

Lab Renovation Checklists

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INITIAL RESEARCH LABORATORY PROGRAMMING

SPACE PLANNING CATEGORY [NEW]

1. Identify Research Category
 - a. Chemical
 - b. Biological
 - c. Electrical
 - d. Physical
 - e. Interdisciplinary
2. Identify Space Infrastructure Requirements
 - a. Intended Occupancy
 - b. Oversize equipment
 - i. Exceeding 4' in any horizontal direction
 - ii. Exceeding 6' in any vertical direction
 - c. Research Equipment
 - i. Number of fume hoods
 - ii. Toxic or flammable gases
 - iii. High electrical requirements
 - iv. Proposed Chemical Inventory
 - d. Specialty Space Considerations
 - i. Clean room and Class (i.e 100, 1000, 10,000)
 - ii. Nanotechnology
 - iii. Cryogenics
 - iv. Gauss sensitivity
 - v. Low vibration required (Rating – A-F; i.e. electron microscope)
 - vi. High vibration producing (Segregated slab req.; i.e. Load frame testing)
3. Chemical and Lab Use Safety review
 - a. Does selected space meet safety guidelines (i.e. EH&S mandated maximums; Chemical or gas maximums per floor; Fire Authority mandates)
 - i. Yes – move forward
 - ii. No – reduce scope or revise location
4. Determine Available Existing Facility Space to Accommodate Requirements
 - a. Determine Min-Max square footage range
 - b. Consider existing lab space utilizations for best use scenarios
 - c. Consider alternative lab space usage through relocation (i.e. “domino” moves)

5. Other AHJ requirements:
 - a. Fire safety
 - b. Building code upgrades**
 - c. University policies
 - d. Specialty security considerations (DARPA, ITAR, Federal Radiation, etc.)

B. PROJECT LAB SPACE

1. Select Primary Preferred Location
2. Evaluate Existing Facility Infrastructure
3. Chemical inventory [Floor maximums, include multi-story considerations)
4. Confirm Space Availability with Authority having Jurisdiction
5. Domino Moves required (i.e. relocation of current lab space occupants to other spaces)?

Include Domino moves in hierarchy project scheduling

Listing of facility elements to be identified and considered for Lab Projects
Space planning (not in any particular priority).

1. Space
 - a. Existing infrastructure (as built)
 - i. Year built
 - ii. Code review (necessary update once touched – built code versus current code to be built too)
 - b. Square footage
 - i. Perimeter shape
 - ii. Structural members
 1. Columns
 2. Overhead beams
 - iii. Ceiling height
 1. Ceiling type
 - a. Example Armstrong 2X2 acoustic
 - b. Example 2X4 washable vinyl
 - c. Other
 - c. Flooring
 - i. VCT
 - ii. Sheet flooring
 - iii. Concrete
 - iv. Ceramic tile
 - v. Carpet
 - vi. Other attributes
 1. Electrostatic dissipative (ESD)
 2. Cove up wall
 - vii. Cove base
 - d. Walls
 - i. Block
 - ii. Brick
 - iii. Drywall
 - iv. Specialty (i.e. FRP, etc.)
 - v. Plumbing chase
 - vi. Air return chase
 - e. Electrical
 - i. Availability
 - ii. As built
 - iii. 120v
 - iv. 208v
 1. Single phase
 2. Three phase

- v. 480v
 - 1. Single phase
 - 2. Three phase
- vi. Other
 - 1. Medium voltage
 - a. 4160v
 - 2. High voltage
- vii. Specialty transformers
 - 1. Power conditioners
- viii. Specialty safety
 - 1. Fencing
 - 2. Discharge wands
 - 3. Emergency Off
 - 4. Ground fault interrupt
 - 5. Specialty Fire (i.e. Non-water)
- f. Lighting
 - i. Type
 - 1. Troffer flush mount
 - 2. Pendant
 - 3. Architectural (specialty for design not necessarily function)
 - ii. Bulbs
 - 1. Fluorescent
 - 2. LED
 - 3. UV
 - 4. Yellow
 - 5. Other (i.e. color in Kelvin)
 - iii. Lumens by design
 - 1. Classroom – 55?
 - 2. Lab - 75?
 - iv. Controls
 - 1. Dimmable
 - 2. Split switch
 - 3. Motion activated
- g. Air Quality Dynamics
 - i. Existing air exchange rate
 - 1. Single pass air
 - 2. Recirculated air
 - ii. Use of heat exchanger?
 - iii. HVAC
 - 1. VAV boxes
 - a. 2-pipe system
 - b. 4-pipe system
 - c. Size of existing unit, if any

2. DX units
 - a. Capacity
 - i. Current available percentage for new lab
 - ii. Percentage of outside air
 3. Humidity control
 - a. Steam
 - b. Other devices
 - i. Dehumidifier
 4. Control system
 - a. Remote or manual control
 - b. Pre-set controls (Factory or on-site)
- iv. Exhaust
1. General room exhaust
 2. Fume Hood exhaust
 - a. Acid exhaust
 - i. House exhaust
 1. Capacity
 2. Available
 - ii. Individual lab exhaust fan
 1. Capacity
 2. Available
 - b. Solvent exhaust
 - i. House exhaust
 1. Capacity
 2. Available
 - ii. Individual lab exhaust fan
 1. Capacity
 2. Available
 3. Equipment exhaust
 - a. Type (i.e. snorkel, direct hook up, glove box, etc.)
 4. Control system
 - a. Phoenix Valves or other brand auto-adjusting
 - b. Remote or manual control
 - c. Pre-set controls (Factory or on-site)
- v. Nanoparticle
1. Vibration
 2. Particle Filtering in exhaust or other

- vi. Bio-filtered
 - 1. Alarms?
 - 2. Security?
 - 3. Bio-Class
 - a. 1
 - b. 2
 - c. 3 or higher (biosafety regulated)
- vii. Air pressure dynamics
 - 1. Negative to outside of lab
 - 2. Positive to outside of lab
- viii. Clean room
 - 1. Class Rating (i.e. Class 10,000, 1000, 100)
 - 2. Entire space or only a portion
 - 3. HEPA
 - a. Mini-clean room
 - b. Other
 - 4. Gowning area
- h. Water
 - i. Process chilled water
 - 1. Require temperature for specific equipment?
 - 2. Volume of flow?
 - a. Pipe sizing
 - b. Gauges
 - c. Alarm re: low flow
 - 3. Room chiller required for lower temp than provided?
 - ii. DI
 - 1. Megaohm range needed
 - 2. Polisher required (by researcher but power, shelf and drain provided by project)
 - iii. RO
 - 1. Building RO
 - 2. Undersink unit
 - iv. Faucet/Sink/drain
 - 1. Double or single
 - 2. Hot water needed?
 - a. Req. volume per minute; per hour.
 - b. Piped from building hot water heater
 - c. New hot water heater
 - d. Insta-hot
 - v. Specialty considerations
 - 1. Dishwasher
 - 2. Flask washer
 - 3. Abatement (i.e. goes to tank not sewer)

- vi. Safety Shower
 - 1. Within 10 sec access and no pass thru door to utilize it
 - 2. With curtain for privacy (cultural mandate)
- vii. Eyewash
 - 1. ADA compatible
- i. Gases
 - i. Compressed Air (CA)
 - 1. Building provided
 - 2. Independent CA unit
 - ii. Cylinder provided
 - 1. Inert gas
 - 2. Toxic
 - 3. Flammable
 - iii. Meter required for billing/tracking?
- j. Vacuum
 - i. Vacuum conduit
 - 1. Copper
 - 2. Stainless steel
 - 3. Chemical resistant
 - 4. Conduit size (calculated)
 - ii. Equipment usage
 - 1. Direct connect
 - 2. Powers on with equipment
 - 3. Manual switch
 - iii. Fume hood usage
 - 1. Direct connect valve
 - iv. Biohood usage
 - 1. Bio-filtered
 - v. Chemical
 - vi. Vacuum required TORR rating (specification for use).
 - vii. Station count (i.e. to determine vacuum pump size)
 - viii. Static or PRN
 - 1. Example constant vacuum furnace
 - 2. Example holding a work piece on a table
 - 3. Pipetting
 - ix. Toxic (i.e. exhausted to fume hood or other)
 - x. Not toxic
 - xi. Specialty considerations
 - 1. Alarms when failure
 - 2. Text or alert system
 - 3. Maintenance (typically two units, each capable of running independently so as to allow for break down and repair without loss of function to the system.)

- 4. Vibration (vacuum pumps near microscope or other vibration sensitive equipment?).
 - 5. Noise
 - k. Fire Controls
 - i. For equipment
 - ii. Notification
 - iii. As required by AHJ
 - l. Exiting
 - m. Alarm systems
 - i. Fire
 - ii. Low exhaust
 - iii. Gas leak
 - iv. Water
 - v. Loss of power
 - vi. Biological refrigerator or other
 - n. CODE ISSUES
 - i. Too numerous to list
 - o. ADA issues
 - p. Abatement concerns
 - i. ASBESTOS
 - 1. Walls
 - 2. Floor
 - 3. Materials
 - 4. Piping wrap
 - 5. Etc.
 - ii. Mercury, Lead or other regulated substances
 - q. Equipment access
 - i. Loading dock
 - ii. Door opening sizes
 - iii. Freight elevator
 - 1. Size/capacity
- 2. Lab Equipment
 - a. Fume hoods
 - i. Quantity
 - ii. Size (i.e. 4'; 6'; 8')
 - iii. Type
 - 1. Acid
 - a. Epoxy base
 - 2. Solvent
 - a. Stainless steel base
 - b. Epoxy base
 - 3. Metals free
 - 4. Other

- a. Laminar Flow HEPA filtered
- iv. Features
 - 1. Acid cabinet
 - a. Epoxy base
 - 2. Solvent Cabinet
 - 3. Vacuum chamber
 - 4. Carboys
 - 5. Sinks
 - 6. Valves
 - a. Gas
 - b. Liquid
 - c. Vacuum
 - d. Etc.
 - 7. “Monkey bars”
 - 8. Electrical outlets
- b. Gases
 - i. Gas Cabinets
 - 1. Type
 - a. Toxic
 - b. Flammable
 - c. Pyrophoric
 - d. Caustic
 - e. Other (i.e. Highly regulated)
 - 2. Size of gas
 - 3. Number of cylinders
 - 4. Quantity of Cylinders per cabinet
 - 5. Control systems
 - a. Automatic
 - b. Semi-automatic
 - c. Manual
 - d. Purge
 - ii. Inert gas
 - 1. Quantity of tanks
 - 2. Piping
 - 3. Liquid Dewar’s
 - 4. Storage
- c. Piping
 - i. High Purity
 - ii. Stainless steel
 - iii. Other

- d. Sensors
 - i. Fire/Smoke
 - ii. Chemical
 - iii. Gas
 - iv. CO
 - v. CO₂
 - vi. O₂
- e. Fire Alarm
 - i. Toxic
 - ii. Flammable
 - iii. Pyrophoric
 - iv. Highly regulated
- f. Fire Sprinkler systems
- g. Bio-hoods
 - i. Exhausted
 - ii. HEPA filtered
 - iii. Type
 - iv. Class
 - v. Size
 - vi. Base
 - vii. Location in relation to exiting and air flow past the opening
- h. Cryogenics
 - i. Process chilled water
 - ii. Chiller
 - iii. Gas exhaust for emergency release of Nitrogen or Helium
 - iv. Overhead crane to remove cryo head
 - v. Ceiling height
 - vi. Power
 - 1. Emergency Power
 - 2. Alert system for power failure
 - vii. Specialty needs
- i. Specialty
 - i. Microscopes
 - 1. Electron
 - 2. Atomic Force
 - 3. Vibration sensitive
 - 4. Gauss sensitive
 - ii. Vibration-producing
 - iii. Low Vibration required
 - 1. Rating A-F
 - 2. Segregated slab
 - 3. Mass slab

- j. Floor mount
- k. Bench mount
- l. Wall mount
- m. Ceiling mount
- 3. Specialty research
 - a. Controlled Environment Rooms
 - b. Laser
 - i. Warning lights
 - ii. Curtains
 - iii. Voltage stabilizer
 - iv. Interlocks
 - v. Chiller
 - vi.
 - c. Electron microscope
 - i. EMI sensitivity
 - d. Live Animals
 - e. Supersonic wind tunnel
 - f. Radiation producing
 - g. High Power
 - i. Microgrid
 - ii. 4160v
 - iii. High Amperage
 - iv. Safety requirements
 - h. Agriculture
 - i. Drone
 - i. Safety netting
 - ii. Protection against building damage (i.e. fire sprinklers. Walls, windows, etc.)
 - iii. Specialty wireless needs
 - j. Large Load frame
 - i. Specialty mounting
- 4. Safety considerations
 - a. Specialty
- 5. Architectural features
 - a. Windows
 - b. Wall graphics
 - c. Wall displays (i.e. corkboard for posters, etc.)
- 6. Electronics
 - a. Internet
 - b. Intranet
 - c. Wireless
 - d. Conditioned power
 - e. Static electricity discharge

- i. Flooring
 - ii. Mats
 - iii. Other
 - f. Solder stations
 - i. Fume extraction
- 7. Furniture (FFE)
 - a. Lab bench
 - i. Height i.e. sitting or standing or adjustable
 - b. Storage cabinets
 - i. Uppers
 - ii. Lower
 - c. Chemical storage cabinets
 - i. Size,
 - ii. Venting
 - d. Flammable storage cabinets
 - i. Size
 - ii. Venting
 - e. Chairs
 - i. Cleanable
 - ii. Height adjustable
 - iii. Arms
 - iv. Foot rest
 - v. Electrostatic dissipative (ESD)
 - f. Shelving
 - i. Adjustable
 - 1. Weight bearing capacity
 - g. Phone
 - h. Signage
 - i. ADA