laboratory design

does the declining need for commercial office space offer opportunity for life science labs?

BY: STEVE KIMBALL

the commercial office market

The *Deloitte 2024 Commercial Real Estate Outlook: Finding Terra Firma* report offers insight into realigning the real estate industry to meet new realities. One of the key takeaways states that 61% of respondents admit core technology infrastructures rely on legacy systems, acknowledging the need to modernize and evolve.

The need to modernize paired with declining demand for traditional office space, creates an opportunity for conversion to life science lab / office environments.

JLL reports that 11% (243 million square feet) of leased office space expires in 2023 with 900 million square feet of lease space expiring by 2025. In addition, a majority of office space is inefficient and could accommodate significantly greater occupancy and diversified utilization.

10 key considerations for office-to-lab conversion

The evaluation of a potential office to lab conversion requires the assessment of key factors.

1. Floor Plate

An important initial consideration when evaluating office space for laboratory use is the floor plate size and column spacing. Building columns can be a significant impediment to an efficient lab layout. Space plan evaluation of a typical 11-foot lab module relative to column spacing is a first important step when assessing the potential space conversion.

Overall floor plate size will be important as well. Does it adversely restrict layout and operational flow? Can stacked / multi-floor lab operations function appropriately for your life science use? Program requirements, adjacencies, and workflow relative to floor plate size and the potential for multiple floor operations should be a criterion when assessing a tenant office conversion.

2. Floor To Floor Height

Confirmation of existing floor-to-floor heights and floor load capacity relative to program requirements is a key criterion for design consideration. As a general rule, typical office construction may have floor-to-floor heights and load capacity that is less than preferred / required for a laboratory environment.

Wet lab floor-to-floor height minimum is typically 13' with a preferred height of 16' to 17'. Conventional office space with a floor-to-floor height less than the typical range required for a lab environment will require special attention during programming, careful design coordination, and attention to equipment selection (particularly fume hoods) to facilitate use of the space.

3. Ceiling Space

Floor-to-floor height considerations impact above ceiling height space available for HVAC and utility distribution. Early assessment, design, and program evaluation will be necessary to provide a comprehensive design and construction solution. 36" of above ceiling utility space is ideal.

4. Floor Load

Laboratory floor load design criteria will typically be 100 psf minimum with 125 to 150 psf as an ideal condition. Office conversion with a floor load capacity of less than 100 psf can be addressed during design with placement of equipment at the ground floor level in lieu of incurring the expense of designing a reinforced structure.

Scope: The project scope includes the entire building, along with any historically associated property under the same ownership. The review encompasses the building's site and environment, as well as any buildings that were functionally related historically. Therefore, any new construction and site improvements occurring on the historic property are considered part of the project for purposes of the tax credit.

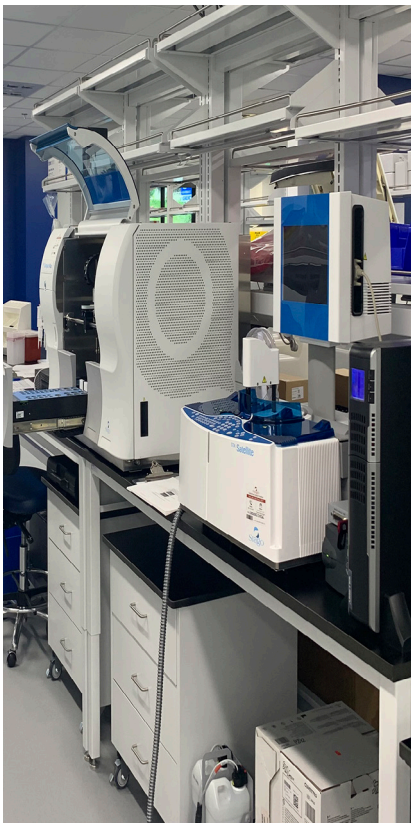
5. Roof Capacity

Roof capacity can play an important role in assessment and capacity to support HVAC equipment. Space for equipment as well as roof structural load capacity should be evaluated. Most roofs have additional capacity to support HVAC equipment, however placement relative to vertical ductwork shafts requires assessment.

Where space and/or structural capacity are not sufficient ground mounted may be a viable alternative.

6. Column Spacing

Column spacing in an existing building is a key consideration and potential impediment to developing an efficient program layout. Typical lab modules are 11 feet suggesting 22-foot, 33 feet, or a 44 feet column spacing is ideal for efficiency. Column spacings outside this planning metric can accommodate a laboratory program with early understanding and review of the specific nature of required laboratory operations.



7. Shaft Space

Laboratory HVAC requirements typically drive larger floor-to-floor shaft placement and size. Understanding those needs relative to floor plate and column spacing is another key element in assessment and planning. For multi-story projects where other tenants occupy space above the laboratory, review and consideration of shaft size and placements relative to potential tenant disruption should be evaluated as part of the overall assessment.

8. Circulation

Shared Dock / Receiving Areas

For multi-tenant buildings with shared building shipping and receiving, the need for isolated hazardous waste will be an important consideration. Typically, a locked and isolated waste disposal room is desirable, if not required. In addition, shipping and receiving of laboratory materials and products may require unique operation protocol and security.

Circulation Path

Dirty-to-clean workflow requires a one-way traffic pattern for travel from a "contaminated" area to a "clean" area.

An early understanding of the workflow process and "clean / dirty" requirements will be important to determine the suitability of the space under consideration.

One-way workflow is essential to prevent cross-contamination as items move through the process. To support the workflow, ventilation systems are designed to contain contaminants in soiled work areas with negative airflow relative to clean spaces and to protect clean work areas with positive airflow.

While maintaining a dirty-to-clean workflow may seem simple, device-specific cleaning procedures can be complicated and include multiple steps, making these procedures highly error-prone. This is especially true if the sterile processing area does not provide physical separation between dirty and clean areas, appropriate airflow design, and the space, countertops, sinks, or other equipment needed to support the correct workflow.

9. Waste Control Storage

Laboratory waste control typically requires a designated locked / limited access holding room adjacent or near the building dock / shipping / receiving area. Consideration of the circulation path from the laboratory to the waste control holding room should be evaluated from a workflow process and dirty / clean separation requirement.

10. Utilities

Lab environments require robust HVAC and electrical utility service and distribution. Emergency power and uninterruptible power (UPS) can often be a requirement. For a typical lab, electrical power service and distribution demand may be 50% to 100% in excess of office building systems' capability.

The building water and sanitary capacity will require evaluation to address capacity and waste steam requirements. Laboratory waste may require acid waste neuralization before it can be discharged to the sanitary waste system. Where this is not practical small, point of use containment should be considered.

HVAC systems designed for an office environment are often inadequate to accommodate the more stringent temperature, humidity, ventilation, and quality criteria required for laboratory operations. Modification of existing systems and/or installation of supplemental systems may be necessary.

summary

The key take-aways when considering an office-to lab conversion include:

1. **Floor Plate**

• Will the space plan accommodate typical lab module spacing if 11'-0"?
• Does the floorplate size restrict layout and operational flow?
• Will multi-floor operations function for your life science use?

2. Floor-to-Floor Height

• Is the floor-to-floor height a minimum of 13'-0""?
• If the floor-to-floor height is less than 13'-0", are there special equipment & programming considerations?

3. Ceiling Space

• Is there adequate ceiling space for utilities distribution?

4. Floor Load

• Is the floor load capacity adequate for operations / equipment (125 to 150 psf)?
• Can equipment and operations that exceed the floor load capacity be located at ground level?

5. Roof Capacity

• Verify space and load requirements for roof top HVAC equipment.
• If space is not available can the equipment be ground mounted?

6. **Column Spacing**

• Is column spacing adequate to accommodate a typical lab module of 11 feet?

7. Shaft Space

• Is vertical utilities shaft space adequate?
• Can vertical shaft space be added without adversely impacting multi-tenant occupancy?

8. Circulation

• Are shipping /receiving / dock facilities adequate?
• Is the building circulation path adequate to accommodate efficient workflow and dirty / clean operations?

9. **Waste Control & Storage**

• Is designated locked / limited access control waste storage required?

10. Utilities

- Is there adequate building electrical capacity available?
- Is emergency power / UPS required and available?
- Are building water and sanitary waste stream systems adequate?
- Can point-of-use waste containment be considered?
- Can building HVAC systems accommodate specific lab temperature and humidity requirements?

In a CBRE analysis dated October 4, 2023, in the U.S., 60 million sq. ft. of office conversions are planned or in progress, comprising 1.4% of the total U.S. office inventory. Of these conversions, offices to life sciences labs now account for 19% of activity. This shows with careful review and thoughtful planning, a successful office to laboratory conversion can be an attractive option for new or expanded space.

about the author

steve kimball

PMP, LEED AP

Steve Kimball, emersion DESIGN's Science & Technology Client Leader, has been with the firm for over 15 years. His leadership propels emersion to fulfill their mission—to advance clients that advance society. Connect with Steve for any planning or design needs.