

# *Planning Goals & Objectives*



The NIH will provide state-of-the-art vivariums to enhance and maintain its position as the world leader in biomedical research. The NIH will accomplish this goal by constructing new facilities and renovating older ones to meet ever-changing biomedical research needs. These guidelines will be applied to new vivarium facilities and, to the extent possible, to renovation projects.

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

## **B.1 Quality of Life**

There are no unequivocal data relating to the quality or quantity of an animal's activity to its physical or psychological well-being. For example, housing an animal in a cage does not necessarily limit the amount of activity in which the animal engages, although the form of activity may be changed. The need for exercise or induced activity is subject to the judgment of the animal care professional based on an understanding of the species or breed temperament, age, history, physical condition, nature of the research, and expected duration of vivarium residence. Examples of supplementary activity that can be provided include furnishing a treadmill or exercise wheel, walking on a leash, providing access to a run, or releasing an animal from its cage into an animal room. Provision shall be made for animals with specialized locomotion patterns to express these patterns, especially when animals are held for long periods. For example, ropes, bars, and perches are appropriate for brachiating nonhuman primates.

The vivarium is also a workplace. The environment shall be aesthetically pleasing to employees and consistent with the needs of investigators engaged in animal research. Therefore, it must provide for the health and safety of the staff and provide an environment for highly sensitive animal subjects, compatible with the requirements and protocols of research. It shall be efficient, secure, and effective and easy to maintain and perform animal caretaking services. Sufficient air supply, filtration, and exhaust shall be provided to minimize unpleasant animal odors and animal allergens. Provision of natural light, if feasible, adequate work space, color, and ergonomic furniture systems are integral to a pleasing, functional, and effective work environment that will enhance productivity and aid in the recruitment and retention of quality personnel.



In order to provide for an environment within the vivarium that meets these goals, the following objectives must be dealt with and met during the planning stages.

### **B.1.1 Animal Housing/Holding**

Animal housing must be designed to ensure animal well-being, to meet research requirements, to be cleanable and easily maintained, and to minimize experimental variables (maximize predictability). The facility must promote a healthy social environment for the animals. The characteristics of each species must be considered in deciding how to house a diverse census of animals.

### **B.1.2 Natural Light**

*The Guide* recommends against windows or skylights in animal rooms. If windows are to be placed in animal rooms, veterinarians shall be consulted for placement of windows and window treatments. However, if feasible, natural light may be provided in administration areas.

### **B.1.3 Lighting/Illumination**

Illumination levels for an occupied room are generally 400-900 lx. Fluorescent lighting is recommended because it generates less heat. However, discussions shall be held with the veterinarian and researchers regarding the color rendition of fluorescent lamps.

### **B.1.4 Noise**

Acoustical control is an important planning consideration and shall be evaluated during design. Most animals are stimulated by noise. Noise can distress animals and can introduce variables into research studies.

### **B.1.5 Graphics/Signage**

Without views to the outside or significant landmarks within the facility, orientation becomes a planning issue. It is recommended that a map of the corridor system be provided in the hallway. Each room shall have a room number clearly displayed at its entry. In addition, color or other graphics shall be considered in corridors to



provide an easily recognizable identity. See the NIH *Interior Signage System Users Manual* for further information.

#### **B.1.6 Other Amenities**

Amenities such as lounges, break areas, and conference rooms shall be provided.



## **B.2 Flexibility and Adaptability**

A goal of these guidelines is to provide vivarium facilities that are adaptable. The spaces shall be generic with the ability to accommodate changes in function without having to make major changes to the facility. Individually planned, nongeneric, or customized spaces are to be avoided where possible.

The vivarium space and its accompanying utility services shall be planned and designed to be adaptable to changes in animal species and research protocol.

### **B.2.1 Accessibility**

Care shall be given to plan and design building systems to permit easy accessibility for routine inspection, maintenance, and repair without entering the animal holding rooms. All systems shall be planned to be accessible to all spaces which require them and be configured so they can be extended, added, or deleted in an unobtrusive manner.

### **B.2.2 Expansion/Renovation Considerations**

Expansion of the vivarium facility or spaces shall be considered during the planning phase. It must be possible to construct any expansion with minimal interference to the operation of the facility. It is important that the expansion tie into the existing circulation.



## **B.3 Planning Module**

Modular planning schemes shall be used, to the maximum extent practicable, for animal housing and procedure space. Ideally, when planning a multifunction research building, this scheme will be similar in size and configuration to the laboratory module. Wherever possible rooms shall be clustered to provide separate zones for small and large animals, taking into consideration the differences in rack dimensions, waste disposal requirements, caretaking requirements, investigators, protocols, disease status, and airflow requirements. For specific requirements see section D, Design Criteria.

### **B.3.1 Structural Bay Spacing**

Structural loads of an animal facility are quite substantial due to the potential use of concrete masonry partitions and heavy equipment which is needed for the day-to-day operation of the facility. The most basic requirement of the structural system is that it not interfere with other systems or preclude future changes. Therefore, the spacing of the structural system, both vertical and horizontal components, must be coordinated with the room and corridor configuration and utility systems distribution.

### **B.3.2 Systems/Services**

Utility systems within the vivarium must be capable of providing all the services necessary for scientists to conduct their research and the animal husbandry staff to properly care for the animals. It is equally important that provisions be made for future utility services to accommodate unanticipated demands brought about with new technologies or through changes in research protocols. Also, a certain amount of reserve capacity shall be designed into the primary building systems to accommodate increased animal densities.



## B.4 Zoning of the Vivarium Building

Zoning for the vivarium building shall have three major components. First, an administration and management support zone, which includes offices, conference rooms, etc.; second, a transitional zone, which includes gowning areas, locker, and toilet rooms; and third, an animal-housing, procedure, and support zone. The building layout shall be planned to minimize personnel traffic in the holding areas.

Within the vivarium the flow of materials, cages, animals, and personnel must be accommodated in an efficient and economical manner. Adjacencies shall be planned to maximize operational affinities and minimize travel distances. Relationships between deliveries, quarantine, housing, procedure rooms, cage wash, staff locker rooms, and administration spaces must be effectively planned. It is also essential that designs consider adjacencies based upon the variety of species that are anticipated for the vivarium.

The following Diagram No. 1 shows all the functional areas within each of the three major zoning components: Administration and Management Support Zone, Transitional Zone, and Animal Housing, Procedure and Support Zone. Interrelationships within and between zones are depicted.

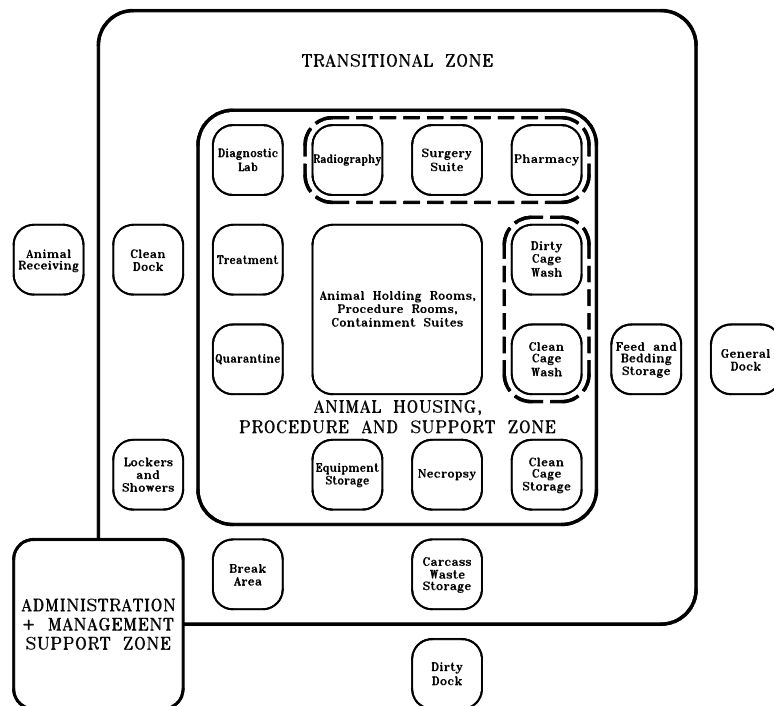


Diagram No. 1



### **B.4.1 Circulation/Flow of People/Animals/Materials**

Circulation space is a critical factor in controlling contaminants within the vivarium. Planning of circulation focuses on the movement of cages and racks in the facility, since this is the most intensive use of this space. Most important, during the planning phase the User/Architect/Planner/Engineer decides the extent to which the corridor system helps manage the potential for contamination and to what extent management dictates certain protocols of time and direction of movement.

### **B.4.2 Security**

The objective of security is to ensure the safety of the animals, staff, equipment, and data. Vivarium users shall take into account security at the site, building, vivarium, and room levels. At the NIH, the site (the first level of security) is open to the public; therefore, the second level of security, or building access, must be managed. Air intakes and any central utilities must be safeguarded from intruders. The third level of security is the access to the vivarium. Finally, the fourth level of security is the specific animal rooms, containment suites, surgical suites, pharmacy, or other areas within the animal facility which require special considerations.

### **B.4.3 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.

