Planning Goals & Objectives

Research Laboratory
NIH Design Policy and Guidelines

The NIH will provide state-of-the-art research laboratories to enhance and maintain its position as the world leader in biomedical research. The NIH accomplishes this goal by constructing new facilities and renovating older ones to meet ever-changing biomedical research needs. The end users of the research laboratory must be involved during the programming and design phases to meet the various specific needs of the laboratory occupants. These guidelines will be applied to new research facilities, and to the extent possible, to renovation projects.

The following goals and objectives define the minimum recommended requirements for the design of research laboratory facilities. For specific requirements see section D, Design Criteria.

B.1 Quality of Life

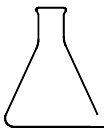
The laboratory shall be designed for people and provide them with a safe and pleasant work environment that leads to increased productivity. Direct natural light, adequate work space, color, a coordinated and well-organized layout, and attractive and functional casework are some of the design features that will enhance the quality of life. Laboratories that provide a good work environment will help in the recruitment and retention of distinguished researchers.

B.1.1 Natural Light

Laboratories and offices shall be provided with natural light and views to the outside, so long as they do not conflict with functional requirements. Natural light is not required in laboratory support areas.

B.1.2 Noise

Noise levels in laboratories are difficult to control because room finishes are generally non-sound absorbent. Equipment such as chemical fume hoods, centrifuges, and vacuum pumps contribute to the high noise levels within the laboratory. Planning shall isolate noise sensitive areas from noise sources wherever possible.



B.1.3 Lighting

Lighting intensity and uniformity shall provide shadow-free illumination of the laboratory work surface. The ability to control lighting in specialized laboratories or in spaces that use computers must also be considered.

B.1.4 Interaction

Good research is fostered by communication and collaboration among scientists. Laboratory planning concepts shall encourage interaction through the strategic location of common facilities, conference rooms, reading rooms, and lounge and break areas. Such areas shall be provided as part of a project's net assignable program.

B.1.5 Graphics/Signage

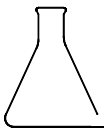
Graphics and signage will help employees and visitors find their way through a laboratory building. Directional graphics/signage shall be functional and in harmony with the architecture of the building. See the NIH *Interior Signage System Users Manual* for detailed information.

B.1.6 Artwork

Artwork may be considered for shared use, common support, and some circulation spaces. Artwork is not typically part of a project's construction budget, and is to be selected and purchased by the user Institute.

B.1.7 Other Amenities

Consideration during the programming and planning stages shall be given to the inclusion of other amenities such as cafeterias, lounges, bank machines, credit unions, shower and locker facilities, and child care. These additional amenities shall be coordinated with campuswide issues as defined by the Program of Requirements and the NIH Campus Master Plan.



B.2 Density of Research Space

It is the NIH's goal to provide each investigator with adequate laboratory work space, laboratory support space, office space, and administrative support space in order to create a safe and functional research environment.

B.2.1 Laboratory Work Space

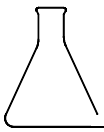
Adequate equivalent linear measurement (ELM) of laboratory work space shall be provided to meet the needs for length of lab components such as chemical fume hoods, biological safety cabinets (BSC), laboratory benches, equipment, storage, and desk space. The space or floor area must be adequate to provide a safe working area and access to and around equipment, containment devices, and benchtop areas.

B.2.2 Laboratory Support Space

The ratio of laboratory support spaces to research laboratories shall be adequate to eliminate the need to locate equipment in non-laboratory functional areas. Consideration shall be given to locating noise, heat, and vibration producing equipment in laboratory support spaces adjacent to the research laboratory. These may be dedicated or shared spaces, open alcoves, or securable rooms as required. They may also be on the same planning module as the laboratory.

B.2.3 Office and Administrative Areas

Office and administrative areas shall be adequate to provide areas outside the laboratory with a quiet, aesthetic environment that is sized to support the number of researchers in a laboratory branch. Where possible, laboratory staff shall be provided with low-bench desk space which is physically separated from the laboratory bench. This work space shall be outside yet adjoining the laboratory. Administrative and clerical support areas shall be provided with adequate storage for files, records, etc.



B.3 Flexibility and Adaptability

The goal of these guidelines is to produce laboratory facilities that are adaptable. This concept encourages generic spaces with the ability to readily accommodate changes in function (within the same space category) without requiring significant physical or infrastructure changes to the space itself and within budget constraints. Excessively and individually planned, nongeneric, or customized spaces are to be avoided.

B.3.1 Services and Systems

Services must be uniformly and repetitively distributed to each laboratory and designed to provide simple extension into the laboratory without disruption to adjacent modules. Services may run overhead, in a service corridor, or in interstitial space to permit changes without requiring an upgrade to the building infrastructure, capacity, or major distribution systems. All building system components that require routine maintenance and repair shall be accessible without interrupting the day-to-day operations of the laboratory.

B.3.2 Expansion Considerations

Designs for new research facilities shall include considerations for future expansion including horizontal and vertical expansion. Reserve capacity shall be planned into primary building systems to accommodate future growth and research mission changes within budgetary constraints.

B.3.3 Services and Systems Distribution Concepts

Utilities and services shall be organized into specific zones, both horizontally and vertically, to provide uniform distribution of systems and services to each lab module. This three-dimensional planning allows for ease of maintenance and access of services and provides for maximum operational flexibility. The following identifies several concepts:

Ceiling and Shaft: Vertical distribution of utility services is accommodated through shafts. Horizontal distribution is through ceiling space to the laboratory. Services are fed down to the work area, or in the case of waste, is collected horizontally and then fed down through a chase.

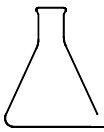
Multiple Internal Shafts: Distribution of utilities is provided through smaller vertical shafts. Horizontal distribution is through ceiling space.

Multiple Exterior Shafts: Distribution of utilities is provided through vertical shafts, with horizontal distribution through the ceiling space.

Utility Corridor: Distribution of utilities is provided through an internal dedicated accessable utility corridor which is not meant to provide service access.

Service Corridor: Laboratories abut an accessible corridor which houses overhead utility services, routed horizontally into the laboratory via the ceiling or through the laboratory wall. Vertical shafts are required for mechanical and piping systems. The clear width of the service corridor shall be 1500 mm minimum.

Interstitial Space: Interstitial space yields unobstructed open area for laboratory space. Horizontal distribution is through dedicated accessible floor space above the ceiling. Services drop vertically from the interstitial space into the laboratory. Centralized vertical shafts connect the interstitial space throughout the building. Interstitial space provides maximum adaptability of the laboratory space below.



B.4 Planning Module

Many researchers have special laboratory design requirements. The goal is to establish an idealized common space denominator to meet a variety of research needs while allowing mechanical systems, partitions, and laboratory casework to be provided as required. The laboratory module is the basic conceptual building block which provides regularity and repetitiveness of area and services for the building. It must be carefully organized on a modular basis, free of stairwells, chases, shafts, shear walls, elevators, and other obstructions.

The planning module must be properly sized so that larger units can be created by assembling a number of modules. This permits the rational creation of space and allows the standardization of mechanical/electrical/ plumbing (MEP) systems. Systems are thereby accessible to each individual lab module. Modular planning is essential to the NIH given the diversity of research activities that are ongoing.

B.4.1 Laboratory and Laboratory Support Module

The laboratory building is based on a planning module that is repetitive and regular, such as the 3,350 mm x 3,350 mm unit in the following Diagram No. 1. This allows the rational creation of spaces that can accommodate a wide variety of laboratory and laboratory support functions

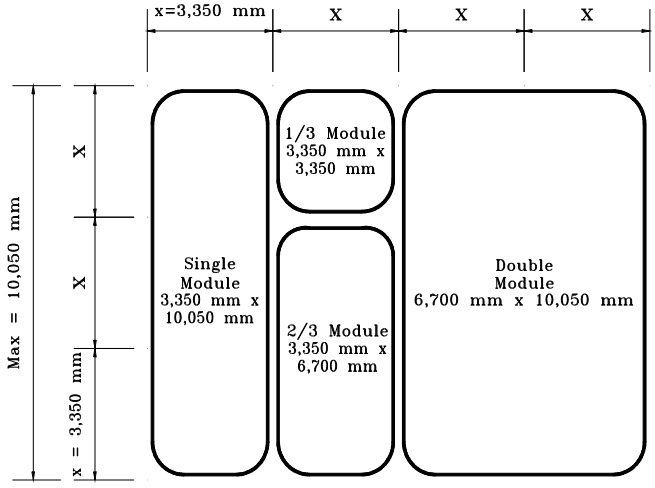
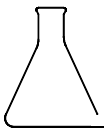


Diagram No. 1.

B.4.2 Structural Bay Spacing

The building's structural system relates to the planning module. Major structural columns shall not intrude into laboratory space, and beams shall be located to minimize any impact with MEP systems. The structural system and column grid shall be designed to maximize the building's efficiency. Laboratory buildings will be designed to minimize vibrations. Refer to section D, Design Criteria, for specific requirements.



B.5 Zoning of the Laboratory Building

The planning of laboratories must address the relationships of all related functions or activities.

B.5.1 Planning Diagrams

Planning Diagram Nos. 2 through 6 describe in graphic form the basic planning zones for the modular development and relationships between laboratory zones, office zones, desk zones, corridors, and support zones. These are diagrammatic only and must be adapted to requirements of the specific building's program of requirements, site constraints, user requirements, and budgetary constraints.

Laboratory and Laboratory Support Concept: The planning of a laboratory building must address both relationships of functions and circulation. Diagram No. 2 illustrates primary personnel circulation between the lab and lab support zone and the office zone. The central service corridor supports the laboratories and segregates the flow of people and materials.

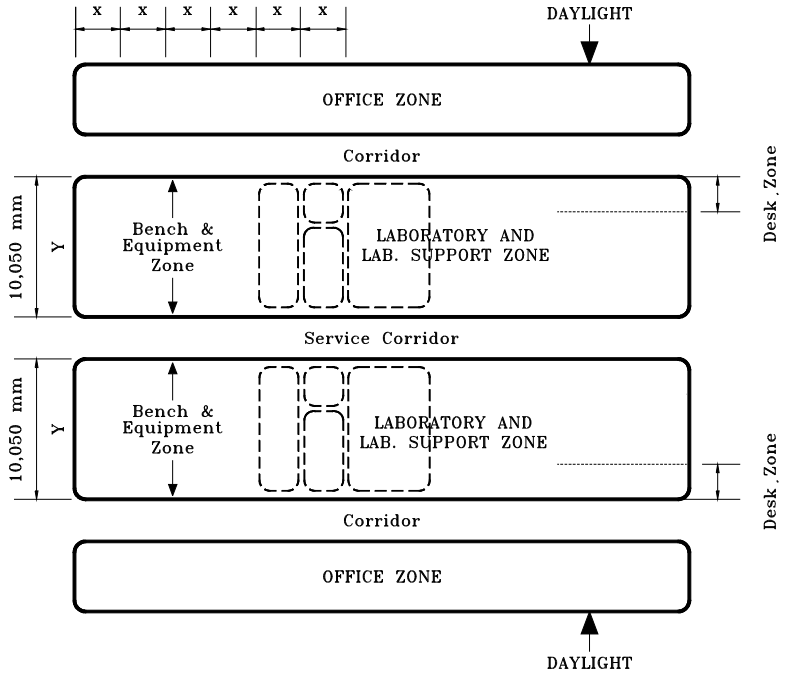


Diagram No. 2

Laboratory Module with Service Corridor: The layout of the laboratory must provide adequate space and a safe working environment. Diagram No.3 illustrates a lab having access to both a personnel and service corridor. Desks are located near the personnel corridor while utilities are near the service corridor. Direct natural light is generally not available.

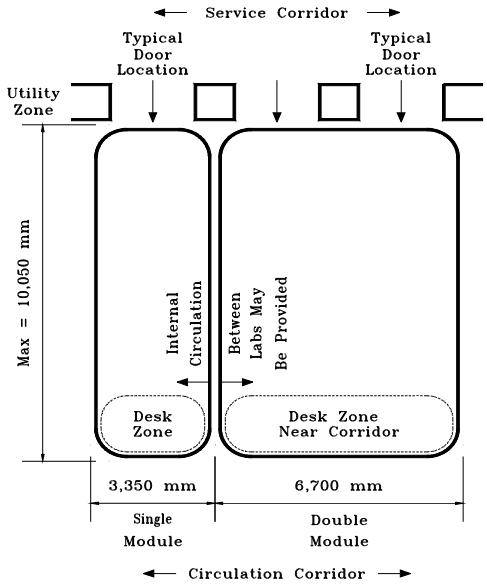


Diagram No. 3

Laboratory Zones with Single Corridor: Diagram No. 4 illustrates a primary personnel corridor between the lab zone connecting to a central office zone. This central corridor supports the laboratories and the offices combining the flow of people and materials. All spaces receive direct natural light.

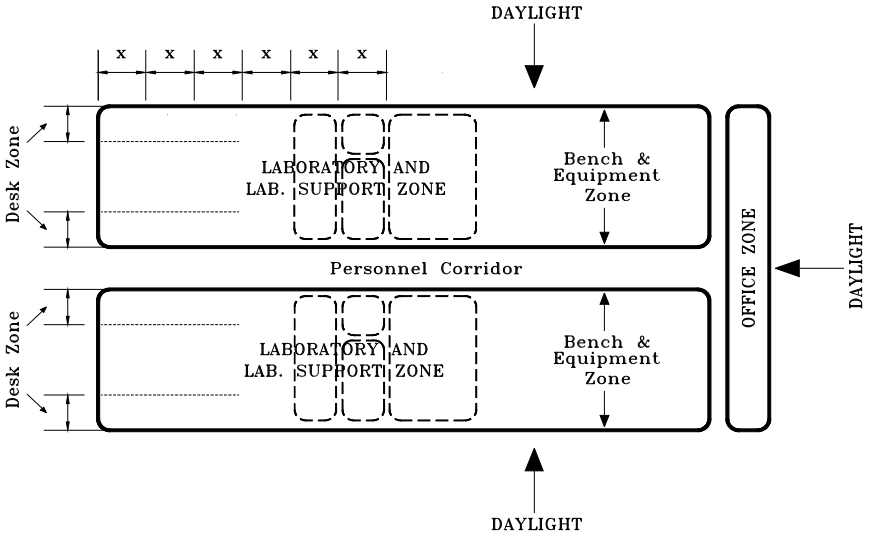


Diagram No. 4

Laboratory and Laboratory Support Zones with Single Corridor:
Diagram No.5 illustrates a double-loaded personnel corridor with a lab zone on one side and an office zone on the other side. This central corridor supports the laboratories and the offices, combining the flow of people and materials. All spaces receive natural light.

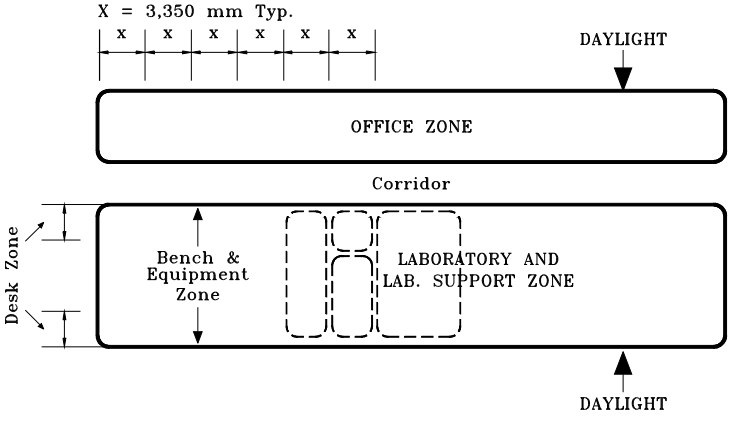


Diagram No. 5

Laboratory Module with Single Corridor: Diagram No.6 illustrates a lab having access to a central personnel corridor. Desks are located either near the entry to the corridor or at the end of the lab near the window. Equipment of lab components may be arranged in a variety of ways within the lab. Utilities distribution, people, and materials flow are combined in a single corridor. Direct natural light is available to the laboratory.

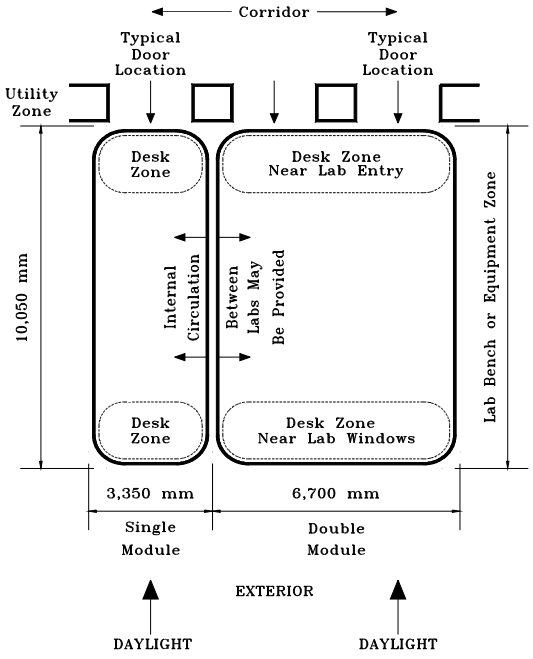


Diagram No. 6

B.5.2 Circulation/Flow of People and Materials

Circulation throughout the laboratory building shall be efficient and direct. Clearly defined horizontal and vertical circulation routes for people, equipment, supplies, research animals, waste disposal, and maintenance and repair activities are needed. Service corridor circulation, ghost corridor circulation between laboratories, and primary circulation patterns between labs, offices, and animal or lab support spaces shall be clearly addressed early in the design process. Minimum laboratory corridor widths shall be 1,500 mm clear.

Movement of laboratory animals is usually restricted to the animal facility. Researchers requiring immediate access to animals shall be provided laboratories or procedure rooms adjacent to the vivarium.

B.5.3 Security

Access by visitors and employees into the facility shall be delineated and controlled to minimize disruption. Zones of security within the building or at the loading dock may also be required. Electronic security such as card access and closed-circuit television may be planned for the facility.

B.5.4 Loading Docks

Locations and quantities of docks must be based on an operations concept for the specific facility. The quantity and types of materials that will be received and discharged, the need for security, quality control functions, accessibility for vehicles of multiple sizes, temporary storage and staging, recycling, pest management, waste disposal, materials storage, and staff marshaling are key issues to address.