Health & Safety of Research Laboratory Development

Public Meeting

June 6, 2024

boston planning & development agency

Agenda

Purpose: Provide information and answer questions about the health and safety of research laboratory development in Boston.

1. Research Lab Development Overview (**Reuben Kantor,** *Boston Planning & Development Agency)*
    - Siting
    - Design Guidelines
    - Market Trends
2. Economic Impact of Life Science Industry (**David Shore,** *MassBio/Environmental Health & Engineering, Inc.*)
3. Lab Safety
    - Public Health (**Paul Shoemaker, PJ McCann,** *Boston Public Health Commission)*
    - Fire Safety Design Requirements (**Christopher Lynch,** *Code Red Consultants)*
    - Boston Fire: Hazardous Materials, Inspections, Response (**Chief Patrick Ellis, Captain Mark Dunnigan, Captain Ryan McGovern,** *Boston Fire Department)*
    - Emergency Medical Response (**Leo Shubitowski,** *Boston EMS)*
    - Worker safety (**Sara Evarts,** *Safety Partners)*
    - Laboratory Safety (**Brandon Linz,** *Triumvirate Environmental)*
4. Q&A

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Where are Labs Located in Boston?

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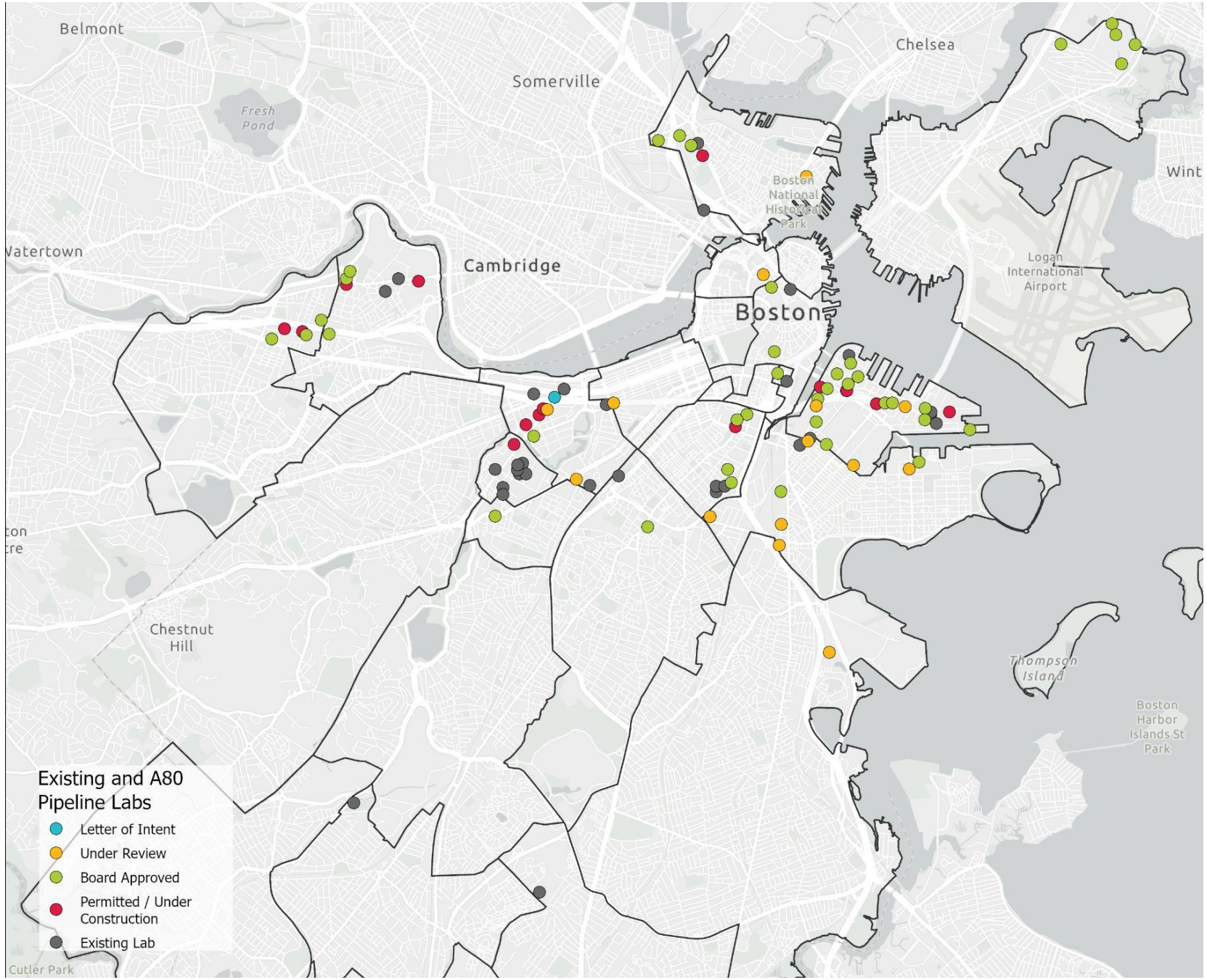
Of the 125 research labs in the BPDA development database:

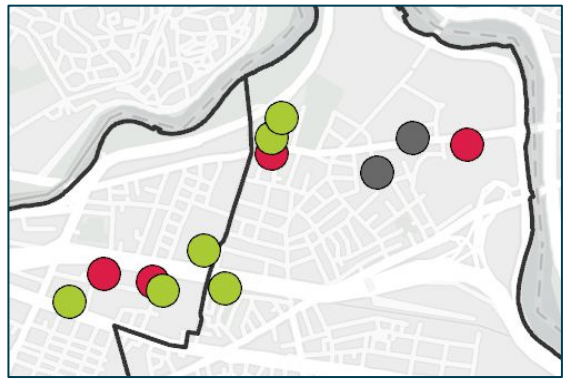
- 19 projects (5.3M SqFt) are in the phase of **letter of intent/under review**
- 51 projects (13.9M) are **Board approved**
- 18 project (5.0M) are **permitted / under construction**



Source: BPDA Development Review Salesforce database, as of April 1, 2024

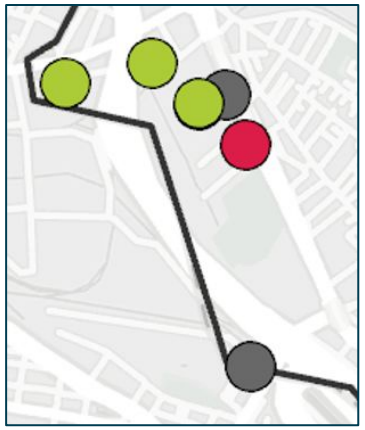
Most labs are concentrated in institutional and jobs centers

Allston/Brighton

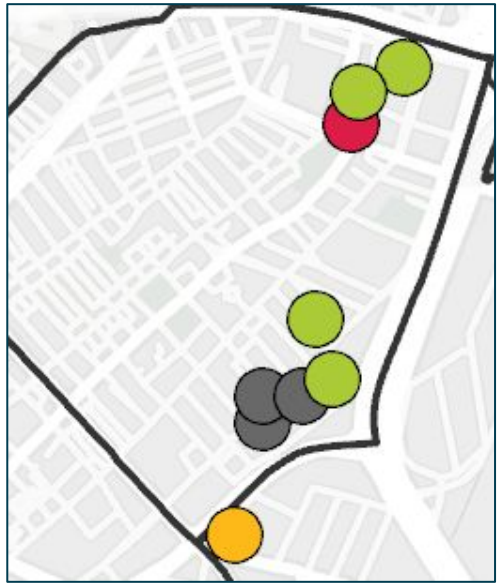


South Boston Waterfront

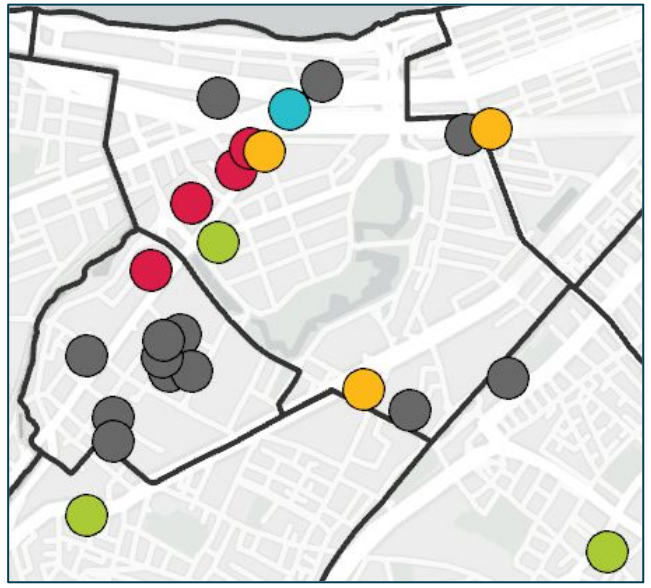
Charlestown



South End



Fenway



- Letter of Intent
- Under Review
- Board Approved
- Permitted / Under Construction
- Existing Lab

Source: BPDA Development Review database, Data pulled 4/2/2024

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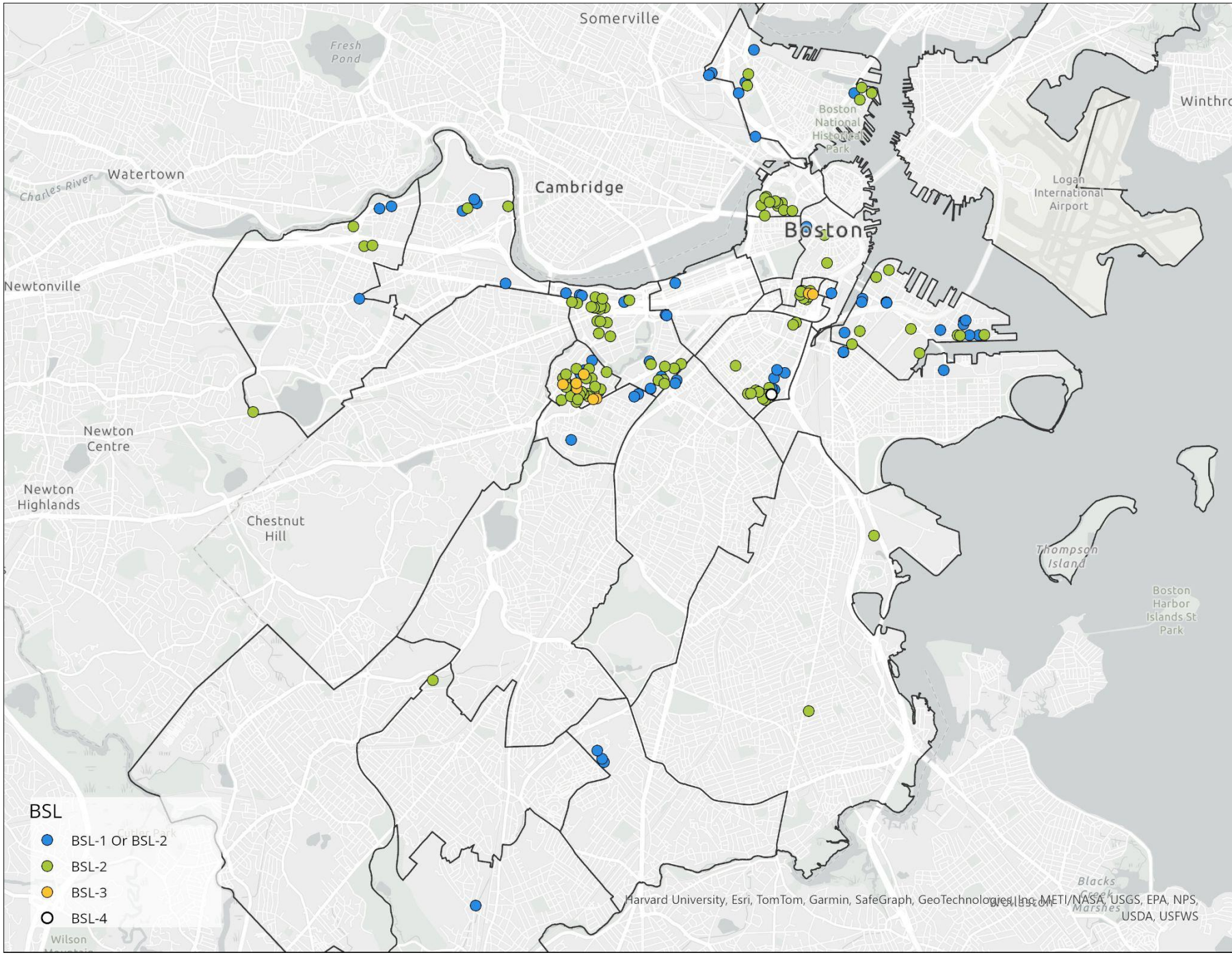
There are 243 existing labs in the City at 168 unique addresses

Of those, seven locations are at BSL-3 and one is a BSL-4, all of which are run by hospitals and universities.



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Source: BPHC, BFD, and BPDA Databases

Design Guidelines?

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What is the purpose of the Design Guidelines?

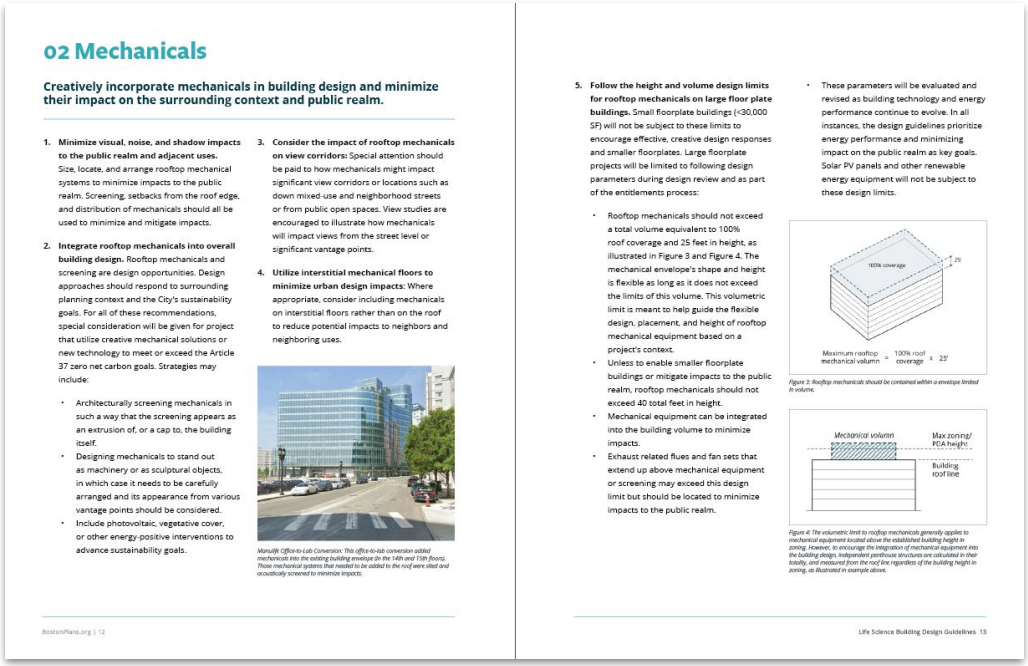
Inform property owners, business owners, developers, and the public about the desired form and character of life science development in the City of Boston.

The BPDA aims to work with developers and the community to help life science development:

- **Achieve a respectful fit** that complements and enhances neighboring buildings and the unique character of each of Boston's neighborhoods.
- **Support flexibility in building design and use**, including allowing future innovations in life science requirements and conversion to non-life science uses in anticipation of market changes in a fast-moving and innovative industry.
- **Contribute to the urban fabric of the City of Boston**, in ways that activate mixed-use and industrial areas and support the growth and preservation of housing, offices, community facilities, neighborhood retail, and new industry.
- **Contribute to citywide planning goals** including resilience, sustainability, and diversity, equity, and inclusion.

How will the Life Science Design Guidelines be used?

- To be used by the BPDA, other City agencies, developers, architects, and community members to **evaluate project design and applications**.
- They provide **guidance on citywide design and performance goals** for lab development.
- **They do not supersede neighborhood plans, existing zoning or regulations.**
- Consistency with these guidelines is also **separate and distinct from other review processes** such as the review process of the Boston Civic Design Commission (BCDC) or Boston Public Improvement Commission (PIC).



02 Mechanicals

Creatively incorporate mechanicals in building design and minimize their impact on the surrounding context and public realm.

1. **Minimize visual, noise, and shadow impacts to the public realm and adjacent uses.** Size, locate, and arrange rooftop mechanical systems to minimize impacts to the public realm. Screening, setbacks from the roof edge, and distribution of mechanicals should all be used to minimize and mitigate impacts.
2. **Integrate rooftop mechanicals into overall building design.** Rooftop mechanicals and screening are design opportunities. Design approaches should respond to surrounding planning context and the City's sustainability goals. For all of these recommendations, special consideration will be given for project that utilize creative mechanical solutions or new technology to meet or exceed the Article 37 zero net carbon goals. Strategies may include:
   - Architecturally screening mechanicals in such a way that the screening appears as an extrusion of, or a cap to, the building itself.
   - Designing mechanicals to stand out as machinery or as sculptural objects, in which case it needs to be carefully arranged and its appearance from various vantage points should be considered.
   - Include photovoltaic, vegetative cover, or other energy-positive interventions to advance sustainability goals.
3. **Consider the impact of rooftop mechanicals on view corridors:** Special attention should be paid to how mechanicals might impact significant view corridors or locations such as down mixed-use and neighborhood streets or from public open spaces. View studies are encouraged to illustrate how mechanicals will impact views from the street level or significant vantage points.
4. **Utilize interstitial mechanical floors to minimize urban design impacts:** Where appropriate, consider including mechanicals on interstitial floors rather than on the roof to reduce potential impacts to neighbors and neighboring uses.

Manulife Office-to-Lab Conversion: This office-to-lab conversion added mechanicals into the existing building envelope (in the 14th and 15th floors). Those mechanical systems that needed to be added to the roof were sited and acoustically screened to minimize impacts.

5. **Follow the height and volume design limits for rooftop mechanicals on large floor plate buildings.** Small floorplate buildings (<30,000 SF) will not be subject to these limits to encourage effective, creative design responses and smaller floorplates. Large floorplate projects will be limited to following design parameters during design review and as part of the entitlements process:
   - Rooftop mechanicals should not exceed a total volume equivalent to 100% roof coverage and 25 feet in height, as illustrated in Figure 3 and Figure 4. The mechanical envelope's shape and height is flexible as long as it does not exceed the limits of this volume. This volumetric limit is meant to help guide the flexible design, placement, and height of rooftop mechanical equipment based on a project's context.
   - Unless to enable smaller floorplate buildings or mitigate impacts to the public realm, rooftop mechanicals should not exceed 40 total feet in height.
   - Mechanical equipment can be integrated into the building volume to minimize impacts.
   - Exhaust related flues and fan sets that extend up above mechanical equipment or screening may exceed this design limit but should be located to minimize impacts to the public realm.
   - These parameters will be evaluated and revised as building technology and energy performance continue to evolve. In all instances, the design guidelines prioritize energy performance and minimizing impact on the public realm as key goals. Solar PV panels and other renewable energy equipment will not be subject to these design limits.

Maximum rooftop mechanical volumn = 100% roof coverage x 25'

Figure 3: Rooftop mechanicals should be contained within a envelope limited in volume.

Mechanical volumn | Max zoning/ PDA height | Building roof line

Figure 4: The volumetric limit to rooftop mechanicals generally applies to mechanical equipment located above the established building height in zoning. However, to encourage the integration of mechanical equipment into the building design, independent penthouse structures are calculated in their totality, and measured from the roof line regardless of the building height in zoning, as illustrated in example above.

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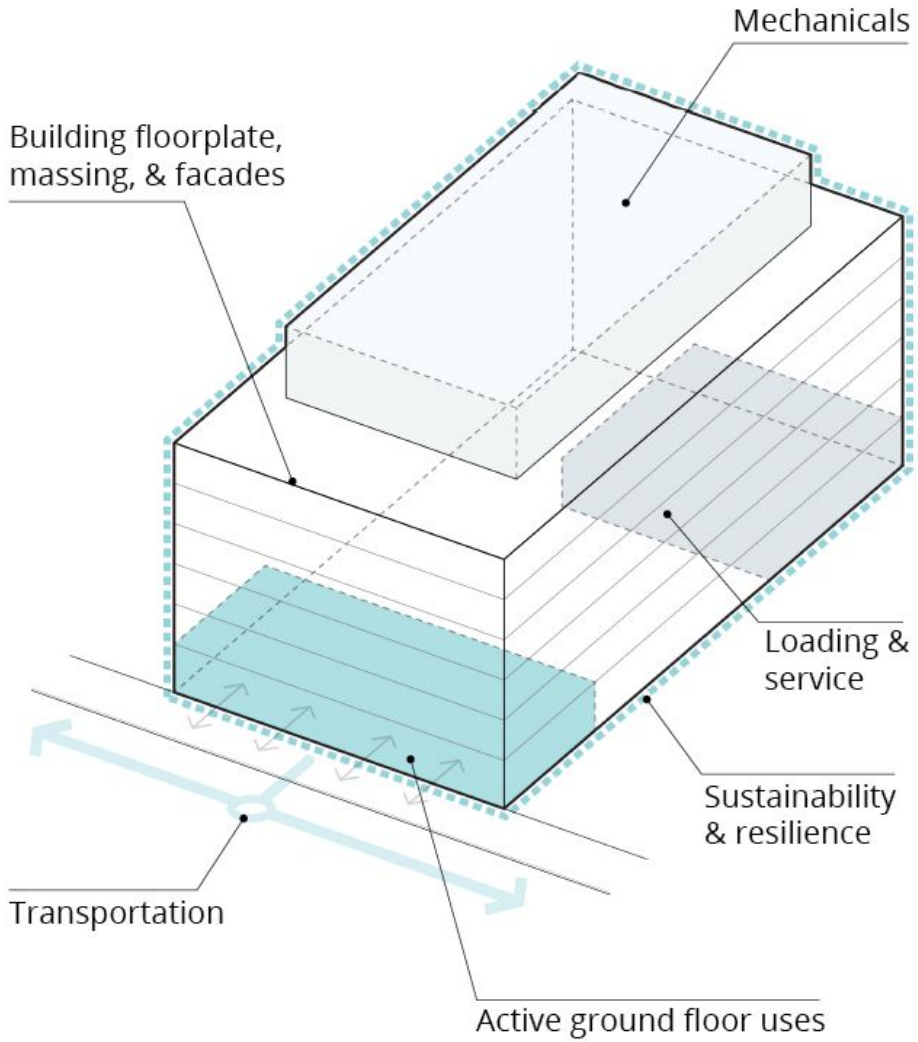
Design Guidelines Focus Areas

The document provides design guidance on:

1. *Building Floorplate, Massing, & Facades*
2. *Mechanicals*
3. *Ground Floor: Active Uses, Loading & Service*
4. *Transportation*
5. *Sustainability & Resilience*

When these elements are considered holistically from the beginning of the design process, future lab buildings can become more flexible, inclusive, resilient, and responsive to the evolving needs of the city.



Our Design Guidelines process to date

We are here

Focus groups with:
- developers
- BSA members

BPDA staff research and draft guidelines

Focus groups with:
- developers
- BSA members

Publish Draft Guidelines
- Approximately 1 year of proposed projects to be designed to guidelines

Assess and Refine Draft Guidelines
- Evaluate results:
  - Respectful Fit
  - Design Flexibility
  - Urban Fabric
  - Planning Goals

Publish Revised Draft Guidelines
- Public & industry review
- Host public meetings
- Adopt the final Design Guidelines

https://www.bostonplans.org/projects/standards/life-sciences-action-agenda

Market Trends

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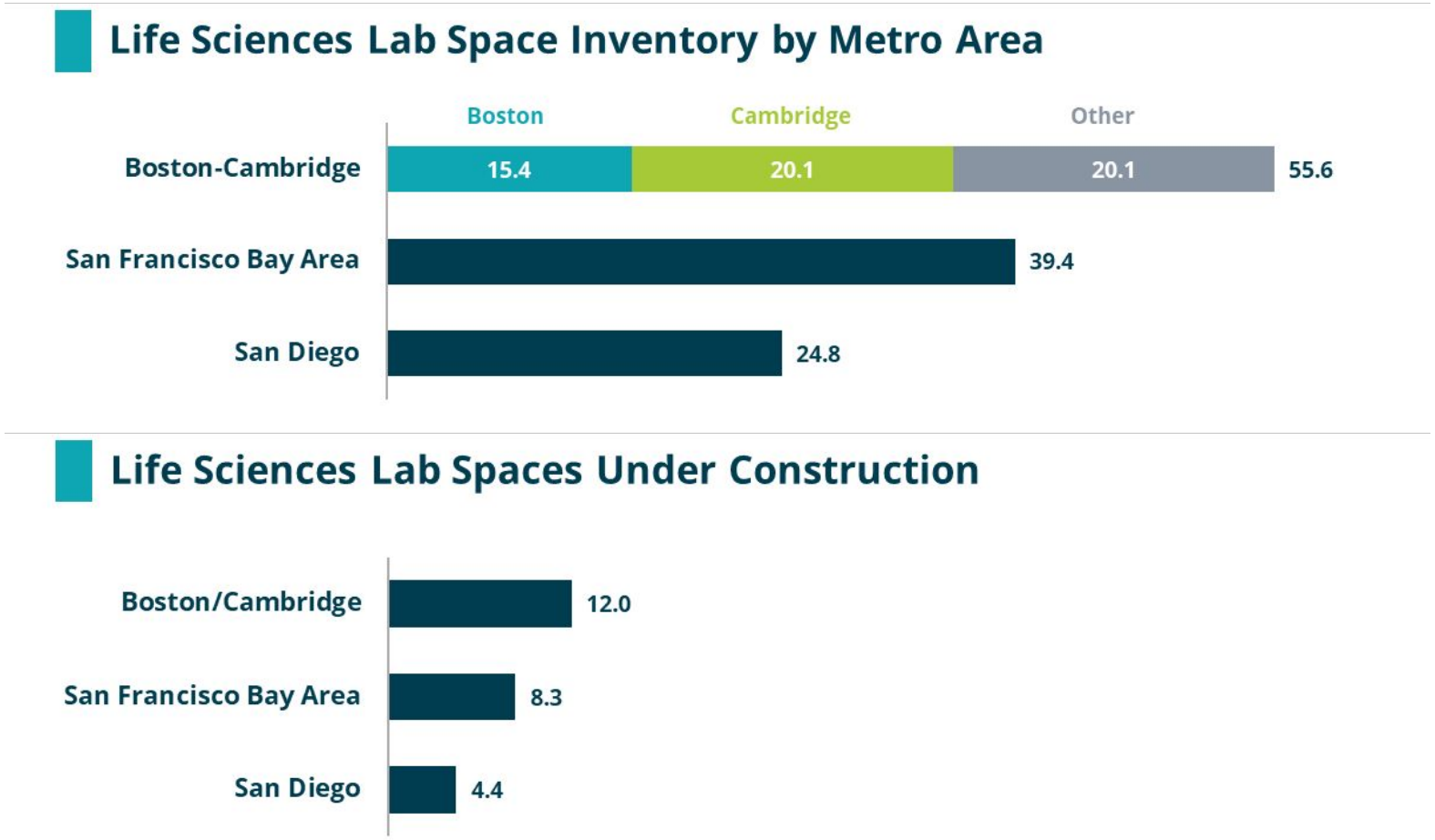
Existing and Under Construction Lab Space

Life sciences lab space in inventory and under construction by metro area, Q4 2023, in millions of square feet

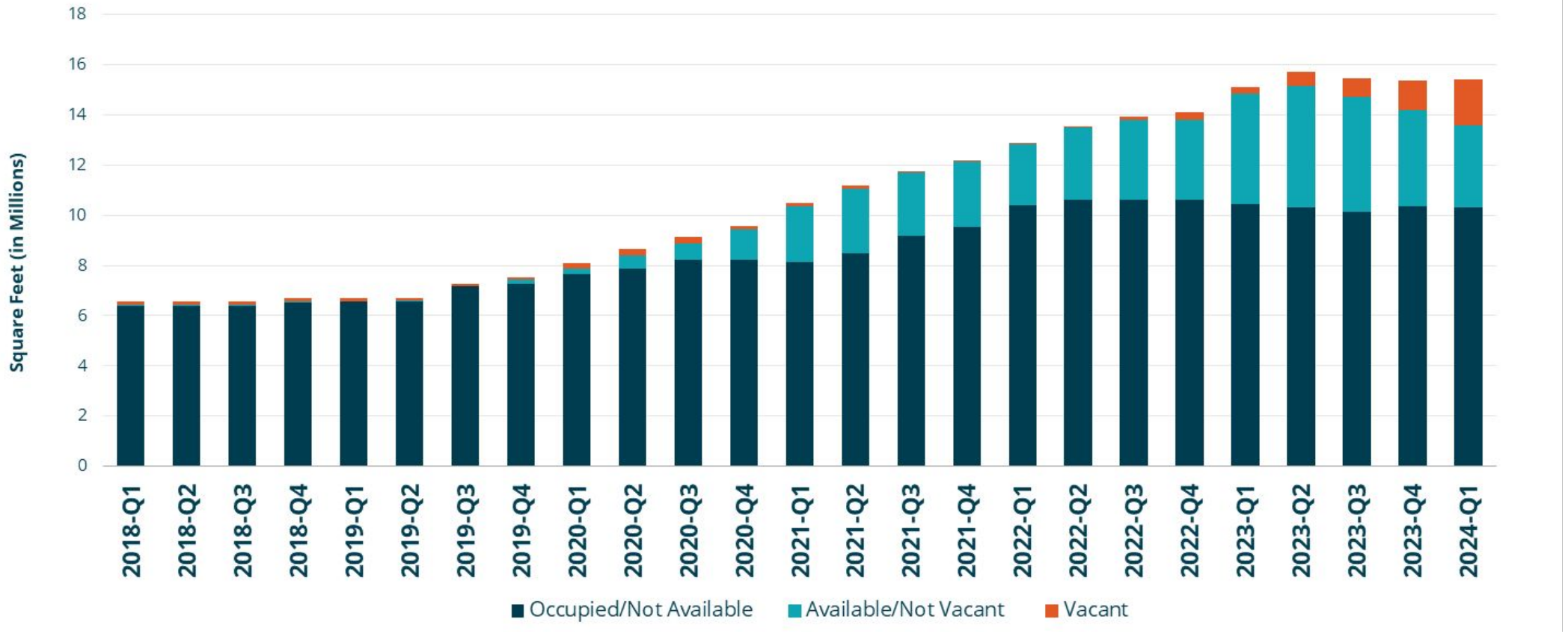


The Boston/Cambridge metro has the most commercial lab space in the country with more coming online.

Source: CBRE, Global Commercial Real Estate Services, Q4 2023, BPDA Research Division Analysis

Total Commercial Lab Inventory in Boston

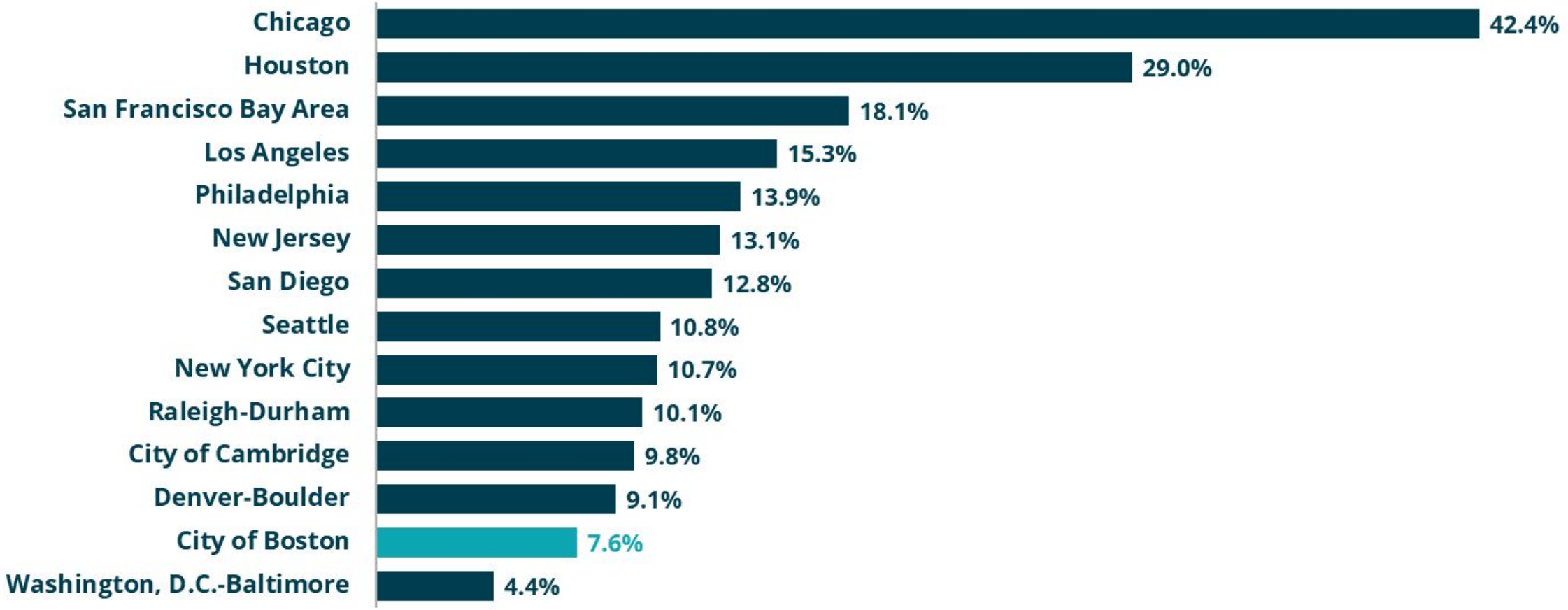
Commercial lab inventory in Boston has increased rapidly over the past 4 years, but about a third is currently available.



Source: CBRE, Global Commercial Real Estate Services, BPDA Research Division Analysis

Life sciences Lab Vacancy Rate by City

Boston lab vacancy rates remain low compared to other parts of the country.



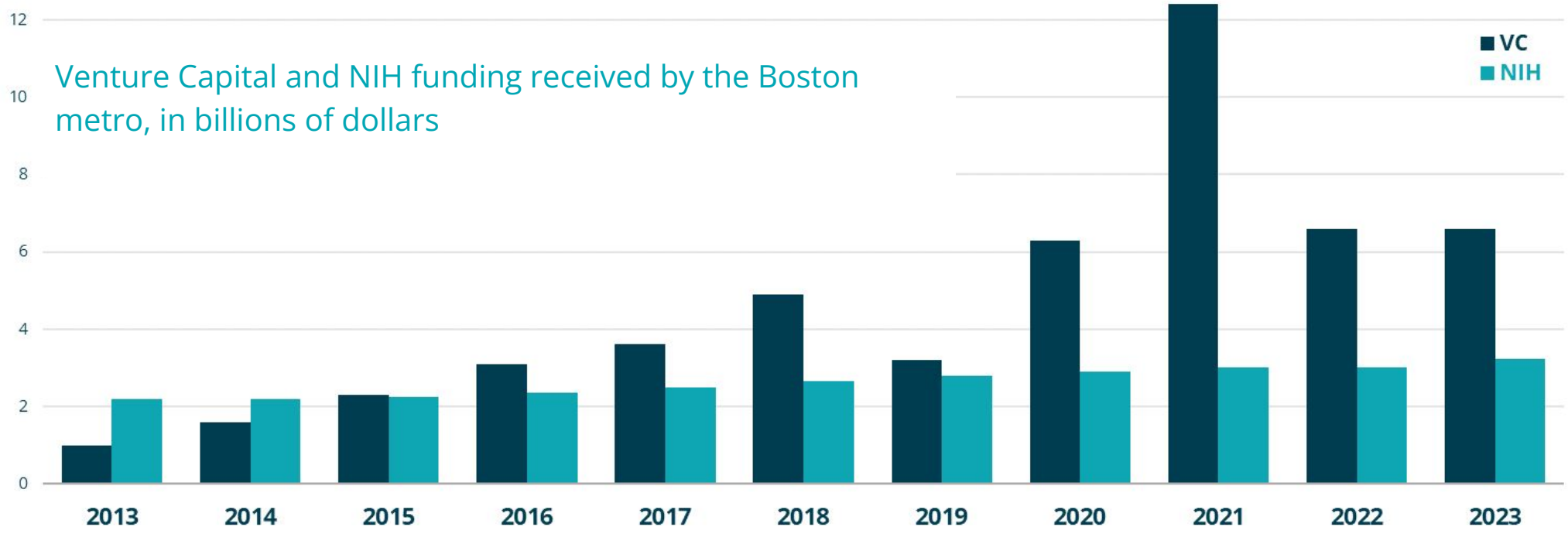
Source: CBRE, Global Commercial Real Estate Services, Q4 2023, BPDA Research Division Analysis

All areas except City of Boston and City of Cambridge are metro areas

Boston Metro: A National Hub for Life Science Investment

Upcoming Major Investments:

- **$500 million private investment** in Cambridge biotechnology firm Arena BioWorks
- The Federal Advanced Research Projects Agency for Health (ARPA-H) selected Cambridge to be a regional hub anchoring its national health innovation network. To date, **$206.6 million in funding** to Boston metro area projects
- Reauthorization of the Commonwealth's Life Sciences Initiative at **$1 billion for 10 years**



Source: CBRE, Global Commercial Real Estate Services, National Institutes of Health, BPDA Research Division Analysis

Economic Impact of Life Science Industry

MassBio/Environmental Health & Engineering

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About MassBio

MassBio's mission is to advance Massachusetts' leadership in the life sciences to grow the industry, add to the healthcare system, and improve patient lives. MassBio represents the premier global life sciences and healthcare hub, with 1,600+ members dedicated to preventing, treating, and curing diseases through transformative science and technology that brings value and hope to patients.

Learn more at massbio.org

MASSBIO

Industry Employment: Biopharma

Economic Impact, 2022

"MassBio's 2023 Snapshot outlines what we have long known to be true — Massachusetts is the global epicenter of the life sciences industry. We are the home of life-changing innovation because we have recognized the unique opportunity to harness the incredible talents and resources that we have here, and back them with real investments. Our administration remains committed to partnering with the industry to support our workforce, expand new opportunities through job training, and continue to inspire innovation."

— **Governor Maura Healey**, Commonwealth of Massachusetts

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

Industry Employment: Biopharma

Massachusetts Biopharma Industry Employment

- In 2022, biopharma employment in Massachusetts grew by 6.9%.
- Since the Massachusetts Life Sciences Initiative was passed in 2008, biopharma employment grew by 110%.

"Sanofi's newest campus, Cambridge Crossing, opened in 2022 where our Massachusetts-based Research & Development (R&D), Medical and the Specialty Care business unit teams, among others, help develop transformative treatments for patients. Grounded by our rich heritage and driven by our patient-focused, science led approach, we are proud of our long-history in Massachusetts and our unwavering commitment to the communities where we live and work across the Commonwealth."

— **Bill Sibold**, Executive Vice President, Head of Global Specialty Care, Sanofi

Year	Number of Employees
2022	113,994
2021	106,679
2020	84,296
2019	79,972
2018	74,256
2017	69,941
2016	67,046
2015	63,967
2014	60,459
2013	57,643
2012	56,461
2011	56,097
2010	55,342
2009	54,829
2008	54,280
2007	51,518
2006	46,117
2005	43,904
2004	41,128
2003	40,449
2002	36,689

Footnote: In response to the changing life sciences industry, MassBio revised the NAICS codes we use to measure total biopharma employment in 2021.

Source: Privately owned companies, U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages (QCEW)

Workforce Update

Bioversity

- Second Bioversity cohort graduated; third cohort goes through June 27th
- Board Meeting held May 8th. Recapping Lessons Learned and adjusting the program as it rolls

Life Sciences Career Alliance

Partnering with YearUp to create an intermediary between training programs and industry.

Goals will include:

- Ensuring alignment between industry needs and training being provided
- Supporting the City of Boston's efforts to bring 1000 residents into the life sciences workforce

Industry Employment: Biopharma

Largest Biopharma Industry Employers in Massachusetts

"Massachusetts is a global leader in the life sciences industry with a thriving ecosystem of innovative companies, world-renowned hospitals and top academic institutions. Takeda is proud to contribute to the continued growth of this important science innovation hub, and we support the state's commitment to fostering a dynamic environment that attracts investment, drives collaboration, builds talent and advances patient care."

— **Julie Kim**, President, U.S. Business Unit and U.S. Country Head, Takeda

Rank	Company	Massachusetts Employees
1	Takeda	6,290
2	Sanofi	4,600
3	Moderna	4,163
4	Vertex	3,400
5	Pfizer	3,012
6	Novartis	2,500
7	Biogen	2,100
8	Bristol Myers Squibb	1,850
9	AbbVie	1,560
10	AstraZeneca/Alexion	1,400
11	Alnylam	1,159
12	Foundation Medicine	1,100
13	Merck	955
14	Sarepta	735
15	Ginkgo Bioworks	726
16	Alkermes	700
17	EMD Serono	618
18	Beam Therapeutics	550
19	GlaxoSmithKline	432
20	Amgen	407

Source: MassBio Membership Reports & Surveys

Boston Public Health Commission

Paul Shoemaker

Director, Environmental and Occupational Health Division

Labs are categorized based on risk

Biosafety Level IV (BSL-IV)	Laboratories working with dangerous and exotic agents that pose a high individual risk of aerosol-transmitted laboratory infections and life-threatening diseases	High-risk and life threatening, like the Ebola Virus
Biosafety Level III (BSL-III)	include clinical, diagnostic, teaching, research or production facilities working with indigenous or exotic agents that may cause serious or potentially lethal diseases as a result of exposure by inhalation	Usually curable/ treatable, but higher risk, like Tuberculosis
Biosafety Level II (BSL-II)	laboratories working with agents of moderate potential hazard to personnel and the environment. Laboratory personnel have specific training in handling pathogenic agents	Curable / treatable, like Lyme or influenza
Biosafety Level I (BSL-I)	laboratories working with well-characterized agents that are not known for causing disease in healthy adult humans and are of minimal potential hazard to laboratory personnel and the environment	"like your kitchen"

BOSTON PUBLIC HEALTH COMMISSION

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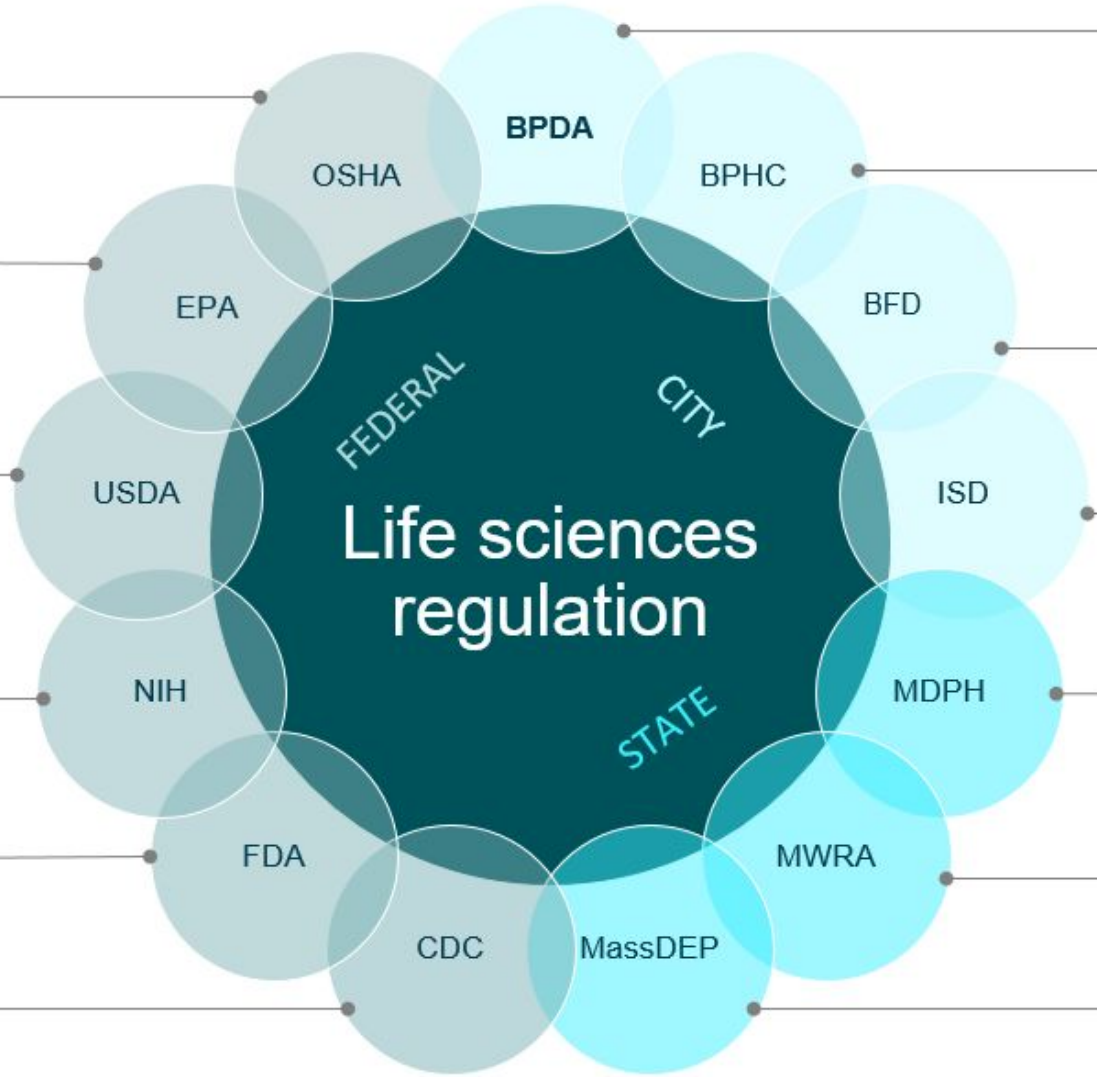
Regulatory Framework



Occupational Safety and Health Administration: Bloodborne Pathogens Standard Exposure Control Plan; Chemical Hygiene Plan; construction side safety

Environmental Protection Agency: Air quality

US Department of Agriculture: Institutional Animal Care and Use Committee ensures safe and human treatment

National Institutes of Health: Guidelines for regulated lab space; incident reporting; Institutional Biosafety Committee

Food and Drug Administration: Pharmaceutical or food-related labs

Centers for Disease Control and Prevention: Registration for use of select agents and toxins; publishes formal Biosafety guidance

Boston Planning & Development Agency: Article 80 review process for development projects

Boston Public Health Commission: Biosafety permitting process; Boston Biosafety Committee

Boston Fire Department: Laboratory registration; flammable, corrosive storage and generator permits; annual inspections

Inspectional Services Department: reviews building plans; Certificate of occupancy; construction site safety inspection

MA Dept of Public Health: Bureau of Infectious Disease and Laboratory Sciences

MA Water Resources Authority: Discharges into sewer system

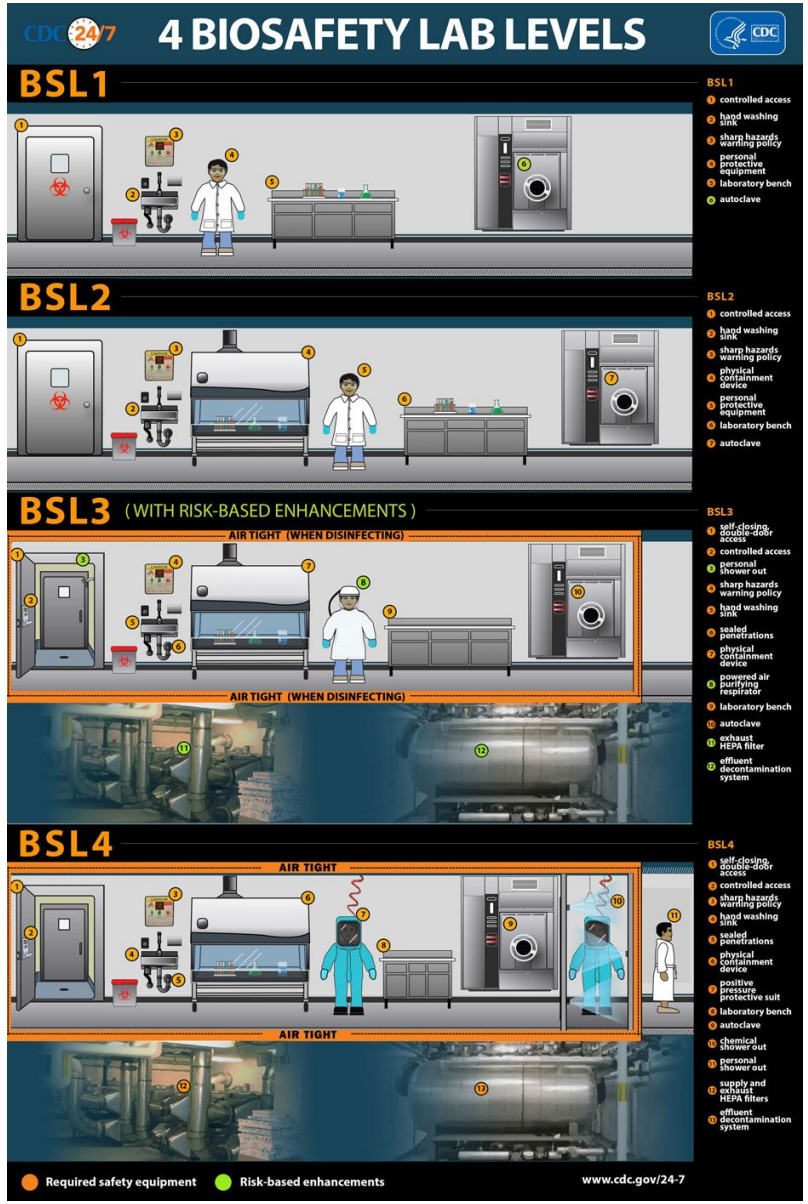
MA Department of Environmental Protection: Wastewater and air emissions

Public Health Laboratory Regulation and Oversight

BPHC Regulations:
- Biological Laboratory Regulation (rDNA BSL-2, BSL-3, BSL-4)

Inspections:
- New permit applications, amendments
- Compliance, announced and unannounced
- Incident investigation

Reporting:
- Illness or disease (confirmed or suspected) caused by high-risk agent/attenuated strain
- Unexplained absenteeism from workplace
- Spill or accidental release (rDNA materials or high-risk agents)
- Personnel exposure or potential exposure
- Failure of major mechanical system (e.g., HVAC)
- Any incidents reportable to NIH or CDC



Advisory and Coordinating Bodies

Boston Biosafety Committee (BBC)

- Created by Biosafety Regulation, appointed by BPHC Commissioner, provides technical assistance and advice to BPHC on permits, research protocols, modifications, and other regulatory issues
- Includes:
  - Research scientists
  - Biosafety officers
  - Infectious disease experts
  - Occupational health doctors
  - Boston community residents

Boston Biosafety Working Group (BSWG)

- Coordinating group of City agencies involved with lab regulation and emergency response
- Includes:
  - BPHC Biosafety Program
  - BPHC Office of Public Health Preparedness
  - Boston EMS
  - Boston Fire Department
  - Boston Police Department
  - Mayor's Office of Emergency Management
  - Federal Bureau of Investigation
  - Leadership of BSL-3 and BSL-4 labs

Code Red Consultants

Design Requirements for Fire Safety

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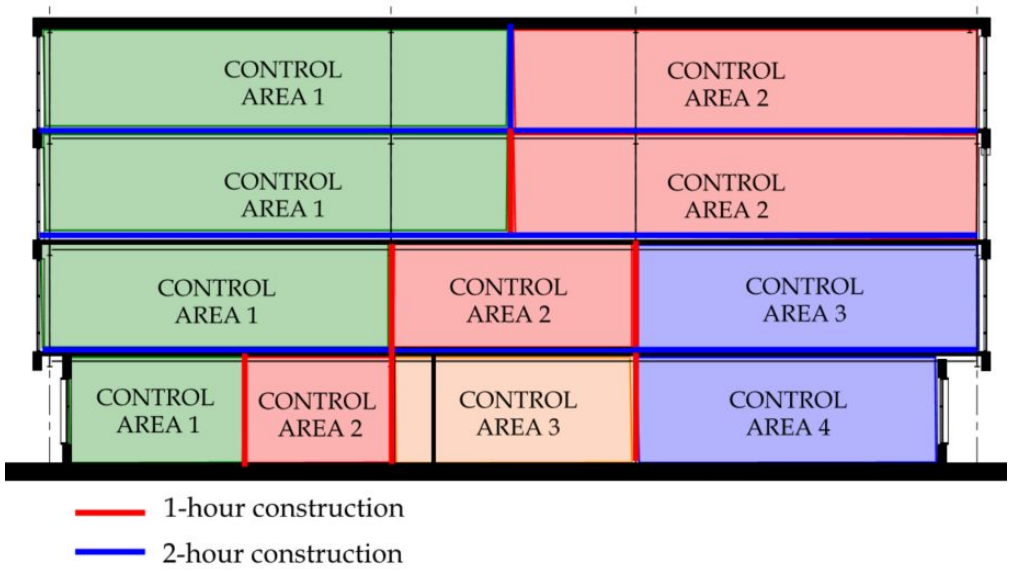
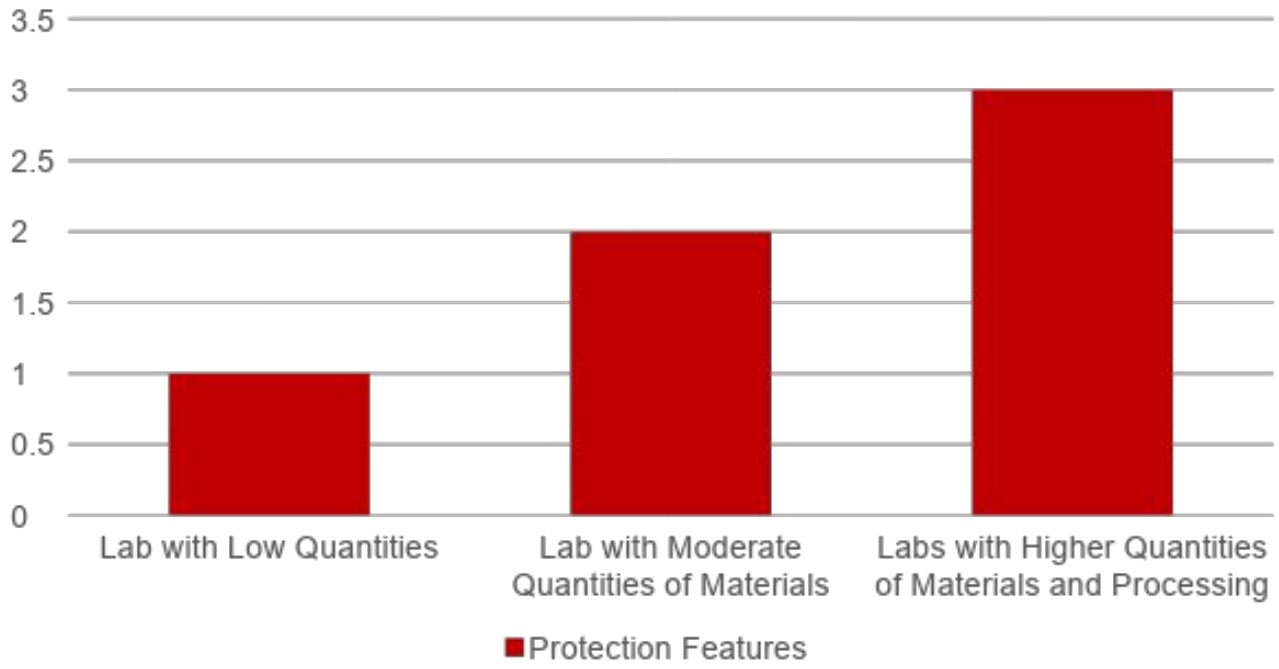
Laboratory Base Building Key Design Requirements for Safety

1. The Building Structure is generally of Fire-Proofed Steel and Concrete
2. Building is divided into fire areas by floors and walls designed to slow movement of fire
   - Chemical restrictions on amount per fire area
3. Automatic sprinkler design is more robust and designed to control fire from lab hazards
4. HVAC systems designed specifically for lab hazards
5. Required Protection Features increase as hazards increase



Building Fire Protection Features Relate to Risk of Hazards

- Protection design is based on the type of chemical hazards, the quantity of the chemicals present, and the nature of the use of chemicals
- Code Requires a “belts and suspenders” approach for redundancy as risks increase



Boston Fire Department

Laboratory Safety Unit
Fire Prevention

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BFD LABORATORY SAFETY UNIT

Fire Marshal Deputy Chief Patrick Ellis
Asst. Marshal District Chief Joe Walsh
Fire Captain Mark Dunnigan
Fire Chemist John Drugan
Fire Lieutenant Michael Kates
Fire Inspector Alston Allen

BOSTON FIRE DEPARTMENT'S CORE MISSION

The Boston Fire Department is a dedicated group of professionals united in our mission to serve the community by protecting life, property, and the environment.

Our ability to protect the community is accomplished through our relentless efforts in fire prevention, education, and training which yields top-tier emergency, medical, and firefighting services.

BOSTON FIRE LAB SAFETY UNIT

" An ounce of Prevention is worth a pound of cure" (Benjamin Franklin).

- Lab Inspectors are trained Fire Prevention Officers & certified Hazardous Material Technician/Specialists.
- Lab Unit is tasked to enforce the fire code in order to prevent and minimize fires or explosions in laboratory-scale operations involve hazardous materials.

  - *In 1990s, the position of Laboratory Safety Officer was created within the Boston Fire Department.*

  - *In 2021, The BFD began making significant efforts to create the Laboratory Safety Unit in response to the rapid growth in Boston's the life science industry to further support fire prevention efforts.*

LABORATORY SAFETY OFFICER

PRIMARY DUTIES - Per City Municipal Code 11-5c

- Responsible for conducting programmatic inspections.
- Inspections may entail comprehensive physical inspections of laboratories and/or laboratory facilities.
- Alternatively, inspections may focus solely on assessing compliance with registration requirements & emergency preparedness.
- Ensures vital information is readily accessible to first responders & Hazard Warning Signage is posted & accurate.

ADDITIONAL DUTIES - LAB SAFETY UNIT

WHAT ELSE THE LAB UNIT DOES !

- Conducts Plan Reviews - New Permit Submissions
- Inspects New & Existing Laboratories.
- Inspects Facilities That Process Hazardous Materials (PSM).
- Supervise HazMat Disposal/Removals - High Hazards
- Provide Education on Lab Safety & Fire Safety
- Assist in Hazard Control & Risk Reduction
- Post Lab Incident/Accident Investigations

BFD LAB PERMITTING & REGISTRATION PROCESS

WHAT IS REVIEWED DURING PERMITTING PROCESS ?

- Review process ultimately determines if permit request is within code limits & if the laboratories built environment & safeguards satisfy the code requirements.

- Fire Marshal may require additional safeguards.

Laboratory Inspection Process - New Lab Permits

Inspection Process: Two Part Inspection

Inspection 1: Lab Safety Inspection

Labs Built Environment - Safeguards/Devices - Signage
Emergency Response Data

Passing this inspection enables the laboratory to begin to store & use hazardous materials within the permit limits.

Inspection 2: Operations Inspection

Proper Storage & Use of Hazardous Materials - Safe Lab Practices

BOSTON FIRE DEPARTMENT

SPECIAL OPERATIONS COMMAND HAZMAT

BFD Soc-Hazmat Capabilities

- **5 Hazmat Technician Companies**
  - Stationed throughout The City
- **10 Decontamination Companies**
  - Stationed to respond citywide, as well as to strategic hospitals
- **Special Operations Command**
  - 6 Specialists
  - Chain of command
  - Training & Equipment

Response Levels

- **Level 0**
  - Petroleum spills less than 10 gallons
- **Level 1**
  - Petroleum spills between 10- 50 gallons
  - CO levels above 100 PPM
  - Transformer leaks with PCBs
- **Level 2**
  - Petroleum spills above 50 gallons
  - Unknown chemical leaks or releases
- **Level 3**
  - Confirmed chemical spill requiring use of Chemical Protective Equipment
  - Chlorine or Anhydrous Ammonia

Boston EMS

Len Shubitowski
Superintendent for Operations
Boston Emergency Medical Services

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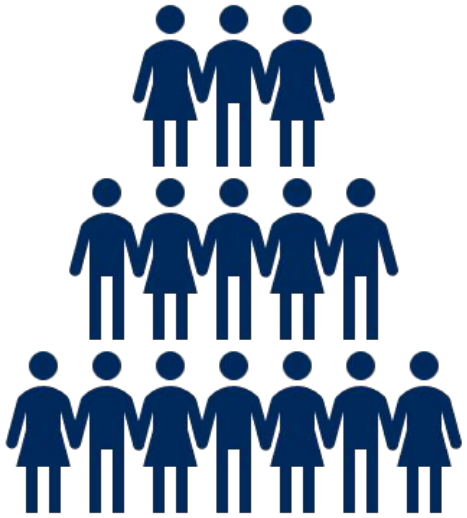
2023 Overview Boston EMS By The Number



428

Uniformed Personnel

21

BLS Ambulances

5

ALS Ambulances

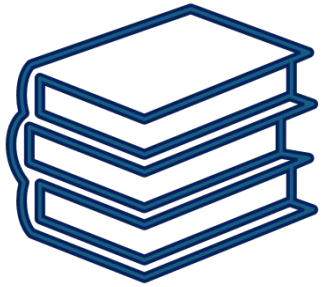
138,424

Clinical Incidents

91,369

Transports

Emergency Preparedness & Training



Advanced education and training in the Boston EMS Training Academy

Coordination and response planning in conjunction with BPHC and Boston Fire

Biosafety network and regular meetings

Laboratory Safety Overview: Safety Partners

Sara Evarts, CIH

sevarts@safetypartnersinc.com
Associate Director, Industrial Hygiene
Safety Partners, Inc.

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SAFETY PARTNERS

Hands-on Workplace Safety

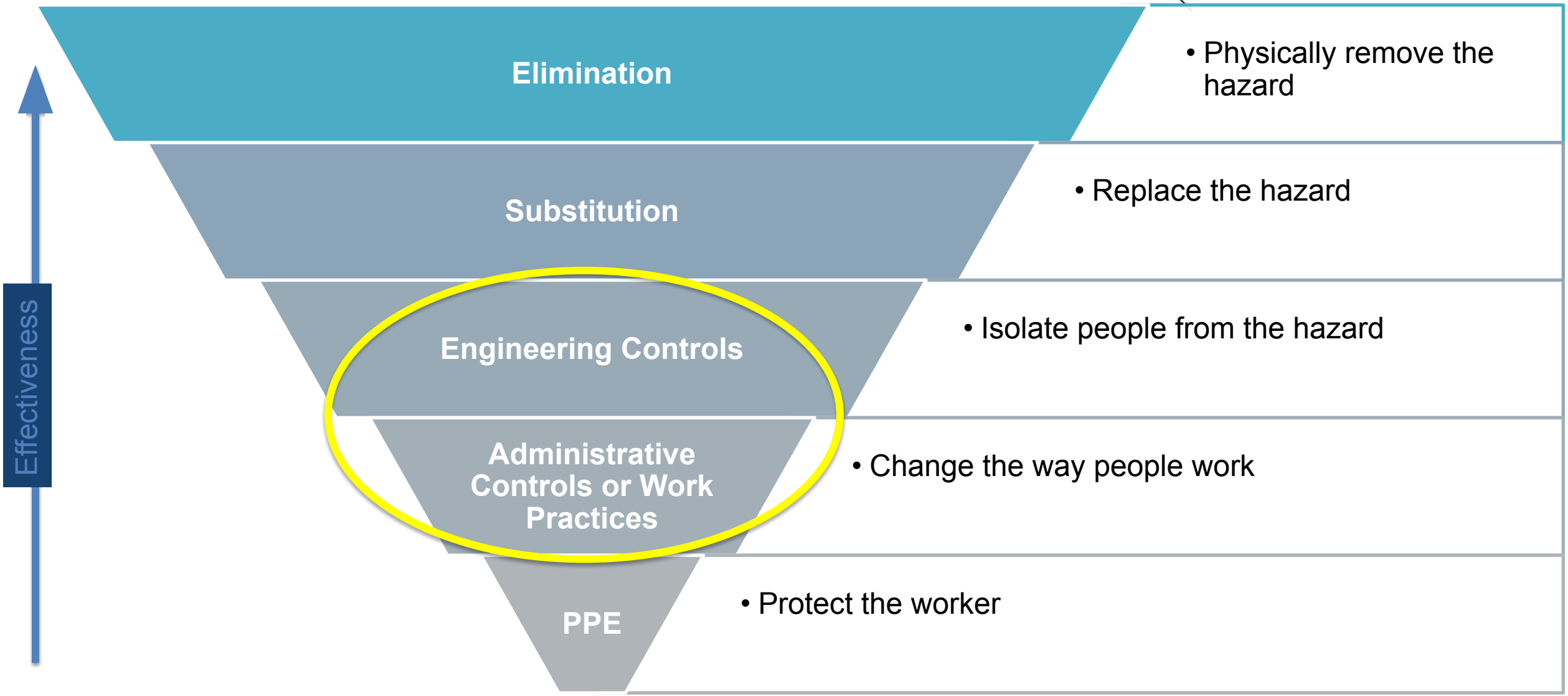
Over the past 30 years, Safety Partners has supported 800+ organizations in environmental health and safety with permits, licenses, manual creation, manifest management, program maintenance, training, and all compliance/regulatory needs so they can focus solely on their science and research. We help organizations in vital phases of their growth by simplifying environmental health and safety and taking the burden off scientific management and their teams.

- Biological safety
- Chemical safety
- Radiation safety
- EHS program development, oversight, & implementation
- Safety training programs
- Regulatory compliance
- Permits & licenses
- EHS audits
- Animal care & use
- Emergency preparedness
- Industrial hygiene
- Laser safety
- Ergonomics
- Decommissioning

REGULATORY AGENCIES

- In addition to the Boston regulatory agencies, laboratories are regulated by various Federal and State agencies
- These agencies can conduct inspections of laboratory facilities
- Goal is to have companies “inspection ready”
- Inspection readiness goes hand in hand with maintaining a safe workplace
- Laboratories are specially designed and operated for the proper handling of laboratory materials
  - Worker safety
  - Public safety
  - Environmental protection

HIERARCHY OF CONTROLS



ENGINEERING CONTROLS

- Laboratories have a specific airflow to maintain containment
  - Air flows from the offices *into* the labs, such that lab air does not leave designated work areas
  - Lab air HVAC is separate from office air HVAC
  - Lab air is exhausted from a facility through specific ventilation systems that can be monitored and filtered as needed

ENGINEERING CONTROLS CONT.

- Chemical Fume Hood
  - Used to contain any material that produces vapors, fumes, aerosols, etc. at the source
  - High flow rate through dedicated exhaust
    - Air does not enter lab space
    - Exhaust can be monitored and filtered as necessary

ADMINISTRATIVE CONTROLS

- The implementation of an EHS program:
  - Company must be compliant with federal, state, and local regulations
  - Permits must be acquired and maintained
  - Program ensures worker safety and protects the environment and the public
  - Typically accomplished by each company through an onsite EHS or safety representative or consultant
- Required Safety Manuals:
  - Emergency Action Plan or Contingency Plan
    - » Emergency response is planned in advance
- Other Safety Manuals, if applicable to work being conducted:
  - Biosafety Manual & Exposure Control Plan
  - Chemical Hygiene Plan

ADMINISTRATIVE CONTROLS CONT.

- General EHS Training
  - All employees get Emergency Procedures Training
  - Lab workers receive appropriate training guided by regulatory requirements
    - Lab Standard
    - Hazard Communication
    - Biosafety/Bloodborne Pathogens
- Task-Specific Training
  - Lab workers receive task-specific training from supervisors or process experts as required

CONCLUSION

LABORATORY DESIGN + REGULATORY COMPLIANCE

ADMINISTRATIVE CONTROLS + ENGINEERING CONTROLS

=

A SAFE WORKPLACE, ENVIRONMENT, and PUBLIC

TRIUMVIRATE ENVIRONMENTAL

Laboratory Safety Overview

Brandon Linz, PhD, RBP (ABSA)

EHS Director of Biosafety

Triumvirate Environmental

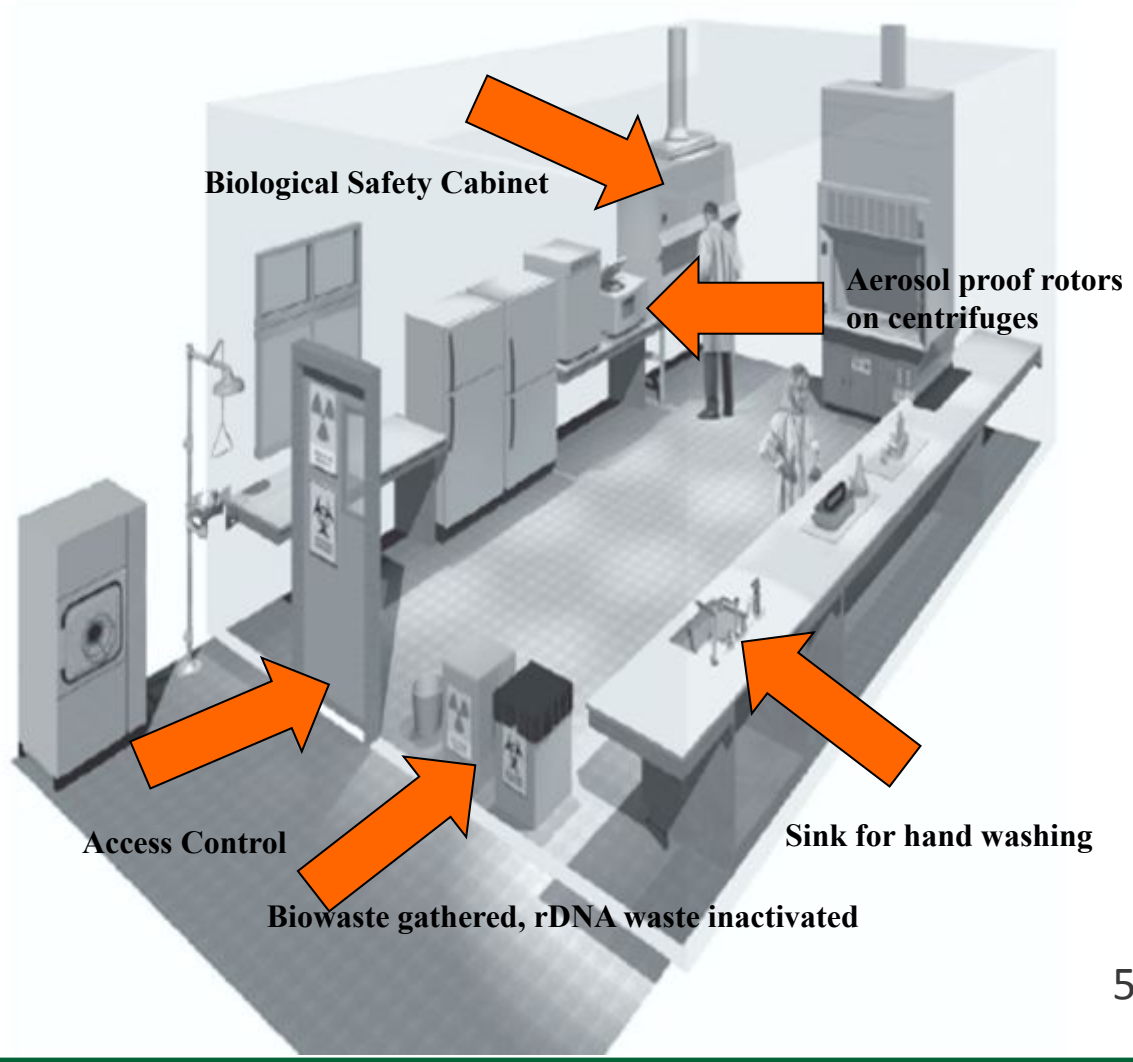
boston planning & development agency

Triumvirate Environmental

- EHS Consulting and Program Management
- Onsite Support, Waste Management
- Hazardous Waste Disposal, Fuel Blending, and Recycling
- Biosafety Cabinet and Fume Hood Certifications
- HazMat Emergency Response

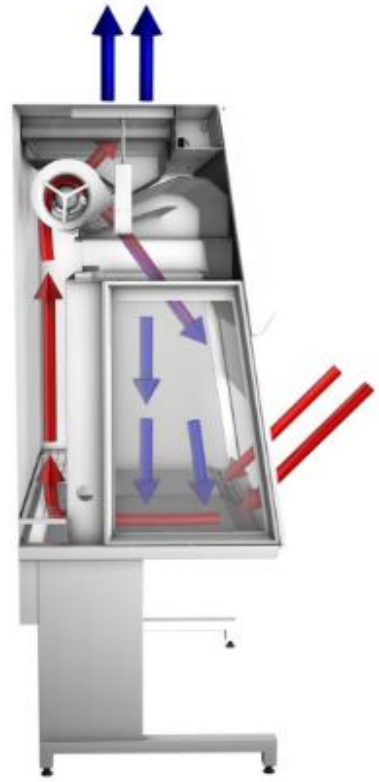
BSL2 Laboratories

- Access control
- Biowaste gathered
  - Inactivated onsite or offsite
- Aerosol containment
  - BSC
  - Aerosol proof rotors on centrifuges
  - Others as needed

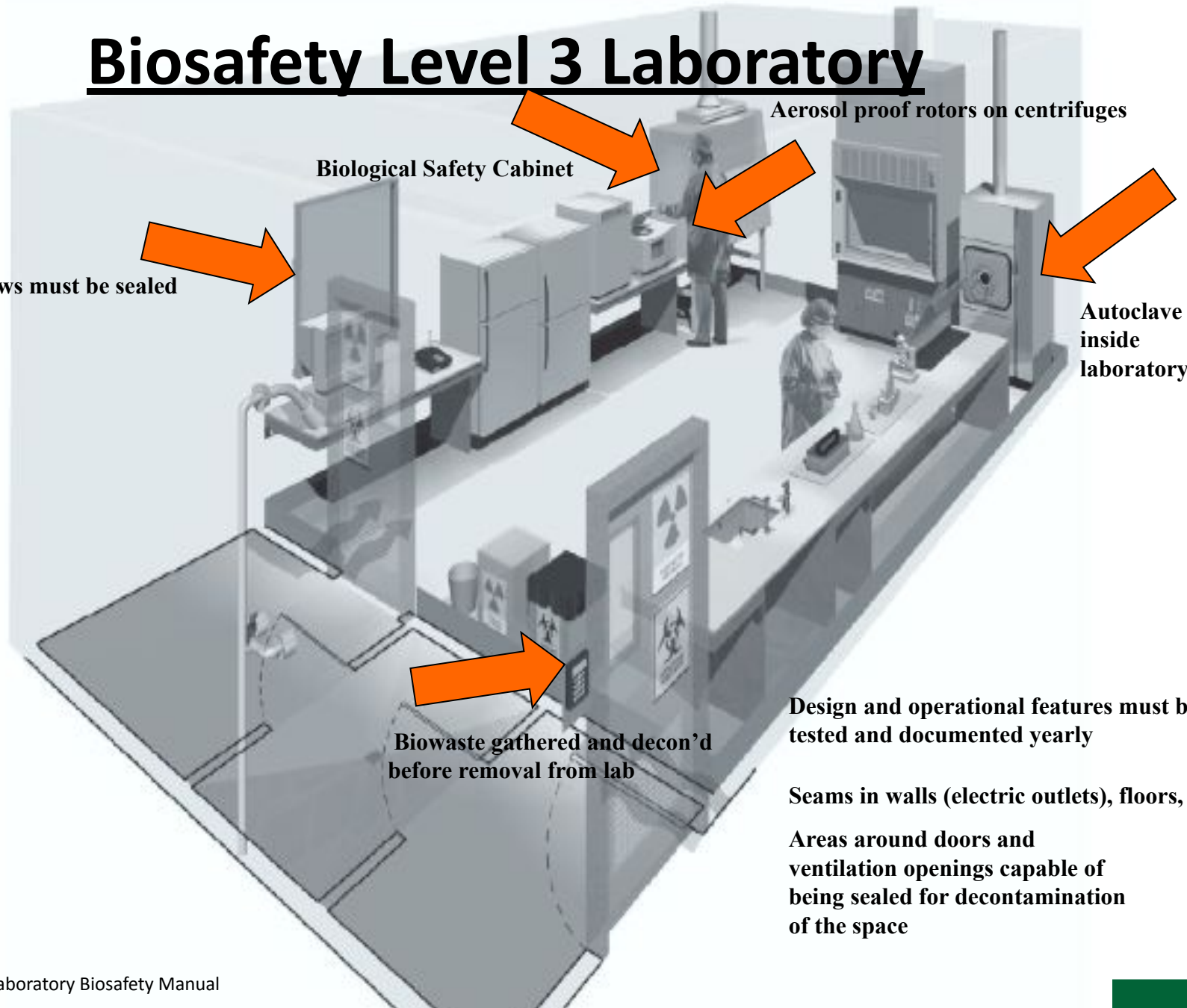


Engineering Controls

- Biosafety Cabinets (BSCs) protect users, the environment, and the materials in use.
- Contaminated air is passed through a high efficiency particulate air (HEPA) filter and the filtered air is blown onto the work surface or re-circulated out of the cabinet back into the lab.



Biosafety Level 3 Laboratory



Design and operational features must be tested and documented yearly

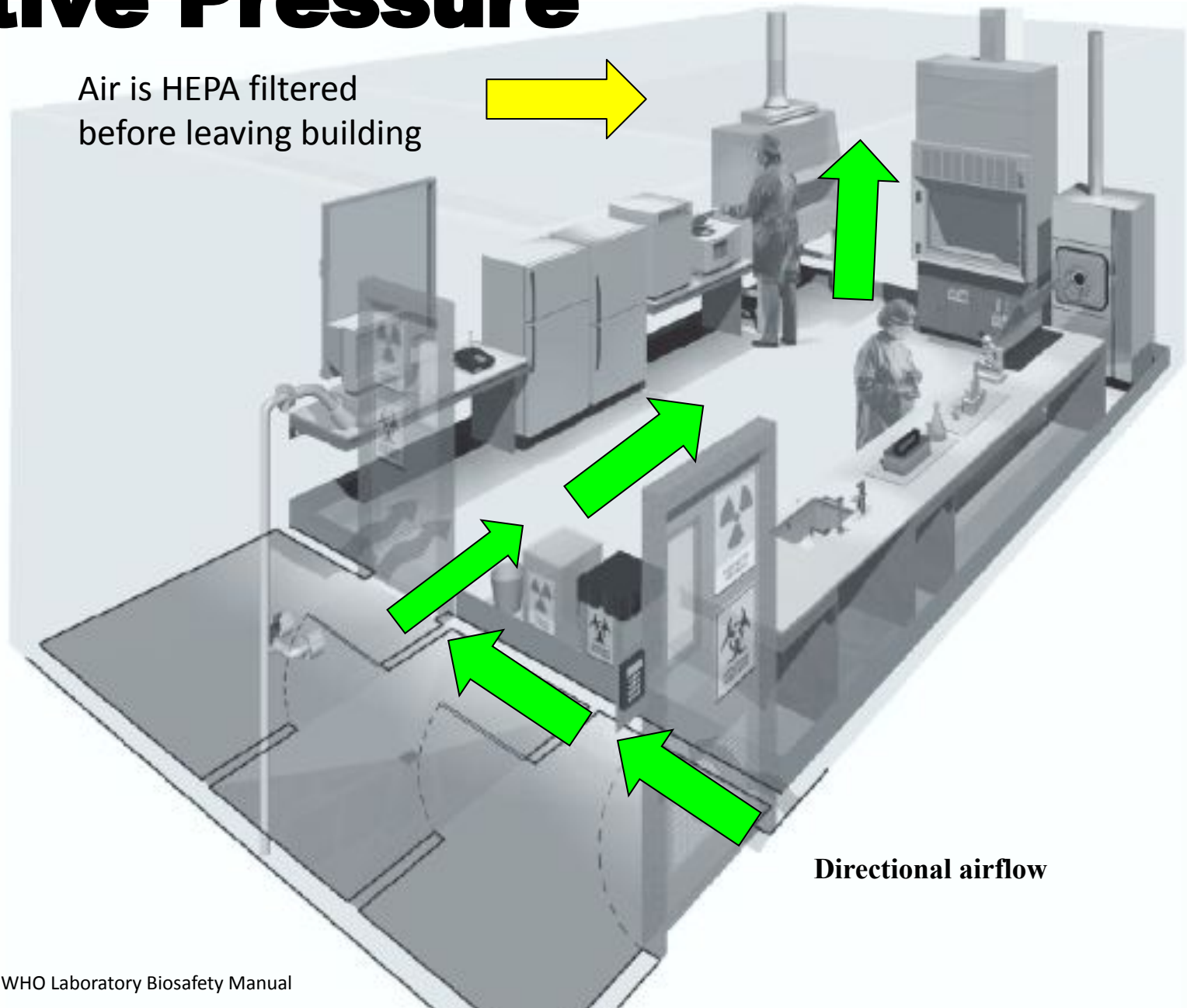
Seams in walls (electric outlets), floors, ceiling are sealed

Areas around doors and ventilation openings capable of being sealed for decontamination of the space

WHO Laboratory Biosafety Manual

Negative Pressure

Air is HEPA filtered
before leaving building



Directional airflow

BSL3 Laboratory

Changes from BSL2 to BSL3

- Facility design
  - Negative pressure is required
- HVAC
  - Redundant supply and exhaust
    - Dedicated exhaust
    - HEPA filtered exhaust
  - Emergency power and battery supply for all containment equipment and HVAC
- Containment
  - Aerosol containment
  - All samples within secondary containment at all times
- PPE: Double gloves, disposable gown or Tyvek suit, respirator (N95 or PAPR)
- Facility must be commissioned initially and annually

BSL4 Laboratory

- Positive Pressure Suits
  - Or Class III BSC
- Chemical showers and kill tanks
- Personnel suitability
- Facility and program security
- Heavy federal, state and local regulatory oversight

Biomedical Research Advances Treatments and Cures

- Vaccine development and testing
- Therapeutics development and production
  - Small molecules
  - Antibodies
  - Viral vectors/gene therapy
- Clinical testing
  - Research
  - Diagnostics
- Basic science research

What do researchers do in these labs?

- Genetic analysis and manipulations
- Cell and organismal culture
- Animal studies and tissue processing
- Clinical human patient sample processing
- Processing and analysis of above samples

Conclusion

Goals

- **Safety First.** Safety is always top of mind. We strive to improve public confidence in the safety of our Life Science Industry.
- **Communication Is Key.** Ensure that we are **listening** to community concerns, and **responding** and improving practices wherever we can.
- **Core to Our Economy.** This industry is vital for the Greater Boston Economy.
- **Stay Informed and Involved.** Participate in open meetings and consider involvement with research organizations in the City.

Questions

boston planning &
development agency