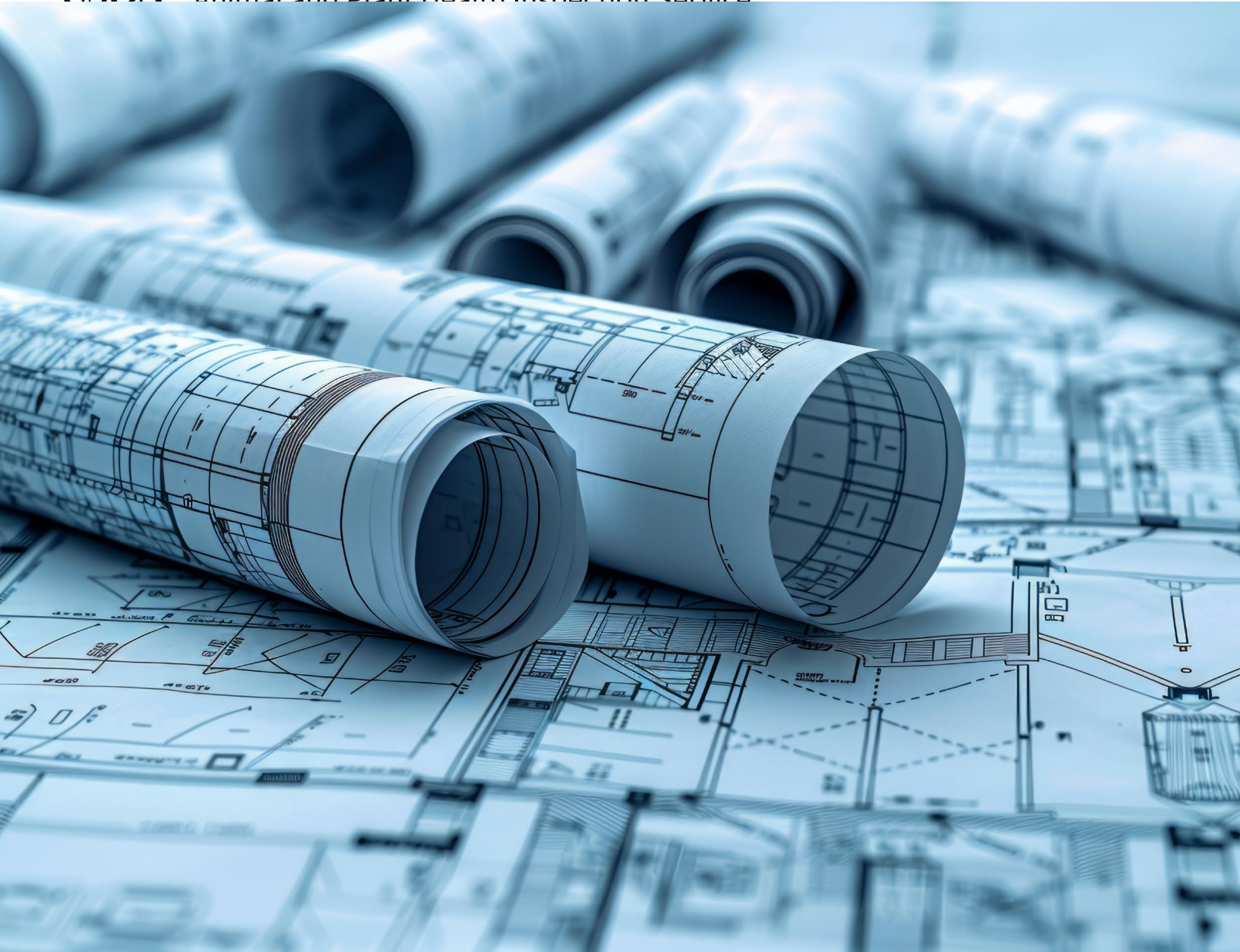




Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE



Animal and Plant Health Inspection Service



APHIS Facility Design Criteria

January 2023

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Section 1 Acronyms and Abbreviations

1.1 Standard Associations and Agency Acronyms/Abbreviations

ACGIH American Conference of Governmental Industrial Hygienists

AIHA America Industrial Hygiene Association

ANSI American National Standard Institute

APHIS Animal Plant Health Inspection Service

ARS Agricultural Research Service

ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASME American Society of Mechanical Engineers

BMBL Biosafety in Microbiological and Biomedical Laboratories

BRM Biorisk Management

BSL Biosafety Level

CDC Centers for Disease Control

CFR Code of Federal Regulations

CPHST Center for Plant Health Science and Technology

DR Departmental Regulation

EPA Environmental Protection Agency

ERCS Emergency and Regulatory Compliance Services

FDA Food and Drug Administration

HVAC Heating, Ventilation, and Air Conditioning

IACUC Institutional Animal Care & Use Committee

IBC International Building Code

IEEE Institute of Electrical and Electronics Engineers

IES Illuminating Engineering Society

IFC International Fire Code

NCAH National Centers for Animal Health

NCAPP National Center for Applied Plant Protection

NFPA National Fire Protection Association

NIH National Institute of Health

NWRC National Wildlife Research Center

OSHA Occupational Safety and Health Administration

PHS Public Health Service

PIS Plant Inspection Station

PPE Personnel Protective Equipment

PPQ Plant Protection and Quarantine

RA Risk Analysis (or Risk Assessment)

SOP Standard Operating Procedures

USDA United States Department of Agriculture

VS Veterinary Services

WS Wildlife Services

1.2 Room Data Sheet Acronyms/Abbreviations

ABSL Animal Biosafety Level

ACH Air Changes per Hour

ACT Acoustical Tile

AW Acid Waste

BSC Biosafety Cabinet

BSL Biosafety Level

CA Compressed Air

CHW Chilled Water

CMU Concrete Masonry Unit

CO2 Carbon Dioxide

DCW Domestic Cold Water

Ded. Ckt. Dedicated Circuit

DHW Domestic Hot Water

DI Deionized Water

EM PWR Emergency Power

EMI Electromagnetic Interference

FC Foot Candles

Fire Ext Fire Extinguisher

FRP Fiberglass Reinforced Plastic

Gyp. Brd. Gypsum Board

H2 Hydrogen

HLW High Level (Contaminated) Waste

HM Hollow Metal

HVAC Heating, Ventilation, and Air Conditioning

Liq N2 Liquid Nitrogen

N2 Nitrogen

NG Natural Gas

NRC Noise Reduction Coefficient

O₂ Oxygen

Occ. Occupancy

Occup. Occupied

PNT Paint

PPE Personal Protective Equipment

PW Pure Water

RH Relative Humidity

San Sanitary Waste

Smt. Brd. Smart Board

SS Stainless Steel

SS/EW Combination Safety Shower/Eyewash

STC Sound Transmission Class

TBC To Be Confirmed

TBD To Be Determined

Temp Temperature

Unocc. Unoccupied

UPS Uninterruptible Power Supply

VAC Vacuum

VT Vinyl Tile

Wht. Brd. White Board

Section 2

Definitions and Terms

For the purpose of this document the following terms and definitions are provided. All lab-like spaces utilized by APHIS should fall into one of these broad categories, with final design for each being developed by an APHIS project team. The following are representative examples intended to provide clarification of space types and are not considered exhaustive lists.

2.1 Laboratory

2.1.1 Definition

A room designed and dedicated for testing analysis, or experimentation under controlled conditions, and where those actions pose a safety risk to employees, and the environment. Chemicals where present must be used or handled safely by a single person for a non-production purpose. Use or storage of biohazardous materials shall be opened/manipulated inside a Biosafety Cabinet (BSC). The following items typically are found in laboratory spaces:

- Fume hood.
- Use of chemicals with the following classifications requiring approved storage cabinets: toxic, corrosive, unstable, oxidizer class, organic peroxides, or explosive class.
- Use or storage of biohazardous material.
- Biosafety cabinet.
- Registered biological samples.
- Operations that may generate an aerosol.

2.1.2 Examples of Laboratory Spaces and Processes

Examples of Laboratory Spaces included, but are not limited to the following:

2.1.2.1 Diagnostic Labs

Diagnostic facilities utilize animals, plants, and insects in different ways. Sometimes sick animals are held, tested, and treated to determine the nature of a disease they have contracted. In other instances, animals are used in the diagnostic process to determine the nature of a disease that has affected a human or animal outside the facility. An animal may be infected with a sample taken from a hospital, a veterinary clinic, or in the field to aid in determining the nature of the illness. Generally diagnostic facilities only need to accommodate small numbers of animals.

2.1.2.2 Biologics

Biological therapeutics are a class of medicines which are developed from large-scale cell cultures of bacteria or yeast, or plant or animal cells. What distinguishes biologics from other medicines is that these are generally proteins purified from living culture systems or from blood,

whereas other medicines are considered as ‘small molecules’ and are either made synthetically or purified from plants.

2.1.2.3 Pathology/Necropsy

Samples of diseased animals or insects, either field collected or from mass rearing colonies are dissected and observed via stereomicroscopes. If pathogenic microbes are suspected, tissue samples are collected, homogenized, and then are plated on selective agars in petri dishes and incubated to observe microbe, fungi, or yeast colony development. Subsamples of specific microbe colonies are placed on microscope slides, stained, and observed for characteristic morphologies.

2.1.2.4 General Chemistry Labs

These types of spaces support diagnostic functions supporting APHIS-PPQ needs of confirming the components and purity of components used in insect attractants and lures. High-performance liquid chromatography (HPLC) and gas chromatography (GC) are the most frequently used methods employed in these processes.

2.1.2.5 Fume Hood Alcove

Fume hoods are used in many processes in S&T laboratories, they are often installed in laboratory workspaces where acids, bases, caustic, or carcinogenic chemicals are used in small quantities to complete scientific studies or for chemical reductions from larger containers to smaller containers.

2.2 Laboratory Support Spaces

2.2.1 Definition

A space that directly supports a laboratory space but is not classified as a laboratory. These spaces may have many common features with laboratory spaces but must not contain fume hoods, BSC, or other similar systems. Canopy hoods or snorkel hoods for heat removal may be present in these spaces.

Chemicals where used must not be classified as any of the following:

- Toxic
- Corrosive
- Unstable
- Oxidizer class
- Organic peroxides
- Explosive class.

Chemical storage of all classes is allowed in approved storage cabinets.

2.2.2 Examples of Laboratory Support Spaces and Processes

Examples of Laboratory Support Spaces included but are not limited to the following:

2.2.2.1 Chemical Storage Room

Centralized room containing approved storage cabinets and ventilations as required for chemicals classified as noted above.

2.2.2.2 Hazardous Waste Storage

Hazardous waste storage may be accomplished by providing the appropriate accumulation area and/or storage cabinets in the associated workspaces or within a centralized common storage area to facilitate proper disposal.

2.2.2.3 Glass Washing Facility

An equipment space that supports the decontamination, cleaning and drying of laboratory glassware. Use of clean glassware is critical in laboratories to ensure accurate diagnostic and research results.

2.2.2.4 Incinerator

Laboratory incinerators are designed to ensure total destruction of laboratory waste products including biological material, sharps, pharmaceuticals, chemicals, and compounds.

2.2.2.5 Cold Storage of Non-Registered Samples

Cold storage can either include environmentally controlled rooms that are refrigerated ~40°F, or freezing storage <0°F rooms; may also include rooms holding free-standing refrigerators/freezers. Refrigerated rooms are often used to store insect and plant samples for processing later, or storage of insects collected (inducing torpor) for shipment to other cooperators later, or short-term storage of diet ingredients. Freezer rooms are used to kill insect/plant samples for processing later, store samples for extended periods of time, storage of temperature sensitive diet ingredients, or to kill insects in meridic diet for disposal if autoclave sterilizers are unavailable.

2.2.2.6 Sterilization (Autoclaving)

Autoclaves use water, pressure, and heat to create superheated steam that kills microorganisms and spores. Steam sterilization is a function of temperature, pressure, and time, wherein the amount of time needed to sterilize most organisms is dependent upon the temperature and pressure. At 250°F (121°C) in a vessel pressurized to 20 psi, bags require at least 30 minutes to sterilize. Sterilization is required for biological waste materials prior to disposal at BSL2 and above.

2.2.2.7 Change Room

For PPQ, this space is used to put on dedicated laboratory jackets and cloth bootie covers while personnel work within the insect quarantine facilities. The jackets and booties are removed and stored in lockers prior to exiting the facility. This is done to ensure that ‘hitch-hiking’ insects are not allowed to escape the facility. Change rooms are also required for many animal facilities to ensure that biological contamination is not spread from animal waste.

2.3 Scientific Workspace (Non-Laboratory)

2.3.1 Definitions

A space for scientific work that is not identified as a laboratory. These spaces generally require resilient materials for cleanability but are not anticipated to house chemical or biological processes such as laboratories.

The following are characteristics of a scientific workspace:

- No BSC, canopy hoods, fume hoods, or snorkel hoods are present
- Rear-wall exhaust systems may be implemented for personnel safety related to odors, and the spaces are always exhausted to the outside
- Flammable materials where used are below applicable building code exemption amounts
- Spaces may or may not have pressure relationships relative to other spaces.

2.3.2 Examples of Scientific Workspaces and Processes

Examples of scientific workspaces included but are not limited to the following:

2.3.2.1 Plant ID Workspace

This space is similar to the space noted below for Insect ID Workspace.

2.3.2.2 Plant Inspection Station

At the plant inspection stations, PPQ Plant Health Safeguarding Specialists inspect imported plants and seeds to ensure that they are free from plants pests and diseases that are not known to occur in the United States, and which could be damaging to either U.S. agriculture or natural resources.

2.3.2.3 Insect ID Workspace

This workspace is used to process field collected insects and is designated as such to keep contaminant insects isolated from other sections of the laboratory. Insects are sorted and counted, often with the aid of stereomicroscopes or table-mounted magnifying glasses. Samples are collected for further identification, storage in glass vials of ethanol, or prepared for cold storage.

Preparation of slides is a primary activity that may include use of a rear-wall exhaust to provide personnel safety related to odors/fumes from small amounts of slide preparation chemicals.

2.3.2.4 Insect Inspection Station

This workspace is used to closely process ‘clean’ samples of insects, often with the aid of stereomicroscopes. Key taxonomic characters are identified prior to further processing, storing in glass vials with ethanol, or placement in vials for storage in ultra-low freezers for future genetic analysis.

2.3.2.5 Animal Housing Support (But Not Limited to the Following)

1. Food Preparation: Some colonies of insects can be reared on artificial or meridic diets that may or may not incorporate host plant material. Mixing of insect diets requires combining multiple dry and wet ingredients into homogenous mixtures that are used as is, or possibly cooked in kettles to eliminate insect pathogenic microbes. Diets are either used while fresh or are cold stored for future use.
2. Cage Washing: Automated, pressure washing equipment that utilizes detergents for the removal of scale, hard water deposits, animal fats, and dried feces on animal cages and related equipment.
3. Bedding Prep: Any USDA regulated animal that will be housed for more than 12 hours requires species-appropriate bedding. Prep areas are typically collocated with cage washing facilities and are used for applying fresh bedding to clean caging.

2.3.2.6 Technical/Reference Library (Including Insect and Plant Collections)

These spaces are used to house insect reference materials for comparing taxonomic characters from dead and dried specimens or are housed in ultra-low freezers as genetic reference materials that have been collected internationally to compare to recent interceptions from ports of entry or in various trapping programs.

2.3.2.7 Blood Processing

Includes any procedure employed after collection, such as the identification of a blood sample, the preparation of components from such unit of blood, serological testing, labeling and associated recordkeeping. Typical equipment includes centrifuges.

2.4 Animal Facilities

2.4.1 Definition

A space used to hold animals in support of APHIS' mission. These facilities and applicable individual structures are designed with appropriate separation and ventilation systems to prevent aerosol and vector-borne disease transmission, as well as environmental contamination.

2.4.2 Examples of Animal Facilities and Processes

Examples of animal facilities included but are not limited to the following:

2.4.2.1 Animal Holding Room

Spaces designed for the housing of animals. Requirements for room sizes, finishes, and environmental controls will vary based on species and may include use of microenvironments such as caging/tanks, or open holding in pens.

2.4.2.2 Insect Holding Room

Colonies of insects are maintained either in rearing rooms, environmental growth chambers, or greenhouses with host plant material or artificial/meridic diets. This is done to maintain pure genetic isolates of distinct populations collected from multiple geographic locations. These may serve as starter colonies for larger insect population rearing efforts, especially for beneficial insects that are to be used in experiments or field released.

2.4.2.3 Animal Quarantine Room

Type and location may vary by program; however, spaces may be utilized for receipt and inspection of livestock presented for importation to the United State, or isolation of animals for diagnostic purposes. Quarantine facilities are intended to prevent potential spread of disease into domestic populations.

2.4.2.4 Insect Quarantine Room

Colonies of nonindigenous insects, usually collected from foreign countries, are held in quarantine to prevent their escape into the environment. Colonies of insects are maintained either in rearing rooms, environmental growth chambers, or greenhouses with host plant material or artificial/meridic diets. This is done to main pure genetic isolates of distinct populations collected from multiple geographic locations. The colonies of insects are held for studies and experiments to determine specific factors of their respective biologies to determine if they are safe to be reared outside of the quarantine facility.

2.5 Production Spaces

2.5.1 Definition

A room designed for producing a product for government use or commercial sale. Chemicals may be used or stored in the room. Fume hoods, BSC, canopy hoods, snorkel hoods, and similar systems may be present.

2.5.2 Examples of Production Spaces and Processes

Examples of Production Spaces include but are not limited to the following:

2.5.2.1 M-44 Cyanide Capsule Production Room

Used for the weighing, grinding, mixing, and drying of chemicals. Assembly of the M-44 capsules by filling the capsules with the cyanide mixture and inserting a wad and wax seal on the ends of the capsules.

2.5.2.2 Gas Cartridge Production Room

Used for the weighing and mixing of chemicals, filling gas cartridge tubes with the chemical mixture, and sealing the gas cartridge tubes.

2.5.2.3 Fatty Acid Room

Used for weighing/measuring chemicals and packaging these chemicals. This room is also used for the production of synthetic lures using fatty acids.

2.5.2.4 FDA Drug Room

Used for weighing the ingredients for Sylvatic Plague Vaccine Baits and the extrusion, rolling, and drying of the sylvatic plague vaccine baits.

2.5.2.5 Mixing Room

Used for weighing and mixing the ingredients used in grain baits

2.5.2.6 Strychnine Laced Bait Mixing and Production

Used to weigh the grain used in baits and then mix the grain with the active and inert ingredients used to make toxic grain baits. The bait is then weighed and bagged in this area also.

2.6 Leased Facility

Property not owned by a government agency but is contracted for a specific amount of time for use by the USDA. Property is typically maintained by non-government entity, however APHIS plays a critical role in design.

2.7 Owned Facility

Property owned by the USDA for its use. The USDA is responsible for design, construction and maintenance of the property.

2.8 Agreement Space

Property owned by a non-USDA government agency; space is allocated on property for use by the USDA. APHIS is largely responsible for the health and safety of employees working on site.

Section 3

Introduction to Design Criteria

3.1 Purpose of Design Criteria

The U.S. Department of Agriculture (USDA), Animal Plant Health Inspection Service (APHIS) owns, leases, and operates several types of laboratories, both inside and outside the Continental United States. Some APHIS facilities have been designed and constructed per ARS Facilities Design Standards (ARS242.1) for both diagnostic and research facilities; requirements that do not always address the operations of APHIS facilities relating to plants, insects, and related pathogens. This document provides design criteria on the unique design, construction, and operations needs of APHIS facilities and is intended to be utilized for APHIS facilities that are not required to meet the more rigorous biosafety criteria required by ARS 242.1 This criteria will be used as outlined in APHIS Directive XX as part of a collaborative facility design and acquisition process.

This manual establishes design standards, technical criteria, and Agency policies to be applied during the programming, design, construction, alteration, and renovation of APHIS buildings and facilities. This document must be used for all APHIS Diagnostic Facilities and Field stations. APHIS laboratory locations at Ames, Beltsville, and Ft. Collins must continue to use ARS 242.1 without modifications. This design criteria does not apply to BSL3/ABSL3/ACL3, BSL3Ag or BSL4, ABSL4/ACL4 containment facilities.

3.2 How to Use Design Criteria

The APHIS Laboratory Facility Design Criteria is intended to provide cost effective and practical design criteria that is relevant to APHIS facilities, provide uniform basis of design information that will streamline design and construction of APHIS facilities in the United States (U.S.), and improve lab operations and processes.

The APHIS Laboratory Facility Design Criteria include cross-references to appropriate existing Design Standards & Guidelines where pertinent design requirements may be found. The intent is not to supersede existing Guidelines and Standards, but to make it easier to locate and comply with requirements aligning with APHIS facility functions. In addition to the cross-references, these design criteria provide general criteria for APHIS Facilities that expand or clarify requirements from other guidelines and standards as well as providing basic room criteria sheets with uniform basis of design criteria for standard space types. Not all space types may be included, nor may the spaces that are included all be applicable to a given facility; room criteria and space descriptions are included as a representative overview of common space needs. All project specific criteria shall be determined through collaborative scoping and programming of contracted requirements. A design team shall coordinate these requirements, the application of which will vary slightly with each space.

The designer shall meet stated requirements. If there are instance where conflicts exist, it shall be resolved with APHIS project team input. Any deviations from this guidance must be documented and remain part of the project record. (USDA to define this).

1. Any deviations/equivalency concepts proposed for use by the A-E must be submitted to the government for approval no later than the 35 percent design.
2. The request must state the deviation/equivalency concept proposed, reasons for the request, and supporting rationale.
3. The EPM or AOE will coordinate the request with the appropriate office and provide a response to the A-E.

The construction of laboratory facilities requires oversight for risk-based design. Regulatory requirements must be addressed, and good practice must be considered. Laboratory facilities have architectural, space planning, HVAC, environmental control, and fire/life safety requirements not generally found in most types of construction. USDA APHIS has prepared and will maintain this design criteria to aid various divisions across APHIS and project design teams with planning and design issues. The intent of this design criteria is to improve design efficiency and minimize changes in conjunction with plan review and consultation services. The Design Criteria is a resource document to be used by design professionals during the planning, design, and commissioning phases of a project. It is applicable to all facilities occupied by USDA APHIS employees and contractors with an emphasis on those facilities that will be used as laboratory buildings, laboratory units, and laboratory work areas in which hazardous materials are used, handled, and stored. The criterion in this Design Criteria represents the minimum requirement; more stringent requirements may be

necessary depending on the specific laboratory and the type of activities being conducted. This Design Criteria applies to both leased and owned buildings.

The primary objective in laboratory and scientific support design should be to provide a safe, accessible environment for personnel to conduct their work. A secondary objective is to allow for maximum flexibility for safe laboratory testing, development, and manufacturing, where applicable and where the risk-basis for activities is based on the highest hazard at any moment. Therefore, health and safety hazards shall be anticipated and carefully evaluated so hazard mitigation measures can be incorporated into the design wherever possible. The requirements contained herein illustrate some of the basic health and safety design features required for new and remodeled laboratories.

3.3 Basic Requirements

The APHIS Biorisk Management (BRM) document outlines the following pertaining to the risk assessment for design criteria related to the secondary, or building barriers, for APHIS facilities:

“The recommended secondary barrier(s) will depend on the agriculture risk assessment (RA). For example, exposure risks in agriculture containment facilities may include direct contact with the agents (aerosol, splash, parenteral route, or vector transmission when arthropods are present),

or inadvertent contact exposures through contaminated work environments. Secondary barriers in these laboratories may include separation of the laboratory work area or animal rooms or greenhouse from public access, availability of a decontamination equipment (e.g., autoclave), and hand washing facilities. Just as important, these secondary barriers are designed to prevent accidental release of agricultural pathogens, animals, plants or plant pests, or their vectors into the environment that could be detrimental to agriculture and cause economic loss or food insecurity. When designing highly complex facilities, it is important to consider physical security, energy design, accessibility design, mechanical, plumbing, heating, ventilating, and air-conditioning (HVAC), electrical, illumination, telecommunications, safety and health elements, vertical transportation systems, animal facilities (vivarium), animal welfare considerations, greenhouses, insectaries, pest control, and personnel usability.”

Departmental Regulation (DR) DR4400-007 Biorisk Management Policy further identifies the requirement for each Mission area, agency, and staff office to develop a comprehensive Biorisk Management plan. While Biorisk Management plans may not direct planning requirements, it is critical to ensure that Agency Biosafety officers are integrated into the design review process from project inception to mitigate conflicts between planning and biosafety.

This section defines generic requirements for these secondary building barriers for spaces unique to APHIS. Refer to individual room data sheets in Section 4 for additional space requirements. Where multiple options are identified in room data sheets, all may be considered acceptable as a basic requirement and the designer may select the most appropriate option. Room data sheets have been provided to represent common spaces occurring in APHIS facilities, however room data sheets are not exhaustive nor are all space types applicable in all facilities. An APHIS project team shall confirm space requirements during project specific scoping meetings at the start of all projects. Any variances or clarifications shall be confirmed with all APHIS partners on the project team.

3.4 Design Principles/Objectives

APHIS buildings shall be designed and constructed to best meet the functional, safety, and environmental needs of the programs they house.

3.4.1 Environmental and Functional Needs

APHIS buildings shall provide an environment in which occupants can do their work with maximum efficiency at the optimum level of comfort, taking the following factors into consideration.

3.4.1.1 Arrangement of Space

Space relationships within buildings shall be planned to optimize the functions being performed by the occupant. Interaction areas shall be provided within the building to promote informal discussion among scientists and other support staff.

3.4.1.2 Access for the Disabled

Buildings shall meet the needs of individuals with physical disabilities. Design shall conform to the standards as outlined in the Americans with Disabilities Act (ACT) and Architectural Barriers Act (ABA) Accessibility Standards as promulgated by the United States Access Board. Information may be obtained from the following websites:

www.access-board.gov/ufas/ www.ada.gov/

3.4.1.3 Illumination

Natural and artificial illumination shall be sufficient to meet requirements of the tasks performed by the occupants.

3.4.1.4 Thermal Environment

The thermal environment shall be such as to provide safe working and healthful conditions for the occupants and proper climatic conditions for the work being performed. Provision of flexibility and suitable control is necessary. Individual control shall be considered where appropriate.

3.4.1.5 Acoustical Environment

New buildings and alterations shall be planned and designed to minimize noise that disturbs occupants unduly or interferes with their ability to do their work. An adequate level of privacy shall be provided so

that occupants can perform their tasks effectively with minimum outside disturbance. The level of privacy required will vary depending on the tasks involved.

3.4.1.6 Maintenance and Operation

Designs shall be based on user needs and maintenance capabilities and shall satisfy the functional requirements for efficient operation of the facility. Materials and projects shall be durable, easily maintained, and appropriate for the intended use.

3.4.1.7 Regional Character

Buildings shall reflect the architectural character of the locale. Local building ordinances and zoning practices shall generally be followed. Use of materials and products indigenous to the locale of the project shall be given preference. Federal facilities projects shall incorporate aspects that help to strengthen the viability and livability of communities in which they are located by integrating local sustainability, transportation, renewable energy, etc., planning initiatives in the design.

3.4.1.8 Sustainable Design

New buildings and alterations shall be designed utilizing environmentally preferable products. To the greatest extent possible, bio-based building products that are of comparable price, proven performance, and availability will be used with other products. The project design shall incorporate Best Management Practices (BMP) for water conservation. Details of these BMP are available at FEMP's website:

www1.eere.energy.gov/femp/program/waterefficiency_bmp.html

3.4.2 Safety, Health, and Security

APHIS buildings shall provide an environment that is safe for occupants, and that offers them maximum protection during emergencies or disasters.

3.4.2.1 Structural Adequacy

Design of buildings shall be adequate for the functions to be performed and the loads imposed by building equipment, occupants, and their activities. Soil and other geotechnical problems shall be carefully analyzed and resolved during the design process.

3.4.2.2 Protection against Disaster

Design shall provide minimum exposure to fire, earthquake, or natural disaster, and shall provide egress and refuge for all people, including the disabled, in an emergency.

3.4.2.3 Security

Buildings shall be designed to minimize security risks to persons, animals, and property. Security must be an integral part of building and site planning, starting at the earliest phase and continuing throughout the process. Appropriate security design criteria shall be determined for each project, based on a facility-specific risk assessment and an analysis of all available information on security considerations, constraints, and tenant needs.

3.4.2.4 Accident Prevention Design

Design shall be the result of safety analyses and shall address unsafe conditions that cause injury, illness, or property damage.

3.4.2.5 Health Hazards

Materials and products with known or suspected properties that are hazardous to the health of occupants and installers shall be avoided. Only materials that are free of polychlorinated biphenyls (PCB), lead, and asbestos shall be used in APHIS buildings. Volatile organic compounds (VOC) shall only be used if no other practical materials are available. If a VOC is

used it must contain the lowest practicable concentration of VOCs. This includes materials such as paint, adhesives, sealers, sealants, floor tiles, etc.

3.4.2.6 Repair, Renovation, and Alterations

Design shall be accomplished to reduce or eliminate hazardous exposure through selection and use of materials and methods. Prior to any renovation or demolition project, existing hazardous building constituents, such as asbestos or lead, etc. will be mitigated. If lead or asbestos-containing materials are present, the design shall stipulate that the construction contractor shall be required to submit relevant management and abatement plans as part of their proposal for APHIS approval prior to initiating work.

3.4.3 Economy

APHIS buildings shall be designed at the most reasonable cost in terms of combined initial and long-term expenditures, based on best life cycle costs, without compromising other project requirements.

3.4.3.1 Site Adaptation

In many, if not most instances, a site has already been selected before design begins; however, design professionals shall, where possible, have a part in the selection. The design of the building shall be sited economically and efficiently. Mitigate the heat island effect and light pollution where possible. In site selection, prioritize:

Building orientation to maximize energy efficiency of the building.

Locations in central business districts and rural town centers.

Sites well served by transit.

Site design elements that ensure safe and convenient pedestrian access.

Consideration of proximity to housing affordable to a wide range of federal employees.

Adaptive reuse or renovation of buildings.

Avoiding development of sensitive land resources (such as greenfields and USDA Prime Farmland as defined in 7 U.S.C. 4201).

Evaluation of parking management strategies.

3.4.3.2 Efficient Utilization

The ratio of net usable area to gross area shall be as high as possible, consistent with program objectives. Space allocation for occupants shall be as low as possible consistent with General Services Administration (GSA) guidelines and the intended functions.

3.4.3.3 Economical Materials

Materials, products, and systems of proven dependability shall be used in the design or alteration of buildings. Materials shall be as economical as possible, in terms of combined initial and long-term cost and consistent with program objectives. Standard commercially available products shall be used to the extent possible and consistent with requirements to use biobased, recycled, and sustainable products.

3.4.3.4 Cost Alternatives

Alternatives shall be considered to ensure long-term, cost-effective design.

3.4.3.5 Maintenance, Operation, Repair, and Replacement Costs

Buildings shall be designed, and materials selected, to minimize the cost of maintenance and repair.

3.4.3.6 Foster Maximum Competition in Bidding

Buildings shall be designed and building materials, components, and systems incorporated into the design and specified so as to foster maximum competition among contractors and suppliers.

3.4.3.7 Project Administration

Projects shall be planned and scheduled to ensure effective and efficient design.

3.3.4 Conservation and Resources

Energy, natural resources, and water conservation shall be given prime consideration in the design of APHIS buildings. Products, materials, and systems shall be selected with a view toward minimizing the use of nonrenewable resources. The design must emphasize the requirements for a waste management plan and recycling of non-hazardous construction materials. Divert a minimum of 50 percent of non-hazardous construction waste and demolition debris per Executive Order (EO) 13514.

3.4.5 Historical Preservation

Special sensitivity shall be shown in altering and retrofitting APHIS buildings of historical significance to preserve and highlight their architectural integrity. The improvement design shall

make no major impact upon the qualities which make these structures significant in accordance with the National Historic Preservation Act of 1966, as amended.

3.5 Codes and Standards

3.5.1 General

Federal Law: The Public Buildings Act of 1959, as amended by the Public Buildings Amendments of 1988, 40 U.S.C. 3312 (Public Law 100-678 and formerly section 21 of the Public Buildings Act of 1959, 40 U.S.C. 619), requires that each building constructed or altered by any federal agency shall, to the maximum extent feasible, be in compliance with one of the nationally recognized model building codes and with other applicable nationally recognized codes. Additional requirements include compliance with state and local codes and special rules regarding state and local government consultation, review, and inspections.

3.5.2 Compliance with National Model Codes

The design shall adhere to the latest edition of one of the following national building codes as applicable to the project site and as further qualified in Section 1.2.3 (B) of this document.

International Building Code (IBC), maintained by the International Code Council.
(www.intlcode.org)

NFPA 101- Life Safety Code, maintained by the National Fire Protection Association
(www.nfpa.org).

3.5.3 Compliance with Other National Codes

Each APHIS building shall be constructed or altered, to the maximum extent feasible, in compliance with other applicable nationally recognized codes. These codes shall include, but are not limited to, electrical codes, fire and life safety codes, and plumbing codes. APHIS has established the following policy:

3.5.3.1 Fire, Fire Alarm, Fire Sprinklers

For all projects, the requirements of the National Fire Protection Association (NFPA) National Fire Codes shall apply in lieu of other codes.

3.5.3.2 Plumbing Requirements

For all projects, the plumbing requirements of the National Standard Plumbing Code (NSPC) shall apply in lieu of other codes.

3.5.3.3 Electrical Requirements

For all projects, the electrical requirements of the National Electrical Code (NEC) shall apply. Refer to Chapter 6 for a list of codes.

3.5.3.4 Mechanical Requirements

For all projects, all national codes shall apply. Refer to Chapter 5 for a list of codes.

3.5.3.5 Telecommunications Requirements

For all projects, refer to FD PGM-06-001 and the APHIS Telecommunications Distribution Design Guide, found <http://www.afm.APHIS.usda.gov/facilities/files/PGM-06-001.doc>. In addition to the APHIS Telecommunication Distribution Design Guide, the following Codes and Standards should be used:

1. Electronic Industry Alliance (EIA).
2. Institute of Electrical and Electronics Engineers, Inc. (IEEE).
3. American National Standards Institute (ANSI).
4. Telecommunications Industry Association (TIA).
5. Building Industry Consulting Service International (BICSI) Standards.

3.5.4 Compliance with State and Local Codes

3.5.4.1 General

The policy of APHIS is to comply with local building codes to the greatest extent possible; however, buildings built on federal property are exempt from state and local building codes. In addition to using the applicable national model codes as minimum standard, special requirements directly related to local practices or circumstances which do not compromise the best interest of the government shall be incorporated into project design.

During the planning process and development of associated environmental documentation for APHIS new construction or renovation projects, the A-E shall consider all requirements (other than procedural requirements) of zoning laws and laws relating to landscaping, open space, minimum distance of a building from the property line, maximum height of a building, historic preservation, aesthetic qualities of a building, and other similar laws and regulations of a state or political subdivision of a state which would apply to the project if it were not constructed or altered by the federal government. The project design team is to fully address such laws and requirements in their planning and design documents. Any proposed deviations from such laws and regulations are to be documented, fully justified, and approved by APHIS.

Local regulations shall be followed in the design of systems that have a direct impact on off-site terrain or utility systems, such as storm water run-off, erosion control, sanitary sewers and storm drains and water, gas, electrical power, communications, emergency vehicle access, roads, and bridges. Although with respect to the number of parking spaces, the requirements stated in the building program take precedence over any local zoning ordinances.

3.5.4.2 State and Local Government Consultation, Review, and Recommendations

For purposes of meeting the requirements of the Public Buildings Amendments of 1988 (Public Law 100-678), local and/or state officials shall be given the opportunity to review APHIS projects for compliance with local requirements.

To effectively deal with local code compliance:

1. The A-E shall consult/meet with local code officials prior to schematic design to determine local requirements for the proposed building construction or alteration project and report those requirements to APHIS for further consideration. These may include, but are not limited to, the review of drawings and specifications, on-site inspections, issuing permits, compliance with local regulations for site development, zoning regulations, hazardous material handling, and compatibility with local firefighting practices. The A-E shall also inform the state and local government officials that APHIS and its contractors are not authorized to pay any amount in compensation for any action taken by the state and/or local government officials in the exercise of their duties.
2. Once the local requirements are identified, the A-E can proceed with the design and develop the documents necessary to describe the project per APHIS requirements and for a potential plan review by state and local code officials. Upon request by APHIS, the A-E shall formally submit design plans for a building department plan review and shall time the submission in close coordination with the project schedule so as not to adversely affect progress of the project.
3. If local officials choose to review the project, the A-E shall establish a concise period of time in which comments can be accepted (e.g., 30 days). If local officials choose not to review the project, this shall be documented in the project file.
4. Local officials may submit only written recommendations concerning measures which should be taken in the construction or alteration of APHIS buildings. The A-E shall review all recommendations made by state and local government officials for consistency with APHIS Design Standards. Each recommendation shall be carefully considered and presented to APHIS for approval.
5. The A-E shall then report its recommendations based on adequacy, cost, and nationally accepted practice to APHIS regarding any such recommendations from state and/or local government officials; however, APHIS shall have the final authority to accept or reject any of the recommendations for inclusion in the project design. All of the above project reviews by state

and local officials must be completed well before construction contractors' proposals or bids are solicited for the project.

3.5.4.3 Site Specific Design Review Authorities

Site Specific Design Review Authorities, such as Zoning Boards, Historic Commissions, Design Review Boards, Public Art Commissions, etc.:

1. In general, the A-E shall follow the same procedures described above in 3.5.4.2.
2. For projects located in and around Washington, D.C., the following institutions may have non-exclusive jurisdiction and shall be contacted for potential project review:
 - a. Projects within a designated Historic District shall be coordinated with the Commission of Fine Arts (CFA). For information on background, submission requirements, and review meeting calendar, go to www.cfa.gov.
 - b. The National Capital Planning Commission (NCPC) may also be responsible for reviewing certain design aspects. For additional information, go to www.ncpc.gov.

3.5.5 Code Review and Analyses

3.5.5.1 General

Code criteria shall be reviewed by each discipline to assure that the design of the project meets all applicable code requirements. The A-E is responsible for obtaining copies of all applicable codes and standards from the issuing authorities.

3.5.5.2 Code Edition

The current edition of each applicable code (national, state, and local, including the current accumulative supplements), in effect at the time of design contract award, shall be used throughout the project's design and construction. To ensure flexibility, it is APHIS policy to make maximum use of equivalency clauses in all recognized codes.

3.5.5.3 Code/Criteria Analysis

The A-E shall prepare a comprehensive analysis of applicable codes/criteria/regulations that documents an investigation of the various codes described above, and APHIS Design Criteria that will govern the design of a specific project.

3.5.5.4 Conflict Between Codes and APHIS Requirements

All conflicts between APHIS requirements and either national or state/local codes, shall be resolved by designing for the most stringent requirements.

3.6 Compliance with National Environmental Policy Act

3.6.1 The National Environmental Policy Act

The National Environmental Policy Act (NEPA) was established January 1, 1970, to ensure federal agencies consider the potential impacts of their actions on the environment. As required under NEPA, the USDA and APHIS published regulations to supplement the Council on Environmental Quality (CEQ) guidelines for NEPA implementation. The CEQ regulations appear at 40 CFR 1500-1508; USDA; USDA regulations can be found at 7 CFR 1b.

These regulations provide managers and decision-makers a means to evaluate the direct, indirect, and cumulative environmental consequences of proposed actions at the earliest possible time (i.e., before irreversible commitment of resources). They also specify how to document efforts to identify, evaluate, and quantify both the positive and negative environmental effects of proposed actions. It is APHIS policy to fully comply with the NEPA law and applicable regulations. Whenever possible, consideration should be given to avoiding or mitigating adverse environmental effects. 3.7 APHIS Mission

APHIS protects the health of U.S. agriculture and natural resources against invasive pests and diseases, regulates genetically engineered crops, administers the Animal Welfare Act, and helps people and wildlife coexist. APHIS also certifies the health of U.S. agricultural exports and resolves phytosanitary and sanitary issues to open, expand, and maintain markets for U.S. plant and animal products.

3.7.1 Operational Program Units

3.7.1.1 Animal Care

Determines and promotes standards of humane care and treatment of animals through inspections and educational efforts.

3.7.1.2 Biotechnology Regulatory Services

Protects agricultural and natural resources by ensuring safe development of genetically engineered organisms using a science-based regulatory framework.

3.7.1.3 International Services and Trade Support Team

Provides international animal and plant health expertise to safeguard U.S. agricultural health and promote U.S. agricultural trade.

3.7.1.4 Plant Protection and Quarantine (PPQ)

Safeguards agriculture and natural resources from risks associated with the entry, establishment, or spread of pests and noxious weeds.

3.7.1.5 Veterinary Services (VS)

Protects and improves the health, quality, and marketability of our nation's animals, animal products, and veterinary biologics by preventing, controlling, and/or eliminating animal diseases, and monitoring, and promoting animal health and productivity.

3.7.1.6 Wildlife Services (WS)

Provides leadership to resolve wildlife conflicts and creates a balance allowing people and wildlife to peacefully coexist.

3.7.2 APHIS Management Support Units

3.7.2.1 Emergency And Regulatory Compliance Services (ERCS)

Provides leadership on all issues related to emergency preparedness and response, regulatory investigative and enforcement activities, safety initiatives, and the regulation of agricultural select agents.

3.7.2.2 Legislative and Public Affairs

Manages communications with congress, states, tribes, industry stakeholders, trading partners and the media.

3.7.2.3 Marketing and Regulatory Programs Business Services (MRPBS)

Provides resource management and administrative services to APHIS and USDA's Agricultural Marketing Service.

3.7.2.4 Policy and Program Development

Provides rigorous policy analysis and budgetary and regulatory development for APHIS that is consistent with the agency's environmental stewardship goals and legal authorities. Also conducts critical programmatic evaluations and reviews to ensure programs are operating efficiently and effectively.

Section 4 Architectural Design Guidance

4.1 General

4.1.1 Objective

A safe and healthy work environment is the crucial objective in the design of agency facilities. The requirements listed in this section are the minimum agency requirements to meet this objective. Provide architectural requirements as outlined below. Where specific room data sheet allows multiple finishes/materials, designer must select appropriate finishes materials to suit the nature of the project.

4.1.2 Codes and Standards

4.1.2.1 General

The design shall comply with the local and national requirements of the codes and standards that apply to the project design. The current edition of each applicable code, in effect at the time of design contract award, shall be used throughout the project's design and construction.

4.1.2.2 Occupancy Classification

Agency structures shall be classified in accordance with the established local building codes of the jurisdiction in which the structure is to be located. Occupancy loads and egress requirements shall be in accordance with applicable building and life safety codes.

4.1.2.3 Requirements

Requirements relating to safety and health in the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) regulations, American Conference of Governmental Industrial Hygienists (ACGIH) Industrial Ventilation Manual, Standards of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), APHIS safety and health policy, and local building and fire codes must be met as a minimum to achieve a safe and healthy work environment. Where a conflict arises, the most stringent requirement shall govern.

4.1.2.4 Department of Labor Standards

The project shall be designed to comply with the latest versions of the applicable OSHA Standards (29 CFR Part 1910) and Safety and Health Regulations for Construction (29 CFR Part 1926) as promulgated by the Department of Labor.

4.1.2.5 U.S. Department of Health and Human Services Biosafety Guidelines

The project design shall comply with the latest revision of the applicable Biosafety Guidelines promulgated by the Centers for Disease Control and Prevention (CDC), and National Institutes of Health (NIH) applicable to the level and nature of the project activities.

4.1.2.6 Laboratory Chemical Fume Hoods Standards

The project shall be designed to comply with the latest revision of the ACGIH and ANSI/AIHA (American National Standard Institute/American Industrial Hygiene Association) Z9.5, as well as specific requirements of this chapter.

4.1.2.7 American National Standards Institute

The drawings and specifications for each project shall show and require safety and health construction features and practices which conform to the most current ANSI Standards noted in the ANSI Safety and Health Index, Publication 5P8L-PC20M1085.

4.1.2.8 Code Review, Analysis, and Waiver Process

The code criteria shall be reviewed by the A-E to the degree of detail necessary to assure that tasks accomplished during design meet code requirements. All deviations from code/APHIS requirements and any equivalency concepts proposed for use must be identified by the A-E and submitted to the government for approval no later than the 35 percent design stage.

4.1.3 Design Submissions and Coordination

The A-E shall submit architectural design concepts, drawings, sketches, calculations, specifications, etc., at various stages throughout the design process as outlined in the A-E contract.

4.1.4 Accessibility

Public Law 90-480 requires that federal buildings, including site work, be designed to ensure that individuals with physical disabilities will have ready access to, and use of, such buildings. APHIS requires compliance with the United States Access Board standards.

4.2 Health and Safety

4.2.1 Materials

Materials and products with known or suspected properties that are hazardous to the health of occupants and installers, shall be avoided. Only materials that are PCB, lead or asbestos free and contain the lowest available levels of VOCs, shall be used in RS buildings. This includes materials such as paint, adhesives, sealers, sealants, floor tiles, etc.

4.2.1.1 Asbestos

All work involving asbestos-containing materials shall be performed in accordance with OSHA standards contained in 29 CFR Part 1910.1101, as applicable, as well as those federal and state EPA regulations that pertain to asbestos-containing material maintenance and abatement.

4.2.1.2 Lead Base Paint (LBP)

All work involving LBP materials shall be performed in accordance with OSHA standards contained in 29 CFR Part 1926.62, as applicable, as well as those federal and state EPA regulations that pertain to LBP material maintenance and abatement.

4.2.1.3 Mold

All work involving mold remediation shall be performed in accordance with applicable OSHA regulations, US Environmental Protection Agency (EPA) regulation 402-K-01, and applicable state regulations.

4.2.2 Fire, Smoke and Heat Safety

The entire building housing the APHIS facility, as completed, will be equipped with a wet sprinkler system (except for the telecom room). A dry pipe fire suppression system shall be considered for telecom rooms, rooms with water sensitive equipment and/or chemicals. Smoke detection will be provided throughout. Fire alarm and notification systems will be provided in accordance with local fire code and agency requirements.

4.2.2.1 Fire Alarm Systems

Fire alarm systems shall be installed in accordance with NFPA 72.

4.2.2.2 Portable Fire Extinguishers

The appropriate number, types, and locations of fire extinguishers must be provided in accordance with NFPA 10, "Portable Fire Extinguishers."

4.2.3 Biosafety

Safety, biosafety, biocontainment, and biosecurity features shall be incorporated as a part of the physical facility.

Where biological or chemical operations are used, primary containment devices in alignment with risk assessment shall be incorporated.

4.2.4 Chemical Storage

Laboratories which use flammable/combustible materials and chemicals shall provide adequate storage in a segregated, storage cabinet in accordance with NFPA 30 and NFPA 45. If the cabinets must be vented, venting shall be accomplished in accordance with NFPA 30 and 45.

In areas where corrosive materials will be used, there shall be a segregated corrosive material vented storage cabinet. Use corrosion resistant materials suitable for their intended use.

Compressed gases shall be manifolded at a central location closest to those laboratories they serve. Efforts shall be taken to avoid extraneous use of gas cylinders in laboratories.

The design of any area for the express purpose of storage of compressed gases and flammable combustible materials shall comply with OSHA Standards in 29 CFR 1910, Subparagraph H, Hazardous Materials; NFPA 30; NFPA 45, and Compressed Gas Association, Pamphlet P-1.

4.2.5 Laboratory Safety Equipment

Rooms shall include hand-wash sink with wrist blades for hands free operation as well as emergency eyewash and safety shower in compliance with American National Standards Institute (ANSI) Standard Z358.1 in any area where chemical or biological contaminants may be present, including animal quarantine/inspection areas. Handwashing facilities shall be located near laboratory or animal room exit.

Eye wash stations and safety showers will be centrally located, meeting the ANSI standard which provides that emergency equipment be installed within 10 second walking time for the location of hazard. All OSHA regulations for placement of eye wash and emergency showers must be followed.

APHIS Safety & Health personnel will evaluate placement during design phase.

Safety showers shall be provided with tepid water, floor drain (where practicable) and trap primer. Safety showers and eye/face washes shall have stay-open actuation valves, to allow operators free use of both hands once the flow of water has begun. Wall-mounted portable units and hand-held single-head devices are not acceptable in lieu of stationary dual-head eye washes.

4.3 Security Design

4.3.1 General

Appropriate architectural security design criteria and standards for a project shall be determined based on project-specific risk assessment.

This section focuses on using interior planning to safeguard occupants and critical building systems. The location of functions away from high-risk areas can reduce vulnerability and the consequences of various tactics.

Emergency communication and emergency access/egress plans shall be developed in accordance with institutional policies and Authority Having Jurisdiction.

4.4 Planning and Design

There are basic principles that guide the planning of new and renovation of existing diagnostic facilities, including those that quarantine or house animals. For any area designated at BSL-3 or above, refer to ARS Guidelines. The following sections apply to Laboratory, Scientific Work Room, Laboratory Support, Production and Animal Facilities.

4.4.1 General Planning

4.4.1.1 Mixed Occupancies

Separate high and low-risk tenants. When possible, high-risk tenants shall not be housed with low-risk tenants. If they are housed together, publicly accessible areas shall be separated from high-risk tenants.

There shall be effective separation between neighboring areas in which there are incompatible activities. Measures shall be taken to prevent cross-contamination by providing clear separation between clean and dirty/contaminated operations.

4.4.1.2 Loading Docks and Shipping and Receiving Areas

Separate loading docks and shipping and receiving, from utilities. Protecting utility systems and/or locating them away from vulnerable areas helps assure that services will provide life safety and operations support after an attack.

Laboratory, scientific workspaces, production areas and animal spaces within APHIS diagnostic facilities areas shall be located in a clearly demarcated, access-controlled area within the building. Room access and associated paths of travel/egress shall be separated from any publicly accessible portions of the building.

All Interior doors shall be lockable; laboratory and animal facility doors shall be self-closing.

Facility shall include vermin protection.

Laboratory, scientific workspaces, production areas and animal spaces to be provided with appropriate signage.

Animal facilities shall have access to change rooms/shower facilities.

Given the nature of diagnostic animal facilities, any space for animal holding or quarantining shall be designed to accommodate a range of species that may vary; including, but not limited to, generously sized rooms to accommodate a variety of species caging/penning types, doors sized for animal movement, durable finishes to withstand washdown, variable temperature, humidity, and lighting controls. Animal rooms shall have floor drain with trap filled with water/disinfectant.

4.5 Special Design Considerations

4.5.1 Acoustics

All spaces that share the same wall as the broker area must be soundproofed to limit sound from outside sources.

4.5.1.1 Class B2 Spaces

This category consists of spaces where people are likely to speak in a higher-than-normal tone of voice and spaces where concentrations of noisy equipment are located, including laboratories (with fume hoods).

The design ambient noise levels must not exceed NC 50. Noise measurements for laboratory space with fume hoods shall be taken with all the fume hoods operating at 18-inch sash height and with hood sashes closed. For laboratories without hoods, noise measurements shall be taken with a maximum airflow, i.e., in maximum cooling mode.

Sound isolation at partitions enclosing class B2 space must be a minimum STC of 45.

Acoustical ceilings must have minimum NRC of 0.65 in non-carpeted areas.

4.6 Building Elements

4.6.1 Exterior

4.6.1.1 Configuration and Orientation

The configuration and orientation of any new structure shall be carefully analyzed to make optimum use of site potentialities and to reduce energy consumption. To the extent allowed by site constraints, the design shall be such that existing neighboring structures that make use of passive or active solar design shall not be compromised by the new design.

4.6.1.2 Roofing

Roof drains shall be located at low points. Buildings with nominally flat roofs shall have the finished roofing system sloped a minimum of 1/4-inch per foot to the roof drains. The pattern of roof drains, high points, and slope to drain shall be indicated on the roof plan. Roofing materials shall be selected to minimize energy consumption.

4.6.1.3 Roof-Mounted Equipment

Since it is a potential source of leaks, roof-mounted equipment shall be held to a minimum. Wherever possible, roof penetrations shall be consolidated or grouped together utilizing a common roof curb flashing platform. Penetrations in the roof deck shall be protected against leakage.

Permanent access shall be provided to roof-mounted equipment requiring maintenance. The access shall be located in a portion of the building available to operating and maintenance personnel at all times.

Supports for cooling towers, exhaust stacks and other equipment shall not be constructed directly on the roof membrane; a supplementary elevated roof platform shall be constructed to minimize membrane penetrations and provide a minimum of 3 feet of clearance on all sides of the equipment.

4.6.1.4 Windows and Glazing

Safety glass shall be used for glazed doors and sidelights, and other areas adjacent to, or in, the line of pedestrian traffic. Partitions and exterior fenestration that are glazed to the floor line shall have protective barriers at push bar height. Low E coated insulating glass units and thermally broken framing systems are required. Products shall conform to the standards of applicable major industry associations such as the

American Architectural Manufacturers Association (AAMA) and the North American Fenestration Standard/Specification (NAFS).

Air infiltration of exterior glazing systems shall be in accordance with ASHRAE 90.1. External windows to laboratory areas shall be sealed.

Exterior windows shall be provided with an internally controllable roller shading device; mini blinds are not acceptable in laboratory environments.

4.6.2 Interior

4.6.2.1 Walls

Diagnostic facilities may be constructed out of a combination of metal stud with gypsum board wall or concrete masonry units. Where impact resistance is needed based on movement of large equipment, carts or holding of animals, CMU is recommended.

Rooms shall be constructed of robust materials that provide water resistant surfaces which are easy to clean.

4.6.2.2 Floors

Floor construction should be stable and monolithic, generally concrete, and able to withstand a 125 psf live load to minimize vibrations. Where animal holding is to be located, verify vibration sensitivity of species to ensure appropriate structural stiffness is provided.

4.6.2.3 Ceilings

The minimum clear finish ceiling height, i.e., vertical distance from floor to lowest finish material or obstruction above, shall be 8 feet; however, clear height required inside the laboratory, scientific workspaces, production and animal spaces will be driven by the function and equipment utilized and is usually in the range of 9'-0" to 10'-0". Above the ceiling of laboratory or animal rooms there will be substantial service distribution which may be accommodated in a deep plenum space (4'-0" to 5'-0"), a walkable 'interstitial' space (E7'-0"), or a full mechanical floor (10'-0" to 12'-0" or greater). For scientific work rooms and production areas, service distribution requirements will be lessened.

Ceiling types may vary based on space function but are typically either acoustical ceiling tile or painted gypsum board in laboratories. In scientific workspaces, acoustical ceiling tile, painted gypsum board or exposed structure may be acceptable. Ceilings in animal spaces may be subjected to hose-down procedures based on species and should be evaluated for ease of cleaning and durability to wet environments.

4.6.2.4 Doors

Except for closet doors, minimum door width shall be 3 feet and minimum height shall be 6 feet 8 inches. To permit future lowering of suspended ceilings, tops of doors shall be a minimum of 1-foot below the ceiling. Doors in a laboratory and animal areas should generally be a minimum of 42 inches wide x 96 inches high where in the path of travel for fume hoods, biosafety cabinets, or large cart movement. Doors shall be durable, scratch/dent resistant, and compatible with chemical disinfection.

Many of the doors in a diagnostic facility may also play a critical role in the control of airflow. Door undercuts and grills work in conjunction with the mechanical systems to control the flow of air through the facility and ensure directional airflow in spaces that require it.

Fire doors shall meet the requirements contained in National Fire Protection Association (NFPA) Standard No. 80. Doors, hardware, and frames of fire door assemblies shall bear the label of the Underwriter Laboratories, Inc., Factory Mutual, or other approved testing laboratory in accordance with ASTM E 152.

Doors leading into all laboratories shall contain a sensor alarm to monitor the laboratory pressure and alarm when the laboratory is no longer under negative pressure.

Laboratories shall not have a main door entry leading to the outside. Doors leading to the outside within a laboratory shall be for emergency egress only and contain an alarm.

4.6.2.5 Glazing (Windows)

Internal glazing for laboratories and animal areas shall be non-operable based on risk assessment.

4.6.2.6 Finishes

Finishes shall be smooth, impermeable to liquids and resistant to chemicals and disinfectants used for cleaning. Floors are generally finished with a flooring system aligned with the function of the spaces but should be easily cleanable and maintainable. In many areas, floors will be seamless, monolithic, slip-resistant and include integrally covered bases. Wall and ceiling finishes shall be epoxy painted coating for easy cleaning and decontamination.

The use of carpets, rugs and other porous surfaces is not appropriate for use in laboratory, scientific workspaces or animal areas.

The location of specific materials in each room/area will be indicated during the design phase.

While some animal holding, and quarantine spaces may be designed as exterior open-air barns, generally animal holding and quarantine rooms within buildings are designed with finishes capable of being washed down with a hose and disinfectants. Most indoor animal facilities utilize concrete masonry units (CMU) for walls although some may also utilize prefabricated panels (fiberglass, steel) as well. Unless pre-finished, walls are generally finished with a seamless wall coating system with the intent to provide a surface that is impervious, easily cleanable, and resistant to any chemical disinfectants intended for use in the facility.

Corrals shall be constructed of appropriate materials that are of sufficient strength to contain cattle with a minimum height of 64 inches and anchored/buried in concrete for support.

Snake alleys shall be made of ¼-inch galvanized sheet metal approximately 6-foot high and shall be at least 4 inches off the ground. Prefabricated snake alleys are allowed.

4.6.2.7 Casework

Casework and benchtops shall be impervious to water and resistant to laboratory chemicals such as acids, alkalis, organic solvents, and other chemicals used in cleaning and decontamination. Casework (e.g., storage cabinetry) may be wood or metal. Surfaces to be scratch, stain, moisture, chemical, and heat resistant in accordance with function.

Casework shall be capable of supporting anticipated loads and uses.

Adjustable casework shall be considered, where practicable.

4.6.2.8 Penetrations

Penetrations in floors, walls and ceiling surfaces shall be sealed to facilitate cleaning and pest control.

4.7 Equipment

Anticipated equipment must be considered when planning a diagnostic facility, as the planned and future equipment can impact everything from room sizing to ceiling height, doorways, and support equipment such as autoclaves and oversized sinks. As a minimum provide the specialty equipment indicated on the specific room data sheets in Section 5 of this document. Additionally, the following criteria shall be included as applicable.

4.7.1 General

Spaces between casework and equipment must be accessible for cleaning and decontamination.

Provide 5-foot minimum aisle clearance between casework and equipment.

All equipment shall be identified, properly maintained, and calibrated with maintenance and calibration procedures documented.

Life safety/support systems such as those used in animal microisolators, or tank systems shall be tied to Building Automation System (BAS).

Equipment may require local uninterrupted power.

4.7.2 Autoclave

Access to sterilization equipment shall be provided for the sterilization of biological waste when indicated by biological risk assessment (BSL2 and above).

Size and location of equipment to be determined as part of project requirements.

4.7.3 Biological Safety Cabinets

Biosafety Cabinets (BSCs) are a primary containment device, used to ensure personnel protection from known or suspected biological pathogens. Selection of the Biological Safety Cabinet's Class shall be determined by the program based on the program risk assessment during the initial project planning.

BSCs shall be Class II, A2, with thimble (canopy) exhaust or Type B1 per institutional policies. The class II biological safety cabinets shall comply with NSF/ANSI Standard 49 for class II laminar flow biological safety cabinet to provide personnel; environmental; and product protection.

Spaces where BSCs are installed shall be designated as laboratories and must therefore comply with laboratory design guidance on finishes, ventilation, etc. Prior to specifying a BSC, A/E shall confirm location and purpose with program biosafety officer.

BSCs shall be certified annually.

Locate BSCs away from doors, windows, and occupant traffic. Where fume hoods or Biosafety cabinets are placed opposite one another, the design shall take into consideration egress and aerodynamic considerations.

4.7.4 Rear Wall Diffuser

Rear wall diffusers may be used in workspaces where minute chemical quantities are utilized for slide preparation and personnel protection is required.

4.7.5 Chemical Fume Hood

All laboratory chemical fume hoods and exhaust systems shall comply with ACGIH and ANSI/AIHA guidelines. Surfaces must be durable and easily cleanable. Service outlets shall be located so that the operator will not have to reach into the hazard zone to make connections. Variable Air Volume (VAV) hoods shall be the primary choice of hoods in new construction or renovation.

Where feasible, 4'-0" width fume hood is preferable to minimize energy consumption.

Fume hood to be recirculating type.

Fume hood must come with a low flow alarm (alarms at <80 ft.min).

Face velocity shall be 100 FPM at 18" sash height.

Minimum stack height shall be 10 feet from roof plane with minimum exhaust velocity of 15 m/s (3000 fpm) at point of discharge to prevent re-entrainment of exhaust into the building.

Hood locations must be away from doors, windows, and occupant traffic. Where fume hoods or Biosafety cabinets are placed opposite one another, the design shall take into consideration egress and aerodynamic considerations.

Fume hood and chemical storage cabinets shall be ventilated independently to permit continuous ventilation of chemical storage when fume hood is set-back/not in use. Room exhaust shall not be dependent on Fume Hood Operation.

4.7.5.1 **Manufacturer Certification**

The laboratory hood manufacturer shall provide certification that the unit performs satisfactorily under the condition required by the design documents. The designer shall clearly define the requirement for a report and certification of the “As Manufactured” ANSI-ASHRAE 110 Defined Performance Test Data in the project specifications. This report will show the hood(s) to be used in the project have been tested and passed the ANSI-ASHRAE 110 Performance Test Data.

Fume hoods shall be certified annually.

4.7.6 **Incinerator**

Incinerators shall meet or exceed all state, local, Environmental Protection Agency and National Fire Code requirements. Permitting process/requirements will be identified during the design process by the design A-E.

Section 5 Mechanical Design Guidance

5.1 General

5.1.1 Objective

The Heating, Ventilation, and Air Conditioning (HVAC), Plumbing, and Fire Protection systems shall be selected for long-term durability, energy efficiency, flexibility, accessibility, ease of operation and maintenance, and efficient life-cycle ownership and operating costs.

5.1.2 Codes and Standards

5.1.2.1 General

The design shall comply with the requirements of the site applicable codes and standards, including the guidelines referenced therein, that apply to mechanical and plumbing system design. The current edition of each applicable code, in effect at the time of design contract award, shall be used throughout the project's design and construction.

5.1.2.2 Mechanical Design Standards

The design shall conform to the following publications and codes. The term "Recommended" as used in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standards shall be considered "Required."

1. National Fire Protection Association: National Fire Codes
2. American National Standards Association: ANSI Z 9.5 American National Standard for Laboratory Ventilation
3. American National Standards Association: ANSI Z358.1 American National Standard for Emergency Eyewash and Shower Equipment
4. ASHRAE: Handbook of Fundamentals
5. ASHRAE: Handbook of HVAC Applications
6. ASHRAE: Handbook of Refrigeration
7. ASHRAE: Handbook of HVAC Systems and Equipment
8. ASHRAE: Standard 15: Safety Standard for Mechanical Refrigeration
9. ASHRAE: Standard 62.1: Ventilation for Acceptable Indoor Air Quality

10. ASHRAE: Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings
11. ASHRAE: Standard 100: Energy Conservation in Existing Buildings
12. ASHRAE: Guideline 12: Minimizing the Risk of Legionellosis Associated with Building Water Systems
13. National Standard Plumbing Code (NSPC)
14. All applicable state and local codes.
15. Federal, state, and local environmental requirements
16. Uniform Federal Accessibility Standards (UFAS)

5.1.2.3 Mechanical Design Guides

The latest editions of the standards listed here are intended as guidelines for design and to establish a basic level of engineering practice. They are mandatory only where referenced as such in the text of this chapter, in applicable codes, or in the A-E's Scope of Work. The list is not meant to restrict the use of additional guides or standards.

1. ASHRAE: Laboratory Design Guide
2. ASHRAE: Standard 55: Thermal Environmental Conditions for Human Occupancy
3. ASHRAE: Standard 105: Standard Method of Measuring and Expressing and Comparing Building Energy Performance
4. ASHRAE: Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems
5. ASHRAE: Standard 114: Energy Management Control Systems Instrumentation
6. ASHRAE: Standard 135: BACnet: A Data Communication Protocol for Building Automation and Control Networks
7. ASHRAE: Guideline 1: The HVAC Commissioning Process
8. ASHRAE: Guideline 4: Preparation of Operating and Maintenance Documentation for Building Systems
9. ASHRAE: Guideline 5: Commissioning Smoke Management Systems

10. ASHRAE Guideline 13: Specifying Direct Digital Control Systems
11. ASHRAE Applications Handbook, Sound and Vibration Control
12. NEBB: Procedural Standards for Building Systems Commissioning
13. American Society of Plumbing Engineers: ASPE Data Books
14. Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA):
 - a. HVAC System Duct Design
 - b. HVAC Duct Construction Standards: Metal and Flexible
 - c. HVAC Air Duct Leakage Test Manual
 - d. Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems
 - e. Seismic Restraint Manual Guidelines for Mechanical Systems
15. Energy Policy Act of 2005 (EPACT)
16. The Energy Independence and Security Act of 2007 (EISA) 15) 10 Code of Federal Regulation (CFR):
 - a. Part 433 – Energy Efficiency Standards for the Design and Construction of New Federal Commercial and Multi-Family High Rise Residential Buildings
 - b. Part 434 – Energy Code for New Federal Commercial and Multi-Family High Rise Residential Buildings
 - c. Part 435 – Energy Efficiency Standards for New Federal Low-Rise Residential Buildings

5.1.2.4 Code Review and Analysis and Waiver Process.

The code criteria shall be reviewed by the A-E to the degree of detail necessary to assure that tasks accomplished during design meet code requirements. All deviations from codes/ARS requirements and any equivalency concepts proposed for use must be identified by the A-E and submitted to the government for approval no later than the 35 percent design stage.

5.1.3 Design Submissions and Coordination

The A-E shall submit mechanical design concepts, drawings, sketches, calculations, specifications, etc., at various stages throughout the design process as outlined in the A-E contract.

5.1.4 Energy Conservation, Life Cycle Cost Analyses, and Environmental Preferred Products

5.1.4.1 General

A major concern in the design of a project is energy conservation and the need for all facilities to be energy efficient. For this reason, the A-E must direct attention to all areas where the greatest impact in energy savings can be made.

5.1.4.2 Life-Cycle Cost Analyses (LCCA)

The LCCA for the HVAC requirements must be completed in conjunction with HVAC analysis that must be performed to meet EPACT 2005. EPACT 2005 requires that the design of all new federal buildings achieve a level of energy efficiency 30 percent greater than ASHRAE Standard 90.1-2004 if life cycle cost effective. To analyze new federal buildings, agencies must estimate both the life cycle cost and energy consumption of the planned building as designed and an otherwise identical building meeting the minimum criteria set forth by ASHRAE 90.1 - 2004. The HVAC analysis performed must meet the requirements of ASHRAE 90.1-2004, Appendix G, as part of the energy analysis described below.

The A-E shall perform this comparison; this analysis shall show that the planned building is designed 30 percent more energy efficient than an otherwise identical building designed to meet the requirements of ASHRAE 90.1-2004 if life cycle cost effective.

If the 30 percent savings is not life-cycle effective, the A-E must evaluate the cost-effectiveness of alternative designs at successive decrements below 30 percent in order to identify the most energy-efficient design that is life-cycle cost effective for that building. However, the building must remain compliant with the current version of ASHRAE 90.1. The A-E shall use the life-cycle cost methodologies described in the latest edition of Handbook 135, "Life-Cycle Costing Manual for the Federal Energy Management Program," published by the National Institute of Standards and Technology (NIST). The life-cycle cost analysis must include investment costs, energy costs, non-fuel operation and maintenance costs, repair and replacement costs, and salvage values.

5.1.4.3 Life-Cycle Cost Analyses (LCCA)

In order to assist the A-E in meeting the new requirements for energy efficiency, several energy saving design elements are listed in the Appendix 6C Energy Saving Design Appendix. The items listed in the appendix are provided to reinforce ASHRAE 90.1 requirements and stress energy saving design elements.

5.1.4.4 Specifying Energy Efficient Products and Equipment

1. To assist in specifying energy efficient products, the Department of Energy (DOE) provides product energy efficiency recommendations and other information at:
<http://www1.eere.energy.gov/femp/program/>
2. The A-E shall specify products that are in the upper 25 percent of energy efficiency for all similar products, or products that are at least 10 percent more efficient than the minimum level that meets federal standards. This requirement shall apply wherever such information is available through either federal or industry approved testing and rating procedures.
3. The A-E shall, to the greatest extent possible, incorporate energy efficient criteria consistent with ENERGY STAR and other FEMP-designated energy efficiency levels into project specifications developed for new construction and renovation. See
<http://www.energystar.gov/>
4. The A-E shall specify environmentally preferable products.

5.1.4.5 Renewable Energy

The A-E shall incorporate the use of renewable energy technologies in the design of ARS buildings and facilities when life-cycle cost effective. Renewable energy includes photovoltaic, solar thermal, biomass (wood, wood waste, refuse and agricultural waste), wind, geothermal and low impact hydropower technologies. Per EISA 2007, 30 percent of hot water demand for new buildings or major renovations must be met by using solar hot water heating if life cycle cost effective.

5.1.4.6 Water Conservation

The A-E shall incorporate Best Management Practices (BMP) for water conservation in the design of the project. Details of these BMPs are available at Whole Building Design Guide (WBDG) Website: http://www.wbdg.org/design/conserv_water.php. Choose products labeled through the EPA WaterSense program where cost effective. The WaterSense label will indicate that these products and program meet water efficiency and performance criteria. Refer to EPA Website: <http://www.epa.gov/watersense>.

5.1.4.7 Sustainable Design

The A-E shall incorporate and apply the sustainable design principles developed for the federal government. These principles were developed in compliance with the requirements of the Five Guiding Principles of the High Performance and Sustainable Buildings MOU and Executive Order 13423 and have been incorporated into the internet-based “Whole Building Design Guide” that can be accessed at <http://www.wbdg.org/>. Refer also to the EPA Environmentally Preferable Purchasing website at <http://www.epa.gov/epp/>.

5.1.4.8 **Meter all Utilities**

Each individual building shall be metered for all utilities including electricity, water, natural gas, steam, and chilled water where cost effective. Electricity, water, natural gas, and steam meters shall be advanced (smart) meters with meter network connections.

5.1.5 **Acoustical Requirements**

5.1.5.1 **General**

Acoustical and noise level criteria for all building spaces are described in section 3.4.2 of this Manual.

5.1.5.2 **Noise and Vibration Isolation**

Refer to and incorporate the basic design techniques as described in ASHRAE Applications Handbook, Sound and Vibration Control. Isolate all rotating equipment in the building.

5.1.5.3 **Mechanical Room Isolation**

Where vibration control is considered critical to APHIS operations as defined by APHIS, floating isolation floors should be considered for major mechanical rooms located in penthouses or at intermediate levels in mid-rise and high-rise construction.

5.1.5.4 **Mechanical Chases**

Mechanical chases should be closed at top and bottom, and where they enter the mechanical rooms. Any piping and ductwork should be isolated as it enters the shaft to prevent propagation of vibration to the building structure. All openings for ducts and piping must be sealed, except that shafts dedicated to fuel gas piping and oxygen piping must be ventilated.

5.1.6 **Access to Machines and Equipment**

Space shall be provided around all equipment as recommended by the manufacturer and in compliance with local code requirements for routine maintenance. Access doors or panels should be provided in ventilation equipment, ductwork and plenums as required for inspection and maintenance. Equipment access doors or panels shall be readily operable and sized to allow full access to intended equipment or devices. Large central equipment shall be situated to facilitate its replacement. In addition, adequate methods of access shall be included for items such as: chillers, boilers, heat exchangers, cooling towers, reheat coils, VAV boxes; fire dampers; control dampers; pumps; hot water heaters, and all devices which have maintenance service requirements. The clearance required for filter and coil/tube removal shall be indicated on the drawings. Access to elevated major equipment (such as AHU's, cooling towers, chillers, and boilers) shall be by stairs, not by ladders. Elevated platforms with only base-mounted pumps shall be accessed by stairs, not by ladders.

5.1.7 Installation of Equipment for Proper Operation

The design drawings shall show the space/installation requirements for proper performance of all equipment and appurtenances. The necessary straight upstream and downstream duct/pipe diameters shall be shown for air flow monitoring stations, sound attenuators, VAV boxes, humidifiers, duct traverse locations, hydronic flow switches, pressure reducing valves, etc.

5.2 Mechanical Security Design

5.2.1 General

Appropriate security design criteria and standards for a project shall be determined based on project-specific risk assessment done in accordance with the methodology outlined in the Physical Security Criteria for Federal Facilities for New Federal Office Buildings and Major Modernization Projects.

The mechanical system should continue the operation of key life safety components following an incident. The criteria shall focus on locating components in less vulnerable areas, limiting access to mechanical systems, and providing a reasonable amount of redundancy. Mechanical system controls should remain in operation during fire conditions, although air handling units should be de-energized in accordance with NFPA requirements. Smoke control systems shall remain operational.

5.2.2 Mechanical Engineering Security Considerations

5.2.2.1 Air System

1. Air Intakes. Place air intakes at high level. On buildings of more than four stories, locate intakes on the fourth floor or higher. On buildings of three stories or less, locate intakes on the roof as high as practical. Locating intakes high on a wall is preferred to a roof location.

2. The design should note that laboratory exhausts are generally on the roof or upper levels of buildings and the air intakes shall be located to prevent entrainment of exhaust air.

5.2.2.2 Utility Protection

1. Utilities and Feeders. Locate utilities away from vulnerable areas. Utility systems should be located at least 50 feet from loading docks, front entrances, and parking areas.

2. Incoming Utilities. Protect incoming utilities. Within building and property lines, incoming utility systems should be concealed and given blast protection, including burial or proper encasement wherever possible

3. Above ground backflow preventers should be enclosed and locked.

5.2.2.3 Ventilation Systems

1. Smoke Evacuation. Protect ventilation equipment and locate away from high-risk areas. In the event of a blast, the ventilation system may be essential to smoke removal, particularly in large, open spaces. Ventilation equipment should be located away from high-risk areas such as loading docks and garages. The system controls and power wiring to the equipment should be protected. The ventilation system should be connected to emergency power to provide smoke evacuation. The designer should consider having separate HVAC systems in lobbies, loading docks, and other locations where the significant risk of an internal event exists. Ventilation and smoke evacuation equipment should be provided withstand-alone local control panels that can continue to individually function in the event the control wiring is severed from the main control system.

2. Pressurized Stairways. Maintain positive pressure in stairways. A stairway pressurization system should maintain positive pressure in stairways for occupant refuge, safe evacuation, and access by fire fighters.

3. The entry of smoke and hazardous gases into stairways must be minimized.

5.2.3 Fire Protection Engineering Security Considerations

5.2.3.1 General

The fire protection system inside the building should maintain life safety protection after an incident and allow for safe evacuation of the building when appropriate.

While fire protection systems are designed to perform well during fires, they are not traditionally designed to survive bomb blast. The three components of the fire protection system are:

1. Active features, including sprinklers, fire alarms, smoke control, etc.
2. Passive features, including fire resistant barriers.
3. Operational features, including system maintenance and employee training.

5.2.3.2 Active System

1. Water Supply. Protect water main. The fire protection water system should be protected from single point failure in case of a blast event. The incoming line should be encased and buried or located 50 feet away from high threat areas. The interior mains should be looped and sectionalized.

2. Standpipe Connection. Have locked covers for standpipe connections. Locked covers should be provided on standpipe and Siamese connections to ensure reliability and prevent damage to threads.

3. Fire Alarm System. Provide microprocessor-based fire alarm system. An intelligent, microprocessor based, addressable fire alarm system with voice capability should be provided. The system should be configured so that any single impairment shall not disable the system on more than one half of a floor. The configuration should include individual data gathering panels arranged on a network with stand-alone capability in case the main control panel is incapacitated. The system main control panel should be located in the fire control room near the building's main entrance to facilitate fire department access.

4. Egress Door Locks. All security locking arrangements on doors used for egress must comply with requirements of NFPA 101, Life Safety Code.

5.3 Plumbing

5.3.1 Fixture Requirements

Fixtures shall be water conserving type. For alteration projects in the same toilet rooms or areas, fixtures shall match existing fixtures if possible. Number of fixtures in each toilet room shall conform to the National Standard Plumbing Code (NSPC) and the local plumbing code.

One of each type of plumbing fixtures, suitable for use by individuals with physical disabilities, shall be provided in each public toilet room (men - one lavatory, one water closet, and one urinal, women - one lavatory and one water closet).

5.3.2 Water Coolers and Drinking Fountains

Drinking water station shall be provided near toilet rooms and shall not be provided in containment facilities, laboratories, or where hazardous materials are stored. Drinking water station shall be suitable for use by individuals with physical disabilities. Special requirements shall be as outlined in UFAS.

5.3.3 Floor Drains

Floor drains or floor sinks, with hinged grates and sediment buckets shall be installed in boiler rooms, mechanical equipment rooms, kitchen and dishwashing areas, garages, and similar areas. Floor drains shall not be installed in certain areas where possibilities of spills of harmful chemicals and like materials exist. Floor drains shall be provided with individual traps. Provision for automatic trap primers shall be made to ensure that traps for floor drains connected to sanitary sewers are sealed. Special trap depths are required for containment laboratories and animal rooms.

5.3.4 Sanitary System

5.3.4.1 Fixture Elevations

Each plumbing fixture and floor drain shall be installed as required by code and recommended by manufacturer. Where plumbing fixtures cannot be installed so fixture waste cannot drain to sewer system by gravity, automatic sewage ejector system shall be provided.

5.3.4.2 Cleanouts. Refer to NSPC

Where a cleanout will interfere with architectural finish of a room, a finished brass cover shall be installed over the cleanout.

5.3.4.3 Sewage Ejectors

Sewage ejectors shall not be used if other methods can be employed to allow gravity flow. Where ejectors are required, only lower floor facilities shall drain to ejectors. Upper floor facilities shall drain by gravity to the main sewer. Duplex sewage pumps are required and shall be non-clog, screenless ejector type, with each discharge not less than 4 inches. Avoid using sewage ejectors for acid waste and other special waste systems where possible.

5.3.4.4 Special Wastes.

1. Acid Waste. Separate drainage and vent systems for acid wastes shall be of corrosion resistant material. Corrosive liquids, spent acids, or other harmful chemicals that might destroy or injure a drain or vent pipe, or create noxious or toxic fumes, or interfere with sewage treatment processes, shall be thoroughly diluted, neutralized, or treated prior to entering the drainage system. A properly constructed and an acceptable dilution or neutralizing device shall be provided. Depending on type of treatment required, this device shall be provided with either, or both, an automatic supply of diluting water, or a neutralizing medium, so as to make its contents safe before discharge to the drainage system. Discharge of corrosive and method of treatment shall be coordinated with and approved by local code authorities. Special isolation and sealing are required for contained mechanical equipment and devices in laboratories, animal rooms, greenhouses, etc.

2. Other Special Waste. Other special waste such as grease or oil that can enter drains shall be designed in accordance with plumbing codes. USDA will define when a separate hazardous waste system terminating in a biohazard treatment system is required.

5.3.5 Storm Water Drains

Roof drains shall be located in areas where deflection of the roofing system occurs rather than above or near columns. Locations shall be coordinated with architectural requirements. Provide cleanouts in storm water lines, as required.

5.3.6 Water Supply System

5.3.6.1 Water Treatment

A chemical analysis of the water supply must always be obtained. Treatment of cold water is usually not necessary where water is obtained from a municipality or from a corporation. Water softeners shall be installed, if required, for treatment of water supplied to water heaters, boilers, or RO systems. Water softeners shall be installed in strict accordance with instructions from the manufacturer and applicable codes.

5.3.6.2 Water Piping Materials

Local engineers and water company officials should be consulted regarding the performance of different kinds of pipe in a particular locality. Dielectric couplings shall be provided where pipes of dissimilar metals are joined.

5.3.6.3 Water Pressures Required

Provide the minimum water pressure as required by the NSPC for the fixtures to be installed. Refer to the latest NFPA Codes and Standards for water pressure requirements for fire sprinkler and standpipe systems. When street pressures are not adequate to maintain pressures indicated above, provide a domestic water pressure booster system.

5.3.6.4 Service Pipe

In large buildings, two sources of water supply from different mains are desirable but not required. Service lines must enter the building in an accessible location. They must never enter fuel rooms, storage rooms, switchgear rooms, telecom rooms, or transformer vaults. A swing type joint shall be provided for a service line at its entrance to the building. Water meters and reduced pressure zone backflow preventors shall be provided on incoming water mains for buildings.

5.3.6.5 Interior Water Piping

Water distribution systems shall be protected against back flow. All domestic water piping to biohazardous spaces, biosafety cabinets, and fume hoods of any kind, shall be considered as non-potable water and protected from potable water system with reduced pressure zone backflow preventors. Refer to latest editions of the NSPC and local codes for requirements. Pressure reducing valves shall be installed on the domestic water mains or branches where required by the NSPC or local codes. A valved bypass, one pipe

size smaller than the main size, shall be provided around pressure reducing valves. The valve in the bypass shall be of the globe pattern. Specifications shall state the initial pressure, required flow, and final pressure.

5.3.6.6 Valves

Locations and types of valves must be shown on drawings and must be accessible. Valves shall be installed on cold water, hot water, and hot water return circulating mains so that sections of mains may be shut off without disturbing the services to other parts of the building. In addition, a valve shall be provided on the main supply at its entrance to the building and on the inlets and outlets of mechanical equipment requiring water connections. A shut off valve located close to the main shall be installed on each branch connection off the main serving more than one fixture. Valves shall be provided at the base of risers.

5.3.6.7 Sizing of Piping

Refer to the latest NSPC edition.

5.3.6.8 Domestic Hot Water

Equipment shall be automatically controlled and shall have sufficient capacity to deliver a minimum of 105°F water. A separate domestic water heating system shall be provided to supply high temperature water requirements for special cafeteria equipment. Provide centralized controls or a local time clock to turn equipment off during unoccupied hours. The hot water maintenance method (loop or heat maintenance cable) shall be selected by life cycle cost. Fuel or energy selected for water heating shall be determined by availability and life cycle cost. Type selected may be steam, gas, oil, electricity, or solar. The domestic hot water system shall be designed to comply with applicable codes, including ASHRAE 90.1, Paragraph 7.1. Thirty percent of the building's hot water shall be provided by solar hot water heating where cost effective.

5.3.7 Gas Piping

5.3.7.1 Design

Gas piping shall be designed using the latest edition of NFPA Standard No. 4 and ANSI Z 223.1, National Fuel Gas Code. Gas piping shall not be run in trenches, tunnels, furred ceilings, or other confined spaces where leaking gas might collect and cause an explosion. Underground piping in buildings and above ground in areas subject to fires, such as trash rooms, shall be avoided.

5.3.7.2 Ventilation

Gas meter rooms and places containing major gas supplied equipment, such as gas-fired boilers, gas engine emergency generators, or other equipment using large quantities of gas, shall be ventilated to ensure removal of leaking gas. When major gas supplied equipment is located on upper floors or on the roof of a building, gas supply piping shall be located outside the building or in a separate two-hour fire-resistant shaft vented at the top and bottom to the outside so as to prevent leaked gas from accumulating in the shaft or penetrate other portions of the building.

Adequate air shall be provided for combustion in accordance with NFPA 54.D. Advanced gas meters shall be provided on natural gas mains entering buildings.

5.3.8 Fire Safety

5.3.8.1 General

The requirements of the latest edition of National Fire Codes published by the National Fire Protection Association (NFPA) shall be used as criteria.

5.3.8.2 Automatic Sprinkler System

1. General

a. Automatic sprinklers systems shall be installed throughout all new construction projects and in all major renovation projects in accordance with the requirements of NFPA 13 and the site applicable National Model Building Code.

b. All sprinkler systems shall be wet-pipe sprinkler systems, unless installed in areas subject to freezing or in critical areas (see paragraphs c and d below).

c. In areas subject to freezing, install dry-pipe sprinkler systems, dry pendent sprinkler systems, or provide heat in the space, and/or reroute the sprinkler piping. Heat tape shall not be used on sprinkler piping.

d. Preaction sprinkler systems should be used for some critical areas where an accidental sprinkler discharge can cause serious water damage.

2. Sprinkler System Design

a. Sprinkler systems shall be hydraulically calculated in accordance with the requirements specified in NFPA 13.

b. Some critical areas may require fire protection by systems other than wet sprinkler systems. An example of this type of area is a computer room. For these areas, provide dry chemical fire suppression systems. Systems using Halon are prohibited.

5.4 Heating, Ventilation, And Air Conditioning (HVAC)

5.4.1 Design Criteria

5.4.1.1 General

Comfort conditions to be maintained in a building are dry bulb temperature and relative humidity, 3 to 5 feet above the floor. Designed indoor temperature will vary with the activity and intended use of the building.

5.4.1.2 Outdoor Design Conditions

Outdoor air design criteria shall be based on weather data tabulated in the latest edition of the ASHRAE Handbook of Fundamentals. Winter design conditions shall be based on the 99 percent column dry bulb temperature in the ASHRAE table. Summer design conditions shall be based on the 1 percent column dry bulb temperature, with its corresponding mean coincident wet bulb temperature. Cooling towers shall be selected based on the 1 percent wet-bulb temperature.

5.4.1.3 Indoor Design Conditions

Unless otherwise specified in the project's POR, the following indoor design conditions shall be used to calculate loads and size of equipment:

1. General Office Space and Laboratories Cooling 76°F DB and 50 percent RH Heating 70°F DB and a minimum of 30 percent RH.
2. Computer Rooms Year-round 72°F to 78°F and 40 percent RH.

5.4.2 Design Calculations

5.4.2.1 Heat Losses

Heat losses shall be calculated in BTU per hour. Heat transfer coefficients and calculations shall be based on the ASHRAE Handbook of Fundamentals. The heating plant shall be sized based on the calculated block heating load for space and process plus an allowance of 25 percent extra capacities per ASHRAE 90.1.

5.4.2.2 Heat Gains

Heat gains shall be calculated in BTU per hour. Heat transfer coefficients and calculations shall be based on the ASHRAE Handbook of Fundamentals. Unless otherwise specified in the project POR, cooling load calculations shall be based on inside design conditions of 76°F DB and 50 percent RH. The refrigerating plant shall be sized based on the calculated block cooling load plus an allowance of 15 percent extra capacities, per ASHRAE 90.1.

5.4.2.3 Calculation Format

1. Calculations shall be recorded in a standard format for each room to permit checking and to provide a reference for system modification. Design calculations shall include, but not be limited to, indoor and outdoor temperatures, heat loss, heat gain, supply and exhaust ventilation requirements, humidification or dehumidification requirements, and heat recovered.
2. The room heating and cooling loads shall include a 10 percent safety factor.

5.4.3 HVAC Design Coordination

HVAC design shall be coordinated with other facets of construction. The following factors require special consideration.

5.4.3.1 Mechanical Equipment Rooms

Rooms shall provide adequate space for equipment installation and maintenance. If expansion is planned, the size shall be based on future requirements. Equipment removal access shall be provided where required. Proper location of these spaces is necessary for economical air and water distribution.

5.4.3.2 Shafts

Size and location of shafts for ductwork and pipes shall be checked before ductwork and piping system design. Effects of shaft location on mechanical equipment and distribution systems shall be carefully determined.

5.4.3.3 Louvers

Location and size of outdoor air intakes, relief air discharge, and exhaust air discharge louvers shall be coordinated with the architectural design. Outdoor air intakes shall be located so as to avoid intakes of dust, smoke, generator and truck diesel fumes and exhaust air.

5.4.3.4 Cooling Tower Location

Tower shall be located to be least obvious and, if possible, at ground level. Discharge at low levels, or where it may come in contact with buildings or fresh air intakes, shall be avoided.

5.4.3.5 Access

Location and size of control panels and the type of service and maintenance a facility requires shall be coordinated with the architectural design to allow personnel access to an area or to a piece of equipment.

5.4.3.6 Wind Forces

Design of outdoor equipment, such as cooling towers, stacks, and their supports, shall be based on the maximum wind velocities prevalent at the site. Exterior mechanical equipment shall be anchored, braced, or guyed to withstand the prevailing wind velocity.

5.4.3.7 Seismic Considerations

If sites are subject to earthquakes, design of equipment especially outdoor cooling towers and water tanks, piping systems, ductwork, and foundations, shall include suitable allowance for horizontal forces. Equipment and piping shall be seismically braced.

5.4.4 Ventilation and Exhaust Requirements

Ventilation shall be provided as required to remove hazardous or noxious fumes for dust and odor control, equipment room temperature control, and for personnel comfort.

1. Laboratories: Ventilation systems shall be designed to comply with NFPA 45 and ANSI Z9.5, American National Standard for Laboratory Ventilation, and the ASHRA Laboratory Design Guide.

2. Non-Laboratory Spaces: Ventilation systems shall comply with ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality. Where appropriate, process ventilation shall conform to the American Conference of Governmental Industrial Hygienists publications and recommendations.

3. Laboratory and Hazardous Fume Exhaust: For laboratory exhaust and other systems conveying hazardous fumes, an exhaust plume analysis shall be performed. This analysis will verify that the

exhausted air does not reenter the building's fresh air intake or the intakes of nearby buildings or otherwise pose a hazard to personnel.

Spaces where exhaust systems are used to remove contaminated or hot air shall be maintained at a negative pressure to prevent exfiltration to other areas. Negative pressure shall be created by exhausting 5 to 15 percent more air than the supply air. If anticipated fumes and vapors have a specific gravity greater than air, exhaust intakes shall be provided at the floor level. Explosion proof ventilation equipment shall be provided for areas where explosive vapors or dust are anticipated. Filters shall be provided where particulate matter must be removed from the supply or exhaust air.

5.4.5 Air Cleaning Systems

Air supplied to occupied spaces, equipment rooms, kitchens, cafeterias, etc., shall be provided with air filters, arranged to provide clean air at an upstream side of air handling units, fan coil

units, and heating units. Filter efficiency shall be in accordance with ASHRAE recommendations. Select filters for operating velocity recommended by the manufacturer to give an economic combination of static pressure loss and dust holding capacity. Minimum clearance of 2 feet shall be provided for service and inspection. An access door with minimum width of 18 inches and an electric light in a watertight-type fixture shall be provided.

5.4.6 Piping Systems

Design piping per ASHRAE Handbook of Fundamentals. Provide valves to isolate equipment (for operation and repair), including room units and individual risers to room units. Provide bypass piping on critical systems to allow operation during maintenance operations that may have extended times. Provide manual vents at highpoints and hose type drain valves at low points and both in sections or risers that can be isolated by valves. Show locations of expansion joints, loops, and anchors on drawings.

Suitable devices shall be provided so flow can be measured in major equipment such as chillers, cooling towers, boilers, AHU coils, solar system loops, or other zones, e.g., primary, and secondary loops. Balancing devices shall be provided to allow adjustment. Cooling towers shall be equipped with water meters where sewer charges may be avoided on makeup water. Piping systems shall be insulated as required for the service and location in the building and in accordance with ASHRAE 90.1. Systems exposed to weather or in tunnels shall be protected from freezing. Each closed/open piping system shall be provided with chemical treatment to inhibit corrosion, bacterial scale, deposits, or growth. Equipment in corrosive environments such as marine areas shall be corrosion resistant.

5.4.7 Air Duct Systems

Equal friction method or static pressure regain method in the ASHRAE Handbook of Fundamentals may be used to determine duct sizes.

Duct leakage rates shall be per ASHRAE Handbook of Fundamentals. The SMACNA duct seal classifications shall be shown on the drawings. (Note: For facilities involving work with hazardous materials, all exhaust ducts shall be constructed in a leak tight manner with seams and joints usually welded airtight.)

Where ductwork is connected to equipment (such as heating coils, cooling coils, or filters), transition fittings should be smooth. Slopes of transition shall be 15 degrees on the upstream side and less than 30 degrees on the downstream side. Transitions in elbows shall be avoided.

Access doors or panels shall be provided in ductwork for any apparatus requiring maintenance, inspection, and service for: filters; heating and cooling coils; sound absorbers; volume and splitter dampers; fire dampers; thermostats; temperature controls; variable air volume boxes; valves; and humidifiers.

Volume or splitter dampers shall be provided in ductwork, where necessary, to obtain proper control, balancing, and distribution. Fire and smoke dampers shall be provided in accordance with NFPA standards. (NOTE: No fire dampers or control dampers shall be used in chemical fume hood exhaust ductwork, The exception is where control dampers are used to isolate redundant exhaust fans.)

5.4.8 Air Distribution Devices

Air outlets shall be selected and located to provide proper throw, drop, and spread. Air should not blow against obstructions such as beams, columns, lights, or sprinklers, or on occupants. Supply outlets shall be uniformly located within range of throws to distributed loads with air velocity at the occupant's level not exceeding 50 feet per minute. Where loads are concentrated, supply outlets shall be located near the load source. Noise level criteria shall be included on the drawing schedule. Supply air diffusers shall be placed so as not to interfere with the function of fume hoods. Supply air diffusers and exhaust inlets shall be placed

so that the room is swept by the air with short circuits being avoided. Air terminals for variable air volume (VAV) systems shall be selected to be compatible with characteristics of VAV box, i.e., outlets must be capable of performing at full and partial loads. Flow patterns must be properly evaluated. Standard air outlets do not perform satisfactorily with variable air volume flows.

5.4.9 Equipment Selection

5.4.9.1 Fans

Fans shall be selected to operate as close to the point of maximum efficiency as possible. Fans should absorb the least brake horsepower for the given conditions of air flow and static pressure. If fans are selected for parallel operation, each fan shall have self-closing or automatic discharge dampers to prevent back flow. Fan motors shall be sized for individual full speed operation with increased air flow against reduced static pressure. Fans serving fume hoods or biological safety cabinets shall have full capacity back up fan in parallel with each other. Each fan shall have motorized automatic dampers at inlet and outlet of fan to isolate fan completely when it is not operating.

5.4.9.2 Central System Air Handling Unit Requirements

Psychometric analysis, with load calculations shall be provided for each air handling system in accordance with ASHRAE procedures. Face velocity for coils and filters shall be between 400 - 500 feet per minute. However, coil air side pressure drop shall not exceed requirements of ASHRAE 62.

5.4.9.3 Refrigerating Machines

Refrigerating units in a plant should be of the same type unless alternative units are required to take advantage of alternative energy sources or to improve system efficiency. Design plant for minimum of N+1 units that will carry the load and provide sufficient capacity reduction to permit continuous operation at minimum loads. Variable frequency drives on centrifugal chillers should be provided for energy conservation. Arrange condensers and chillers for parallel flow unless series flow of chilled water is shown to be more economical. Flow diagrams must be provided coordinating flow and temperature ranges of chillers and cooling coils; include hydraulic characteristics of the chilled water system and pumps. Machines selected shall be energy conserving. Energy consumption per ton kW/hr shall be specified; however, the kW requirements must be met by more than two major manufacturers. Consider variable frequency drives on chilled water pumps to reduce energy consumption.

5.4.9.4 Cooling Towers

Provide mechanically induced draft cooling towers having a separate cell for each refrigerating machine. Each cell shall have a separate basin. Height of supports should permit easy maintenance and painting of basin and supporting structure. Outlet connections must be accessible for repairs. Size towers for heat rejection of system served. Design architectural enclosures and structural supports to accommodate both cross flow and counter flow towers having any standard post spacing. Enclosures should not restrict air flow to tower or permit recirculating of fan discharge air. Variable frequency drives on cooling tower fans may be used. As an alternative, allow fans to operate at full speed and use controls and programming for lowering condenser water temperatures on low load days for better chiller efficiency.

5.4.9.5 Boilers

Multiple boilers should be of the same type. Where boilers are to be used, design plant for minimum of N+1 units that will carry the load and provide sufficient burner capacity reduction to permit continuous operation at minimum loads. Boilers shall be sized to maximize efficiency for heating or process required water or steam. Existing central steam may be used as the heating source if available and life cycle cost efficient. Building level advanced steam meters shall be installed and connected to the meter network.

5.4.10 Automatic Temperature and Humidity Control

5.4.10.1 General

Automatic controls for temperature and humidity shall be provided for HVAC systems and shall comply with ASHRAE 90.1. Drawings shall delineate the control type, with standard symbols, schedules, description of operation, sequences, set points, alarms, etc. Show all room thermostats/sensors on floor plans.

5.4.10.2 Direct Digital Control (DDC) System

Direct Digital Control (DDC) system with a host computer-controlled monitoring and control shall be provided:

1. Controls. Preprogrammed stand-alone single or multiple loop controllers shall be used to control all HVAC and plumbing subsystems. DDC computers shall have USDA security software.
2. Temperature Controls. Heating and cooling energy in each zone shall be controlled by a thermostat or a temperature sensor located in that zone. Independent perimeter systems must have at least one thermostat or temperature sensor for each facade of the building with a different orientation. The sequences controlling the heating and cooling to spaces shall minimize the magnitude to which they are provided simultaneously to the same zone. A2.5 C (5 F) dead band shall be used between independent heating and cooling operations within the same zone. Night set back controls must be provided for all comfort conditioned spaces, even if initial building occupancy plans are for 24-hour operation. Morning warm-up or cool-down must be part of the control system. Occupancy sensors must be provided for laboratories.
3. Temperature Reset and Economizer Controls for Air Systems. Where appropriate, systems supplying heated or cooled air to multiple zones will include controls that automatically reset supply air temperature by representative building loads or by outside air temperature. Where required by ASHRAE 90.1, an economizer cycle will be used when the outside air conditions can provide free cooling.
4. Hydronic Systems. Where appropriate, systems supplying heated water to comfort conditioning systems will also include controls that automatically reset supply water temperatures by representative temperature changes responding to changes in building loads (including return water temperature) or by outside air temperature. Consideration shall be given to resetting condenser water supply to chillers. and resetting discharge air to minimize reheat (simultaneous heating and cooling).

5.4.11 Start-up, Testing, and Balancing Equipment and Systems

5.4.11.1 Start-Up

The designer shall specify that factory representatives are present for startup of all major equipment, such as boilers, chillers, pumps, fans, and automatic control systems.

5.4.11.2 Testing and Balancing

It shall be the responsibility of the designer to adequately specify testing, adjusting, and balancing resulting in not only proper operation of individual pieces of equipment, but also the proper operation of the overall HVAC system (air and water sides) in accordance with the design intent. The Testing and Balancing contractor shall have up to date certification by either

Associated Air Balance Council (AABC) or National Environmental Balance Bureau (NEBB). The specification shall adequately address both occupied and unoccupied operations and seasonal conditions if applicable. Airflow or air balance diagrams shall be included to simplify testing and balancing operations. The TAB contractor shall be a third-party contractor.

5.4.11.3 Commissioning

The designer shall prepare contract documents which include provisions for commissioning of the mechanical, plumbing, and fire protection systems during the design process.

The specification shall adequately address both occupied and unoccupied operations and seasonal conditions if applicable. Airflow or air balance diagrams shall be included to simplify testing and balancing operations. The commissioning firm shall be a third-party contractor.

5.5 Underground Heat and Chilled Water Distribution Systems

5.5.1 General

Underground heat and chilled water distribution systems shall be designed in accordance with the ASHRAE Handbook Series and standard industry practice. Advanced steam meters shall be provided on steam mains entering buildings where cost effective. Meters are required when steam is supplied from a central or off- site boiler plant. Meters for chilled water shall be provided for chilled water mains entering buildings where cost effective. Meters are required when chilled water is supplied from a central or off-site chilled water plant.

Section 6 Electrical Design Guidance

6.1 Electrical Systems

6.1.1 Applicable Codes, Regulations, and Standards

The design and specification of all work will be in accordance with the latest USDA standards and guidelines, with applicable codes and ordinances, and with codes and industry standards referenced herein. The following is a summary of major organizations with codes and standards referenced herein:

- NFPA 70 National Electrical Code (NEC)
- NFPA 70E Standard for Electrical Safety in the Workplace
- NFPA 72 National Fire Alarm and Signaling Code
- NFPA 101 Life Safety Code
- NFPA 780 Standard for the Installation of Lightning Protection Systems
- IEEE C2 National Electrical Safety Code
- IEEE 81 Measuring Earth Resistivity, Grounding Impedance, and Earth Surface Potentials of a Ground System
- IEEE C62.41 Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits
- IEEE 141 Electric Power Distribution (The Red Book)
- IEEE 241 Electrical Power Systems in Commercial Buildings (The Gray Book)
- IEEE 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (The Buff Book)
- ASHRAE 90.1 Energy Standards for Buildings Except Low-Rise Residential Buildings
- IES HB-10 IES Lighting Handbook
- ICC IBC International Building Code
- TIA-568.0-E Generic Telecommunications Cabling for Customer Premises
- TIA-568.1-E Commercial Building Telecommunications Cabling Standard Part 1: General Requirements
- TIA-568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standards
- TIA-568.3-D Optical Fiber Cabling Components Standard
- TIA-568.4-D Broadband Coaxial Cabling and Components Standard
- TIA-569-E Telecommunications Pathways and Spaces
- TIA-606-C Administration Standard for Commercial Telecommunications Infrastructure
- TIA-607-D Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
- USDA/APHIS Telecommunications Site Standards Guide for New and Remodeled Program Offices

6.1.2 Power

At minimum, a standby generator is required for the facility that shall cover loads such as telecommunications equipment, fire alarm, security systems, and other essential systems and equipment per USDA guidance. Recommended power requirements are listed in the room data sheets for specific room types. Specific detailed equipment power requirements will be coordinated during the design phase.

Laboratories with associated laboratory support spaces shall have a dedicated power panelboard serving the group of associated spaces.

Uninterruptible Power Supply (UPS) is not a requirement for the facility space types under consideration in this Design Criteria; however, some specific equipment may require a small desktop-style UPS dedicated for that equipment. These smaller UPS units would be provided by the government and defined during the design phase. If it is determined during design that a central UPS system is desired, or already present at the facility, the central UPS may be used in lieu of the desktop-style UPS systems if capacity is available. New central UPS systems would not be provided by the government, instead would be designed by the design firm's electrical engineer.

In BSL-2 rated spaces and Scientific Workrooms with benches, provide surface-mounted dual compartment raceway with metal divider at the bench backsplashes and where practical elsewhere. The dual compartment raceway will provide power receptacles and voice/data ports (see Section 6.1.4) as required for the project, typically 2 foot to 3 foot on center at bench spaces and where required for dedicated service to equipment. Standard recessed or surface-mounted receptacles and data ports may be used in other spaces.

6.1.3 Lighting

All general space lighting shall be dimmable type LED. Fixtures shall be rated appropriately for the space types (wet, damp, cold temperature, etc.). Provide separately controlled LED task lighting at benches. BSL-2 rated spaces and Scientific Workrooms shall incorporate sealed and gasketed style construction and a Color Rendering Index (CRI) of 90, or higher, for all fixtures. Where recessed in gypsum board ceilings, fixtures shall have maintenance access from the bottom of the fixture via an integral hinged fixture frame.

Provide 90-minute emergency lighting and illuminated exit signs in the form of fixture-integral battery backup or lighting inverter to meet NFPA 101, and NFPA 70.

Lighting controls should utilize "smart" dimming control system that meets the ASHRAE 90.1 version applicable to the project location. Designer shall coordinate with the government if the project is a retrofit or renovation to ensure compatibility and/or expandability of the new lighting control system when working alongside an existing lighting control system that is to remain or may be updated in the future. Provide occupancy sensors, daylight sensors (where required), and wall stations with automatic controls. Where automatic shutoff would endanger the occupants,

manual control is acceptable per ASHRAE 90.1. Coordinate with mechanical engineer during design on occupancy-based HVAC controls, as many lighting control systems can communicate with a Building Management System that is able to control HVAC or other building systems based on occupancy detection from the lighting control system.

For animal holding and quarantine spaces, diurnal/circadian lighting may be required. If required for the animal species, fixtures shall be gasketed, dimmable, and automatically color tunable to simulate sun cycles correctly. As requirements may vary by animal species and project parameters, requirements of this system must be coordinated with USDA and design firm electrical engineer.

6.1.4 Communications/Data/Security

Provide data ports, Voice-over-IP (VOIP) wall phone outlets, and Wi-Fi outlets/systems as required for the project. Active communications equipment, like switches, routers, and networking equipment will be provided by owner. Some technical equipment requires dedicated data ports for monitoring and reporting located near the equipment and should be coordinated during the design phase. For BSL-2 rated spaces and Scientific Workrooms with benches, utilize shared power/data surface-mounted dual compartment raceway with metal divider (see Section 6.1.2). Typically, data ports are 2 foot to 3 foot on center for these bench areas.

Security, Closed Circuit Television (CCTV) cameras, and access control requirements may vary by facility, whether owned or leased, and should be coordinated closely with the government during design phase. If the project is a renovation, any security or access control systems incorporated shall be compatible with the existing facility systems. Storage areas with high value items shall have access control at minimum. Recommendations are provided in the room data sheets.

Public Address (PA) system requirements and functions vary by facility and should be closely coordinated with the government during design phase as the PA system may be shared with the Mass Notification System (MNS) and/or fire alarm speaker system. Coordinate with the government if the ability to broadcast a PA message from any VOIP phone is desired or if it can only be accessed from a specific location. If PA is required for the project, each occupied space and corridor shall have speakers.

6.1.5 Fire Alarm/Mass Notification

Provide fire alarm system, including pull stations, speaker/strobe devices, horns, smoke detectors, duct detectors, heat sensors, where applicable. Provide a main fire alarm control panel and remote annunciator panels as required for the project. If facility is a renovation, new devices and systems shall be compatible with existing system.

If Mass Notification System (MNS) is required for a new facility, provide system as a part of the fire alarm speaker system. Provide strobe devices, speakers, head-end units, and amplifiers as

needed. Depending on the requirements for the project, the public address (PA) system may be integral to the MNS system. See Section 6.1.4 above.

Section 7 Health, Safety and Security Design Guidance

7.1 Safety and Health Elements

7.1.1 General

Provide safety and health elements as indicated in Section 4 of this document except as modified in this section. Refer also to USDA Biorisk Management Policy DR4400-007 and APHIS Biorisk Management (BRM).

All USDA agencies and staff offices shall direct questions and inquiries regarding this DR 4400-007 to the USDA Animal and Plant Health Inspective Service (APHIS) Biosafety Officer at 301-436-3117.

7.1.2 Definition of Laboratory

For APHIS projects the definition of space types in Section 2 of this design criteria is to be used.

7.1.2.1 Laboratory Ventilation Control

Provide controls to reduce laboratory ventilation rates based on occupancy of the space. Occupancy shall be determined by occupancy sensor in the space. When the space is unoccupied, the system may turn back to reduced airflow for energy savings. Under reduced airflow pressure relationships must be maintained.

7.2 Biohazard Containment Design

Biocontainment is a term used in describing safe methods, facilities features, and containment or safety equipment for managing infectious materials in the laboratory environment where these materials are being handled or maintained. The purpose of containment is to reduce or eliminate exposure of laboratory workers, other persons, and the outside environment to potential biohazardous agents or toxins.

Refer to ARS 242.1 for BSL3/ABSL3, BSL3-Ag and BSL4/ABSL4.

7.2.1 Objectives

The functional objectives of the biological containment facility are the: 1) protection of employees, contractors, and visitors from injury, illness, or accident as a result of work activities; 2) protection of experimental studies by preventing the spread of disease agents from one biocontainment area to another; and 3) protection of the environment by preventing the escape of disease agents causing any of the diseases studied at the facility.

7.2.2 Biohazard Definition

“Biohazard” is a contraction of the words “biological” and “hazard.” A biohazard is defined as an infectious agent, or a part thereof, presenting a real or potential risk to humans, animals, or plants, either directly through infection, or indirectly through disruption of the environment. In certain regulations these are referred to as infectious substances.

7.2.3 Barriers

Based on risk assessment, to establish multiple protective layers to contain biohazardous materials, the facility may be required to be designed and constructed with three levels of barriers to meet the above objectives:

7.2.3.1 Primary Barriers

Usually these are specialized items of equipment designed and specified for capture or containment of biological agents. Biological Safety Cabinets and animal cage dump stations are examples of larger primary barriers.

7.2.3.2 Secondary Barriers

These are facility related design features and operational practices that protect the environment external to the laboratory from exposure to biohazardous materials (from one interior area to another, or from the interior of the facility to the outside environment). Examples of secondary barriers include work areas that are separate from public areas, decontamination and hand washing facilities, special ventilation systems, directional airflow, and administrative controls such as risk assessment.

7.2.3.3 Tertiary Barriers

These are systems that are designed and maintained to minimize or control access to contaminated areas. These include physical barriers such as the building proper, perimeter fencing, remote controls, and monitoring devices.

7.3 Animal Facilities

7.3.1 Animal Housing

Refer to the Guide for the Care and Use of Laboratory Animals for species-based design criteria for specialized facilities for animal housing including environmental conditions, monitoring, lighting, drainage, vibration, and noise control.

7.3.2 Quarantine Facilities

Spaces identified as quarantine facilities for animals used in diagnostics and importation. Many quarantine facilities are housed within exterior enclosures/barns. Where quarantine facilities are housed within buildings, provide space at negative pressure to adjacent spaces.

7.4 Safety and Security

Safety and security are critical drivers particularly in laboratory facilities. Such facilities may be at risk from those attempting to obtain biological agents, those attempting to obtain access to proprietary scientific information, or animal rights interest groups. Careful placement of any animal areas within the facility and well-organized circulation routes can make the animals and staff working with them safe and secure without disrupting public areas and other functions. While protecting the facility as a whole is critical, there are also measures to be taken at interior spaces to ensure animals and staff are safe and secure. Consideration should be given to the following security measures as appropriate to the institution in question.

7.4.1 At the Site Level

- Loading area should be protected from view.
- Physical Barriers: Fences and secure building perimeters may be required.
- Monitoring and detection cameras may be required.
- Access Control: Consider limiting to one monitored point of entry for staff and visitors. One monitored point of entry for deliveries.

7.4.2 At the Building Level

- A top floor location can make mechanical servicing very efficient.
- Ground floor locations can make animal movement simpler eliminating the need to move animals and supplies through ramps or elevators.
- Locate animal areas away from public spaces.
- Provide secure zones as needed to avoid unintentional or unwanted access.

7.4.3 At the Room Level

- Security Access Control Devices.
- Security Cameras.
- Alarms.
- Building Controls.

Section 8 Modularity, Flexibility, and Maintainability Design Guidance

8.1 Modularity and Flexible Design

Flexible design encompasses adaptability, versatility, interchangeability, and expandability – all of which supports future program changes. The hallmark of flexible design is the use of modular planning, a concept that yields greater predictability and organization of horizontal and vertical utility distribution systems. Typical lab modules range from an 11-foot x 11-foot module for standard lab functions, to a 12-foot x 12-foot module for animal spaces, oversized equipment areas or other support functions. By utilizing a standard module, the designer can provide a safe work zone, congestion free circulation and depth to support casework and equipment.

Modules may be arranged, based on need, to create small, medium, and large suites. These blocks help define the structural system, window placement and utility distribution strategies. The careful integration of engineering systems, design, and architectural planning will result in the following benefits:

Adaptability – Each laboratory will provide sufficient area and appropriate linear feet of space for casework, special ventilation, and open floor space for equipment and storage. Individual laboratories will have independent access and control of their respective utilities to allow for reconfiguration without affecting adjacent laboratories.

Economy – The laboratory units will provide for efficient utilization of zones designated for open areas, casework, equipment, and storage without wasting floor or wall area. More economies can be gained in clustering of laboratory units together by levels of utility requirement.

Quality – Windows into the laboratories from the adjacent open office area borrowing daylight from the exterior windows will open up the lab environment as well as encourage interaction and provide greater safety by making the occupants visible.

Safety – The laboratory layout is zoned to provide higher hazard activities occurring in a zone at the rear of the lab with lesser hazard activities occurring at the front.

Plan for incremental adjustments to MEP systems such as extra space in chases and/or mechanical rooms to allow for lower cost/no cost adjustment as they are required. Scenario planning will identify the primary services to be provided and the amount of space required to support the systems and distribution. Adding capacity for future additional MEP support space for future additions is a relatively inexpensive way to provide safeguards for unforeseen needs.

Prior to the start of design, A/E shall request any Departmental Regulations (DR) or facility specific criteria that may impact design modularity.

8.2 Maintainability

Maintainability of building systems is critical to ensuring the systems operate and support the building functions throughout the life of the facility. All equipment must have adequate clearance to provide proper maintenance and equipment replacement. Equipment rooms should have exterior access to allow for maintenance and replacement activities. Provide means of isolation for all equipment that requires service. All valves, dampers and accessories in plumbing and mechanical systems must be accessible through removable finishes (ACT, etc.), or access doors must be provided.

Where room or space is a primary or secondary Biohazard Containment barrier, all valves, dampers, and accessories shall be exposed in space or located outside the space in accessible location.

Section 9 Facility Design and Construction Criteria

9.1 General

To normalize as much as possible APHIS' multiple laboratories located inside the United States and its territories, individual room data sheets for certain spaces have been developed. These data sheets help indicate the required facilities for each space type and can be implemented if space is a lease agreement, Agreement Property, or owned by USDA. Spaces are organized into three classifications.

9.2 Laboratory Spaces

The following spaces have room data sheets developed and are included in the Laboratory Space Category of Appendix A.

9.2.1 General Chemistry, Biological or Diagnostic Laboratory, Fume Hood Alcove

These spaces are designed for laboratory functions such as general chemistry, biology, diagnostics, or fume hood areas. The intent is for this space guidance to be used where biological or chemistry functions are required that may include storage of chemicals or potential biological contamination.

9.2.2 Necropsy/Pathology

These areas involve dissection of biological samples that have the potential to generate aerosols. Space guidance for these areas is similar to guidance indicated for laboratories, though increased need for room wash down and access to change rooms is unique.

9.3 Animal Facilities

The following spaces have room data sheets developed and are included in the Animal Facility Space Category of Appendix A.

9.3.1 Animal Holding and Quarantine

This guidance is designed for animal housing and quarantine as part of normal diagnostic populations. Quarantine facilities are designed to house sick or potentially infected animals away from native animal populations. These space requirements are intended to represent building-based animal facilities and are not intended for field or barn-based facilities.

9.4 Scientific Workroom

The following spaces have room data sheets developed and are included in the Scientific Workroom Space Category of Appendix A.

9.4.1 Insect/Plant ID Workroom, Technical Reference Library, Food Prep, Blood Processing and Treatment Rooms

These guidelines are for use in non-laboratory workspaces used for comparing field samples with reference collections, storage of technical reference samples, food preparation areas, blood processing or treatment rooms. Many of these spaces have lab-like elements such as casework or storage elements but are not used for typical chemical or biological processes that are found in laboratories.

9.4.2 Plant Inspection Station

This space is designed for use in inspection of imported plants. These open workspaces typically include ample work surfaces/tables and lighting for close review of plants for pests that may be harmful to native U.S. species.

9.4.3 Shipping and Receiving, Loading Docks

These guidelines are for use in shipping and receiving areas that support the packaging or unpackaging of materials and samples related to program function. These are enclosed areas located at the facility perimeter which may require enhanced security to separate non-facility personnel and functions from those interior to the program.

9.5 Laboratory Support Spaces

The following spaces have room data sheets developed and are included in the Laboratory Support Space Category of Appendix A.

9.5.1 Change Room Suite

These rooms are used for access to controlled areas within the facility. The suite provides spaces for changing from work clothes to non-work clothes. The space may have toilet and shower facilities depending on the risk analysis.

9.5.2 Hazmat, Chemical Storage

These spaces are dedicated to the storage of chemicals or chemical waste materials. Typically, this space stores larger quantities than are generally found in a laboratory space or stores chemicals with specific hazards. Chemicals are normally stored in vented cabinets within the space.

9.5.3 Cold Storage and Equipment Support Rooms

These spaces are dedicated to equipment typically used for storage of non-registered biological samples or similar laboratory support functions. Cold storage can either include prefabricated environmentally controlled rooms or they may also include rooms holding free-standing refrigerators/freezers.

9.5.4 Sterilization

These spaces are designed to house facility autoclave equipment. Oftentimes, if glass washing or cage washing facilities are also required these may be co-located.

9.5.5 Incinerator

These spaces are designed to support heat-intensive incineration equipment for use in the destruction of laboratory waste products including biological material, sharps, pharmaceuticals, chemicals, and compounds.

9.6 Production Spaces

The following spaces have room data sheets developed and are included in Other Space Types Category of Appendix A.

9.6.1 M-44 Cyanide Capsule Production, Fatty Acid

These spaces are designed for producing a product for government use or commercial sale and includes functions for the weighing, grinding, mixing, and drying of chemicals in Cyanide Production, as well as the periodic assembly of C-44 capsules. Production of synthetic lures also occurs in Fatty Acid space in addition to the chemical weighing and mixing operations. Containment devices including fume hoods, BSC, canopy hoods, snorkel hoods, and other containment methods may be present.

9.6.2 Gas Cartridge Production, FDA Drug, Mixing, Bait Mixing

These spaces are designed for producing a product for government use or commercial sale and include functions for the weighing and mixing of chemicals, extrusion, rolling, and drying of vaccine baits, as well as mixing and bagging of grain baits. Chemicals may be used or stored in room.

Appendix A Room Data Sheets



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested. Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____

Space Type: _____ Select One

BS/ABS LEVEL: _____ BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☐ Epoxy	☐ Gyp. Brd.	☐ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd. <u>6'</u>
☐ Sheet Flooring	☐ FRP	☐ CMU	☐ Hand Wash	☐ Snorkel
☐ VT	☐ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other _____	☐ Deep Sink	☐ BSC
☐ Other _____	☐ Other _____		☐ Floor Drain	☐ Other _____
	Height _____		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other _____	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☐ Epoxy PNT	☐ Integral	☐ DCW	☒ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☐ Cove	☐ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other _____	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other _____	☐ VAC	☐ Neutral Press.
☐ Other _____			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) _____
			☐ CO ₂	Temp (Cool) _____
			☐ O ₂	RH Limit _____
			☐ N ₂	ACH (occup) _____
			☐ H ₂	ACH (unocc.) _____
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☐ HLW	
			☐ Other _____	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☐ Wht. Brd.	☐ Mobile	☐ Chemical	☐ Critical	☐ Wall
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ CCTV	☐ Floor
☐ Monitor	☐ Wall	☐ Corrosive	☐ Access Control	☐ Bench
☐ Room Darkening	☐ Tall	☐ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☐ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Card Reader	☐ Ded. Ckt.
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other _____	☐ Other _____	☐ Keyed Entry	☐ 460 V
☐ Other _____	Casework Mat. <u>Select One</u>		☐ Other _____	☐ EM PWR
	Counter Mat. <u>Select One</u>			☐ UPS
	Shelving Mat. <u>Select One</u>			☐ Other _____
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☐ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC _____	☐ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☐ Comm	☐ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☐ Control
☐ PPE	☐ Blast Resist.		☐ Other _____	☐ Dimmer
☐ Soap Dispenser	☐ Explosive			☐ In-use
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☐ Fire Ext.	☐ Other _____			☐ Diurnal
				☐ Other _____
				Min. FC _____
				Fixture Typ. _____

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.
- A2. Window operability and screening requirements to align with BMBL requirements based on Risk Analysis.
- E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- E2. Emergency power from generator or other source may be required for the overall facility and/or systems per ARS 242.1. No specific additional requirements for this space.
- E3. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.
- E4. Card reader inside the room for exit only to prevent brokers/importers from accessing the rest of the facility
- H1. When no animals present may reduce to rate required to maintain appropriate pressure relationships and temperatures.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____

Space Type: Select One

BS/ABS LEVEL: BSL Per Risk Analysis

H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

H3. Exhaust space such that clean side is positively pressurized relative to dirty side. Provide Toilet and Shower exhaust as indicated in ASHRAE 62.1.

SPECIAL EQUIPMENT NOTES

Q1. Specialty downdraft/backdraft equipment, animal hoists and similar may be required based on species.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____

Space Type: Select One

BS/ABS LEVEL: BSL Per Risk Analysis

- Q2. Animal caging, aquaria and pens are based on AALAC species requirements. Animal caging is considered life-sustaining equipment and shall be connected to emergency power as necessary.
- Q3. Slotted rear-wall exhaust diffuser may be used where minute quantities of chemicals are used for slide preparation and similar activities that require personnel protection.
- Q4. Laboratory support equipment such as LN2 freezers or CO2 incubators may require service connections. Coordinate all laboratory equipment locations and services during design.
- Q5. Sterilization and glasswash equipment shall be provided in location appropriate for biosafety level labs it supports. Refer to BMBL for specific requirements.
- Q6. Where environmental control rooms are being considered in lieu of free-standing cold storage equipment, review with Facilities and EHS to determine long-term applicability and maintenance concerns.



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: General Chemistry, Biological, Diagnostic, Fume Hood Vestibule

Space Type: Laboratory

BS/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☒ Lab Sink	☒ Fume Hd <u>4'-0" or 6'-0"</u>
☒ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☒ VT	☒ ACT	☐ FRP	☒ Cup Sink <u>At Fume Hoods</u>	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other _____	☐ Deep Sink	☒ BSC <u>For biologicals</u>
☐ Other _____	☐ Other _____		☐ Floor Drain	☐ Other _____
	Height <u>See Note A1</u>		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other _____	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☒ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other _____	☐ Straight	☒ CA <u>TBC</u>	☒ Neg. Press.
☐ Wall Guard SS		☐ Other _____	☒ VAC	☐ Neutral Press.
☐ Other _____			☒ NG <u>TBC</u>	☒ 100% Exhaust
			☒ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☒ CO ₂ <u>TBC</u>	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>8 (Minimum)</u>
			☐ H ₂	ACH (unocc.) <u>4 (Minimum)</u>
			☐ CHW	
			☒ PW <u>TBC</u>	
			☒ DI <u>TBC</u>	
			☐ San	
			☒ AW <u>TBC</u>	
			☐ HLW	
			☐ Other _____	
DOOR	DOOR SIZE	WINDOWS	COMM	ELECTRICAL
☒ HM	☐ 36 in.	☒ Exterior	SECURITY	POWER
☐ FRP	☒ 42 in.	☒ Interior	☐ Critical	☐ Wall
☒ Wood	☐ 48 in.	☐ Storefront	☐ CCTV	☐ Floor
☐ Glass	☐ 36 / 12 in.	☐ Skylight	☒ Access Control	☒ Bench <u>See Note E2</u>
☐ Other _____	☐ Other _____	Operability <u>See Note A2</u>	☐ SCIF	☐ Ceiling
			☐ Intrusion Detect.	☒ Island
			☐ Card Reader	☒ Ded. Ckt. <u>TBC</u>
			☐ Biometric Reader	☐ 230 V
			☒ Keyed Entry	☐ 460 V
			☐ Other _____	☐ EM PWR
				☒ UPS <u>See Note E1</u>
				☐ Other _____
AUDIO VISUAL	CASEWORK	HAZMAT	DATA	LIGHTING
☒ Wht. Brd.	☒ Mobile	☒ Chemical	☒ Data <u>See Note E2</u>	☒ Occ. Sensor
☐ Smt. Brd.	☒ Fixed	☒ Flammable	☐ Comm	☒ Task <u>Hood Lights</u>
☐ Monitor	☒ Wall	☒ Corrosive	☒ Wi-Fi	☒ Control
☐ Room Darkening	☒ Tall	☒ Toxic	☐ Other _____	☒ Dimmer
☐ Projection	☐ Display	☒ Biological		☐ In-use
☐ Speakers	☒ Shelves	☒ Neutralized		☐ Amber Light
☐ Intercom	☐ Lockers	☐ Radiation		☐ Diurnal
☐ Listening Assist	☐ Other _____	☐ Other _____		☐ Other _____
☐ Other _____	Casework Mat. <u>Steel or Wood</u>			Min. FC <u>50, 100@Bench</u>
	Counter Mat. <u>Epoxy</u>			Fixture Typ. <u>Std.</u>
	Shelving Mat. <u>Match Casework</u>			
SAFETY EQUIP	SPECIAL	ACOUSTICS		
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC		
☒ Eyewash	☐ Vibration Control	☐ Acoustical		
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation		
☒ PPE	☐ Blast Resist.			
☒ Soap Dispenser	☐ Explosive			
☒ Robe Hooks	☐ Water Reactive			
☒ Fire Ext.	☐ Other _____			

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.
- A2. Window operability and screening requirements to align with BMBL requirements based on Risk Analysis.
- E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- E2. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: General Chemistry, Biological, Diagnostic, Fume Hood Vestibule

Space Type: Laboratory

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: General Chemistry, Biological, Diagnostic, Fume Hood Vestibule

Space Type: Laboratory

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Necropsy/Pathology

Space Type: Laboratory

BSL/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☒ Lab Sink	☐ Fume Hd
☒ Sheet Flooring	☒ FRP	☐ CMU	☒ Hand Wash	☐ Snorkel
☐ VT	☐ ACT	☒ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☒ BSC
☐ Other	☐ Other		☒ Floor Drain	☒ Other
	Height		☐ Scullery Sink	See Note Q1
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☒ Pressure Indicator
☒ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☒ Neg. Press.
☒ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☐ Other			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) 70 F
			☒ CO ₂	Temp (Cool) 76 F
			☒ O ₂	RH Limit 30%-50%
			☐ N ₂	ACH (occup) 15 (Minimum)
			☐ H ₂	ACH (unocc.) See Note H1
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☒ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM	ELECTRICAL
☒ Wht. Brd.	☒ Mobile	☐ Chemical	SECURITY	POWER
☐ Smt. Brd.	☒ Fixed	☐ Flammable	☐ Critical	☐ Wall
☐ Monitor	☒ Wall	☐ Corrosive	☐ CCTV	☐ Floor
☐ Room Darkening	☐ Tall	☐ Toxic	☒ Access Control	☒ Bench
☐ Projection	☐ Display	☒ Biological	☐ SCIF	☒ Ceiling
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Intrusion Detect.	☒ Island
☐ Intercom	☐ Lockers	☐ Radiation	☐ Card Reader	☒ Ded. Ckt.
☐ Listening Assist	☐ Other	☐ Other	☐ Biometric Reader	☐ 230 V
☐ Other	Casework Mat. Stainless Steel		☐ Keyed Entry	☐ 460 V
	Counter Mat. Stainless Steel		☐ Other	☐ EM PWR
	Shelving Mat. Select One			☒ UPS
				See Note E1
				☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☒ Eyewash	☐ Vibration Control	☐ Acoustical	☒ Comm	☒ Task
☒ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☒ Control
☒ PPE	☐ Blast Resist.		☐ Other	☐ Dimmer
☒ Soap Dispenser	☐ Explosive			☒ In-use
☒ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other			☐ Diurnal
				☒ Other
				See Note Q2
				Min. FC 200
				Fixture Typ. Gasketed

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.
- E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- E2. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.
- H1. When no animals present may reduce to rate required to maintain appropriate pressure relationships and temperatures.

SPECIAL EQUIPMENT NOTES

- Q1. Specialty downdraft/backdraft equipment, animal hoists and similar may be required based on species.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Necropsy/Pathology

Space Type: _____ Laboratory

BS/ABS LEVEL: _____ BSL Per Risk Analysis

Q2. Surgical light shall provide minimum 300fc at operating table.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Necropsy/Pathology

Space Type: _____ Laboratory

BS/ABS LEVEL: _____ BSL Per Risk Analysis

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date:

Revision: B

Revision Date: 12/8/2022

Processes: Animal Holding, Quarantine (Building-Based), Insect Holding

Space Type: Animal Facility

BS/ABS LEVEL:	BSL Per Risk Analysis
---------------	-----------------------

ARCHITECTURAL		PLUMBING		MECHANICAL	
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT	
☒ Epoxy	☒ Gyb. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd	
☒ Sheet Flooring	☒ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel	
☐ VT	☐ ACT	☒ FRP	☐ Cup Sink	☐ Canopy	
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☒ BSC	
☐ Other	☐ Other		☒ Floor Drain	☒ Other	See Note Q2
	Height		☐ Scullery Sink		
			☐ Glasswash		
			☐ Other		
WALL PROT.		WALL BASE		HVAC	
☐ Corner Guard	☒ Epoxy PNT	☒ Integral		☒ Pressure Indicator	
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove		☒ Pos. Press.	Insect/Quarantine
☐ Wall Guard	☒ Other	☐ Straight		☒ Neg. Press.	Animal Holding
☒ Wall Guard SS	Insect Room finishes shall all be white or light colored	☐ Other		☐ Neutral Press.	
☐ Other				☒ 100% Exhaust	
				Temp (Heat)	Per Species
				Temp (Cool)	Per Species
				RH Limit	Per Species
				ACH (occup)	15 (Minimum)
				ACH (unocc.)	See Note H1
DOOR		WINDOWS		ELECTRICAL POWER	
☒ HM	☐ 36 in.	☒ Exterior		☒ Wall	At 48" GFI
☒ FRP	☒ 42 in.	☐ Interior		☐ Floor	
☐ Wood	☐ 48 in.	☐ Storefront		☐ Bench	
☐ Glass	☐ 36 / 12 in.	☐ Skylight		☐ Ceiling	
☐ Other	☐ Other	Operability	See Note A2	☐ Island	
				☐ Ded. Ckt.	
				☐ 230 V	
				☐ 460 V	
				☐ EM PWR	
				☐ UPS	
				☐ Other	
AUDIO VISUAL		HAZMAT		LIGHTING	
☐ Wht. Brd.	☐ Mobile	☐ Chemical		☐ Occ. Sensor	
☐ Smt. Brd.	☐ Fixed	☐ Flammable		☐ Task	
☐ Monitor	☐ Wall	☐ Corrosive		☒ Control	
☒ Room Darkening	☐ Tall	☐ Toxic		☒ Dimmer	
☐ Projection	☐ Display	☐ Biological		☐ In-use	
☐ Speakers	☐ Shelves	☐ Neutralized		☐ Amber Light	
☐ Intercom	☐ Lockers	☐ Radiation		☒ Diurnal	
☐ Listening Assist	☐ Other	☐ Other		☐ Other	
☐ Other	Casework Mat.			Min. FC	Per Species
	Counter Mat.			Fixture Typ.	Gasketed
	Shelving Mat.				
	Stainless Steel				
	Stainless Steel				
	Select One				
SAFETY EQUIP		ACOUSTICS			
☐ Comb. SS/EW	☐ EMI Shielding	☒ STC/NRC	50		
☒ Eyewash	☒ Vibration Control	☐ Acoustical			
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation			
☒ PPE	☐ Blast Resist.				
☒ Soap Dispenser	☐ Explosive				
☐ Robe Hooks	☐ Water Reactive				
☐ Fire Ext.	☐ Other				

NOTES

- | | |
|-----|--|
| A1. | Provide minimum of 8'0" ceiling/ 9-0" is preferred. |
| A2. | Window operability and screening requirements to align with BMBL requirements based on Risk Analysis. |
| H1. | When no animals present may reduce to rate required to maintain appropriate pressure relationships and temperatures. |

SPECIAL EQUIPMENT NOTES

- Q2. Animal caging, aquaria and pens are based on AALAC species requirements. Animal caging is considered life-sustaining equipment and shall be connected to emergency power as follows:



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggestDisclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggesttested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Animal Holding, Quarantine (Building-Based), Insect Holding

Space Type: Animal Facility

BS/ABS LEVEL: BSL Per Risk Analysis

necessary.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Animal Holding, Quarantine (Building-Based), Insect Holding

Space Type: Animal Facility

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Insect/Plant Identification, Technical Reference Library, Food Prep, Blood Processing, Treatment Room

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☒ Sheet Flooring	☒ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☒ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☐ Floor Drain	☒ Other <u>See Q3</u>
	Height <u>See Note A1</u>		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☐ Other			☐ NG	☐ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H2</u>
			☐ H ₂	ACH (unocc.) <u>See Note H2</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☒ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☒ Wht. Brd.	☒ Mobile	☒ Chemical <u>minute qty</u>	☐ Critical	☒ Wall
☐ Smt. Brd.	☒ Fixed	☐ Flammable	☐ CCTV	☐ Floor
☐ Monitor	☒ Wall	☐ Corrosive	☒ Access Control	☒ Bench <u>See Note E2</u>
☐ Room Darkening	☒ Tall	☐ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☒ Display	☐ Biological	☐ Intrusion Detect.	☒ Island
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Card Reader	☒ Ded. Ckt. <u>TBC</u>
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other	☐ Other	☐ Keyed Entry	☐ 460 V
☐ Other	Casework Mat. <u>Wood</u>		☐ Other	☐ EM PWR
	Counter Mat. <u>Phenolic</u>			☒ UPS <u>See Note E1</u>
	Shelving Mat. <u>Match Casework</u>			☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☐ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☒ Eyewash	☐ Vibration Control	☐ Acoustical	☒ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☒ Wi-Fi	☒ Control
☐ PPE	☐ Blast Resist.		☐ Other	☒ Dimmer
☒ Soap Dispenser	☐ Explosive			☒ In-use <u>See Note Q3</u>
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☐ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Min. FC <u>50, 100@Bench</u>
				Fixture Typ. <u>Std.</u>

NOTES

A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.

A2. Window operability and screening requirements to align with BMBL requirements based on Risk Analysis.

E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.

H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Insect/Plant Identification, Technical Reference Library, Food Prep, Blood Processing, Treatment Room

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis

Q3. Slotted rear-wall exhaust diffuser may be used where minute quantities of chemicals are used for slide preparation and similar activities that require personnel protection.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Insect/Plant Identification, Technical Reference Library, Food Prep, Blood Processing, Treatment Room

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Plant Inspection Station

Space Type: _____ Scientific Workroom

BS/ABS LEVEL: _____ BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☐ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☐ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☐ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☒ Sealed Concrete	☒ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☒ Floor Drain	☐ Other
	Height	See Note A1	☒ Scullery Sink	
			☐ Glasswash	
			☒ Other	
			In-sink erator	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☐ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☐ Other			☐ NG	☐ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) 70 F
			☐ CO ₂	Temp (Cool) 76 F
			☐ O ₂	RH Limit 30%-50%
			☐ N ₂	ACH (occup) See Note H2
			☐ H ₂	ACH (unocc.) See Note H2
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☒ HLW	
			☐ Other	
DOOR	DOOR SIZE	WINDOWS	COMM	ELECTRICAL
☒ HM	☒ 36 in.	☒ Exterior	SECURITY	POWER
☐ FRP	☒ 42 in.	☐ Interior	☐ Critical	☒ Wall
☒ Wood	☐ 48 in.	☐ Storefront	☐ CCTV	☐ Floor
☐ Glass	☐ 36 / 12 in.	☐ Skylight	☒ Access Control	☒ Bench
☐ Other	☐ Other	Operability See Note A2	☐ SCIF	☐ Ceiling
			☐ Intrusion Detect.	☒ Island
			☒ Card Reader	☒ Ded. Ckt.
			☒ Biometric Reader	☐ 230 V
			☐ Keyed Entry	☐ 460 V
			☐ Other	☐ EM PWR
				☒ UPS
				Other
AUDIO VISUAL	CASEWORK	HAZMAT	DATA	LIGHTING
☒ Wht. Brd.	☒ Mobile	☐ Chemical	☒ Data	☒ Occ. Sensor
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ Comm	☒ Task
☐ Monitor	☐ Wall	☐ Corrosive	☒ Wi-Fi	☒ Control
☐ Room Darkening	☐ Tall	☐ Toxic	☐ Other	☒ Dimmer
☐ Projection	☐ Display	☐ Biological		☐ In-use
☐ Speakers	☒ Shelves	☐ Neutralized		☐ Amber Light
☐ Intercom	☐ Lockers	☐ Radiation		☐ Diurnal
☐ Listening Assist	☐ Other	☐ Other		☒ Other
☐ Other	Casework Mat. Stainless Steel			Bug/UV
	Counter Mat. Stainless Steel			Min. FC 50, 100@Bench
	Shelving Mat. Metal Wire			Fixture Typ. Std
SAFETY EQUIP	SPECIAL	ACOUSTICS		
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC		
☐ Eyewash	☐ Vibration Control	☐ Acoustical		
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation		
☐ PPE	☐ Blast Resist.			
☒ Soap Dispenser	☐ Explosive			
☐ Robe Hooks	☐ Water Reactive			
☒ Fire Ext.	☐ Other			

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'0" is preferred.
- A2. Window operability and screening requirements to align with BMBL requirements based on Risk Analysis.
- E1. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.
- E2. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

SPECIAL EQUIPMENT NOTES

- Q1. Card reader inside the room for exit only to prevent brokers/importers from accessing the rest of the facility



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Plant Inspection Station

Space Type: _____ Scientific Workroom

BS/ABS LEVEL: _____ BSL Per Risk Analysis



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes:	Plant Inspection Station
Space Type:	Scientific Workroom
BS/ABS LEVEL:	BSL Per Risk Analysis



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Shipping & Receiving Areas, Loading Docks

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☐ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☐ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☐ VT	☐ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☒ Sealed Concrete	☒ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☐ Floor Drain	☐ Other
	Height		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☒ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☒ Wall Guard	☐ Other	☐ Straight	☐ CA	☐ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☒ Other			☐ NG	☐ 100% Exhaust
Door Guard			☐ Liq. N ₂	Temp (Heat) 70 F
			☐ CO ₂	Temp (Cool) 76 F
			☐ O ₂	RH Limit 30%-50%
			☐ N ₂	ACH (occup) See Note H2
			☐ H ₂	ACH (unocc.) See Note H2
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☒ Wht. Brd.	☒ Mobile	☐ Chemical	☐ Critical	☒ Wall
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ CCTV	☐ Floor
☐ Monitor	☐ Wall	☐ Corrosive	☒ Access Control	☐ Bench
☐ Room Darkening	☐ Tall	☐ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☐ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☒ Shelves	☐ Neutralized	☒ Card Reader	☐ Ded. Ckt.
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other	☐ Other	☐ Keyed Entry	☐ 460 V
☐ Other	Casework Mat. Select One		☐ Other	☐ EM PWR
	Counter Mat. Select One			☐ UPS
	Shelving Mat. Metal Wire			☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☒ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☒ Control
☐ PPE	☐ Blast Resist.		☐ Other	☒ Dimmer
☒ Soap Dispenser	☐ Explosive			☐ In-use
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Bug/UV
				Min. FC 30
				Fixture Typ. Std.

NOTES

H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Shipping & Receiving Areas, Loading Docks

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Shipping & Receiving Areas, Loading Docks

Space Type: Scientific Workroom

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Change Rooms/Entry Sequence

Space Type: Laboratory Support

BSL/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☒ Sheet Flooring	☒ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☒ VT	☐ ACT	☒ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☒ Other <u>Damp-rated</u> Height <u>See Note A1</u>		☒ Floor Drain	☒ Other <u>See Note H3</u>
			☐ Scullery Sink	
			☐ Glasswash	
			☒ Other <u>Shower/WC</u>	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☐ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☒ Neutral Press.
☐ Other			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H3</u>
			☐ H ₂	ACH (unocc.) <u>See Note H3</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☒ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☐ Wht. Brd.	☐ Mobile	☐ Chemical	☐ Critical	☒ Wall
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ CCTV	☐ Floor
☐ Monitor	☐ Wall	☐ Corrosive	☐ Access Control	☐ Bench
☐ Room Darkening	☐ Tall	☐ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☐ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Card Reader	☐ Ded. Ckt.
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other	☐ Other	☐ Keyed Entry	☐ 460 V
☐ Other	Casework Mat. <u>Select One</u>		☐ Other	☐ EM PWR
	Counter Mat. <u>Select One</u>			☐ UPS
	Shelving Mat. <u>Select One</u>			☒ Other <u>GFCI</u>
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☐ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☐ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☐ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☒ Control
☒ PPE	☐ Blast Resist.		☐ Other	☐ Dimmer
☒ Soap Dispenser	☐ Explosive			☐ In-use
☒ Robe Hooks	☐ Water Reactive			☐ Amber Light
☐ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Min. FC <u>20</u>
				Fixture Typ. <u>Wet Listed</u>

NOTES

A1. Provide minimum of 8'0" ceiling/ 9-0" is preferred.

H3. Exhaust space such that clean side is positively pressurized relative to dirty side. Provide Toilet and Shower exhaust as indicated in ASHRAE 62.1.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Change Rooms/Entry Sequence

Space Type: Laboratory Support

BS/ABS LEVEL: BSL Per Risk Analysis



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Chemical Storage, Hazardous Material Storage

Space Type: Laboratory Support

BS/ABS LEVEL: Not Applicable

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☒ Sheet Flooring	☐ FRP	☒ CMU	☐ Hand Wash	☐ Snorkel
☒ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☐ Floor Drain	☒ Other <u>Vented Cabinets</u>
	Height <u>See Note A1</u>		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☐ Other			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H4</u>
			☐ H ₂	ACH (unocc.) <u>See Note H4</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☐ Wht. Brd.	☐ Mobile	☒ Chemical	☐ Critical	☒ Wall
☐ Smt. Brd.	☐ Fixed	☒ Flammable <u>non-vented</u>	☐ CCTV	☐ Floor
☐ Monitor	☐ Wall	☒ Corrosive <u>vented</u>	☒ Access Control	☐ Bench
☐ Room Darkening	☐ Tall	☒ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☐ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Card Reader	☐ Ded. Ckt.
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other	☐ Other	☒ Keyed Entry	☐ 460 V
☐ Other	Casework Mat. <u>Select One</u>		☐ Other	☐ EM PWR
	Counter Mat. <u>Select One</u>			☐ UPS
	Shelving Mat. <u>Select One</u>			☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☐ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☒ Control
☐ PPE	☐ Blast Resist.		☐ Other	☐ Dimmer
☐ Soap Dispenser	☐ Explosive			☐ In-use
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Min. FC <u>10</u>
				Fixture Typ. <u>Gasketed</u>

NOTES

A1. Provide minimum of 8'0" ceiling/ 9'0" is preferred.

H4. Provide ventilation per building code when exempt amounts of chemicals are exceeded.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggestDisclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggesttested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Chemical Storage, Hazardous Material Storage

Space Type: _____ Laboratory Support

BS/ABS LEVEL: _____ Not Applicable



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Cold Storage for Non-Registered Samples, Equipment Room

Space Type: Laboratory Support

BS/ABS LEVEL: Not Applicable

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☐ Sheet Flooring	☐ FRP	☒ CMU	☐ Hand Wash	☐ Snorkel
☒ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☐ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☐ Floor Drain	☒ Other
	Height <u>See Note A1</u>		☐ Scullery Sink	<u>See Note Q4</u>
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☐ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☐ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☐ Neutral Press.
☐ Other			☐ NG	☒ 100% Exhaust
			☒ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☒ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H4</u>
			☐ H ₂	ACH (unocc.) <u>See Note H4</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM	ELECTRICAL
☒ Wht. Brd.	☐ Mobile	☐ Chemical	SECURITY	POWER
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ Critical	☒ Wall
☐ Monitor	☐ Wall	☐ Corrosive	☐ CCTV	☐ Floor
☐ Room Darkening	☐ Tall	☐ Toxic	☒ Access Control	☐ Bench
☐ Projection	☐ Display	☐ Biological	☐ SCIF	☐ Ceiling
☐ Speakers	☐ Shelves	☐ Neutralized	☐ Intrusion Detect.	☐ Island
☐ Intercom	☐ Lockers	☐ Radiation	☐ Card Reader	☒ Ded. Ckt.
☐ Listening Assist	☐ Other	☐ Other	☒ Biometric Reader	☒ 230 V
☐ Other	Casework Mat. <u>Select One</u>		☐ Keyed Entry	☒ 460 V
	Counter Mat. <u>Select One</u>		☐ Other	☒ EM PWR
	Shelving Mat. <u>Select One</u>			☐ UPS
				☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☐ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☐ Wi-Fi	☒ Control
☐ PPE	☐ Blast Resist.		☐ Other	☐ Dimmer
☐ Soap Dispenser	☐ Explosive			☐ In-use
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Min. FC <u>10</u>
				Fixture Typ. <u>Gasketed</u>

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.
- E1. Freezers or Refrigerators may require 208V or 240V. Coordinate during design.
- E2. Freezers/Refrigerators/Compressors shall be on Emergency Power.
- H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

SPECIAL EQUIPMENT NOTES

- Q4. Laboratory support equipment such as LN2 freezers or CO2 incubators may require service connections. Coordinate all laboratory equipment locations and services during design.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Cold Storage for Non-Registered Samples, Equipment Room

Space Type: Laboratory Support

BS/ABS LEVEL: Not Applicable

Q6. Where environmental control rooms are being considered in lieu of free-standing cold storage equipment, review with Facilities and EHS to determine long-term applicability and maintenance concerns.



Animal and Plant Health Inspection Service

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Sterilization and Glass Washing

Space Type: Laboratory Support

BS/ABS LEVEL: Not Applicable

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy ☐ Sheet Flooring ☐ VT ☐ Sealed Concrete ☒ Other <u>Slip-resitant</u>	☐ Gyp. Brd. ☒ FRP ☒ ACT <u>Vinyl Faced</u> ☒ Open ☐ Other <u>Damp Rated</u> Height <u>See Note A1</u>	☒ Gyp. Brd. ☒ CMU ☐ FRP ☐ Other _____	☐ Lab Sink ☒ Hand Wash ☐ Cup Sink ☐ Deep Sink ☒ Floor Drain ☒ Scullery Sink ☒ Glasswash ☐ Other _____	☐ Fume Hd _____ ☐ Snorkel _____ ☒ Canopy <u>See Note H5</u> ☐ BSC _____ ☐ Other _____
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☒ Corner Guard ☒ Corner Guard SS ☒ Wall Guard ☒ Wall Guard SS ☐ Other _____	☒ Epoxy PNT ☐ Acrylic PNT ☐ Other _____	☒ Integral ☒ Cove ☐ Straight ☐ Other _____	☒ DCW ☒ DHW ☒ CA <u>See Note H5</u> ☒ VAC <u>See Note H5</u> ☐ NG ☐ Liq. N ₂ ☐ CO ₂ ☐ O ₂ ☐ N ₂ ☐ H ₂ ☐ CHW ☒ PW <u>See Note H5</u> ☐ DI ☐ San ☐ AW ☐ HLW ☒ Other <u>Steam</u>	☐ Pressure Indicator ☐ Pos. Press. ☐ Neg. Press. ☒ Neutral Press. ☐ 100% Exhaust Temp (Heat) <u>70 F</u> Temp (Cool) <u>76 F</u> RH Limit <u>30%-50%</u> ACH (occup) <u>See Note H2</u> ACH (unocc.) <u>See Note H2</u>
DOOR	DOOR SIZE	WINDOWS	HAZMAT	ELECTRICAL POWER
☒ HM ☐ FRP ☐ Wood ☐ Glass ☐ Other _____	☐ 36 in. ☒ 42 in. ☐ 48 in. ☐ 36 / 12 in. ☐ Other _____	☐ Exterior ☐ Interior ☐ Storefront ☐ Skylight Operability _____	☐ Chemical ☐ Flammable ☐ Corrosive ☐ Toxic ☐ Biological ☐ Neutralized ☐ Radiation ☐ Other _____	☒ Wall ☐ Floor ☒ Bench ☐ Ceiling ☐ Island ☒ Ded. Ckt. ☒ 230 V <u>See Note H5</u> ☒ 460 V ☐ EM PWR ☐ UPS ☐ Other _____
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	LIGHTING
☒ Wht. Brd. ☐ Smt. Brd. ☐ Monitor ☐ Room Darkening ☐ Projection ☐ Speakers ☐ Intercom ☐ Listening Assist ☐ Other _____	☒ Mobile ☐ Fixed ☐ Wall ☐ Tall ☐ Display ☒ Shelves ☐ Lockers ☐ Other Casework Mat. <u>Stainless Steel</u> Counter Mat. <u>Stainless Steel</u> Shelving Mat. <u>Metal Wire</u>	☐ Chemical ☐ Flammable ☐ Corrosive ☐ Toxic ☐ Biological ☐ Neutralized ☐ Radiation ☐ Other _____	☐ Critical ☐ CCTV ☒ Access Control ☐ SCIF ☐ Intrusion Detect. ☐ Card Reader ☐ Biometric Reader ☒ Keyed Entry ☐ Other _____	☒ Occ. Sensor ☒ Task ☒ Control ☒ Dimmer ☐ In-use ☐ Amber Light ☐ Diurnal ☐ Other _____
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	
☒ Comb. SS/EW ☐ Eyewash ☐ Goggle Sanitation ☐ PPE ☒ Soap Dispenser ☐ Robe Hooks ☐ Fire Ext.	☐ EMI Shielding ☐ Vibration Control ☐ Light tight ☐ Blast Resist. ☐ Explosive ☐ Water Reactive ☐ Other _____	☐ STC/NRC ☐ Acoustical ☐ Sound Insulation	☒ Data ☒ Comm ☐ Wi-Fi ☐ Other _____	Min. FC <u>50, 100@Bench</u> Fixture Typ. <u>Gasketed</u>

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9-0" is preferred.
H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.
H5. Provide ducted exhaust hoods and services per Sterilizer Mfr. Requirements

SPECIAL EQUIPMENT NOTES

- Q5. Sterilization and glasswash equipment shall be provided in location appropriate for biosafety level labs it supports. Refer to BMBL for specific requirements.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Sterilization and Glass Washing

Space Type: _____ Laboratory Support

BS/ABS LEVEL: _____ Not Applicable



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Incinerator

Space Type: Laboratory Support

BS/ABS LEVEL: Not Applicable

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☐ Epoxy	☐ Gyp. Brd.	☐ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☐ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☐ VT	☐ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☒ Sealed Concrete	☒ Open	☐ Other	☐ Deep Sink	☐ BSC
☐ Other	☐ Other		☒ Floor Drain	☒ Other <u>Stack</u>
	Height <u>See Note A3</u>		☐ Scullery Sink	
			☐ Glasswash	
			☐ Other	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☒ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other	☐ Straight	☐ CA	☐ Neg. Press.
☐ Wall Guard SS		☐ Other	☐ VAC	☒ Neutral Press.
☐ Other			☐ NG	☐ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H2</u>
			☐ H ₂	ACH (unocc.) <u>See Note H2</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☐ HLW	
			☐ Other	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☒ Wht. Brd.	☐ Mobile	☐ Chemical	☐ Critical	☒ Wall
☐ Smt. Brd.	☐ Fixed	☐ Flammable	☐ CCTV	☐ Floor
☐ Monitor	☐ Wall	☐ Corrosive	☒ Access Control	☒ Bench
☐ Room Darkening	☐ Tall	☐ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☐ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☒ Shelves	☐ Neutralized	☐ Card Reader	☒ Ded. Ckt.
☐ Intercom	☒ Lockers <u>PPE</u>	☐ Radiation	☐ Biometric Reader	☐ 230 V
☐ Listening Assist	☐ Other	☐ Other	☒ Keyed Entry	☒ 460 V
☐ Other	Casework Mat. <u>Select One</u>		☐ Other	☐ EM PWR
	Counter Mat. <u>Select One</u>			☐ UPS
	Shelving Mat. <u>Metal Wire</u>			☐ Other
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC	☒ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☒ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☒ Wi-Fi	☒ Control
☒ PPE	☒ Blast Resist.		☐ Other	☐ Dimmer
☒ Soap Dispenser	☐ Explosive			☒ In-use
☒ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other			☐ Diurnal
				☐ Other
				Min. FC <u>50, 100@Bench</u>
				Fixture Typ. <u>Gasketed</u>

NOTES

A3. Ceiling Ht. shall be based on Incinerator Mfr. Requirements.

H2. Provide ventilation to meet requirements of building code. Evaluate if space use requires more strict ventilation/100% exhaust or pressurization.

SPECIAL EQUIPMENT NOTES

Q1. Specialty equipment, scales, animal hoists and similar may be required based on species.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: _____ Incinerator

Space Type: _____ Laboratory Support

BS/ABS LEVEL: _____ Not Applicable



Animal and Plant Health Inspection Service

FACILITY DESIGN CRITERIA

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: M-44 Cyanide Capsule Production, Fatty Acid

Space Type: Production

BS/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☒ Lab Sink	☒ Fume Hd <u>4'-0" to 6'-0"</u>
☒ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☐ Snorkel
☒ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☐ Sealed Concrete	☒ Open	☐ Other _____	☐ Deep Sink	☐ BSC
☐ Other _____	☐ Other _____ Height <u>See Note A1</u>		☐ Floor Drain	☒ Other <u>See Note Q3 for Fatty Acid</u>
			☐ Scullery Sink	
			☐ Glasswash	
			☐ Other _____	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☒ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other _____	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other _____	☐ VAC	☐ Neutral Press.
☐ Other _____			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H4</u>
			☐ H ₂	ACH (unocc.) <u>See Note H4</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☒ HLW	
			☐ Other _____	
DOOR	DOOR SIZE	WINDOWS	COMM	ELECTRICAL
☒ HM	☐ 36 in. _____	☒ Exterior	SECURITY	POWER
☐ FRP	☒ 42 in. _____	☒ Interior	☐ Critical	☒ Wall
☒ Wood	☐ 48 in. _____	☐ Storefront	☒ CCTV	☐ Floor
☐ Glass	☐ 36 / 12 in. _____	☐ Skylight	☐ Access Control	☒ Bench <u>See Note E2</u>
☐ Other _____	☐ Other _____	Operability <u>See Note A2</u>	☐ SCIF	☐ Ceiling
			☐ Intrusion Detect.	☒ Island
			☒ Card Reader	☒ Ded. Ckt.
			☒ Biometric Reader	☐ 230 V
			☒ Keyed Entry	☐ 460 V
			☒ Other <u>See Note E7</u>	☐ EM PWR
				☒ UPS <u>See Note E1</u>
				☐ Other _____
AUDIO VISUAL	CASEWORK	HAZMAT	DATA	LIGHTING
☒ Wht. Brd.	☒ Mobile	☒ Chemical	☒ Data	☒ Occ. Sensor
☐ Smt. Brd.	☒ Fixed	☒ Flammable	☐ Comm	☒ Task
☐ Monitor	☒ Wall	☒ Corrosive	☐ Wi-Fi	☒ Control
☐ Room Darkening	☐ Tall	☒ Toxic	☐ Other <u>See Note E3</u>	☒ Dimmer
☐ Projection	☐ Display	☐ Biological		☒ In-use <u>Cyanide</u>
☐ Speakers	☐ Shelves	☐ Neutralized		☐ Amber Light
☐ Intercom	☐ Lockers	☐ Radiation		☐ Diurnal
☐ Listening Assist	☐ Other _____	☐ Other _____		☐ Other _____
☐ Other _____	Casework Mat. <u>Steel</u>			Min. FC <u>50, 100@Bench</u>
	Counter Mat. <u>Epoxy</u>			Fixture Typ. <u>Gasketed</u>
	Shelving Mat. <u>Select One</u>			
SAFETY EQUIP	SPECIAL	ACOUSTICS		
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC _____		
☐ Eyewash	☐ Vibration Control	☐ Acoustical		
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation		
☒ PPE	☐ Blast Resist.			
☒ Soap Dispenser	☐ Explosive			
☐ Robe Hooks	☐ Water Reactive			
☒ Fire Ext.	☐ Other _____			

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'-0" is preferred.
- A2. Window operability and screening requirements based on Risk Analysis.
- E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- E2. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.
- E3. All security measures IAW Drug Enforcement Agency/Homeland Security
- H4. Provide ventilation per building code when exempt amounts of chemicals are exceeded.



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

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Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: M-44 Cyanide Capsule Production, Fatty Acid

Space Type: Production

BS/ABS LEVEL: BSL Per Risk Analysis

SPECIAL EQUIPMENT NOTES

Q3. Slotted rear-wall exhaust diffuser may be used where minute quantities of chemicals are used for slide preparation and similar activities that require personnel protection.



Animal and Plant Health Inspection Service

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ROOM DATA SHEET

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Gas Cartridge Production, FDA Drug, Mixing, Bait Mixing

Space Type: Production

BS/ABS LEVEL: BSL Per Risk Analysis

ARCHITECTURAL			PLUMBING	MECHANICAL
FLOORING	CEILING	PARTITIONS	FIXTURES	DUCTED EQUIPMENT
☒ Epoxy	☒ Gyp. Brd.	☒ Gyp. Brd.	☐ Lab Sink	☐ Fume Hd
☒ Sheet Flooring	☐ FRP	☒ CMU	☒ Hand Wash	☒ Snorkel <u>Gas-Cartridge</u>
☒ VT	☒ ACT	☐ FRP	☐ Cup Sink	☐ Canopy
☒ Sealed Concrete	☒ Open	☐ Other _____	☐ Deep Sink	☐ BSC
☐ Other _____	☐ Other _____ Height <u>See Note A1</u>		☐ Floor Drain	☒ Other <u>See Note Q3</u>
			☐ Scullery Sink	
			☐ Glasswash	
			☐ Other _____	
WALL PROT.	WALL FINISH	WALL BASE	SERVICES	HVAC
☐ Corner Guard	☒ Epoxy PNT	☒ Integral	☒ DCW	☐ Pressure Indicator
☐ Corner Guard SS	☐ Acrylic PNT	☒ Cove	☒ DHW	☐ Pos. Press.
☐ Wall Guard	☐ Other _____	☐ Straight	☐ CA	☒ Neg. Press.
☐ Wall Guard SS		☐ Other _____	☐ VAC	☐ Neutral Press.
☐ Other _____			☐ NG	☒ 100% Exhaust
			☐ Liq. N ₂	Temp (Heat) <u>70 F</u>
			☐ CO ₂	Temp (Cool) <u>76 F</u>
			☐ O ₂	RH Limit <u>30%-50%</u>
			☐ N ₂	ACH (occup) <u>See Note H4</u>
			☐ H ₂	ACH (unocc.) <u>See Note H4</u>
			☐ CHW	
			☐ PW	
			☐ DI	
			☐ San	
			☐ AW	
			☒ HLW	
			☐ Other _____	
AUDIO VISUAL	CASEWORK	HAZMAT	COMM SECURITY	ELECTRICAL POWER
☒ Wht. Brd.	☒ Mobile	☐ Chemical	☐ Critical	☒ Wall
☐ Smt. Brd.	☒ Fixed	☐ Flammable	☒ CCTV	☐ Floor
☐ Monitor	☒ Wall	☐ Corrosive	☒ Access Control	☒ Bench
☐ Room Darkening	☐ Tall	☒ Toxic	☐ SCIF	☐ Ceiling
☐ Projection	☐ Display	☒ Biological	☐ Intrusion Detect.	☐ Island
☐ Speakers	☐ Shelves	☐ Neutralized	☒ Card Reader	☒ Ded. Ckt. <u>TBC</u>
☐ Intercom	☐ Lockers	☐ Radiation	☐ Biometric Reader	☒ 230 V <u>TBC</u>
☐ Listening Assist	☐ Other _____	☐ Other _____	☒ Keyed Entry	☒ 460 V
☐ Other _____	Casework Mat. <u>Steel</u>		☒ Other <u>See Note E7</u>	☐ EM PWR
	Counter Mat. <u>Epoxy</u>			☒ UPS <u>See Note E1</u>
	Shelving Mat. <u>Select One</u>			☐ Other _____
SAFETY EQUIP	SPECIAL	ACOUSTICS	DATA	LIGHTING
☒ Comb. SS/EW	☐ EMI Shielding	☐ STC/NRC _____	☒ Data	☒ Occ. Sensor
☐ Eyewash	☐ Vibration Control	☐ Acoustical	☒ Comm	☒ Task
☐ Goggle Sanitation	☐ Light tight	☐ Sound Insulation	☒ Wi-Fi	☒ Control
☒ PPE	☐ Blast Resist.		☒ Other <u>See Note E3</u>	☒ Dimmer
☒ Soap Dispenser	☐ Explosive			☐ In-use
☐ Robe Hooks	☐ Water Reactive			☐ Amber Light
☒ Fire Ext.	☐ Other _____			☐ Diurnal
				☐ Other _____
				Min. FC <u>50, 100@Bench</u>
				Fixture Typ. <u>Gasketed</u>

NOTES

- A1. Provide minimum of 8'0" ceiling/ 9'0" is preferred.
- E1. UPS desktop units may be required for computers or specific lab equipment defined during design phase. UPS desktop units provided by Government.
- E2. Provide dual-compartment raceway with metal divider shared with electrical and voice/data at countertops.
- E3. All security measures IAW Drug Enforcement Agency
- H4. Provide ventilation per building code when exempt amounts of chemicals are exceeded.

SPECIAL EQUIPMENT NOTES



Animal and Plant Health Inspection Service

ROOM DATA SHEET

FACILITY DESIGN CRITERIA

Disclaimer: Criteria listed below shall be confirmed by A/E during programming and design. Guidance is provided as suggested starting point and is not definitive.

Issued Date: _____

Revision: B

Revision Date: 12/8/2022

Processes: Gas Cartridge Production, FDA Drug, Mixing, Bait Mixing

Space Type: Production

BS/ABS LEVEL: BSL Per Risk Analysis

Q3. Slotted rear-wall exhaust diffuser may be used where minute quantities of chemicals are used for slide preparation and similar activities that require personnel protection.