CONTENT

CODES AND STANDARDS

Important laboratory references and guidelines are listed below. These are minimum requirements. In the case of laboratory related buildings, the recommendations of the guidelines below and the standards and requirements suggested by the design team will often address issues not sufficiently covered in local building codes.

REFERENCES AND GUIDELINES

Document	Reference	Summary of Purpose
2010 California Building Code	(CBC 2010)	Compete State building code requirements.
2010 ADA Standards for Accessible Design	(ADA 2010)	Furnishes special considerations that must be given to accommodate laboratory workers with physical impairments. This includes wheel chair accessibility, work bench height, and access to controls.
ANSI/ICC A117.1-2003 Standard on Accessible and Usable Buildings and Facilities.	(ANSI 2003)	Provides specs for elements used in making functional spaces accessible to allow persons with physical disability to independently get to, enter, and use a site, facility, building, or element.
ANSI/AIHA Z9.5, Laboratory Ventilation	(AIHA 2003)	Establishes minimum requirements and procedures for the design and operation of laboratory ventilation systems used to protect personnel from overexposure to harmful or potentially harmful contaminants.
ANSI Z358.1-2004, American National Standard for Emergency Eyewash and Shower Equipment	(ANSI 2004)	Establishes minimum performance and use requirements for eye wash and shower equipment for the emergency treatment of the eye or body of a person who has been exposed to injurious materials.
ANSI/ASHRAE Standard 110-1995, Method of Testing Performance of Laboratory Fume Hoods	(ASHRAE 1995)	Provides a method to quantify fume hood performance. It tests the competence of a fume hood at a given point in time to establish a baseline for quantifying a fume hood's performance.
ANSI/ASHRAE Standard 55-1992, Thermal Environmental Conditions for Human Occupancy	(ASHRAE 1981)	Forms the basis for the indoor design temperature and humidity for most spaces.
ANSI/ASHRAE Standard 62-1999, Ventilation for Acceptable Indoor Air Quality	(ASHRAE 1989)	Forms the basis for the minimum outside air requirements for most spaces and stipulates when treatment of outside air and exhaust air is necessary.

CODES AND STANDARDS

Document	Reference	Summary of Purpose
ASHRAE 90.1-2007, Standard for Energy Conservation in New Building Design	(ASHRAE 2007)	Provides guidelines for designing energy efficient HVAC systems.
ASHRAE Handbook, HVAC Applications, Chapter 14, Laboratories	(ASHRAE 2007)	Provides guidelines for laboratory ventilation and applications to various laboratory facilities.
Operations Manual for Laboratories. SHEMP (Safety, Health and Environmental Management Program)	(EPA 1998)	This document provides guidance on management and administration, hazard identification and evaluation, laboratory Safety, Health and Environmental Division programs, engineering controls, protective clothing and equipment, work practice controls and laboratory emergency situations.
NFPA 30, Flammable and Combustible Liquids Code	(NFPA 2008)	Provides the most up-to-date requirements for dealing with flammable and combustible liquids and is therefore useful to design engineers, enforcing officials, insurers, and laboratory workers.
NFPA 45, Fire Protection for Laboratories using Chemicals	(NFPA 2004)	Provides the minimum fire protection requirements for fire safe design and operation in educational and industrial laboratories using chemicals.
NFPA 101, Life Safety Code	(NFPA 2009)	Addresses all the construction, protection, and occupancy features needed to minimize danger to life from fire, smoke, and panic. Forms the basis for law in many national jurisdictions.
Prudent Practices in the Laboratory, Handling and Disposal of Chemicals	(NRC 1995)	Recommends several prudent practices that stimulate a culture of safety for chemical laboratory operations. Provides information and cross-references on how to handle compounds that pose special hazardous risks.
OSHA 29 CFR 1910.1450, Occupational Exposure to Hazardous Chemicals in Laboratories	(OSHA 1990b)	Provides protection for all laboratory workers engaged in the use of hazardous chemicals.
SEFA 1-2002, Laboratory Fume Hoods, Recommended Practices	(SEFA 2002)	Provides information on design, materials of construction, use, and testing of laboratory fume hoods. These tests establish the average face velocity and adequacy of the airflow throughout the overall open face area of fume hoods.

CODES AND STANDARDS

Document	Reference	Summary of Purpose
SEFA 2-1997, Installation of Scientific Furniture and Equipment, Recommended Practices	(SEFA 1997)	Provides information for architects, specifying engineers, contractors, and other purchasers about the installation practices recommended by manufacturers of scientific laboratory furniture and equipment.
SEFA 8, Laboratory Furniture, Recommended Practices	(SEFA 2007)	Provides manufacturers, specifiers, and users with tools for evaluating the safety, durability, and structural integrity of laboratory casework and complementary items.
Industrial Ventilation, A Manual of Recommended Practices, 24th Edition	(ACGIH 2001)	Recommends best practices, including research data and information on the design, maintenance, and evaluation of industrial exhaust ventilation systems. Basic ventilation principles and sample calculations are also presented.

CODES AND STANDARDS

APPLICABLE CODE COMMENTARY

International Building Code

Occupancy: Because the laboratory areas are educational spaces above the 12th grade, as allowed by paragraph 304.1, the laboratory areas should be classified as Business Group B occupancy except where not allowed as described below.

Hazardous Materials: Control Areas in Group B occupancies may contain up to the maximum quantity of the exempt amounts of hazardous materials as listed in Tables 307.7 (1) and (2), including allowable increases for buildings provided with automatic fire suppression and approved storage cabinets. A Control Area can be made up of several laboratories, an entire floor, or an entire building; a multi-story Control Area is allowed. The floor area of a Control Area is not limited. The number of Control Areas per floor and the percentage of the maximum allowable quantities of hazardous materials per floor are listed in Table 414.2.2. Control Areas containing hazardous materials exceeding the exempt amounts must be classified as Group H occupancies as indicated in the tables and constructed as required.

Fire Resistance Rating Requirements: Control Areas shall be separated by fire barriers of fire-resistance ratings listed in Table 414.2.2. The floor assembly of Control Areas and the construction supporting the floors of the Control Areas shall have a minimum 2-hour fire resistance rating. A 1-hour fire resistance rating is allowed in buildings of Types IIA, IIIA, and VA construction provided the building is equipped with an automatic sprinkler system and is three stories or less above the grade plane.

Exits: Spaces in Group B with more than 50 occupants shall have two or more exits or exit access doorways.

OTHER STANDARDS

While the following provisions from other standards are not specifically referenced by the International Codes, they provide specific laboratory design recommendations.

NFPA 101: Life Safety Code

Means of Egress: Where exits are not immediately accessible from an open floor area, safe and continuous passageways, aisles, or corridors shall be maintained leading directly to every exit and shall be arranged as to provide convenient access for each occupant to at least two exits by separate ways of travel.

Exit access shall be so arranged that it will not be necessary to pass through any area identified under protection from hazards in the chapters on specific occupancies. Exit access from rooms or spaces shall be permitted to be through adjoining or intervening rooms or areas, provided that such adjoining rooms are accessory to the area served. Access to an exit shall not be through storerooms, workrooms, closets, or similar spaces, or other rooms or spaces subject to locking.

CODES AND STANDARDS

Corridor Width: The minimum width of any corridor or passageway serving as a required exit, exit access, or exit discharge shall be 44 inches.

NFPA 45: Fire Protection for Laboratories Using Chemicals

Means of Egress: The means of egress for laboratory units and laboratory work areas should comply with NFPA 101.

Access to Exits: A second means of access to an exit shall be provided from a laboratory work area if any of the following situations exist:

- A laboratory work area contains an explosion hazard so located that an incident would block escape from or access to the laboratory work area.
- A Class A laboratory work area which exceeds 500 SF or a Class B, C, or D laboratory work area which exceeds 1,000 SF.
- A fume hood in a laboratory work area is located adjacent to the primary means of exit access.
- A compressed gas cylinder in use which is larger than lecture bottle size or a cryogenic container in use, and contains a gas which is flammable or has a hazard rating of 3 or 4 and would prevent safe egress in event of accidental release of cylinder contents.

The required exit doors of all laboratory work areas within Class A or Class B laboratory units shall swing in the direction of exit travel.

Furniture and Equipment: Furniture and equipment in laboratory work areas shall be arranged so that means of access to an exit may be reached easily from any point.

Explosion Hazard: Explosion hazard is considered to exist if reactivity rating 4 materials are stored or used, or if highly exothermic reactions or procedures without established properties are planned, or if high pressure reactions are planned.

NFPA 30 - Flammable and Combustible Liquids Code

Liquid Classification

Combustible liquids have a flash point at or above 100° F (37.8°C) and are classified as follows:

- Class II: Liquids with a flash point at or above 100°F (37.8°C) and below 140°F (60°C)
- Class III A: Liquids with a flash point at or above 140°F (60°C) and below 200°F (93°C)
- Class III B: Liquids with a flash point at or above 200°F (93°C)

Flammable liquids have a flash point below 100°F (37.8°C) and a vapor pressure not greater than 40 lbs per square inch (absolute) (2,068 mm Hg) at 100°F (37.8°C). Flammable liquids are classified as follows:

CODES AND STANDARDS

- Class I A: Liquids with flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C).
- Class I B: Liquids with flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C).
- Class I C: Liquids with flash points at or above 73°F (22.8°C) and below 100°F (37.8°C).

Storage Cabinets: Not more than 120 gallons (454 L) of Class I, Class II, and Class III A liquid may be stored in a storage cabinet. Of this total, not more than 60 gallons (227 L) may be of Class I and Class II liquids and not more than three (3) such cabinets may be located in a single fire area in a building equipped with automatic fire suppression, except that, in an industrial occupancy, additional cabinets may be located in the same fire area if the additional cabinets (not more than a group of three) are separated from other cabinets or group of cabinets by at least 100 feet (30 M).

ANSI/AIHA Z9.5 Laboratory Ventilation

Air Recirculation

Non-laboratory air. Air from building areas adjacent to the laboratory may be used as part of the supply air to the laboratory if its quality is adequate.

General room exhaust. Air exhausted from the general laboratory space (as distinguished from exhaust hoods) shall not be recirculated unless one of the following sets of criteria is met:

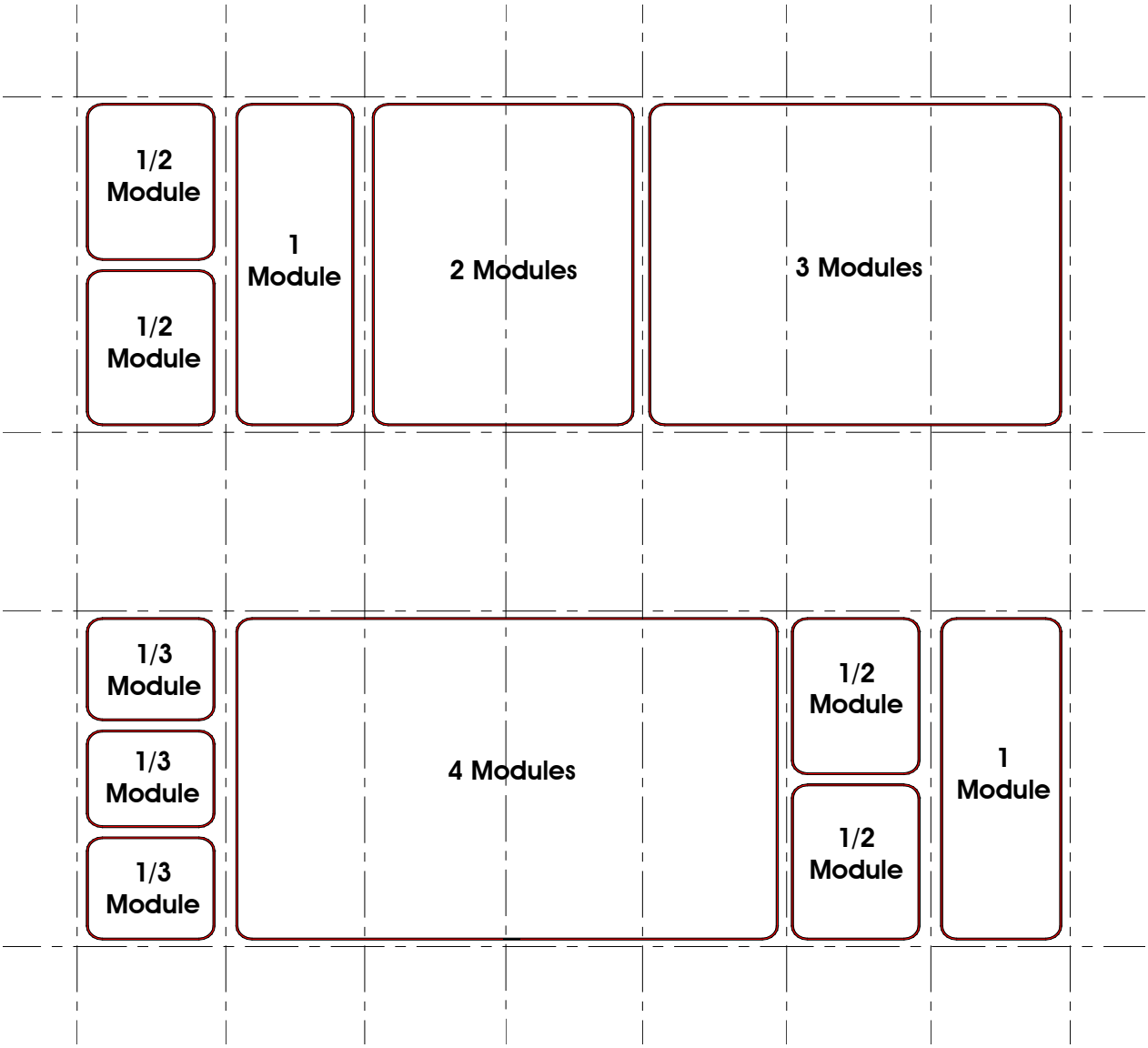
1. Criteria A
   a. There are no extremely dangerous or life-threatening materials used in the laboratory.
   b. The concentration of air contaminants generated by the maximum credible accident will be lower than short-term exposure limits;
   c. The system serving the exhaust hoods is provided with installed spares, emergency power, and other reliability features as necessary.
2. Criteria B
   a. Recirculated air is treated to reduce contaminant concentrations to those specified in 4.3;
   b. Recirculated air is monitored continuously for contaminant concentrations or provided with a secondary backup air cleaning device that also serves as a monitor (i.e., a HEPA filter in a series with a less efficient filter, for particulate contamination only);
   c. Provision of 100% outside air, whenever continuous monitoring indicates an alarm condition.

In addition to the above standards it will be necessary during the design phases of the project to work closely with the representatives of CañCollege. The project team may need to incorporate additional requirements as laboratory and support spaces are more definitively developed.

MODULAR PLANNING & FLEXIBILITY

Laboratories should be organized around modular planning principles so they are constructed with standardized units or dimensions for flexibility and a variety of uses. Modular planning is used as an organizational tool to allocate space within a building. The module establishes a grid by which walls and partitions are located. As modifications are required because of changes in laboratory use, instrumentation, or departmental organization, partitions can be relocated, doors moved, and laboratories expanded into larger laboratory units or contracted into smaller laboratory units without requiring reconstruction of structural or mechanical building elements.

The planning modules may be combined to produce large, open laboratories or subdivided to produce small instrument or special-use laboratories.



The above description of the planning module also includes the organized and systematic delivery of laboratory piped services, HVAC, fume hood exhaust ducts, power and signal

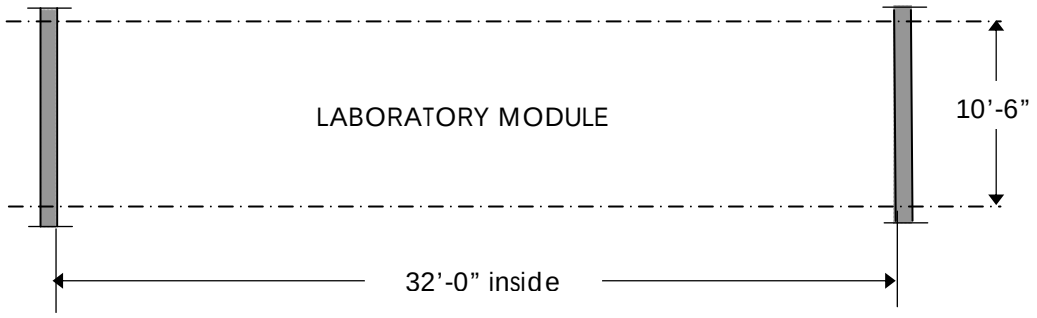
MODULAR PLANNING & FLEXIBILITY

cables. If these services are delivered to each laboratory unit in a consistent manner, then changes in laboratory use requiring addition or deletion of services will be easy to accomplish because of the constant nature of the infrastructure.

The laboratory planning module dimensions should result from analyzing the laboratory bench space, equipment and circulation space.

- The bench dimensions should accommodate technical work stations, instruments, and procedures.
- The space between benches is designed to allow people to work back-to-back at adjacent benches, allowing accessibility for disabled and movement of people and laboratory carts in the aisle.
- The module should provide adequate bench space for floor standing equipment.

Based on the above requirements and anticipated occupant loads the laboratory planning module for the Science & Technology Building has been determined to be 10'-6" wide by 32'-0" as shown below.



Island benches which are generally 5'-0" deep for double-sided use and wall benches 2'-6" deep are anticipated to accommodate the types of activities and instruments to be used in the Science & Technology Building. In all cases the dimensions and configurations of the cabinets below the benches must be carefully coordinated with clearances needed for installing plumbing and electrical equipment and services.

A 5'-0" minimum aisle between benches will minimize circulation conflicts and reduce potential safety hazards and should be provided wherever possible. It is critical in all laboratory spaces that students and instructors are able to maneuver without conflict in all aisles.

CIRCULATION AND INTERACTION

CIRCULATION

The design of the Science & Technology Building should assure effective external circulation for people accessing the building, delivery of materials and equipment and the removal of the laboratory waste on periodic basis.

Internal building circulation should provide safe pedestrian egress from each individual laboratory and laboratory support space through an uncomplicated path of egress to the building exterior at grade. The circulation system should accommodate the preferred adjacencies identified for the relationships between laboratories and laboratory support spaces and between laboratories and offices.

At least one door into each laboratory space should ideally have a minimum 52" wide clear opening. This can be accomplished using doors with 3'-0" active leaf and one 1'-6" inactive leaf.

Equipment lists should be carefully reviewed to verify that individual pieces of equipment can be transported and maneuvered between spaces. Future equipment should be anticipated.

Main interior circulation corridors are recommended to be a minimum 8'-0" width

Doorways accessing corridors should open into recessed alcoves serving the corridor. The doors should swing out from laboratories, in the direction of exit.

Circulation and fume hood locations within laboratory spaces should be coordinated to preclude primary exiting in front of the fume hoods.

INTERACTION

The design of the Science & Technology Building should develop concepts that would directly support interaction at different levels. Interaction areas should be linked to the circulation schemes. Interaction spaces should be developed within laboratories, between laboratories and other spaces, on each floor and in public areas.

Informal interaction spaces include:

- Casual meeting/interaction spaces for short duration interaction.
- Outdoor gathering spaces should be highly visible and inviting.
- Display/announcement boards serves as gathering places for informal contact.
- Connections to other campus facilities will facilitate interaction with faculty and staff in nearby buildings.

ACCESSIBILITY

The Science & Technology Building must conform to applicable local, state and federal regulations for providing accessibility to persons with disabilities. Early considerations should be given to the following accessibility aspects:

- All parts of the building shall be accessible by persons with disabilities (subject to certain limited exceptions in the Standards).
- All faculty lecture or demonstration positions should be accessible to persons with disabilities.
- All staff preparation areas should provide a path of travel accessible by persons with disabilities.
- Accessible work stations, sinks, fittings and fume hoods for employees should be provided in the laboratories, faculty demo areas and staff prep areas based on the Americans with Disabilities Act Guidelines (ADAAG), the institutions requirements, and any applicable state regulations. ADAAG does not dictate the quantity of such accessible employee work stations but requires reasonable accommodation in the workplace and encourages provision of such features during design to avoid expensive renovations in the future.
- Accessible student work stations including associated sinks, fittings, and storage should be provided in the instructional laboratories for a minimum of 5% of the student stations (rounded up). A minimum of one fume hood, one general purpose laboratory sink, and each type of general use storage in each instructional laboratory should also be accessible.
- Location of accessible work stations should be in close proximity to eyewash and safety showers.
- 18" clearance on the pull side and 12" clearance on the push side (when both a closer and latch are present) of the strike side of doors is required for interior doors.

General criteria and guidelines for accessible work stations in laboratories are as follows:

- Work surfaces 30" - 34" above floor with 27" minimum vertical wheelchair clearance below. Adjustable work surfaces can provide a range of possible height adjustments.
- Laboratory service controls and equipment controls should be placed within easy reach for persons with limited mobility. Controls should have single-action levers or blade handles for easy operation.
- Aisle widths and clearances adequate for maneuvers of wheelchair bound individuals. Aisles 5'-0" wide are recommended with turnaround areas.

NOISE CONTROL

Noise control requires specific attention to design and construction details. The following sound sources should be addressed in the future detailed design of the mechanical and electrical systems:

- Fan noise transmitted to spaces through the duct system or through the building structure. This noise is characterized by a low-frequency rumble and often includes annoying pure tones.
- Noise generated by the excitation of duct wall resonance produced by fan noise, by pressure fluctuations caused by fan instability, and by high turbulence caused by discontinuance in the duct system.
- Noise generated by air flowing past dampers, turning vanes, terminal device louvers, and comprising mid-to-high frequency energy.
- Water circulation system noise caused by high velocities or abrupt pressure changes and is generally transmitted through structural connections.
- Noise and vibration caused by out-of-balance forces generated by the operation of fans, pumps, compressors, etc.
- Magnetostrictive hum associated with the operation of fluorescent lighting ballasts, transformers, or electric motors.
- Elevator equipment noise from motor generators, hoist gear, and counterweight movement; or from hydraulic pump systems.

Other design precautions could include where applicable:

- Conduits should not directly link noise-sensitive spaces, nor should they mechanically bridge vibrationally-isolated building elements using a rigid connection.
- Flexible conduit should be used for connections to isolated floor slabs, walls, and vibrationally isolated mechanical/electrical devices.
- Duct silencers should be considered when duct distance is not sufficient to provide adequate acoustical separation.

Generally, laboratory spaces should satisfy the following preliminary requirements:

Space	**Noise Criterion Target Minimum**
Teaching Laboratories	NC 35
Laboratory Support Room	NC 35

These values assume fume sashes are closed and a VAV exhaust systems, and do not take into account adjacencies that may be incompatible and specialized laboratory spaces with large machinery; the design will be evaluated for incompatibilities, and additional mitigation provided, as required.

Noise levels should be less than NC 50 at a distance of 36 inches from fume hoods.

VIBRATION/STRUCTURAL CONSIDERATIONS

The common sources of vibration in the Science & Technology Building are the adjacent road traffic, footfall traffic on supported floor and mechanical equipment. Minimizing vibration from these sources should be implemented by structural and mechanical design. Special structural consideration maybe required for specific areas of the building.

Uniform live load shall not be less than minimum uniformly distributed loads required by structural code. For vibration considerations, laboratory areas should ideally be designed for 100 psf uniform live load. Concentrated loads may produce a greater load effect.

Human activities and operating machines are the most significant sources of vibration at above-grade building levels.

Footfall-induced vibrations and steady-state operating machine vibrations should be alleviated by:

- Increasing the stiffness of the floor by combinations of floor mass and depth.
- Confining heavily traveled areas to regions near column lines.
- Placing sensitive equipment near columns,
- Placing the equipment away from heavily traveled areas,
- Minimizing the length of spans.
- Cast-in-place concrete floor solutions.

Building mechanical systems are major source of vibration. Air handling equipment and ductwork should be selected and installed to minimize vibration. Equipment should be isolated from supporting structure with resilient mounts. Vibration isolators should be selected based on floor stiffness, span extension, equipment power and operating speed.

Vibration criteria for areas intended to accommodate sensitive equipment are based on rms Velocity Level as measured in one-third octave bands of frequency over the range of 8-100 Hz. Generic Vibration Criterion (VC) curves have been developed for different types of equipment. The results are shown in the table below.

Criterion curves VC-A through VC-E are applicable to science and engineering facilities. International Standards Organization (ISO) criteria for human exposure to vibration are also shown.

It is recommended that consideration be given to design of the structural floor system to meet the VC-A criterion (2,000 μin/s) for long term flexibility of laboratory use or, if cost prohibitive, one category lower (4,000 μin/s). The design should follow the AISC Guidelines of Design for Sensitive Equipment.

VIBRATION/STRUCTURAL CONSIDERATIONS

Design Criteria for Sensitive Instrumentation and Equipment not otherwise Vibration-Isolated

Criterion Curve	V_{rms} Velocity Level		Detail Size (μm)	Description of Use
	(μin/s)	(dB) Ref: 1μin/s		
Workshop (ISO)	32,000	90	N/A	Distinctly felt vibration. Appropriate to workshops and non-sensitive areas.
Office (ISO)	16,000	84	N/A	Felt vibration. Appropriate to offices and non-sensitive areas.
Residential Day (ISO)	8,000	78	75	Barely felt vibration. Sleep areas in most instances. Probably adequate for computer equipment, probe test equipment and low-power microscopes (to 20X).
Op.Theatre (ISO)	**4,000**	**72**	**25**	**Vibration not felt. Suitable for sensitive sleeping areas. Suitable in most instances for microscopes to l00X and for other equipment of low sensitivity.**
VC-A	**2,000**	**66**	**8**	**Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.**
VC-B	1,000	60	3	Optical microscopes to l000x, inspection and lithography equipment (including steppers) to 3 micron-meter line widths.
VC-C	500	54	1	A good standard for most inspection equipment and lithography to 1 micron micron-meter detail size.
VC-D	250	48	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs, SEMs, AFMs) and E-Beam systems, operation to the limits of their capacity.
VC-E	125	42	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems.

Note: Detail Size represents the minimum width of fabrication details or size of research particles that could be handled at a specific criterion value.

HVAC

SAFETY

The laboratory HVAC system should promote the safe operation of the building, health and comfort of the occupants and safe outside environment. The laboratory environment must be free of hazardous substances. Harmful vapors, gases, particulates or biological agents must be contained at the source and continuously removed from the any laboratory in which they are present.

The HVAC design should be based on regulatory requirements and guidelines along with good engineering practices. Code requirements are a minimum standard.

PRIMARY CONTAINMENT

The primary containment in laboratory ventilation consists of Laboratory Fume Hoods which operate under negative pressurization with respect to the laboratory, preventing the personnel exposure to hazardous materials.

Laboratory Fume Hoods

Laboratory fume hoods will be factory certified. Field certification "As Installed" will also be required prior to fume hood use in the laboratory.

Hood sash movement may be vertical, horizontal or a combination of both.

Laboratory fume hoods shall be designed to maintain an average face velocity of 100 feet per minute ±10%. For energy saving considerations, the design sash position should be 60% of maximum hood opening. Vertical sash stops shall be provided at design sash position. The location shall be labeled. The sash should be fully open only during set-up or take-down operations.

The constant volume fume hoods will develop face velocities below 100 feet per minute when the sash is raised above the design operating position of 18". Under no circumstances shall face velocities drop below 60 fpm. Variable air volume fume hoods maintain constant face velocities by controlling the exhaust flow relative to the sash position.

Consideration can be given to "low flow" or "low face velocity" fume hoods operating at face velocities less than 80 feet per minute. However, the safe use of these hoods often requires special training and procedures so the use of this equipment shall be a common decision of the design team and Environmental Health and Safety Authority.

Each fume hood shall be equipped with a flow-measuring device and should be monitored locally to allow convenient confirmation of adequate hood performance. All laboratory fume hoods must be equipped with visual and audible alarms warning of unsafe airflow.

The fume hoods, should be located away from interfering drafts, airflow disturbances, supply air openings and pressure differentials created by the swing of doors.

HVAC

SAFETY

Other Exhaust Equipment

Canopy Hoods - Hoods over work areas or equipment used to capture heat or steam. The recommended design flow rate is 75 cfm per linear foot of open perimeter.

Vented Cabinets - Cabinets used to store hazardous, corrosive, toxic and other health hazard substances. Cabinets for storage of non-flammable substances are typically vented by connection to the laboratory exhaust system, providing a negative pressurization of the enclosure. However, per NFPA 30, Flammable and Combustible Liquids Code, venting of flammable liquid storage cabinets has not been demonstrated to be necessary for fire protection purposes. Additionally, venting a cabinet could compromise the ability of the cabinet to adequately protect its contents from involvement in a fire, because cabinets are not generally tested with any venting. Therefore, venting of flammable liquids storage cabinets is not recommended. This recommendation should be confirmed by the Authority Having Jurisdiction.

SECONDARY CONTAINMENT

Secondary containment is provided by the negative pressurization of the laboratory space relative to corridors and adjacent spaces where required. Negative pressurization is achieved by controlling the ratio of exhaust to supply air at minimum 110%. Walls surrounding laboratories should extent to structure or a solid ceiling should be provided to ensure proper pressurization is maintained.

Some laboratory spaces may require positive or neutral pressurization.

Doors to laboratories should generally be equipped with closers and should not be held open.

Laboratory spaces serving chemistry and biological purposes in most cases should be continuously ventilated 24 hours per day.

Air from spaces identified as using hazardous materials shall be exhausted outdoors and not recirculated.

Air from offices and laboratories that do not generate odors, chemical, biological or other type of hazard may be recirculated.

Supply air should be effectively distributed into all portions of the laboratory space. Supply air distribution should not create drafts in front of laboratory hoods. The maximum supply air velocity 6 feet above the floor, in front of fume hoods shall be less than 50% of the fume hood face velocity.

EMERGENCY AND STANDBY POWER CONSIDERATIONS

Measures involving emergency and standby power should be approved by the Jurisdiction Having Authority.

HVAC

SAFETY

Emergency power supply should be implemented if a definite potential for catastrophe such as explosion, fire, violent ejection of chemicals or other life-threatening situations is present. Fire detection and alarm systems, elevators, fire pumps, public safety, communication and monitoring systems and processes where current interruption would produce serious life safety or health hazard should be on emergency power.

Standby power should be provided to serve loads such as heating, ventilating and refrigerating systems, smoke removal, sewage disposal systems, lighting systems, data processing, communication systems, and processes that, when stopped, could create a hazard, discomfort, significant or costly interruption or damage to product or process.

Standby power should be provided to exhaust fans of the manifolded system serving laboratory areas based on a risk assessment by the institution.

Momentary or extended losses of power shall not change or affect any of the control system setpoints, calibration settings, or emergency status.

Specific standby power requirements will be identified in the Design Development phase.

HVAC

ADAPTABILITY

Laboratory ventilation systems should be designed to be adaptable to changes of teaching protocols and building operation.

Modularity is the key concept to an adaptable laboratory HVAC system. The laboratory module may support various functions over the life of the building.

If at all possible, the laboratory HVAC system should be designed as an assembly of repetitive modules. Each laboratory planning module will have supply air diffusers, exhaust grilles, terminal air flow control device, with capability for individual temperature control based on zoning.

The laboratory ventilation system should be flexible, allowing timely and cost effective changes over time without affecting the performance and operation of the building HVAC system.

The HVAC system should be flexible and provide spare capacity to accommodate changes of the laboratory space allocation or laboratory designation.

The HVAC system design should have the capability of supporting additional future fume hoods.

Some laboratory spaces that exceed the average air flow requirements will need special HVAC considerations.

HVAC

DESIGN CRITERIA

FILTRATION

Laboratory air handling units shall be provided with pre-filters and final filters. Pre-filters should be minimum, 30-35% ASHRAE efficiency. Final filters should be minimum 80-95% ASHRAE efficiency.

Laboratory supply and exhaust systems should be design for adequate static pressure for maintaining air flow capacity with fully loaded filters.

VENTILATION RATES

The air flow rate for each laboratory space should result from the uppermost of the following criteria:

- Minimum air changes per hour.
- Laboratory heat gain.
- Exhaust requirements from fume hoods and other exhaust equipment.

Minimum Air Changes per Hour

Minimum outdoor air in laboratory facility spaces shall comply with ASHRAE Standard 62.1-2007 requirements or local code, whichever is stricter.

Laboratories generating odors or chemical, biological or other type of hazard shall be 100% exhausted to the outdoors. Air from offices and laboratories that do not present any risk of hazard may be recirculated. Supply air could consequently be 100% outdoor air or mixture of outdoor and recirculated air.

In laboratories exhausting 100% air to the outside, minimum air changes shall comply with OSHA 29 CFR Part 1910, p. 3332, 4. (f) OSHA 1990b), which recommends 4 to 12 air changes per hour if local exhaust hoods are used as the primary method of control. The exhaust air and the minimum design air exchange rates are recommended in Table H2.

Table-H2 Exhaust Ratios and Minimum Air Changes

Space	Exhaust Air		Minimum Air Changes per Hour	
	Minimum	Maximum	Occupied	Unoccupied
Laboratory	100%	100%	6	4
Laboratory Support	100%	100%	6	4

Note: Some laboratory spaces require higher air exchange rates. Refer to Detailed Space Requirements exhibits.

HVAC

DESIGN CRITERIA

Heat Gain from Laboratory Equipment

Heat gain depends on the type and specifics of the laboratory. Detailed heat gain from laboratory equipment will be provided during the Design Development phase for each laboratory space. Preliminary heat gain estimated as an average per net square foot of laboratory area is shown in Table H3.

Table-H3 Laboratory Equipment Heat Gain

Space	Equipment	
	BTU/Hr ft^2	W/ft^2
Laboratory	20	5.9
Laboratory Support	35	10.3

Exhaust Equipment Requirements

The design exhaust flow from typical laboratory equipment is shown in Table H4. A complete schedule of exhaust equipment will be issued during the Design Development phase.

Table H4-Typical Exhaust Equipment Flow rates

Equipment	Design Flow (cfm)	
Laboratory Fume Hoods	**Bench type hood**	**Floor mounted hood**
4' Laboratory Fume Hood	500	850
5' Laboratory Fume Hood	650	1,150
6' Laboratory Fume Hood	800	1,400
8' Laboratory Fume Hood	1,100	1,950
Canopy hoods	75 per linear foot of open perimeter	
Equipment vent/Snorkels	50 (min)	200 (max)

HVAC

BASIC SYSTEMS AND CONTROLS

MINIMUM LABORATORY HVAC REQUIREMENTS

The laboratory HVAC system should be controlled to ensure operational safety, regulatory compliance and satisfy process constraints as well as occupant comfort. The designed HVAC control system should provide flexibility and minimize the operational cost of the building.

A typical control system is recommended to provide the following minimal safety requirements in response to abnormal situations:

- Annunciate the equipment failure to a monitoring center and turn on the existing standby equipment.
- Maintain relative levels of pressurization in the laboratories.
- De-energize the supply air handling unit serving laboratory areas, in case of fire or smoke detection. The exhaust fans should continue to operate at a level that facilitates a safe evacuation of the building through doors between pressurized spaces. Reducing the level of exhaust to a desired pressurization could be obtained by ramping down the exhaust fans or by activation of bypass dampers on exhaust plenum. Capability of operating doors under fire alarm conditions must be tested and documented as part of the commissioning process.
- It is recommended that HVAC control systems shall be direct digital control with pneumatic actuation.
- The supply and exhaust air flow regulators must be within ± 5% accuracy of design flow, specifically designed for laboratory use and must be pressure independent. The products must have a minimum of five years of installed field operating history. Commercial components are not acceptable.

SELECTION OF LABORATORY BUILDING AIR FLOW CONTROL SYSTEM

Laboratory buildings are complex facilities comprising a variety of spaces and equipment subject to diversified programs. The most versatile air flow control is the variable air volume system (VAV), capable of responding to changes of conditions in the space.

However, teaching laboratory cooling loads vary considerably between occupied and non-occupied periods. The equipment component of cooling load is usually not significant. The air flow driver may be minimum air changes. In such scenario, a two-position constant volume system (CAV) may be appropriate.

Fume hoods in teaching laboratories are recommended to be VAV, providing stable operation of the hood at constant face velocity. In some situations of low fume hood density, it may be suitable to operate the hood at constant volume, providing the minimum air changes per hour required for the space.

Some chemistry teaching laboratories are equipped with numerous hoods, making them ideal candidates for VAV.

HVAC

BASIC SYSTEMS AND CONTROLS

A laboratory VAV control system should perform the following functions:

- Control the hood volumetric flow rate to maintain the constant face velocity,
- Monitor room temperature to provide adequate air flow for removing the room heat gain.
- Monitor room occupancy to provide 100% of operational supply air when space is occupied.
- Reduce the air flow at scheduled level for unoccupied mode of operation,
- Control the fume hood exhaust, the general exhaust and the supply airflow to maintain the laboratory pressurization.
- Provide time delay in changing room air supply and exhaust flow to unoccupied mode based on room occupancy sensor.
- Provide time delay in changing the fume hood flow to standby mode based on fume hood motion sensor.

HVAC

DUCTWORK AND FANS

SUPPLY AIR DUCTWORK

Supply air duct system should be galvanized steel of minimum 4 inch water gauge pressure class for mains. Branch ducts should be minimum 2 inch class. Sealing, reinforcing and supporting should be according to SMACNA standards.

Lining the supply duct in laboratory spaces is not recommended.

EXHAUST AIR DUCTWORK

Fume exhaust ducts should be constructed of materials compatible with chemicals to be carried in the air stream. Typical selection of exhaust ductwork materials, based on effectiveness and cost criteria, is shown in Table H5.

Table H5 Exhaust Ductwork Materials

Exhaust ductwork	First option	Second option
Fume hood branch	Stainless steel	PVC coated galvanized steel
Exhaust mains	Galvanized steel	
Laboratory general exhaust	Galvanized steel	

Longitudinal sections of exhaust ducts should be continuous seamless tube or continuously welded formed sheet. Horizontal ducting from fume hoods should be sloped down towards the fume hood at 1/8 inch to the foot.

Sound absorbing interior lining or other sound absorbing devices should not be used in the exhaust ductwork.

Velocity in fume exhaust duct should range 1,600-2,000 feet per minute.

Fume hood exhaust ductwork within the building shall be under negative pressure.

Balancing and control dampers of the exhaust system shall fail open in event of failure.

Fire dampers should not be placed in manifolded fume exhaust ducts.

Exhaust air filtration is not generally required for manifolded exhaust systems.

Manifolding the Exhaust Systems

Exhaust ducts from chemical fume hoods and other special exhaust systems within the same laboratory unit may be combined into one common system. A manifold system has the advantage of diluting the effluents inside a combined exhaust system, improving the system

HVAC

DUCTWORK AND FANS

flexibility and reducing the initial cost and operating cost. Compatibility of effluents, as defined in ANSI/AIHA Z9.5, should be considered in manifolding the fume hood exhaust.

Laboratory unit is defined in NFPA 45 and could extend to the area of an entire floor. NFPA 45 classifies the laboratory units as Class A (high fire hazard), Class B (moderate fire hazard), Class C (low fire hazard), or Class D (minimal fire hazard), according to the quantities of flammable and combustible liquids.

Exhaust air from each laboratory unit, which may include fume hood and other exhaust systems, shall be separately ducted to outside the building or to a mechanical shaft.

Connection to a common chemical fume hood exhaust duct system may be permitted to occur only in any of the following locations depending on code limitations:

- Fire protected mechanical room within the building
- Fire protected shaft within the building
- A point outside the building

EXHAUST FANS

Fume exhaust fans should be constructed of materials compatible with chemicals present in the exhausted air. They will be located in a separate space under negative pressure in respect to the surrounding spaces and will provide direct access to the outside for fan discharge ducts.

Fume hood exhaust fans of manifolded exhaust systems should have a degree of redundancy such that the failure of a single fan does not render the operation of the ventilation system unsafe.

Manifolded fume hood exhaust system fans should be provided with emergency power.

Air exhausted from chemical fume hoods and dedicated exhaust systems shall be discharged above the roof at a location, height, and velocity sufficient to prevent re-entry of chemicals and to prevent exposures to personnel.

HVAC

BUILDING EXHAUST STACKS AND AIR INTAKE

The fume exhaust stacks must be above the highest point of the building, including mechanical penthouses and roof parapets. The height of the fume exhaust stacks will be determined in conjunction with local codes and regulations. The key parameters that affect stack design and location are:

- Stack height
- Discharge velocity
- Volumetric flow rate
- Intake locations

The height of the stacks and their location on the roof are critical to safe building operation and the safe of neighboring sites. Fume exhaust stacks must be minimum 10 feet above the adjacent roof line to avoid exposing the maintenance personnel to the direct upward blast of the fume exhaust.

The design discharge velocity from exhaust stacks should be 3,500 to 4,000 feet per minute to counteract any entrainment due to varying wind direction or area environmental features.

Volumetric flow rates of VAV systems should to maintain discharge velocity above a minimum level. This can be accomplished by sizing the stack for the minimum velocity at minimum exhaust flow or by inducing outdoor air into the exhaust stream prior or after the exhaust fan.

Exhaust stacks should not be located within enclosures or architectural screens. Architectural masking structures may be used as long as they do not create recirculating zones of the exhaust discharge and the stack extends at least one diameter above the masking structure.

Entrainment of the harmful fumes from exhaust stacks on the roof into the outside air intakes of building ventilation systems should be prevented. The location and height of the exhaust discharge relative to the building air intakes should be correlated with prevailing wind directions. Outside conditions, surrounding buildings, hills, trees, and other obstacles which can cause turbulent flow around the laboratory building should be considered.

It is recommended that building air intake be located on the lower one-third of the building and high enough above the ground to avoid dust or vehicle exhaust. If located on the roof, air intakes should not be placed near the edges of a wall or roof.

Manifolding the building exhaust system provides a high degree of dilution at stack discharge.

In the cases of high concentrations of harmful chemicals at stack discharge, specialized dispersion evaluation techniques, such as wind tunnel modeling or numerical simulations, may be considered by the Owner and design team.

HVAC

ENERGY RECOVERY AND BUILDING MANAGEMENT SYSTEM

ENERGY RECOVERY

Energy recovery in laboratory buildings exhausting 100% of intake air can substantially contribute to lifetime savings and short payback periods. The following technologies of heat recovery from exhaust air stream are available and could be evaluated based on variations in the local climatic condition and energy costs.

Runaround Loop - A heat recovery system where the heat from the exhaust air is exchanged between the exhaust and the supply air system through a circulated water-based medium (glycol mixture) using coil heat exchangers. Runaround loops are simple and have the advantage that separate airstreams make cross-contamination no possible. The system recovers only sensible heat and requires periodic cleaning to keep deposits from accumulating on the exterior of the finned coil.

Heat Pipe Heat Exchanger - The heat pipe transfers heat from one airstream to the other by evaporating a refrigerant at the hot side of the tube heat exchanger and condensate it at the cold side. The heat pipe system requires the two airstreams to be located adjacent to each other. The excellent heat transfer on the inside the tube is not matched outside on the air side diminishing the overall heat transfer. The effectiveness of sensible heat transfer for heat pipes is 45% to 65%. The physical separation of supply and exhaust ducts makes cross-contamination not possible.

Heat Wheel Heat Exchanger - Rotary air-to-air heat exchanger filled with media of various small geometric configurations coated with desiccant, providing a large internal surface of heat and mass transfer. One half of the wheel is in contact with the exhaust stream and the other half with the supply air. Both sensible and latent heat is transferred between the two sides, resulting in a high efficiency. The inevitable cross-contamination resulted from carryover or leakage is substantially reduced to 0.1% by using a purge section between the two sides.

Plate Heat Exchanger - Plate-type air-to-air heat exchangers transfer heat from one airstream to another through alternating layers of exhaust and supply airstreams separated by a metal plate. The system has no cross-flow but requires the installation of supply and exhaust ducts side by side.

Gravity Flow Systems or Thermosiphon – A gravity circulating system of a heat and mass transfer medium using either heat pipe or coil heat exchangers. The thermosiphon system does not require any pumping. No moving parts and separate air stream are the advantages of these systems.

Table ER1 shows a performance comparison of energy recovery systems.

HVAC

ENERGY RECOVERY AND BUILDING MANAGEMENT SYSTEM

Table ER1 Energy Recovery Systems

	Runaround	Heat Pipe	Heat Wheel	Fixed Plate	Thermosiphon
Efficiency	55% to 65%	45% to 65%	50% to 85%	50% to 80%	40% to 60%
Size (cfm)	100 and up	100 and up	50 to 80,000	50 and up	100 and up
Pressure drop (inch of water)	0.6 to 2	0.6 to 2	0.4 to 0.7	0.4 to 1.2	0.4 to 2
Temperature	–45°F to 500°F	–40°F to 105°F	–65°F to 900°F	-75°F to 900°F	–40°F to 105°F

BUILDING MANAGEMENT SYSTEM – BASIC CRITERIA

The Science & Technology Building should be provided with a micro-processor based, direct digital control building automation and energy management system. This system shall provide energy management, controls in all spaces and monitoring of the laboratory controls.

A personal computer should be provided as an operator interface. The PC will store record data, provide analysis and reporting functions, and act as a graphical user interface with the networked controllers.

Unsafe levels of operation of the exhaust system should be indicated by local alarms in the rooms affected and should be capable of coupling with a central alarm monitored by building maintenance personnel. Local codes may require certain emergency or fire detection, monitoring and alarming which may affect the design of the laboratory ventilation system.

Monitoring of critical parameters of the ventilation system is important for safe operation and effective maintenance and management of the building. HVAC operational parameters of laboratories, cold and warm rooms and other critical spaces, should be recorded, reported, and alarmed.

A high level of control and functionality should be provided by an integrated laboratory and building control system. The monitoring of the complete system should be performed by the centralized facility management system providing graphical displays and analysis tools, centralized alarm reporting, real time status and custom reports, automatic system-wide emergency responses and maximized energy savings. The Building Automation System should utilize distributed processing for speed, stability, and system reliability. The distributed controllers will be networked to share information.

LABORATORY PIPED SERVICES

SYSTEMS DESCRIPTION

Laboratory piped systems distributed throughout the building include: domestic potable water, industrial non-potable water, laboratory waste, purified water, compressed air, vacuum, natural gas and specialty gases. Refer to the Detailed Space Requirements worksheets for specific requirements for each laboratory and laboratory support space.

Laboratory piped systems should be flexible and adaptable to changes. The system design should consist of horizontal mains with points of connection to each laboratory. The systems should be distributed in utility corridors in double-ended horizontal loops through each floor of the building. If applicable, an assembly of repetitive connections to each laboratory module should be implemented.

The location of the points of connection should be consistent throughout the building for simple identification. Each laboratory unit will have separate shut-off valves on all piping services. The points of connection valves should be fully accessible. All piping components subject to condensation, heat loss or freezing should be insulated and protected by fire-retardant jacket. The piping systems must be labeled for identification.

The design of the laboratory piping systems should include diversity and capacity allowance for future expansion. Laboratory piping is not subject to requirements of NFPA 99 Standard for Health Care Facilities.

Water Supply Systems

Industrial Cold Water and Hot Water (IHW, ICW)

It is recommended that laboratories are supplied with separate industrial cold and hot water systems protected by central backflow preventers. Industrial water is supplied to laboratory sinks and cupsinks, fume hoods, washing and sterilizing equipment, hose stations, laboratory ice machines and laboratory equipment. All fixtures utilizing industrial water shall have a sign stating "NON-POTABLE WATER". Maximum water pressure at service outlet should be limited to 80 psi. Minimum 40 psi should be provided at the hydraulically remote fixture or equipment. Industrial hot water will be recirculated. Hot water will be distributed at 120°F.

Potable Cold Water and Hot Water (CW, HW)

The building potable cold and hot water systems protected by central backflow prevention equipment and distributed through each floor of the building may be connected to laboratories for drench hoses and safety shower/emergency eyewash fixtures. Vacuum breakers shall be provided at each outlet to meet code requirements. Maximum water pressure at service outlet should be limited to 80 psi. Minimum 40 psi should be provided at the hydraulically remote fixture or equipment. Industrial hot water will be recirculated. Hot water should be distributed at 120°F.

LABORATORY PIPED SERVICES

Tempered water system (TW)

Tempered water supplying drench hoses and safety shower/emergency eyewash fixtures is potable water of tepid temperature normally distributed in a separate loop on each floor. The mixing valves would be located at the connection of potable water systems to the riser. Usually the tempered water is not recirculated. The frequent use of drench hoses and the scheduled testing of eye washing and safety shower equipment should prevent tempered water stagnation.

Purified Water (PW)

A Central Purified Water System should be designed to satisfy the present and future laboratory requirements. Initial and operating cost, environmental impact, minimization of chemical use, reliability, and constructability should be considered in selection of the system. The water treatment normally should include softening to the level of 3 to 5 grains per gallon, reverse osmosis as primary treatment and deionization as secondary treatment. The level of purification is recommended to satisfy Type II ASTM specifications including minimum resistivity of 1meg-ohm-cm. More stringent water purity requirements for specific needs, Type I ASTM, will be provided by local point-of-use polishing equipment connected to the central purified water system. Each floor should be provided with a piping distribution system independent of other floors. The distribution should be continuous loop of unchanged size dropped to each service. The connection to the services will have isolating valve and should minimize the dead-legs.

Laboratory Vacuum (LV)

Laboratories are to be provided with a centralized vacuum system as indicated. The system should be designed based on 19 to 23 inch Hg negative pressure at the most critical location of the vacuum service. The system should include duplex vacuum pumps, storage tank, controls, and distribution piping. Horizontal branch piping shall be taken off above the centerline of the main pipe and rise at an angle of not less than 45 degrees from vertical.

Laboratory Natural Gas (LG)

Natural gas should be supplied at low pressure of 4 to 7 inches of water. Propane may be used in remote locations where natural gas is not available. Each floor must have an isolation valve that is quickly accessible for emergency shutoff. Additional shutoff valves should be provided downstream of the point of connection in accessible locations for controlling the usage of natural gas in teaching laboratories.

Laboratory Waste System (LW)

The laboratories using chemicals should generally be provided with acid-resistant waste and vent system. Laboratory waste and vent systems must be separate from the general use sanitary system. The two systems should be connected to the sanitary sewer outside the building perimeter.

LABORATORY PIPED SERVICES

The release of chemicals is strictly regulated by the Laboratory Protocols that do not permit discharging acids, bases or other chemicals into the laboratory waste system. As a result, the dilution of the effluents in the laboratory waste is significant. Combining laboratory waste with sanitary waste outside of the building provides further dilution. If the expected concentration levels are normally below the limits imposed by the Authority, neutralization of the laboratory waste may be unnecessary. In that case, a sampling pit, in a designated location prior to discharging into the city sewer system should be provided for monitoring the concentration of chemicals. The solution should be discussed with and approved by the Authority.

PIPING MATERIALS

The laboratory piping materials should be high quality, resistant to corrosive or erosive effects of the conveying fluids. The materials recommended for piped services are shown in Table P1.

Table P1- Piping Materials

Piping system	Designation	Material and joints
Industrial Cold Water and Hot Water	ICW/IHW	Type L copper with brazed or Sil-Fos joints
Potable Cold Water and Hot Water	CW/HW	Type L copper with brazed or Sil-Fos joints
Purified Water	PW	Unpigmented polypropylene (PP) pipe, valves and fittings with electro-fusion joints
Laboratory Vacuum	LV	Type L copper with brazed or Sil-Fos joints Local vacuum pump: Materials compatible with pump exhaust
Natural Gas	LG	Black steel with welded or threaded joints
Laboratory Waste and Vent System	LW, LWV	Unpigmented polypropylene pipe with mechanical joints above grade in accessible spaces. Thermally welded joints below grade, behind walls or inaccessible spaces

ELECTRICAL SYSTEMS

SYSTEMS DESCRIPTION

NORMAL SERVICE AND DISTRIBUTION

Distribution Voltages

- 480V, 3 phase, 3 wire - Motors greater than 1/2 HP
- 480V/277V, 3 ph, 4 wire - Fluorescent lighting, large laboratory equipment
- 208V/120V, 3 ph, 4 wire - Receptacles, specialized lights, and small laboratory equipment power.

Power Sources

Laboratory panelboards at 208Y/120V are normally mounted outside individual laboratories, with one panelboard per 2-4 laboratory modules. All other panels should be mounted in electrical rooms on each floor. Segregated panelboards at 480Y/277V are not typically required for laboratory loads.

Each laboratory panel should have a main circuit breaker. Each pole space with a circuit will require a circuit breaker overcurrent protection device to be installed, as sized in laboratory electrical design documents. Additionally, each pole space without a circuit will be provided with a 20-amp single-pole circuit breaker, such that there are installed spares to the maximum capacity of the panel.

Transient voltage surge protection should be provided at the 208/120 Volt transformer secondary distribution switchboards.

ELECTRICAL SYSTEMS

SYSTEMS DESCRIPTION

EMERGENCY AND STANDBY SERVICE DISTRIBUTION

Power Sources

Consideration should be given to providing the building electrical systems with emergency diesel or natural gas engine generator backup.

Such an emergency generator system should consist of engine generator and controls, UL listed fuel tank, exhaust system, radiator, batteries, starting system and generator output circuit breaker located outdoors in a common sound attenuated weatherproof enclosure. Generator fuel supply should have the capacity to operate the generator at full load rating for a time period specified by the campus, or as required by state and local codes, whichever is longer.

An emergency power system should have adequate capacity to supply emergency circuits and legally required standby circuits. Peak load shaving may be used to meet this requirement. The system should have at least 20% spare capacity in anticipation of future needs.

Automatic transfer controls should operate the main switchboard electrically operated main and emergency generator breakers. All automatic transfer controls should be located at the main switchboard.

Emergency power

Emergency power systems are necessary in an environment where a definite potential for catastrophe such as explosion, violent ejection of life-threatening chemicals or overheating could exist or develop as a result of a loss of normal power to the building. Requirements for emergency power systems are specified per code in one of three categories: emergency power, legally-required standby power, and optional standby power. These categories are not interchangeable, but are supplied from the same emergency generator system. Building systems defined by code as required in event of emergency, such as egress lighting, exit signs, monitoring and safety equipment, and ventilation required for safety, are typical emergency power loads.

Grounding System

All parts of the normal and emergency power distribution system should be provided with a wired equipment ground conductor. This system should extend from building service entrance switchboard or nearest line voltage transformer to the branch circuit load or device. The grounding system should be extended to each floor as required for electrical distribution, and to provide a grounding path for some non-powered laboratory equipment, such as flammable storage cabinets.

ELECTRICAL SYSTEMS

SYSTEMS DESCRIPTION

INTERIOR LIGHTING SYSTEMS

Lighting Fixture Types

Laboratory and Laboratory Support Areas should be provided with adequate lighting meeting the requirements noted in the Detailed Space Requirements worksheets. Typically one of the following lighting fixture types is utilized:

- Direct / Indirect 3 lamp, double switched fluorescent fixtures.
- 2' x 4' - 3 lamp, double switched fluorescent troffers with prismatic lenses.
- 4' linear pendant 3 lamp, double switched fluorescent fixtures (typically used with unfinished ceilings).

Teaching laboratories should be zoned for AV presentations which may utilize separate switching for front 1/3rd and back 2/3rd or other schemes.

Specialty and task lighting will be as specified based on specific project needs, and will be identified during the design phases.

ELECTRICAL SYSTEMS

TELEPHONE/DATA SYSTEMS

TELEPHONE AND DATA SYSTEM

System Description

The telephone/data system consists of distribution blocks located in separate telephone and data rooms connected through conduit and cable tray or other pathways to wall outlets in all occupied spaces, including laboratories, laboratory support, offices, administrative support areas and conference rooms. Telephones should normally be provided at exits of mechanical and electrical rooms.

Campus standards should be followed in all cases. The design will require careful coordination with existing campus systems.

In laboratory areas, a single conduit should run from each wall telephone/data outlet box, floor box, island bench pedestal, and raceway data channel to the cable tray above an accessible ceiling.

ELECTRICAL SYSTEMS

DESIGN CRITERIA

LOAD CALCULATION CRITERIA

Design Voltages

Normal power	480Y/277V, 3 phase, 4 wire 208Y/120V, 3 phase, 4 wire
Emergency/standby power	480Y/277V, 3 phase, 4 wire 208Y/120V, 3 phase, 4 wire

Preliminary Design Loads

A preliminary overall connected Volt-Ampere per Square Foot projection is shown in Table E1.

Table E1 - Preliminary Design Loads

Space	Overall connected load (Volt-Amp/Sq Ft)	
	Lighting	Receptacles
Laboratory	3.5	Approximately 20
Laboratory Support	3.5	Approximately 20
Storage	0.25	-

EQUIPMENT SIZING CRITERIA

The equipment sizing criteria are presented in Tables E2-E5.

Table E2 - Branch Circuit Load Calculations

Branch Circuit	Load
Lighting	Actual installed Wattage
Receptacles - dedicated outlet	1,000 VA
Receptacles - general equipment outlet	500 VA
Receptacles - convenience outlet	180 VA
Surface wireway	500VA per receptacle circuit
Special outlets	Actual Wattage of equipment served

ELECTRICAL SYSTEMS

DESIGN CRITERIA

Demand Factors: The demand factors shown in Table E3 should be applied at upstream distribution board, and would not be reflected on laboratory panel schedules.

Table E3 - Demand Factors

	Demand Factors
Lighting	100% of total Watt
Receptacles	100% of first 10 kVA plus 50% of all over 10 kVA (Note 1)
Motors	125% of wattage of largest motor plus 100% of wattage of all other motors
Fixed equipment	100% of total wattage

Note 1: This diversity should only be applied to convenience outlets. No diversity should be taken on equipment area receptacles, dedicated receptacles, or surface raceway receptacles.

Lighting Criteria

The Design light levels listed in Table E4 are generalized. Specific spaces may require different lighting levels. Refer to Detailed Space Requirements sheets for information.
Generally, indirect lighting will allow light levels to be set slightly lower.

Table E4 - Lighting Design Criteria

Space	**Maintained Foot-Candle**
Laboratory, Support, Technical Area-Bench and table top	75-80 direct 55-65 direct/indirect
Storage	20-30

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Cañada College Math and Science Building
Audiovisual Technology Requirements

TA Project #14032

Prepared By:
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9 July 2014

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Cañada College Math and Science Building
Audiovisual Technology Requirements

INTRODUCTION

This document presents the general technology recommendations for the Cañada College Math and Science Building. This report is an outline of the functional relationships between the technology and the front of room teaching system that will be used by the instructional staff.

Thorburn Associates is an Acoustical, Technology (audiovisual, data/telecom, security) and Lighting design firm retained to review the existing architectural design and determine appropriate audiovisual requirements for the space.

OVERVIEW

Cañada College located in Redwood City, California is preparing a concept design for a new Math and Science technology building. This document is a preliminary review of the technology requirements of the classroom and laboratory rooms. The recommendations made are based on a front of the room teaching system currently used at the college.

GENERAL RECOMMENDATIONS

Displays

The San Mateo County Community College District Instructional Technology guidelines address some of these issues, but not in a quantifiable way.

Images should be in a 16x9 aspect ratio found in HD video and most laptops / tablet computers.

Whenever possible a direct view display (flat panel) should be used. This provides much better contrast and image quality. Because flat panel displays are smaller than a projection screen there will need to be a number of displays in each classroom or laboratory for proper viewing of the instructional content.

The furthest seating distance for a student to a display, whether a flat panel or projection screen, is determined by the height of the image. This “furthest seat” is the Least Favored Viewer (LFV). To determine the height of the image, the distance to the LFV is divided by a factor based on the type of content being viewed.

- close inspection of the content – divide by four
- inspection with clues (additional text or highlights on the document) – divide by six
- video or general viewing – divide by eight

Most higher learning facilities use a compromise factor of five. If the LFV is 35 feet from the image then the height of the screen or display should be seven feet. (35/5=7)

However, display images should be at least six inches below the ceiling and at least 42 inches above the floor, but no less than 36 inches. Using the formula provided above, if the ceilings are ten feet high, the image can be six feet tall with the bottom of the image 42 inches above the floor. With only a six foot tall image, the LFV is 30 feet not 35 feet.

All projection surfaces should have at least two inches of black masking around the perimeter of the image to improve contrast.

Projector Locations

Projectors should be located at the far back wall opposite the projection screen. This will require coordination with the placement of lighting fixtures or other hanging objects. By moving the projector out of the center of the room we can move the projector fan noise and heat out of the center of the student space.

Lighting

Direct light on the screens should be avoided in order to not wash out the image.

Dimmable lighting zones should be set up with preset scenes depending on the lighting requirements for the demonstration or viewing needs.

Basic "walk in" lighting controls should be at each door, with full control for all lighting zones at the front of the room, near the instructor's station.

Lighting zones, at a minimum, should include the following areas:

- Over the displays
- Student work area
- Instructor work area
- White board / wall washers

Teaching Station

The teaching stations can be used to hold the electronics needed for the technology in the room. At a minimum the teaching station should have connections for an instructor's laptop, and if possible a control system touch panel or keypad. The height of the teaching station and position in the room must take into account the size of the projection screen in order to not block the line of sight for the students.

Connections and Use

- There should be floor boxes in the front of the room to allow the instructor to plug in a laptop, microphone, and a document camera.
- A simple presentation switch should be used to connect any sources and display the video on the projection screen.

- Distributed audio should come from ceiling mounted loudspeakers.
- There should be an electronics rack located in the casework or instructor work station with a connection for an assistive listening transmitter.
- A blu-ray DVD player should be provided and located in the electronics rack.
- The ceiling mounted projectors should be of sufficient brightness to maintain required task lighting at student desks and still produce a viewable image.
- Laser projectors should be considered because of their low maintenance requirements (no bulbs), however the school should require a demonstration to be sure the projectors meet their requirements.
- A document camera with a connection for a laptop and the ability to remotely annotate should be provided. A portable document camera that only requires a power connection should be considered. This would allow the instructor to show items at a student's table.
- Wireless connection of laptops to display on the screens should be considered. This will require sufficient bandwidth or a separate multicast access point.
- A fixed assistive listening system (ADA) is required. It is recommended that an infrared type system be used.

Control System / Panels

There should be a simple-to-use control panel located near or on the instructor station. This control panel should be able to power the system on and off, control volume, and switch between sources and when needed control those sources. Lighting control should also be part of the control panel.

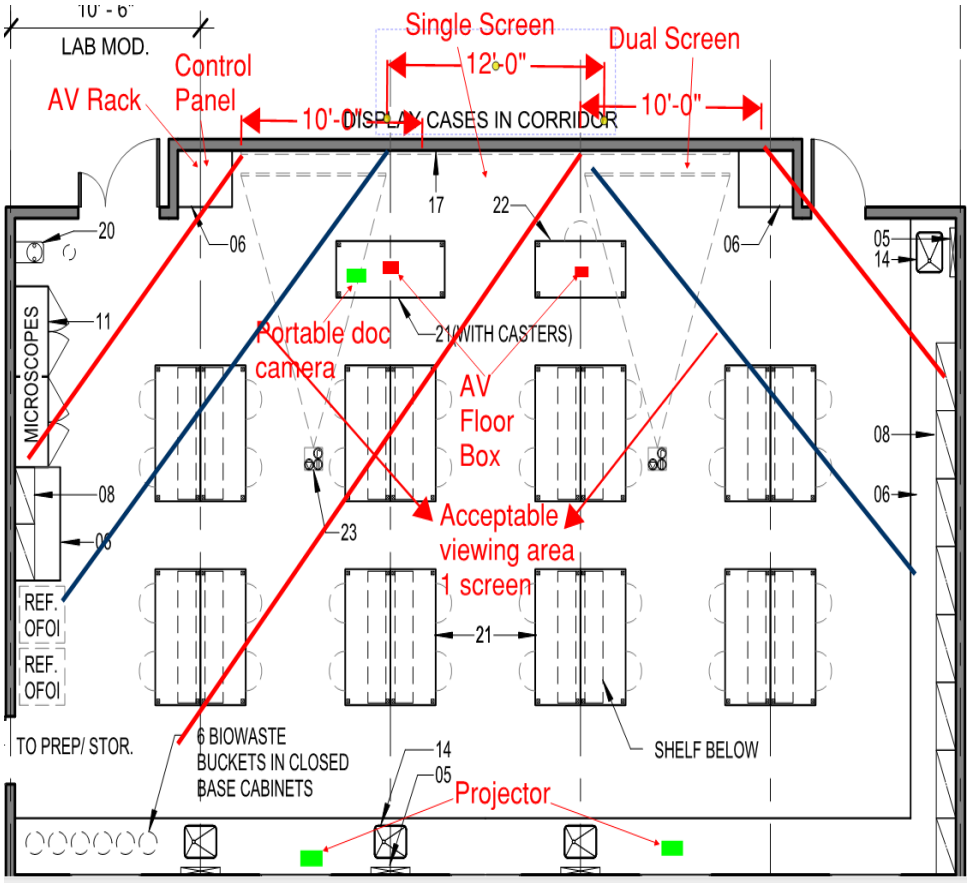
ROOM BY ROOM COMMENTS

Biology/Microbiology Laboratory, Earth Science Laboratory, Astronomy Laboratory

Each of these rooms should be used as a demonstration and student participation space.

Image Viewing

- In order to provide adequate viewing angles for all students there should be two screens at least ten feet wide. An acceptable viewing angle is 45 degrees from the edges of the image.
- The bottom of the screen will be 42 inches from the floor, this will require making sure the Laboratory benches in the two corners are relocated to not obstruct the view.
- The two shown demonstration tables height and size should be considered for the viewing clearance of the screens.
- If a single projection screen is used then the screen will need to be 14 feet wide, and the ceiling height will need to be at least 12 feet in order to allow enough room for the screen image to be 42 inches above the floor.

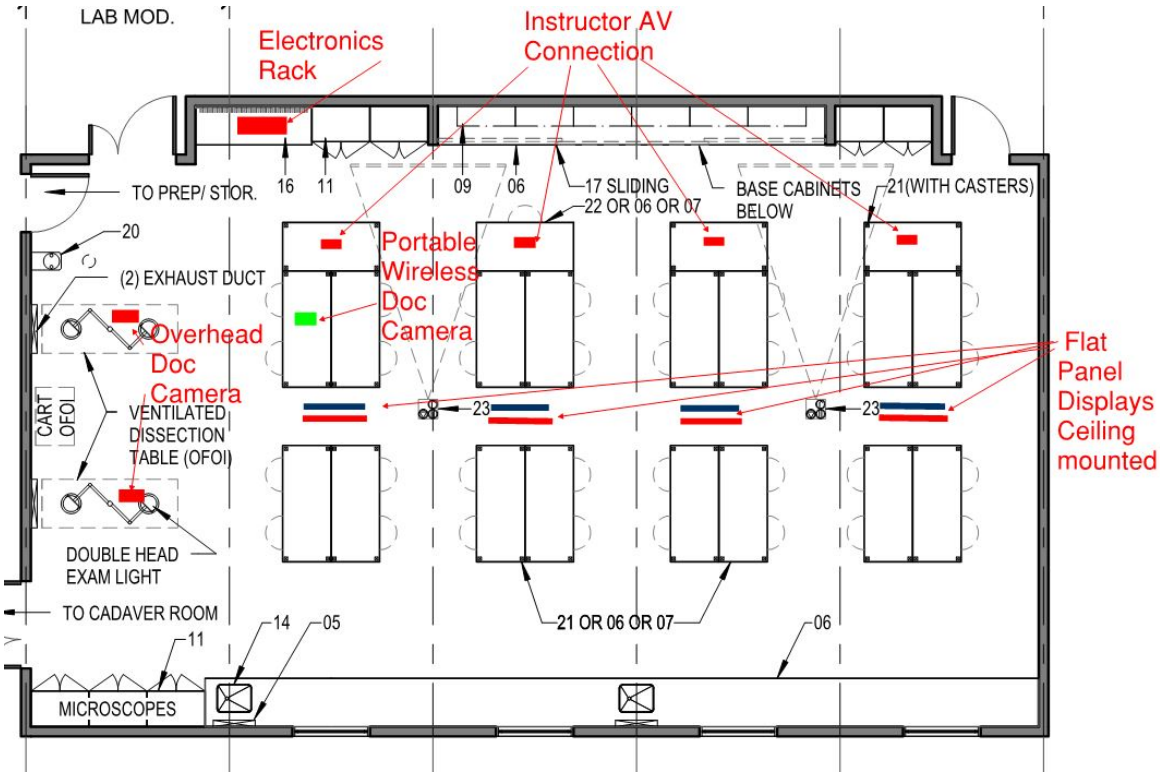


Anatomy/Physiology Laboratory

These laboratories will have similar functions as the biology and microbiology lab. Our past experience has been that the student benches are movable and often are at standing height in these spaces. The video information provided for the students needs to be close inspection, which does not lend itself to projection systems.

Image Viewing

- There should be ceiling mounted flat panel displays along the center of the room, located at the end of the exam tables. These displays can be on motorized lifts to bring the image down during use.
- Additional displays could be located around the room as needed.
- Each table could have a fixed tablet that receives wireless streaming video from the instructor. This could include video from a camera or from the instructor's computer.
- The exam tables should have fixed cameras above them to allow the image to be seen on all the displays, and allow for recording.
- A distance learning system should be considered.



Biology Projects Laboratory

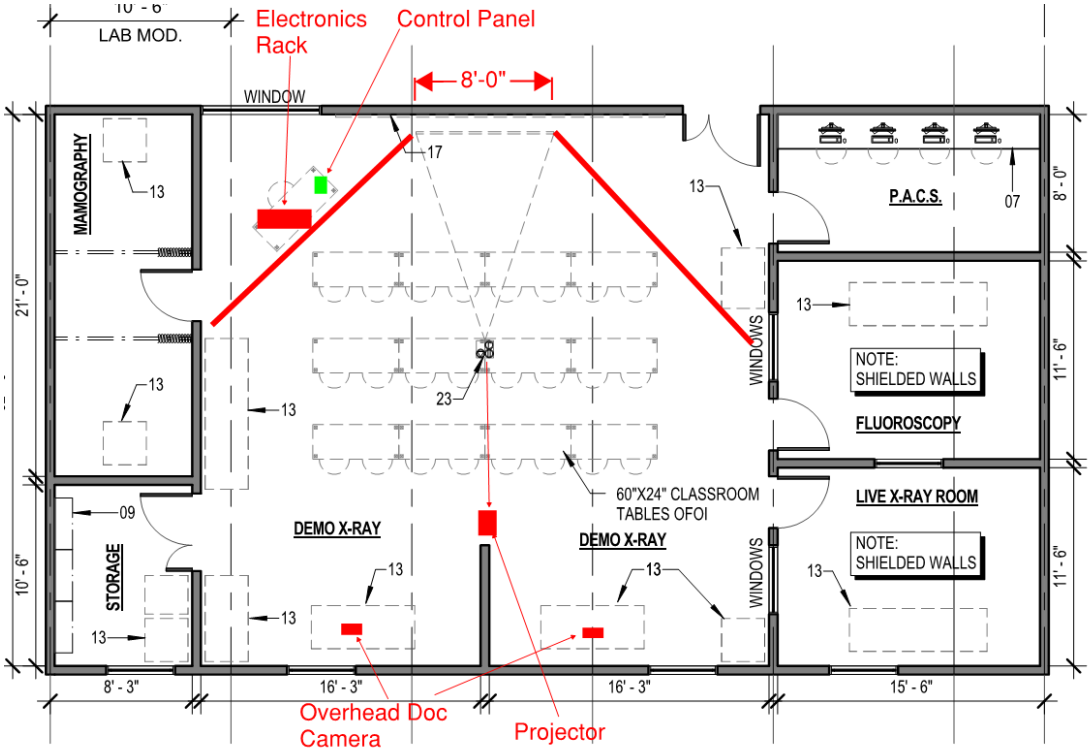
This laboratory does not normally have any advanced technology. The students will require network connections at each work space.

Radiology Tech Laboratory

This space combines a traditional front of the room teaching classroom with spaces for students to learn how to use Radiology equipment.

Image Viewing

- A single projection screen located in the center of the room should be used.
- The projector should be ceiling mounted and located in the back of the room.



Large Classroom

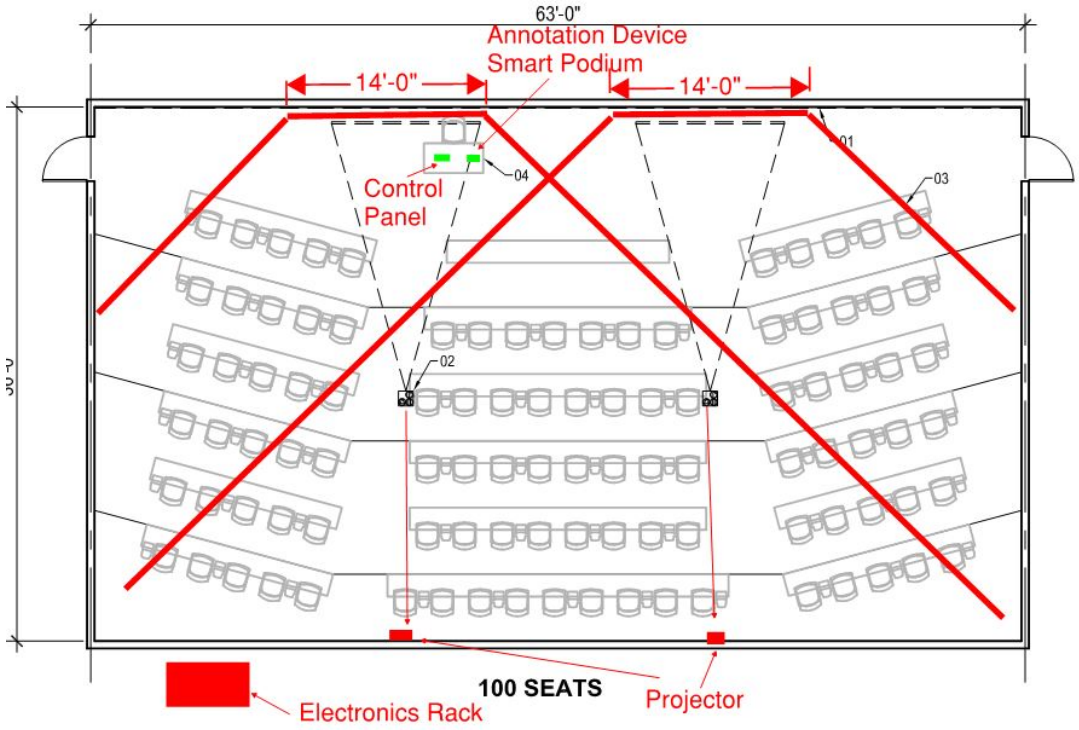
The large classroom will seat 100 students. This classroom should have tiered seating, two large projection screens and a teaching station on a raised stage.

Image Viewing

- The classroom will be 62 feet wide. Each projection screen should have at least an eight foot high image. This will require the ceiling height to be fifteen feet at the stage.
- The projectors should be ceiling mounted and located in the back of the room..

Connections and Use

- There shall be a teaching station/lectern on the stage with connections for a laptop, document camera and a “Smart Podium”.
- The electronics rack should be located in a separate space outside of the classroom.
- Camera locations in the front for audience view and back for presenter view shall be used for distance learning and lecture capture.
- Connections at the AV Rack should be available for lecture capture and streaming for distance learning.
- This space should have a separate multicast wireless access point to use for streaming and lecture capture storage systems.

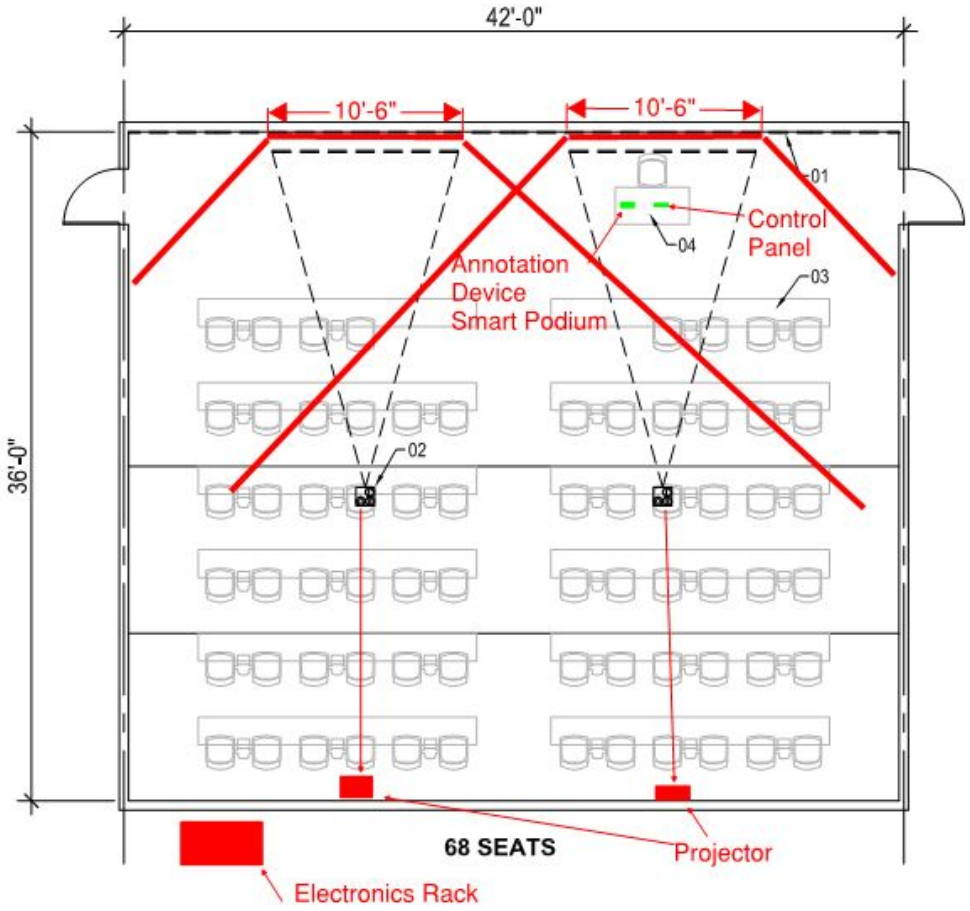


Medium Classroom

This classroom will seat 68 students. This classroom should have tiered seating, two large projection screens and a teaching station.

Image Viewing

- The classroom will be 42 feet wide. Each projection screen should have at least a six foot high image. This will require the ceiling height to be 12 feet.
- The projectors should be ceiling mounted and located in the back of the room.

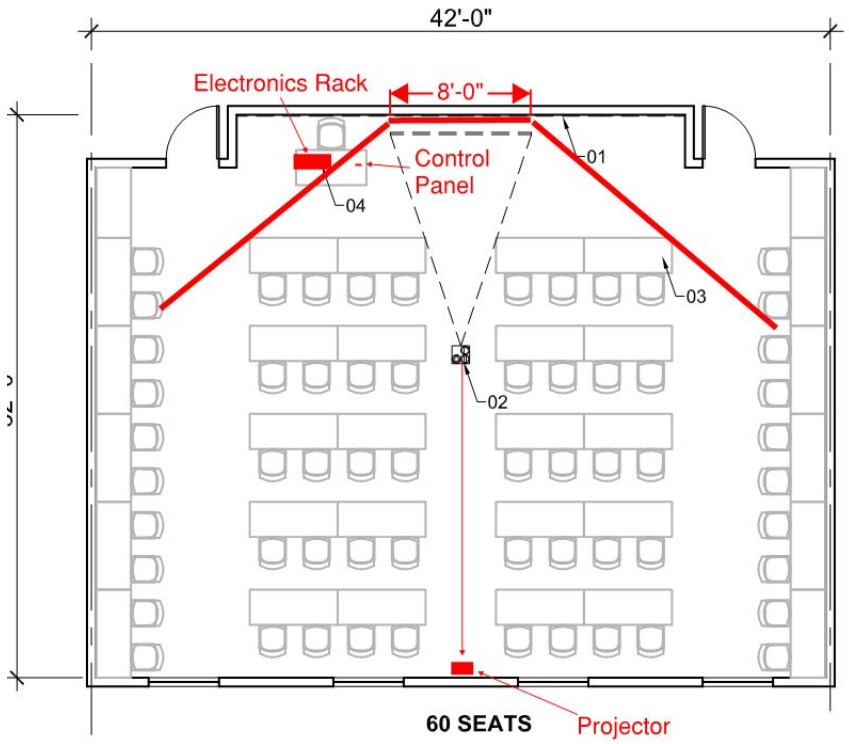


Computer Science Classroom

This classroom will seat 60 students. This classroom should have staggered seating, a large projection screen and a teaching station.

Image Viewing

- The classroom will be 42 feet wide. The projection screen should have at least a six foot high image. This will require the ceiling height to be 12 feet.
- The projector should be ceiling mounted and located in the back of the room.



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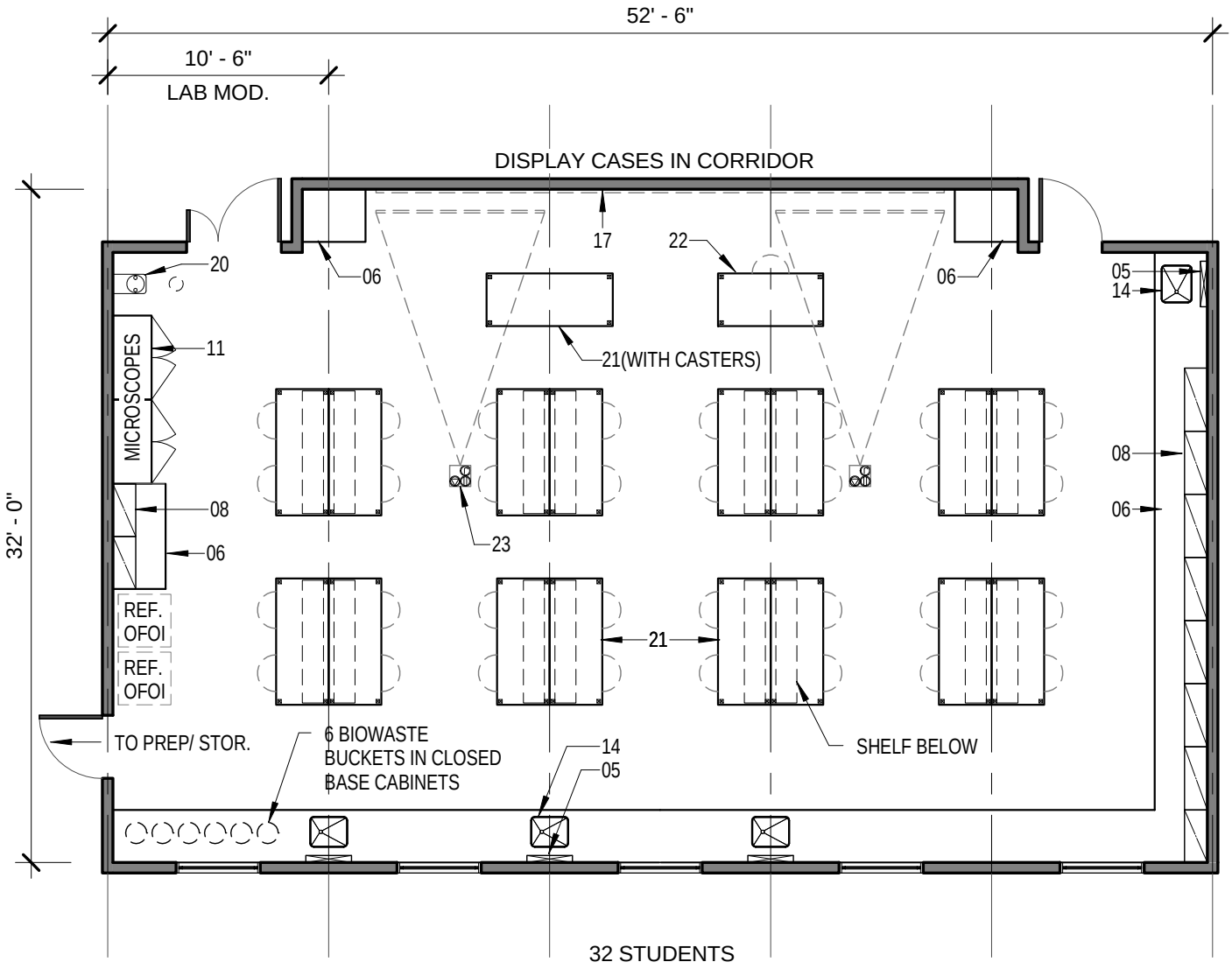
SPACE DIAGRAM | **Science & Technology Building**

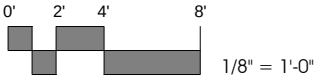
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.01**

SPACE NAME: BIOLOGY LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.01
SPACE NAME: BIOLOGY LABORATORY **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Note 1
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	Note 2
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 3
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 4
Zoned Lighting	Note 4
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:
Refrigerators

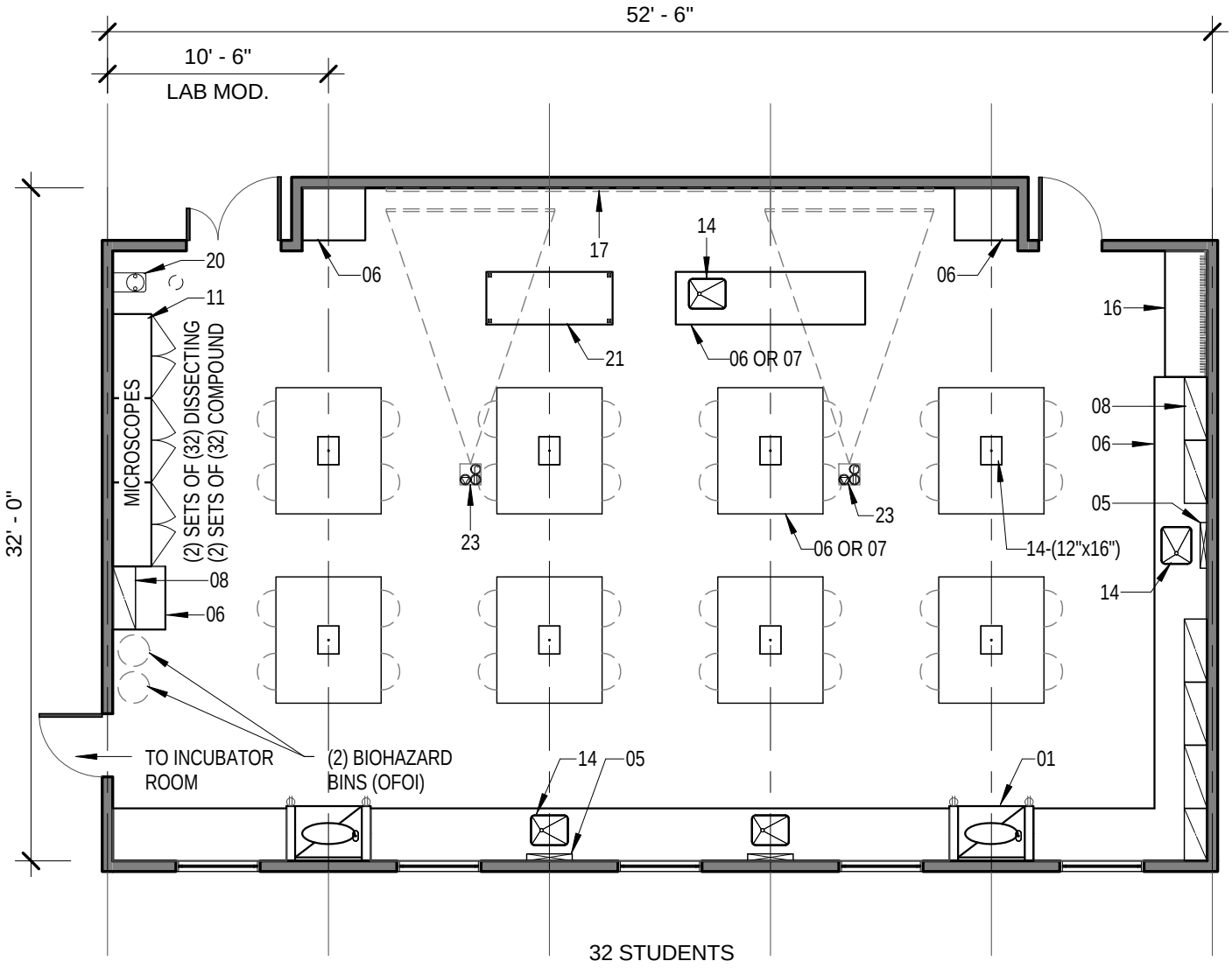
REMARKS:

1. Normally 6 ACH with user controllable timer switch for 15 ACH.
2. Low and high exhaust grilles.
3. For microscopes.
4. Suitable for AV presentations.

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.02**
SPACE NAME: MICROBIOLOGY LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'
1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

05/13/2014

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.02
SPACE NAME: MICROBIOLOGY LABORATORY **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	Note 1
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 2
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	Note 3
Industrial Cold Water (ICW)	Note 3
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 4
Zoned Lighting	Note 4
Other	

CHEMICALS	
Bases	●
Acids	●
Solvents	●
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

Biohazard waste bins

REMARKS:

1. (2) 4' CFH.
2. For microscopes.
3. Pedal activated sinks.
4. Suitable for AV presentations.

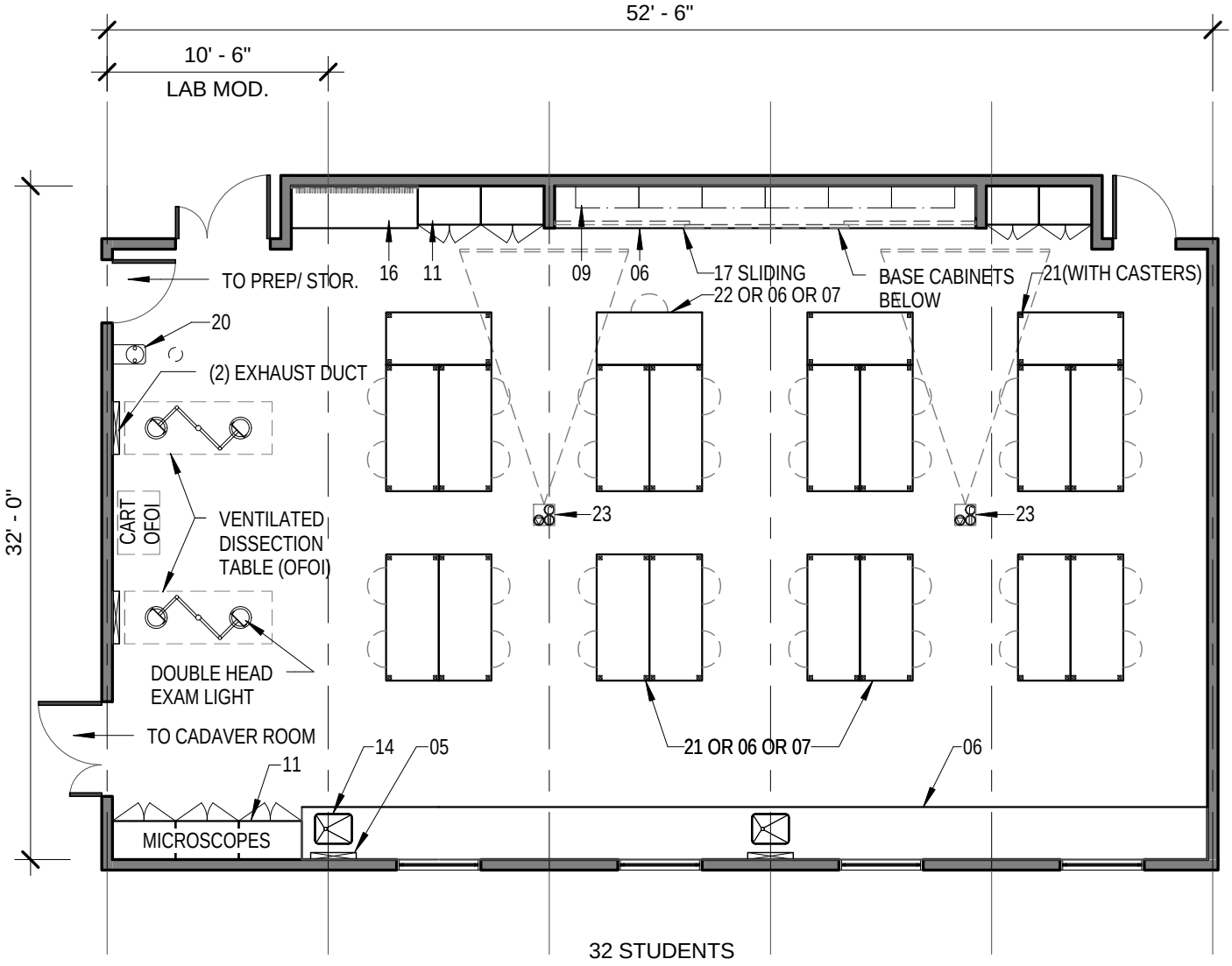
SPACE DIAGRAM | **Science & Technology Building**

Artik Art & Architecture/ RFD | ***Cañada College***

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.03**

SPACE NAME: ANATOMY LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'

1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.03
SPACE NAME: ANATOMY LABORATORY **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Note 1
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	Note 2
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	Note 3

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 4
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	Note 5
Darkenable	Note 6
Zoned Lighting	Note 6
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

Downdraft dissection tables.
Carts

REMARKS:

1. Normally 6 ACH with user controllable timer switch for 15 ACH.
2. Low and high exhaust grilles.
3. Exhaust on timer switch for downdraft dissection tables.
4. For microscopes.
5. Double-head exam lights over dissection tables.
6. Suitable for AV presentations.

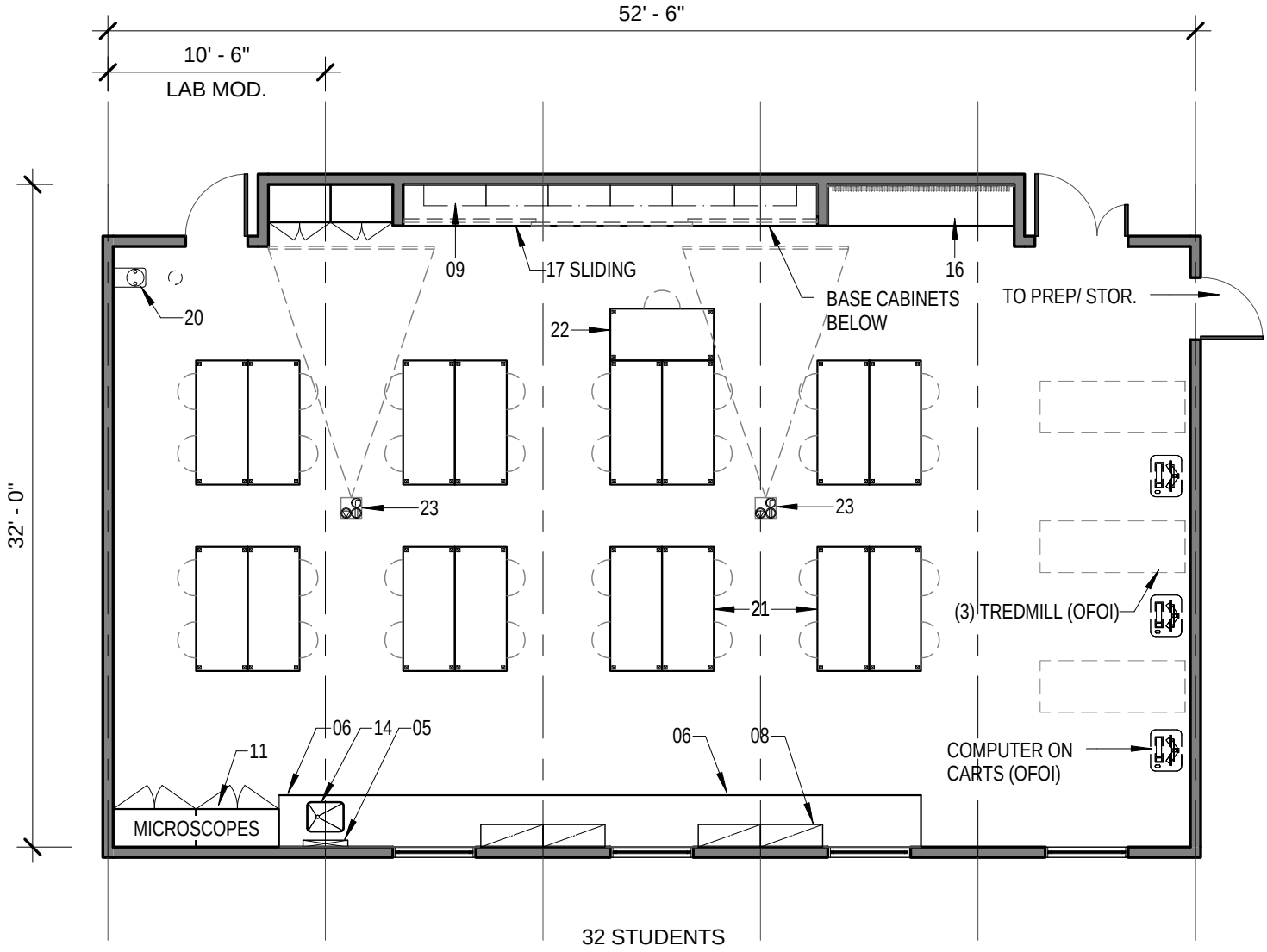
SPACE DIAGRAM | **Science & Technology Building**

Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.04**

SPACE NAME: PHYSIOLOGY LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'

1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.04
SPACE NAME: PHYSIOLOGY LABORATORY **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 1
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 2
Zoned Lighting	Note 2
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

Treadmills and/or stationary bikes
Carts

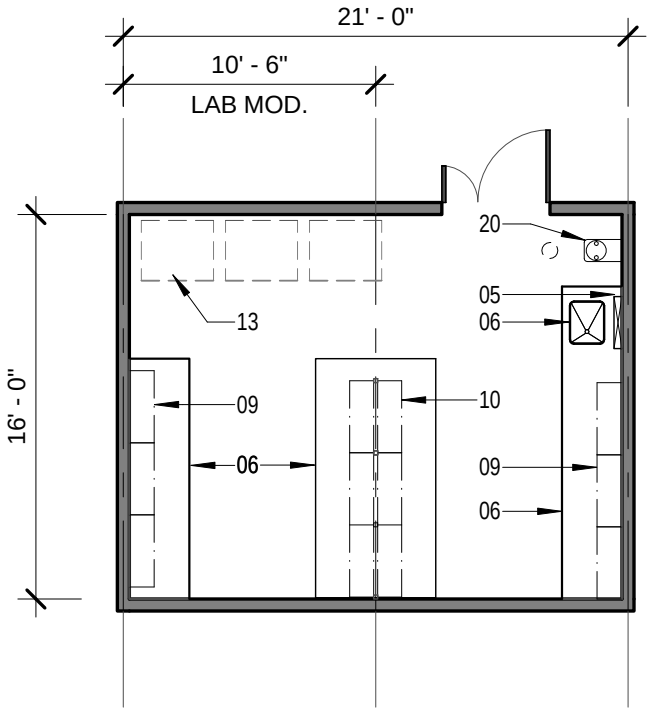
REMARKS:

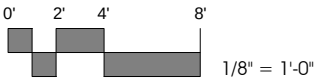
1. For microscopes.
2. Suitable for AV presentations.

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.05**
SPACE NAME: BIOLOGY PROJECTS LABORATORY **AREA (NSF): 336**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.05
SPACE NAME: BIOLOGY PROJECTS LABORATORY **OCCUPANTS:** 2-8

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 1
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:
Refigerator
Freezer
Incubator

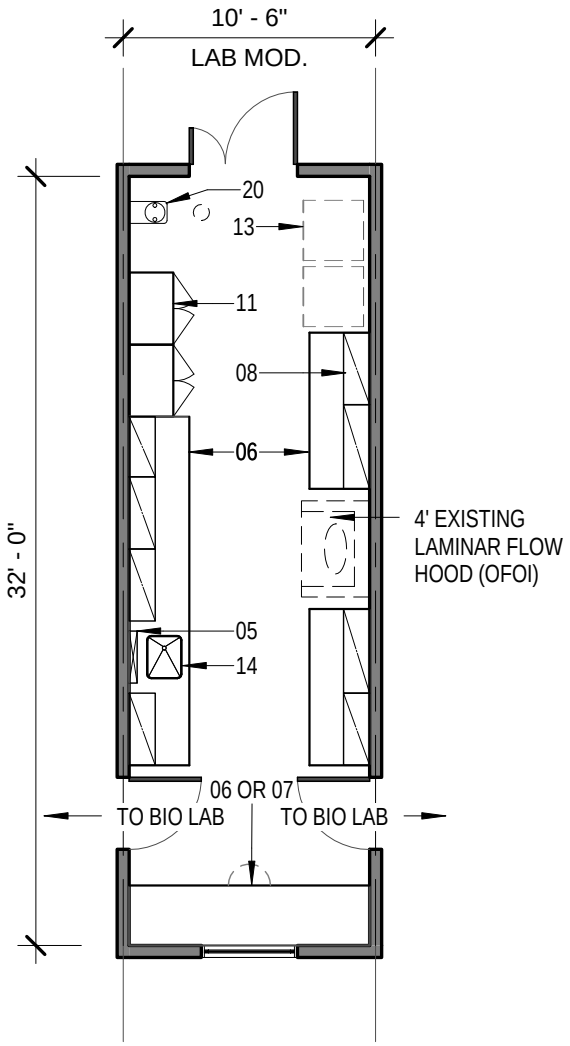
REMARKS:

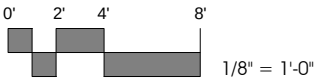
1. For microscopes.

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.01**
SPACE NAME: BIOLOGY PREP **AREA (NSF): 336**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY
SPACE NAME: BIOLOGY PREP

SPACE ID NO: A2.01
OCCUPANTS: 2 - 6

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	Note 1
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	Note 2
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	●
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	●
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

Laminr flow hood
Refrigerators
Freezers
Incubators

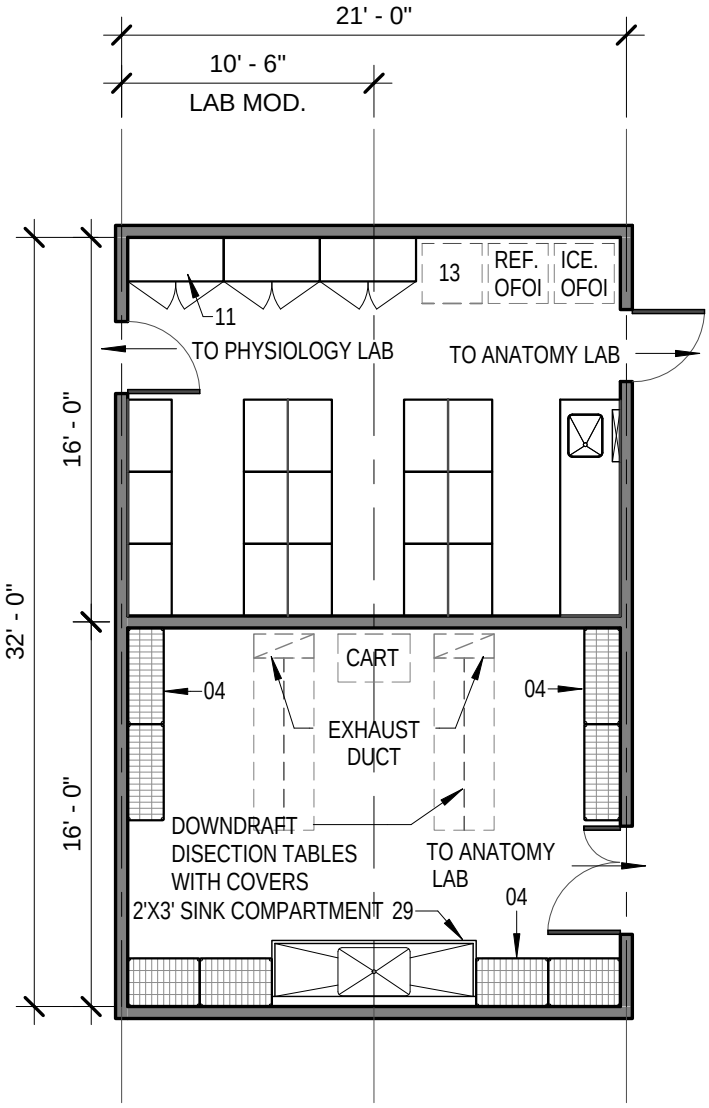
REMARKS:

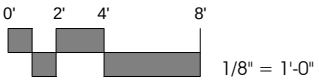
1. (1) Existing 4' recirculating laminar flow hood (OFOI).
2. For microscopes.

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.02, A2.09**

SPACE NAME: ANATOMY & PHYSIOLOGY PREP/ STORAGE, CADAVER ROOM **AREA (NSF): 336 , 336**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.02
SPACE NAME: ANATOMY & PHYSIOLOGY PREP / STORAGE **OCCUPANTS:** 2-3

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	10
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	●
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:
Refigerator
Freezer
Ice machine

REMARKS:

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.09
SPACE NAME: CADAVER ROOM **OCCUPANTS:** 2 - 16

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	15
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	Note 1
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	Note 2

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	Note 3
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

Downdraft dissection tables.
Carts

REMARKS:

1. Low and high exhaust grilles.
2. Exhaust on timer switch for downdraft dissection tables.
3. Double-head exam lights over dissection tables.

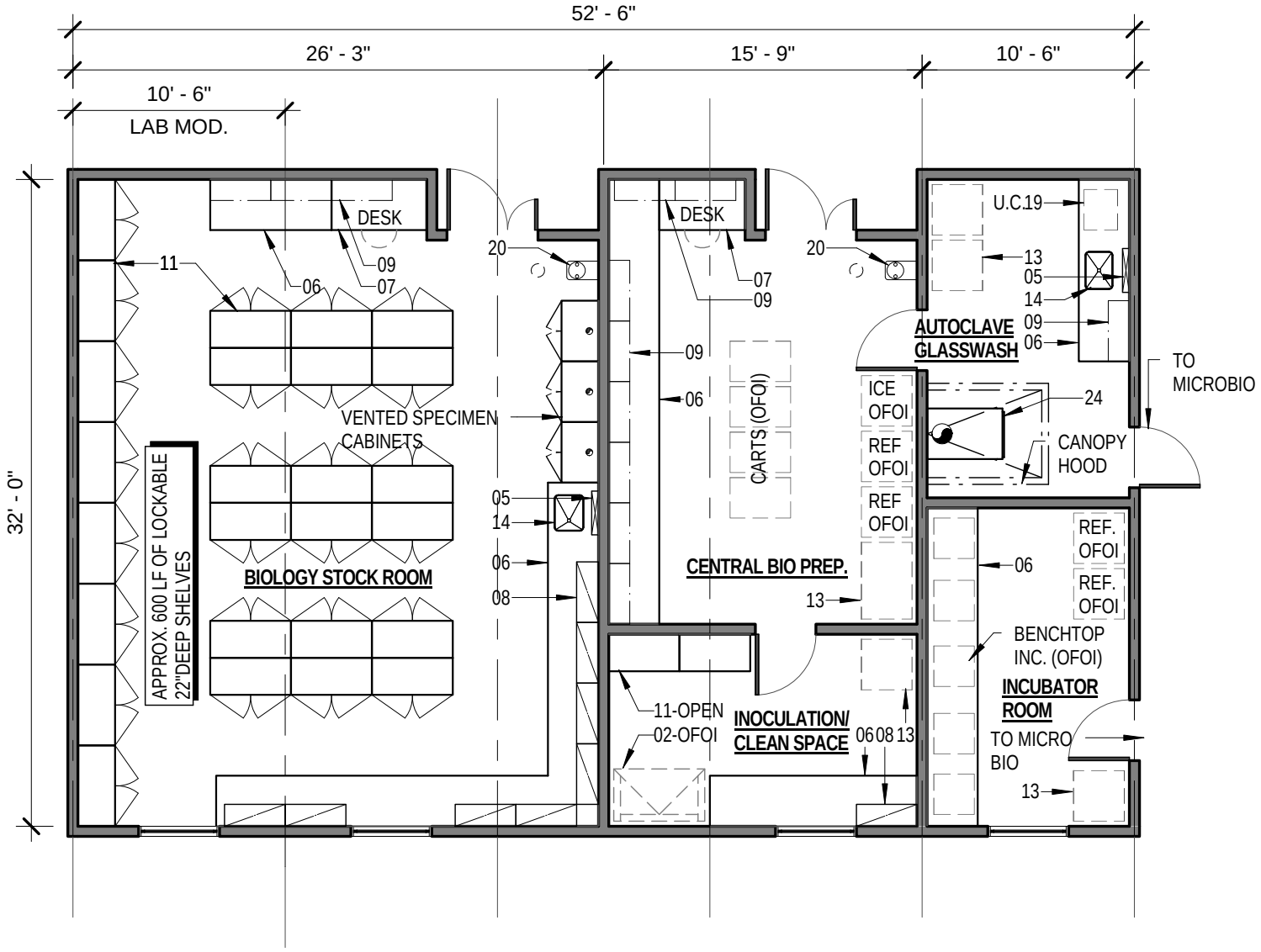
SPACE DIAGRAM | **Science & Technology Building**

Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.03,A2.05,A2.06,A2.07,A2.07A**

SPACE NAME: BIO STOCKROOM, CENTRAL BIO PREP, AUTOCLAVE/ GLASSWASH, & INCUBATOR ROOM **AREA (NSF): 1,680 TOTAL**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

05/13/2014

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.03
SPACE NAME: BIO STOCKROOM **OCCUPANTS:** 1 - 2

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	Note 1

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	●
Radioisotope Storage	
Chemical Storage	●

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:
Carts

REMARKS:
1. Vented dissection specimen storage cabinets.

DEPARTMENT: SCIENCE & TECHNOLOGY
SPACE NAME: INCUBATOR ROOM
SPACE ID NO: A2.05
OCCUPANTS: 2 - 8

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	●
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	
Data	
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	●
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

Incubators
Refrigerators

REMARKS:

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.06
SPACE NAME: AUTOCLAVE / GLASSWASH **OCCUPANTS:** NA

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	12
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	●
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	●
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Compressed Air (cA)	●
Industrial Hot Water (IHW)	●
Soft Ind. Hot Water (SIHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	Note 1
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	●
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	●
208V, 30A, 3 Phase	●
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	
Data	
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	
Epoxy	●
Sealed Concrete	
Other	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

Carts

REMARKS:

1. For glasswasher final rinse.

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.07
SPACE NAME: CENTRAL BIOLOGY PREP **OCCUPANTS:** 1 - 2

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	●
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	●
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:
Refrigerators
Ice Machine
Carts

REMARKS:

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.07A
SPACE NAME: INOCULATION / CLEAN SPACE **OCCUPANTS:** 1 - 2

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	Note 1
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	●
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	●
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	●
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	
Integral w/floor	●
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	●
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

Recirculating biosafety cabinet
Refrigerator
Incubator
Carts

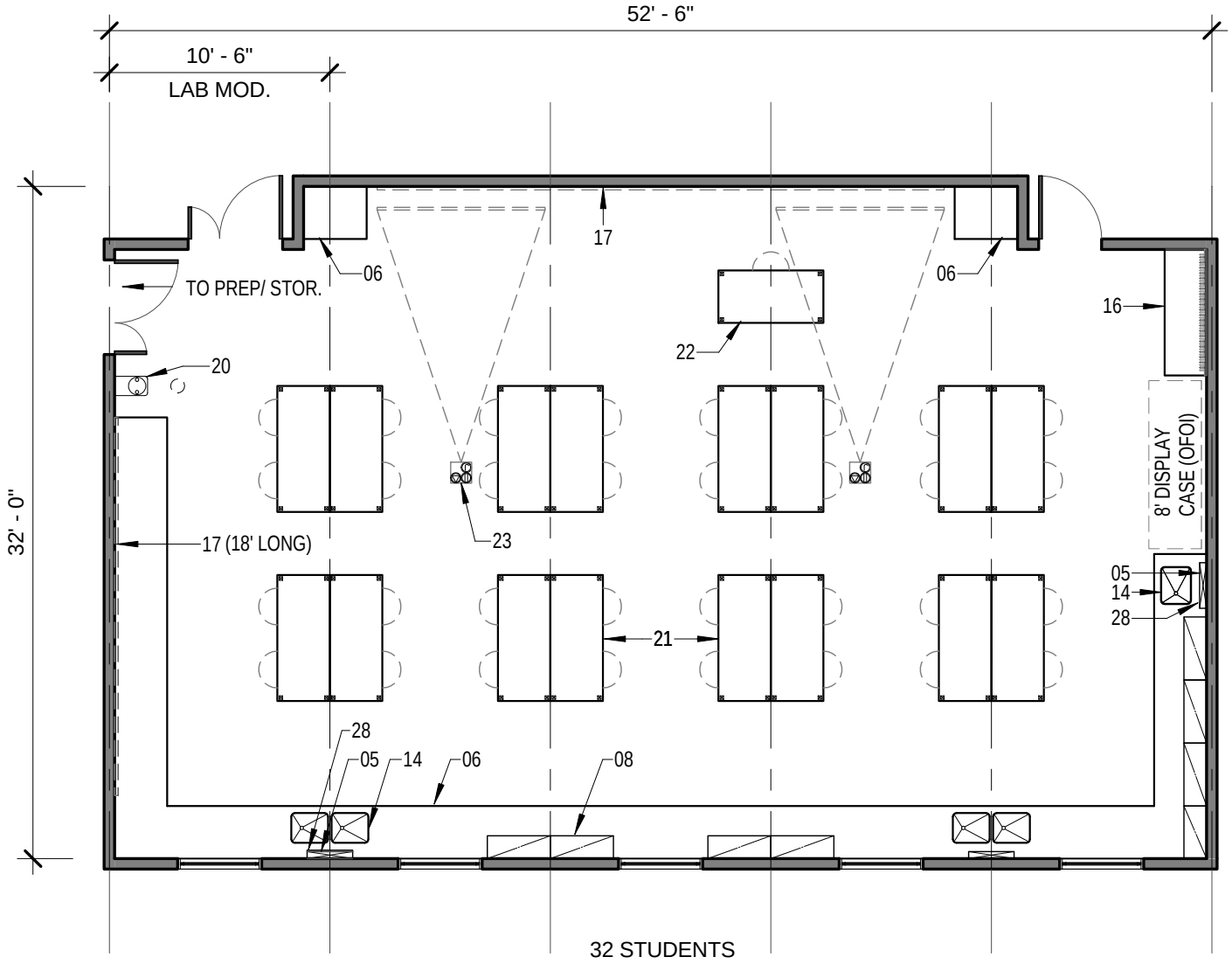
REMARKS:

1. (1) Existing recirculating 4' BSC (OFOI).

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.06**
SPACE NAME: EARTH SCIENCE LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'
1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.06
SPACE NAME: EARTH SCIENCE LABORATORY **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	●
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 1
Zoned Lighting	Note 1
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

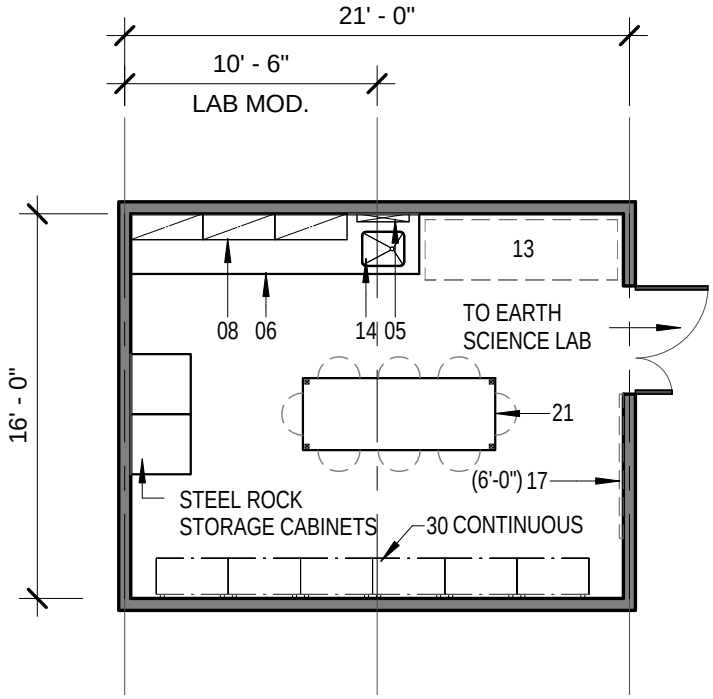
Diplay case

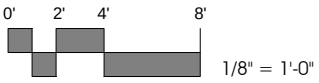
REMARKS:

1. Suitable for AV presentations.

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.10**
SPACE NAME: EARTH SCIENCE STORAGE/ STUDENT PROJECTS **AREA (NSF): 336**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.10
SPACE NAME: EARTH SCIENCE STORAGE / STUDENT PROJECTS **OCCUPANTS:** 1 - 8

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	6
Air Recirculation	No
Air Pressure Positive	
Air Pressure Negative	●
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	●
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

REMARKS:

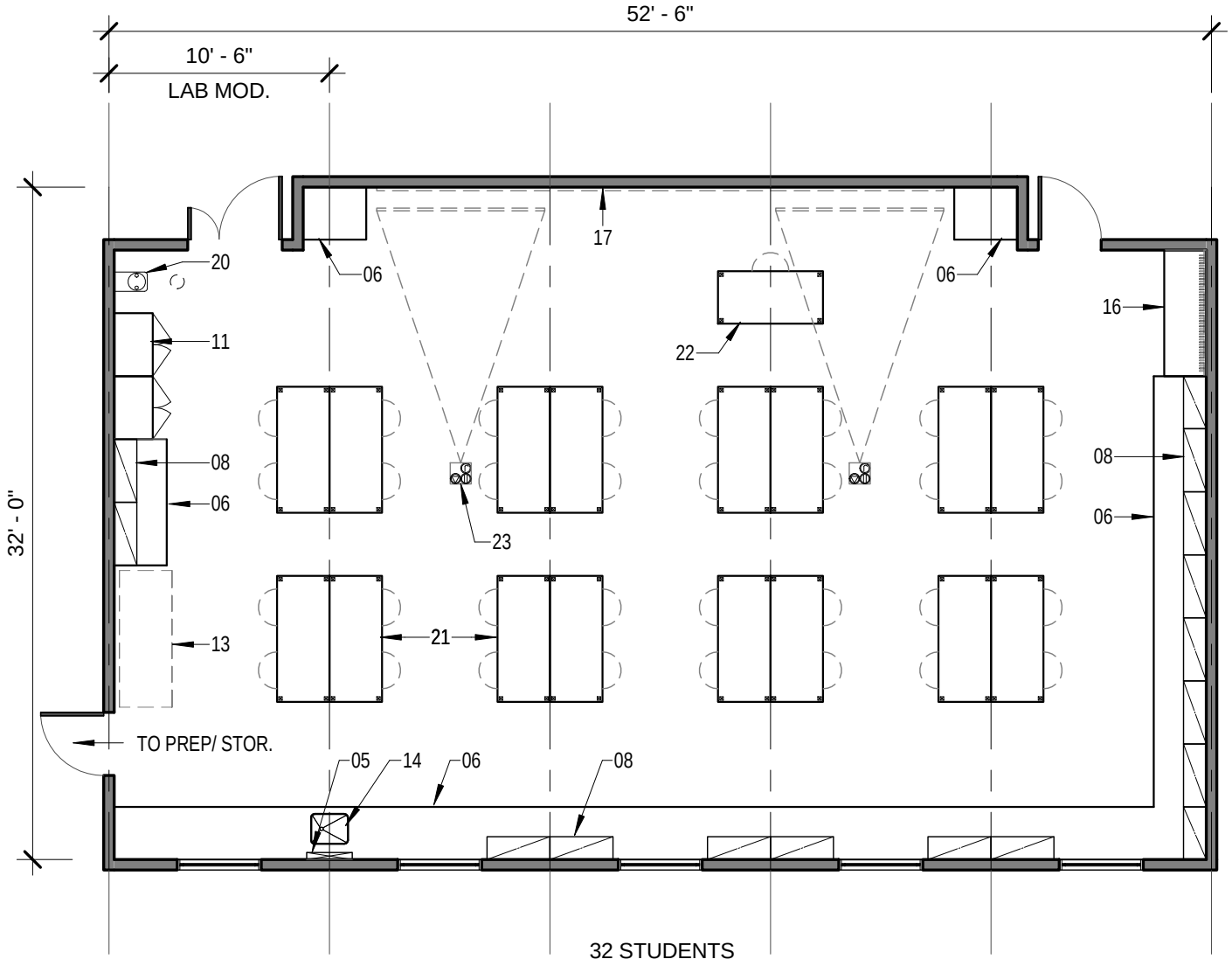
SPACE DIAGRAM | **Science & Technology Building**

Artik Art & Architecture/ RFD | ***Cañada College***

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A1.07**

SPACE NAME: ASTRONOMY LABORATORY **AREA (NSF): 1,680**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'

1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY
SPACE NAME: ASTRONOMY LABORATORY
SPACE ID NO: A1.07
OCCUPANTS: 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Per code
Air Recirculation	Yes
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	●
Industrial Cold Water (ICW)	●
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 1
Zoned Lighting	Note 2
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

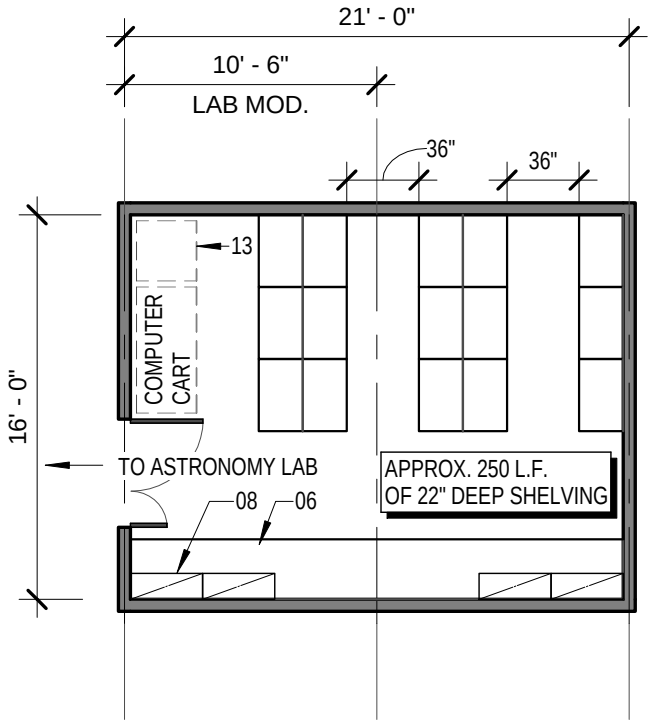
REMARKS:

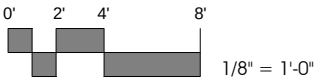
1. Blackout shades at windows.
2. Suitable for AV presentations.

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.11**
SPACE NAME: ASTRONOMY STORAGE **AREA (NSF): 336**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.11
SPACE NAME: ASTRONOMY STORAGE **OCCUPANTS:** 33

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Per code
Air Recirculation	Yes
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	

EQUIPMENT BY OWNER:

REMARKS:

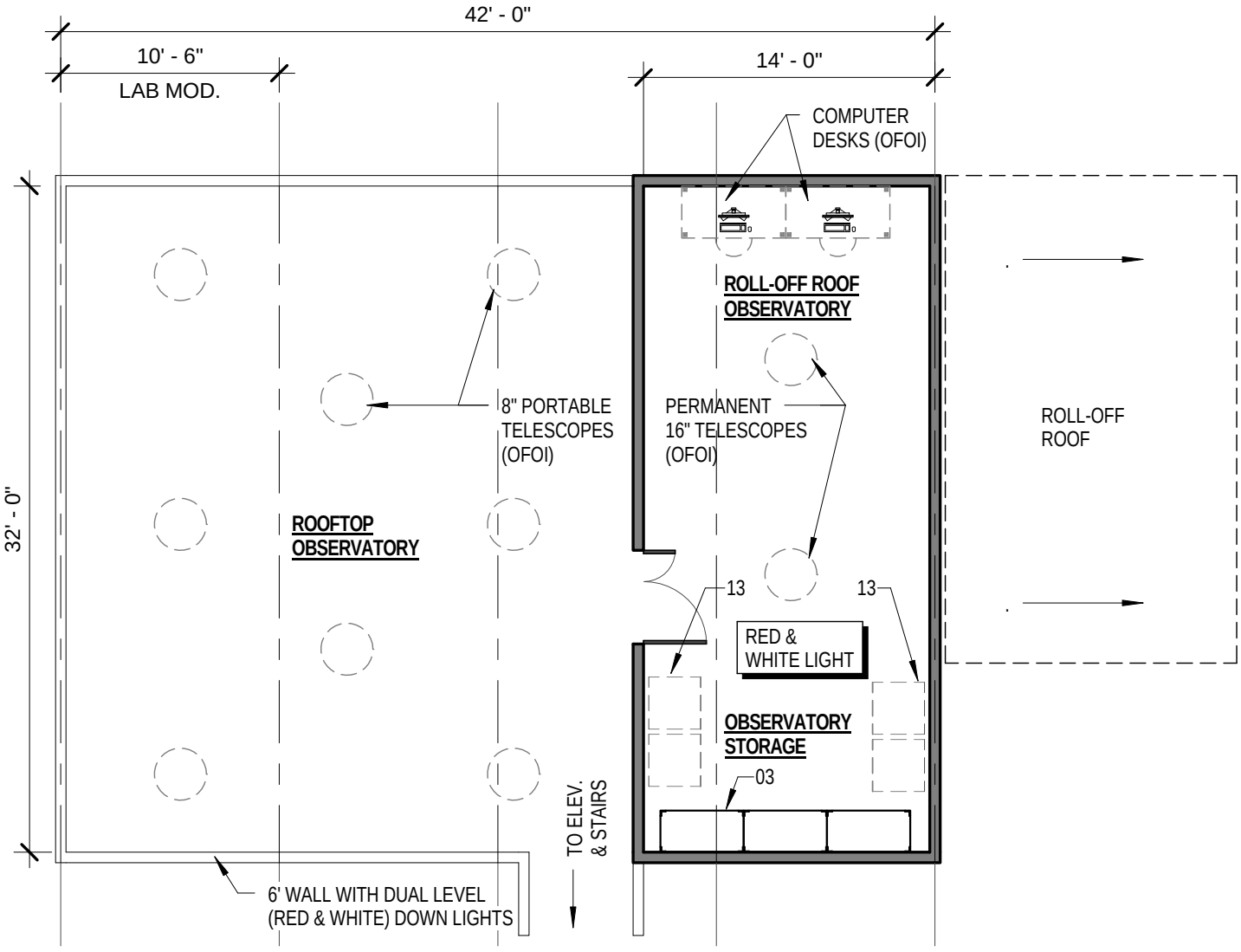
SPACE DIAGRAM | **Science & Technology Building**

Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A2.12, A2.13**

SPACE NAME: ROOFTOP OBSERVATORY, ROLL-OFF ROOF OBSERVATORY & STORAGE **AREA (NSF): 896, 448**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'

1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

05/13/2014

DEPARTMENT: SCIENCE & TECHNOLOGY
SPACE NAME: ROOFTOP OBSERVATORY
SPACE ID NO: A2.13
OCCUPANTS: Max. 50

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●

MECHANICAL	
Temperature	
68°-75° ± 2°F	
Other	Exterior
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	
Data	
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	Note 1
Safe light	
Special Lighting	Note 1
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	Note 2
Base	
4" Vinyl	
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	Note 3
Ceiling	
Open	
Acoustic Tile	
Gyp Board, Epoxy Paint	
Height	
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

Telescopes

Equatorial telescope mounts

REMARKS:

1. Dual level red and white lighting.
2. Walkable roof surface.
3. 6' tall light shielding wall around.

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A2.12
SPACE NAME: ROLL-OFF ROOF OBSERVATORY & STORAGE **OCCUPANTS:** 5 - 15

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	
24 hours/day	●

MECHANICAL	
Temperature	
68°-75° ± 2°F	Note 1
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Per code
Air Recirculation	Yes
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	Note 2
Safe light	
Special Lighting	Note 3
Darkenable	
Zoned Lighting	
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	Note 4
Base	
4" Vinyl	
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	Note 5
Ceiling	
Open	●
Acoustic Tile	
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	

EQUIPMENT BY OWNER:

Telescopes
Telescope mounts
Computers and desks
Ladders

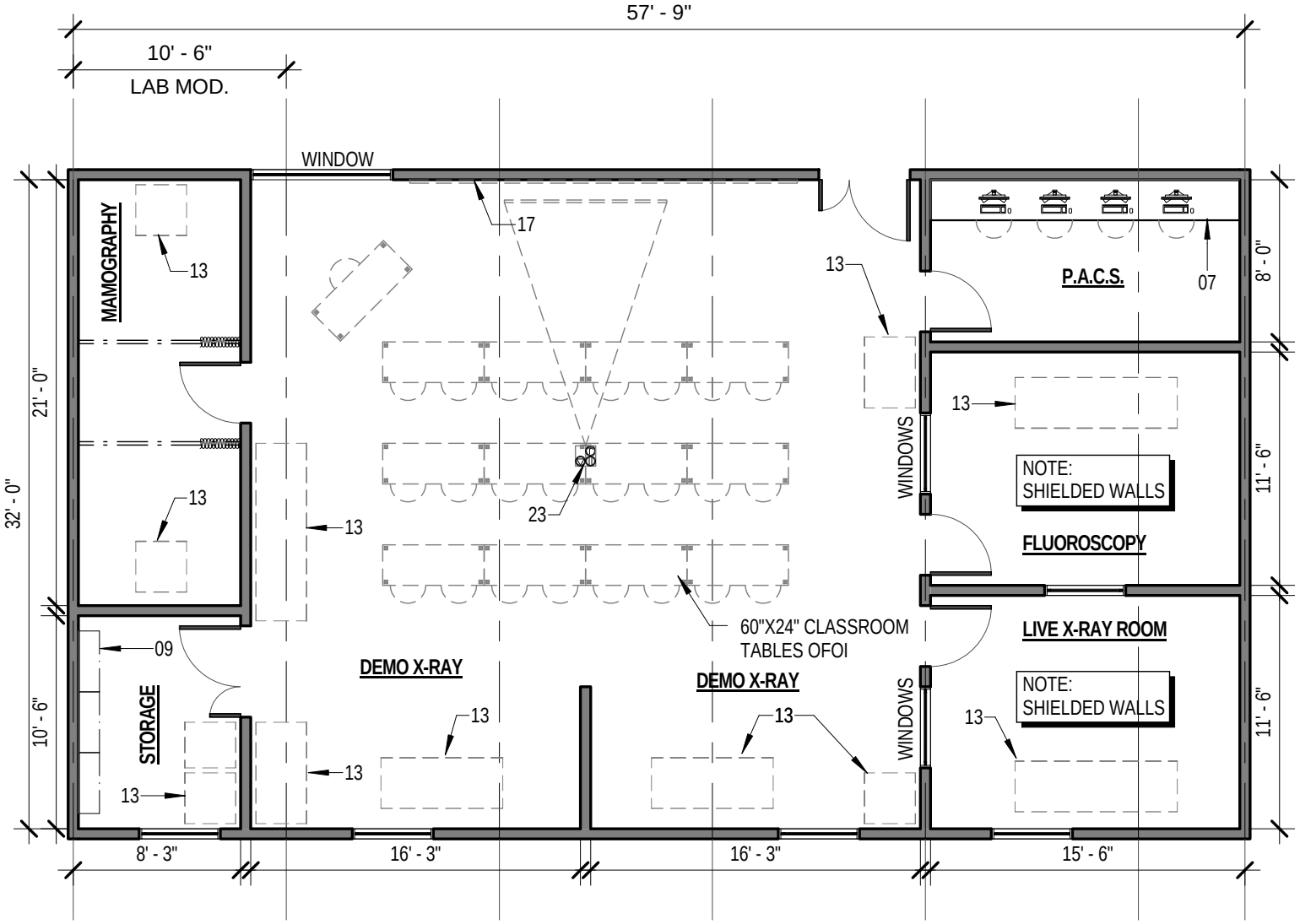
REMARKS:

1. To be confirm with college.
2. White lighting.
3. Red low level lighting.
4. Walkable roof surface.
5. Exposed metal panels.

SPACE DIAGRAM | **Science & Technology Building**
Artik Art & Architecture/ RFD | *Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO.: A1.08,A2.15 - 17**
SPACE NAME: RADIOLOGY TECH LABORATORY **AREA (NSF): 1,848**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



0' 2' 4' 8'
1/8" = 1'-0"

FURNISHINGS

01. Chemical Fume Hood
02. Biological Safety Cabinet
03. Industrial Shelving
04. Metro Shelving
05. Pipe Drop Enclosure
06. Laboratory Bench, Standing Height
07. Laboratory Bench, Sitting Height
08. Wall Cabinet
09. Adjustable Wall Shelves
10. Island Bench Shelves
11. Tall Storage Cabinet
12. Flammable/ Corrosive Cabinets.
13. Equipment Space
14. Laboratory Sink
15. Cupsink
16. Coat/ Bookbag Storage
17. White Markerboard
18. Tackboard
19. Glassware Washer
20. Safety Shower/Eyewash
21. Movable Laboratory Table
22. Movable Demonstration Bench
23. Multi-media Projector & Sceen (Clg. Mtd.)
24. Autoclave
25. Cylinder Rack
26. Cylinder Restraint
27. Equipment Exhaust
28. Drying Rack
29. Scullery Sink
30. Heavy Duty Wall Shelves

05/13/2014

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.08, A2.15 - 17
SPACE NAME: RADIOLOGY TECH LABORATORY **OCCUPANTS:** 25

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Per code
Air Recirculation	Yes
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	Note 1
208V, 30A, 3 Phase	Note 1
480V, 100A, 3 Phase	Note 1
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	Note 1
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 2
Zoned Lighting	Note 2
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

REMARKS:

1. As required for live X-ray and fluoroscopy equipment
2. Suitable for AV presentations.

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A1.08, A2.15 - 17
SPACE NAME: RADIOLOGY TECH LABORATORY **OCCUPANTS:** 25

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	Per code
Air Recirculation	Yes
Air Pressure Positive	●
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide (CO_2)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	Note 1
208V, 30A, 3 Phase	Note 1
480V, 100A, 3 Phase	Note 1
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	Note 1
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	
75 fc at bench/desk	●
Safe light	
Special Lighting	
Darkenable	Note 2
Zoned Lighting	Note 2
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	●
Welded Seam Sheet Vinyl	
Epoxy	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	9' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	●
Light Tight Rotating Door	
Vision Panel	●
Natural Daylight	●

EQUIPMENT BY OWNER:

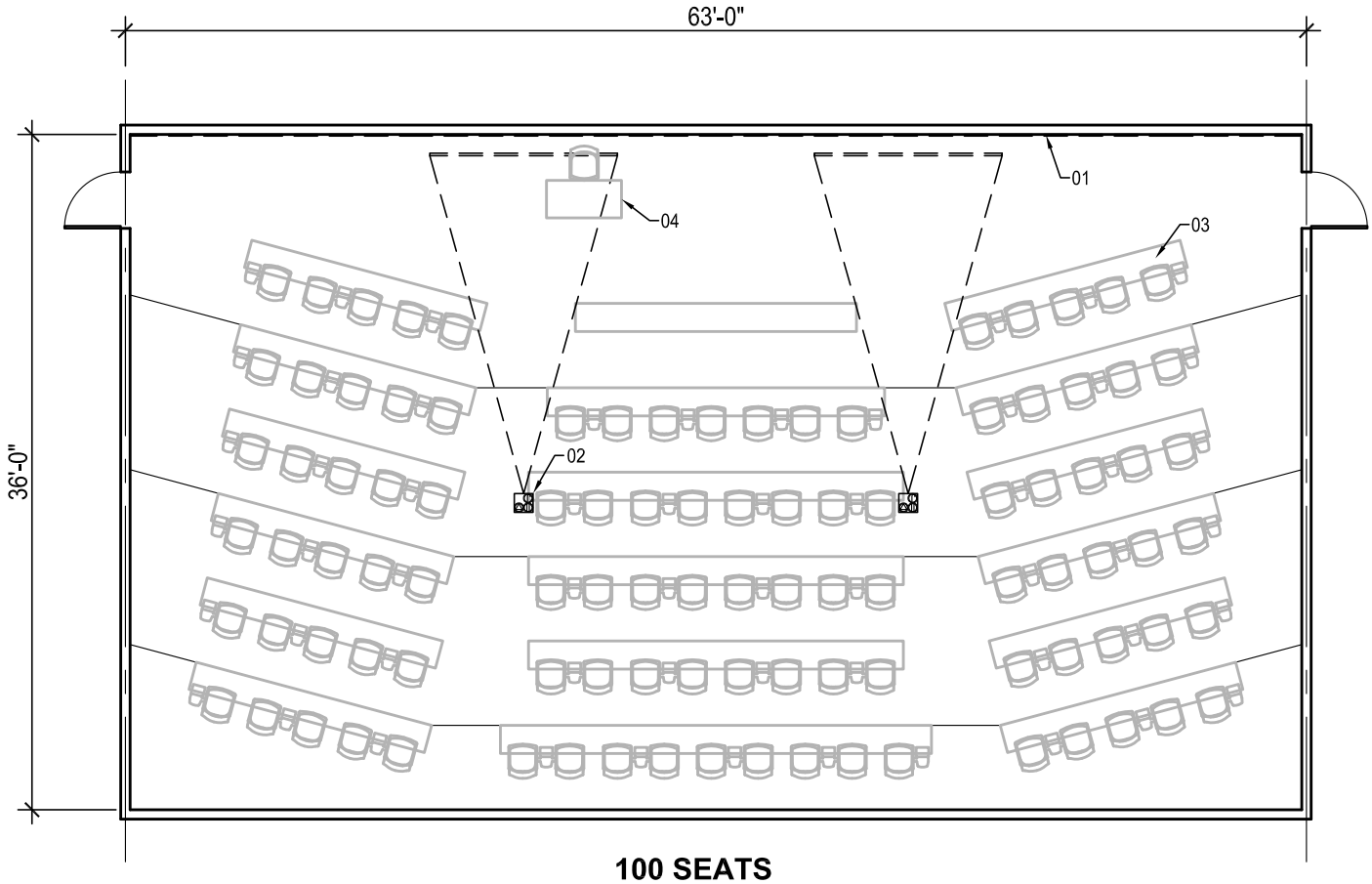
REMARKS:

1. As required for live X-ray and fluoroscopy equipment
2. Suitable for AV presentations.

SPACE DIAGRAM	Science & Technology Building
Artik Art & Architecture/ RFD	*Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A4.01**
SPACE NAME: Large Lecture Classroom **AREA (NSF): 2,250**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



100 SEATS

0' 5' 10'
1" = 10'-0"

FURNISHINGS

01. White Markerboard
02. Multi-media Projector & Screen (Clg. Mtd.)
03. University Fixed Table/Seating - Tiered
04. Teacher station

DEPARTMENT: SCIENCE & TECHNOLOGY — **SPACE ID NO:** A4.01
SPACE NAME: LARGE LECTURE CLASSROOM — **OCCUPANTS:** 101

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	
Air Recirculation	Yes
Air Pressure Positive	
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	●
75 fc at bench/desk	
Safe light	
Special Lighting	Note 2
Darkenable	Note 3
Zoned Lighting	Note 3
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	
Carpet	●
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	Note 1
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	12' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	●

EQUIPMENT BY OWNER:

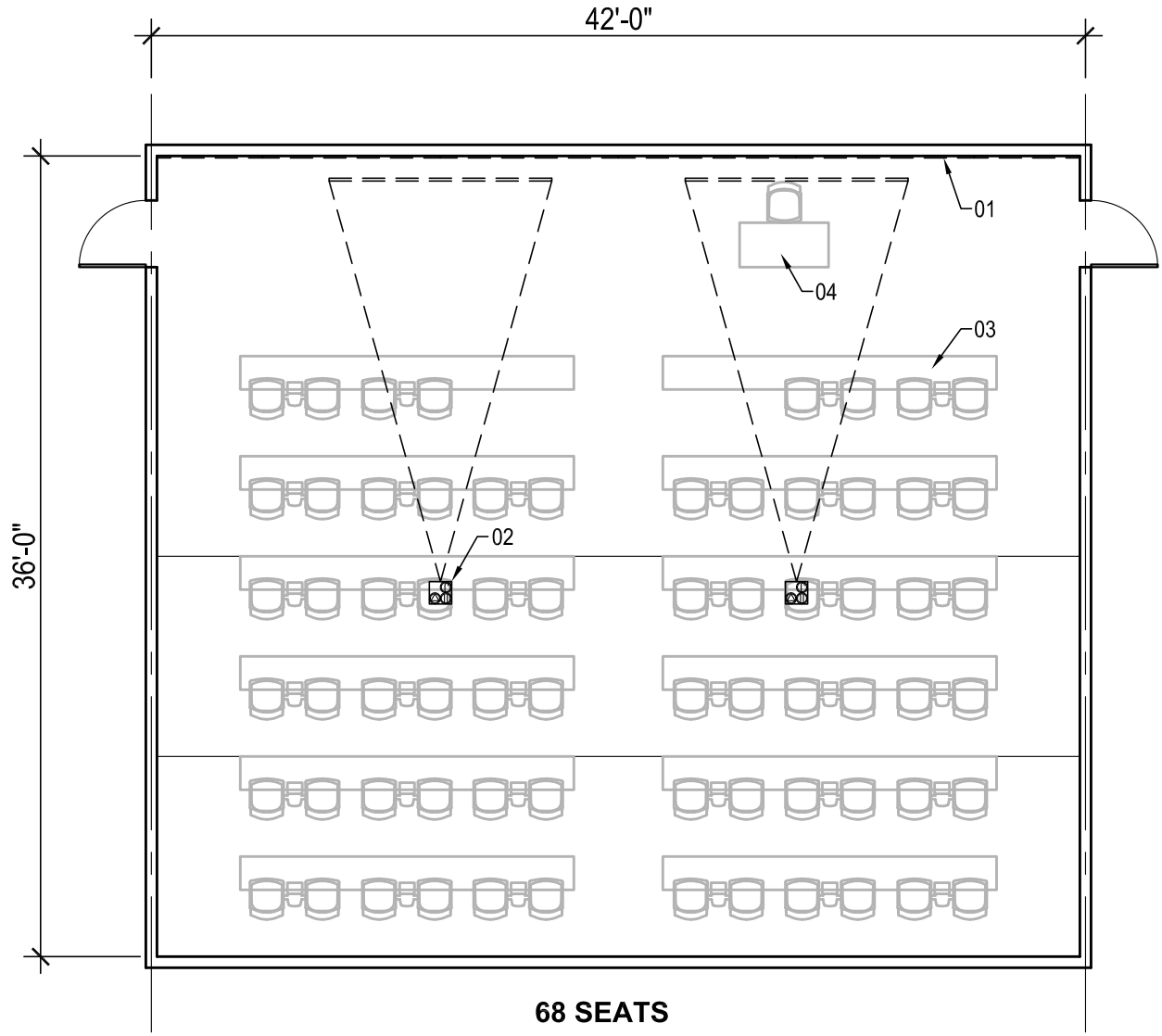
REMARKS:

1. Sound absorption at side and rear walls.
2. Dimmable lighting.
3. Suitable for AV presentations.

SPACE DIAGRAM	Science & Technology Building
Artik Art & Architecture/ RFD	*Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A4.02**
SPACE NAME: Medium Lecture Classroom **AREA (NSF): 1,494**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.



68 SEATS

0' 2' 4' 8'
1/8" = 1'-0"

FURNISHINGS

01. White Markerboard
02. Multi-media Projector & Screen (Clg. Mtd.)
03. University Fixed Table/Seating - Tiered
04. Teacher station

06/10/14

DETAILED SPACE REQUIREMENTS

Science & Technology Building

Artik Art & Architecture / RFD

Cañada College

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A4.02

SPACE NAME: MEDIUM LECTURE CLASSROOM **OCCUPANTS:** 69

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	
Air Recirculation	
Air Pressure Positive	
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	●
75 fc at bench/desk	
Safe light	
Special Lighting	Note 2
Darkenable	Note 3
Zoned Lighting	Note 3
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	
Carpet	●
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	Note 1
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	12' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	●

EQUIPMENT BY OWNER:

REMARKS:

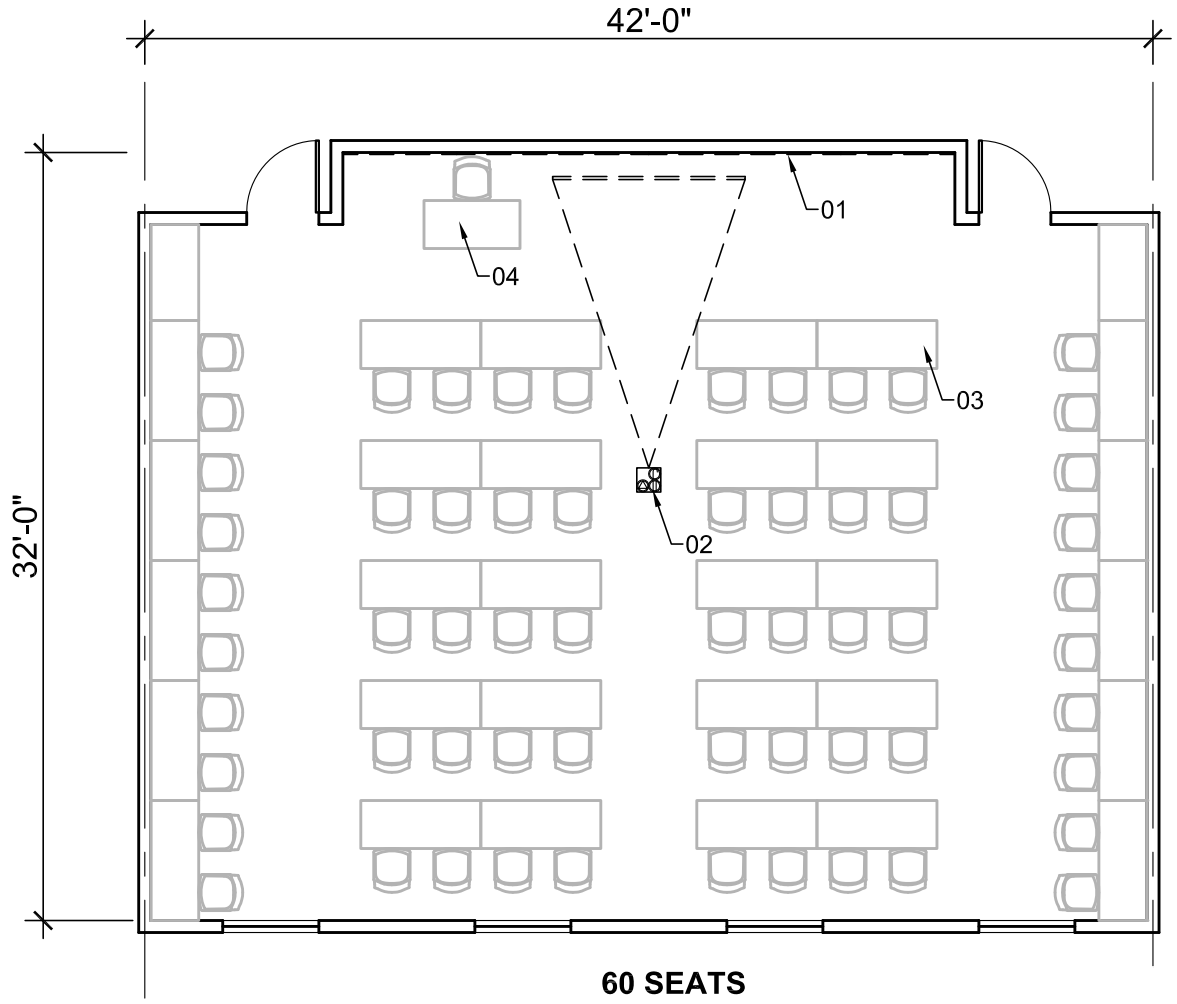
1. Sound absorption at side and rear walls.
2. Dimmable lighting.
3. Suitable for AV presentations.

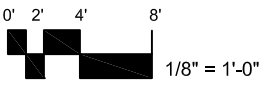
5/13/2014

SPACE DIAGRAM	Science & Technology Building
Artik Art & Architecture/ RFD	*Cañada College*

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO: A4.03**
SPACE NAME: Computer Science Classroom **AREA (NSF): 1,280**

This diagram is conceptual and is provided only to indicate required furnishings, equipment, and general room proportions. The actual room design may change.





FURNISHINGS

01. White Markerboard
02. Multi-media Projector & Screen (Clg. Mtd.)
03. University Fixed Table/Seating - Tiered
04. Teacher station

DETAILED SPACE REQUIREMENTS

Science & Technology Building

Artik Art & Architecture / RFD

Cañada College

DEPARTMENT: SCIENCE & TECHNOLOGY **SPACE ID NO:** A4.03

SPACE NAME: COMPUTER SCIENCE CLASSROOM **OCCUPANTS:** 61

UTILIZATION	
Hours of Use	
8 hours/day	
14 hours/day	●
24 hours/day	

MECHANICAL	
Temperature	
68°-75° ± 2°F	●
Other	
Humidity	
Ambient	●
Other	
Minimum Air Changes/Hour	
Air Recirculation	Yes
Air Pressure Positive	
Air Pressure Negative	
Additional Supply Air Filtr.	
Additional Exhaust Air Filtr.	

HOODS	
Chemical Fume Hood	
Radioisotope Hood	
Laminar Flow Hood	
Biological Safety Cabinet	
Snorkel	
Canopy Hood	
Low Slotted Exhaust	
Equipment Exhaust	
Other	

LABORATORY EQUIPMENT	
Vibration Sensitive	
Light Sensitive	
Vibration Producing	
Heat Producing	
Noise Producing	

PLUMBING	
Laboratory Gas (LG)	
Laboratory Vacuum (LV)	
Laboratory Air (LA)	
Compressed Air, 100 psi (A)	
Industrial Hot Water (IHW)	
Industrial Cold Water (ICW)	
Potable Hot Water (HW)	
Potable Cold Water (CW)	
Purified Water (DI/RO)	
Process Cooling Water (PCW)	
Steam	
Condensate Return	
Carbon Dioxide ($C0_2$)	
Nitrogen Gas (N_2)	
Cylinder Gases	
Inert	
Flammable	
Toxic	
Floor Drain (FD)	
Floor Sink (FS)	
Safety Shower/Eyewash (SS)	●
Drench Hose (DH)	

ELECTRICAL	
110V, 20A, 1 Phase	●
208V, 30A, 1 Phase	
208V, 30A, 3 Phase	
480V, 100A, 3 Phase	
Isolated Ground Outlet	
Standby Power	
UPS (OFOI)	
Phone	●
Data	●
Room "In Use" Light	
Task Lighting	
Lighting Level	
100 fc at bench/desk	●
75 fc at bench/desk	
Safe light	
Special Lighting	Note 2
Darkenable	Note 3
Zoned Lighting	Note 3
Other	

CHEMICALS	
Bases	
Acids	
Solvents	
Radioisotopes	
Carcinogens/Regulated	
Chemical Waste Storage	
Biological Storage	
Radioisotope Storage	
Chemical Storage	

ARCHITECTURAL	
Floor	
VCT	
Welded Seam Sheet Vinyl	●
Carpet	
Sealed Concrete	
Other	
Base	
4" Vinyl	●
Integral w/floor	
Partitions	
Gyp Board, Epoxy Paint	●
Gyp Board, Paint	
Epoxy/Fiberglass System	
Other	Note 1
Ceiling	
Open	
Acoustic Tile	●
Gyp Board, Epoxy Paint	
Height	10' Min.
Doors	
3'-6" x 7'	
3' x 7'	●
1'-6" x 7'	
Light Tight Rotating Door	
Vision Panel	
Natural Daylight	●

EQUIPMENT BY OWNER:

REMARKS:

1. Sound absorption at side and rear walls.
2. Dimmable lighting.
3. Suitable for AV presentations.

5/13/2014