

University of Alabama at Birmingham
SCHOOL OF MEDICINE DESIGN STANDARDS

Standards for HVAC and Lighting Controls

I. Lighting - Should meet current code requirements. Below are preferences.

A. Timer Systems – not preferred.

1. Interior - Lights will be programmed to automatically be shut off at 10:00 PM. Lights can always be turned back on via wall switch. Emergency lighting will always provide minimum egress lighting per code. Thus, no one should be in complete darkness should they be working and the lights go out. Lighting should not be programmed to be turned on.

a) *Dial Timer type switches are especially good for Janitor's Closets, Mechanical Rooms, Electrical Rooms and Tele/com Closets, if an occupancy sensor will work for the space*

b) *Laboratory support, conference and single workstation offices should be vacancy sensors. The occupant must turn the switch on in order to activate the occupancy sensor system. Emergency lighting should not remain on in these areas*

c) *Laboratory bench, open office, and corridors should have occupancy sensors that turn on automatically with the ability to override off.*

2. Exterior – Lights will be turned on via photocell tied to a timer system. Appropriate amount of lights should be turned off at 12:00 PM.

B. Occupancy Sensor Systems

1. Simple on/off switch is preferred with dimmable capabilities. Sensors should have dual monitoring (infrared & ultrasonic preferred). Sensors should be ceiling mounted and appropriately sized. Sensors should be zoned for approximately 3 bays one Sensor per bay. Sensors should be installed in each bay. We have seen furniture block a number of wall mounted sensors and is why we like the ceiling mounted detectors.

2. Planning and Commissioning – Commissioning is required for both the design and installation. There have been numerous installations of installing the wrong type of device for the application. We have also found that placement of the devices is critical to detecting movement.

C. Photocell Systems – These devices shall be installed as minimally required by code as they are hard to maintain.

D. Microscopy and laboratory support spaces – These should have a vacancy sensor system to control the main LED lights but should also include “can” downlights controlled by a dimmer.

E. Cell Culture spaces - Do not require “can” Down lights. Lights should be positioned at the front of the equipment not directly over it.

F. Dark Rooms – These rooms are becoming rare as the imaging equipment is moving to digital platforms. However, standard lighting and switching should be installed. Provide portable plug-in fixture for red light. Ceiling-mounted red lights are discouraged as they are hard to maintain.

II. **HVAC Controls** – There are a number of determining factors in how a zone should be set; air change rate, set-back, fume hoods, and pressure relationships ,air flow cascade, etc. The following describes what ability each zone needs to have to obtain efficiency and safety. It should be understood that heat load, regardless of location, is the driving factor in regard to air changes and set-backs. These guidelines were developed for bio-safety level 1 & 2 laboratories. Bio-Safety Level 3 & 4 spaces will follow a deeper set of criteria.

A. Air Change Rates – Zones should have the ability to have their air change rate set at four different settings. These describe a zone in an “Occupied” setting.

1. Drawings should be developed clearly defining these types of zones.

a) *Standard vs. BSL-2 space.*

b) *Air cascade from lowest risk to highest risk spaces. Amount of pressure differential should be noted. Typical cascade flows from office areas to wet bench to support spaces.*

c) *Thermostat Zone drawings showing the limits for each thermostat.*

d) *Drawings will be signed-off by UAB Environmental Health and Safety, Animal Resource Program, School of Medicine, Campus Maintenance and the Commissioning Agent.*

2. Occupied air change rate in Laboratory spaces is minimum 6. Unoccupied air change rate in laboratory spaces is minimum 3.

3. Air change rate for office space is defined by temperature or as required by code.

B. Set-Backs – Zones in the building should have the ability to be set in one of the following “Unoccupied” settings.

1. "Laboratory" means the area will be 3 air changes per hour. It is important to understand fume hood exhaust requirement as open labs have fume hood and normal exhaust systems. Temperature will not vary more than +/- 2 degrees Celsius. Initiation of Occupied and Unoccupied settings should be Automatic meaning the system is tied to an occupancy sensor.

2. "Office" means that a zone’s air conditioning is minimized between 7:00 PM and 7:00 AM. Minimum temperature should be set on 60 and maximum temperature should be set on 80.

C. Thermostats

1. All Zones should have an override button on the T-stat that gives the occupant the ability to override the system for 2 hour. There should be symbol that indicates whether the zone is in an occupied mode or unoccupied mode.
2. Occupants should have the ability to adjust the zone temperature between 67 and 75 degrees. Laboratories are typically kept in a cool zone. Office preferences vary greatly depending on the occupant.
3. Single workstation offices include one t-stat per 3 offices. It is okay to include a simple damper adjustable air flow system for each occupant.
4. DO NOT PROVIDE A T-STAT THAT IS COMPLICATED IF IT CANNOT TELL THE OCCUPANTS WHAT IS GOING ON. For example, if it has an occupancy sensor but the occupancy sensor indicator but the occupancy sensor indicator is not operational. Don't provide a high end T-Stat that only confuses everyone. This was done at Shelby Interdisciplinary Biomedical Research Building. It is a waste of money and confusing.

D. Fume Hoods – This equipment is a major driving factor in the minimal air change rates of a zone. These will require a minimal FPM across the sash regardless of occupied, unoccupied, air change rate or set back settings. Proposed design of how the Hoods work with the HVAC System should be thoroughly coordinated with UAB School of Medicine, EHS, and UAB Maintenance.

1. *“Normal Hood”* means that a fume hood's purpose is general with NO radioisotopes to be used in the fume hood. These should have a minimum of 85 FPM across the face of the sash at 14”.
2. *“Radioisotope Hood”* means that a fume hood has the ability of radioisotopes to be used in the fume hood. These should have a minimum of 100 FPM across the face of the sash at 14”. These are typically only installed as required.
3. *“Lockout”* means a hood needs to be made dormant. The exhaust can still work via built in bypasses to maintain exhaust requirements of a zone. However, the sash will be locked in the down position to prevent anyone from using the hood. Certifications will not be maintained on these hoods.
4. Other Considerations
 - a) *“Constant Volume”* systems should only be installed in areas where exhaust for a zone is not driven by the fume hood exhaust rate. Minimum FPM is measured at 14”. The FPM will fluctuate depending on the height of the sash. However, the hood should not go into alarm when shut all the way.

- b) *“Variable Volume”* systems should be installed where fume hood exhaust is a determining factor for a particular zone. These should be tied to the BMCS to maintain a constant FPM across the sash at any given position AND still get the minimum air exchange rates needed for a zone.
- c) *“Low Flow Hoods”* use must be approved by EHS.
- d) *“Shut the Sash”* - The School of Medicine would like to maintain policy for occupants to “shut the sash.” Occupancy sensors should be installed if the hood remains open and no one is present for more than 10 minutes. The alarms on the equipment should not alarm when the sash is shut.

E. Pressure Relationships

1. Air Cascade - When configuring the air flows of a zone or multiple zones these pressure relationships need to be maintained in Bio-Safety Level 1 & 2 Laboratories. Bio-Safety Level 3 & 4 spaces will follow a deeper set of criteria. A diagram of the safety zones should be developed and signed-off by the School of Medicine and Occupational Health and Safety.
 - a) Laboratory to adjacent space – Laboratory zones should be negative to a corridor and office zones.
 - b) Cell Culture to adjacent space – Cell Culture Rooms should be negative to its adjacent space. These areas provide a higher potential danger than in the laboratory space.
 - c) Microscopy (or other specialized equipment room) to adjacent space – These rooms should be negative to their adjacent spaces again due to the higher potential danger.
 - d) Equipment to adjacent space – These areas should be negative to adjacent spaces in order to keep their heat load to its area in addition to potential danger in relationship to adjacent space.
2. Monitoring Devices – Proper safety monitoring of the cascade should be reviewed with EHS. Current control system wall mounted monitors provide misleading information and do not alarm appropriately. Ball-in-tube systems do not work effectively for the air differential we are working with. For BSL-2 applications they are not required.
3. III. See specific room sections for additional information.

General Note: These guidelines were developed with the NIH Design Requirements Manual as the basis. Should any note not conform please bring this to the attention of the School of Medicine Administration.

Laboratory Support Room Guidelines

III. **General** – There are several different types of Laboratory Support rooms typically found in School of Medicine Laboratory space. These include, but are not limited to, Common Equipment, Microscopy/Imaging, Cell Culture, Procedure, Specialty, and Fume Hood rooms. Dark Rooms are declining in usage as Digital imaging equipment is becoming more common.

IV. Common Equipment Area Guidelines

A. **General** – These rooms are typically used to house equipment and store materials. Equipment that is noisy, generate heat, bulky or can be left outside the wet lab for long periods such as Ultra Low Freezers (-80 and -140), -20 freezers, 4-degree refrigerators are put in these rooms. They also include common equipment used by many groups including gamma or scintillation counters, centrifuges, incubator shakers and liquid nitrogen. The different types of equipment are outlined below:

1. **Ultra-Low Freezers (-80)** - Freezers may come in single or double doors, electrical requirements are usually **either 115V 60Hz or 230V 50Hz, 20 amp**. Freezers must be on emergency power. Most modern ultralow freezer use 115V/20amp outlets.
2. **-20 C Freezers** – electrical requirements 115V 60Hz 20amp dedicated circuit. It is becoming more common to place -20 C freezers on emergency power, thus their inclusion in the common equipment spaces. Heat rejection for these units is lower than ultralow freezers but still needs to be considered.
3. **Centrifuges** - Max heat dissipation in to room is 1.9kW(7000 Btu/hr). Electrical requirements **208V, 60Hz, 30 amp**.
4. **Incubator shakers**- Electrical requirements 120V 60Hz



5. Liquid Nitrogen Supply Tank



B. Finishes



a) **Flooring** – Sealed Concrete, VCT or quartz tile with rubber base is adequate. Epoxy is discouraged as it cracks when exposed to liquid nitrogen. No sheet vinyl.

b) **Walls** – Low VOC acrylic paint with 100% solids. This makes the wall scrubbable. Oil based paints cause disruption when the area is repainted.

c) **Ceiling** – Standard acoustical tile ceiling system.

d) **Wall protection** – A strip of “Acrovyn” type wall protection should be used like bumper guard. -80’s have bolted standoffs located approximately 1’ above finished floor.

C. Space Relationship

1. **Please note: Drawings should indicate equipment areas, not specific pieces of equipment unless noted otherwise.**
2. Equipment rooms are most efficient when they are rectangular in lieu of square. Doors are not encouraged as it eases the flow of materials and air. However, if necessary. The door should be located in the middle and be at least 4’ wide and will likely be held open. If no door is installed, corner guards are necessary.
3. **Space Designated for Equipment** – Ultra-low refrigerators and floor-mounted centrifuges are the deepest units at 4’ deep. Both units usually require 6” of air space between the wall and the unit for air. Space for equipment should be designated on each side of the aisle. Depth for equipment should be equal. Administrators should have the flexibility of putting ultra-low freezers on either side of the aisle.
4. **Aisle** – Allow for 4’ minimum. Door swings on a -80 refrigerator can be 4’.

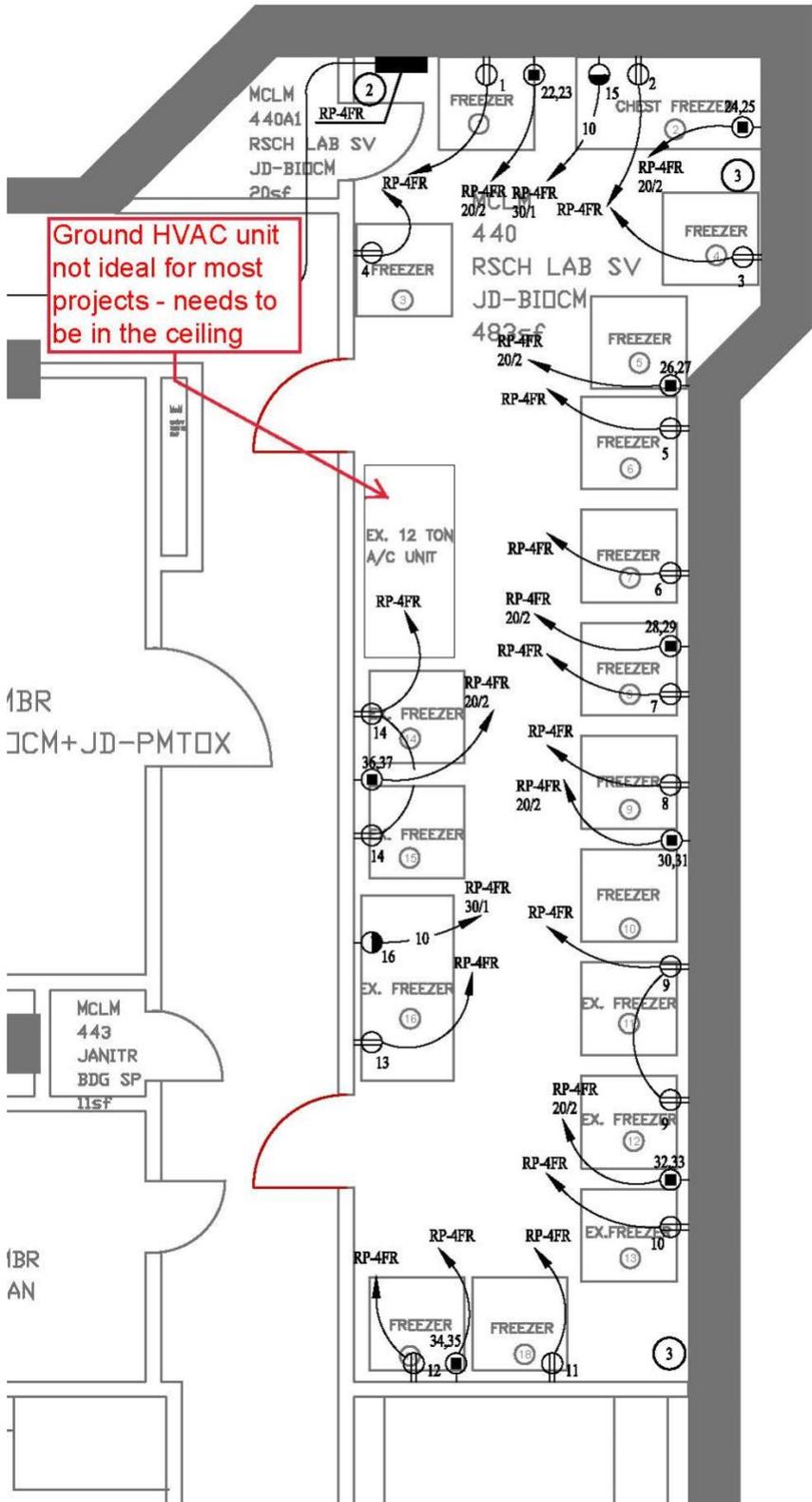
D. HVAC – See standards for HVAC and Lighting Controls for detailed information. See below for main points

1. **Thermostats** are typically a challenge to locate. They should not be located behind where equipment will be located. They can typically be located next to the entrance.

2. Rooms should be counted as **BSL 2** wet lab space and should have the appropriate amount of fresh air changes. Recirculation type supplemental air units should be installed to handle heating loads greater than what the minimum air changes required. Supplemental Air Units should be on Emergency Power. Chilled water pumps feeding those units should be on emergency power.
3. Base heat load for 5% -140 freezer, 95% -80 Freezers. It is common to have only -80 refrigerators in these rooms. Do not assume freezers will be low BTU “Sterling” style.

E. Electrical – Outlet types and locations **MUST** be signed-off by the School of Medicine.

1. Lighting - Lights should be located in the middle of the room. Lighting on the perimeter of the room will be limited by the height of the equipment.
2. 208V 20A outlets - All need to be single receptacle on emergency power.
3. 110V 20A outlets – Most need to be single receptacle on emergency power. A few duplex normal power outlets should be scattered throughout the space.
4. 208V 30A outlets –2 each, 208V 30A outlets should be located together on one side of a given room. These are typically for floor-mounted centrifuges.
5. Blank – a number of single gang boxes with conduit stubbed above ceiling should be located throughout the room for possible future receptacles, alarms, or other low voltage device.
6. All emergency outlets should be **red** and need to be **dedicated circuits** with their own neutral. No circuit breakers should be poled together unless required by voltage needs.
7. Outlets should be installed approximately every 2 feet at 42” AFF.
8. Cover plates should have clear labels defining circuit information AND designate whether emergency or normal power.
9. Electrical Panel – There should be 20 % spare for occupants to run additional circuits as required.
10. Commissioning agent should verify each circuit is labeled correctly at each outlet and panel.



F. General Description - Sterilization facilities are comprised of three main areas. The first is the Sterilization Room where occupants load and unload materials. The second is Sterilization Mechanical Room where the functioning parts of the autoclaves and washers are accessible and most of the utilities to operate the equipment are located. The third is Bio-Hazardous Storage Room for bio-hazardous waste. The following describes room sizes, storage functionality, typical workflow, problems, and equipment specifications. Please note this does not represent requirements for Sterilization and Wash Facilities in Animal Recourse Program space.

G. Sterilization Room

1. Size – Allow enough room for move mobile carts approximately 2’ wide by 3’ long to move easily into and around room. A typical 2 sterilizer & 1 Glassware Washer/Dryer room will require 170 to 220 sf.



2. Casework

a) Counter - A minimum of 5’ work surface (not including Sink) is required 36” AFF. Material should be Epoxy resin with backsplash. Base cabinets are not required and actually discouraged as they usually collect junk and trash. Apron can have pencil drawers which are good for holding manuals and sterilizer paper rolls.

b) Sink – A sink unit is required and should be built into the countertop. Sink should also be epoxy, undermount, with marine edge. Larger and deeper units are preferred .

Shelving – 3’ wide x 2’ deep minimum shelving units should be installed to hold the glassware washer racks and cleaning detergents/rinse.

c) Drying rack – Provide stainless rack with bottom tray to ensure drip will miss backsplash. Drying rack should have soap dispenser and paper towel accessories.





3. Finishes

a) Flooring – Epoxy Resin with decent grip. The floor will get wet. Base should be integral with the epoxy flooring and run up the wall 4". Transitions to other rooms need to be smooth, as carts will be rolling in and out. Flooring should run continuous under autoclave and glassware washers.

b) Walls – Epoxy paint is not required. Oil based paints are discouraged. An acrylic paint with 100% solid content should be used. Special low VOC paints should be utilized for doorframes. High VOC paints cause issues with many workers when areas are being repainted.

c) Ceiling -Moisture resistant 2x2 Lay-in.

d) Condensate is minimal in new machines. "Hoods" are not required. However, if designers are adamant about installing something, a standard commercial "Greenheck" type hood should be utilized over sterilizers and washers. Custom stainless hoods are not required. Connection to HVAC system is not required. Transfer ducts are typically installed between the equipment and mechanical room. Air should flow from equipment to mechanical room.

e) Door – 3' 4" wide by 7' tall to match existing building standard with a half-lite. Door protection preferred. Door closure not required. Utilize overhead stop if space behind the door will be utilized for equipment.

f) Threshold – Transition in and out of the room should be evaluated so that water will stay in the room and run to the drain.

Appropriate threshold that will allow carts and equipment can smoothly roll between the room and corridor should be provide.



4. Utilities

a) HVAC

(1) Areas should be treated as BSL-2, which includes being negative to the adjacent space, 3 air changes unoccupied and 6 air changes occupied.

(2) T-stat location should be away from heat generating equipment.

(3) Air should flow from working area to mechanical area. Mechanical areas do not require cooling. This actually becomes another source of water issues due to condensation. Basically, all air for both spaces should exhaust out the mechanical room.

b) Plumbing

(1) Domestic Water - Provide a swivel gooseneck facet with paddle handles with hot and cold water. Serrated tip not needed.

(2) DI Water – Provide gooseneck facet with serrated tip.

(3) Water Polisher Spigot – provide valve appropriate for Water Polisher to connect.

c) Ice Machine – Each floor typically has an ice machine. An evaluation should be completed if the need for an ice machine should be located in the Sterilizer Room, Common Equipment room or Wet Laboratory. Ice machines should be water-cooled and a chilled water connection provided in addition to domestic water.

H. Sterilization Machine Room – The machine room is the space where the working parts of the autoclaves and Glassware washer reside. It can be entered from the Autoclave room or the corridor adjacent to the Sterilization room. It will have various sources of water on the floor at any given time.

1. Finishes

a) Floor - The epoxy in the Sterilization room should run into through the openings for the equipment into the Machine Room with the same 4" base.

b) Walls – The same Acrylic 100% Solids to a height of 9' AFF.

c) Ceiling – no ceiling is required in these spaces.

2. Plumbing – See Equipment requirements for actual units purchased.



a) *Steam - Trapping is a common problem. Only experienced plumbers who have installed autoclaves should install the piping and provide the connection.*

b) *Recessed Floor Sink - There should be a floor drain between each unit. The drain should not extend beyond the back of the unit to allow ease of access to each machine. Recess the top of the floor sink and include a sloped area drain 1' from the floor sink. Piping should extend into the floor sink.*

c) *Shut-off valves – Domestic water, steam and DI water should have a shut off valve within reach of the machine.*

3. Electrical



a) *Lighting – Wall mounted shop lights. There is typically a lot of overhead plumbing in these rooms. Having the lighting out of the way is beneficial when working overhead. Put lighting on a timer switch.*

b) *Power – Beyond the power needed for each piece of equipment, a convenience 110V duplex receptacle on GFI is requested. There is no need for additional blank panels for 480 V for steam generation. Either the buildings have steam systems or they do not. It will be that way for many years given the new investment.*

4. HVAC

a) *Machine room should be negative to the sterilizer rooms, as this is a high heat load room. However, this is not a BSL-2 area. Supplemental air units can be utilized.*

b) *Registers should not be directly over the equipment. We have experienced condensation on the grills.*

c) *The airflow in the water vapor hood in the Sterilizer room can be transferred to the Sterilization Mechanical Room.*

5. **Door** – Door should have protection and view window. Door closures are not required unless needed for airflow. If closures are installed it should have the capability to be propped open to allow for greater ease when using carts. Overhead stop may be required if space behind the door is to be utilized for storage.

I. Equipment

1. Sterilizers

a) *Size – Typical chamber sizes is 20x20x38*

b) *Gravity & Pre-vacuum – To increase the speed and efficiency of sterilization we require pre-vacuum systems. Typically, these also have Gravity capabilities.*

c) *Cycles and Controls – Sterilizer should provide Gravity, Liquid, Pre-vacuum, Leak Test Cycle. Settings for these cycles should be programmable by the operators via touch screen control panel. The control panel should include Ink-On-Paper verification of each cycle.*

d) *Utilities – Refer to SOM provided cut sheets. Below describes typical situations*

(1) Electrical – locate disconnect in accessible area properly labeled for each piece of equipment it serves.

(2) Steam

(a) *Central vs. Steam Generator – Most buildings have a built in Steam Supply and Return System. Please utilize this system. If a local steam generator is required, utilize carbon steel chamber.. **Blowdown should be automatic.***

(b) *Condensate Return – Most buildings have condensate return. Wastewater should be plumbed accordingly.*

(c) *Designer of the steam supply to these rooms must have experience in design and troubleshooting of steam system as required for Sterilization equipment. Note correct steam trapping is critical. Longevity and most problems with Sterilization equipment are results of poor routing and trapping.*

(3) Water – Water supply should be tested and meet manufacture recommendations in Hardness, Solids, Alkalinity, pH and Silica. If a steam generator is provided another set of water quality criteria as determined by the manufacturer should be met. Equipment should include all water saving features which typically includes vacuum pumps and chilled water.

(4) Telecommunications – Not required

2. Glassware Washer/Dryer

- a) *Size – Chamber load capacity 26x25x26*
- b) *Cycles – Prewash, wash, rinse should be programmable utilizing touch screen pad. Printer should be included*
- c) *Options – Non-Recirculate Heated Pure Water Rinse, Non-Vented Vapor Condenser, Drying System, see cut sheet.*
- d) *Solvents – Washing and rinsing solvents should be front-loaded.*
- e) *Utilities*
 - (1) Steam - **Please provide the steam-heated unit.** Utilize condensate returns located in most buildings.
 - (2) Electrical – 480V, 3-phase, 3 wire or as required by unit
 - (3) Water – Test water to verify it meets unit specifications
 - (4) Pneumatic Air (if required) Test house air to ensure PSIG is adequate. Point of use systems are typically used.

3. Ice Machine

- a) *Ice machines with the icemaker on top of the storage bin are preferred, as they take up minimal SF, similar to Scotsman F0522 with a B322S bin. Icemaker should have approximately 500lb capacity. Ice should be flake. Bin should have legs to ensure adequate drainage.*
- b) *Utilities*
 - (1) Cooling - should be provided by chilled water if available. Chilled water needs to be filtered prior to entering unit. Chilled water units are more energy efficient and much quieter. Air-cooled units are also acceptable. Shut-off valve should be located next to ice machine accessible without the need for a ladder.
 - (2) Domestic Water – As required for making the ice. Shut-off valve should be accessible without the need for a ladder.
 - (3) Drain – Area Floor sink is required. Sink should be crosschecked with actual unit specification prior to placement. Sink should be located behind the unit. Piping should extend into the sink. The building administrator should review any other location prior to placement.

V. Bio-hazardous Waste Storage Area - The purpose of these areas are to hold bio-hazardous waste preventing laboratory workers and vendors from coming in contact with these materials while the waste is waiting to be picked-up.



1. The TB01 Bio-hazardous waste bin currently use by UAB is 18"x18" and the company Stericycle currently is under contract to provide it. They can stack up to four bins each empty, as they fit inside each other. Full, we can stack two high safely. They can also be stacked back to back. The number of units may vary depending on the size of the floor. Typically, we need room for 10 full containers and 10 empty containers.

2. The area can be located in sterilization room but should be designated. Sometimes these areas are located in separate rooms or other utility type areas. EHS prefers that these spaces remain locked and/or accessed by card reader.



3. Finishes – This room will take abuse from the dollies that deliver and remove the bins themselves.

a) *Flooring – The flooring can be either VCT or Epoxy depending on the location.*

(1) Epoxy - If the room is entered from the Sterilization Room it is preferred that the epoxy floor continue into the room. The epoxy should turn up the wall 4".

(2) VCT - If the room is located outside the Sterilization Room, it is typically accessible from the corridor, which is typically VCT. Simply continue the VCT into the room.

b) *Walls – Sheet Acrovyn wall protection should be utilized up to 4' AFF. The same 100% solid paint as in the Sterilizer room should be utilized above the acrovyn.*

c) *Ceiling – Standard lay-in ceiling systems.*

VI. Dark Rooms - These rooms need to be photon free since their purpose is to develop media similar to film.

A. Finishes - Do not make these rooms completely black. Use normal building colors.

1. Walls – Epoxy Paint.
2. Floor – Epoxy with monolithic turned up 4” base.
3. Ceiling – Gasket Ceiling grid.

B. Casework - Provide minimum 6’ of epoxy countertop at 36” AFF. Include integral sink. Wood apron can have pencil drawers to hold the developer manual. Open 1’ deep wall shelves above countertop. No base cabinets.

C. Rotating door with 2 ½’ opening to allow installation of developing equipment. Does not need to be removable.

D. Utilities

1. No Differential Pressure Monitors or any other light generating device should be on the walls,
2. HVAC - Areas should be treated as BSL-2, which includes being negative to the adjacent space, 3 air changes unoccupied and 6 air changes occupied. T-stat location should be away from heat generating equipment.
3. Plumbing
 - a) *Domestic Water - Provide two cold-water spigots. Verify with developer.*
 - b) *Floor Sink*
 - (1) Specification - Provide large deep floor sink to hold 4 - 1” tubes. There should be a 1’ diameter slightly sloped concrete around the floor sink.
 - (2) Location – Floor sink should not be located in front of casework. Floor sink should be located adjacent to the wall with the water spigots. Location should be signed off in the field prior to installation.
 - (3) A Neutralization box should NOT be provided at the sink for developer reagent exchange. Reagents should be dumped to the floor sink via tubing.

4. Electrical

- a) *Two 110Volt 20 amp duplex receptacles above the bench.*
- b) *One 110Volt 20 amp duplex receptacles safely adjacent to the water spigots. 42" AFF.*
- c) *Dedicated switch for normal lights should be located inside the room.*

VII. Microscopy –Microscopy/Imaging Rooms

1. Finishes - Do not make these rooms completely black. Use normal building colors.

a) Walls – Epoxy paint is not required. Oil based paints are discouraged. An acrylic paint with 100% solid content should be used. Special low VOC paints should be utilized for door frames. High VOC paints cause issues with many workers when areas are being repainted..



b) Floor – VCT with Rubber base.

c) Ceiling – Standard Lay-in 2x2 acoustical ceiling. Gasket not required.

2. Casework - Provide minimum 8' of epoxy countertop at 31" AFF. No sink. There should be mostly open space under the counter for seating. Wood apron can have pencil drawers. A few Base Cabinets 18" to 24" wide should be included. Open 1' deep wall shelves 30" above countertop.

3. Door – 3'-4" wide x 7' tall. No view lite.

A light kit should be provided at the door to limit outside light.

B. Utilities

1. No Differential Pressure Monitors or any other light generating device should be on the walls,

2. HVAC – Areas should be treated as BSL-2 which includes being negative to the adjacent space, 3 air changes unoccupied and 6 air changes occupied. T-stat location should be away from heat generating equipment.

3. Plumbing – None required

4. Electrical

a) 2x2 LED lighting located on its own switch.

b) Include compact Fluorescent down lights on Separate Dimmable switch.

c) 4 each 110Volt 20 amp duplex receptacles above the bench on two circuits.

d) *One each 110Volt 20 amp duplex receptacle located on each wall without casework.*

VIII. Cell Culture

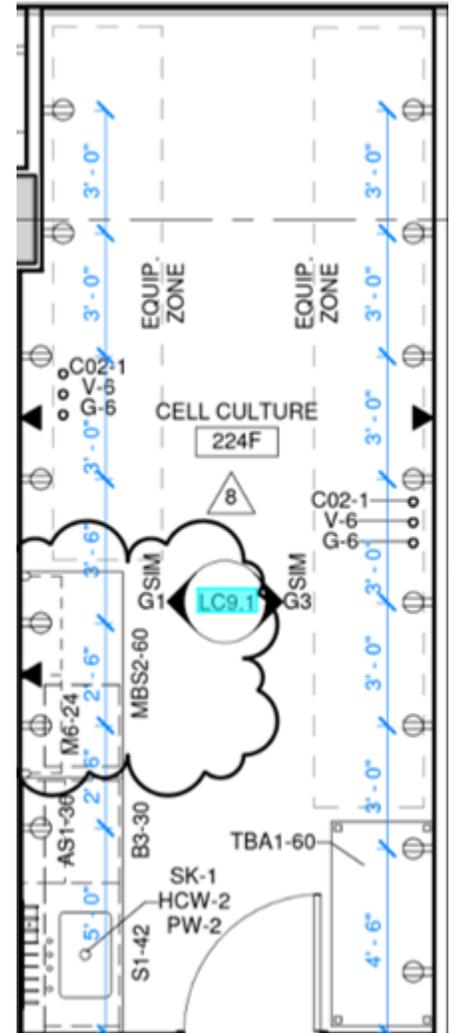


A) Finishes:

- a. Walls: Painted, GWB
- b. Flooring: VCT
- c. Ceiling: ACT, height – 9'6" minimum
- d. Casework: wall shelving, resin benchtops, 1 sink for handwashing located near door
- e. Doors: 1 door 4', active leaf 3'/inactive leaf 1'

B) Utilities:

- a. Lighting: required. Standard lab lighting placed in the middle of the room. Lighting placed over the equipment areas can limit visibility when working in biosafety cabinets
- b. HVAC:
 - i. Temperature control: independent
 - ii. Relative pressure: negative to corridor
 - iii. Air changes: 6 ACH occupied/3 ACH unoccupied minimum. Additional ACH may be required based on risk assessment.
 - iv. Dedicated exhaust not required for biosafety cabinets unless specified. Room exhaust is sufficient.
- c. Plumbing: required – vacuum and natural gas. 1 set on each wall. If a CO2 manifold is available, then CO2 should be provided as well.
- d. Electrical:
 - i. Outlets: Duplex 110V/20 amp receptacles above bench. 110V receptacles located on each wall without casework. See drawing for typical layout.
 - ii. Emergency power: a ratio of 3:1 emergency power outlets should be provided



Other: 1) If tank brackets are required, they should be placed close to the door regardless of incubator location. This provides easy access for tank exchange and reduces disruption and contamination in the space.

IX. Electrophysiology

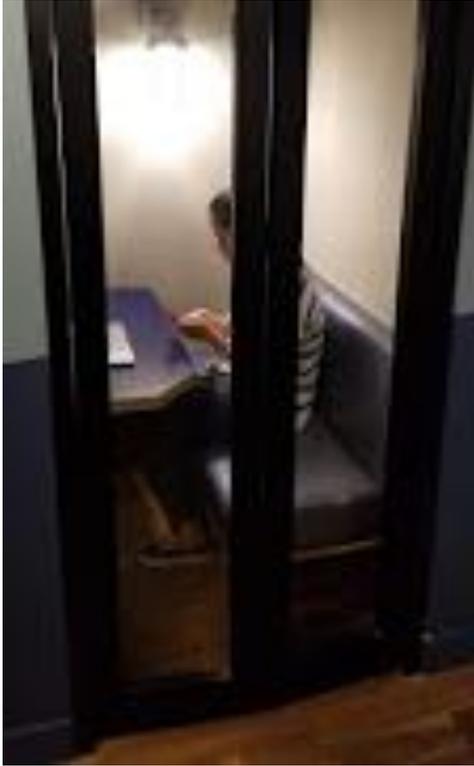
X. Office

A. Write-up – ~36 ASF. Sit-Stand Desk, file cabinet, book shelve combo, all lockable. Dual monitor arm, keyboard tray. Slide out file cabinet. USB/outlet above desktop.

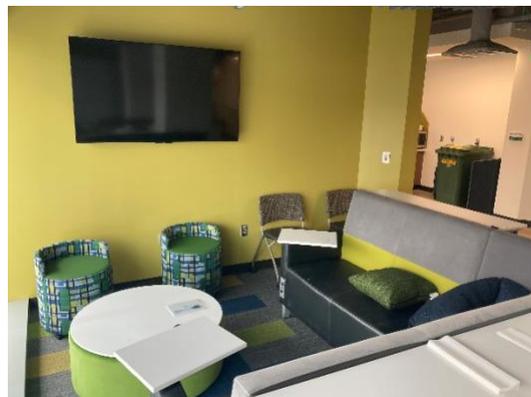
B. Faculty Office <100 ASF. Sit Stand desk, slide out file cabinet, book shelves, movable return, one guest chair. Dual monitor arm, keyboard tray. Sliding door. Manual shade. Adjustable LED lighting. Glass board. Significant soundproofing. USB/outlet above desktop.

C. Phone Booth – Unassigned 1 person. Writing surface. Significant soundproofing.





D. Huddle – 2-4 person meeting. Smart TV with app connectivity. Also provide HDMI cable for computer connection. Provide glass board. 2 styles



1. Built-in monitor “bullet” table. Standard sitting height.
2. Perimeter seating with movable computer stands.

E. Small Conference - 5-8 person. Board style. Smart TV with app connectivity on wall plus HDMI plug-ins at conference table. Glass marker board.

F. Medium-Sized Conference – 9-18 person. Board style with perimeter seating with flip top. Smart TV with app connectivity on wall plus HDMI, USB-A 3.0, USB-C plug-ins at conference table. Full video conferencing. Glass marker board. Simple podium w/o A/V.

G. Large Conference Room –19+ people. Stackable tables and chairs. Provide arrangements for board room and classroom styles. Smart TV(s) with app connectivity on wall plus HDMI, USB A 3.0, USB-C plug-ins at conference table. Full video conferencing. Glass marker board. Full A/V control system operable at podium.



H. Break – Food prep. Domestic water and ice machine with filters. 2+ Microwaves. Large sink for cleaning dishes. Countertop for 3 coffee makers. Large refrigerator. Large Refrigerator/freezer.



I. Coffee – Non-food prep. 2 coffee makers. Small sink. Under counter refrigerator. Concealed trash.

J. Recycling – Work with University Recycling manager to develop plan. Sign-off required by SOM facilities representative.

1. Aluminum and plastic - University provided combo bin at break and office areas.



2. Cardboard – University provide bin at copy or freight area

3. Paper

i. Desk – University provide cardboard box.

ii. Copy – University provided bin

iii. Shredding – Vendor supplied bin

XI. Elevator Guidelines

Freight

1. Floor – Checker Plate preferred
2. Walls – Stainless shell. No panels needed
3. Guard Rail – Stainless, flat profile
4. Ceiling – No special drop ceiling required to maximize the usable space. Lights to have basket protection.
5. Minimum Size
 - a) *Inside Clear Dimensions – 6' wide x 8' deep x 9' high*
 - b) *Door Dimensions – 4' wide x 7' high*
6. Capacity – 5,000 lbs.
7. Control Panel – One panel located on the side to maximize the door size.
8. Security – Card Reader required between 5:00 PM to 7:00 AM.
9. Lobby Requirements – 8' Turning Radius to adjust equipment.

Passenger

10. Floor – No ceramic tile, terrazzo or sheet vinyl. Match lobby corridors unless previously noted.
11. Walls – Laminate panels with flyer holder strips
12. Base – recessed behind wall panels. No rubber base
13. Guard Rail – back and sides.
14. Ceiling – No translucent grid systems. They tend to discolor and never get cleaned.
15. Minimum Size
 - a) *If a Freight Elevator is available, be able to fit 6 persons comfortably*
 - b) *If no Freight Elevator is available*
 - (1) *Inside Clear Dimensions – 5.5' wide x 7' deep x 9' high*

(2) Door Dimensions – 4' wide x 7' high

16. Capacity – 5,000 lbs.
17. Control Panel – One panel located on the side to maximize the door size.
18. Security – Card Reader required between 5:00 PM to 7:00 AM.

XII. Door and Hardware Guidelines

XIII. Laboratory

- A. Minimum Opening 3'-4"x7'-0"
- B. Wood Doors with half lite
- C. Hollow Metal Frame
- D. Hardware
 - 1. Lockset
 - 2. Closure with stop lever
 - 3. Overhead stop
- E. Card reader on open lab designs

XIV. Microscopy

- A. Minimum Opening 3'-4"x7'-0"
- B. Wood Doors (NO Window)
- C. Hollow Metal Frame
- D. Hardware
 - 1. Lockset
 - 2. Closure with stop lever
 - 3. Overhead stop

XV. Autoclave, Sterile Storage, Gas Storage

- A. Minimum Opening 3'-4"x7'-0"
- B. Wood Doors with half lite
- C. Hollow Metal Frame
- D. Hardware

1. Lockset
 2. Closure with stop lever
 3. Overhead stop
 4. Door protection
- E. NO Card reader

XVI. Other Support Rooms

- A. Minimum Opening 3'-4"x7'-0"
- B. Wood Doors with half lite
- C. Hollow Metal Frame
- D. Hardware
 1. Lockset
 2. Closure with stop lever
 3. Overhead stop
- E. NO Card reader

XVII. Conference Rooms, Multipurpose Rooms

- A. Minimum Opening 3'-4"x7'-0"
- B. Wood Doors with view lite
- C. Hollow Metal Frame
- D. Hardware
 1. Lockset
 2. No Closure
 3. Wall stop
- E. NO Card reader

XVIII. Offices, Cubicle Rooms & Break Areas

- A. Minimum Opening 3'-0"x7'-0"
- B. Wood Doors with full lite
- C. Hollow Metal Frame
- D. Hardware
 - 1. Lockset
 - 2. No Closure.
 - 3. Wall stop
- E. NO Card reader

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