DESIGN GUIDELINE 5.2
ANIMAL FACILITIES/ VIVARIUMS

Scope

Animal Research and Study is a vital component of the University of Michigan. It is a priority to provide a safe environment for research and animal housing within facilities designed for this purpose.

Obtain approval of the Provost's Office and Office of the Vice President for Research (OVPR) for all new animal facilities. Secure the written approval of the Provost's Office (Vice Provost for Academic and Budgetary Affairs) prior to finalizing program documentation. It is the responsibility of the unit requesting such spaces to obtain approval prior to initiating design activities.

Related Sections

U-M Design Guideline Section:
4.7 SBA Building Access Control
6.0 DG 230030 - Laboratory Ventilation
6.0 DG 263000 - Engine-Generator System

Reference Specifications:

MS 221113 Piping Materials and Methods

Reference Documents:
"Guide for Care and Use of Laboratory Animals" , promulgated by United States Department of Health and Human Services, and the Regulations of the Federal Animal Welfare Act 9, CFR Parts ,1 2 and 3

Vivarium/ Animal Facility Compliance:

- American Association for the Accreditation of Laboratory Animal Care (AAALAC)
- National Institutes of Health (NIH) criteria for the housing, handling and caring of laboratory animals.
- If a conflict should arise during the design of a specific project, the requirements of AAALAC and NIH will typically take precedence. Consult with the Design Manager who will coordinate with Institutional Animal Care and Use Committee (IACUC) and the Attending Veterinarian (AV).
- The Enforcing Agency for Animal Facilities is the IACUC, which includes the University's AV. Design Manager will arrange for consultations with the IACUC Office and the AV early in Schematic Design.
- Unit for Laboratory and Animal Medicine (ULAM)

Project Documents

Eliminate sensitive terms from the project drawings, specifications, and other review and bidding documents. "Sensitive terms and descriptions" include both specific and general information regarding the animal species and research activities conducted in animal facilities. Appropriate terminology includes research laboratory, support space, procedure room, operating room, clean and/or dirty room, housing, etc. Consult with the Design Manager early in the design process to review terminology requirements.

Location and Space Guidelines

Animal suites including procedure rooms should be separated from offices and main pedestrian corridors to discourage unauthorized access and to mitigate odors.

Wherever possible, provide ready access to an elevator that can be segregated and secured from the public for the transportation of animals, cages, feed, bedding, waste, etc. Determine whether a dedicated elevator is required for the facility.

If feasible provide animal circulation corridors separate from public circulation.

Note that “testing” areas shall meet housing requirements if the testing timeframe is greater than 24 hours.

Animal areas need to be secured with access restricted to only authorized personnel. Card Access Control Provide access control system connected to Campus or Hospital central system depending on the location of the facility. Confirm with ULAM and Researcher.

Discuss with Researcher and ULAM whether a closed circuit TV system is needed for the facility being designed.

Wherever possible, provide ready access to an elevator that can be segregated and secured from the public for the transportation of animals, cages, feed, bedding, waste, etc. Determine whether a dedicated elevator is required for the facility.

Do not locate the animal suite above electrical rooms, telephone/data rooms, or other rooms that could be damaged if water leaks down after wash-down of the animal rooms

When positioned along a perimeter wall, do not install exterior windows in animal rooms.

Verify exterior walls have sufficient insulation and a vapor barrier that will allow the space maintenance temperature and humidity set points.

House noisy species apart from other quieter species.

Consider impacts of building environmental noise when locating individual species housing and procedure areas.

- Electromagnetic

- Vibrations from equipment or adjacent bus/ vehicle traffic
- Fans/ pumps general HVAC noise levels
- Adjacent non compatible occupancies and functions (Classrooms, busy corridors etc.)

Strategically locate support areas (including but not limited to food and bedding storage rooms, hazardous agent storage rooms, clean and soiled cage holding rooms, cage washer rooms, refuse rooms, animal care equipment storage rooms, and animal care personnel lavatory, shower and locker rooms, laundry) to isolate housing rooms from rooms requiring more frequent / less restricted access.

Laundry:

If required, consider location based on venting required and sound isolation from animal housing. Provide floor drain in the laundry room.

Animal Feed:

Provide staging area in loading dock and appropriate storage based on animal needs. Consider food logistics from delivery to storage to serving and disposal. Food sources may require refrigeration, freezers, dry storage for canned goods/ boxes, and storage for fresh greens or hay. Food storage shall be below 70 degrees and 50% relative humidity. Note that some foods may need more stringent environmental requirements.

Animal Bedding & Waste:

Provide storage for animal bedding and waste disposal. Consider logistics for bedding delivery, storage, removal, disposal. Waste disposal shall be coordinated and storage considered.

Animal Watering:

Determine whether an automated animal drinking water system is required.

Animal watering needs have specific requirements. Consult with AV and ULAM to determine clarity of water to be utilized to minimize waterborne contaminants that can impact research. Examples include 0.5 micron filters, RO water etc. PRV minimum pressure range to support normal and flush pressures (need input from Acuity to ensure work with pressure reducing stations)

Animal Water Control Panel: DM to review with O&M Engineering to determine if UM has a panel available. If not, the project will need to provide panels for the UM DDC shop to modify prior to installation.

Rack & Cage Storage:

The logistics of changing out cages/ racks requires additional space for staging of clean and dirty racks. Coordinate logistic discussion with ULAM to understand the space requirements. Staging racks in corridors may or may not be acceptable – review with the AHJ.

Removal:

Provide dedicated storage and means to remove animal carcasses.

Corridors

Main corridors shall be 7 feet wide. Branch corridors shall not be less than 5 feet-6 inches wide.

Corridor paths shall be considered for research use versus public use. Research animals shall not cross paths with individual public use.

Consider automatic door operators within corridors to assist with cart movement.

Surfaces

Surface Requirements should be coordinated with ULAM. The following should be considered depending on function of the space:

Surfaces shall be constructed of materials that are waterproof and easily sanitized.

Use epoxy painted cement block walls or greenboard/ cement board, epoxy painted plaster ceilings, and smooth texture acid and solvent resistant monolithic floors with integral coved base . All pinholes must be filled. Discuss specific floor materials with ULAM and Researcher.

Protect walls with guard rails: size and type project specific

Provide corner guards at all exterior corners in areas that receive cart traffic: size and type project specific.

In renovations of existing facilities, certain less-desirable features may be unavoidable. The following compromises are examples. Obtain permission from Design Manager for these and other deviations from stated requirements:

- Water-resistant gypsum drywall-on-metal-stud partitions.
- Vinyl-covered gypsum lay-in suspended ceiling panel ceilings in galvanized grid with hold down clips.
- Projecting items such as thermostats are undesirable, but if absolutely necessary, shall be protected with bumpers or guards.
- Exposed overhead pipes and conduits. If required, the penetrations shall be sleeved and sealed. All floor penetrations shall have sleeves and be sealed watertight.
- Above-ceiling devices requiring service or maintenance. If required, provide waterproof access panels. Utility valves should be located above the corridor ceiling.

Doors

- Size: 42 inches wide by 84 inches high minimum. Discuss with ULAM and Researcher as 42" may not be applicable in all locations.
- Type: Galvanized hollow metal door and frames. Review viewing window and related light control requirements with ULAM.
- Configuration: Typically in-swinging into housing rooms; however, direction may vary based on code requirements and traffic flow. In some locations, closing direction should be coordinated with air flow direction..
- Hardware:
    - University Standard mortise digital locksets. With ULAM key core.
    - Delayed action closer.
    - Door protection - armor plates and trim protection.
    - Tight fitting self-sealing neoprene sweeps or surface mounted automatic door bottoms.
    - Avoid projecting thresholds for ease of cart traffic.

Ventilation Systems

See Design Guideline technical section, *Laboratory Ventilation* for vivarium ventilation requirements. Link in Related Sections above.

Environmental Controls

Individual room temperature shall be DDC and have local setpoint adjustment. Review temperature and humidity requirements with Design Manger and ULAM management early in design process. Temperature and humidity must be tightly controlled to setpoints on a year-round basis.

Confirm with ULAM if local control is required.

Temperature and pressure within the room shall be monitored in the hallway, and contained in a flush-mounted panel. Temperature and humidity alarms should provide feedback to the U-M central BAS. The BAS system needs to trend temperature and humidity data. The system should trigger an alarm at BAS if any value is out of the acceptable range.

Lighting, Power, Data, and Fire Alarm

Lighting:

Lighting requirements shall be based on species (dogs, cats, rabbits, rodents, birds, primates etc.). Discuss with UM DM, ULAM and researchers to understand how to handle requirements by species. Options for operations, staff entering space, night vision goggles, etc.

Typically, illumination should be dual level with a high level of 100 to 140 fc (measured at 36" AFF with all lights on) and a low level of 50 to 70 fc (measured at 36" AFF with one half

of lights on). Half of the lights shall be controlled by BAS to simulate day/ night sequence. The other half of lights will be controlled by a timer (manual or DDC) located just inside of the room door, under a waterproof cover. Optical sensors (photocells) shall provide feedback to BAS for the trending of both room light levels.

Lighting types, intensity and color are variable based on species planned for research. The following should be considered:

- Clarify white vs. red light
- Consider two level lighting for stepped on/off = dawn/ dusk not abrupt on/ off
- Consider hours of lighting and intensity
- Consider temporary "on" for cleaning during species switch over

Provide waterproof lighting fixtures to prevent entry of insects and water spray from wash-down hoses, this includes all areas the utilize animal research subjects. Electrical receptacles shall have waterproof covers. Provide GFCI receptacles in all areas subject to wash-down or within 6 feet of sinks.

Data & fire alarm:

Review needs for data jacks with waterproof covers in each animal housing and procedure room.

Review wall phone locations with Project Team.

Wifi access points should be available throughout the space to accommodate research connectivity. Coordinate with UM ITS.

Provide waterproof fire alarm devices in all areas subject to wash-down. For animal suites**,** verify with ULAM and DM the type of fire alarm sound and frequency. Consider/ review the following:

- **F**ire alarm audible sound shall be a Temporal Code 3 slow whoop with a peak frequency of less than 500 Hz.
- If the building is a high rise, the Code-required evacuation message shall also be less than 500 Hz.
- Contact the AEC Electrical Department through the Design Manager for the latest recommendation on audible devices.

Fire Alarm in cage wash areas shall be waterproof/ steam proof and high temperature tolerant devices.

Fire alarm visual devices (strobe lights) shall be located in corridors only because animal rooms are not considered public or common spaces.

Standby Power:

Standby power may be critical to maintain animal health in a power outage, especially in locations using ventilated racks. Early in the design process, review the following considerations with the Design Team:

- Need for standby power including, how much power, how quickly, and for how long.
- Specific loads requiring power.
- Spare capacity of existing generators.
- Ability to add a generator, including available space, available fuel, and exhaust, noise and vibration impacts.
- Cost impact on the project.
- Alternatives, such as moving the animals elsewhere, connecting a portable generator to the building within a few hours, etc.
- Consider HVAC for temperature and ventilation during power outage.

Plumbing

Animal rooms should have hot and cold water and a stainless steel wall sink with a drain board. Provide hot and cold water hose bibs located under the sink.

Floor drains capable of being capped (4") are desirable in all rooms, but may be excluded in certain circumstances. Wash down areas shall have the floor sloped 1/4" per yard and contain rim-flush drains. Drains should have locking covers and contain a bucket trap.

Large animal rooms have special plumbing requirements (e.g., trench drains, flush drains).

Operating Rooms

Operating rooms cannot be used as offices, laboratories, or storage rooms.

Supply and exhaust grilles must be located to provide proper airflow within an occupied room. Typically non-aspirating (perforated) supply air diffusers should be selected and located so that incoming air does not disturb the natural thermal plume that develops over the surgical site. The room shall be maintained at a positive pressure with respect to the adjacent preparation area or corridor.

Review specifics with ULAM for species specific needs.

Typically provide the following:

- Surgical light: ceiling mounted if desired
- Surgical table: confirm type with researcher
- Appropriate scavenging vacuum or alternate means of gas exhaust or point exhaust snorkel
- Plumbed oxygen from a central tank location
- Hot and cold water at sink. Consider adding hose bib for hose down.

- Explosion-proof electrical receptacles and conductive flooring if explosive anesthesia is used. Confirm with ULAM.
- Coordinate receptacle locations with desired equipment
- Coordinate safety requirements with UM EHS ie. Emergency shower and eye wash
- Review LMVR with UM EHS

Surgical Support Rooms

Surgical Prep:

- Locate contiguous to operating room.
- Room may be utilized for instrument and pack preparation.
- Evaluate need for sink

Animal Prep:

- Location not required to have direct access to operating room.
- Room may be used for post-operative recovery. Review with Researcher and ULAM
- Prolonged and complex post-operative care should be performed in a recovery room separate from Animal Prep.

Autoclave room:

- Provide in close proximity to Surgical Suite.