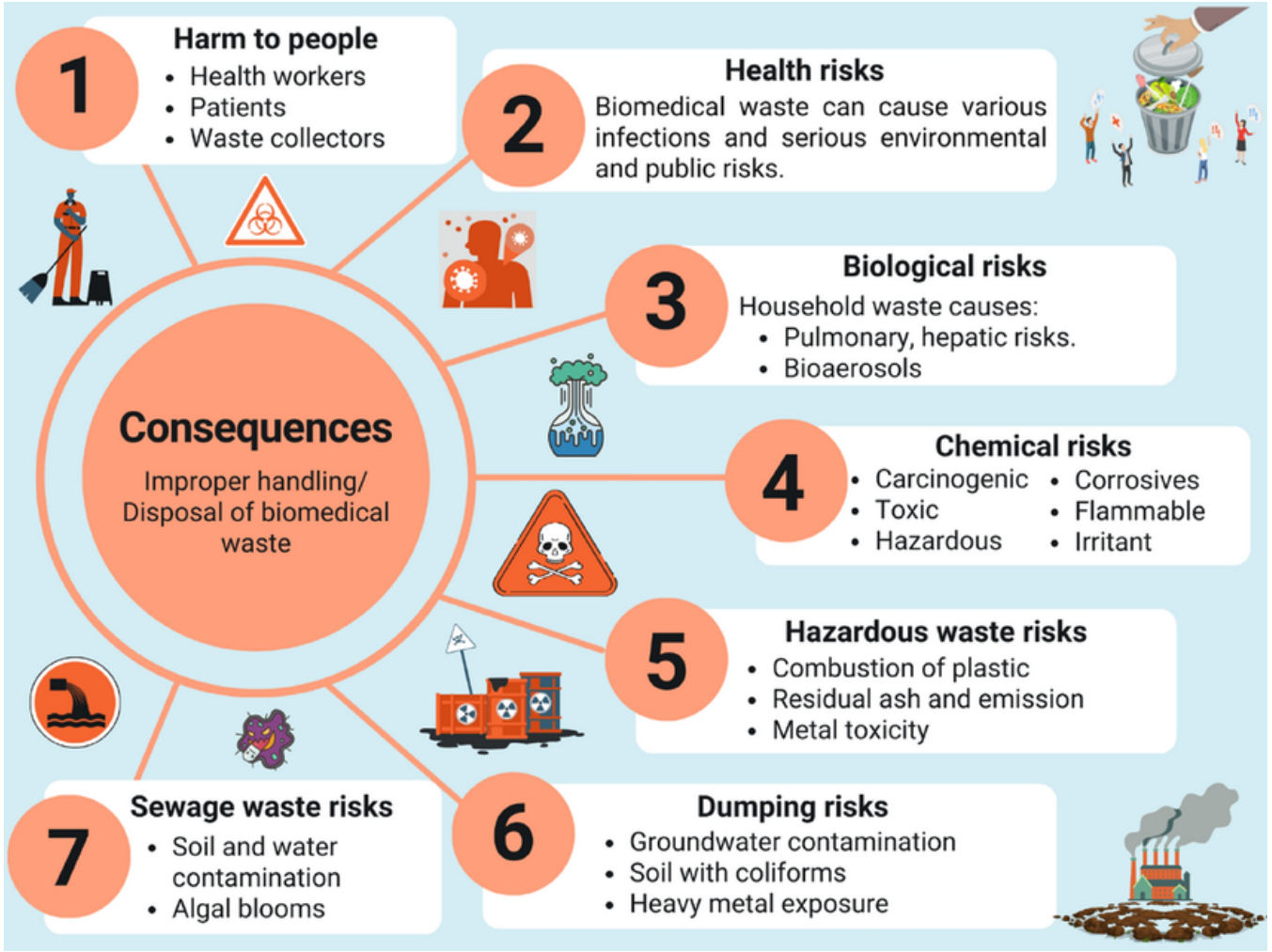
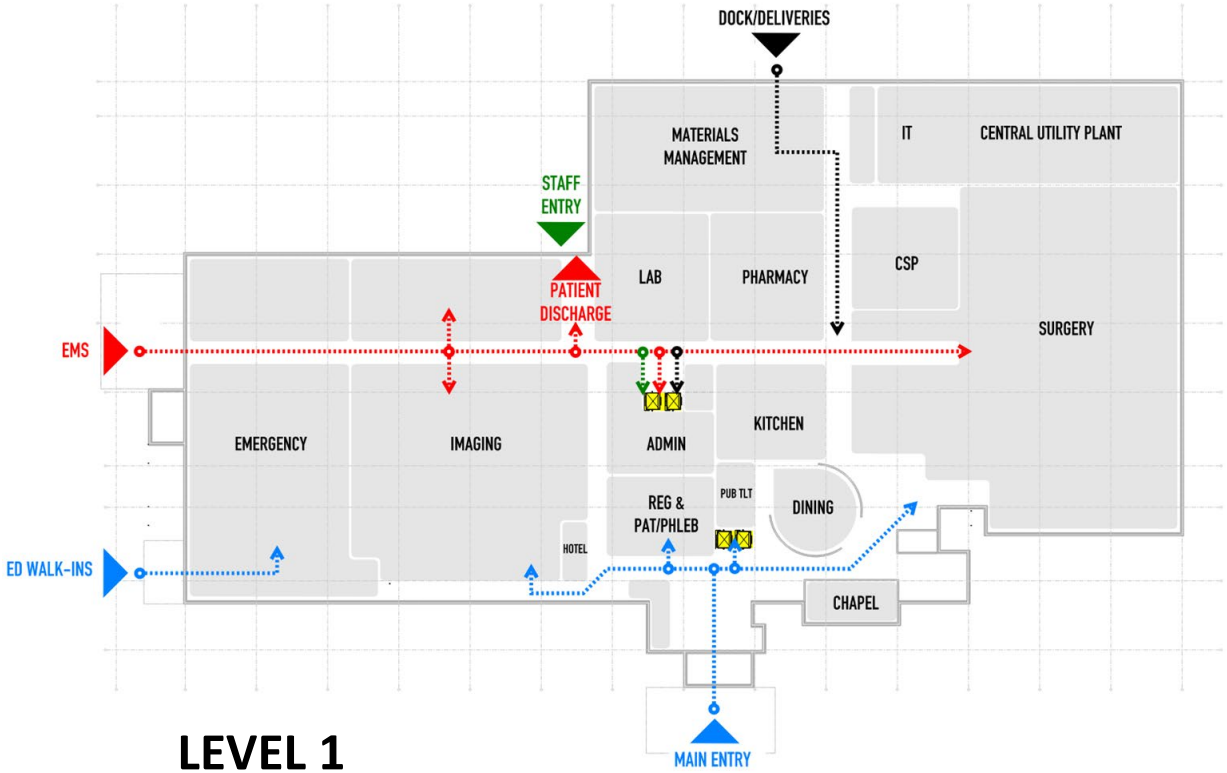


Image from SN Applied Sciences
Harpreet Singh, Kamal Yt. Arun Kumar Mishra, Devarajan Thangadurai

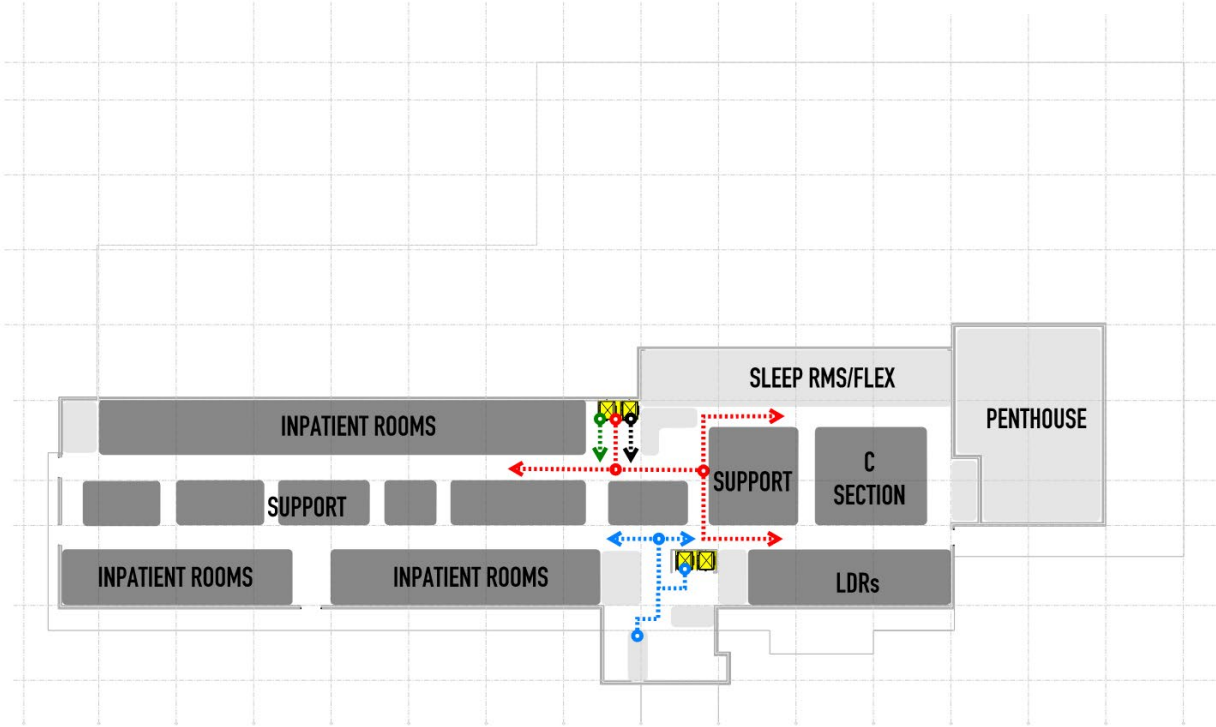
FLOWS

LEGEND

- PUBLIC FLOW
- PATIENT FLOW
- STAFF FLOW
- SUPPLY FLOW



LEVEL 1



LEVEL 2

TYPES OF HOSPITAL WASTE

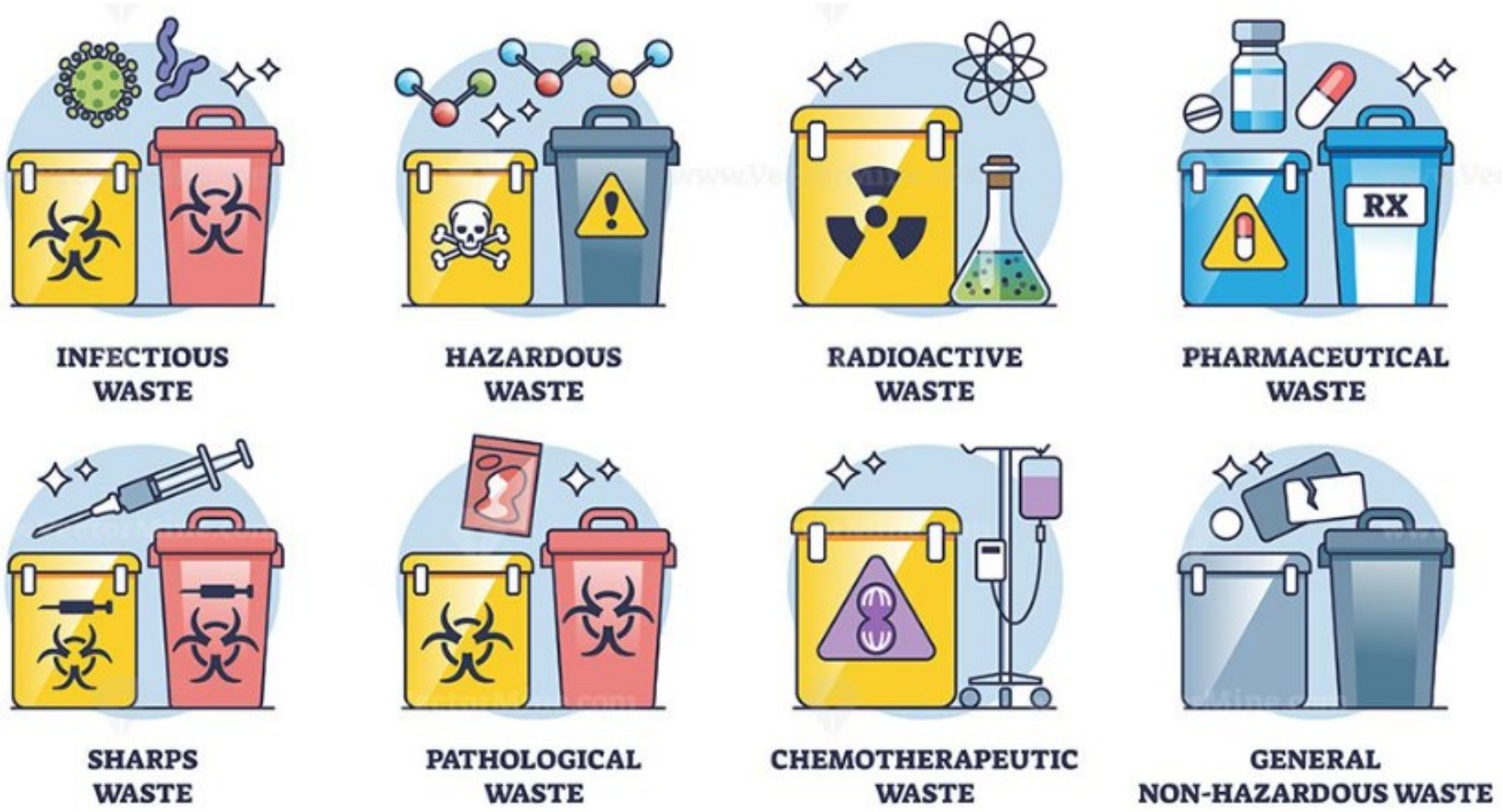


Image from Vectormine

MARGARET MARY HEALTH REPLACEMENT HOSPITAL

- 126,000 SF
- 2 Floors
- I-2 Occupancy
- 25 licensed bed, Critical-Access Hospital
- Located in Batesville, IN
  - Subject to review by the Indiana Department of Health
- Program highlights
  - Surgery Department (sharps + biohazardous waste)
  - Nuclear Imaging (hot waste)
  - Pharmacy (RCRA & Non-RCRA pharmaceutical waste)
  - No chemo in hospital but done in Cancer Center on campus
  - (6) Soiled Hold / Workrooms
- Currently under construction

TYPES OF WASTE & FACILITY PLANNING

Image from New York Times

- Medical Waste Tracking Act (1988)
- Cradle-to-grave pilot study under EPA regulations
- Waste is most infectious immediately as it is generated, then tapers off

Healthcare workers, not the public, are at the highest risk of infection


World Health
Organization


CDC
U.S. CENTERS FOR DISEASE
CONTROL AND PREVENTION


UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY


FDA


OSHA


FGI


NFPA®

International

World Health Organization

- Infectious Waste
- Pathological Waste
- Sharps Waste
- Chemical Waste
- Pharmaceutical Waste
- Cytotoxic Waste
- Radioactive Waste
- Non-hazardous or general waste

Federal

- Infectious Waste
- Hazardous Waste
- Radioactive Waste
- General Waste

Organizational

FGI

- Hazardous Waste
- Anatomical Remains
- Pharmaceutical Waste (Non-RCRA)
- Pharmaceutical Waste (RCRA)
- Chemotherapy Waste (Bulk)
- Chemotherapy Waste (Trace)
- Radiologic Waste
- Municipal Solid Waste
- Universal Waste

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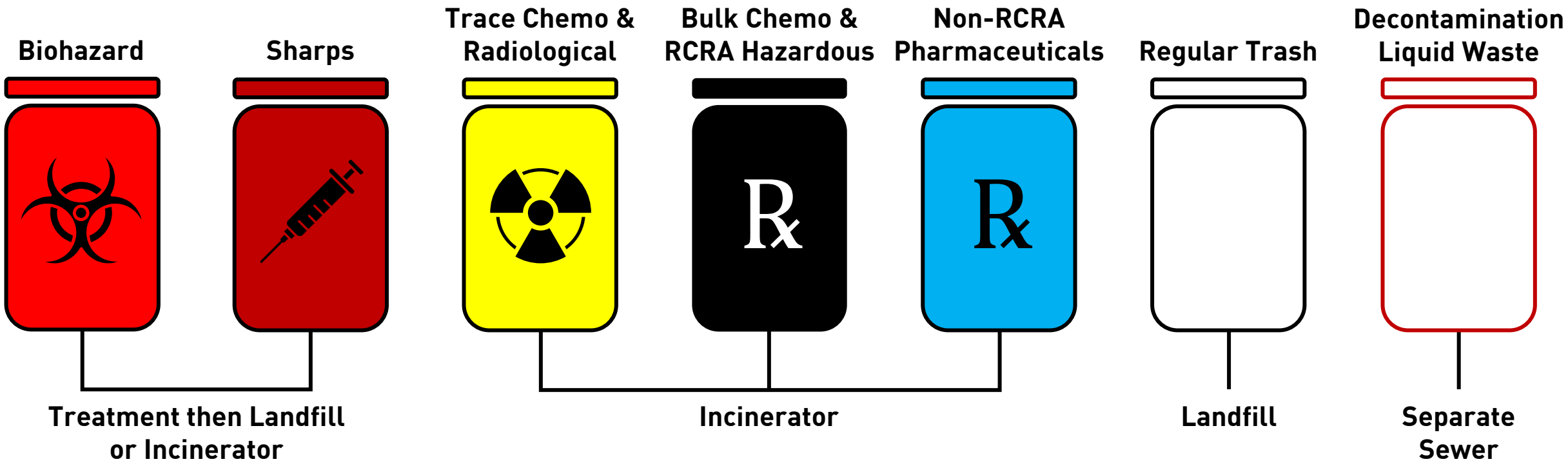
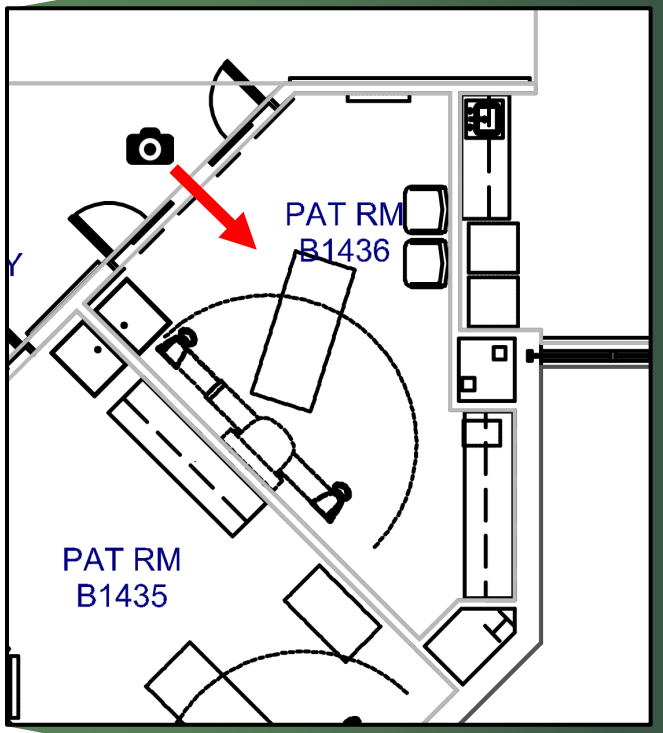
WHAT ARE THE TYPES OF WASTES?



RED: BIOHAZARDOUS & SHARPS

- Biohazardous / Pathological / Infectious

- **Generated in…**
  - Any room where “exam” level or higher-level care is performed
    - Patient rooms, Exam rooms, ORs, Blood Draws, etc.
- **Goes to…**
  - Soiled Holding or Soiled Workroom then…
    - If sharps, sterilized by Sterile Processing Department & reused
    - If biohazardous, bagged & sterilized either on-site or transported to treatment facility



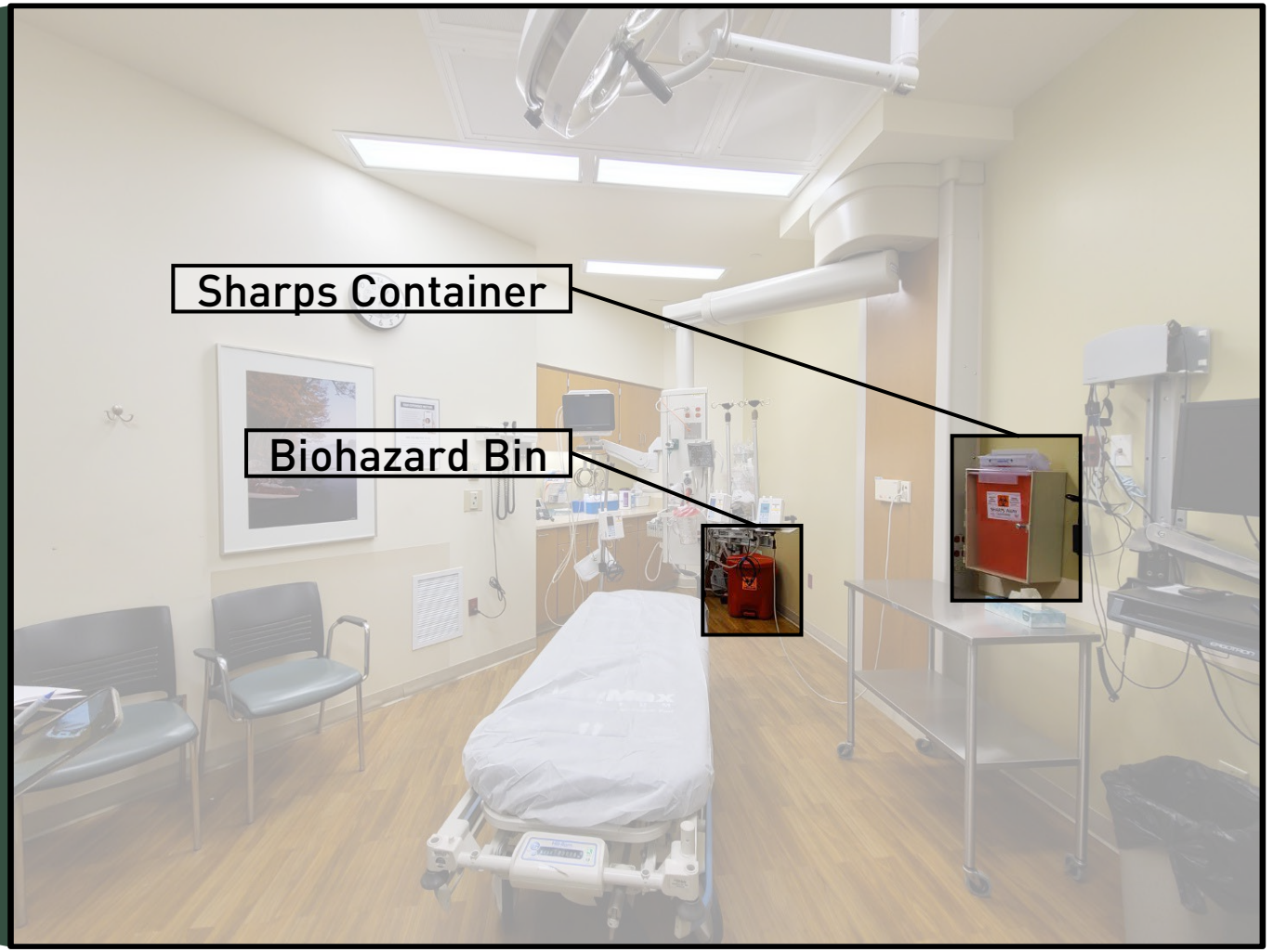


Photo: Margaret Mary Hospital, Emergency Department

BLACK: BULK CHEMO
YELLOW: TRACE CHEMO & "HOT" WASTE

- Bulk vs Trace Chemo?
  - Bulk (**Black** bin) — the drug itself
  - Trace (Yellow bin) — empty IV bags, syringes, etc.
- Radiological Waste / "Hot" Soiled

- **Generated in…**
  - where chemotherapy drugs are handled
  - Nuclear Imaging room for hot waste
- **Goes to…**
  - Soiled Holding or Soiled Workroom then transported to incinerator
  - Radiological "hot" soiled must be placed in a lead container ("lead pig") and taken to Soiled Workroom

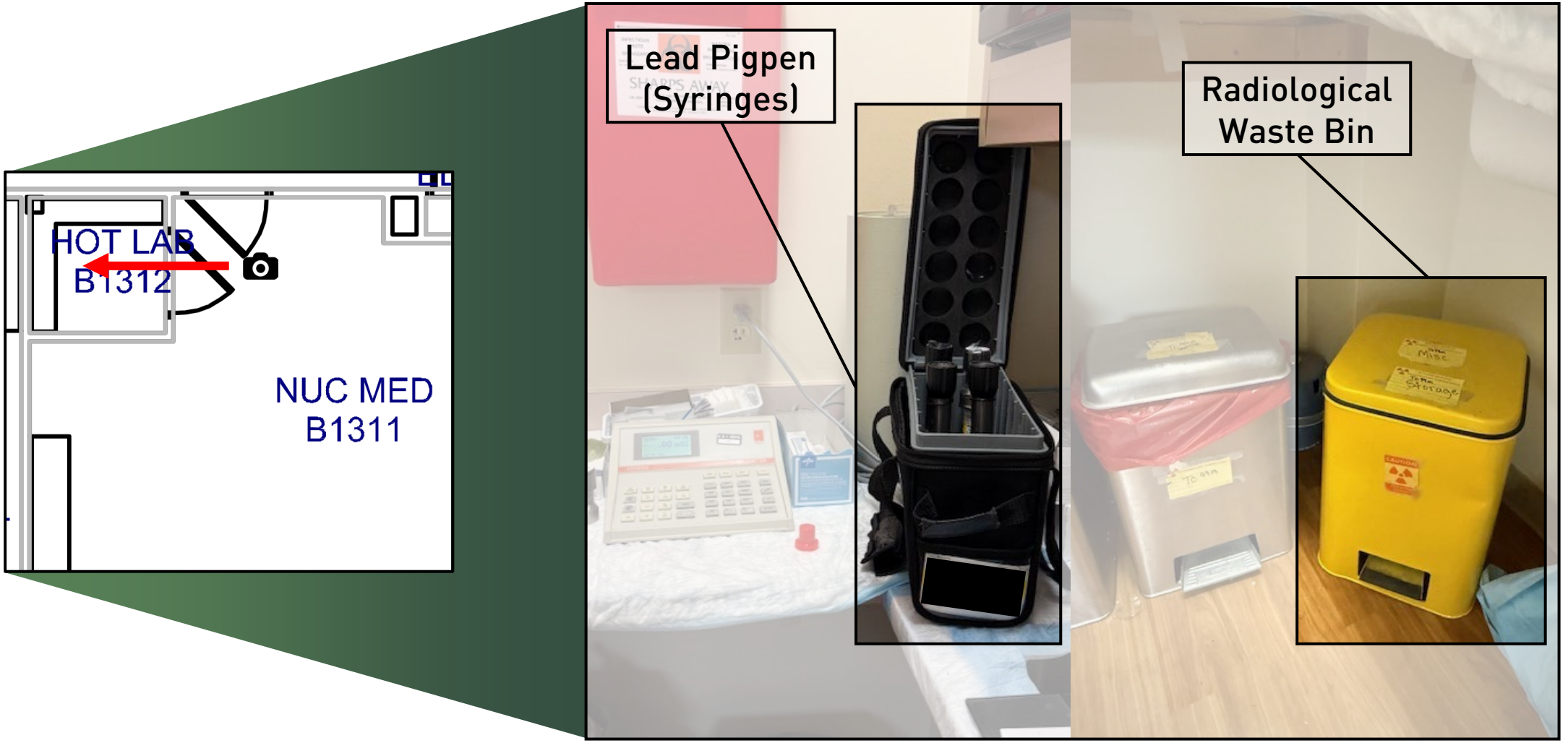


Photo: Margaret Mary Hospital, Nuclear Imaging

BLACK: RCRA PHARMACEUTICALS
BLUE: NON-RCRA PHARMACEUTICALS

- Resource Conservation & Recovery Act (1976)
  - Gives EPA authority to control the movement and classification of wastes
- RCRA vs Non-RCRA Pharmaceuticals
  - RCRA (**Black** bin) — controlled substances
  - Non-RCRA (**Blue** bin) — over-the-counter medications

- **Generated in…**
  - Pharmacy areas, especially compounding rooms
- **Goes to…**
  - Holding room for transport to incinerator

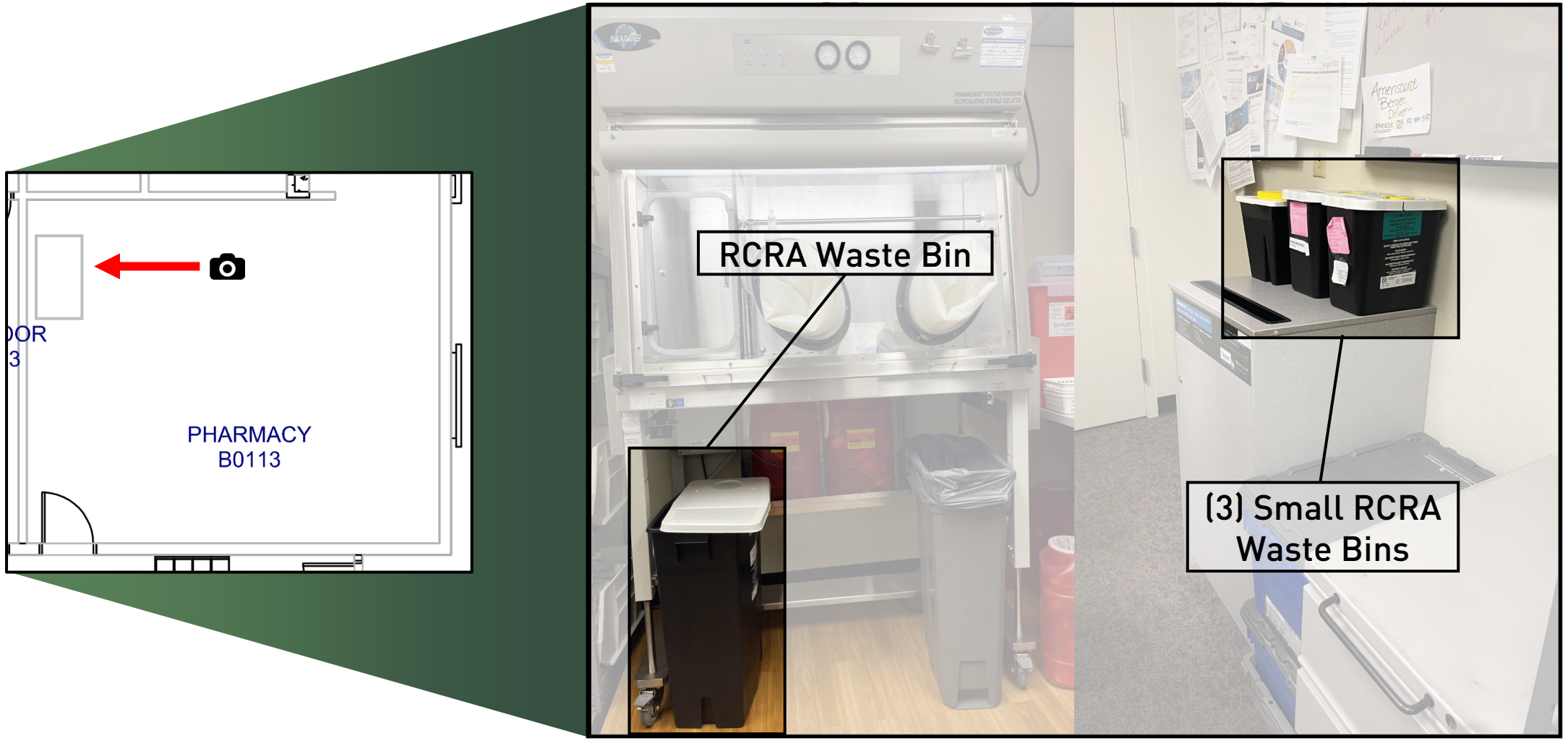
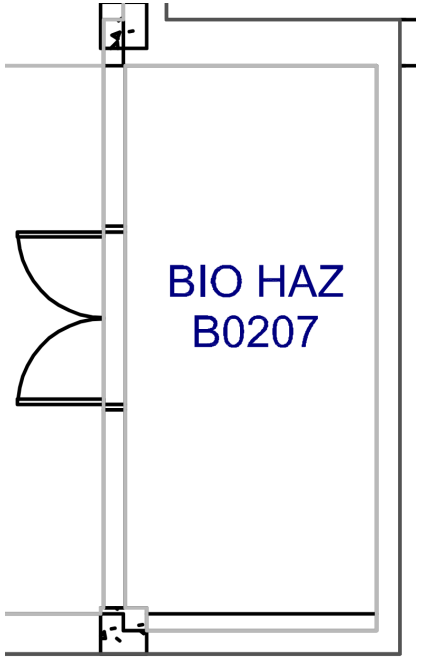
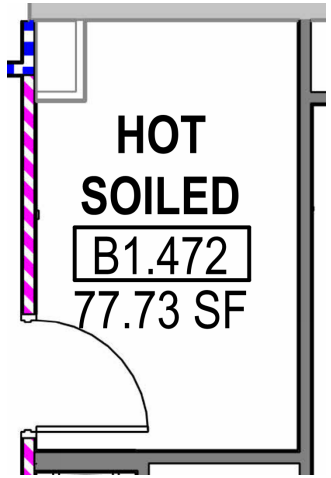


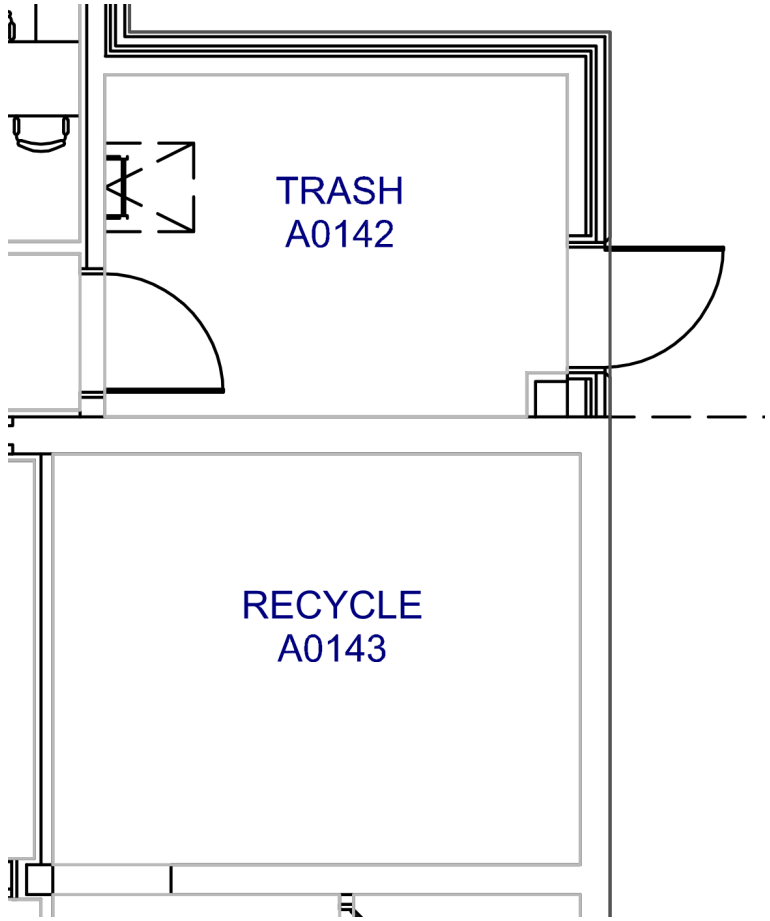
Photo: Margaret Mary Hospital, Pharmacy

WASTE MANAGEMENT ROOM TYPES

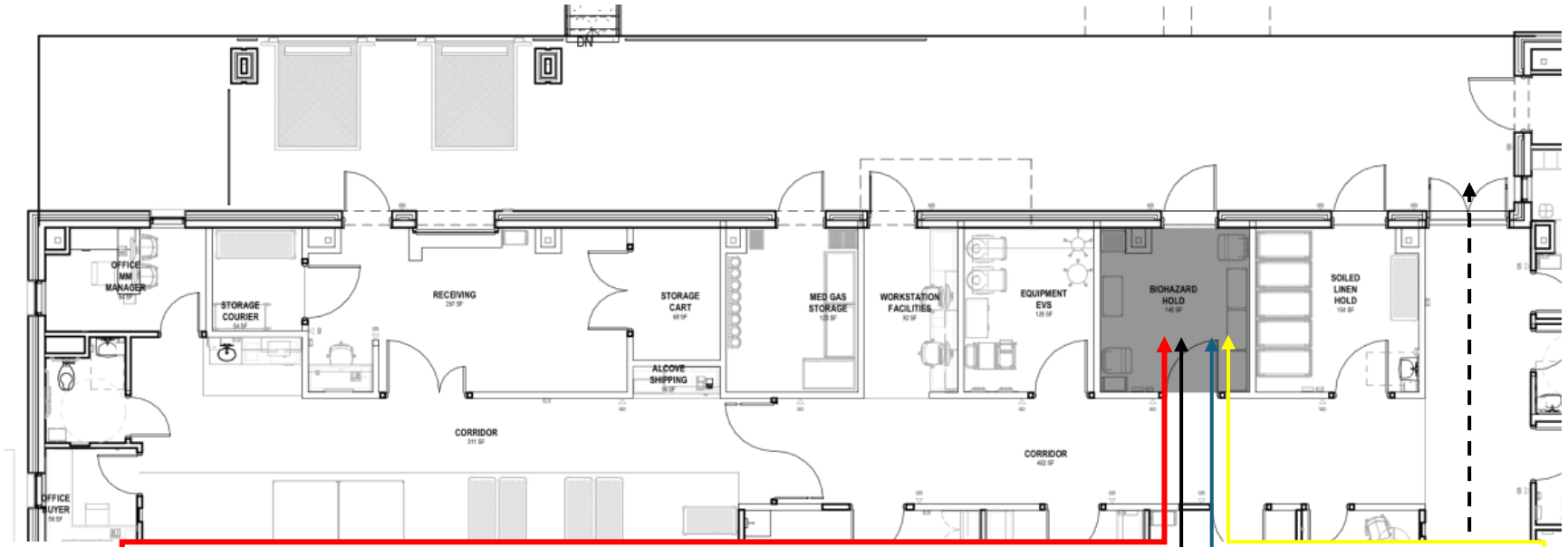
- No explicit SF requirements or ratios provided in FGI
  - Sizing based on categories of waste, projected volumes, methods for handling & disposal, and length of anticipated storage (FGI-H 2022)
  - Talking trash with your health system is <u>required</u>



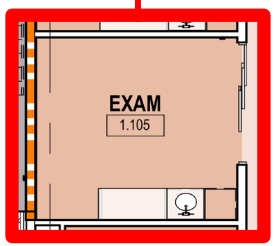


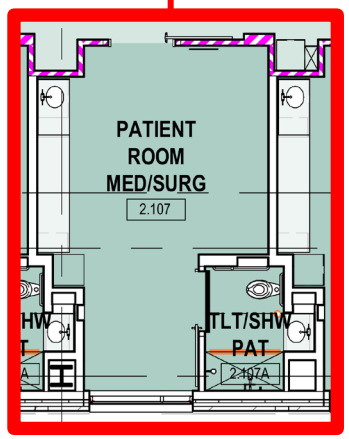


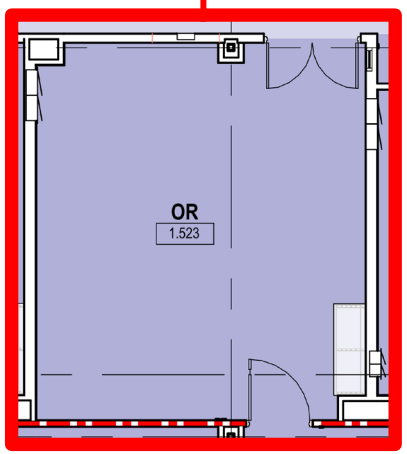
MMH HOSPITAL WASTE STREAMS

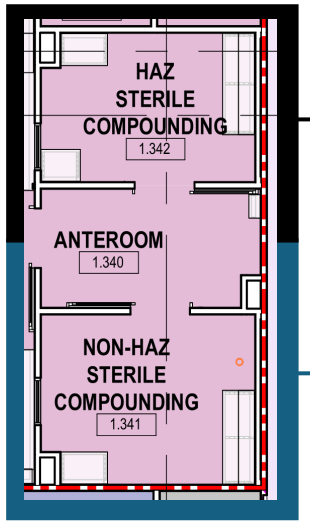


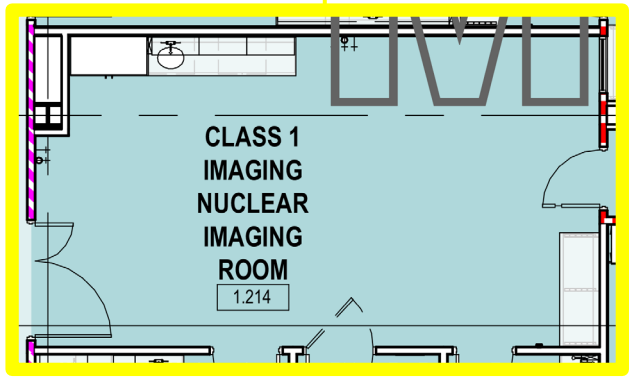
**Trash & Recycling goes directly to dumpsters in loading dock*











MMH HOSPITAL WASTE TREATMENT

MEDICAL WASTE DISPOSAL METHODS

INCINERATION

- Prior to 1997, 90% of RMW
- High energy use, expensive,& environmental emissions

STEAM STERILIZATION

- Most common RMW treatment
- Autoclaving is scalable & more consistent

THERMAL TREATMENT

- Shredded then microwaved
- Not suitable for heavy gauge metal items

CHEMICAL TREATMENT

- Shredded then chemically decontaminated
- First choice for liquid waste
- Disposed of in sewer after

ELECTRO PYROLYSIS

- RMW turned into energy & fuels
- Highly effective for many waste types
- Facility-scale still being studied

Images from Addfield, Pacific Waste Plus, Bertin Medical Waste, UCSD Blink, FEECO

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Methods approved for terminal sterilization of laboratory waste per FGI 2022

Not yet approved per FGI, but may still be used by a health system

Images from Addfield, Pacific Waste Plus, Bertin Medical Waste, UCSD Blink, FEECO

VENTILATION REQUIREMENTS FOR WASTE STORAGE

STANDARD

ANSI/ASHRAE/ASHE Standard 170-2021

(Supersedes ANSI/ASHRAE/ASHE Standard 170-2017)
Includes ANSI/ASHRAE/ASHE addenda listed in Appendix F

Ventilation of Health Care Facilities

ANSI/ASHRAE/ASHE Standard 170-2021

Table 7-1 Design Parameters – Inpatient Spaces

Function of Space (ee)	Pressure Relationship to Adjacent Areas (n)	Minimum Outdoor ach	Minimum Total ach	All Room Air Exhausted Directly to Outdoors (j)	Air Recirculated by Means of Room Units (a)	Unoccupied Turndown	Minimum Filter Efficiencies (cc)	Design Relative Humidity (k), %	Design Temperature (l), °F/°C
Patient Support Facilities									
Bedpan room/soiled workroom (FGI 2.1-2.8.12.2 & 2.1-5.1.3.3)	**Negative**	**NR**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**
Environmental service room (FGI 2.1-2.8.14)	**Negative**	**NR**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**
General Support Facilities: Sterile Processing									
Soiled workroom/decontamination room (FGI 2.1-5.1.2.2[2]) (z)	**Negative**	**2**	**6**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**60-73/16-23**
Other General Support Facilities									
Autopsy room (FGI 2.1-5.7.2.2)	**Negative**	**2**	**12**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**68-75/20-24**
Hazardous material storage (FGI 2.1-5.4.1.1[3])	**Negative**	**2**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**
Linen and refuse chute room (FGI 2.1-5.2.8.1[2]) & 2.1-5.4.1.4)	**Negative**	**NR**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**
Nonrefrigerated body holding room (FGI 2.1-5.7.3) (h)	**Negative**	**NR**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**70-75/21-24**
Regulated waste holding space (FGI 2.1-5.4.1.3)	**Negative**	**NR**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**
Support Areas for Nursing Units and Other Patient Care Areas									
Soiled workroom or soiled holding room (FGI 2.1-2.8.12)	**Negative**	**2**	**10**	**Yes**	**No**	**No**	**MERV-8**	**NR**	**NR**

ASHRAE 170 – ENERGY RECOVERY

Excluded Air Streams with Leakage / Bypass

6.8.3 Energy Recovery Systems with Leakage Potential. If energy recovery systems with leakage potential are used, they shall be arranged to minimize the potential to transfer exhaust air directly back into the supply airstream. Energy recovery systems with leakage potential shall be designed to have no more than 5% of the total supply airstream consisting of exhaust air. Energy recovery systems with leakage potential shall not be used from these exhaust airstream sources: emergency department waiting rooms, triage, emergency department decontamination, radiology waiting rooms, darkroom, bronchoscopy sputum collection and pentamidine administration, laboratory fume hood and other directly ducted laboratory equipment exhaust, waste anesthesia gas disposal, autopsy, nonrefrigerated body holding, endoscope cleaning, central medical and surgical supply soiled or decontamination room, laundry general, hazardous material storage, dialyzer reprocessing room, nuclear medicine hot lab, nuclear medicine treatment room, and any other space identified by the AHJ or the infection control risk assessment (ICRA) team.

Energy Recovery Wheel - Leakage

- Use of an energy recovery wheel eliminates these exhaust sources for energy recovery

Energy Recovery Core – No Leakage

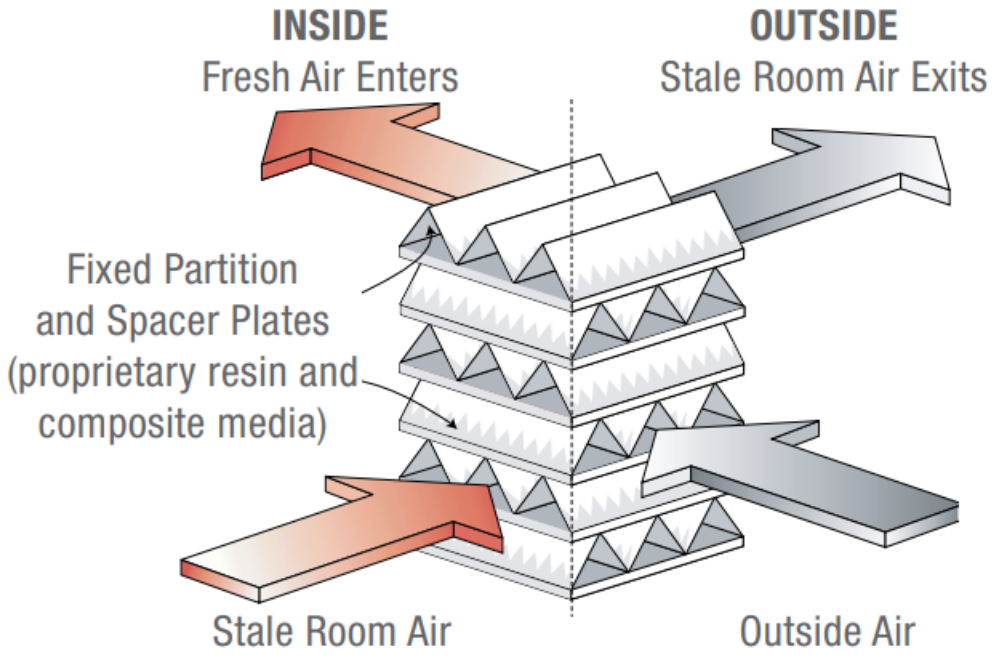
- All room exhaust can be used for energy recovery

ENERGY RECOVERY

Exhaust Airflow – 20 to 25% of Building Total Airflow

– 75 tons of waste heat recovery per 100K SF of Floor Space

AIRSTREAMS DO NOT MIX
& POLLUTANTS ARE NOT TRANSFERRED
ACROSS PARTITION PLATES



SAFETY, RISK & COMPLIANCE

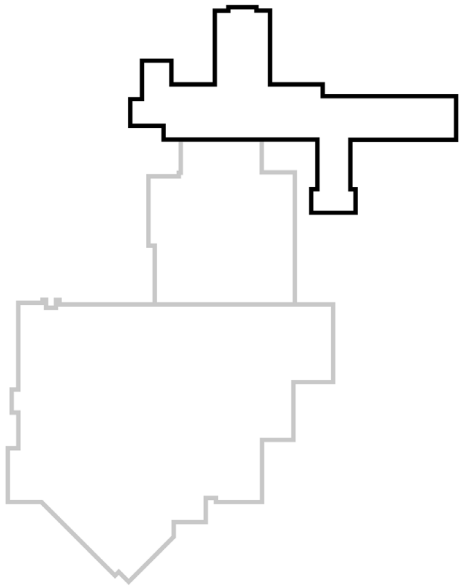
1932.....1971.....RENOVATIONS

- Sub-Level / Tunnel to adjoin the buildings
- Dock resides on opposite side of our facility.
  - Farthest away from patient care areas.

1932 Building

(1) Soiled Workroom

Had to dedicate space in this building for our sleep study rooms



1971 Building

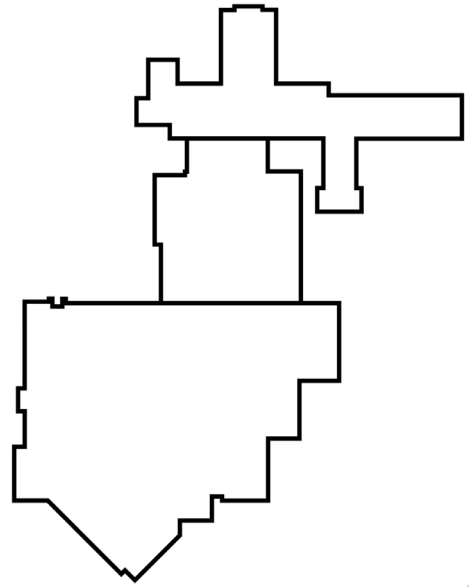
1st Floor

(7) Soiled Work/Hold

2nd Floor

(3) Soiled Work/Hold

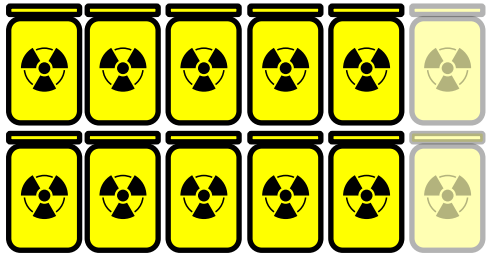
One of these is shared between MS/SCA & OB/L&D



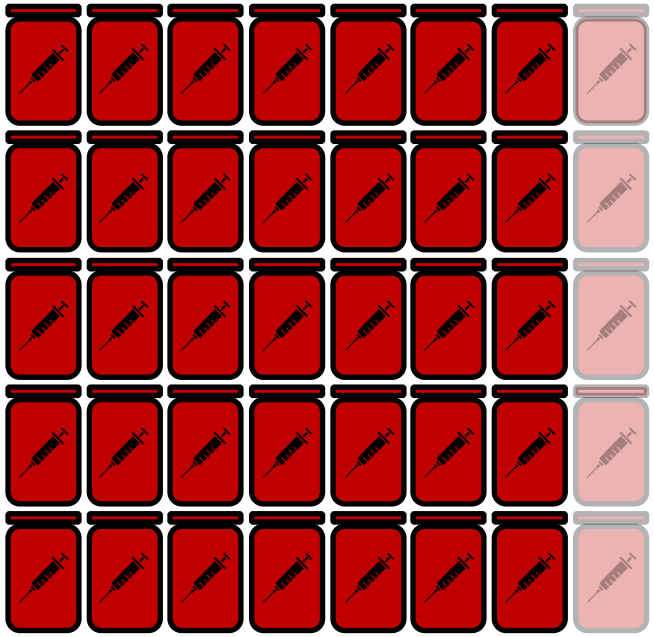
In one week…

Biohazard: 13-15 (32gal)

Chemo: 10-12 (32gal)



Sharps: 35-40 (2gal)



HARDSHIPS/LIMITATIONS

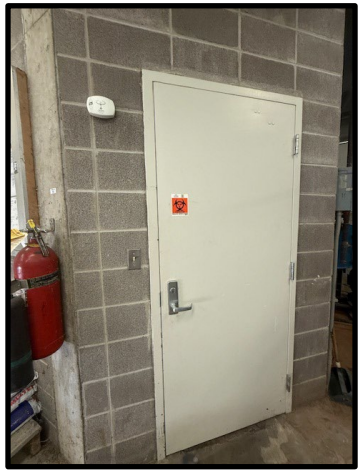
- One Elevator (Staff & Public Use)
  - Transport of Soiled Linens, Biohazard & Sharps containers often occurs in the presence of the public
- Manual pressure checks of soiled and biohazard rooms (operational)
- Long Routes & Small Storage Spaces
  - Challenging to keep safe access/separation/disposal
  - Potential for overflow
  - Where do you store all the clean replacement containers?

From Soiled Workroom

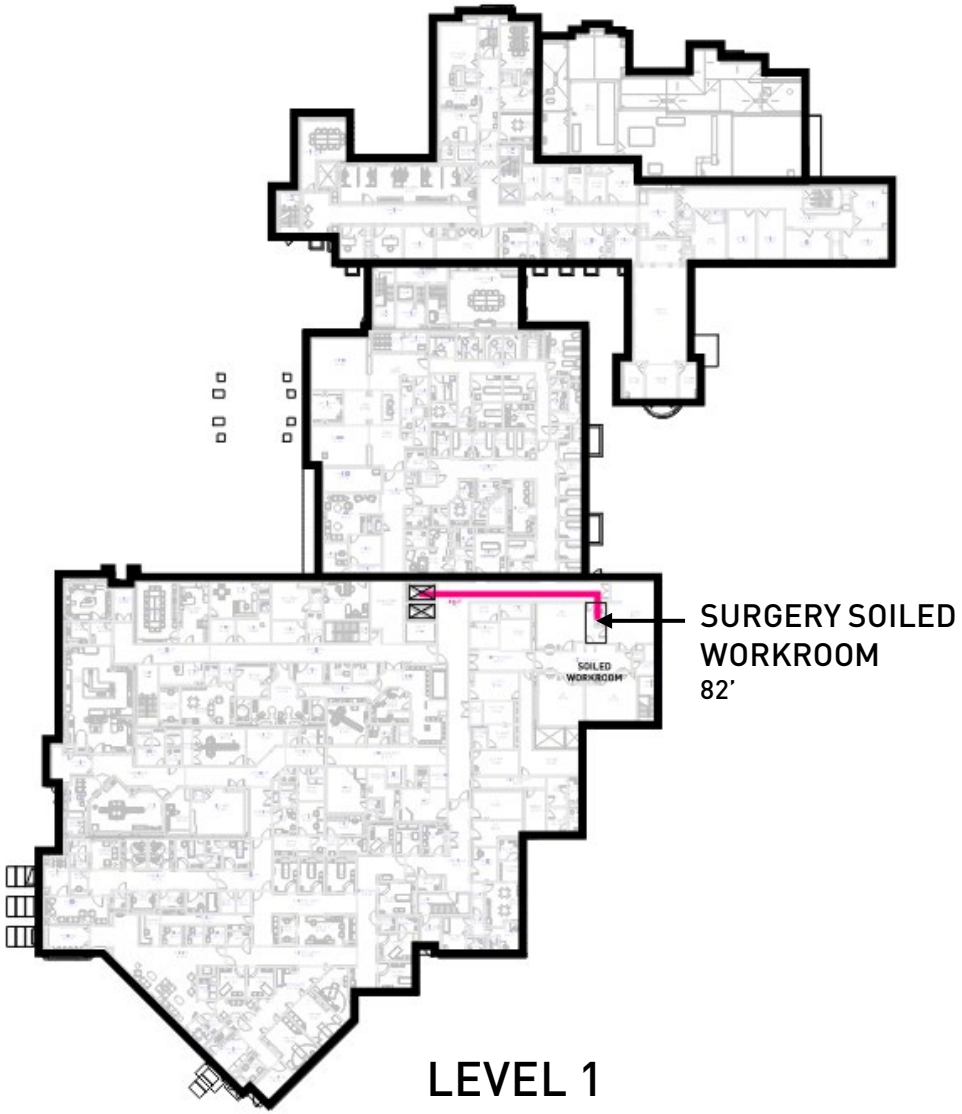
To Tunnel

From Tunnel

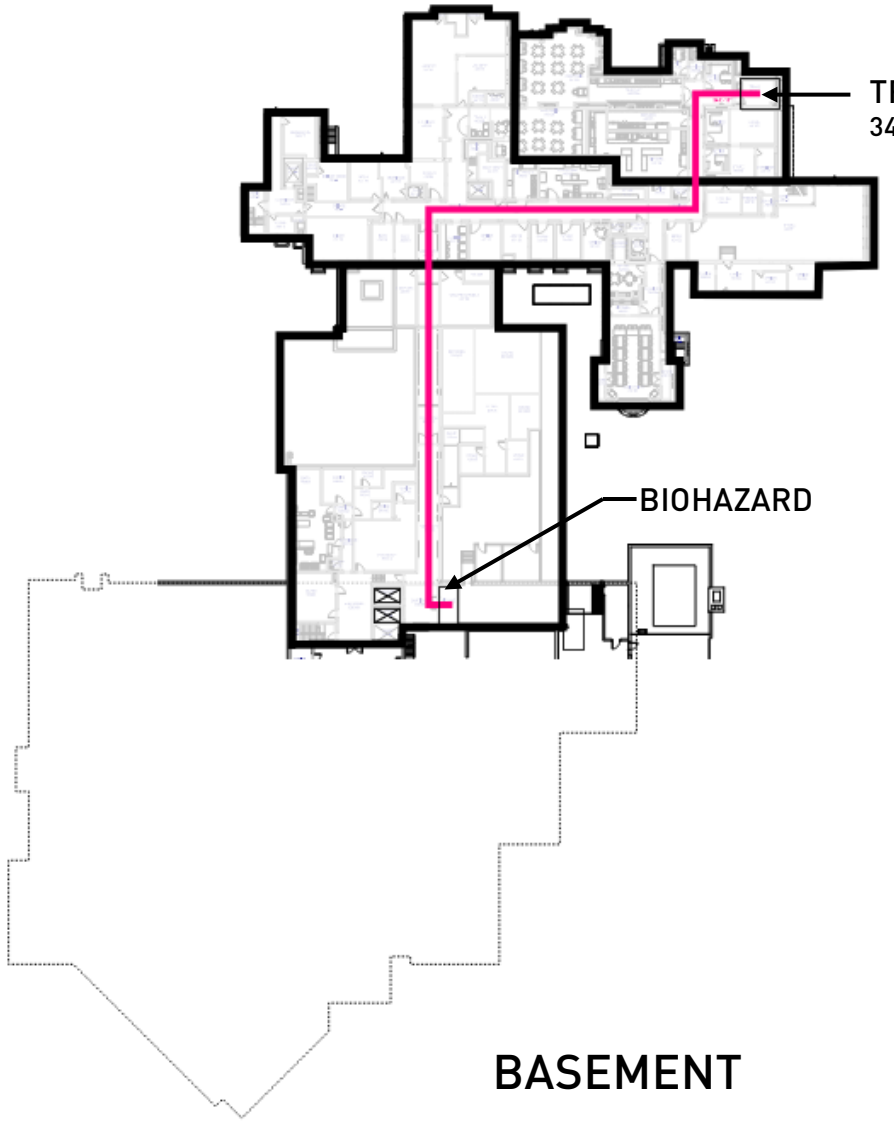
To Waste Pick-up Room



EXISTING FACILITY BIOHAZARD TRAVEL



LEVEL 1



BASEMENT

BIOHAZARD PATH FROM SURGERY TO EXIT

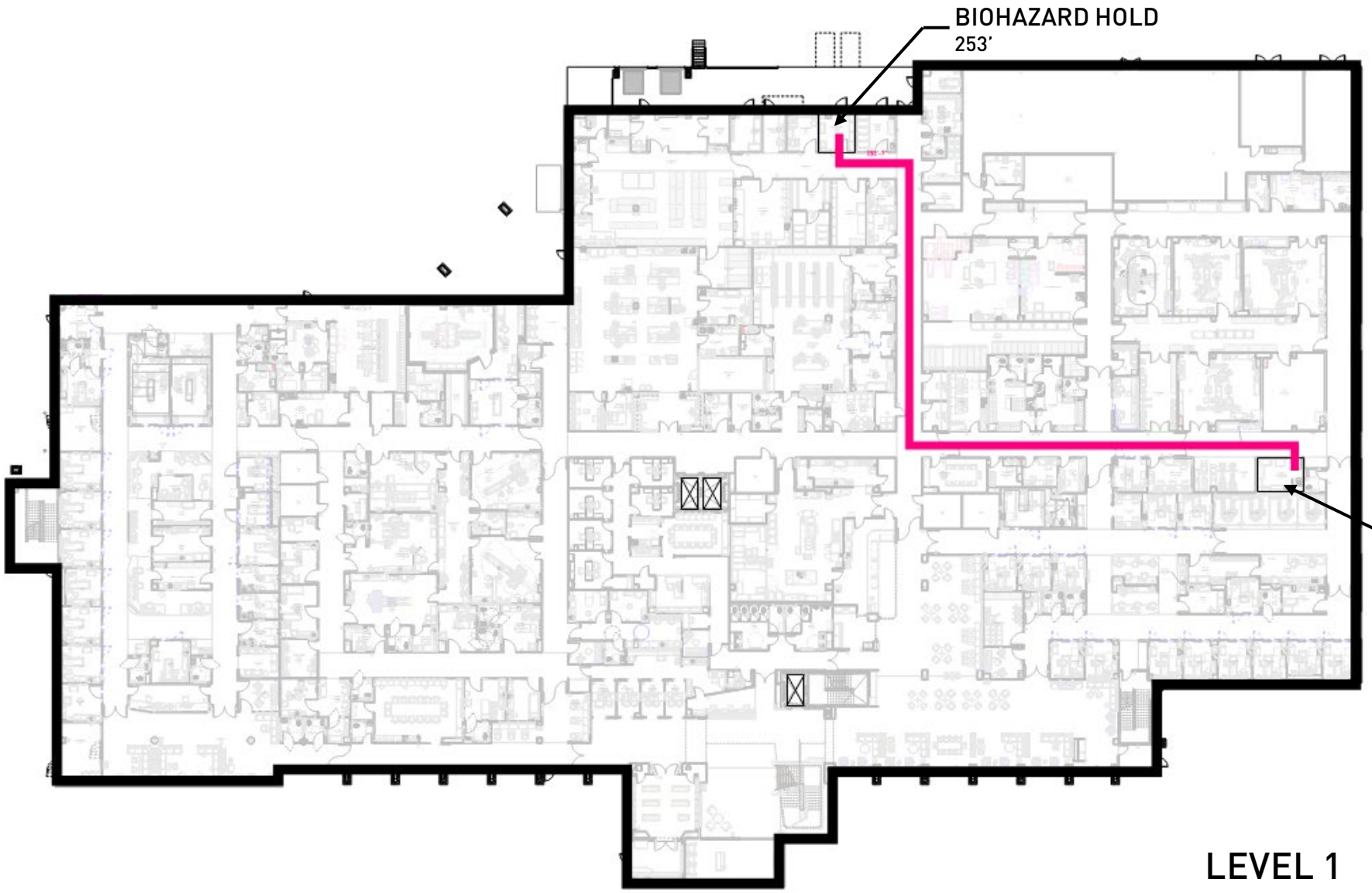
- Level 1 Surgery Soiled Workroom to Elevator = 82'-0"
- Elevator ride to Basement Biohazard Hold
- Biohazard Hold to Trash = 342'-0"
- Total distance traveled = 424'-0" (~1 minute 45 seconds + elevator wait time/travel)

Biohazard waste travels through patient/staff/public elevator and corridors

NEW FACILITY

- Well Planned
  - Placement of Soiled Workrooms and Biohazard room
    - Decreased potential for exposure and injuries
  - Improved work and traffic flow patterns
    - Inclusion of Staff-Only Elevators (Back of House)
    - More direct route to the waste holding rooms and dock
  - Volume-informed storage room sizing
  - Storage room for clean containers

NEW FACILITY BIOHAZARD TRAVEL



BIOHAZARD PATH FROM SURGERY TO EXIT

- Level 1 Surgery Soiled Workroom to Biohazard Hold = 253'-0" (~1 minute of walking)
- Biohazard waste travels through back-of-house corridor
- One trip from soiled workroom directly to biohazard hold
- Waste is picked up by Vendor from exterior door
- 171' less than existing travel distance

*Travel distance cut by **40.3%***

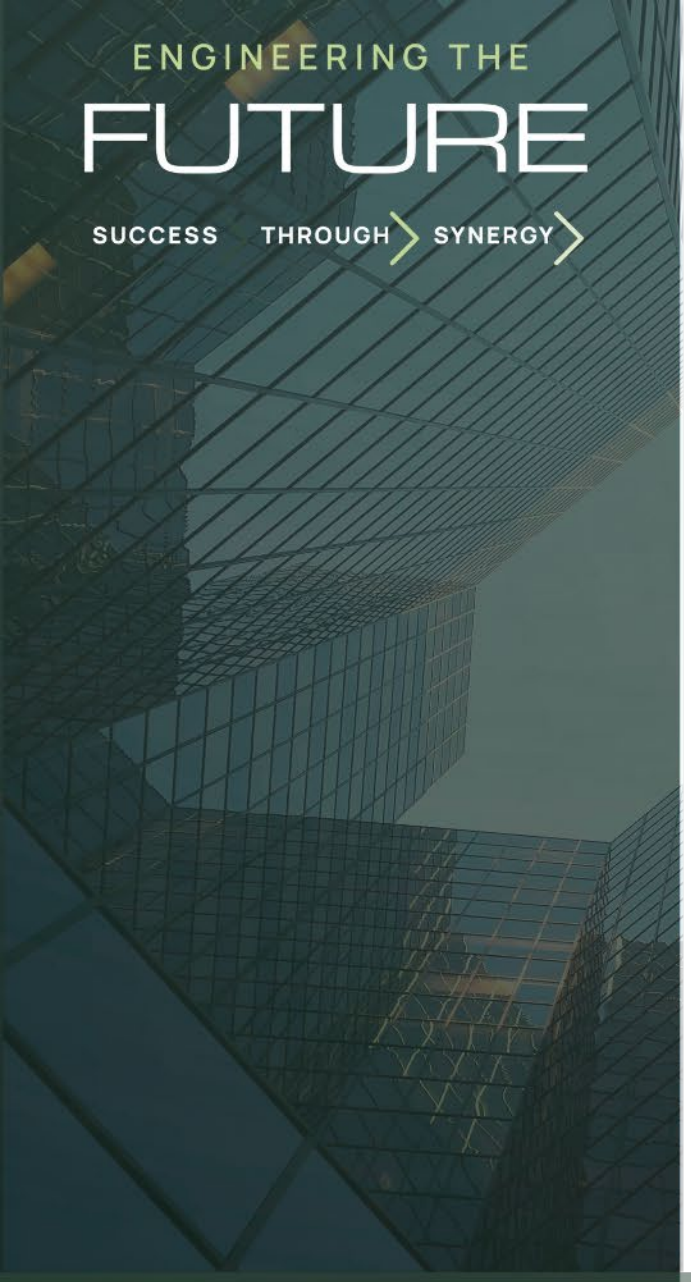
No elevator ride

No public interface

WRAP UP

SUMMARY

"Someone threw away a perfectly good colon."



Q & A

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