VA

U.S. Department of Veterans Affairs
Office of Construction & Facilities Management
Office of Facilities Planning
Facilities Standards Service

Research and Development (R&D)

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designguide

1.0 General

1.1 Foreword

VA Program Offices, project teams, designers and constructors, are obligated to our Nation's Veterans and taxpayers to make the most effective and efficient use of resources, by providing a continuum of safe, secure, high quality, high performance, and high value environments of care and service for Veterans. The VA Office of Construction & Facilities Management (CFM) supports the Department's mission through development and application of standards as a basis for disciplined planning, design, and construction of VA facilities.VA Standards are the culmination of a partnership among the Department of Veterans Affairs (VA), the Veterans Health Administration, Program Officials, Clinicians, Industry, Academic and Research Organizations, Consultants, and the Office of Construction and Facilities Management. Design Guides are developed through integration of VA-specific requirements, Federal law and regulation, benchmarking of industry best practice, evidence-based research and design, and value-based analysis of leading-edge innovation. The result is the establishment of best value standards for optimum functionality, safety, operability, performance, and quality throughout the VA environment of care and service.

Design Guides (PG-18-12) are a critical component of the VA Technical Information Library (TIL) (www.cfm.va.gov/TIL) which provides standards for all VA planning, design, and construction projects. Design Guides focus on selected healthcare departments and services and include an overview narrative of VA-specific planning and design principles and concepts, room templates, equipment lists, and basic technical/engineering requirements. They communicate the basis of design and are required to be utilized by project teams working on new construction and renovations of existing facilities. Design Guides will maximize the effectiveness and efficiency of the planning and design process and ensure a high level of design, while controlling construction, operating, and maintenance costs.

The material contained in Design Guides constitutes a Standard for VA Planning, Design and Construction. For all VA projects, it is required that project teams comply with the following in all phases of project development:

1) All applicable VA Standards published in the VA Technical Information Library (TIL) shall be applied as a basis, foundation, and framework in planning, design, and construction. Any substantial variance from Standards shall be considered only as required to accommodate specific site, functional, and operational conditions. Upon consideration of variance CFM shall be consulted, and each Administration will function as Authority Having Jurisdiction for decision. Each substantial variance shall have a basis rationale and be documented in the project record.

2) Clinicians, providers, primary users, and other stakeholders shall be involved in all phases of project development to best adapt Standards for specific functional,

operational, and site conditions, and to provide optimum service environments for Veterans. This also includes installations and modifications of systems or technology involving safety, security, functionality, or environmental quality. Stakeholder involvement shall be documented in the project record.

Design Guides are not project-specific. It is impossible to foresee all rapidly evolving requirements of healthcare facilities and each site or project will have unique requirements or conditions. Site-specific issues must be addressed within the context of these standards and applied to each individual project. Use of this Guide does not preclude the need for, nor absolve planners, designers, and constructors of their responsibility to provide complete, functional, safe, and secure designs suited to the unique requirements of each project, within budget, and on schedule.

Materials, equipment and systems are shown in an illustrative, performance-based format and are not intended to depict, suggest, or otherwise constitute endorsement of any specific product or manufacturer. Manufacturers should be consulted for actual dimensions, configurations, and utility requirements.

All participants in the project development process must embrace VA Planning, Design and Construction Standards as fundamental in providing optimum environments for Veterans' care and services, in fulfilling VA's mission.

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1.3 Introduction

This Design Guide, along with PG-18-9 Space Planning Criteria, Chapter 278 Research and Development Space Planning Criteria and PG-18-5 Chapter 278 Research and Development Equipment Guide List, establishes the design and construction standards to be used in the planning and design of U.S. Department of Veterans Affairs (VA) Research and Development facilities.

The VA ranks as one of the nation's leaders in health research. The VA Research program consists of four main research services, which work together to address the full spectrum of Veterans' health needs:

- Biomedical Laboratory Research and Development (BLR&D) Service conducts preclinical research to understand life processes from the molecular, genomic, and physiological level in regard to diseases affecting Veterans.
- Clinical Services Research and Development (CSR&D) Service focuses on clinical trials and other research involving human volunteers to study new treatments, compare existing therapies, and improve clinical practice and care.
- Health Services Research and Development (HSR&D) Service supports research to improve the delivery of health care to Veterans.
- Rehabilitation Research and Development (RR&D) Service conducts research to create innovations that restore the function of Veterans who have become disabled due to injury or disease.

Veterinary Medical Units (VMUs), when provided, are available to serve all of the VA Research services. Animal models are used to enhance the research of the four services by expanding the VA’s scientific grasp on living systems.

This Design Guide is a tool to assist planning, design, and construction staff and research staff better understand the planning and design of VA Research and Development (R&D) facilities. It provides an overview of the planning and design concepts for a VA Research and Development facility. Guidance herein may be applied to the departmental level planning and design and/or specific room layouts.

Room Templates for various rooms/spaces within the Research and Development Service are included to illustrate a best practice for room arrangement/layout, furniture, equipment, and staff space needs. The room templates are intended as a generic graphic representation to illustrate room functionality and workflow.

In addition to the general guidance included herein, equipment manufacturers may be consulted for specific minimum dimensions, utilities, power, structural requirements, and other requirements as they relate to specified equipment. Designers and engineers must confirm and verify actual dimensions, weight, and utility requirements of equipment with manufacturers. Refer to VA PG-18-3, Topic 1 for additional direction regarding codes and standards VA has adopted.

1.4 Codes & Standards

The project architects and engineers must be familiar with the most current editions of the applicable VA, healthcare industry, and research facility codes and standards. Codes and standards shown in this document must be adhered to. VA Planning, Design, and Construction Standards can be accessed at the Office of Construction & Facilities Management's Technical Information Library (TIL) (https://www.cfm.va.gov/TIL).

As an agency of the federal government, VA functions as the Authority Having Jurisdiction (AHJ) for all VA facilities and projects on VA property, and has the responsibility to guard public health and safety through enforcement of its own adopted codes and standards. For leased facilities, the AHJ is the local authority. Refer to the current versions of national, regional, and local codes and standards in addition to the VA specific standards and directives when designing facilities for VA Research Services.

1.4.1 VA Technical Information

- H-18-8 Seismic Design Handbook
- PG-18-1 Master Construction Specifications
- PG-18-3 Design and Construction Procedures (refer to Topic 1 for the list of Codes, Standards, and Executive Orders)
- PG-18-4 Standard Details
- PG-18-5 Equipment Guide List
- PG-18-9 Space Planning Criteria
- PG-18-10 Design Manuals and technical criteria pertaining to:
  - Architectural
  - Lighting
  - Electrical
  - Heating, Ventilation, and Air Conditioning (HVAC)
  - Structural
  - Fire Protection
  - Physical Security and Resiliency
  - Plumbing
  - Telecommunications
  - Interior Design
  - Material and Solid Waste Management, Linen and Trash Chutes
  - Sustainability
  - Signage and Wayfinding
  - Elevators
- PG-18-13 Barrier-Free Design Standard
- PG-18-14 Room Finishes, Door, and Hardware Schedule

1.4.2 VA / VHA Directives

- VA Directive 0055, VA Energy and Water Management Program
- VA Directive 0730, Security and Law Enforcement
- VHA Directive 1058, The Office of Research Oversight
  - VHA Directive 1058.01, Research and Compliance Reporting Requirements
- VHA Directive 1061, Prevention of Healthcare-Associated Legionella
- VHA Directive 1200, Research and Development Program
  - VHA Directive 1200.01, Research and Development Committee
  - VHA Directive 1200.02, Research Business Operations
  - VHA Directive 1200.05, Requirements for the Protection of Human Subjects in Research
  - VHA Handbook 1200.07, Use of Animals in Research
  - VHA Directive 1200.08, Safety of Personnel and Security of Laboratories involved in VA Research
- VHA Directive 1611, Safe Patient Handling and Mobility Program
- VA Directive 7512, Seismic Safety of VA Buildings
- VA Directive 7531, Acquisition of Artwork, Decorative Furnishings, and Decorative Items

1.4.3 National Industry Codes/Standards

- AAALAC – Guide for the Care and Use of Laboratory Animals
- ASHRAE Laboratory Design Guide
- ANSI/AIHA Z9.5 -2012 Laboratory Ventilation or approved latest edition
- ANSI Z358.01 Emergency Eyewash and Shower Standard
- CDC – Biosafety in Microbiological and Biomedical Laboratories 6th Edition
- Code of Federal Regulations (CFR)
- International Code Council (ICC) codes and standards
- National Fire Protection Association (NFPA) National Fire Codes (NFC) (for fire protection/life safety issues, the CFM Fire Protection Engineer is the AHJ)
- NIH Design Requirements Manual (this manual is only to be referenced if an issue is not addressed specifically in this Design Guide)

1.5 Definitions

Accessible: A site, building, facility, or portion thereof that complies with provisions outlined in the Architectural Barriers Act of 1968 (ABA).

Adaptability: The ability to change the function of a space with the replacement of furniture and equipment.

Alterations: Improvements that consist of any upgrade or change to an existing space or site to allow its use for a different purpose or function. Some construction is usually required.

Architectural Barriers Act (ABA): A set of standards developed to ensure that all buildings financed with federal funds are designed and constructed to be fully accessible to everyone. This law requires all construction, renovation, or leasing of sites, facilities, buildings, and other elements financed with federal funds to comply with the Architectural Barriers Act Accessibility Standards (ABAAS). The ABAAS replaces the Uniform Federal Accessibility Standards (UFAS).

Authority Having Jurisdiction (AHJ): An organization, office, or individual responsible for enforcing the requirements of a code or standard.

Biomedical Research and Development: Preclinical research to understand life processes from the molecular, genomic, and physiological levels for the purpose of advancing science and the understanding of how diseases affect Veterans.

Biosafety Levels: Biosafety levels are defined in the Centers for Disease Control / NIH publication, Biosafety in Microbiological and Biomedical Laboratories. Specific requirements are for Biosafety Level 1, 2, and 3 laboratories. The Biosafety Level (BSL) required depends on the degree of risk posed by the agent(s) to be studied.

Biosafety Level 1: Practices, safety equipment, and facility design and construction are for work with strains of viable microorganisms not known to cause disease in healthy adults.

Biosafety Level 2: Practices, safety equipment, and facility design and construction are for work with a broad spectrum of indigenous moderate risk agents that are present in the community and associated with human disease of varying severity.

Biosafety Level 3 Suite: Practices, safety equipment, and facility design and construction are for work with indigenous and exotic agents with a potential for respiratory transmission and which may cause serious and potentially lethal infection. At Biosafety Level 3, more emphasis is placed on primary and secondary containment to protect personnel, the community, and the environment from exposure to potentially infectious aerosols.

Biosafety Level 3 Infectious Disease Suite: See Biohazard Area.

Biohazard Area: Areas for animal experiments that involve biological, chemical, or physical agents that pose a particular hazard to humans or other animals. These are designated either “Chemical/Radioisotope Suite” or “BSL3 Infectious Disease Suite,” depending on the type of hazardous material to be contained. The degree of risk from the material dictates the level of containment required.

Cagewash Area: All movable cages and cage racks are transported to and from this area. This area is comprised of a “dirty” side where soiled cages are received and a “clean” side where sanitized cages are charged with clean bedding and stored until needed.

Chemical / Radioisotope Suite: Suite with radioisotopes and hazardous chemicals.

Classified Space: Areas where HVAC systems are specifically designed to reduce airborne contaminants below a specified Level (as defined in ISO classes) and both temperature and relative humidity (RH) are controlled more tightly than in the ambient environment. These areas must be performance verified/qualified.

Cleanroom: A specially constructed room in which the air supply, air distribution, filtration of air supply, materials of construction, and operating procedures are regulated to control airborne particle concentrations to meet appropriate cleanliness levels and other relevant parameters (i.e., temperature, humidity, pressure, etc.) as defined in ISO classifications or any other regulatory entity.

Clinical Science Research and Development: Conducts clinical research on volunteer patients/subjects that might necessitate controlled conditions, such as isolation and/or observation. Studies can range from small population of inpatient (four to five beds) to large outpatient groups.

Containment Laboratory: A laboratory employing engineering controls and administrative protocols for managing infectious materials. The purpose of containment is to reduce or eliminate exposure to laboratory workers, other persons, and the outside environment to potentially hazardous agents.

Durability: Durability is the ability to resist weathering, chemical exposure, abrasion, impact, and other conditions of ordinary service for a cost-effective lifespan or expected use, while undergoing ordinary maintenance such as washing and sanitizing.

Dry Research Space: Research areas used for computational, applied mathematics, data analytics, and other work that can be performed safely outside of wet research space (see below for definition).

Expandability: The ability to enlarge services within set boundaries of a facility by renovation or by expanding the building footprint.

Fail-safe: Condition where, in the event of a power failure, electronic locks automatically open the doors.

Fail-secure: Condition where, in the event of a power failure, electronic locks maintain the locked door.

Flexibility: The ability to convert a space to a new function through light construction.

Full-Time Equivalent (FTE): A staffing parameter equal to the amount of time assigned to one full time employee. It may be composed of several part-time employees whose total time commitment equals that of a full-time employee (i.e., 40 hours per week) .

Functional Area: The grouping of rooms and spaces based on their function within a clinical service or department.

Health Services Research and Development: Research focused on the health care delivery systems, with specific emphasis on patient needs and quality of care provided.

Input Data Statement(s): A question or set of questions designed to elicit information about the healthcare project to generate a Program for Design (PFD) based on the parameters set forth in this set of documents. This information is processed through mathematical and logical operations in the VA Space and Equipment Planning System (SEPS). Depending on the type of information sought, Input Data Statements are tagged (M) for Mission or (W) for Workload or (S) for Staffing.

ISO Class: An air quality classification from the International Organization for Standardization, per ISO 14644-1 standards, which specify the cleanliness of spaces by airborne particulate.

Principal Investigator: An individual who meets eligibility requirements, receives a minimum of $50,000 in peer reviewed funding in support of an approved VA research project, and is supported by one or more Research Associates.

Program for Design (PFD): A project specific itemized listing of the spaces, rooms, and square foot area required for the proper operation of a specific service / department, and the corresponding area for each. PFDs are generated by SEPS based on the PG-18-9 Standard.

Research Core: A shared support zone between several Labs that includes Equipment, Tissue Culture Lab, Fume Hood(s), Cold Room(c), Glass Wash, and Microscope Rooms.

Research and Development (R&D): The investigation of biomedical problems and hypotheses related to the human health, diseases, defects, and handicaps, as well as systematic study of problems and hypotheses related to the delivery of health care. VA R&D consists of Biomedical Research (BLR&D), Health Services Research and Development (HSR&D), Clinical Science Research and Development (CSR&D), and Rehabilitation Research and Development (RR&D) Unit.

Rehabilitation Research and Development: Includes all research related to chronic disabling conditions in Veterans.

Select Agents (or biological select agents or toxins [BSATs]): Bio-agents which have been declared by HHS or USDA to have the potential to pose a severe threat to public health and safety. The agents are divided into (1) HHS select agents and toxins affecting humans; (2) USDA select agents and toxins affecting agriculture; and (3) overlap select agents and toxins affecting both.

Space and Equipment Planning System (SEPS): Produces equipment lists and Program for Design for a healthcare project based on specific information entered in response to Input Data Questions.

Specific Pathogen Free (SPF): Designation for animals that are free of defined germs and other infectious agents that may interfere with research.

Veterinary Medical Unit (VMU): A facility with specifically designed environments for the care and support of animals used for research. This typically includes procedure rooms, cage wash cleaning and sterilization, staff areas, and support spaces.

Wet Research Space: Research areas where samples, biological agents, and other materials are used for experiments and research in a controlled environment.

1.6 Abbreviations

SYM	DESCRIPTION
ABA	Architectural Barriers Act
ABAAS	Architectural Barriers Act Accessibility Standards
ABSL	Animal Biosafety Level
AFF	Above Finish Floor
AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
AT	Acoustical Tile
BLR&D	Biomedical Laboratory Research and Development
BMBL	Biosafety in Microbiological and Biomedical Laboratories
BSC	Biological Safety Cabinet
BSL	Biosafety Level
CAT	Cleanroom Acoustical ceiling Tile
CDC	Centers for Disease Control and Prevention
CFM	Office of Construction and Facilities Management
CFR	Code of Federal Regulations
CMU	Concrete Masonry Units
CPT	Carpet Tile
CSR&D	Clinical Science Research and Development
EPY	Epoxy Flooring
EXP	Exposed
FC	Foot Candles
FTE	Full-Time Equivalent
FRP	Fiberglass Reinforced Panel
GFRB	Gel Coat Fiberglass Reinforced Polymer
GWB	Gypsum Wallboard

SYM	DESCRIPTION
HEPA	High Efficiency Particulate Air
HHS	U.S. Department of Health and Human Services
HSR&D	Health Services Research & Development
HVAC	Heating, Ventilation, and Air Conditioning
IBC	International Building Code
ISO	International Standards Organization
IT	Information Technology
IVIS	In Vivo Imaging Systems
JS	Joint Sealant
JS-1	Architectural Urethane Sealant
JS-2	100% Silicone
JS-3	Siliconized Acrylic Latex
JS-4	Non-Halogenated Latex-Based Elastomeric Sealant
LSP	Life Safety Protected
MC	Mission Critical
MEPT	Mechanical, Electrical, Plumbing, and Technology
NA	Not Applicable
NFC	National Fire Code
NFPA	National Fire Protection Association
NIH	National Institute of Health
NIHDRM	National Institute of Health Design Requirements Manual
NS	No Sealant
ORD	Office of Research and Development
P	Paint

SYM	DESCRIPTION
PF	Pre-finished
PFD	Program for Design
PG	Planning Guide
PI	Principal Investigator
PPE	Personal Protective Equipment
PSRDM	VA Physical Security and Resiliency Design Manual
PT	Porcelain Tile
R&D	Research and Development
RB	Resilient Base (Rubber or Vinyl)
RES-3	Heavy-Duty Urethane and Epoxy Mortar Flooring System with Integral Base
RES-6A	Urethane Climatic areas subject to temperature swings
RES-W	Seamless Resinous Coating for Walls and Ceiling
RH	Relative Humidity
RR&D	Rehabilitation Research & Development
SC	High Build Glazed Coating (Special Coating)
SEFA	Scientific Equipment and Furniture Association
SEPS	Space and Equipment Planning System
SF	Square Feet
SSTV	Security Surveillance Video System
STC	Sound Transmission Class
SVT	Solid Vinyl Floor Tile
TIL	Technical Information Library
USDA	U.S. Department of Agriculture
VA	Veterans Affairs

SYM	DESCRIPTION
VAMC	VA Medical Center
VHA	Veterans Health Administration
VMU	Veterinarian Medical Unit
VR	Virtual Reality
WSF	Welded Seam Sheet Flooring (Heat Welded with Rod)

2.0 NARRATIVE

2.1 General

This Design Guide, along with the Space Planning Criteria Chapter and the Equipment Guidelines, provides planning and design Standards for VA Research and Development (R&D) facilities, as well as guidance to the various sizes, complexities, relationships, and adjacencies for the planning of future R&D facilities. The guidance in this document has been developed with the intention of balancing the minimum effective standards and superior industry practices.

Space requirements for VA Research facilities are driven by the people and activities in those spaces, which are in turn driven by funding. Therefore, research and development space designed to facilitate cutting-edge programs can result in a competitive advantage to secure research funding. The design standards in this document have been developed to reflect industry best practices, based on research and input from VA Subject Matter Experts and industry consultants.

2.1.1 About VA's Office of Research and Development (ORD)

The mission of VA Research is fourfold:

- to improve Veterans' health and well-being via basic, translational, clinical, health services, and rehabilitative research
- to apply scientific knowledge to develop effective individualized care solutions for Veterans
- to attract, train, and retain the highest-caliber investigators, and nurture their development as leaders in their fields
- to assure a culture of professionalism, collaboration, accountability, and the highest regard for research volunteers' safety and privacy

VA Research is unique because of its focus on health issues that affect Veterans. It is part of an integrated health care system and has come to be viewed as a model for superior bench-to-bedside research.

VA Research has five overarching strategic priorities:

- Increasing Veterans' access to high-quality clinical trials
- Increasing the real-world impact of VA research
- Putting VA data to work for Veterans
- Actively promoting diversity, equity, and inclusion
- Building community through VA research

The research process in VA starts with a pointed focus on the everyday health needs and concerns of Veterans, and consultation with national and regional VA clinical leaders. Solutions that address these health needs are identified and developed through careful, rigorous research in labs and clinics, and sometimes in the community. These solutions are then applied to Veteran care, or translated into new or improved programs, as rapidly as possible. Veterans themselves play an integral role in the VA research program. Thousands of Veterans volunteer each year to participate in VA research studies, both to address their own health challenges and to help their fellow Veterans.

VA Research fosters dynamic collaborations with its university partners, other federal agencies, nonprofit organizations, and private industry – thus furthering the program's impact on the health of Veterans and the nation.

The ORD research services encompass the following:

2.1.2 Biomedical Laboratory Research & Development (BLR&D) Service

BLR&D supports and conducts preclinical research to understand life processes from the molecular, genomic, and physiological levels for the purpose of advancing science and the understanding of how diseases affect Veterans. This understanding is accomplished through the exploration of biological or physiological principles in humans or animals through intramural funding mechanisms and career development programs that support talented individual researchers who are working in areas of particular importance to improving the well-being of our nation's Veterans. BLR&D-supported research includes pre-clinical models and investigations of tissues, blood, or other biologic specimens from humans.

BLR&D primarily uses space in laboratories, Veterinary Medical Units (VMUs), and associated office workspace for their research efforts.

2.1.3 Clinical Science Research & Development (CSR&D) Service

CSR&D is focused on moving ideas along the translational pathway from scientific discovery to clinical application in order to advance the healthcare of Veterans. The VA supports research focusing on human beings as the unit of examination. Examples include interventional and effectiveness studies, clinical, epidemiological, and technological studies.

CSR&D primarily uses space in research clinics or medical facilities for work with clinical research subjects. Clinical research involving human subjects may take place in any part of a medical facility. This research is sometimes supported by laboratory space to process samples and perform research work on samples provided by the subjects. The work with research subjects is also supported by workspace for managing clinical research, supporting record keeping, and other clinical research projects that may involve only office-based functions.

2.1.4 Health Services Research & Development (HSR&D) Service

HSR&D is an integral part of the VA's quest for innovative solutions to today's healthcare challenges. HSR&D supports research that encompasses all aspects of VA healthcare, focusing on Veteran care, cost, and quality. The main mission of HSR&D research is to identify, evaluate, and rapidly implement evidence-based strategies that improve the quality and safety of care delivered to Veterans.

HSR&D is an office and field-based research function that primarily uses individual workstations and group workspaces for analysis and collaboration.

2.1.5 Rehabilitation Research & Development (RR&D) Service

RR&D advances scientific knowledge and fosters innovations to maximize Veterans' functional independence, quality of life, and participation in their lives and community. RR&D integrates clinical, preclinical, and applied rehabilitation research to enable translation into clinical practice to restore, replace, or return Veterans' functions to improve their quality of life.

RR&D uses space in laboratories, VMUs, and associated office workplace for their research efforts, as well as rehabilitation-focused clinical research space for working with human subjects.

2.1.6 Veterinary Medical Units (VMUs)

In VMUs, animal models are used to further the VA's understanding of living systems, and to help improve the lives of not only Veterans, but people all around the world. VA allows research with animals only if it is scientifically necessary and if the welfare of the animals is taken care of.

VMUs are considered core facilities, rather than independent research services. They are not independently funded, and their space requirements are driven by the needs of the services they support (BLR&D, CSR&D, or RR&D).

2.2 Program Elements

The design objective for VA R&D facilities is to provide high-quality, flexible, and adaptable space to take research to a practical betterment of outcome, from bench to bedside. These Standards support the development of facilities to meet the wide variety of VA research demands by providing a baseline design strategy which can be modified as required by the needs of individual facilities.

2.2.1 Workplace Evaluations

In addition to the expertise of designers and consultants, the content presented in these Standards is based on multiple investigations of the current state of VA R&D.

In February 2021, over 1,600 VA research staff participated in a workplace evaluation survey which was conducted to ascertain information about their use of space and time in VA R&D facilities. Participants included staff from every service area of VA R&D, in facilities across the nation. Information was gathered about user experience in program and design decision-making, as well as areas for future planning and design based on targeted outcomes. This information was used to establish broad trends in research (discussed in the Section 2.3 Space and Global Trends). Key findings are detailed in Appendix A.

Additionally, two virtual site visits were conducted at existing VA R&D facilities: the Rocky Mountain Regional VA Medical Center (VAMC) in Aurora, CO and the New Orleans VAMC in New Orleans, LA. The findings are presented in Appendix A. Finally, reviews and discussions were conducted of numerous non-VA academic and government facilities performing similar research work as the VA R&D services.

The efforts described above culminated in this Design Guide which is data-driven and based on VA research expertise, survey results, and the most current trends and uses in research. While forecasting is not a scientific pursuit, the Standards are intended to empower facilities to design in a manner that can accommodate specific research needs as well as future changes in research.

As design teams prepare to apply these Standards to individual projects, investigations must be performed to ascertain the unique needs, capabilities, and goals that are specific to each site.

2.2.2 Range of Facility Sizes

The VA Research program extends to many sites nationwide. These sites are often adjacent to, and share resources with, affiliated medical centers. The space needs of every research program and its areas of research are unique.

The VA offers research options to all facilities with justified research proposals. VA Research and Development facilities range from small to very large research laboratory and associated spaces. Small facilities may not require comprehensive laboratory space, instead utilizing specialized research tools that are supported by more focused space. Large facilities are likely to have both comprehensive laboratories and specialized research space.

PG-18-9 Space Planning Criteria Chapter 278 provides space requirements and guidance for the development of BLR&D and VMU programs ranging from three to 90 Principal Investigators, and a basis of design without ranges for RR&D, CSR&D, and HSR&D. PG-18-9 is to be used in conjunction with PG-18-12 and PG-18-5 Equipment Guide List to accommodate the specific space needs of a facility.

As data is gathered on the needs of a specific facility, it is important to understand its areas of research focus, and the future direction of the research program, in order to appropriately determine the space needs for the facility.

2.2.3 Renovations and Additions

Standards in PG-18-5, PG-18-9, and PG-18-12 apply to all R&D project types: new construction, renovations, and additions. The intent of a renovation is to correct deficiencies or shortfalls in existing spaces, rather than to replace in kind. Types of renovation include: minor construction or non-recurring maintenance of laboratory spaces and systems to incorporate new needs, upgrade systems, and extend the facility life; complete transformation of an existing laboratory space or facility, which would involve removing everything down to the structural elements and reconfiguring to VA standards; and adaptive re-use of a facility such as an unused building that is upgraded for laboratory use.

In the design of any facility for VA, maximizing space use is important. This is particularly true when renovating existing facilities, which requires recognizing necessary compromises to optimize space use at the best value for VA. These Standards provide a baseline which can be modified to the specific needs of an individual facility.

In planning renovations, it is important to understand how the current configuration of the space will drive the application of these Standards. An existing facility must first be evaluated for the building's ability to house a modern research laboratory. The following infrastructure conditions should be evaluated to determine what extent of renovation is feasible:

- Does the floor-to-floor height and structural system configuration provide appropriate space to run ductwork, piping, and electrical systems in the configuration anticipated?
- Does the floor live load capacity support the anticipated weight of laboratory equipment anticipated? Typically, a minimum live load capability of 100 psf is needed.
- Can the vibration requirements of equipment such as microscopes and biological safety cabinets be met by the structure?
- Does the structural grid support well planned laboratories close to the preferred module width 11'-0” (described in Section 2.4 Strategic Planning of Laboratories)?

For renovations and additions, the existing building utility infrastructure must also be evaluated to assess the current systems’ capacities to meet the demands of a research program. The renovation or addition must address the research program’s needs, including but not limited to increased or decreased HVAC, mechanical, plumbing, electrical, house gas, and security equipment/system.

Every renovation and addition will have unique issues, challenges, and opportunities for facility improvement. An approach for renovating research facilities is outlined in Figure 1 below. The questions in the Program Optimization column are to be addressed first so that a complete understanding of the renovation's requirements is achieved. The Laboratory, VMU, and Workplace columns contain important points of analysis for design in those spaces. The Building column indicates service and flow considerations for the entire facility, and the Systems Optimization column addresses mechanical, electrical, and plumbing assessments.

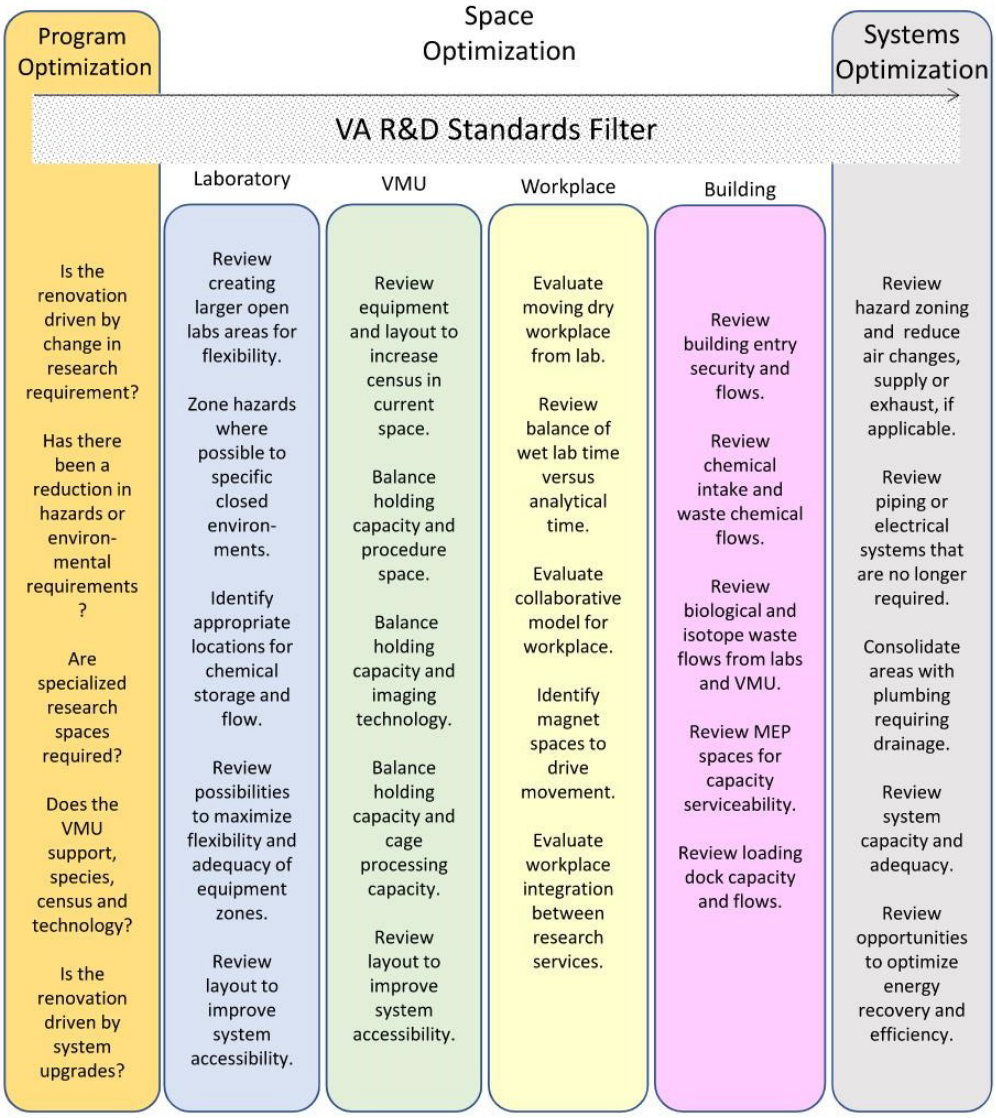


Figure 1 Renovation Flow Process

2.2.4 Collaboration and Service Integration

Many VA facilities' research services collaborate on research programs and publications. For example, the BLR&D Service has a very strong collaborative relationship with the CSR&D Service, which utilizes laboratory space for experiments on samples. Figure 2 below illustrates the reported collaborations among VA Research staff in the survey (see Section 2.2.1 Workplace Evaluations) about user experience in program and design decision-making (note that the survey results are only an average among responders and not indicative of the specific relationships at a given facility).

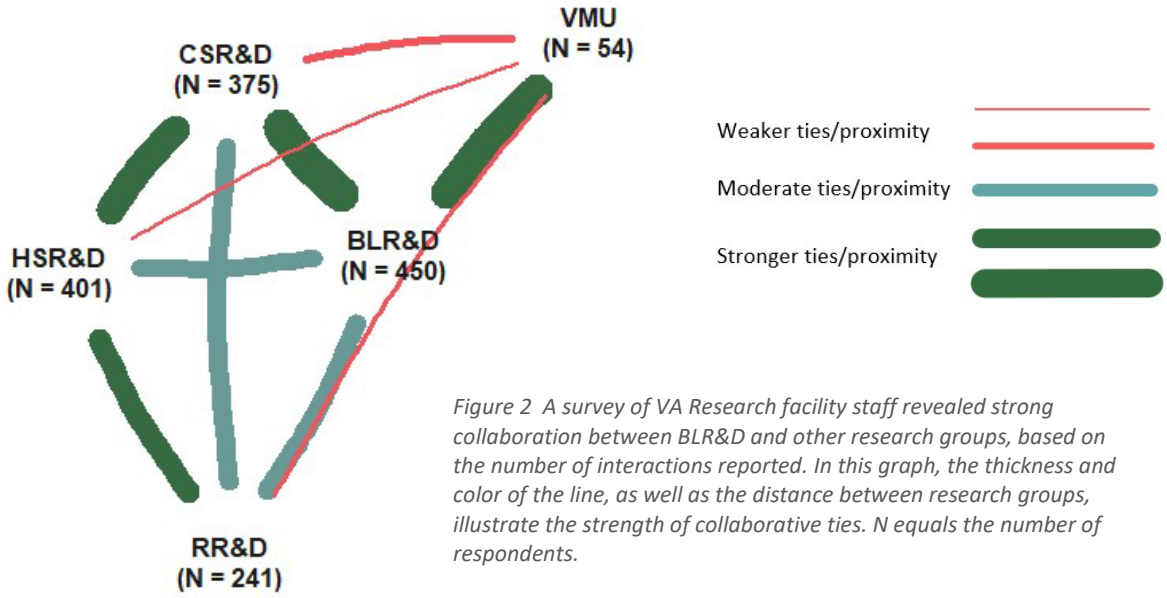


Figure 2 A survey of VA Research facility staff revealed strong collaboration between BLR&D and other research groups, based on the number of interactions reported. In this graph, the thickness and color of the line, as well as the distance between research groups, illustrate the strength of collaborative ties. N equals the number of respondents.

The building design must support service integration within and between services. Collaboration is an increasingly important part of research. As theme- and team-based research grows (see Section 2.3 Space and Global Trends), research teams are joining to work on common goals, and focusing on research themes to develop new therapies or approaches to faster and better Veteran care.

In Section 2.10 Staff Workplace and Collaboration Space, there is information about how collaborative space increases opportunities for both scheduled collaborations and unplanned collaborations.

In addition to inter- and intra-service collaboration, VA Research Services are a vital collaborative resource at VAMCs and academic medical and science centers. Many researchers have dual appointments with an academic affiliate in addition to a VAMC. Adjacency and ease of access between VA and academic affiliates is encouraged when appropriate to maximize the opportunities in those relationships, and for the safety and comfort of Veterans and researchers traveling between facilities.

2.2.5 Flexibility and Adaptability

Flexibility is the ability to convert a space to a new function through light construction. Adaptability is the ability to change the function of a space with the replacement of furniture and equipment.

Due to the changing nature of research, providing facilities with maximum flexibility and adaptability for changing uses and technologies is very important. The BLR&D Research Area is designed as an open laboratory with adjustable casework along a standard modular grid, enabling rapid changes in equipment and bench configuration as research evolves. The standardized lab module and room sizes allow several BLR&D Research Support Rooms to be used for multiple purposes. For example, the same room size can accommodate tissue culture, confocal microscopy, flow cytometry, or other technologies. The laboratory and key support spaces are described and illustrated in Section 2.4 Strategic Planning of Laboratories, Section 2.5 Biomedical Research and Development Service (BLR&D), and Section 4 Room Templates.

In CSR&D and RR&D, work with Veterans in research typically occurs in clinical spaces or specialized research areas. Clinical and rehabilitation research technologies change rapidly, and the ability to transform the space where they occur is critical. For example, advances in exoskeleton technology have resulted in over 100 models currently used in rehabilitation research. The various sizes and functions of exoskeletons, encompassing therapies for issues from gait problems to spine injuries, require flexible space that can accommodate future technological developments. Another example of rapid technological development is the integration of virtual reality (VR) technologies in both clinical and rehabilitation research. Veterans using VR interact with monitors or TV screens, which may be embedded into a larger piece of equipment (such as an exercise machine), increasing space requirements. Veterans interacting in these spaces need accessible pathways and ramps to maneuver assistive devices.

2.3 Space and Global Trends

VA R&D facilities may be in operation for 10 or more years between renovations or new construction projects. A design that accounts for future developments and uses of space will extend the longevity of the facility. This section first describes trends in staff areas (2.3.1) and dry research areas (2.3.2) that apply to all VA Research Services, followed by trends that are specific to BLR&D (2.3.3), RR&D (2.3.4), and the VMU (2.3.5). Graphical depictions of data gathered from VA Research staff surveys, which illustrate their use of space and equipment, are included.

2.3.1 Staff Areas

Workplace design is shifting to accommodate a variety of work styles in all areas of research. The traditional workplace model of solo work seats with low amounts of support space is becoming less popular. Offices are trending towards an open, activity-based environment, planned with settings that are allocated according to work style and work process. However, this trend is to be balanced with the need for quiet environments for privacy or concentration. The frequency of virtual meetings, and the need for space and acoustic separation to participate in them from individual workstations, is rising. A successful workplace design offers a variety of spaces that facilitate the needs of individual researchers while promoting collaboration among and between teams.

Technological advances have resulted in many jobs becoming capable of being performed remotely, a trend which the 2020 pandemic has accelerated dramatically, as shown in Figure 3 below. As a result, workplaces need space for staff to connect virtually with remote workers. This trend also offers the opportunity to maximize the efficiency of space utilization with shared, unassigned workstations.

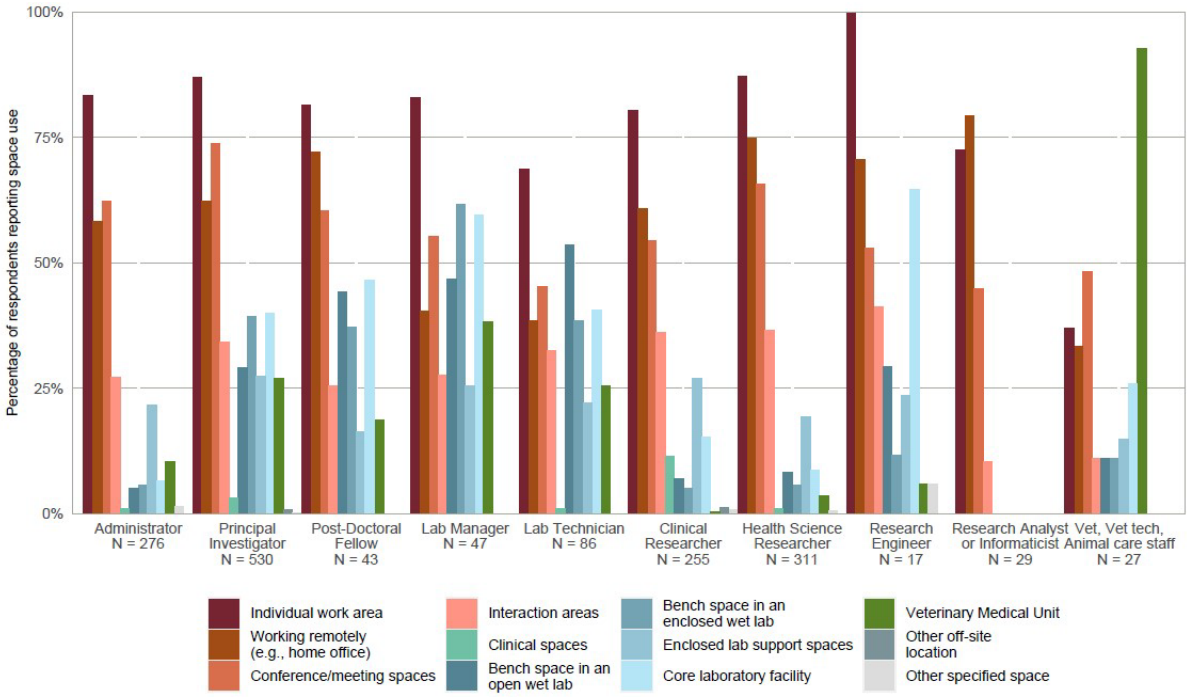


Figure 3 A survey of VA Research facility staff revealed that over 60% of respondents spent at least part of their work week working remotely in February 2021.

Large, scheduled, in-person meetings have declined in frequency. Small (fewer than eight people) meetings that are often impromptu and/or virtual are more common, as shown in Figure 4 below, and support more frequent collaboration among teams.

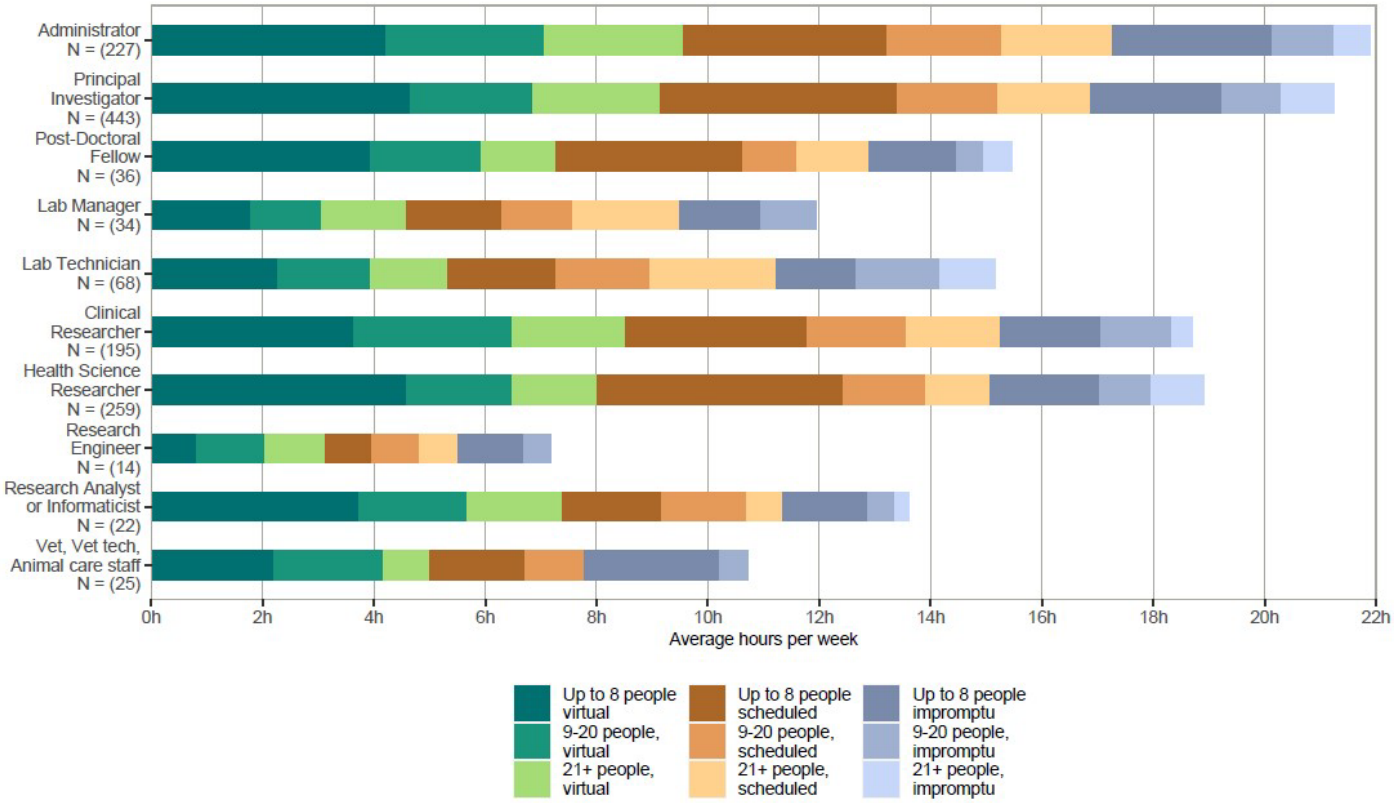


Figure 4 A survey of VA Research facility staff revealed meetings with two to eight staff are the most common, and that virtual meetings are more common than scheduled in-person or impromptu in-person meetings.

2.3.2 Dry Research Space

In "wet" (i.e., traditional laboratory) research space, samples, biological agents, and other materials are used for experiments and research in a controlled environment. By contrast, "dry" research space is used for computational, applied mathematics, data analytics, and other work that can be performed safely outside of a laboratory. Dry research space is used in every research service.

The pace at which research integrates data is rapidly increasing with technological advances. The need of researchers to share and discuss data is increasing, resulting in increased space demands. Researchers also increasingly need to accommodate additional computer screens within their individual workspace and to share information in small group meetings and across locations. Research has become more sub-specialized, requiring more space to facilitate collaboration among and between teams, such as Huddle and Conference Rooms (see Section 2.10 Staff Workplace and Collaboration Space for more information).

While digital files reduce the need for paper storage generally, documentation storage needs have not decreased in clinical research areas. CSR&D requires physical storage for paper documentation of some records and protocols, which tend to grow throughout the lifetime of a clinical science research facility.

2.3.3 Biomedical Laboratory Research & Development (BLR&D) Service

Biomedical research is a dynamic and ever-advancing field. The growth and shifts in research focus, methods, and technology require forward-looking design. Planners must account for both the current and future needs of a facility. An awareness of the emerging trends in biomedical research, outlined below, is crucial for long-term efficiency in a facility.

Research has shifted away from individual researchers working independently, and towards team- and theme-based programs, driving more open, flexible laboratory space. Collaboration, sharing, and knowledge transfer are becoming more prevalent in the laboratory, in the dry workplace, and between the two. Principal Investigators in BLR&D may also act as clinical Research Associates in CSR&D, or as rehabilitation Research Associates in RR&D. This trend also drives the need for integration and easy access between buildings and programs. Space for impromptu small team meetings (Huddle Rooms), planned meetings (Conference Rooms), and chance encounters for collaboration (paths of circulation and Breakrooms) has become a significant factor in laboratory facility design.

In the past, there has been a large space need for hazardous chemicals and materials in the laboratory, but that need has reduced significantly. In general, chemical use is decreasing, which is resulting in both a reduced number of fume hoods required and an ability to share fume hoods. This change presents an opportunity to rethink space design to control the flow and use of chemicals, creating a safer laboratory environment, particularly in the open laboratory. Biological hazards are generally being reduced as researchers move away from work with whole organisms in favor of sub-units such as nucleic acids or proteins. Radioisotope use for assays is dropping rapidly as new techniques have been developed. Nonetheless, understanding and addressing the specific hazards in any laboratory space being planned remains a primary concern of laboratory design.

As use of fume hoods is decreasing, they are often moved out of the open laboratory and into dedicated rooms, where they can be shared among research teams (see Figure 5 on the next page). This shift presents new opportunities and challenges in storing and safe handling of chemicals and reagents.

The reduction of hazards in the laboratory allows rethinking of the mechanical system design for the laboratory space, presenting an opportunity to zone laboratories into various areas of risk, described in Section 2.4 Strategic Planning of Laboratories.

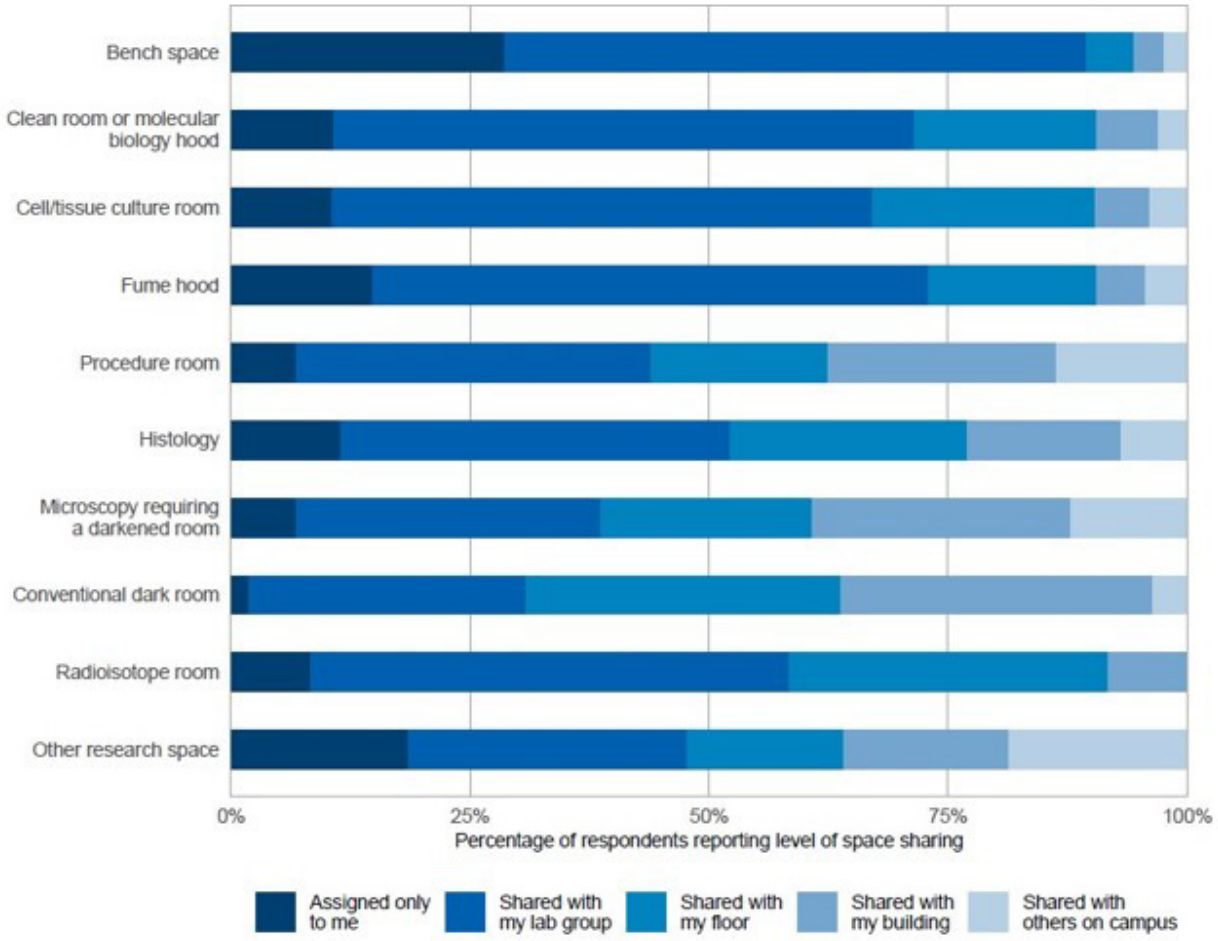


Figure 5 A survey of VA Research facility staff revealed that the majority of research tools and spaces are shared, rather than assigned to one person.

In addition, data sciences are rapidly growing in importance to laboratory research. Integrating hands-on laboratory benchwork with the data analytics performed in dry work areas is becoming a larger aspect of planning research and development facilities. The increasingly mixed balance between "wet" and "dry" work drives the need for more connectivity between the wet laboratory open bench areas and the data analytic workspace areas.

Activities involving cell and tissue culture are rapidly expanding, as shown in the survey results in Figure 6 on the following page. There are many types of cell and tissue culture, all of which require appropriate amounts of space and care to avoid contamination. An efficient layout of tissue culture space promotes a smooth workflow process and allows multiple researchers to work without interruption in the same room.

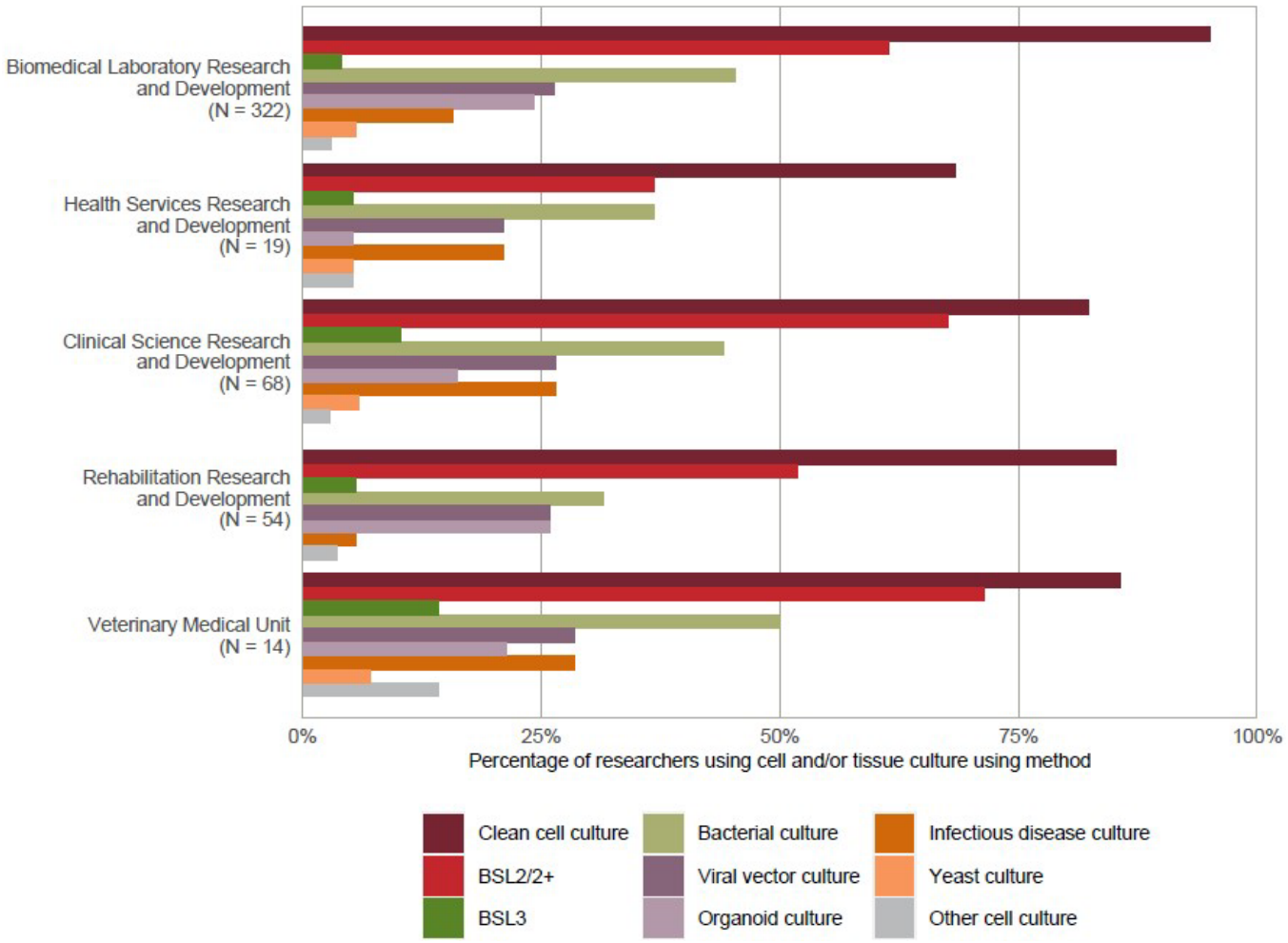


Figure 6 A survey of VA Research facility staff revealed that clean cell culture, BSL2/2+, and bacterial culture comprise the vast majority of cell and tissue culture research.

The rapid expansion of cell and tissue culture brings the need for storage space for personal protective equipment (PPE), media and supply storage, and most importantly, biological sample storage. The quantity of large ultra-low-temperature freezers is constantly increasing as the need for tissue culture grows. In addition, as these samples are rarely discarded, the storage requirements increase year over year. Planning adequate space for these mechanical (heat, noise, standby power or potential cryogenic back-up and large size) or cryogenic (liquid nitrogen source, large size) freezers is becoming one of the more challenging aspects of laboratory design. Grouping freezers together is important, both for collocation of equipment and for efficient zoning of mechanical systems to accommodate heat loads.

2.3.4 Rehabilitation Research & Development (RR&D) Service

Rehabilitation research is uniquely tied to technology and engineering. The exponential growth of computing, automation, robotics, and other technologies is resulting in an explosion of the complexity and variety of rehabilitation techniques. Developments in motion analysis and assistive technologies, particularly gait labs and exoskeletons, have dramatically increased in recent years. Figure 7 below illustrates the high amount of assistive technology research in RR&D.

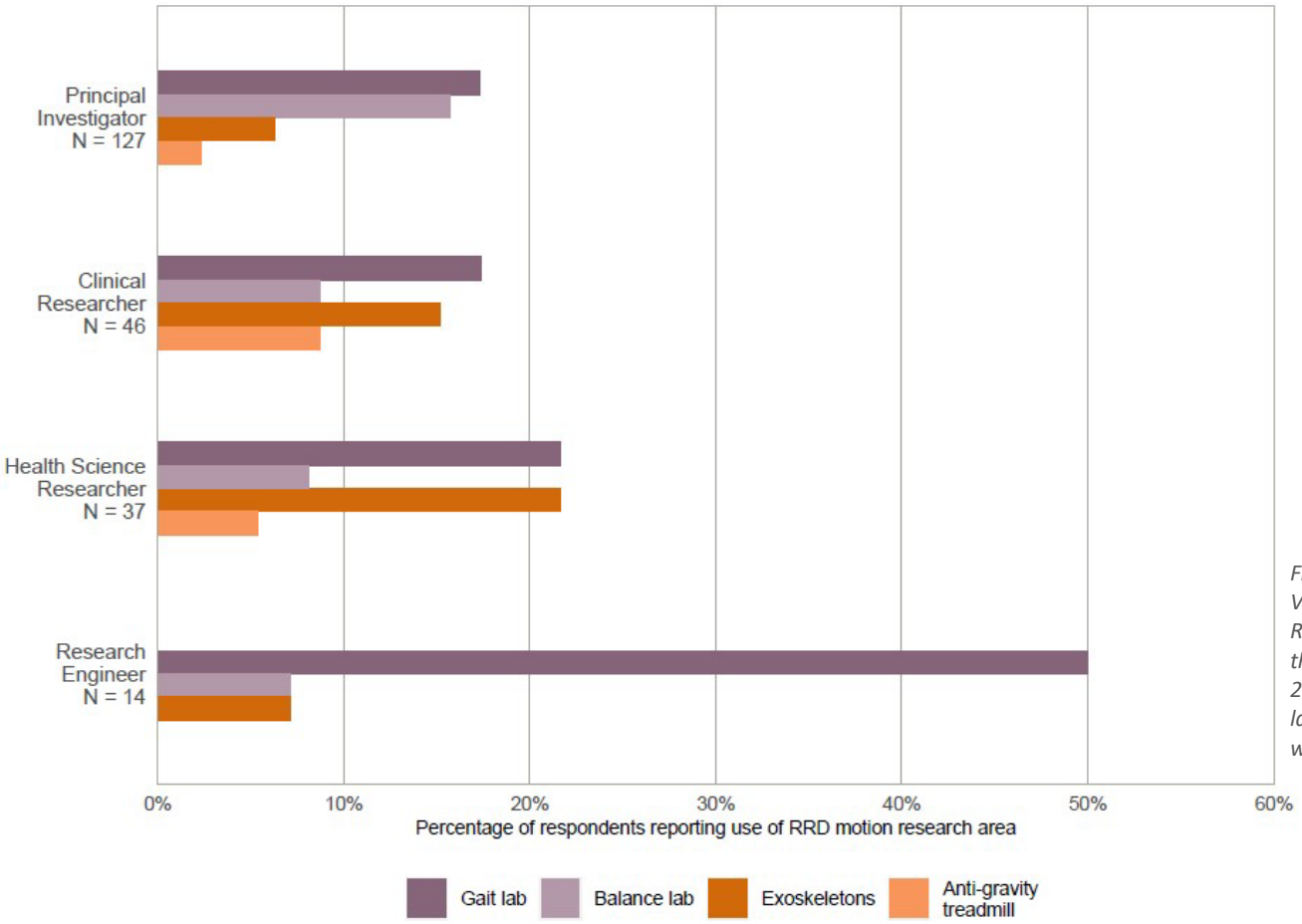


Figure 7 A survey of VA Rehabilitation Research staff shows that approximately 20% use gait laboratories in their work.

As new technologies for Veterans are introduced, there is a greater emerging need for research support space in onstage (where the Veteran interacts with staff) and offstage (staff-only) clinical spaces. Imaging facilities in clinical settings are of particular importance to rehabilitation research efforts, as both functional and structural imaging of clinical research subjects can provide insight into the disease, injury, and extent of recovery with various rehabilitation therapies. Access to VAMCs, where diagnostic services and standard-of-care rehabilitation spaces are often shared with research programs, is vital in accelerating research developments and enabling Veteran participation. Figure 8 on the following page illustrates the frequency and types of spaces where Veteran interactions for RR&D occur.

Engineering and technology are rapidly integrating with scientific research in areas such as bionic medicine. Research environments are supporting this integration with more open, flexible laboratories to facilitate faster and better knowledge transfer. Engineers and scientists are often brought into closer proximity as the work within the two fields merge.

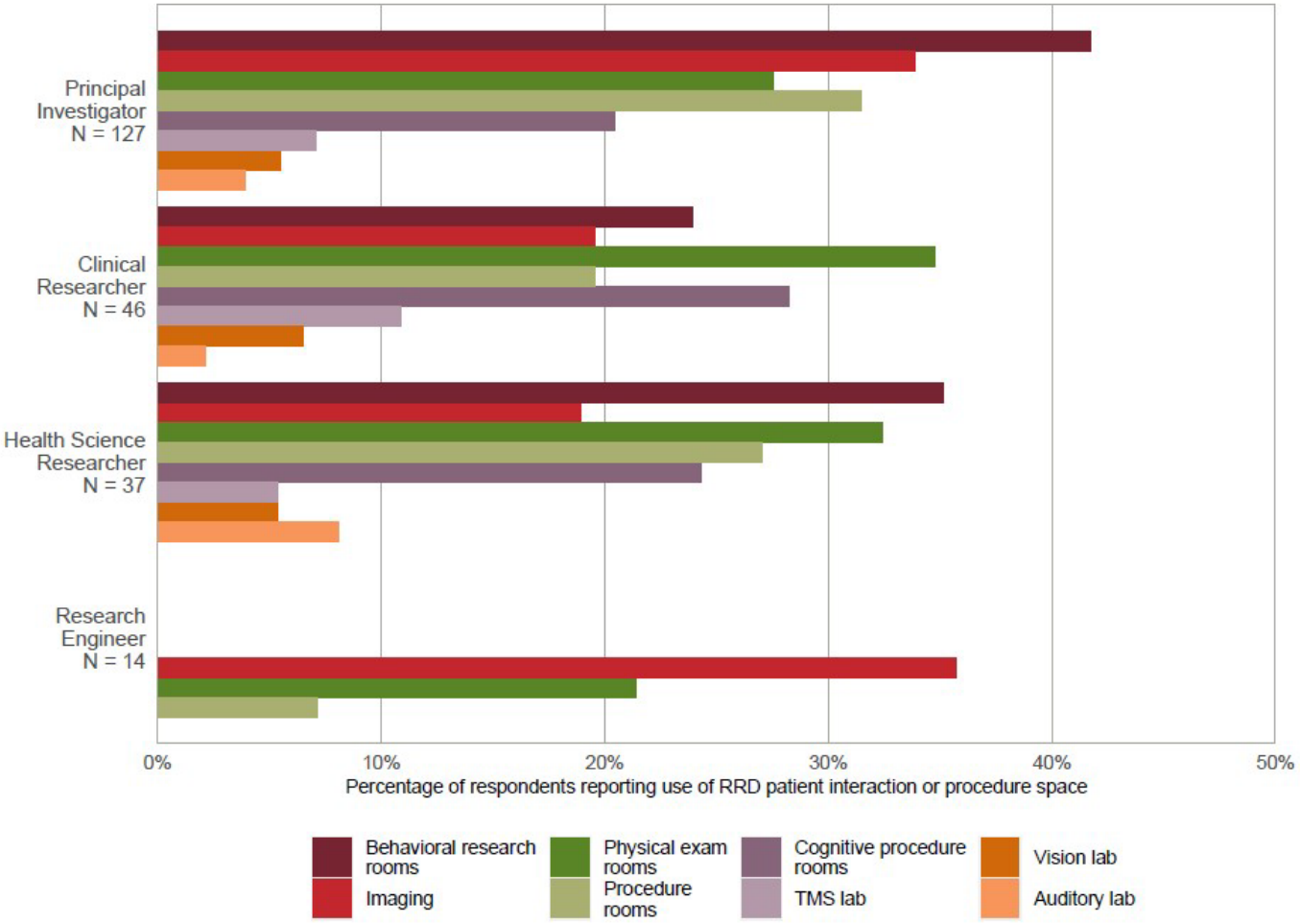


Figure 8 A survey of VA Rehabilitation Research staff shows that Veteran interaction and procedure primarily occurs in behavioral research rooms, imaging rooms, and physical exam rooms.

As in all research, data science in rehabilitation research is on the rise. Technological advances in virtual and augmented reality, informatics, and machine learning technology are quickly changing the research environment and resulting in a greater need for coordinated space between the dry workplace and the technology trial space.

Progress in the medical field is increasing the survivorship of all types of ailments. Rehabilitation practices for previously fatal diseases and injuries are expanding the scope of rehabilitation and the research required to support it. For example, as cancer treatment advances, so does the need for rehabilitation research to help Veterans tolerate physical stress and cognitive issues from treatment, boost endurance, and regain strength. Similarly, advances in prosthetics development are driving both increased recovery rates and expansion of rehabilitation research.

2.3.5 Veterinary Medical Units (VMUs)

VMUs are complex, process-oriented spaces that require careful planning and design. Developments in science, technology, and animal welfare present both new opportunities and new challenges to consolidate space and enhance research.

Animal research, especially with rodents, is increasing. The inherent increase in space needed to house a larger number of animals is amplified by an increased awareness of animal welfare needs. Attention to the mental and physical health of animals is realized via larger and less crowded cages, as well as opportunities for enrichment through social interactions and toys. While animal welfare is a goal in and of itself, comfortable animals also make better research subjects, helping to ensure that their use as research subjects yields valid results.

Traditionally, animals have been brought from the VMU to other research spaces for certain procedures. Technological advances now potentially allow animals to stay in the VMU for all procedures, refining the results of research. For example, cancerous tumor research used to require euthanasia, followed by removal and transport of the tumor to the biomedical laboratory for imaging; today, imaging implants allow tumors to be observed on live animals as they grow, using laser microscopy that is located within the VMU.

Many imaging technologies for animals are rapidly increasing and expanding. Technologies such as CT, MR and PET, bioluminescence, ultrasound, and specialized microscopy, when required in a VMU, need specialized animal preparation areas and flow patterns.

Automation is an upward trend in many areas of research. In VMUs, this trend translates to reduced hazards and manual labor through the use of automated cage washing, watering, and bedding.

Another trend in animal research is the rise of specialized facilities, or specialized space within facilities. Historically, VMUs have been designed to maximize flexible animal housing. With current trends, VMUs are increasingly dedicating space to specialized housing and equipment, including lower-density housing for behavioral, metabolic, biocontainment, gnotobiotic, and other research purposes. In addition to the extra space needed to house animals, each of these types of research requires its own special capacity for testing apparatus and/or containment or protective protocols. Balancing the specialized space needs with the more traditional, high-density housing, both of which occur at many VMUs, involves careful planning and coordination.

The survey of current research at VA showed a wide variety of animal species in use, including sheep, pigs, rabbits, guinea pigs, gerbils, voles, and zebrafish, although the predominate animal usage is mice and rats. It is important to plan the VMU for the specific current research at the VA site in question, while allowing for adaptation to future needs.

2.4 Strategic Planning of Laboratories

The strategic planning of laboratories is a response to five major challenges:

- **Safety**: High-risk factors to researchers include possible contamination from specimens and radioisotopes, explosion or fire, and exposure to chemicals. However, hazards have significantly reduced in many areas of biomedical research, providing opportunities to create zones of risk that can result in increased safety and lower construction and operating costs.
- **Flexibility**: The laboratory design must allow for changes in pattern and type of research work. It is to be expected that the direction of the facility's research program may change between design and activation, and over time.
- **Quality of Environment**: Openness, transparency, the presence of natural light, and an environment that encourages collaboration within and between teams are important factors in employee wellness and performance. A laboratory that provides space to enhance knowledge transfer, with tools for easy idea and data sharing, promotes collaborative and successful research.
- **Maintainability**: HVAC, plumbing, electrical, fire protection, security, information technology and similar systems at a research facility must be readily and reliably available for use, have redundancy in events of system/utility failure, and be quickly restorable in the event of equipment failure. This is particularly important for systems that provide life safety, control hazards, and preserve samples or data.
- **Cost Efficiency**: Research facility design must assure quality facilities while maintaining life-cycle cost in both construction and operations.

This section outlines the planning concepts that address the above challenges with an open, modular laboratory design.

2.4.1 The Open Laboratory

As discussed in Section 2.3 Space and Global Trends, trends in research are driving laboratories to become more open environments. An open laboratory plan improves square footage efficiency, provides flexibility, and facilitates theme and team-based research. Laboratory partitions and barriers are minimized, saving on cost while also improving adaptability. Grouping researchers by similar techniques or themes (e.g., molecular biology or brain injury) increases the benefits of open laboratories. Generally, laboratory spaces are to be closed only where required for the research to control noise, heat, humidity, light, hazards, and contaminants, or when constrained by existing conditions or specific research program requirements.

Sinks in the open laboratory are located on interior perimeter walls, rather than on free-standing laboratory benches or partitions that could be removed to accommodate future laboratory reconfiguration. The interior perimeter wall location consolidates plumbing in the facility, maintains the laboratory's flexibility, and avoids the hazard of a water source near the laboratory bench.

In an open laboratory environment, partitions formerly used in a closed laboratory to hang casework are replaced by free-standing cabinets and shelving. Using mobile casework units or split benches in the center space creates an adaptable environment allowing rapid low-cost change to meet researchers' evolving needs.

In a multistory facility, locating the laboratory on an upper building floor reduces the ductwork length from the fume hoods to the exhaust stacks, thus saving cost by reducing space required by duct shafts.

See Figure 9 below for an illustration of the open laboratory. Section 4 Room Templates contains details of the open laboratory's contents and layout.

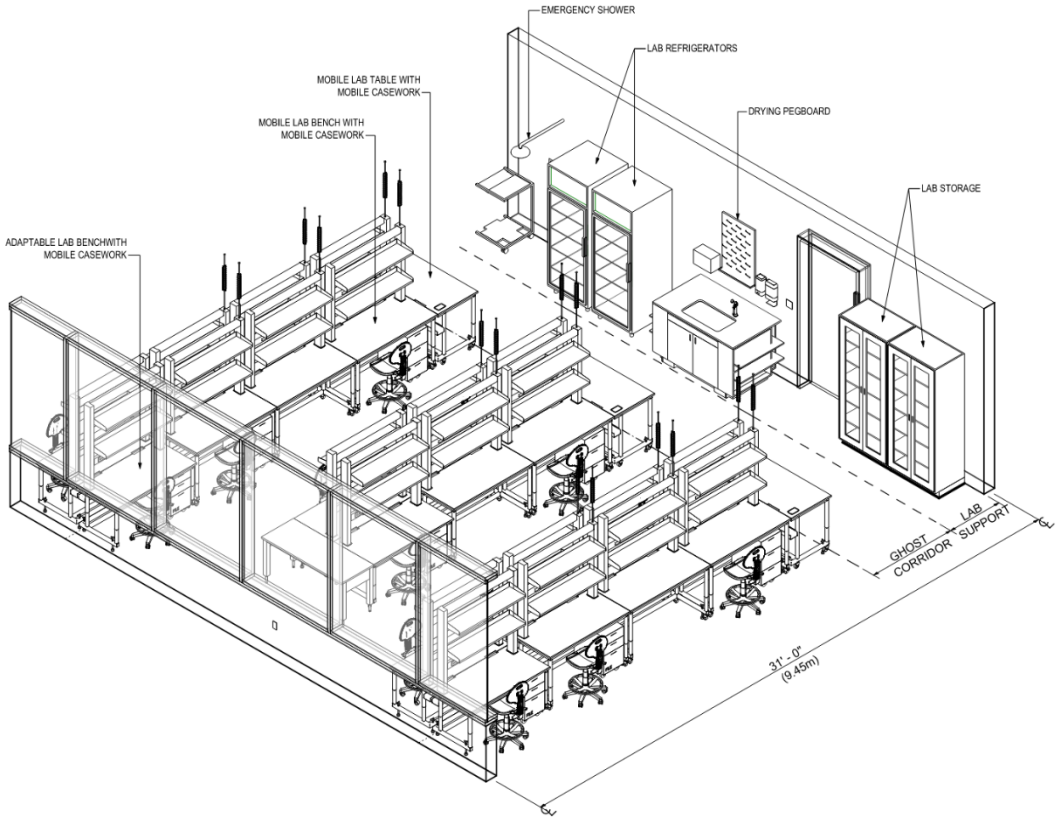


Figure 9 Open Laboratory

Closing the Laboratory

Some laboratory construction projects may preclude achieving a completely open laboratory. For example, partitions may be load-bearing and unable to be removed, or codes and standards may limit the size of a laboratory due to the chemicals required for research.

When a laboratory is “closed” (divided into more than one room), the design can utilize the additional wall space by placing wall-mounted equipment along the wall, such as refrigerators, shakers, incubators. Such equipment can take the space of a Lab Bench in the Lab Bench Unit described in Section 2.4.2.

See Figure 10 below for an illustration of a closed laboratory.

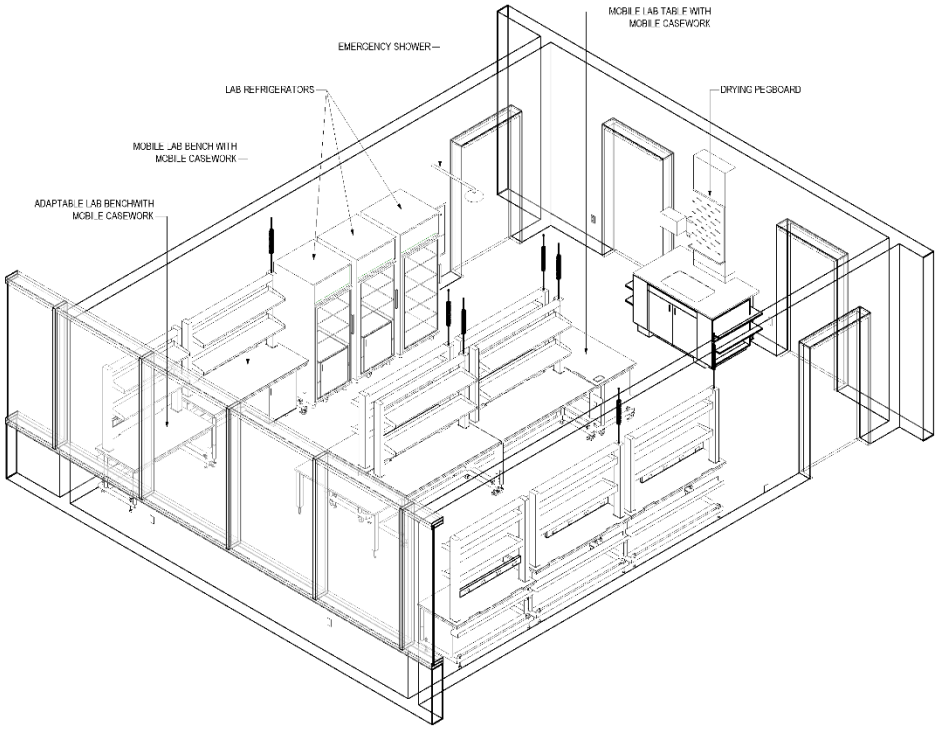


Figure 10 Closed Laboratory

2.4.2 The Lab Bench Unit

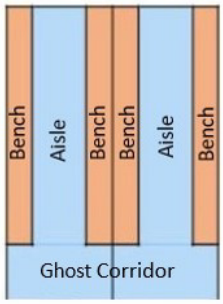


Figure 11 Lab Bench Unit

Lower hazard and data analytics work can be performed on open bench spaces in the open laboratory. A typical lab bench is 5’ wide and 2’6” deep with an adjustable-height benchtop. A Bench Unit is the amount of space that a typical biomedical research team needs, and is comprised of two “islands” of lab benches, with two rows of four benches plus a shared bench at one end of each island. Islands are separated by 6’ aisles, which are aligned to face laboratory exits. 5’ aisles may be used for projects with space or structural constraints (see Section 2.4.3 The Lab Module for ramifications of the aisle width on the facility layout). The lab benches along the exterior wall may be removed from the Bench Unit as needed for additional circulation space. Lab benches may be used for laboratory work or as write-up space.

Adaptability and openness in the laboratory are enhanced with modular casework such as moveable shelves above the lab bench, demountable bench tops, and mobile drawer units. Power and data as well as piped services such as vacuum and compressed air are supplied from the ceiling. Snorkel exhaust systems are provided for point-source exhaust at strategic locations for processes that require increased ventilation.

As described in Section 2.5.3 BLR&D Support Area, biological safety cabinets (BSCs) and fume hoods are consolidated in specialized Support Rooms rather than in the open laboratory, in order to reduce hazardous and noise-generating equipment in the open laboratory. However, the flexibility of the Bench Unit allows BSCs and fume hoods to be placed at the end of a Lab Bench Unit, if restrictions of the space preclude containing them in separate, shared rooms.

Figure 12 A Lab Bench Unit in the open lab at the Rocky Mountain VAMC R&D Facility includes mobile drawer units and utility drops from the ceiling for adaptability.

Figure 13 The adaptability of the Lab Bench Units at the New Orleans VAMC R&D Facility is enhanced with snorkel exhaust systems. (Note that the power and lab gases on the bench at the reagent shelf, pictured here, may inhibit long-term adaptability.)

2.4.3 The Lab Module

To maximize adaptability, a basic planning concept centered on the lab module is employed. The module establishes a dimensioned method by which building systems, partitions, and casework work together within the new or existing building structural framework.

The dimensions of the lab module, outlined below, are based on the number of people working in a laboratory research team, the required length of continuous lab work surfaces per researcher, the optimal width of the aisles in between benches, and safety considerations and codes. Laboratory support, entries and exits, offices, and corridors can be planned to adhere to the module so that a high degree of flexibility is achieved.

The lab module width is 11’-0” on center and 31’ deep. It accommodates two lab benches with an aisle between them, and two rows of Bench Support with a Ghost Corridor between them, as shown in Figure 14 below. Modules wider than 11’-0” can be wasteful of space and energy, as no benefit is gained from the increased aisle width. Modules between 11’-0” and 10’-0” in width are feasible, particularly in open labs. As described below, the primary concern with module width changes is the aisle width.

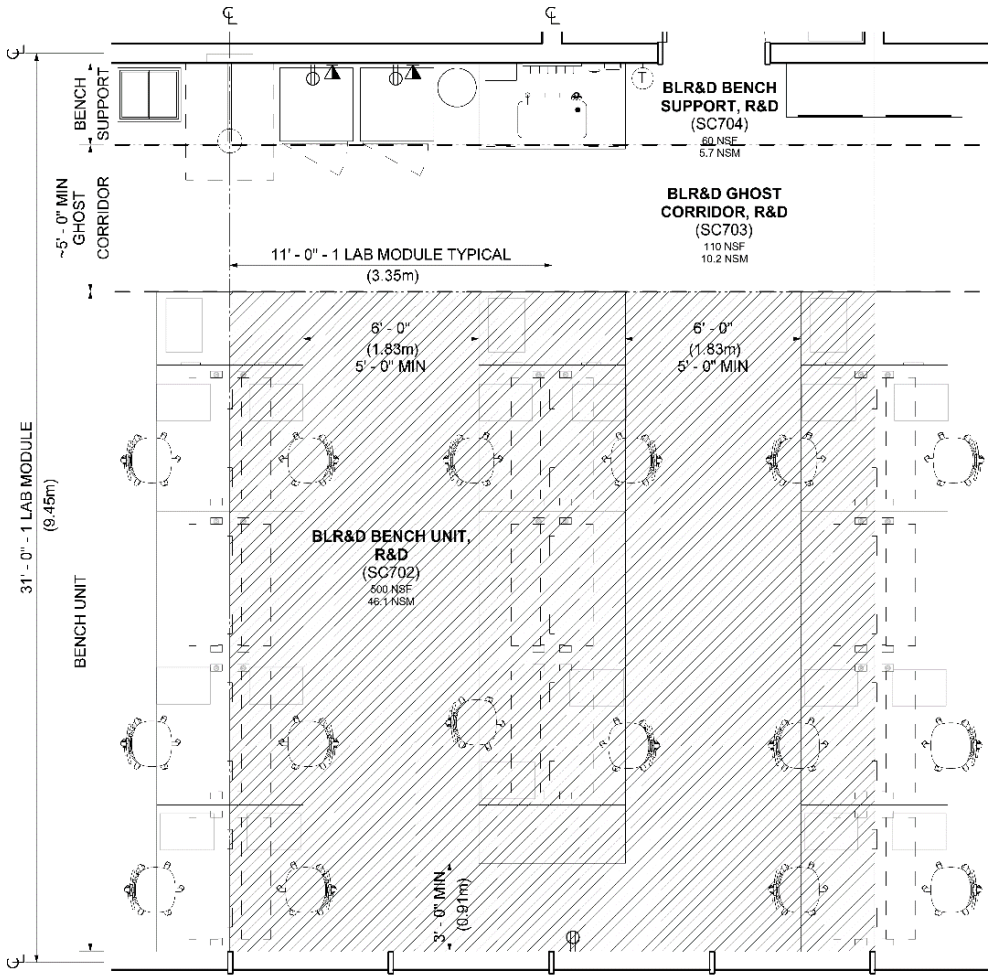


Figure 14 Lab Module (with the Lab Bench Unit shaded)

6’ aisles between the lab benches provides enough space for researchers to work along the lab bench back-to-back and navigate behind each other as needed. Figure 15 below illustrates the efficiency of the 6’ aisle, compared to 5’ and 7’ aisles. The bench efficiency percentage is derived from the square footage of the bench itself, divided by the square footage of the lab module. 5’ aisles have the highest efficiency and are acceptable if required by existing constraints, but can present difficulties for staff navigation around the lab benches. 7’ aisles create unused space between the benches, reducing efficiency.

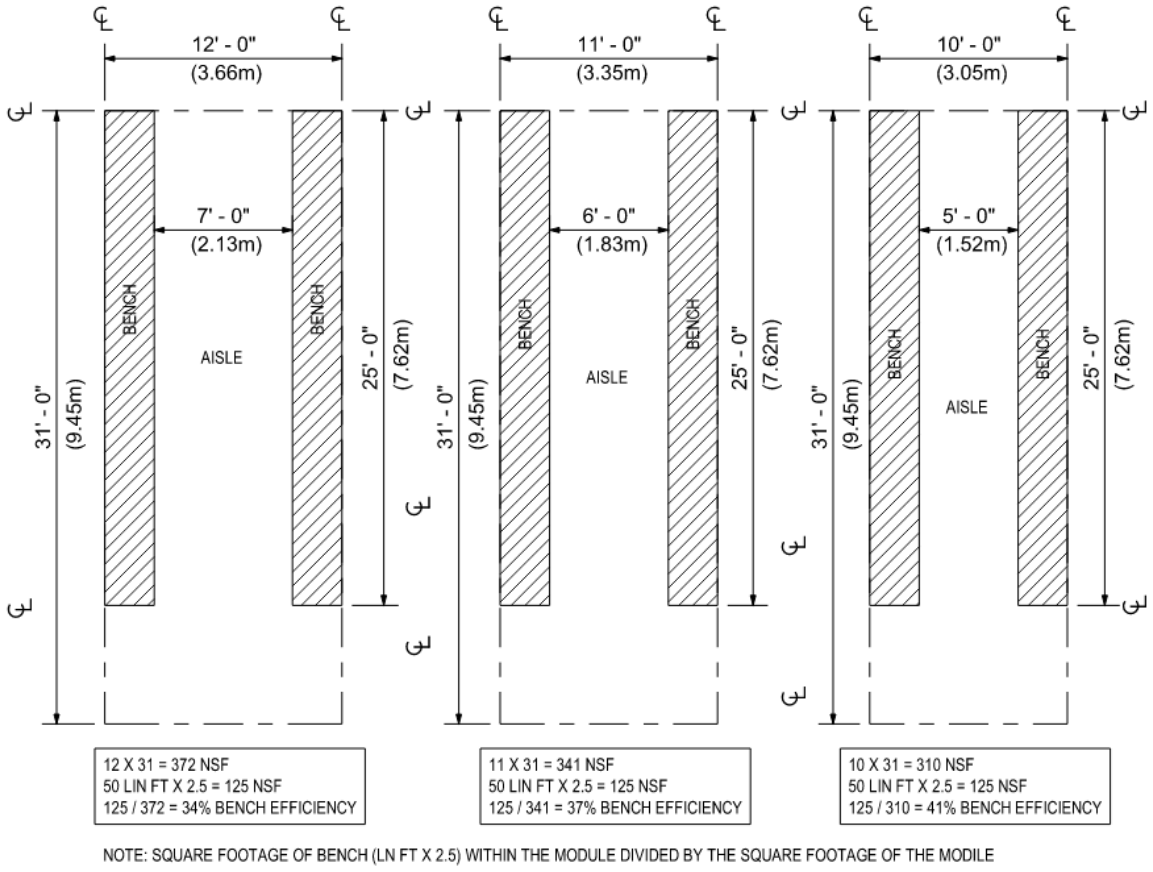


Figure 15 Lab Module Ratio

Another important feature of the 6’ aisle between lab benches is that it maintains the 11’-wide lab module. The lab module forms the floor plate for the entire facility. All research and support spaces follow the established module. An advantage to implementing the module concept is the ability to convert research space and accommodate laboratory furniture and equipment with minimal interruption to the neighboring areas. A consistent module also minimizes the disruption of columns in lab and support space, as the column grid is coordinated with the module dimensions.

The two figures below illustrate how support space is optimized by following lab module dimensions. Figure 16 shows the formation of the lab module (the blue block) based on Bench Unit sizing:

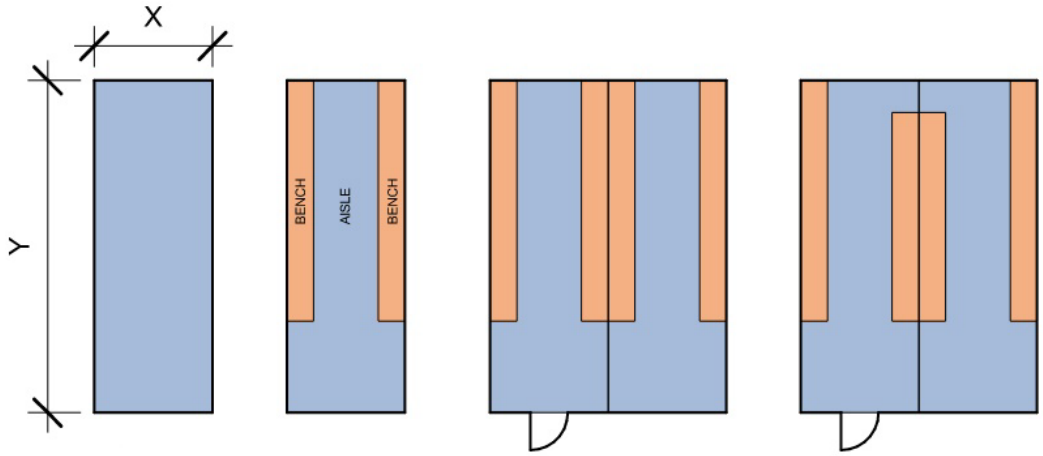


Figure 16 Lab module dimensions

In Figure 17, the lab module is illustrated as the basis for the framework that defines the Support Area. The numbers in the bottom row represent the number of lab modules within each support room.

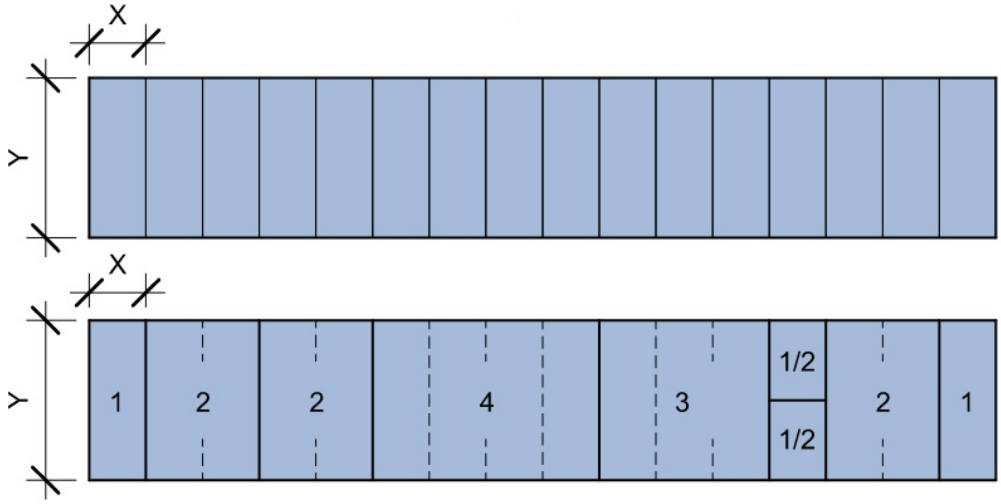


Figure 17 Lab modules in support spaces

The module dimensions described in this section must be evaluated for each project, as justified deviations may be necessary. However, the width of corridors must not be less than 5’, and preferably not more than 6’. Narrower corridors risk being too small for the turning radius of equipment, while wider corridors risk becoming used for storage.

Column spacing is ideally centered on the laboratory module width (22’ or 33’ spacing for 11’-0” modules) to minimize columns conflicting with equipment and travel paths. Centering columns on the module also benefits room layouts, as columns can project out into spaces where the obtrusion has a lower impact on functionality, such as the Service Core, rather than projecting into small rooms with precise layout, such as the Tissue Culture Room.

For renovations, a lab module width of 10’-0” may be optimal if the existing column spacing is 20 or 30 feet, particularly in open laboratories. The 31' lab module depth can be achieved by removing existing partitions and orienting the benchwork parallel to the corridor. Two adjacent spaces can combine to form a laboratory module.

2.4.4 Zoning and Space Relationships

The efficiency, safety, and performance of research in the laboratory is enhanced with strategic location of equipment and space. Space within the laboratory is zoned according to levels of risk, while the laboratory itself is located strategically in relation to other spaces.

Risk-Based Zoning

The reduced hazards in the laboratory (described in Section 2.3 Space and Global Trends) allow laboratories to be zoned into varied areas of risk: higher risk for high chemical use, and lower risk for areas with lower chemical usage and where data analytics are performed. Risk-based zoning facilitates more efficient planning for bringing chemicals into and out of the facility, minimizing chemical and fire hazard risks.

Rooms with greater chemical use require higher air change rates. Locating fume hoods in dedicated, smaller spaces allows zoning of the mechanical systems to provide higher air change rates and make-up air where fume hoods and higher hazard chemicals are used. This zoning allows for lower air change rates in the open laboratory areas without fume hoods and hazardous chemical usage for greater energy efficiency for the facility. Consequently, reduced construction and operating costs, as well as the energy use reduction goals of the federal government, are supported by this approach. Overall laboratory safety is also supported by zoning higher chemical and fume hood equipment usage away from open laboratory, lower chemical usage, and data analytics spaces.

The Service Core (discussed in Section 2.5 Biomedical Laboratory Research and Development [BLR&D] Service) helps to provide a safer and more efficient laboratory by keeping chemical flow, freezers, and maintenance staff outside of open and closed laboratory space to the greatest extent possible.

Dry workspace for writing up experimental laboratory data can be performed in the open laboratory on the Bench Unit or in office space outside of the laboratory area. The latter location has an overall facility energy efficient advantage, as office space has lower air change requirements than laboratories. Laboratories have very high energy requirements; current minimum VA laboratory space ventilation rates are at least six air changes per hour when the laboratory is in use, but may be much higher (e.g., in Fume Hood Rooms), and that air must be cooled/heated as required (see Section 3.5 Mechanical Systems for more information).

Locating office-style work outside of the laboratory reduces the amount of high-energy, high-cost space required at a facility. Transferring ventilation air from lower-risk space, such as offices, to low-risk laboratory space, and from low-risk laboratory space to high-risk laboratory space, can reduce overall ventilation air requirements. Using chilled beams or fan coil units for excess or spot cooling rather than increasing ventilation may also reduce excess ventilation requirements for cooling. As the overall trend of increased data sciences continues, considering new ways to combine (or separate) the dry workplace and the laboratory bench workplace is an important part of planning, both for changing adjacencies and for responsible energy usage.

Specialized areas within various zones often have unique requirements because the equipment housed there is particularly sensitive to vibration, heat, light, or a combination of factors. Vibration mitigation may involve isolating certain spaces from mechanical rooms, dumbwaiters, and elevators, and may be found in both lower and higher hazard zones.

Locating spaces where hazardous materials are handled adjacent to service elevators allows efficient transfer of these materials and waste in and out of the laboratory space. Administrative areas are preferably separated from the traffic generated by the laboratory, and close to passenger elevators. Consider zoning the overall laboratory floor into a high hazard and service zone (e.g., fume hood and specialized rooms), a moderated hazard and service zone (for example, open laboratory rooms) and a low hazard and service type zone (for example, staff officing) to maximize effectiveness and systems design.

Refer to Section 2.5 Biomedical Laboratory Research and Development Service (BLR&D) for more information on Laboratory Support and Staff Rooms.

Space Relationships

Appropriate relationships and adjacencies in the laboratory area are essential to permit a smooth flow of personnel, supplies, and equipment. All of the resources that researchers use on a daily basis, including laboratories, support and research staff space, and all shared equipment, must be conveniently accessible in relation to each other.

Support Area rooms, discussed in Section 2.5.3 BLR&D Support Area, are adjacent to the open laboratory. The Support Area contains closed spaces (Fume Hood Rooms, Tissue Culture Rooms, Equipment Rooms, Glassware Washing / Sterilization Rooms, ultralow freezer space, etc.) and utilities necessary to support individual labs. With the layout depicted in Figure 18 on the following page, Support Area rooms holding equipment such as fume hoods and BSCs are easily shared between researchers. The collaboration that results from sharing equipment encourages interaction among the laboratory staff. The distance between laboratories and common Support Area rooms is to be as short as possible since samples, chemicals, and flammable materials are transported between the two areas.

Principal Investigators' offices must be close to the labs. To foster staff interaction, the offices are preferably grouped in clusters.

The laboratory is ideally located with convenient access from the Veterinary Medical Unit so that specimens may be transported easily. A dedicated elevator can connect these two areas in a multistory facility.

Figure 18 depicts an open laboratory planning concept that brings together all of the zoning and adjacency needs described in this section.

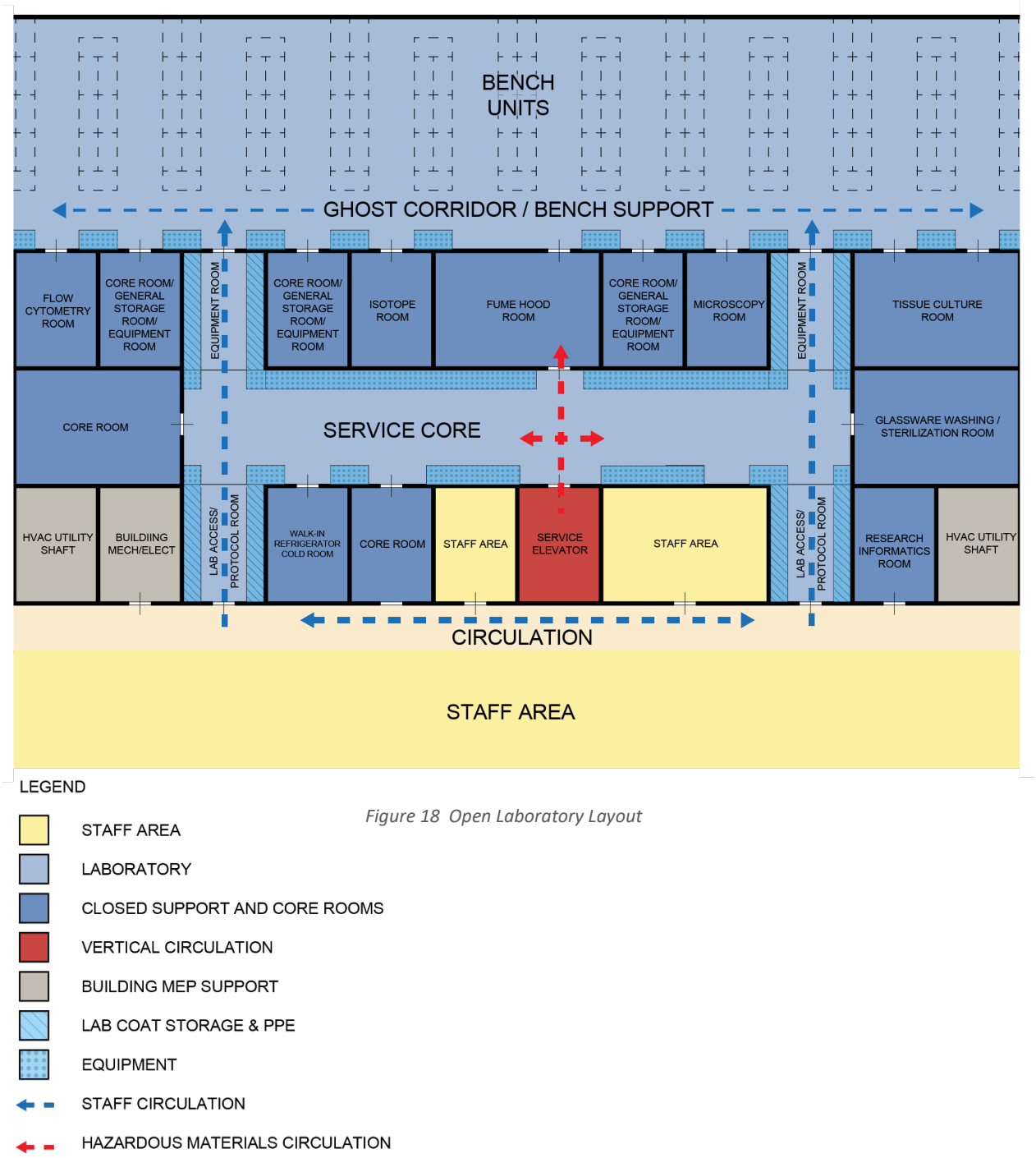


Figure 18 Open Laboratory Layout

2.5 Biomedical Laboratory Research and Development (BLR&D) Service

2.5.1 Introduction

In BLR&D space, experimental research is performed at the cellular, molecular, and physiological level. The equipment and technologies used in this research can change rapidly, and the ability to adapt the space to those changes is a vital design element.

Data analysis plays an increasingly large role in laboratory-based experimental research. The balance of time spent in the lab with hands-on benchwork versus time spent performing analysis of the data generated has a major impact on laboratory facilities.

2.5.2 BLR&D Research Area

The BLR&D Research Area is an open laboratory consisting of the Bench Units, Bench Support, and Internal Circulation space. The layout of the open laboratory is discussed in Section 2.4 Strategic Planning of Laboratories, and detailed in Section 4 Room Templates.

The typical BLR&D team consists of one Principal Investigator and three Research Associates. The lab module, described in Section 2.4.3 The Lab Module, accommodates a BLR&D team's needs for benchtop research equipment and write-up space.

2.5.3 BLR&D Support Area

The Support Area is adjacent to the Research Area and consists of rooms housing equipment or processes requiring specialized environments. Equipment that generates heat or noise, and higher-hazard processing spaces, is also kept in Support Area rooms, outside the open laboratory space. Support spaces may be shared or dedicated to an individual Principal Investigator's needs. These rooms are to be located with convenient access for all researchers to facilitate and promote sharing.

The subsections beginning on the next page detail Support Area rooms that are found in most laboratories. Depending on the needs of the facility, the selection of rooms from those defined in PG-18-9 Space Planning Criteria, Chapter 278 may also include the following:

- Flow Cytometry Rooms, in which cells of various types are sorted and counted
- Cold Rooms for refrigerated storage or processes that benefit from cold environments, such as protein processing (note: chromatography cabinets in the open laboratory are becoming a preferred alternative to Cold Rooms)
- Rooms for infrequently used processes such as mass spectrometry, genomics, specialized electron microscopy, nuclear magnetic resonance, and Isotope Rooms (note: high level Isotope Rooms require access control. If Isotope Rooms are included in the design, any required access control for these rooms must be coordinated with the research activities in the space.)

Fume Hood Room

Fume hoods are used in laboratories to protect the researcher from hazardous chemicals used in the research processes. Chemicals are used within fume hoods, preventing fumes from entering the room environment outside of the fume hood. See Section 4 Room Templates for details of the contents and layout of this room.

In order to minimize the transport of chemicals in a laboratory, Fume Hood Rooms are also used to contain chemical storage. Fume Hood Rooms are ideally located on a direct path from the service elevator or service entry to keep incoming chemicals and chemical waste movement out of the public corridors or the open laboratory (see Figure 18 Open Laboratory Layout in Section 2.4 Strategic Planning of Laboratories).

Section 4 Room Templates includes two layouts of the Fume Hood Room, which are also illustrated below in Figures 19 and 20. The first Fume Hood Room houses one fume hood, and is accessed from the open laboratory through an opening with no door, allowing it to share the air supply of the laboratory. The second Fume Hood Room shown has two doors, providing access from the Service Core (described below) for chemical transport, and from the open laboratory for researchers. This Fume Hood Room houses three fume hoods, requiring higher air change rates than the open laboratory. The details of these options can be found in Section 4 Room Templates.

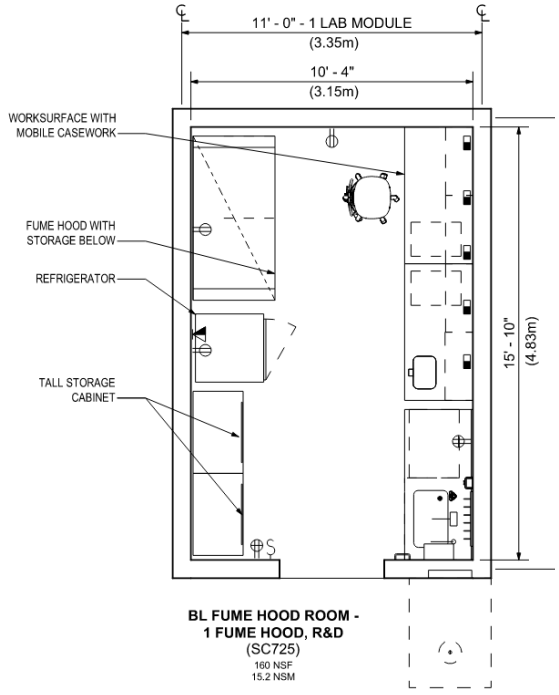


Figure 19 Fume Hood Room – 1 Fume Hood

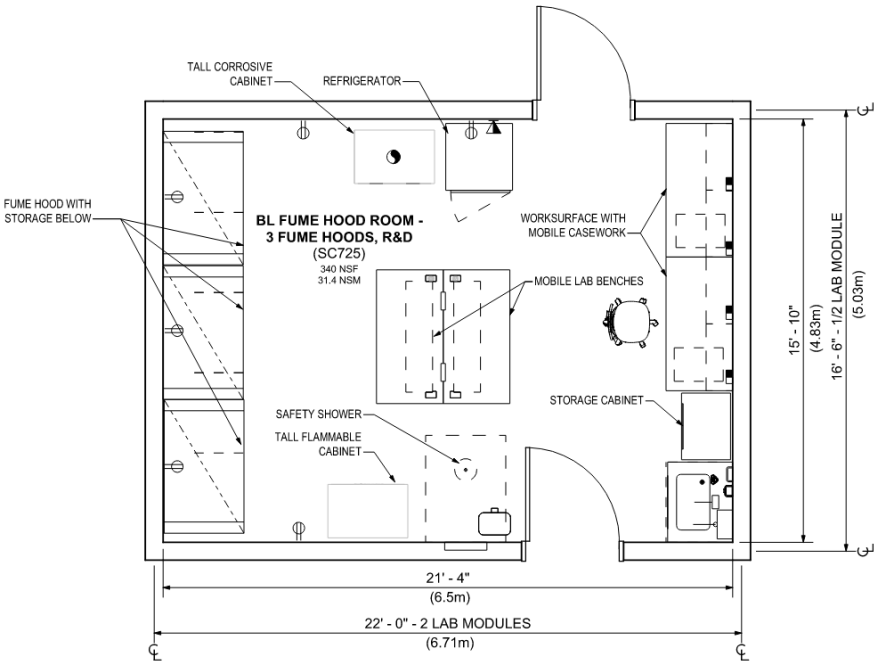


Figure 20 Fume Hood Room – 3 Fume Hoods

An analysis of anticipated chemical use is necessary during the planning stages of design. Depending on jurisdiction, codes such as the IBC or NFPA 45 outline requirements for the quantity of chemicals that can be stored and used in open or closed systems within an enclosed space. The design must ensure that the chemical storage and use match the allowable chemical storage requirements; however, ongoing chemical management is the only way to ensure compliance. Other guidance, such as NFPA 30, which provides safeguards to reduce the hazards associated with the storage, handling, and use of flammable and combustible liquids, must also be consulted.

Flammable chemicals must be stored separately, rather than in the fume hood, to facilitate the sharing of fume hoods among multiple research teams. Flammable chemical storage requires specialized cabinets, which may be vented, to minimize the potential for fire from the chemicals. Acids, bases, and other reactive chemicals are stored separately. Other miscellaneous chemicals and reagents that do not require specialized storage may be stored in cabinets and shelves. A chemical waste cabinet or space in the flammable storage cabinet must be provided to minimize chemical waste stored in the fume hood. A refrigerator is included in the room for chemicals that require cold storage.

Figure 21 A Fume Hood at the New Orleans VAMC R&D Facility is located next to a corrosive storage cabinet, and shares ventilation.

Some higher-hazard functions, such as perchloric acid and higher-level radioisotopes, require specialty hoods with unique design features such as dedicated exhaust systems, exhaust system wash downs (for perchloric acid), and HEPA or activated-charcoal filtration, depending on the risk assessment. These specialty hoods are rare, and are to be included only if there is an established need. If there is a potential future need for a specialty hood, the utilities can be planned for and stubbed out for future installation. Provisions for future installations may include a short duct with specialized fans and venting towards the top of the facility, additional power, etc. as required for the anticipated hood.

Tissue Culture Room

In tissue culture spaces, researchers work with live tissues or cells. The tissue may be infectious agents such as viruses and bacteria, or clean cells that have been cultured to be used as a model for the research. The requirements of tissue culture space may vary depending on the specific use. See Section 4 Room Templates for details of the contents and layout of this room.

Tissue cultures are susceptible to contamination and environmental changes that can affect the research results. The integrity of the tissue culture and the safety of the researcher are important drivers for the room layout and adjacencies. The layout described in these Standards supports a workflow to provide the culture integrity and researcher safety. A clean, stable, and safe working environment must be provided.

To protect tissue cultures from potential contamination within the room/environment and to protect researchers working with hazardous samples (such as those with infectious pathogens), the samples are worked on in a biological safety cabinet (BSC). BSCs protect both the user and the product through a balanced air barrier at the front of the BSC that maintains air downflow and inflow. Coordination between the BSC and the mechanical systems in the rooms is critical to ensure proper BSC performance. The room's air supply diffusers must not blow air towards the BSC, which could affect the BSC's air balance, potentially creating an exposure risk to the researcher. If the BSC is directly connected to the building's mechanical system, any imbalances or changes can have a negative impact on the cabinet's performance.

The placement of BSCs in the Tissue Culture Room must be planned to minimize disruption to researchers while seated at the BSCs. Section 4 Room Templates includes a Tissue Culture Room with a traditional layout of two BSCs in the back of the room, where researchers can work back-to-back; Section 4 also includes a Tissue Culture Room with a cockpit-style BSC arrangement, where each researcher occupies a corner of the room. These options are also illustrated in Figures 22 and 23 on the following page. Both configurations allow researchers to work at BSCs without the need for another researcher to move past them. In the traditional layout, the BSCs on opposite walls can be staggered, rather than back-to-back, to provide more room behind each researcher.

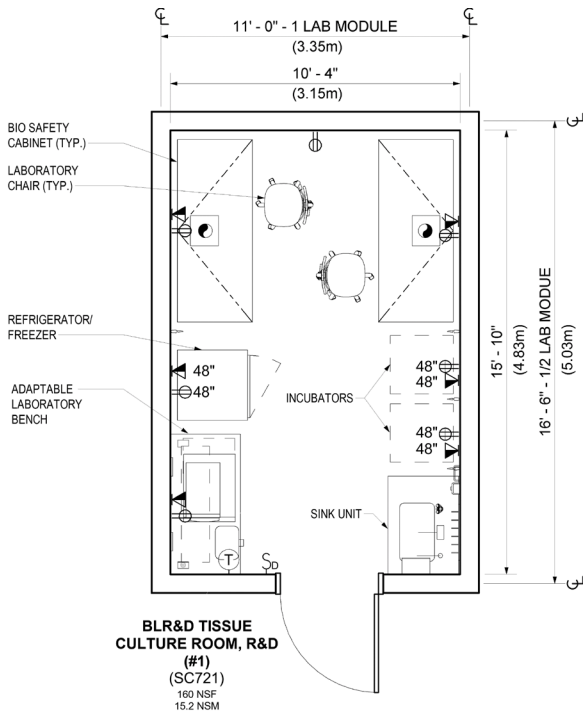


Figure 22 Tissue Culture Room (#1)

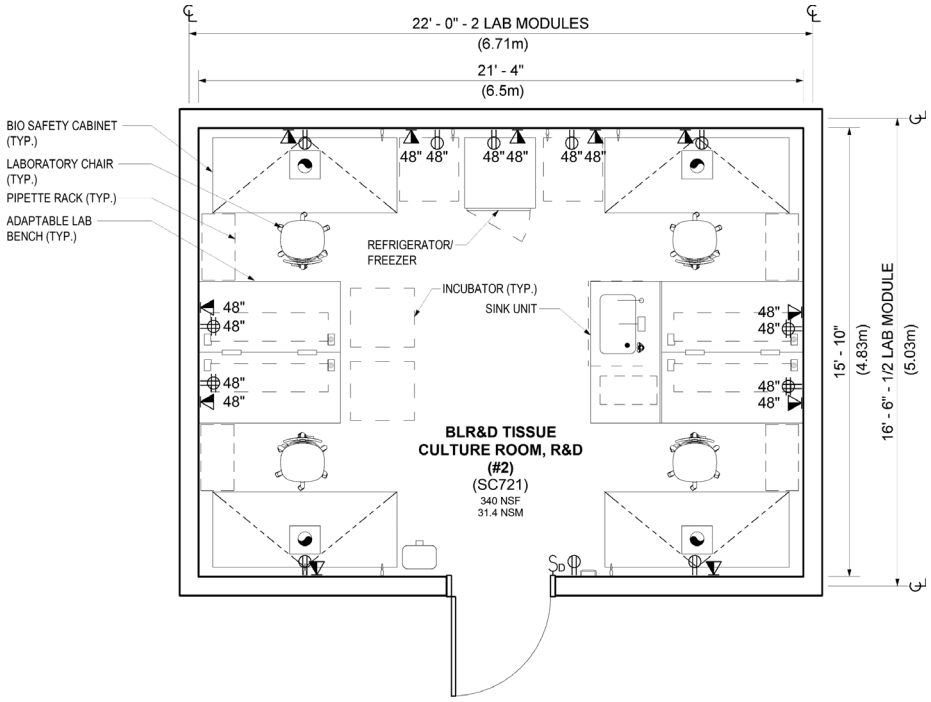


Figure 23 Tissue Culture Room (#2)

The potential for contamination of samples is reduced by minimizing movement into and out of the Tissue Culture Room. The room must be planned to accommodate all the tools necessary for working with the cultures. Among those tools are incubators, where the specimens are kept at very precise temperatures and conditions to allow them to grow as required by the research. Incubators, refrigerators, and freezers for samples and growth media, as well as microscopes, centrifuges, and water baths are common equipment in tissue culture spaces.

Incubators for tissue culture generally require carbon dioxide (CO2). Piped gas from a manifold or central system eliminates the need to move gas cylinders around. A centralized distribution system is preferred for Tissue Culture Rooms.

Sinks in the Tissue Culture Room are located by the entry, and must be sized for handwashing only to prevent them from being used for chemical disposal.

Microscopy Room

Microscopes that are relatively small and low-resolution are located throughout the laboratory along the lab benches, and in Support Area rooms such as the Tissue Culture Room. Specialized, high-resolution microscopes are housed in dedicated Microscopy Rooms. One Microscopy Room may contain a single or multiple microscopes. See Section 4 Room Templates for details of the contents and layout of this room.

The specific requirements of the Microscopy Room depend on the type of microscope used. High-resolution microscopes are typically vibration-sensitive and may require vibration mitigation measures such as vibration-isolation tables. Some microscope tables require compressed gas to operate; ideally this gas is piped from a central gas location versus point-of-use gas cylinders in the room.

Computer screens are often used alongside specialized microscopes, and require additional table space in the room.

Microscopy Rooms require a darkened environment, so an interior location with no windows is necessary to facilitate darkening. Black-out curtains can be placed between microscopes if there are multiple microscopes in the room.

The facility's HVAC systems, mechanical spaces, and vibration-producing spaces must be planned to avoid causing any vibration or distribution of dust or other particles in the Microscopy Room. Refer to Section 3.5 Mechanical Systems for a discussion of HVAC requirements.

The design must account for the research teams' anticipated needs for specialized microscopy equipment. Confocal microscopy is the most common type of specialized microscopy found in VA laboratories. The inclusion of electron, cryo-electron, and other highly specialized microscopes must be assessed as part of a project-specific solution.

Figure 24 The Microscopy Room at the Rocky Mountain VAMC R&D Facility provides a dark environment with no windows and black walls. A vibration-isolation table is provided for the high-resolution microscope.

Service Core and Freezer Storage

The Service Core is a large equipment room that supports the laboratory by housing freezers and other bulky equipment, providing utility distribution and maintenance access for Support Rooms and the open laboratory, space for compressed gas cylinders and manifolds, and circulation space for chemicals outside the laboratory.

Biological samples are stored long-term in low-temperature and ultra-low-temperature freezers. Freezers produce noise, heat, and vibration, and require a significant amount of floor space (even though many are vertical). It is important to locate freezers out of the open laboratory as often as possible, where mechanical systems can provide supplemental air conditioning and mitigate excessive heat in a controlled area. Keeping freezers in the Service Core provides energy efficiency for the facility.

Laboratory freezers often hold multiple years of irreplaceable biological samples, and operate well within a narrow range of room temperature. A backup cooling system must be provided in case of main HVAC system failure to keep the room temperature within acceptable limits for the freezers to remain operational. In the event of loss of normal power, there are several options for backup capability including liquid nitrogen, carbon dioxide, or standby electrical power backup systems. Cryogenic freezers utilizing liquid nitrogen have separate requirements and safety considerations that must be planned for. Refer to Section 3.8 Electrical Systems for a discussion of electrical requirements.

The number of freezers that are to be provided depends on the researchers' needs, but a typical allocation is two freezers per Principal Investigator for daily freezer usage. The adaptable space in the Service Core allows additional freezers to be added as needed, should sample storage needs increase.

The Service Core provides a central location for utility distribution (HVAC main distribution ducts, IT racks/distribution, plumbing lines, etc.) to laboratory spaces. It shares one or more walls with closed Support Area Rooms. Utilities can be accessed from overhead panels in the Service Core. A majority of maintenance can be performed outside of the Support Rooms in this arrangement. This exterior maintenance access helps to prevent outside contamination in the laboratory and Support Rooms by reducing circulation within them. See Section 3.5 Mechanical Systems for more information about system utilities.

The Service Core also provides direct access to the Fume Hood Room. With this layout, chemical waste can be retrieved from the Fume Hood Room without traversing through the open laboratory space. The Service Core can also contain satellite chemical waste storage shelves.

The recommended minimum width of the Service Core is 15'. Freezers may be as deep as 40" and are typically kept at least 4" from the wall for proper air circulation. A 15' Service Core width allows freezers to be placed on opposite walls while leaving circulation space between them when both freezer doors are open, or when maintenance ladders are in use to access valves, VAV boxes, etc.

Floor drains should be provided in the Service Core to provide the flexibility to accommodate ice makers or other equipment that requires drainage. Drains that are not in use must be capped.

Service elevators are preferably planned to open into the Service Core in addition to public corridors, minimizing chemical movement through the laboratory or public spaces.

Equipment Room

The Equipment Room serves as the passageway from the Service Core to the open laboratory space. Like the Service Core, this room is a flexible space for freezers and other bulky and noise-producing equipment items that serve that the open laboratory and Support Rooms. Because the Equipment Room is more directly accessible from the open laboratory and Support Rooms, the Equipment Room is intended to hold samples and other items that are more frequently used, while the Service Core is used for longer-term, less frequently accessed storage.

Glassware Washing / Sterilization Room

Autoclave sterilizers use high-pressure and high-temperature steam to kill microorganisms and spores, decontaminate biological waste, and sterilize instruments. The quantity and size of autoclaves at a given facility is to be based on an assessment of the work requirements.

A soffit at the ceiling above the autoclave is required to capture steam and moisture that exits the autoclave when opened at the conclusion of the autoclaving process.

Dishwashers are located in the Glassware Washing / Sterilization Room, rather than in the open laboratory, to minimize heat and noise-generating equipment in the laboratory. The use of disposable laboratory tools in lieu of reusable tools is a growing trend which reduces the quantity of dishwashers needed.

Laboratory Safety: Shower / Eyewash Stations

Safety Shower / Eyewash Stations are required for laboratory safety and must be in accordance with ANSI Z358.1 Emergency Eye Wash and Shower Equipment. They must be located along interior walls in every laboratory where they can be reached quickly and intuitively, without the need to visually search or open doors. It is vital that they be immediately accessible from anywhere hazardous materials may be handled, such as fume hoods. Refer to the VA Plumbing Design Manual for design requirements.

Floor drains are not effective for safety showers in laboratories, as they require sloped floors to remove the large quantity of discharge, and are a maintenance issue. It is preferable to keep local absorptive spill kits and wet-vacs available. However, some Federal, State, and local requirements mandate floor drains underneath safety showers, so an assessment of authority having jurisdiction's constraints is necessary.

Anti-slip round floor decals should be placed in front of each Safety Shower / Eyewash Station.

Figure 25 The Safety Shower / Eyewash Station is centrally located in the biomedical laboratory at the Rocky Mountain VAMC R&D Facility.

2.5.4 BLR&D Staff Area

In addition to the laboratory research space, a biomedical research facility requires settings for solo and collaborative work, as well as office workspace for the Principal Investigators and technical staff. The Principal Investigator typically has a private office, while the rest of the research staff have open office workstations for administrative work.

Dry research space for focused solo work, information sharing, and storage can be provided within the laboratory bench space or in office workspace. The trend of increased data analytics relative to experimental bench work is moving dry workspace out of the laboratory to workstations in the collaboration/office zone (illustrated in the Open Laboratory Layout diagram [Figure 18] in Section 2.4 Strategic Planning of Laboratories). In planning a biomedical research facility, it is important to understand how analytics at the specific site drive both laboratory and workplace zones.

The Staff Breakroom functions as a destination space for informal discussion, team meeting, respite, or solo work.

A display in a communal staff area where researchers can congregate and discuss their work promotes awareness of the achievements and progress of the research teams. Such a display also promotes cross-team relationships and chance encounters. It may consist of a whiteboard, bulletin board, or monitor, and may be located in a Staff Breakroom, administrative area entrance, or hallway intersection.

Collaboration space is discussed in more detail in Section 2.10 Staff Workplace and Collaboration Space.

2.6 Veterinary Medical Unit (VMU)

2.6.1 Introduction

The VMU is planned to provide a research environment that is safe for researchers and staff and compatible with the sensitive needs of laboratory animals.

For planning purposes, the project team must ascertain the types of animals to be used for present and future research. VMU animals are categorized according to their status under USDA classification. Rodents such as rats and mice are exempt from USDA regulation, and are classified by the VA as small animals. Small animals make up the vast majority of animals in VMUs, and will therefore be the primary focus of this section. Large animals (those regulated by USDA standards) include species such as rabbits, guinea pigs, ferrets, dogs, sheep, and swine. Large animals have more stringent requirements for surgery procedures; therefore, the inclusion of large animals in the planning of a facility has a significant impact on design. If the possibility exists that large animals could be used within the lifespan of the VMU, the design must include the requisite spaces to accommodate them.

2.6.2 Animal Protection

The flow of animals, materials, and staff in a VMU requires precise planning to protect animals and staff. The layout and flow within a specific VMU depend on the research being performed, and the animals in use, but in all cases, they must protect the sensitivity and health of animals.

The VMU design must shield animals from potentially distressing sensory input. An awareness of deceased animals or blood, whether through sight, smell, sound, or vibration, can cause stress which may disrupt or affect the research results. Different species must be housed in different locations of the VMU to prevent the animals' awareness of other species and thus minimize stress. Acoustic separation is especially vital due to the distance that loud animal sounds can travel.

Vibration and sound-producing equipment must not disturb animals or research. Rodents are particularly sensitive to ultrasound and may be disturbed by noises inaudible to the human ear. A slight amount of vibration from equipment can be distressing, particularly when breeding colonies are present. The design of the VMU must minimize the impact of noise and vibration-producing equipment, whether by isolating the VMU from such equipment, or with mitigating techniques such as vibration isolators.

Holding and procedure space must be designed to accommodate the specific levels of noise produced and sensitivity to sensory input of the specific species being used in research. Levels of noise and sensitivity can vary greatly between species.

Animals create a large amount of waste which must be removed and disposed of without undue exposure to animals or staff. Housing and procedure spaces need to be easily disinfected, which requires precise protocols and layouts specific to the facility.

2.6.3 VMU Location

The VMU's location must prevent contamination and disturbance of the animals by other services and activities in the building. Animal sounds from the VMU must not be audible from other activities in the facility. However, the biomedical laboratory should be convenient to access from the VMU, for quick transport of specimens.

Locating the VMU on either the highest floor or basement of the facility is preferable for isolation. A basement location reduces the distance that the high amount of materials, waste, and animals moving to and from the VMU must travel, and bypasses the potential need for a dedicated VMU freight elevator. However, planning a basement-level VMU must include an analysis on flood risk and flood damage prevention. VMUs are not to be located in basements in flood-prone areas, due to the risk of animal, sample, and equipment loss in the event of flooding.

Interstitial space above the VMU floor, and/or a separated mechanical area, can facilitate maintenance staff access without the disturbance of entering sensitive spaces in the VMU.

2.6.4 VMU Animal Area

High-Density Versus Low-Density Rodent Housing

Efficient animal holding in the VMU allows the highest animal census at any given time. Research equipment to house rodents can support either low-density or high-density populations. The design must provide space that can support both uses to allow the VMU to accommodate its present and future research needs without creating space that may go unused. It is also critical that the planning stages of a VMU include verification of the type of research, and requisite housing, that is anticipated.

High-density housing (the Small Animal Holding Room described on the next page) maximizes the number of cages in a room with individually ventilated cage rack systems. High-density housing is ideal when the research involves a large quantity of the same subjects or multiple researchers sharing space without impacting each other's work.

Low-density housing (Behavioral, Metabolic Studies, and BSL-2 Small Animal Holding Rooms) may contain 10-25 rodent cages per room. In addition to the space demands of low-density housing, research that uses lower density housing often includes highly specialized areas to support the research. Some examples of specialized research that requires low-density housing and other unique space include the following:

- Behavioral studies typically require low-density housing to control the effects of crowding on animal behavior. The research often involves the use of additional equipment to conduct studies, such as place preference units, rotarods, or water mazes. There may be electrophysiology apparatus for sensitive neurological measurements. In addition, behavioral studies may require separation of the holding and behavioral testing spaces and video recording of animal behavior.

- Barrier animal spaces are physically separate from the rest of the animal facility; animals must meet pre-determined health requirements to enter and are maintained in a manner to prevent the entry of external pathogens. In addition to physical implements, VMU barriers utilize a comprehensive approach to protection that involves equipment, layout, and staff protocol. For example, animals should never leave a barrier space and reenter. Equipment that leaves the barrier space is typically sanitized in an autoclave before it is brought back in. (Barrier space is rarely required in VA VMUs, and is therefore outside the scope of these Standards; it is to be addressed as a site-specific design as needed.)
- Gnotobiotic animals (either germfree or associated with defined bacterial communities) are similarly protected from outside pathogens, but are also bred and contained in closely monitored aseptic environments in order to have complete control over the germs or bacteria in their bodies.
- Biocontainment space involves the study of infectious disease through the use of animals. Specialized space and protocols are required to keep staff safe, and to keep pathogens from leaving the laboratory. Biocontainment space planning will be addressed in detail in a future set of VA Standards on Biosafety Level (BSL) 3 facilities.

Small Animal Holding Room

Section 4 Room Templates contains detailed information on the contents and layout of the Small Animal Holding Room.

In addition to the ventilated racks where the animals are held, every Small Animal Holding Room must contain at least one animal transfer station. Animals are transferred to a clean cage every one to two weeks, depending on the facility protocol (this is an important clarification for the design team to confirm, as the design of the Cagewash Area depends partially on the frequency of cage changes). The animal transfer station provides laminar flow to protect the animals from pathogens during cage change (note that standard animal transfer stations do not provide protection to staff from allergens or zoonotic infectious disease).

Depending on the rodent census and the number of ventilated racks, a rack washer may also be needed in the Small Animal Holding Room.

Extraneous equipment must be kept to a minimum, and wall-mounted equipment must be consolidated rather than spread out. During cage changing, racks for clean cages are brought in before soiled cage racks are removed. The placement of features such as sinks, mop holders, and shelves must be unobtrusive to allow clearance to maneuver the racks as needed.

Figure 26 A Small Animal Holding Room at the New Orleans VAMC R&D Facility contains height adjustable ventilated cage racks, both single-sided and double-sided, which can be placed against a wall or freestanding in the middle of the room, respectively. The room also has exhaust vent pipes to evacuate dander and other particles.

Large Animal Holding Room

Section 4 Room Templates contains detailed information on the contents and layout of the Large Animal Holding Room.

Large animals need more space than rodents, and are therefore held in smaller numbers than small animals. The design of the Large Animal Holding Room manages the higher amount of waste that larger animals create with the inclusion of a hose reel with spray nozzle, trench drains, and drain piping for VMU staff to periodically hose down the room. The trench drains are at the back of the pens. The Large Animal Holding Room and trench drains must have positive drainage to prevent standing waste and puddles. If the room will hold swine or sheep, trench drains must be large enough to accommodate the high amount and size of solid waste, and sloped enough to provide adequate velocity to flush the waste. Refer to the Plumbing Design Manual for requirements on plumbing systems in VMUs.

Large animals are caged in pens which may be foldable and mounted on casters, or wheels that can be set on legs. Foldable cages are preferred if the facility has the capacity to wash them in the Cagewash Area, because they are easier to maneuver through corridors. Smaller large animal cages – such as for rabbits and ferrets – may be stacked. Swine thrive on social connection for their mental health, so a caging system housing swine must include some communal caging, with openings between pens.

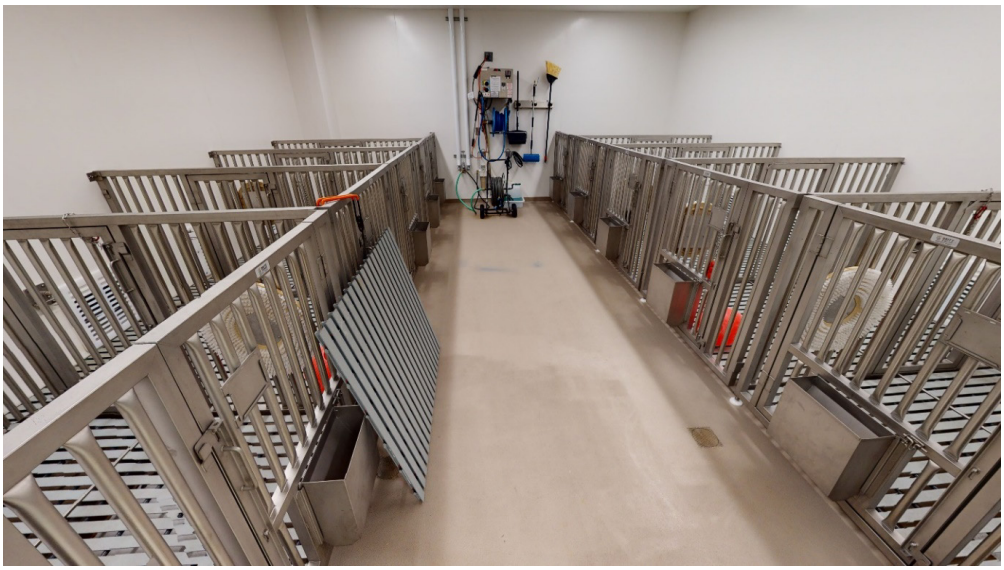


Figure 27 Cages in the Large Animal Holding Room at the Rocky Mountain VAMC R&D Facility include openings for social interactions and open grate flooring for cleaning.

Aquatic Holding Rooms

Some VMUs may perform research on aquatic animals such as zebrafish. Holding rooms for aquatic animals require specialized tank and pump systems that include water filter and circulation. These systems require a dedicated support room adjacent to the holding room. Aquatic Rooms are project specific, unique spaces that are not part of the baseline space requirements in PG-18-9 Space Planning Criteria. Refer to the National Institutes of Health (NIH) Design Requirements Manual (DRM) for design requirements on Aquatic Holding Rooms.

Quarantine Holding Rooms

Research animals received must be quarantined prior to introduction into the VMU for monitoring per the facilities quarantine protocol. The Small and Large Animal Quarantine Holding Rooms are similar in design to the Small and Large Animal Holding Rooms. They must be adjacent to a decontamination chamber and/or (for small animals) a pass-through biological safety cabinet, for animals to be placed immediately after receipt.

All Animal Holding Rooms require 100% exchange with outside air, making humidity control an extremely important consideration. Temperature control is also important. It is vital that preventative measures be in place to protect animals from overheating in the event of a power failure. Refer to Section 3.5 Mechanical Systems for HVAC requirements.

The lighting in Animal Holding Rooms is usually kept on diurnal cycles with sophisticated lighting intensity controls to simulate the animals' natural environment. If a viewing window is provided in the door, it must be tinted red to block light from the corridor. Emergency fire alarm lights must not be placed within these rooms, and fire alarm sounds are not to exceed 500 hertz in rooms housing rodents. Refer to the VA Fire Protection Design Manual for emergency alarm requirements.

Necropsy Room

Section 4 Room Templates contains detailed information on the contents and layout of the Necropsy Room.

In the Necropsy Room, post-mortem procedures are performed. Live animals can become distressed if they smell blood or sense the death of another animal, so there must be adequate distance for sensory separation between the Necropsy Room and animal holding or procedure space. Appropriate locations to provide this separation can be adjacent to the soiled side of the Cagewash Room or the back of the VMU.

A necropsy downdraft table draws air through an exhaust vent, controlling odors as necropsies are performed. Because it is required for necropsies on large animals and all animals with infectious disease or toxic chemicals, it must be included in the Necropsy Room design. It is preferable to place the downdraft table in the middle of the room to allow access on all sides, and vent through the floor. If the project conditions preclude venting down, the table can instead be placed against the middle of a wall where it is accessible from three sides, and an air exhaust duct is connected to a wall on the fourth side. A third option is a mobile downdraft table with the ability to connect to an exhaust duct on the wall or ceiling.

Deceased animals must be kept in freezers after necropsy until their removal. Large animal carcasses are stored in a walk-in Carcass Freezer Room. If the facility only keeps small animals, or smaller large animals such as rabbits, a chest freezer is sufficient to store carcasses, and is considerably less costly to cool than a walk-in freezer.

2.6.5 VMU Treatment Area

General Procedure / Treatment Room

Research, therapeutic, and behavioral procedures are performed on animals in General Procedure / Treatment Rooms. These rooms are preferably located in close proximity or immediate adjacency to the Animal Holding Rooms to minimize the behavioral impact of transporting the animals. There are very rarely more than two staff working at one time in this room.

The General Procedure / Treatment Room can be outfitted for many purposes, but typically contains a wall-mounted sink with a drainboard, one or two biological safety cabinets, an animal-changing station, and procedure tables/benches. The design team needs to determine whether fixed casework or moveable furniture should be added in the General Procedure / Treatment Room. Moveable furniture offers greater flexibility and adaptability, and is easier to sanitize. If casework is preferred, at least one General Procedure / Treatment Room should contain moveable furniture, to provide flexibility for future needs (for example, should the number of animals at the VMU increase, a General Procedure / Treatment Room with moveable furniture can convert to an Animal Holding Room with minimal disruption).

If stereotaxic surgery (brain surgery that sometimes involves the use of chemicals) procedures are anticipated, at least one General Procedure / Treatment Room must include a fume hood.

Figure 28 A VMU General Procedure / Treatment Room at the New Orleans VAMC R&D Facility contains stainless steel cabinetry, a biological safety cabinet, and a fume hood.

2.6.6 VMU Surgery Area

While small animals can undergo surgical procedures in a dedicated area within General Procedure / Treatment Rooms, large animals require a separate Operating Room. The surgical station in the Operating Room includes an operating table and an accompanying light, utility hookup, and medical gas system, ideally from a ceiling drop to the operating table to keep the floor area as clear as possible for moving equipment and instrument carts when needed.

The Operating Room is part of a suite of rooms. The operating suite includes: a Gown/Scrub Room for researchers to don/doff gowns and wash before/after the procedure; a Surgical Preparation Room for preparing the animal for surgery; a Recovery Room to monitor post-surgery animals; and a Surgical Supply Storage Room. The optimal layout of these rooms is illustrated in Figure 29 on the following page.

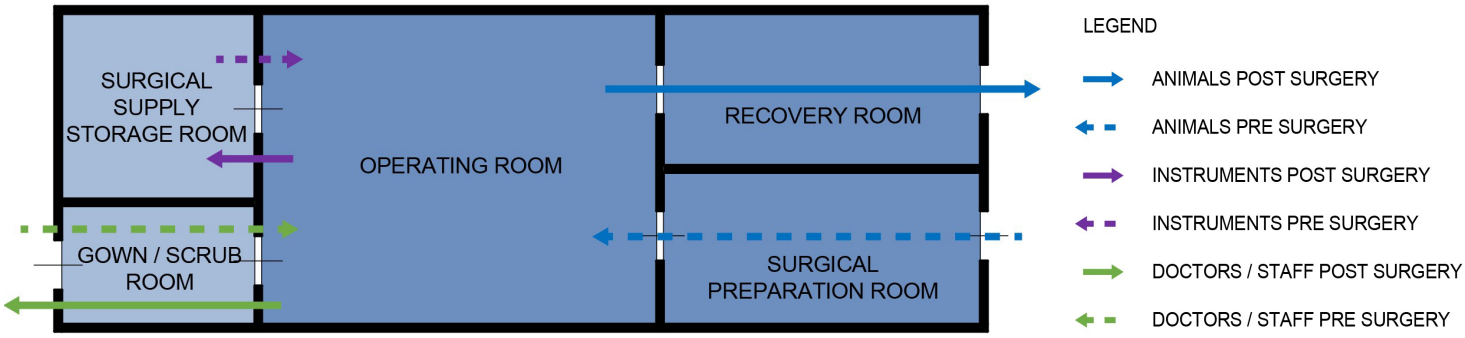


Figure 29 Layout and flow of a VMU Surgery Area

2.6.7 VMU Imaging / Behavioral Study Area

VMUs are increasingly incorporating Micro-CT, ultrasound, In Vivo Imaging Systems (IVIS), specialized imaging, and other equipment for imaging live animals. This development is a great benefit to research, as it eliminates the need to transport animals long distances for imaging. However, sharing that equipment within a VMU requires careful planning, especially if the animal being imaged is held in a barrier or biocontainment space.

The Imaging / Behavioral Study Area consists of a suite of rooms with an Imaging / Behavioral Study Preparation Room where animals can be sedated or otherwise prepared as necessary, and one or more Imaging / Behavioral Study Animal Holding Rooms, where the imaging occurs. The design must account for the anticipated imaging equipment in order to provide the appropriate number of Imaging Rooms.

The layout of space in the Imaging / Behavioral Study Area is similar to the space needed to support behavioral studies and Small Animal Holding Rooms. Thus, the area must include minimal casework and other fixed equipment to the extent that it can maintain flexibility, should the area need to be fitted for behavioral studies or animal holding in the future. Sinks must be included in these rooms for flexibility.

Some animals cannot share imaging equipment with the rest of the animal population, such as those involved in pathogen or germfree work, and may require a separate Imaging / Behavioral Study Area. This suite of rooms must also be designed with sinks and minimal casework so rooms can be converted to Small Animal Holding Rooms as needed. Including Animal Holding Rooms in the Imaging / Behavioral Study Area allows researchers to conduct studies without removing animals from the isolated suite of rooms.

2.6.8 VMU Cagewash Area

The VMU must be planned so that clean materials do not come into contact with soiled materials. In the Cagewash Area, this separation is achieved with a design that segregates the clean and dirty sides with the cage washing equipment, which acts as a wall separating

them. Soiled equipment is wheeled into the cage washer from the dirty side, washed, and then removed on the clean side.

The soiled side of the Cagewash Area provides space to maneuver equipment, remove soiled material like bedding, wash down cages as needed, and wash bottles and smaller cages outside of the built-in cage washer. Soiled bedding removal requires ventilation to collect dust from the soiled bedding as it is moved. The room must have positive slope towards a drain (or drains) to capture water as equipment is hosed down. In addition to the large cage washer that divides the Cagewash Area, a facility must also have smaller cage and bottle washers – two of each are preferred for redundancy and protection of the facility's operations in the event one is inoperable.

The type and size of built-in cage washer best suited for a VMU depends on the number of cages, bottles, and other housing equipment to be processed, and the frequency with which they are washed. Access to the washer is provided on the clean and dirty sides of the Cagewash Area, so staff can enter the washer to load cages on one side, and remove them on the other side. This separated cleaning may alternatively involve a tunnel washer which uses a conveyer system to move equipment from the soiled side to the clean side as it washes.

The clean side of the Cagewash Area includes an autoclave to sterilize bottles and cages. If a higher level of sterilization is required (such as for barrier or germfree space), there may be an additional layer of protection, with cleaned materials going through a sterilization chamber and into a sterilized area. The room or suite of rooms where sterilized equipment is being used must be located directly off the sterilizing space, so that the materials avoid any possible contamination. Bedding storage is also provided on the clean side of this area. Figures 31 and 32 on the following page depict the flow of the Cagewash Area with and without a Sterilizer adjacent to the Clean Cage Room.

Figure 30 The Soiled Cage Room at the New Orleans VAMC R&D Facility includes a pass-through autoclave, a cage washer, and a rack which can be used to wash bottles and other equipment in the cage washer if the bottle washer is down.

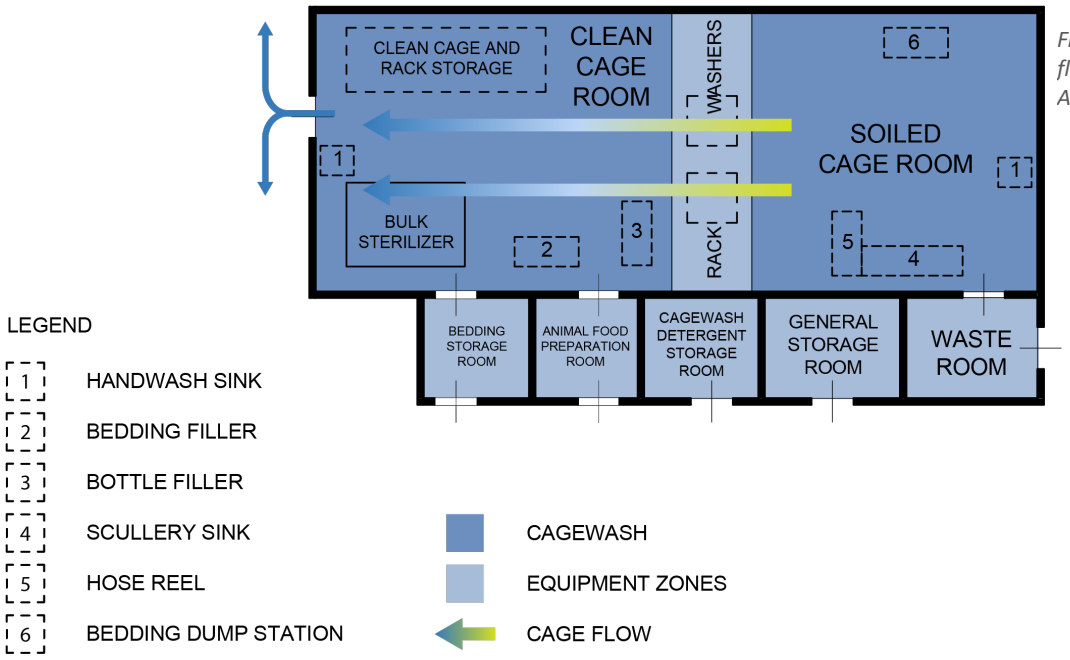


Figure 31 Layout and general flow through the Cage Wash Area (conventional)

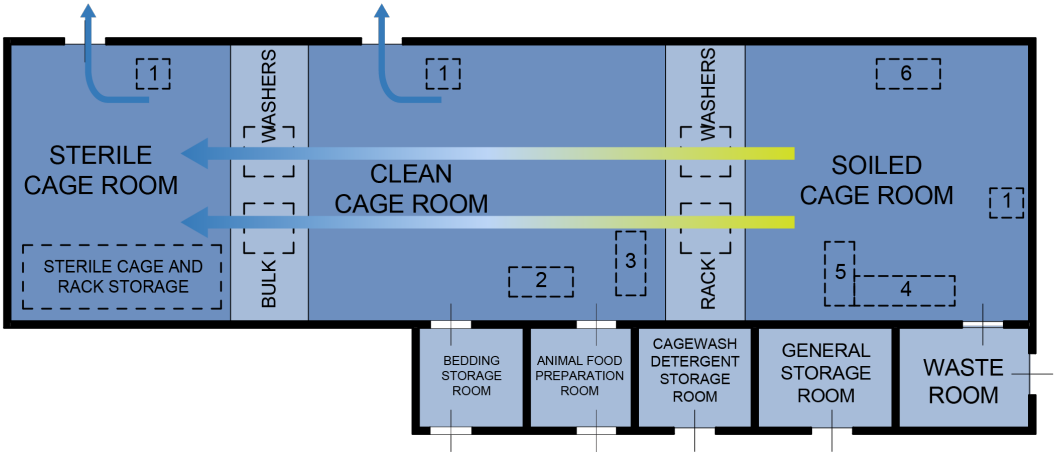


Figure 32 Layout and general flow through the Cage Wash Area (with Sterilizer chamber)

Figure 33 The Cagewash Area at the Rocky Mountain VAMC R&D Facility is separated into a clean side and a soiled side by the cage washer.

2.6.9 VMU Support Area

Loading Dock

All R&D facilities that include a VMU will have a dedicated research Loading Dock for animals, animal food, animal waste, and/or hazardous material supply and removal. The VMU Receiving Room should be directly accessible from the VMU Loading Dock.

The entrance to the Loading Dock should be large enough for vehicles such as semi-trucks or box-trucks to easily access. Delivery vehicles should not be integrated with other circulation, whether vehicular or pedestrian.

Very large VMUs, especially those with a high number of large animals, may require a secure Loading Dock with gates and fencing if the species of animals housed at the facility present a risk of escaping. All VMU docks are to be completely hidden from public access or view. See the Physical Security and Resiliency Design Manual for additional requirements for VMU Loading Docks.

Preventing Outside Contamination

All materials must be decontaminated prior to entering the VMU. The design must include a decontamination chamber in the facility's Receiving Room to wipe down equipment or materials at the point of entry where materials are received, between the VMU and Loading Dock or freight elevator. Materials may be manually wiped or misted with the appropriate disinfectant; alternatively, smaller items such as bags of feed or bedding can be moved through a decontamination tunnel with a conveyor belt and automated misting.

The staff point of entry includes a Locker Room with showers (refer to Section 2.6.10 VMU Staff Area) for staff working with husbandry to gown in/out and shower as required by the research protocol. Researchers' entry can be through an air-shower or vestibule with enough space for gowning.

Animals brought into the facility may require transfer in the Receiving Room through a pass-through biological safety cabinet – this is especially important if they are to be held in a germfree or immunocompromised environment. The cabinet is embedded in a wall that divides the room, with one side accessed from the point of entry and the other leading into the VMU. Typically, the animal transport container is disinfected, and the animals are placed into the biological safety cabinet and then received into the VMU, to prevent contamination of the VMU.

Feed/Bedding Storage

Feed and bedding are typically brought into the VMU in bulk and stored until use. Like all materials, the bags are decontaminated before entering the VMU. Bags are stored in bulk on risers/pallets in the Bedding Storage Room in the Cagewash Area; risers/pallets must be tall enough to clean under. A Food Storage Room – a walk-in cold room – is provided in the Support Area for feed requiring cold storage to preserve freshness.

Figure 34 The Feed/Bedding Storage Room at the Rocky Mountain VAMC R&D Facility is conveniently located next to the corridor leading to the Loading Dock.

Gas Storage

The facility's Gas Manifold Room must have a dedicated manifold system for the VMU that is not shared with other research services in the facility. Medical gas is piped from this room into VMU rooms as needed.

Corridor, Wall, and Door Protection

VMU corridors must withstand impacts from animal cage racks and equipment carts as they are wheeled through the VMU. Corridors must include metal guard rails, placed at 18" and 36", as well as corner guards.

Door frames through which racks will be wheeled are to be fitted with roller guards to redirect impacts and prevent damage to the door frame.

All finishes in a VMU must be durable and cleanable. The inevitable presence of bacteria in a VMU must not be allowed to grow, whether in porous or cracked surfaces. Fiberglass is an ideal wall finish because it is very strong, and once glued creates a continuous surface with no openings. Concrete masonry units (CMUs) are also strong wall material, and metal stud and gypsum board may be acceptable, but both of these wall constructions must be treated with multiple coats of built-up epoxy paint to a pinhole-free finish.

Refer to Section 3.3 Architectural Design and PG-18-14 Room Finishes, Door, & Hardware Schedule for additional information on doors and finishes.

Security

Access to the VMU must be restricted to VMU staff and research teams per the research facility's security protocols.

Documenting staff activity within a VMU is critical to ensure the validity of any research performed. Therefore, access to all Animal Holding Rooms, and to the VMU itself, should be restricted with badge entry that records access history.

Historically, VMUs are at a greater risk of intrusion than other research facilities. The design team must discuss the desired level of perimeter security needed for researchers to maintain personal safety and the integrity of the research. At a minimum, cameras at entry points must be provided.

Refer to VA Physical Security and Resiliency Design Manual for security requirements for animal research facilities.

2.6.10 VMU Staff Area

VMU personnel typically include veterinarians, supervisors, animal care technicians, researchers, and operations/maintenance staff, all of whom have different workspace needs.

Locker Rooms and Shower Rooms must be provided where staff can access them on their way into animal holding, procedure, and cagewash areas.

Animal care research associates have shared workstations for touchdown space throughout the VMU.

Veterinarians and supervisors have private offices which are preferably embedded within the VMU, near other staff spaces such as the Staff Breakroom, as well as the VMU entrance. If the VMU is in a basement without daylight, a suite of VMU offices may be provided on a floor above for access to daylight. These offices must be easily accessible to the VMU.

While a basement location may be preferred for ease of movement of materials, it can be psychologically draining on staff who spend their entire day in the VMU. De-gowning and showering to leave the VMU can be a tedious process, so most staff will stay in the VMU for meals and breaks. Daylight must be provided in staff space wherever possible.

Collaboration space is discussed in more detail in Section 2.10 Staff Workplace and Collaboration Space.

Figures 35 and 36 on the following page depict optimal layouts of the spaces discussed in this section in relation to each other, both with small and large animal holding, and only small animal holding.

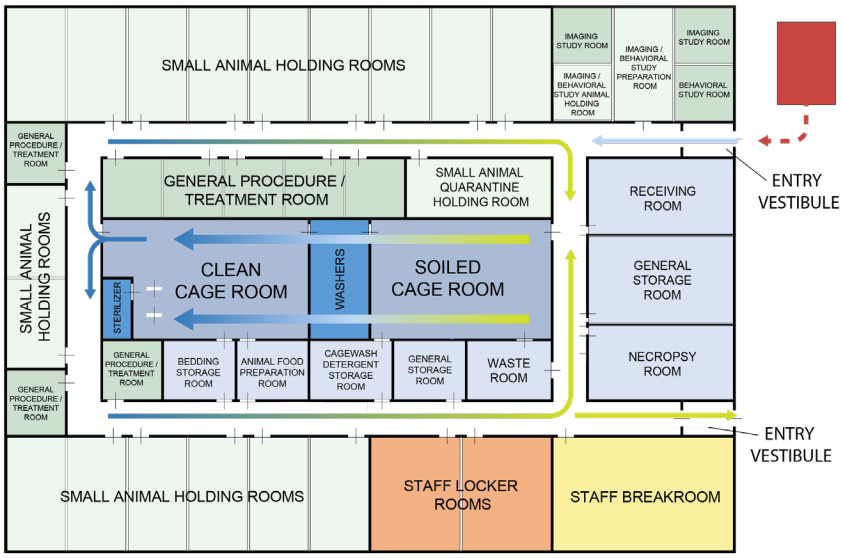


Figure 35 VMU – Small (small animals only)

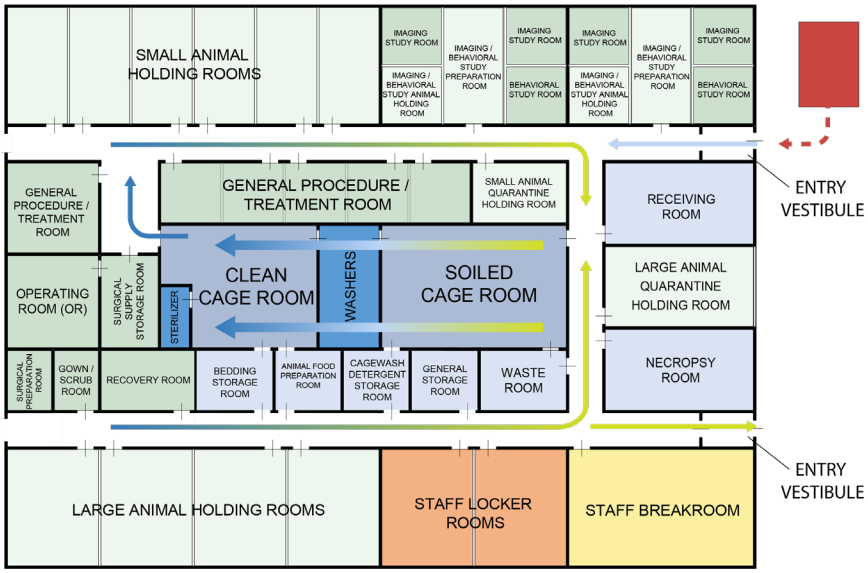
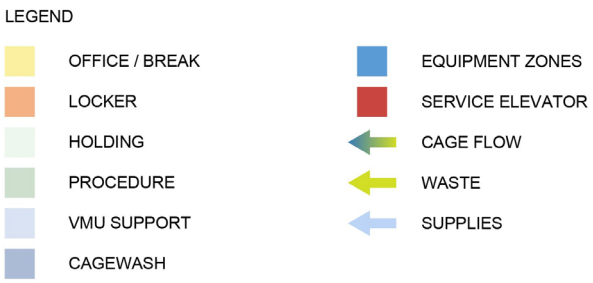


Figure 36 VMU - Large (small and large animals)



2.7 Rehabilitation Research and Development (RR&D) Service

2.7.1 Introduction

In rehabilitation research space, technologies and therapies for a variety of rehabilitation types are developed to work with Veterans. While rehabilitation treatment can generally be categorized into the into physical, sensory, cognitive and psychosocial therapies, they can expand anywhere that an injury or disease causes disabilities that need rehabilitation for return to functional status.

The needs of RR&D facilities differ significantly depending on the type of research activity. For example, research on lower limb rehabilitation will have entirely different space requirements than research on hearing loss and restoration. Because these specialized spaces are so specific to the research, they are not part of the baseline space requirements in PG-18-9 Space Planning Criteria. The design team must be heavily involved with the researchers at the facility to plan space around its specific current and anticipated research, therapies, and technologies.

Specialized RR&D space is comprised of two types: the Research Subject Area, where research on subjects is done, and the Research Support Area, where the technology and equipment used in that research is designed, fabricated, and tested.

Rehabilitation research frequently requires the use of both biomedical laboratory space, discussed in Sections 2.4 Strategic Planning of Laboratories and 2.5 Biomedical Laboratory Research and Development (BLR&D) Service, and rehabilitation research clinical laboratory space. Much of the clinical laboratory space is used in conjunction with the VAMC, either in the Medical Center itself or collocated near it. Often, research therapies may be collocated with standard-of-care rehabilitation space and use diagnostic services from the clinical laboratory or imaging service.

2.7.2 RR&D Research Subject Area

In rehabilitation research subject space, Veterans as research participants are recruited for research to determine the best approaches and therapies for rehabilitation. The spaces can include the following:

- Assessment rooms and exam rooms for examination
- Motion laboratories
- Auditory laboratories
- Virtual reality laboratories for assessing new technologies and devices
- Balance testing rooms
- Rooms for cardiopulmonary rehabilitation

These spaces tend to be more clinical than laboratory in nature, even though some are described as laboratories because of the research and development activities that occur in them.

New technologies in rehabilitation include virtual reality (VR) systems, which can involve a variety of gaming, exercise, and training programs to enhance rehabilitation therapies. The equipment needed to support VR can typically fit within a typical exam room or other therapy space, with no special requirements for the room itself. However, the most advanced VR systems may have special space requirements similar to motion analysis laboratories.

Many types of examinations and assessments occur in non-specialized exam or treatment rooms. Typically, the equipment required to perform tests and evaluations does not entail any specialized construction. However, many potential exceptions exist, such as electromagnetic shielding to manage phantom limb pain, and temperature and humidity controls beyond typical ranges to study the effect of moisture on prosthetic function.

Motion laboratories, in contrast, are typically highly specialized rooms. Camera technology and motion capture are used to measure and analyze the movement of a Veteran who may be recovering from a stroke or other injury, to determine the appropriate required therapy. Motion analysis laboratories tend to be large, open rooms where a Veteran can walk a distance, turn, and even climb stairs, while the camera or motion-capture equipment records his/her gait, to identify any movement or balance disorder. These assessments are often performed with the aid of anti-gravity lifts that run along ceiling-mounted track systems to assist the Veteran and prevent falls. Thus, the room where this research is done should be unobstructed by obstacles like columns, and have a ceiling high enough to accommodate any lifts. Specialized floors also are needed in motion laboratories to accommodate built-in platforms that measure Veteran contact with the floor. Motion laboratories are also used for studies on the effect of propulsion styles of wheelchair users on their upper limbs.

Auditory laboratories are another exception in the amount of specialized space planning needed, as they are often sound-deadened spaces and typically adhere to a higher level of sound absorption than is found in a normal auditory testing room.

2.7.3 RR&D Research Support Area

In rehabilitation support space, technology or equipment is designed, fabricated, tested, and adjusted for rehabilitation research. The RR&D engineering laboratories consist of laboratory spaces to facilitate electrical work for sensors or physical work to fabricate, assemble, or adjust therapeutic devices. The rooms include machine shops, woodshops, or 3D printing shops, robotics shops, etc. It is critical to provide the necessary space for research engineers to work with a variety of tool types and components to develop designs and improve technologies for rehabilitation.

Device implants into research subjects are an important tool in rehabilitation research. The support space for implant devices is highly specialized and requires a clean work area to allow safe manufacturing practices. The size of the space is driven by the type and quantity of the device being developed. The design must account for the researchers' and end users' required space needs for each specific station as well as the layout and required clean conditions for the implant device design and manufacturing processes.

RR&D often involves the fabrication of prosthetics. Prosthetic devices may be the typical variety such as artificial arms or legs, or they may involve bionic functions in which the device is merged with the nervous system to create a limb controlled by the user's thoughts, rather than biomechanical means. The requirements of the space depend on the very specific needs of the research team and the type of prosthetics being developed. However, a prosthetics lab typically uses plasters and plastics, often requiring fume hood space, space to shape and mold the prostheses, and storage space for the tools, supplies, and chemicals needed for manufacturing and assembly.

2.7.4 RR&D Staff Area

Rehabilitation research is very team-oriented and alternates between desk work and hands-on work in the biomedical laboratory and rehabilitation research clinical laboratory spaces. Workspaces are to be located with convenient access to the biomedical or clinical laboratory space, so that researchers can easily transition between settings. Workstations are assigned and clustered into groups that work together to facilitate teamwork.

Collaboration space is discussed in more detail in Section 2.10 Staff Workplace and Collaboration Space.

2.8 Clinical Science Research and Development (CSR&D) Service

2.8.1 Introduction

CSR&D utilizes the vast cooperative network of Veterans as research participants to move ideas along the translational pathway from scientific discovery to clinical application. Clinical research involves giving Veterans access to experimental therapeutics when the standard-of-care therapies have proven ineffective. It also involves retrospective data reviews to gather information related to specific conditions impacting Veteran's health, or the gathering of samples such as found in the Million Veterans Program which studies how genes, lifestyle, and military exposures affect health and illness.

CSR&D space in a given facility is highly specific and cannot be standardized. Because these specialized spaces are so specific to the research, they are not part of the baseline space requirements in PG-18-9 Space Planning Criteria. The design team must be heavily involved with the researchers at the facility to plan space around its specific current and anticipated research, therapies, and technologies.

Specialized clinical research space is generally divided into two types: the research clinic, where clinical research on subjects is performed and the research support area, where clinical research is organized and the results analyzed.

2.8.2 CSR&D Research Clinic Area

Clinical Research with research subjects is typically performed in one of two models. The first is a separate research facility designed specifically for the research. This space should be laid out as required for the type of research activity. It may include exam rooms, a processing laboratory for specimen processing, a research pharmacy, and any other special equipment or procedure rooms needed for the specific research being performed. For example, an eye research team will likely require ophthalmic lanes, clinical cancer research may need treatment rooms for infusion, cardiovascular research may need space for stress testing, a research team studying sleep patterns needs space for overnight studies, etc. Planners should meet with the researchers at a facility to ascertain their current and anticipated needs for research space and equipment.

In the second model of research, the design must accommodate both the research and clinical functions and maintain each function's schedule flow without impacting the other. Research functions tend to take a longer time with the subject than comparable clinical functions, due to the intense collection of data and histories related to the protocols required by the research effort. Because of these time requirements, the flow of Veterans in a research environment is slower than in a typical clinical space and may require dedicated research space in lieu of sharing with the medical clinical space.

Typically, when imaging or diagnostic equipment is required, such as X-ray, magnetic resonance imaging, or computerized tomography scanning, a research team will use the affiliate medical center's rather than purchasing research-only equipment. In those cases, the research is often integrated into the clinical space for easier access to equipment. This is the second model of research, in which the research is integrated into the Standard-of-Care facility at the affiliated medical center to create bench-to-bedside research implementation.

Clinical Science research facilities are often shared with biomedical research facilities, where samples acquired in the clinical research trials can be tested, analyzed, and otherwise experimented on. However, the clinical research facility needs to have its own processing laboratory, where freshly taken samples can be immediately stabilized before testing.

In both models of research, the design must provide a central, shared space for researchers to interact with Veterans before and after their participation in clinical research trials. Regardless of whether the research and care are provided in a clinical or research facility, the space is to provide all the amenities and comforts that a Veteran expects and deserves in a VA Medical Center.

2.8.3 CSR&D Research Support Area

The space required to support CSR&D primarily involves workplace areas. Researchers contact research subjects, analyze data, and manage the protocols and records required for the research. Compared to other fields, there is a great deal of paper documentation involved with clinical research protocols and records. Storage space for such documentation, both at individual workstations and long-term storage, is essential.

Research data typically includes personally identifiable information of Veterans participating in the research. Completed and ongoing research documentation both require secure storage to protect Veteran privacy. The level of planned security is to be determined at the project level.

2.8.4 CSR&D Staff Area

Clinical research is very team-oriented and alternates between desk work and hands-on work in the clinical setting. Workstations are to be located near the clinical space, so that researchers can easily transition between settings. Workstations are sometimes assigned to specific teams, and clustered into groups that work together to facilitate teamwork. There can be a shared space for teams running research protocols in association with the clinic.

Collaboration space is discussed in more detail in Section 2.10 Staff Workplace and Collaboration Space.

2.9 Health Services Research and Development (HSR&D) Service

2.9.1 Introduction

HSR&D examines health outcomes of the Veteran population in order to improve the delivery and distribution of medical care. Population research analysis allows researchers to identify trends in Veteran health that result from specific health care interventions.

HSR&D space in a given facility is highly specific to the research and cannot be standardized. However, the research is typically conducted in a dry research (office) environment.

2.9.2 HSR&D Staff Area

HSR&D is a fast-growing research field. Health Services researchers perform a variety of work activities in an office environment. Adaptable, modular Workstations are essential to allow for maximum team flexibility.

Open offices facilitate collaboration and efficient communication. Workstations can be divided into “active” zones for open conversation and “quiet” zones for phone calls and heads-down work.

HSR&D involves the synthesis of data from a broad network of sources and demographics. Guest speakers and group meetings are a necessary component of that synthesis, which the workspace should accommodate with group rooms and teleconferencing capabilities. Large meetings can be scheduled in the larger conference rooms of the adjacent Medical Center, if available.

Collaboration space is discussed in more detail in Section 2.10 Staff Workplace and Collaboration Space.

Figure 37 The New Orleans VAMC R&D Facility utilizes the renovated historical portions of the research building for office space such as Health Services and other dry research focusing on data analytics.

2.10 Staff Workplace and Collaboration Space

2.10.1 Introduction

Research work environments consist of small groups of researchers working closely together within a team while also collaborating with other teams and research services. The workplace design should support individual researcher success, inter-team collaboration, and connections between groups.

A variety of activity settings is necessary to support the numerous work processes, styles, and schedules in a research work environment. Open offices with shared workstations and a large amount of collaborative space are becoming more popular than traditional, closed workplaces. However, the optimal layout at a research facility provides a mixture of closed and open space, so that the staff has a choice of work settings to accommodate needs for in-person collaboration, virtual meetings, heads-down work, and private conversations.

2.10.2 Workstations and the Office Environment

Providing the ability for staff to control their ambient environment enhances their comfort, and is more feasible in dry research space where controls on the environment are less heavily regulated. Ambient environment considerations include visual and acoustic privacy, temperature, natural daylighting, and artificial lighting.

Access to daylight is enriching to staff wellbeing. Wherever possible, workspaces are to have direct access to daylight. Workspaces in windowless rooms should be avoided, unless required for control of the environment or activity. Providing borrowed light with windows on corridor walls increases the amount of light available in the design.

Many researchers work with Veterans on computer screens that must be protected from view. Where possible, Workstations requiring visual privacy should be positioned so that passers-by do not have visual access to computer screens, and visitors approach facing the seated researcher face-on, rather than from behind. Standing height partitions may be strategically placed for visual privacy, but are not preferable where they may block daylight.

All research services are supported by computational research. Computational researchers often require multiple screens at their workstations, extending the work surface horizontally and vertically. They may be working with extremely sensitive data and/or using high-powered processors to support the software they use. Such data and technology may require a secure informatics room dedicated for research in addition to the building's informatics/server room.

Many researchers (especially clinical science researchers) conduct phone calls regarding confidential subject matter. It is important that they have space where acoustic privacy can be achieved as needed. Private Call Rooms – small, enclosed rooms containing one unassigned desk – are to be provided near the open office area. These rooms can also be available for researchers needing a distraction-free environment for concentrated solo work.

A portion of staff performs work remotely or at multiple locations on and off-campus. Solo workspace needs for hybrid staff are accommodated by providing touchdown seats or unassigned workspaces. Lockers provide staff with the ability to secure their valuables near their workplaces while leaving unattended workstations open to other staff. Unassigned workstations must have the utilities and IT support for researchers to connect to the VA network with their government-furnished equipment, as well as the hardware and software required for a research or technician.

With the exception of clinical research, the demand for paper storage in research facilities is low.

2.10.3 Collaboration and Shared Space

Research facilities require a variety of settings to support collaboration within and between teams. Collaboration space that supports small, impromptu meetings drives teamwork. Larger space for interactions between teams supports intra-team gatherings. The design must provide appropriate amounts of space for both functions.

Associated VA Medical Centers and affiliated universities typically have auditoriums or large conference rooms available by reservation, which research staff can use for meetings with more than 20 people. However, the research building must accommodate the staff's daily conference needs.

Most in-person meetings at research facilities consist of fewer than eight staff and do not need the capacity of a Conference / Multipurpose Room. Huddle Rooms, which accommodate up to four staff, reduce underused conference space while promoting spontaneous collaboration and knowledge exchange when spaced throughout a research floor. Huddle Rooms are to be provided along circulation paths and near workspaces.

Private Call Rooms, described on the previous page, can also be used for private conversations between two people.

Programming needs are to be layered in the footprints of shared spaces to maximize their use for multiple purposes. The Staff Breakroom can be used for informal meetings, solo work, and phone calls. Huddle Rooms and Private Call Rooms should include laptop docks with several monitors for quiet solo work and teleconferencing capability for virtual meetings.

Many researchers move between multiple settings throughout the day. Circulation space between these settings can be used to facilitate spontaneous collaboration and chance encounters. When designed, circulation areas such as hallways, elevator lobbies, alcoves, or intersections can function as impromptu collaboration spaces and outfitted with a combination of white boards, counters, tables, or chairs to promote interactions and collaborations.

All Huddle Rooms, Conference / Multipurpose Rooms, Private Call Rooms, and Staff Breakrooms should have video teleconferencing capabilities. Researchers must have the ability to participate in virtual meetings without disruption to others' activities.

Each service's collaboration space may include an area where research teams can visually display and promote their current achievements and work. A whiteboard, post board, or digital display in a Staff Breakroom that is dedicated to promoting research achievements is a simple way to drive communication and allow staff to express their workplace culture.

Figure 38 Each floor of the Rocky Mountain VA R&D facility contains a Conference / Multipurpose Room with teleconferencing capabilities that includes a kitchenette to double as the Break Room for the floor.

Figure 39 The New Orleans VA R&D facility includes Conference / Multipurpose Rooms, which can be booked by any research team.

Research Informatics Room

Every service (BLR&D, RR&D, CSR&D, and HSR&D) will have a Research Informatics Room for the service's OIT system. As informatics within research services grow, so does the need for individual dedicated server rooms which researchers can access and maintain.

2.11 Building Entry and Visitor Reception Space

2.11.1 Introduction

Requirements for entries to R&D facilities are dictated by the Physical Security and Resiliency Design Manual. See Section 3.3 Architectural Design for additional considerations on the design of exterior entrances.

The flow of people in and out of R&D facilities must be tightly controlled and secured. Members of the public, such as vendors, mechanical maintenance crews, Veterans, job applicants, etc. are invited in and escorted to their destinations. The amount of reception space to be provided depends on the R&D facility's services, as well as its adjacencies and collocations with other VAMC facilities and services.

2.11.2 Reception Area

If both research and non-research services are located within a building, the Reception Area may be shared, and restricted access may begin at the point of entry to research spaces.

If the research facility occupies an entire building, and no clinical research with Veterans as subjects is performed, the Reception Area may be minimal and consist of a room with seating, and an intercom or phone for visitors to request an escort.

For research services that involve Veteran participation, such as CSR&D and RR&D, the design must account for how Veterans will enter the facility, and where the Reception Area is located. If the R&D facility is physically connected to the VAMC, Veterans may enter the VAMC and then be escorted to the R&D facility as needed. If the VAMC is not connected to the R&D facility, a Reception Area with a Reception/Information Station, Waiting, a Security Station, and a Universal Toilet is to be provided. Veterans who participate in research must receive the same level of care and respect as they receive in a VAMC setting.

Figure 40 The Reception Area at the New Orleans VAMC R&D Facility is shared with the VA Community Living Center administrative offices and the VAMC's Logistics Service. It is secured with PIV entry and visitor check-in requirements.

2.12 R&D Support Area

2.12.1 Introduction

The R&D Support Area includes rooms and spaces that support the entire R&D facility. These areas are typically located congregated around the Loading Dock, but may also be placed throughout the building (such as a Housekeeping Aides Closet).

2.12.2 R&D Support Area Considerations

Waste and Hazardous Material Storage

The following R&D Support Rooms are utilized for the handling and storage of hazardous material and waste. See Section 3.11 Waste and Hazardous Material Management and Flows for information on the management and flow of such materials.

- Chemical Waste Room
- Radioactive Waste Room
- Biological Waste Room
- Flammable Storage Room
- Corrosive Storage Room
- Gas Manifold Room
- Full / Empty Gas Cylinder Storage Room

In addition, hazardous material and waste storage space may occupy a portion of many laboratory spaces, including Fume Hood Rooms, Tissue Culture Rooms, Isotope Rooms, Glassware Washing / Sterilization Rooms, open laboratories, and throughout the VMU. Understanding the flow of hazardous materials and waste in the facility helps to ensure appropriate storage and hazard handling capabilities are available and minimize unnecessary hazardous material movement and exposure.

Loading Dock

Refer to PG-18-10 Architectural Design Manual for Loading Dock requirements, and Section 3.3 Architectural Design for more Loading Dock information.

As noted in Section 2.6.9 VMU Support Area, all R&D facilities that include a VMU will have a dedicated research Loading Dock for animals, animal food, animal waste, and/or hazardous material supply and removal. All other supplies and equipment are generally received at the VAMC and delivered to the R&D facility. If the VAMC and R&D facility are distant from each other, an assessment will be made for provision of a full-service Loading Dock or a VMU-oriented Loading Dock.

Bulk storage rooms for gas cylinders and hazardous materials may be located directly adjacent to the Loading Dock.

Receiving and Breakdown

Shipments into the facility must be received and broken down in a controlled manner. Most supplies will be delivered to the VAMC and then transported to the research building except for animals, food & bedding, most hazardous materials/waste, and large equipment. There should be direct access from the VAMC to the Receiving and Breakdown Rooms. Boxes that have been broken down and packaged for recycling are moved to the Recycling Room for disposal. The recycling pick-up area is usually at the VAMC Loading Dock, so cardboard will be transported back to the VAMC.

3.0 Building Technical Considerations

The intent of Section 3 Building Technical Considerations is to reference discipline-specific design manuals. The narrative of this section focuses on items that are not addressed, as well as items that deserve special emphasis for their critical nature or function.

3.1 VA Policies/Directives/Handbooks, Codes, and Standards

3.1.1 Local Codes and References

The Public Buildings Amendments of 1988, 40 U.S.C. 3312, require that each building constructed or altered by a federal agency must, to the maximum extent feasible, comply with one of the nationally recognized model building codes and with other applicable nationally recognized codes. In addition to building-specific codes, VA projects must comply with federal, state, and local environmental laws, regulations, and Executive Orders. VA's policy is voluntary conformance with state and local code requirements even when permitting or approvals from local regulators are not required.

As an agency of the federal government, VA functions as the Authority Having Jurisdiction (AHJ) for all VA facilities and projects on VA property, and has the responsibility to guard public health and safety through enforcement of its own adopted codes and standards. For leased facilities, the AHJ is the local authority.

Planning, design, and construction of all VA Research and Development facilities must be in accordance with this Design Guide and with the latest editions and/or versions of all applicable VA policies and standards.

Refer to Section 1.4 Codes & Standards for additional information as subject to project-specific contract terms and professional responsibilities.

3.2 Site Considerations

3.2.1 Physical Security

The VA Physical Security and Resiliency Design Manual (PSRDM) identifies the baseline physical security and resiliency requirements for Mission Critical Facilities, Life-Safety Protected Facilities, and Life-Safety Protected Facilities with Mission Critical Utilities/Systems Redundancies.

The manual identifies Animal Research Facilities (Veterinary Medical Units [VMUs]) and Research Facilities with Wet Labs as Mission Critical.

The manual identifies Research Facilities with Dry Labs Only as Life Safety Protected.

3.3 Architectural Design

3.3.1 General

VA reference materials are to be followed for architectural systems, products, and materials as required to meet VA standards. Refer to Section 1.4 Codes and Standards for applicable criteria.

The VA Architectural Design Manual, VA Physical Security and Resiliency Design Manual (PSRDM), VA Fire Protection Design Manual, and PG-18-14 Room Finishes, Door, and Hardware schedule provide specific architectural requirements for VA R&D facilities.

Outlined in this section are significant architectural elements, which list research-specific requirements. Refer to the above reference materials for additional requirements.

3.3.2 Exterior Building Envelope

Exterior Walls

Exterior wall construction should be reinforced masonry or equivalent for security. In addition, any existing exterior walls composed of metal or wood frames must have an interior backing of steel security screen mesh or steel sheet partition.

Exterior Doors

All exterior doors in an R&D facility (connected to a Medical Center) or department entry doors (if research is collocated within a Medical Center) are access-controlled and monitored and must meet PSRDM requirements. Public entrance doors must meet security protocols. In addition, all emergency egress doors from the research laboratory and VMU spaces must be access-controlled and monitored.

VMU entrance doors have specific requirements outlined in the PSRDM. In addition, entrances used to deliver animals and toxic chemicals must be in discreet locations and monitored by SSTV.

Loading Dock doors for animals, supplies, and equipment delivery must be insulated, industrial-grade overhead coiling doors. Adjacent to this overhead coiling door is a pedestrian door that allows vendor and staff access without opening the overhead coiling door. Provide an air curtain for insect and vermin control.

Exterior Windows and Glazing

Operable windows are not allowed in a research laboratory or VMU.

The locations of windows or skylights must meet the PSRDM for the following conditions:

- Less than 18’ above adjacent finish grade
- Less than 18’ from the roof of a lower abutment
- Less than 18’ from the windows of an adjoining building

- Accessible by a building ledge leading to windows of other floor rooms

The forced entry construction is only stainless-steel woven security mesh securely anchored to the window frame that has an intrusion detection alarm that annunciates in the Security Control Center. Other acceptable materials that provide security, and are not unsightly, may include laminated glass but are to be reviewed during design.

Roofing

There are no specific roofing requirements for R&D services. Refer to the VA specifications for acceptable roofing systems and accessories, and to the VA Fire Protection Design Manual for roof covering and roof deck assembly requirements.

Loading Docks

The Loading Dock area includes space for the Loading Dock(s), receiving and breakdown, waste, hazardous materials, and bulk chemical / flammable storage. For most VA R&D facilities, many of these services are located at the Medical Center Loading Dock. General trash and cardboard are transported to the Medical Center, and most supplies are delivered from the Medical Center. Unless transported to the Medical Center, flammable bulk storage and chemical waste are located at the Loading Dock in separate storage rooms. Review with AHJ and use NFPA to determine maximum gallons in one control area and location. Reference PG-18-9, Section FA13 for VMU support spaces and Section FA17 for R&D support spaces.

Provide isolated areas used for waste handling and do not stage waste materials within the receiving area. Separate spaces may be provided (based on the type of research) for holding and disposing of pathological medical waste, hazardous waste, radioactive waste, mixed waste, general waste, and recycling waste. Add floor depression with grate to contain spills in chemical rooms (with no drain).

Vermin control is critical in research laboratories, and especially in VMUs. All exterior doors in the loading dock to have weather-stripping, appropriate sealant to eliminate all cracks and openings (see Section 3.3.12 Sealants), and air curtain(s).

3.3.3 Interior Design

In PG-18-10 Interior Design Manual, there are no interior design requirements that are specific to R&D facilities. However, the interior design expectations for R&D facilities are to use materials that are durable and easily cleanable. Also, the selection of materials and colors should be limited to timeless selections, rather than trends.

Creating an interior design with an open lab modular layout, with ample exterior windows and views, improves health, productivity, and creativity for the research team.

3.3.4 Accessibility

R&D facilities are to comply with standards issued under PG 18-13 VA Barrier Free Design Standard, A Supplement to the Architectural Barriers Act (ABAAS). These standards apply to facilities designed, built, altered, or leased with federal funds.

There are no unique barrier-free design requirements for R&D facilities. Accessible casework is to be provided on an "as-needed" basis, so the architect is to review any special accessibility requirements with the users.

3.3.5 Signage and Wayfinding

The VA Signage Design Manual provides requirements and examples for exterior and interior signs. The signage at the R&D facility is to match the style at the Medical Center.

Wayfinding in most areas of an R&D facility is primarily for the staff as there is minimal outside visitation. However, if there is a main research entrance, a staffed or monitored space allows any visitor, research team applicant, or vendor to be stopped and then escorted into the research areas.

Any space that research participants traverse must provide similar wayfinding systems as a Veteran would encounter in a Medical Center, such as high-contrast signage and coordinated building finishes.

3.3.6 Interior Partitions

Construction

Typical wall construction details and requirements for interior partitions are found in the Architectural Design Manual and VA Standards for Construction, Special Sections, Architectural Symbols (PG-18-4).

Partitions are generally gypsum wallboard (GWB) on metal studs to accommodate different slab-to-slab dimensions, recessed items, and utility runs. See Table 3.3.7, Interior Wall Materials for a complete list of wall materials and finishes. In addition, specific interior partition requirements are detailed in the Physical Security and Resiliency Design Manual (PSRDM) for the following:

- All Interior partitions that separate the R&D facilities and VMU from other non-research services
- Interstitial space
- Storage rooms containing Category A select agents and irradiator rooms

All walls in the VMU (including Treatment, Surgery, Imaging, Animal Holding, and Cagewash rooms), except Offices, Toilet Rooms, and Breakrooms, are to be high-impact, moisture-resistant, impervious, and easily cleanable. Acceptable finishes in order of preference are Gel-coat Fiberglass Reinforced Polymer (GFRP), reinforced drywall with a resinous epoxy finish and base, or CMU with a high build glaze coating with all pinholes filled.

Design the VMU to protect the resident animal population from exposure to insects and rodents. Cap and seal tops of partitions that are not extended to the underside of the structure or ceiling to resist pest harborage and dust infiltration.

Laboratory wall strapping is not required if using a modular, adaptable casework system with integral shelves. However, if securing shelving to walls, provide the following:

- The interior lab side on the selected partition must have 102 mm wide (4”), 1.59 mm (1/16”) minimum sheet metal straps, placed horizontally on the studs for the entire length of the partition.
- Install the top edge of these metal strips at the following heights: 305 mm, 762 mm, 914 mm, 1,676 mm, 2,133 mm (12”, 30”, 36”, 66”, 84”).
- Strapping to be installed at any partition where casework may be hung for future flexibility.

Acoustics

The sound-resistant elements (partitions, doors, duct system) of the following spaces require sound-rated assemblies achieving a Sound Transmission Class (STC) as follows:

- STC of 60 in VMU for cagewash areas and small and large animal rooms, provide acoustical separation between all animal rooms and other adjacent spaces
- STC of 50 for all public corridors and functionally separate rooms
- STC of 45 for non-all public corridors

Other STC Requirements are in PG-18-3.

Wall Protection

Provide wall protection to incorporate corner guards in the Loading Dock area, corridors, and other areas with potential wall damage from supply or trash carts. To produce a clean, desirable aesthetic throughout the facility, corner guards are to be set flush with adjacent wall surfaces and selected in colors that complement the adjoining wall colors.

The VMU requires stainless steel or rigid vinyl wall protection in the Clean and Soiled Cage Rooms and other spaces with a high volume of cage movement.

3.3.7 Floors

Table 3.3.7, Floor and Base Materials on the following pages provides an overview of R&D facility spaces and their floor and base materials. This table identifies preferred finishes in bold type and includes a list of material abbreviations at the bottom. A room-by-room listing of all spaces and materials is found in PG-18-14 Room Finishes, Door, & Hardware Schedule.

The first category listed in the table is Semi-Public spaces which includes Visitor Areas, Staff Areas, Toilets, Locker Rooms, and Showers. The materials selected are similar to what is found throughout a VA Medical Center for durability and aesthetics. It is labeled Semi-Public as the public will be escorted to all these areas unless there is a Lobby that will be open to the public.

The second category is Research Areas. This includes all the BSL-2 Lab Areas (as defined by BMBL - Biosafety in Microbiological and Biomedical Laboratories), most spaces in the R&D facilities including bench space; specialty, and core labs; tissue culture; equipment rooms; wet/steam rooms; and clean research. Solid vinyl floor tile with a resilient base is an appropriate floor for Research Areas and a resinous floor with an integral base for wet / steam rooms and clean research.

The third category is VMU. All animal holding, procedure rooms, and laboratories require a resinous floor with an integral base for durability and cleanability. Wet rooms with temperature swings due to steam or cleaning with hot water require a urethane climatic resinous floor with an integral base.

The final category is Support Spaces including loading dock, waste holding rooms, chemical storage, and cylinder storage. These include research service areas that require a resinous floor with an integral base for durability and cleanability. There are also building service rooms that only require a painted epoxy floor.

Table 3.3.7, Floor and Base Materials

Semi-Public Spaces:

Type of Space	**Room Type Examples**	**Floor**	**Base**	**Notes:** Preferred Finish is in **BOLD**
Visitor Areas	Waiting and conference room	**CPT**	**RB**	Other decorative materials can be considered
Staff Office Areas	All workstations, offices, conference rooms, huddle rooms, and breakrooms	**CPT** SVT	**RB**	SVT is acceptable in the breakroom
Toilets and Lockers	Public and staff restrooms and lockers	**PT** RES	**PT** RES	
Showers	Staff showers	**PT**	**PT**	

Research Areas:

Type of Space	**Room Type Examples**	**Floor**	**Base**	**Notes:** Preferred Finish is in **BOLD**
BSL-2 Lab Areas	Biomedical and Rehab Research benches; specialty, and core labs; tissue culture; and equipment rooms	**SVT** RES-3 WSF	**RB** RES-3	RES-3, WSF, and SC are current VA floor standards, recommend SVT with RB
Wet/Steam Rooms	Glasswash and autoclave	**RES-3**	**RES-3**	
Clean Research	Microscope room	**RES-3** WSF	**RES-3** RB	

VMU:

Type of Space	**Room Type Examples**	**Floor**	**Base**	**Notes:** Preferred Finish is in **BOLD**
High Abuse/ Contamination Areas BSL-2 Lab Areas	All animal procedure rooms (imaging, ORs, treatment rooms, etc.), small animal holding, and necropsy	**RES-3**	**RES-3**	
High Abuse/ Contamination Areas BSL-2 Lab Areas	Large animal holding and cagewash sterilizer spaces	**RES-6A**	**RES-6A**	

Support Areas:

Type of Space	**Room Type Examples**	**Floor**	**Base**	**Notes:** Preferred Finish is in **BOLD**
Research Service Areas	Loading dock, waste holding rooms, chemical storage, and cylinder storage	**RES-3**	**RES-3**	
Building Systems	Interstitial floor, mechanical, electrical, and OIT	**EPY**	**SC**	

Abbreviations:

SYM	Description
CPT	Carpet Tile
EPY	Epoxy Flooring
PT	Porcelain Tile
RB	Resilient Base (Rubber or Vinyl)
RES-3	Heavy-duty urethane and epoxy mortar flooring system with integral base
RES-6A	Urethane Climatic areas subject to temperature swings
SC	High build glaze coating (Special Coating)
SVT	Solid Vinyl Floor Tile
WSF	Welded Seam Sheet Flooring (Heat Welded with Rod)

3.3.8 Interior Walls

Table 3.3.8, Interior Wall Materials below summarizes R&D facility spaces and their preferred wall materials. These tables identify preferred finishes in bold type and include a list of material abbreviations at the bottom. A room-by-room listing of all spaces and materials is found in PG-18-14.

This table's format is similar to Table 3.3.7, Floor and Base Materials. Refer back to 3.3.7 Floors for a detailed explanation of the formatting.

Table 3.3.8, Interior Wall Materials

Semi-Public Spaces:

Type of Space	Room Type Examples	Material	Finish	Notes: Preferred Finish is in **BOLD**
Visitor Areas	Waiting and conference room	**GWB**	**P**	Other decorative materials can be considered
Staff Office Areas	All workstations, offices, conference rooms, huddle rooms, and breakrooms	**GWB**	**P**	
Toilets and Lockers	Public and staff restrooms and lockers	**PT** GWB	**PT** SC	Toilet rooms with PT wet wall to ceiling and GWP/SC on dry walls
Showers	Staff showers	**PT**	**PT**	

Research Areas:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
BSL-2 Lab Areas	Biomedical and Rehab Research benches; specialty, and core labs; tissue culture; and equipment rooms	**GWB** CMU	**P** **SC**	CMU and SC are current VA wall standards - recommend moisture-resistant GWB with P
Wet/Steam Rooms	Glasswash and autoclave	**GWB**	**SC**	Moisture resistant GWB
Clean Research	Microscope room	**GWB**	**P**	

VMU:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
High Abuse/ Contamination Areas BSL-2 Lab Areas	All animal procedure rooms (imaging, ORs, treatment rooms, etc.), small animal holding, and necropsy	**GWB** GFRP CMU	**RES-W** PF RES-W	Wall finish options include abuse resistant GWB, FRP as the most durable and cleanable, and eliminate all pinholes in CMU
High Abuse/ Contamination Areas BSL-2 Lab Areas	Large animal holding and cagewash sterilizer spaces	**GFRP** GWB CMU	**PF** RES-W RES-W	

Support Areas:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
Research Service Areas	Loading dock, waste holding rooms, chemical storage, and cylinder storage	**GWB** CMU	**SC**	
Building Systems	Interstitial floor, mechanical, electrical, and OIT	**GWB**	**SC**	

Abbreviations:

SYM	**Description**
CMU	Concrete Masonry Units
GFRP	Gel coat Fiberglass Reinforced Polymer
GWB	Gypsum Wallboard System
P	Paint
PF	Pre-finished
PT	Porcelain Tile
RES-W	Seamless resinous coating for walls and ceiling
SC	High Build Glazed Coating (Special Coating)

3.3.9 Ceilings

Table 3.3.9, Ceiling Materials on the following pages provides a summary of R&D facility spaces and recommended ceilings. This table identifies recommended finishes in bold type and includes a list of material abbreviations at the bottom. A room-by-room listing of all spaces and materials is found in PG-18-14 Room Finishes, Door, & Hardware Schedule.

Ceiling heights are to be as follows at a minimum:

10’-0” Open and enclosed Labs, VMU Cage Washing, Loading Dock

9’-0” Other rooms 200 SF or greater

8’-0“ Other rooms less than 200 SF

Rooms where the ceiling is exposed to the underside of the structure above must have a minimum clear height as listed above. In addition, the room must have an additional minimum 4'-0" clear space to the underside of the structural system to allow for the

mechanical, electrical, plumbing and technology (MEPT) equipment. In rooms with animal cages, the ceiling height must be coordinated with the animal cage equipment to have a minimum 18" clear above the tallest cage.

The ceilings in the open and enclosed Labs can be either acoustical tile (AT) or exposed to structure and MEPT equipment/systems or a combination of both. All MEPT systems/equipment must be organized into a regular pattern and allow access for maintenance with the exposed option. An exposed ceiling option will require an increase in HVAC capacity and fire sprinkler spacing.

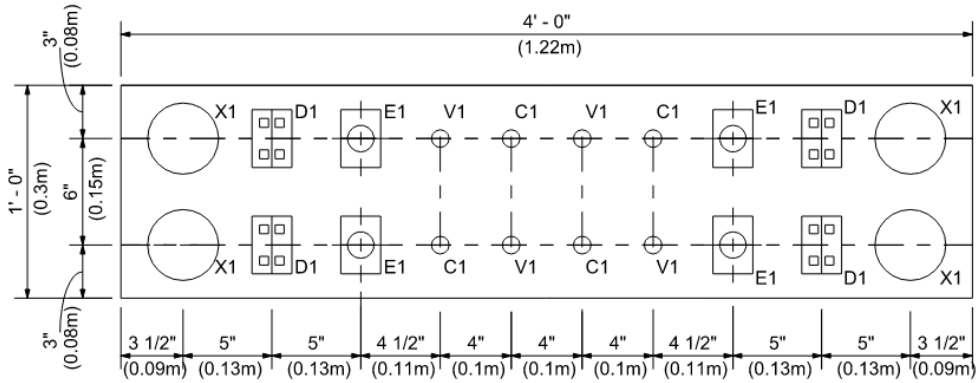
Overhead Service Panels

Overhead service panels are to be used in laboratories, above bench space, to provide flexible MEPT connections. The panels can fit into an acoustical tile grid system or be attached to the structure overhead using metal struts to suspend the panels above the lab bench. Panels should be developed specifically for the project based on the standard shown in Section 4 Room Templates.

Standard services include:

- Air, gas, and vacuum quick connects
- Electrical receptacles and faceplates
- Data outlets

The finish on overhead service panels is powder-coat to match ceilings. The service panels are set into the existing grid (grid by others) and secured to the grid with screws. Overhead support is to be provided as required.



E1 - ELECTRICAL OUTLET

D1 - DATA OUTLET

V1 - VACCUM

C1 - COMPRESSED AIR

X1 - EXHAUST

Figure 41 Overhead Service Panel Detail

The illustration above depicts a sample overhead service panel. Note that the overhead service panel is a customizable fabricated infrastructure endpoint, and accommodates a variety of gas, electrical/data, and exhaust needs. Each panel serves four benches on average. The services are only meant to be connected to the bench, with user endpoints on the bench itself.

See Sections 3.6 Plumbing Systems, 3.8 Electrical Systems, and 3.9 Telecommunications, Special Telecom, Monitoring, & Signal Systems for additional information on connections to overhead service panels.

Table 3.3.9, Ceiling Materials

Semi-Public Spaces:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
Visitor Areas	Waiting and conference room	**AT**	**PF**	Other decorative materials can be considered
Staff Office Areas	All workstations, offices, conference rooms, huddle rooms, and breakrooms	**AT**	**PF**	
Toilets and Lockers	Public and staff restrooms and lockers	**AT**	**PF**	
Showers	Staff showers	**GWB**	**PT**	

Research Areas:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
BSL-2 Lab Areas	Biomedical and Rehab Research benches; specialty, and core labs; tissue culture; and equipment rooms	**AT** EXP	**PF** SC	Exposed ceiling only applicable in open labs
Wet/Steam Rooms	Glasswash and autoclave	**GWB**	**RES-W**	Moisture resistant GWB
Clean Research	Microscope room	**CAT**	**PF**	Gasketed ceiling for dust control

VMU:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
High Abuse/ Contamination Areas BSL-2 Lab Areas	All animal procedure rooms (imaging, ORs, treatment rooms, etc.), small animal holding, and necropsy	**GWB**	**RES-W**	
High Abuse/ Contamination Areas BSL-2 Lab Areas	Large animal holding and cagewash sterilizer spaces	**GWB**	**RES-W**	

Support Areas:

Type of Space	**Room Type Examples**	**Material**	**Finish**	**Notes:** Preferred Finish is in **BOLD**
Research Service Areas	Loading dock, waste holding rooms, chemical storage, and cylinder storage	**EXP** AT	**P** PF	Ceiling to be GWB/RES-W for rooms without rated fire walls
Building Systems	Interstitial floor, mechanical, electrical, and OIT	**EXP** AT	**P** PF	

Abbreviations:

SYM	Description
AT	Acoustical Ceiling Tile
CAT	Cleanroom Acoustical ceiling Tile
EXP	Exposed
GWB	Gypsum Wallboard System
P	Paint
PF	Pre-finished
RES-W	Seamless resinous coating for walls and ceiling
SC	High Build Glazed Coating (Special Coating)

3.3.10 Doors and Hardware

A room-by-room listing of each room and its door and hardware requirements are found in PG-18-14.

Typical door sizes are as follows:

- 4'-0” wide doors in animal holding rooms, operating / procedure rooms, and cagewash rooms
- 3'-6” wide doors in all research areas and most of VMU (exceptions are 4’-0” doors in animal holding and cage wash, as listed above, and 3’-0” doors in staff areas, as listed below.)
- 3'-0” wide doors in all staff offices / lounges, conference rooms, and toilet / shower rooms

The 4’-0” wide doors are sliding doors, automated, and have a push button operation. This provides easy hands-free access into these rooms and minimizes impact to the size and usability of the spaces (as compared to swing doors).

Fail-secure (does not open if a fire alarm is activated) electronic locks are provided at all building or department entrances, loading dock entrances, and VMU entrances. Do not use magnetic locks to secure doors: use fail-secure electric strikes. In addition, card readers are to be provided at all rooms indicated above, plus all lab corridor entrances, service corridor access, and secured storage rooms (animal holding, chemical, hazardous waste, laser microscope rooms, radioactive storage, etc.).

All egress doors must comply with NFPA 101 (the latest edition adopted by the VA) Section 7.2.1.5.2: "locks and latches shall NOT require the use of a key, a tool, or special knowledge or effort for operation from the egress side." Delayed-egress hardware with a card-access by-pass is often used to secure these locations.

All doors are to be 7'-0” high. Verify the type of animal racks model the facility uses. Some older models have top mounted blowers and require an 8'-0" high door.

Door materials are to be gel-coat fiberglass reinforced polymer in animal holding rooms, hollow metal in the remainder of VMU and research labs / support, and solid core wood in staff areas. Hollow metal is acceptable in animal holding rooms and wood in the remainder of VMU and research labs / support if a more economical solution is required.

Avoid usage of thresholds for doors as this this creates obstructions for mobile equipment.

See Section 3.3.2 Exterior Building Envelope – Exterior Doors for additional information.

3.3.11 Millwork and Casework

Provide modular (interchangeable and readily available for easy reconfiguration) steel casework with stainless steel, phenolic, or polycarbonate resin casework in locations with corrosive environments. All casework must meet current Scientific Equipment and Furniture Association (SEFA) requirements.

In all laboratories, provide epoxy or solid phenolic countertops. Use stainless steel in VMU and meet all SEFA requirements. The recommended minimum counter depth is 762mm (2’-6”) and 1.5m (5’-0”) at peninsulas and islands. Verify if additional width is required for specialized equipment.

Plastic laminate, including chemical-resistant plastic laminate, is allowed in non-research areas such as breakrooms and conference spaces. All toilets are to have JSN CT025 - Countertop / Solid Surface with sink combination.

Laboratory sinks must be epoxy or stainless steel to facilitate the decontamination of surfaces. See Section 3.6 Plumbing Systems for additional information and requirements. Cupsinks are not allowed unless researchers identify a specific need. Add a marine edge at the surrounding sink perimeter to encourage the flow of water into the sink. Acrylic splash guards must be located adjacent to sink areas to prevent splashing water onto adjacent lab benches. Provide hands-free operation via automatic sensors. As required for ultra-purified water, provide a shelf mounted above the laboratory sink with a building pure water supply connection and dedicated power outlet to accommodate the point of use purification system.

Limited chemical supply stock is allowed in the fume hood rooms and under a fume hood. These amounts vary by jurisdiction so a code analysis is required to determine max allowed and locations.

Provide task lighting under all shelves above the work countertop. See 3.7 Lighting and Electrical Systems for additional requirements.

3.3.12 Sealants

Table 3.3.12, Sealants on the following page summarizes where to apply different sealants in types of research spaces.

All penetrations in partitions, floors, and ceilings must be sealed for sanitation and to resist air infiltration. Piping, ductwork, electrical boxes, and other penetrating items must be firmly anchored to resist movement that could damage seals. Penetrations must be visible for inspection and maintenance.

Seams between walls, floors, and ceilings, and between all dissimilar materials must be fully sealed. Sealant at movement joints is to be applied after installation of high-performance finishes to resist cracking.

Sealants must be applied in a uniform, smooth, and continuous manner, resulting in a finish free of voids, pinholes, or excess sealant. Sealant must be compatible with all material in contact with and be chemical resistant, flexible, durable, adherence, and other characteristics appropriate for its use. Opaque sealant is recommended to verify full coverage and highlight imperfections in an application. Following is a summary of the recommended sealants and their properties and attributes:

- JS-1 Architectural Urethane Sealant ASTM C920. This sealant is adhesive, flexible, and paintable, and stands up to heavy traffic. It is primarily used in the BSL-2 laboratory (as defined by BMBL - Biosafety in Microbiological and Biomedical Laboratories) and support.
- JS-2 100% Silicone ASTM C920. This sealant is elastic, adhesive, and waterproof; is not paintable; and has a mineral spirit cleanup. It is used in wet areas and ABSL-2 (as defined by BMBL), and VMU.
    - Use acetoxy mildew-resistant silicone sealant when sealing toilets, sink faucets, and other plumbing fixtures and in areas subject to standing water and dampness.
    - Use aluminum finish silicone sealant when sealing stainless steel in cage washers, tunnel washers, rack washers, and other stainless-steel equipment, fixtures, and assemblies. The warranty for this product will be voided in hot, steam, and wet areas and require replacement every five years.
- JS-3 Siliconized Acrylic Latex ASTM C834. This sealant is not waterproof, and cleans up with water.
- JS-4 Non-Halogenated Latex-Based Elastomeric Sealant ASTM C920. This sealant is used for floor and wall penetrations.

Table 3.3.12, Sealants

Doors:

Description	Non-lab	BSL-2	ABSL-2 or VMU	Comments
Door penetrations, hinges, view panel, hardware	NS	NS	JS-2	
Thresholds	JS-1	JS-1	JS-2	
Door frame and wallboard	JS-3	JS-3	JS-2	
Magnetic latch	NS	NS	JS-2	

Cabinetry/Shelving:

Description	Non-lab	BSL-2	ABSL-2 or VMU	Comments
Base mount for tables and legs, tops, and bottoms of shelf brackets	NS	JS-3	JS-2	
Seal where cabinets and countertops contact dissimilar materials or one another	JS-2 or JS-3	JS-2	JS-2	In Non-lab use JS-2 in toilets and or JS-3 in breakrooms
Around shelf support brackets, gaps, and openings in racks	NS	NS	JS-2	
Peninsular shelving support at countertop and ceiling	NS	JS-1	JS-2	

Walls/Floors/Ceilings:

Description	Non-lab	BSL-2	ABSL-2 or VMU	Comments
Wall and corner guards, bumpers and rails, Perimeter of AT or FRP ceiling frames	NS	JS-3	JS-2	
Penetrations through slab	NS	JS-4	JS-5	
Door bumpers, top of the trim strip and sheet flooring at the wall, ceiling access panels	NS	NS	JS-2	
Top of cove base, Floor mounted plates, Control joints in ceilings and walls	NS	JS-1	JS-2	
Bottom of cove base	NS	JS-1	NA	Integral base in ABSL-2 and VMU
Interior window frames	JS-3	JS-3	JS-2	
Tops of all CMU walls	NA	NA	JS-2	
Control joint in the floor	JS-1	JS-1	JS-1	
Joints where dissimilar walls meet	JS-3	JS-3	JS-2	
Wall penetrations, including inside sleeves, collars, and surrounding construction	JS-4	JS-4	JS-4	Any firewall penetrations will require firewall sealant

Abbreviations:

SYM	Description
JS	Joint Sealant
JS-1	Architectural Urethane Sealant
JS-2	100% Silicone
JS-3	Siliconized Acrylic Latex
JS-4	Non-Halogenated Latex-Based Elastomeric Sealant
NA	Not Applicable
NS	No Sealant

3.3.13 Safety and Security

Safety

Emergency safety equipment includes emergency showers, eyewash, and fire extinguishers. See ANSI Z358.01 for emergency showers and eyewash locations. Reference Sections 2.5.3 BLR&D Support Area and 3.6 Plumbing Systems for additional information on showers and eyewash.

Locate fire extinguisher cabinets per NFPA 10, Standard for Portable Fire Extinguishers. See the VA Fire Protection Design Manual for size and signage for Fire Extinguisher Cabinets.

Security

Section 5.15 of the VA Physical Security and Resiliency Design Manual (PSRDM) references specific security requirements for VA Research Laboratories and VMUs.

Research Facilities with Wet Labs and VMUs are designated as Mission Critical (MC) Facilities. These facilities are intended to remain fully functional with little to no damage to impede operations during and following a natural or manmade extreme event or a national emergency.

Research Facilities with Dry Labs Only are designated as a Life Safety Protected (LSP) Facilities. LSP Facilities are those intended to protect the life safety of the VA patients, staff, and visitors in case of an emergency. LSP facilities are not required to remain operational during and following a natural or manmade extreme event or a national emergency.

The Appendices to the PSRDM provide security door and security system requirements, including access control requirements, alarms, and camera locations for the video surveillance system.

3.4 Structural Design

3.4.1 General

The structural systems for R&D facilities share the same features and requirements of general spaces, as identified in PG 18-10, VA Structural Design Manual. The exception to this is the floor slab under equipment sensitive to vibration may need to be modified to provide vibration dampening. The structural design should be coordinated with the laboratory planner to ensure vibration dampening is provided when required by special equipment.

3.4.2 Seismic Design

The structural design must comply with the latest edition of VA Handbook 18-8, Seismic Design Requirements.

Chapter 7 of the 2020 revision of VA Handbook 18-8 identifies VA Facilities Occupancy Categories for various facility types. The Occupancy Categories are translated to IBC Risk Categories for development of the Seismic Design Category per ASCE 7, *Minimum Design Loads and Associated Criteria for Buildings and Other Structures*.

The design must account for seismic forces in accordance with the requirements of VA Handbook 18-8 for new or existing facilities, as appropriate for the project.

3.5 Mechanical Systems: Heating, Ventilation, & Air Condition Systems

3.5.1 General

Heating, Ventilation, and Air Conditioning (HVAC) systems for R&D facilities share many of the features and requirements of general spaces, as identified in the VA HVAC Design Manual. Some equipment frequently included in R&D facilities, such as fume hoods and biological safety cabinets (BSCs), require additional HVAC controls beyond the typical office or hospital spaces.

The intent of this section of the Design Guide is to reference the VA HVAC Design Manual where possible and to supplement the VA HVAC Design Manual where the manual does not address items specific to R&D facilities.

The VA HVAC Design Manual provides AHU System Data Sheets and Room Data Sheets for VA building spaces. These room types can be correlated to the spaces identified in the program generated from the PG-18-9 Space Planning Criteria for an R&D facility. The VA HVAC Design Manual also provides a graphic representation of air flow relationships between spaces in a VMU.

References to industry standards are provided in this narrative. The order of hierarchy is to follow VA documents first then use national codes and standards. If there is a conflict between the VA documents and other references, the VA documents will take precedence.

3.5.2 Room Templates

Room templates for R&D-specific spaces are included in Section 4 of this Design Guide. These templates provide graphic illustrations of the architectural and MEP room relationships.

3.5.3 System Sizing and Selection

System sizing and selection should follow the process outlined in the VA HVAC Design Manual.

Particular attention must be paid to the potential impact of noise, vibration, and temperature on animals in VMUs. Specific HVAC requirements are identified in the VA HVAC Design Manual Room Data Sheets and AAALAC International's *Guide for the Care and Use of Laboratory Animals*.

The impact of equipment, such as fume hoods, BSCs, and flammable storage cabinets on the building ventilation system must be considered. Fume hoods and BSCs are described in Section 3.5.6 below.

Flammable liquids storage cabinet requirements are addressed in Chapter 9 of the 2018 revision of NFPA 30, *Flammable and Combustible Liquids Code.*

Requirements for handling of chemicals in a laboratory are addressed by NFPA 45, *Fire Protection for Laboratories Using Chemicals*.

Chapter 7 of the 2019 revision of NFPA 45 addresses laboratory ventilating systems and hood requirements. NFPA 45, section A.7.2.2.1, permits a minimum ventilation rate of four air changes per hour for unoccupied laboratories when chemicals are stored properly. However, the minimum air change rate for VA facilities may not be less than six air changes per hour (ACH). Air change rates for occupied laboratories should be based on the greater of temperature requirements or the amount of exhaust air required for hoods or exhaust devices in the laboratory. The minimum air change rates must ensure occupant safety and safe operation of exhaust devices, but in no case shall be less than 6 ACH. NFPA 45 references ANSI/ASSP Z9.5, *Laboratory Ventilation*, for additional information on laboratory ventilation.

3.5.4 Supply Air

Ventilation is the primary method of preventing exposure of the building occupants to contaminants. The selection and sizing of ventilation systems to control temperature, provide outside air, and control pressure relationships is addressed in the VA HVAC Design Manual. Control strategies for maintaining pressure differentials between spaces are described in Chapter 11 of the second edition of the ASHRAE *Laboratory Design Guide*. The control strategies selected must be consistent with the design requirements of the VA HVAC Design Manual.

Supply air requirements, including outside air requirements and pressure relationships between rooms, are called out in the VA HVAC Design Manual room data sheets.

Supply air shall be designed to provide enough make-up air to meet exhaust requirements associated with lab general spaces, hoods, equipment, or other exhaust pickup points within a room. The supply air shall be less than the amount of exhaust required for spaces required to remain under negative pressure. A description of some equipment requiring exhaust is provided in section 3.5.6 below and Chapter 5 of the second edition of the ASHRAE Laboratory Design Guide.

Supply air fans should be on the emergency equipment circuit, to ensure the exhaust fans do not create a negative pressure great enough to prevent doors from opening on loss of normal power. If emergency power is not available for the supply fans, the exhaust fans must be coordinated to ensure doors can be opened on loss of normal power, while maintaining protection of the occupants.

Since the specimen freezers and refrigerators must be on emergency power, supply air units for freezer rooms must also be on emergency power to remove the heat generated by the refrigeration equipment in the freezer room.

3.5.5 Exhaust System

Some rooms require dedicated exhaust, while others, such as offices, may have return air. Return air is not permitted in spaces where chemical fumes, vapors, or gases are generated. (See chapter 7 of the 2019 revision of NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*).

Specific room requirements for return air and exhaust air are identified in the VA HVAC Design Manual room data sheets.

3.5.6 Exhaust Hoods

Exhaust hoods are discussed below to provide a general awareness of the various hood types. Selection of a specific hood is based on the protection required due to the process occurring in a space. A discussion of exhaust hoods and their application is covered in Section 2.5.3 of this design guide (BLR&D Support Area).

The typical fume hoods in VA R&D facilities are chemical fume hoods. Laboratory bench units may have local exhaust ventilation provided by snorkel arms. Canopy hoods are used to remove heat or moisture generated by equipment. BSCs are required in biological laboratories when handling organisms or infectious agents that can be potentially harmful to personnel or the environment.

Chemical fume hoods are designed to contain harmful fumes to protect the laboratory personnel. The fume hood performance must be tested and monitored. ASHRAE Standard 110, *Method of Testing Performance of Laboratory Fume Hoods*, identifies the test method for fume hoods while ANSI/ASSP Z9.5, *Laboratory Ventilation*, defines the acceptance criteria.

Chemical fume hoods are described in detail in Chapter 5 of the second edition of the ASHRAE *Laboratory Design Guide.*

BSCs are required when a typical exhaust hood is not sufficient to prevent contamination of personnel, other projects, the environment, or the material being handled. BSCs are divided into Class I, II, and III. All BSC require exhaust air filtration.

A Class I BSC protects personnel and the environment. It does not protect the product being handled. Per Scientific Equipment and Furniture Association (SEFA) document, SEFA 1, *Recommended Practices for Laboratory Fume Hoods*, there are no nationally recognized standards for construction and performance testing of Class I BSC.

A Class II BSC protects personnel, the environment, and the product being handled. Class II BSC are designed for BSL-1, BSL-2, or BSL-3 containment. Construction and performance requirements for Class II BSC are identified in NSF/ANSI Standard No. 49, *Biosafety Cabinetry: Design, Construction, Performance, and Field Certification*.

A Class III BSC is for processes that have the greatest hazard. These processes are associated with BSL-3 and BSL-4 containment. According to SEFA 1, *Recommended Practices for Laboratory Fume Hoods*, there are no nationally recognized standards for construction and performance testing of Class III BSC.

Biosafety levels are described in the CDC publication *Biosafety in Microbiological and Biomedical Laboratories*. The VA R&D facilities typically have no processes requiring containment levels greater than BSL-2.

More detailed descriptions of BSC are provided in Chapter 5 of the second edition of the ASHRAE *Laboratory Design Guide* and section 8.4 of the fifth edition of SEFA 1, *Recommended Practices for Laboratory Fume Hoods*.

Supply air diffusers in rooms with fume hoods or BSCs must be selected to minimize air disturbances near the face of the fume hoods or cabinets. In general, diffusers should be located as far from hoods as possible. More information is available in Chapters 6 and 12 of the second edition of the ASHRAE *Laboratory Design Guide.*

Additional information on fume hoods may be found in the ASHRAE *Laboratory Design Guide* and SEFA 1, *Recommended Practices for Laboratory Fume Hoods*.

3.5.7 Building Automation System

R&D Laboratories are typically provided with supply and exhaust airflow offset to control pressure boundaries. Control of Variable Air Volume (VAV) or Constant Volume (CV) terminal units must be integrated with the building automation system. The room ventilation controls must be integrated with the controls and instrumentation for exhaust hoods to ensure adequate ventilation air is provided and room pressure boundaries are maintained.

In animal holding rooms the HVAC control system must allow for flexibility in temperature requirements, based on the species of animal being housed, while maintaining the required pressure boundaries and the required minimum outside air changes. AAALAC International's *Guide for the Care and Use of Laboratory Animals* and Chapter 11 of the second edition of the ASHRAE *Laboratory Design Guide* identify factors to consider in VMU ventilation.

Guidance on options and selection of air flow control devices is provided in Chapter 11 of the second edition of the ASHRAE *Laboratory Design Guide*. Typical control strategies for devices are also provided.

The HVAC controls must address emergency conditions such as chemical spills or fan failure. Some considerations for emergency conditions are provided in Chapter 11 of the second edition of the ASHRAE *Laboratory Design Guide.*

More information on Building Automation and Controls is provided in Chapter 5 of the VA HVAC Design Manual.

3.5.8 Energy Conservation

Energy recovery should be utilized when supported by a Life Cycle Cost Analysis, as noted in the VA HVAC Design Manual.

When energy recovery units are utilized, care should be taken to ensure supply air is not contaminated by exhaust air. Use of enthalpy wheels is not permitted per the VA HVAC Design Manual.

Air handling units with economizer should be considered for systems serving spaces, such as offices, where return air is permitted. The local climate and the opportunity for energy

savings must be considered before adding an economizer to the air handling unit. Hot, humid climates are normally not good candidates for an economizer.

While constant air volume systems controls are simpler than variable air volume, use of VAV fume hoods and supply air systems can provide savings over constant volume hoods. The fume hood design face velocity must be maintained when in use. The room exhaust and supply offsets must be maintained to ensure proper pressure relationships.

When the processes in a laboratory permit setback during unoccupied hours, this strategy can provide energy savings. The minimum of six air changes per hour should be maintained in the setback period. Setback strategy is discussed in Chapter 11 of the second edition of the ASHRAE *Laboratory Design Guide*.

A strategy to be considered for energy savings is using transfer air, when possible, to supply air from clean spaces such as offices to less clean spaces such as the Service Core.

Commissioning provides assurance that a facility is designed and constructed in accordance with the Owner's Project Requirements (OPR). Section 2.5 of the VA Sustainable Design Manual requires compliance with the VA Whole Building Commissioning Process Manual. Additional guidance on laboratory commissioning is provided in Chapter 14 of the second edition of the ASHRAE *Laboratory Design Guide*.

3.6 Plumbing Systems

3.6.1 General

Plumbing system design requirements for R&D facilities are identified in the VA Plumbing Design Manual. Plumbing requirements unique to R&D facilities that are not included or referenced in the VA Design Manual are noted in this design guide.

3.6.2 General Plumbing Requirements

Refer to the VA Plumbing Design Manual for general plumbing requirements.

3.6.3 Water Systems

Laboratory and animal feed water treatment and monitoring requirements are identified in the VA Plumbing Design Manual.

Refer to section 8.5.2.1 of the VA Physical Security & Resiliency Design Manual for amount of potable water storage required for mission critical facilities. Include water required for animals in water storage calculations.

3.6.4 Plumbing Fixtures and Equipment

The VA Plumbing Design Manual provides design requirements for water flows and faucet outlet types.

The VA Plumbing Design Manual provides design guidance for plumbing laboratory equipment, including prevention of cross contamination.

Emergency Fixtures

The VA Plumbing Design Manual provides design guidance for locations, water flow rates, and water temperatures of emergency plumbing fixtures.

3.6.5 Drainage Systems

Design for sanitary waste, laboratory waste, and building storm water drainage systems is addressed in the VA Plumbing Design Manual.

Most of the animal waste is typically disposed of and removed from the facility. The remaining animal waste will be hosed down and flow to trench drains and/or floor drains connected to the building sanitary drainage system. Refer to the Room Templates for floor and trench drain locations.

3.6.6 Laboratory Gas and Vacuum Systems

General design of laboratory gas and vacuum systems is to be in accordance with the VA Plumbing Design Manual, VA Master Specification 22 62 00, Vacuum Systems for Laboratory and Healthcare Facilities, and VA Master Specification 22 63 00, Gas Systems for Laboratory and Healthcare Facilities.

Consider the use of mercaptan for odor detection of gas systems. Carbon filters must be used when using mercaptan.

3.6.7 Medical Gas and Vacuum Systems

General design of medical gas and vacuum systems is to be in accordance with the VA Plumbing Design Manual, VA Master Specification 22 62 00, Vacuum Systems for Laboratory and Healthcare Facilities, and VA Master Specification 22 63 00, Gas Systems for Laboratory and Healthcare Facilities.

3.7 Lighting Systems

3.7.1 General

Lighting systems for R&D facilities share many of the features and requirements for general spaces, as identified in the VA Lighting Design Manual. The A/E must provide a complete lighting design as outlined in the VA Lighting Design Manual.

The intent of this section of the design guide is to reference the VA Lighting Design Manual (LDM) and the VA Electrical Design Manual where possible and to supplement the two manuals where the manuals do not address items specific to R&D facilities. The A/E must provide complete lighting system design for the project. In terms of design standards and codes, the LDM states a list of design standards and codes that lighting system design must comply with, as a minimum.

3.7.2 Fixtures

General lighting fixtures in animal research areas must typically be LED, IP65 rated, UL damp/wet location listed, and factory sealed with gasketed housings. Fixtures in the dirty side of cage wash, storage, and gowned-in area of corridor must be UL wet location listed. Fixtures outside of the gowned-in areas of corridors, locker rooms, and toilet rooms must be UL damp location listed. Provide vapor proof lighting fixtures in Medical Pathological Waste Holding areas. Fixtures can be recessed, or surface mounted and must be coordinated with ceiling construction. For rooms requiring hose-down capabilities, IP65 fixtures must be installed in or on gypsum board ceiling. Provide fixtures with dimmable drivers to 1%.

In small animal and rodent holding rooms locate fixtures so that they are accessible from the service isles between cages where possible. Coordinate fixture location with ventilated rack connection, rack locations and automatic watering systems to reduce shadowing.

Diurnal cycle lighting schemes for circadian rhythm are required in animal holding areas to avoid disruption to animals and research. Lighting levels and cycles will vary for each species of animal. Fixtures in these areas must have a tunable white and red LED source. Tunable white LED source must have a CCT of 2700K to 5500K. Refer to controls section for control of dual function fixtures. Coordinate specific lighting requirements of each species with research staff.

Refer to the VA Electrical and VA Lighting Design Manuals for information on lighting fixtures in all other spaces not listed above.

3.7.3 Lighting Levels

The following table contains general average maintained lighting level recommendations for animal research areas. Lighting level recommendations can change for different species of animals and should be coordinated with research staff. A uniformity ratio of 3:1 or less and a minimum CRI of 80 is recommended.

VMU Rooms

Refer to the VA Lighting Design Manuals for lighting levels in offices, corridors, stairways, general storage, toilet rooms, mechanical/electrical rooms, and laboratories.

Function/Space	Lighting Level in Lux (Fc)	Lighting Measurement Height
VMU – Small Animal Holding	*270-810 (25-75)	@ 36” AFF
VMU – Large Animal Holding	540-810 (50-75)	@ 36” AFF
VMU Operating Room	375-1075 (35-100)	@ 42” AFF
VMU Surgery Table Area	2200 (200)	@ 36” AFF
VMU Procedure Room	500 (50)	@ 42” AFF
VMU Necropsy Room	1075 (100)	@ 36” AFF
VMU Cagewash Equipment Room	430-540 (40-50)	@ 42” AFF
VMU Animal Food Preparation Room	430-540 (40-50)	@ 36” AFF
Receiving/Decontamination	110-215 (10-20)	@ 42” AFF
VMU Waste Room	200 (20)	@ 42” AFF

*Small animal holding rooms have two levels of illumination. One level of illumination for the diurnal cycle must have an average maintained illumination of 25 FC. The second level of illuminations for inspection and cleaning must have an average maintained illumination of 75 FC.

3.7.4 Controls Approach

Where dual LED fixtures with red and tunable white LEDs are required for diurnal cycle, the lighting must be controlled by a lighting control system. The system should typically provide a cycle for 12 hours “on” and 12 hours “off” control scheme. The system should allow for adjustments to the cycle including duration of cycle and dimming. Provide a programable user interface in animal research supervisors office or similar location for user control. The user interface must be graphical with a facility floor plan and icons for easy user scheduling. The control system must provide monitoring and alarm notification and reporting. Animal holding rooms must have a photocell to report verification of proper lighting in room to the lighting control system. Provide an override switch in animal holding rooms to raise illumination to an inspection/cleaning level.

Dimmer switches must be provided in procedure, necropsy, and treatment. Provide two dimmer switches in the small animal holding areas. Dimmer switch nearest the door must control the red LED only. Locate the second switch away from the first to override the diurnal cycle lighting for cleaning and inspection of animal holding room.

Occupancy sensors in animal research facilities must have no ultrasonic sound emission to limit disruption to research animals. Provide occupancy sensors in quarantine, receiving/decontamination, and dirty side of cage wash.

Provide vacancy controls in feed and bedding areas.

All occupancy/vacancy, switches and daylight harvest sensors must be sealed.

In areas including the dirty side of cage wash, procedure, necropsy, treatment, and receiving/decontamination provide a minimum of one un-switched night light fixture.

Refer to the VA Lighting Design Manual for lighting controls in areas not listed above.

3.8 Electrical Systems

3.8.1 General

Electrical systems for R&D facilities share many of the features and requirements for general spaces, as identified in the VA Electrical Design Manual (EDM).

The intent of this section of the design guide is to reference the VA EDM and the VA Physical Security and Resiliency Design Manual (PSRDM) where possible and to supplement the two manuals where the manuals do not address items specific to R&D facilities. The VA EDM provides the A/E with design requirements of the electrical power systems. The A/E must provide the electrical power design system that complies with all applicable requirements stated in the EDM. In term of design standards and codes, the EDM state a list of design criteria that the electrical power system design must comply with, as a minimum.

Normal Power: Selected lighting fixtures, receptacles, and equipment, not connected to the Essential Electrical System (EES), must be connected to normal power.

Emergency Power: Selected lighting fixtures, receptacles and equipment must be connected to the Critical Branch of the EES.

3.8.2 Raceways, Wiring, and Equipment

Conduits

To prevent infection from vermin either contaminating the area or carrying harmful bacteria or viruses out, all conduits in Viburnum spaces must be sealed off.

3.8.3 Receptacle and Power Requirements

Receptacles

Provide hospital grade receptacles for each location. Receptacles located in hose down areas must be protected by a GFCI circuit breaker and have a weatherproof cover installed. The cover must be rated IP44 minimum. Receptacles must be watertight single straight blade or twist locking type as required.

Provide dual channel wireways at laboratory benches that contain both receptacles and data. Devices must be spaced 24 inches on center. Mount the assembly 46” AFF.

Power to laboratory benches must generally be provided by overhead service panels. Overhead service panels must contain a minimum of four 20A twist lock receptacles. Refer to Section 3.3 Architectural Design for more information on overhead service panels.

Refer to the VA Electrical Design Manual for receptacle requirements in Animal Surgery Rooms and ground fault circuit interrupters.

3.9 Telecommunications, Special Telecom, Monitoring, & Signal Systems

3.9.1 General

Telecommunications and Security systems for R&D facilities share many of the features and requirements for general spaces and mission critical facilities, as identified in the VA Telecommunications and Special Telecommunications Systems Design Manual and the VA Physical Security Design Manual.

The intent of this section of the design guide is to reference the VA Office of Information and Technology – Telecommunications and Special Telecommunication Systems Design Manual and the VA Physical Security Design Manual where possible and to supplement the two manuals where the manuals do not address items specific to R&D facilities.

3.9.2 Telephone

Telephone systems must be based on VoIP using data cabling as the means for interconnection. As an alternative locate switching can be used based on digital system.

3.9.3 Information Technology, Wi-Fi, and Public Address

If an R&D facility cannot be supported by the main telecom room at the facility/campus, or is a stand-alone building/facility, a telecom room must be planned/provided.

Refer to VA Office of Information and Technology - Telecommunications and Special Telecommunication Systems Design Manual for data, Wi-Fi and public address requirements for animal research facilities.

Refer to the VA Office of Information and Technology - Infrastructure Standard for Telecommunications Spaces for telecommunications closet layout and cabling standards. Data for laboratory benches must generally be provided by overhead service panels. Overhead service panels must include a minimum of four 4-port data outlets. Refer to Section 3.3 Architectural Design for more information on overhead service panels.

3.9.4 Security System

Refer to VA Physical Security and Resiliency Design Manual for security requirements for animal research facilities.

PACS

Refer to VA Handbook 0730 Appendix B for security requirements per room type.

3.10 Fire Protection & Life Safety

3.10.1 General

Fire protection systems for R&D facilities share many of the features and requirements of general spaces, as identified in the VA Fire Protection Design Manual. Spaces that are not addressed in the VA Fire Protection Design Manual are included in this design guide.

3.10.2 Fire Protection Systems

Codes and Standards

Fire protection design must follow the latest edition of the following:

- National Fire Protection Association (NFPA) National Fire Codes (NFC)
- VA Fire Protection Design Manual

Flammable Liquid Storage Cabinets

Flammable liquids must be stored in accordance with NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals

Flammable liquid storage cabinets (FLSCs), listed by a nationally recognized testing laboratory (NRTL), constructed of metal must be provided in each laboratory work area.

FLSCs are required to be located as remotely as possible from the exit doors of laboratories. FLSCs must not be located in corridors or beneath fume hoods.

The integrity of FLSCs must not be compromised by their mounting method.

FLSCs must not be vented.

3.10.3 Fire Suppression Systems

Automatic Sprinkler Systems

All new occupied facilities, reconstruction, and/or additions are required to be fully sprinklered to meet compliance of the Federal Fire Safety Act of 1992.

All laboratory work areas must be classified as Ordinary Hazard Group 2 throughout in accordance with NFPA 13. Special hazard areas requiring higher hazard classifications must be protected in accordance with NFPA 13.

In all other areas that do not contain laboratories, the sprinkler systems must be designed in accordance with the associated hazards per NFPA 13. Animal research and holding facilities must comply with NFPA 150.

3.10.4 Life Safety: Fire Alarm

Fire Alarm System

Fire alarm system are required to be addressable type with speaker notification devices to allow for voice communication and mass notifications. Refer to VA Fire Protection Design Manual for fire alarm system requirements in Animal Research Facilities - Vivaria.

Notification Devices

Notification devices must be installed in areas in accordance with NFPA 101 and NFPA 72 except for the following:

- Operating rooms must only have strobes installed.
- Darkrooms and laser labs must only have speaker notification devices installed.

Refer to the VA Fire Protection Design Manual for raceway and cabling requirements for the fire alarm system.

3.11 Waste and Hazardous Material Management and Flows

3.11.1 General

The following documents contain guidance on waste and hazardous materials management requirements:

- NFPA 82 Standard on Incinerators and Waste and Linen Handling Systems and Equipment
- PG 18-3 Design and Construction Procedures – Topic 18 Transportation, Materials and Solid Waste Management, and Automated Delivery Systems
- PG-18-10 Material and Solid Waste Management, Linen and Trash Chutes Design Manual
- VA Physical Security and Resiliency Design Manual
- 29 CFR 1910.1200 – Hazardous Communication
- 29 CFR 1910.1030 – Bloodborne Pathogens
- 29 CFR 1910.134 – Respiratory Protection
- 40 CFR 261–265 - Identification and Listing of Hazardous Waste
- 40 CFR Part 22 - Consolidated rules of practice Governing the Administrative Assessment of Civil Penalties and the Revocation/Termination or Suspension of Permits
- 49 CFR 171–180 – Classification and Package Selection of Hazardous Materials

In facilities with Biomedical Laboratories and VMUs, the management of waste and hazardous materials is best achieved with a layered approach, with appropriately located and designed storage space for chemicals, gas cylinders, isotopes, and waste in central building support rooms for bulk quantities where appropriate and as close to the point of use as possible. The layered approach begins at the Loading Dock, where materials are brought into the facility. Bulk chemicals and other supplies are stored in appropriately designed rooms near the Loading Dock. Depending on the specific VA site approaches, compressed gas cylinders may be placed in central storage before distribution or may be taken directly to the laboratory space by the vendor. Once in the laboratory or VMU, appropriate storage requirements for smaller quantities of chemicals, gas cylinders, biological or radioactive materials, etc. must be provided. As chemicals or other materials are used and waste is generated, the spent materials are moved from the laboratory or VMU back to the Loading Dock, where there are holding areas for waste.

Gas cylinders are typically placed in a laboratory, Gas Manifold Room, or Service Core and piped to the location of use. Gas cylinders such as carbon dioxide gas for tissue culture may be ganged into a manifolded system to supply a building, floor, or a room. On the other hand, a gas cylinder such as nitrogen gas for a microscope air table may be placed in the Microscopy Room or in the Service Core behind the room with piping to the equipment. The gases required and the approach to distribution should be discussed early in the planning, as each has different space requirements, construction costs and operating costs.

Planning the flow of these materials is crucial. A lack of space to accommodate waste and hazardous materials as they move through a facility can result in bottlenecks and other issues that impact the research performance and safety. At VA medical centers overall flow of hazardous materials and waste is to be examined during planning. It may be possible to combine incoming and outgoing material flows between the research and medical facilities, particularly from facilities where large quantities are present.

The flow diagram at the end of this section illustrates how the flow of chemicals into and out of the facility can minimize the potential hazards, allow for better chemical management and compliance with codes as well as reduce the need for high ventilation rates in many lab areas. Chemical brought into the facility are either taken directly to the laboratory or stored in a room designed for holding chemicals. As noted below, the design requirements of this room will vary depending on the need to transfer bulk flammable liquids from larger into smaller containers or conversely flammable chemical waste from smaller containers into bulk containers for disposal.

Chemicals can be moved from the appropriate storage rooms near the Loading Dock and the service elevator to the laboratory floors. The location of the chemical and waste storage related to the service elevator must minimize the path the chemicals need to take through the facility. On the laboratory floor, the service elevator should open directly into the laboratory zone eliminating the need for chemicals to travel through office corridors and public areas.

One in the laboratory, the chemical flow is to provide close access from the service area to the room where chemical storage and use is highest. This is typically the shared Fume Hood Room, but might also be a drug chemistry laboratory if this room type is present in the specific facility. Smaller quantities of chemical can be mixed or dispensed in the shared Fume Hood Room for movement to other laboratory rooms for use as necessary to support the research minimizing the chemical quantities that move through the laboratory, reducing the potential of a major chemical spill. Chemical waste removed from the laboratory follows a similar flow in reverse. A similar thought process and flow should be used in the planning for other hazards such as biological and radioactive materials.

3.11.2 Storage

Various regulations and codes limit the amount of chemicals that can be stored and the method of storing them. These limitations are based on their hazardous properties (flammable, radioactive, biological, etc.). Each material's supply and removal process must be planned to account for these regulations. For example, a typical BLR&D facility falls into the Business Occupancy classification, which often restricts the size of chemical containers within a facility to five gallons. Bulk containers received in the Loading Dock must be dispensed into smaller containers to be used throughout the building. Dispensing chemicals requires special hazardous material handling spaces with very specific designs.

Restrictions on the amount of chemicals that can be stored may vary by location within the building, such as in enclosed storage rooms, enclosed experimental spaces, or in the open laboratory.

3.11.3 Waste

As chemical and hazardous material waste accumulates, it is typically collected and congregated in specialized storage rooms for offsite removal. For flammable chemical storage, these rooms may require explosion-proof mechanical ventilation system to mitigate the impact of an explosive event.

3.11.4 Medical Centers

Many hazardous materials in a Biomedical R&D facility are the same as those found within a Medical Center. If the two buildings are collocated, or located within the same building, some supply and waste flow management systems may be combined, such as by sharing a chemical waste storage room.

3.11.5 VMU Considerations

The activities within a VMU generate a large volume of bedding waste which must be removed from dirty cages and disposed of safely in the Soiled Cagewash Area. Large VMUs may utilize automated bedding disposal, which involves pneumatic or chain-driven mechanical systems to move the spent bedding out of the facility. For most VMUs, however, a manual laminar flow bedding dump station is sufficient. This station is a ventilated cabinet to prevent staff exposure to bedding debris and particles. Bedding should be dumped into a bag-lined container so the bags can be securely closed and removed from the facility.

Biological waste at the VMU is typically picked up by a disposal service at regular intervals. Animal carcasses should be double bagged and kept in freezers between these pickups. For small animals, chest freezers are sufficient for carcass storage. Facilities using large animal models may require walk-in freezer rooms. The disposal staff must have access pathways from the Loading Dock to any rooms they need to access (e.g., Carcass Freezer Rooms, Waste Rooms, Necropsy Rooms, and Soiled Cagewash Room) that do not bring the disposal staff near live animal spaces.

VMU procedures such as surgery and necropsy generate biological waste that must be disposed of safely. It should be collected in biological waste bags and stored in the Waste Room until it is picked up by a disposal service.

Rooms where procedures are performed on animals must be equipped with vacuum systems to draw out anesthetic gases that accumulate during procedures requiring anesthesia.

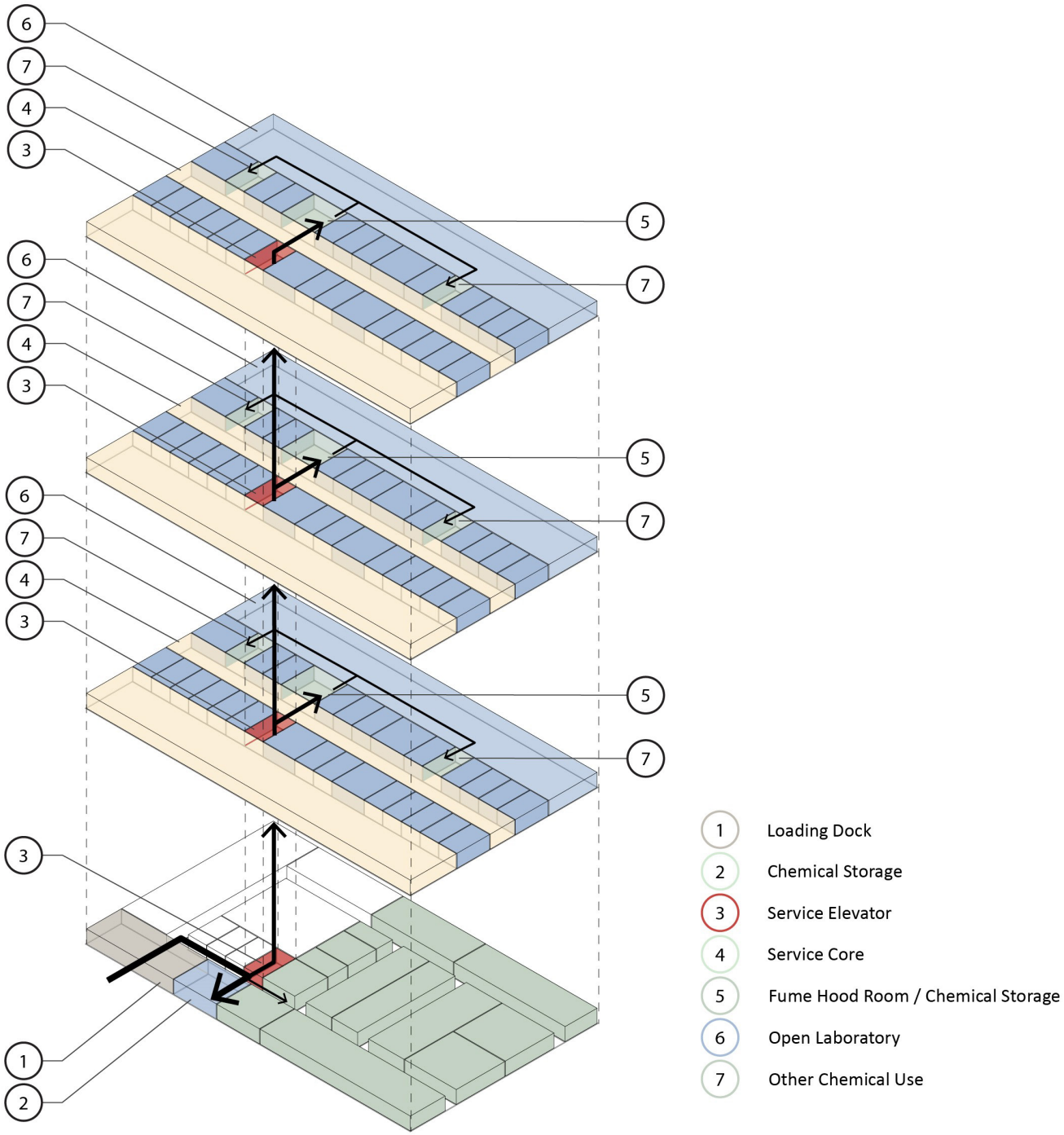


Figure 42 Chemical flow through an R&D facility

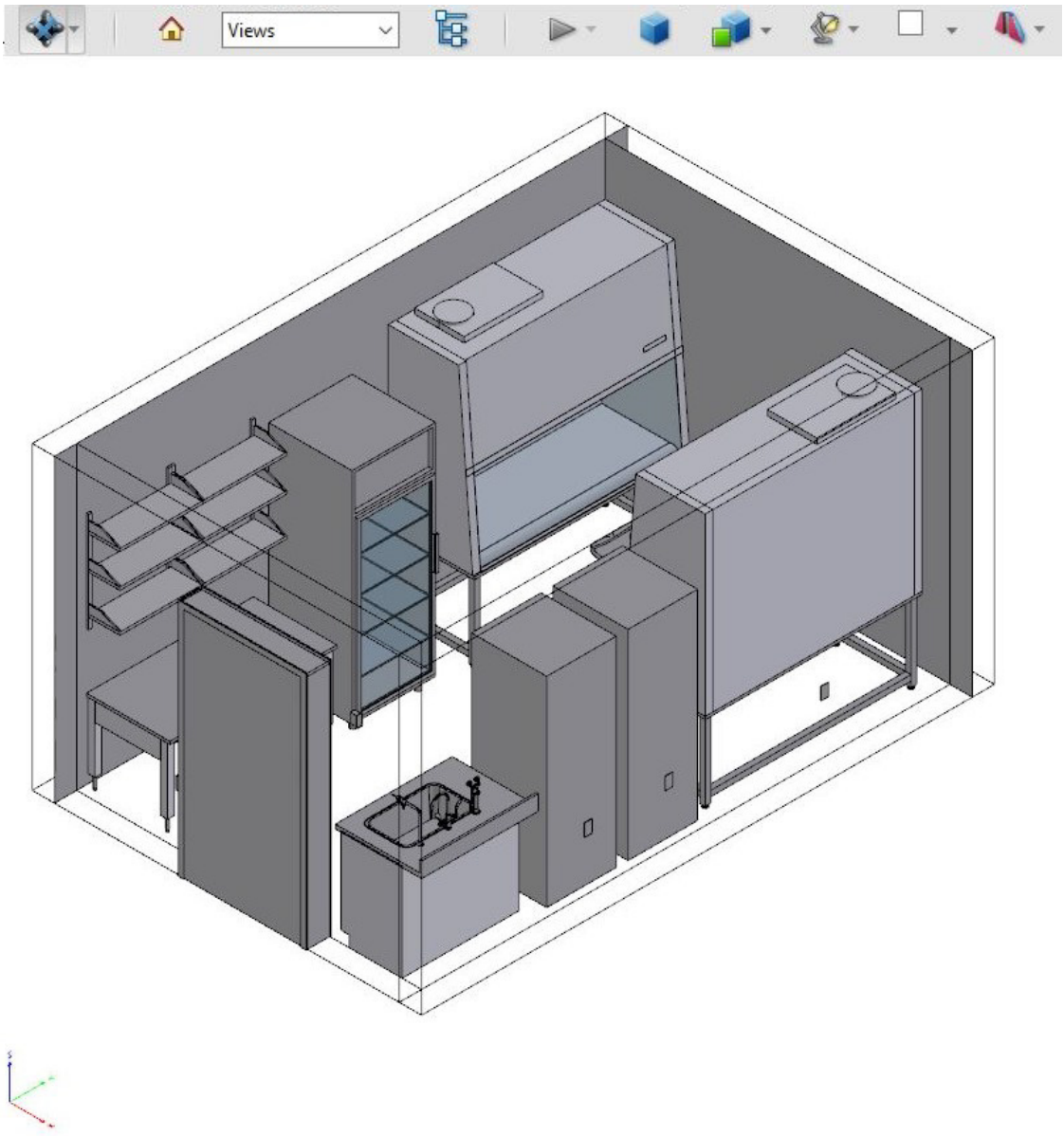
3.12 Equipment: Refer to PG-18-5

PG-18-5 Equipment Guide List provides a list of equipment for every room, as well as furnishings and utility requirements for each piece of equipment in a functional area. Additional general information and guidance is available in Section 4 of this Design Guide for items contained in the individual rooms represented by the Room Templates. Refer to equipment manufacturers' data for information specific to equipment items.

4.0 Room Templates

The Room Templates listed in this chapter include an interactive 3D PDF, axonometric (in isometric projection), floor plan, reflected ceiling plan, elevations, room data sheets, and the equipment list of each space.

When viewing the interactive 3D view, the common control tools and menus below will help in the navigation of each space. Each element is adjustable to user preference; however, these settings will be a good starting point to view each space. Please maintain a record copy of this document to preserve the default setting for other users.



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LEGEND

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0' 4' 8' 16'

ROOM NAME (ROOM CODE) AREA NSF AREA NSM	ROOM TAG	JSN TagName	EQUIPMENT JSN NUMBER & NAME	1 1 1 1	ELEVATION REFERENCE
CENTERLINE	SPRINKLER HEAD		OVERHEAD LINES		CLEARANCE LINES
	2X2 ACOUSTIC CEILING SYSTEM		COMPOUND CEILING, GYPSUM BOARD ON METAL STUD	A	1X4 TROFFER LIGHT FIXTURE
A	2X4 TROFFER LIGHT FIXTURE	A	2X2 TROFFER LIGHT FIXTURE	A	1X4 SURFACE MOUNTED LIGHT FIXTURE
A	2X4 SURFACE MOUNTED LIGHT FIXTURE	A	2X2 SURFACE MOUNTED LIGHT FIXTURE		WALL MOUNTED LIGHT FIXTURE
A RECESSED CAN LIGHT FIXTURE	A STRIP LIGHT FIXTURE		RETURN REGISTER		SUPPLY DIFFUSER
	EXHAUST REGISTER	SLOT SUPPLY DIFFUSER	FLOOR-MOUNTED DUPLEX OUTLET	FLOOR MOUNTED QUADRAPLEX OUTLET	FLOOR MOUNTED DATA OUTLET
TV	TELEVISION OUTLET PLAN TELEVISION OUTLET ELEVATION	A	MEDICAL AIR OUTLET PLAN MEDICAL AIR OUTLET ELEVATION	V	OXYGEN OUTLET PLAN OXYGEN OUTLET ELEVATION
O	OXYGEN OUTLET PLAN OXYGEN OUTLET ELEVATION	P CEILING MOUNTED PULL SWITCH	EPO	EMERGENCY POWER SHUTOFF	CEILING UTILITY QUICK CONNECT PANEL

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LEGEND

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	DROP CORD, SINGLE CONVENIENCE OUTLET	DF / DFR	DIFFERENTIAL AIR PRESSURE MONITOR PLAN / DIFFERENTIAL AIR PRESSURE MONITOR ELEVATION	T / TR	THERMOSTAT PLAN / THERMOSTAT ELEVATION
C / CR	CLOCK HANGER RECEPTACLE PLAN / CLOCK HANGER RECEPTACLE ELEVATION	S / SR	SINGLE SWITCH PLAN / SINGLE SWITCH ELEVATION	S_2 / S2R	MULTIPLE SWITCH PLAN / MULTIPLE SWITCH ELEVATION
S_D / SDR	DIMMER SWITCH PLAN / DIMMER SWITCH ELEVATION		WALL-MOUNTED DATA OUTLET PLAN / OUTLET ELEVATION		WALL-MOUNTED TELE OUTLET PLAN / OUTLET ELEVATION
	WALL-MOUNTED DUPLEX GFI OUTLET PLAN / OUTLET ELEVATION		WALL-MOUNTED QUADRAPLEX OUTLET PLAN / OUTLET ELEVATION		WALL-MOUNTED SPECIAL OUTLET PLAN / OUTLET ELEVATION
	WALL-MOUNTED DUPLEX EMG PWR OUTLET PLAN / OUTLET ELEVATION		WALL-MOUNTED DUPLEX OUTLET PLAN / OUTLET ELEVATION	S_S	WALL-MOUNTED DUPLEX SWITCHED OUTLET PLAN / OUTLET ELEVATION
WP/GF	WEATHERPROOF DUPLEX GFI OUTLET PLAN / OUTLET ELEVATION		WALL-MOUNTED PLUG MOLD PLAN DUAL CHANNEL DUPLEX OUTLET AND DATA	CR	WALL-MOUNTED CARD READER / OUTLET ELEVATION
PIPED LAB UTILITY LEGEND (REFER TO NARRATIVE FOR SPECIFICS) **LA** - LAB AIR **LV** - LAB VACCUUM **LG** - LAB GAS				XR	WALL-MOUNTED REQUEST TO EXIT TOUCHLESS / OUTLET ELEVATION

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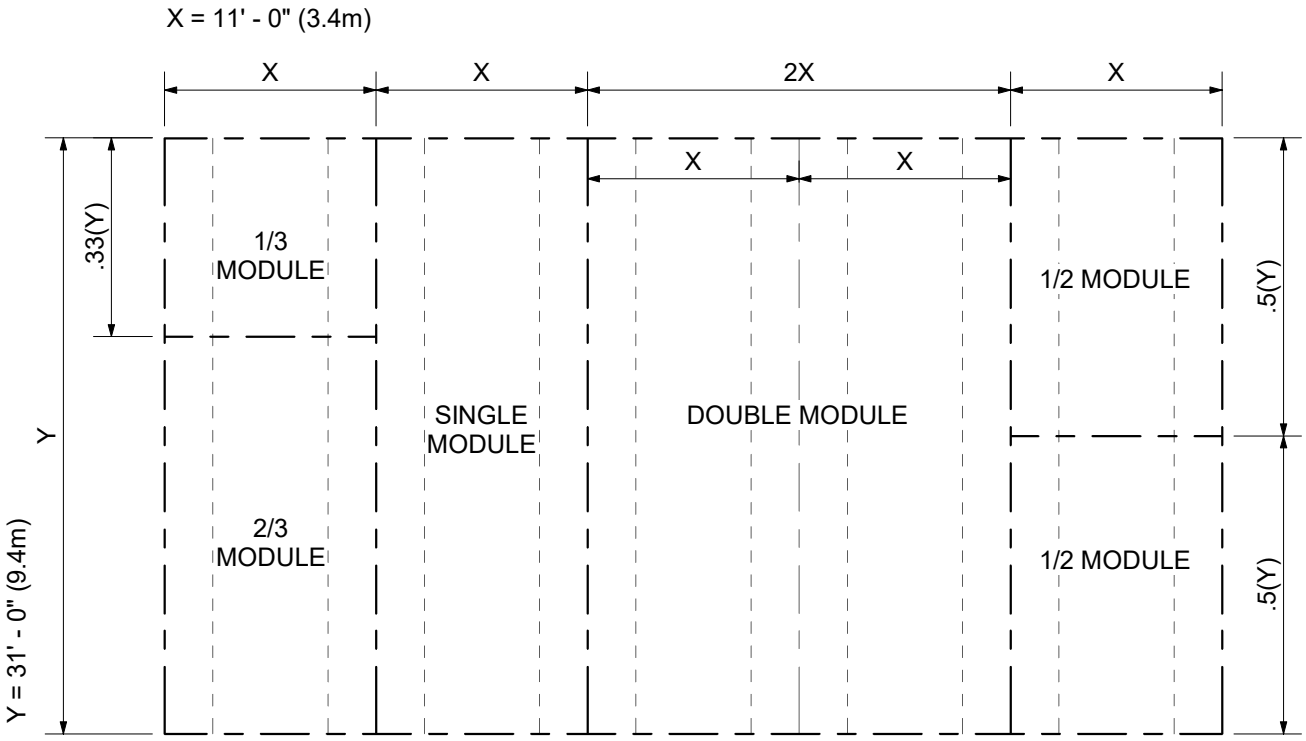

- BENCH UNIT - SINGLE MODULE
- MICROSCOPY ROOM - 1/2 MODULE
- GLASSWARE WASHING/STERILIZER - (2X) 2/3 MODULE
- TISSUE CULTURE - 1 BSC - 1/2 MODULE
- TISSUE CULTURE - 3 BSC - (2X) 1/2 MODULE
- FUME HOOD - 1 HOOD - 1/2 MODULE
- FUME HOOD - 3 HOOD - (2X) 1/2 MODULE

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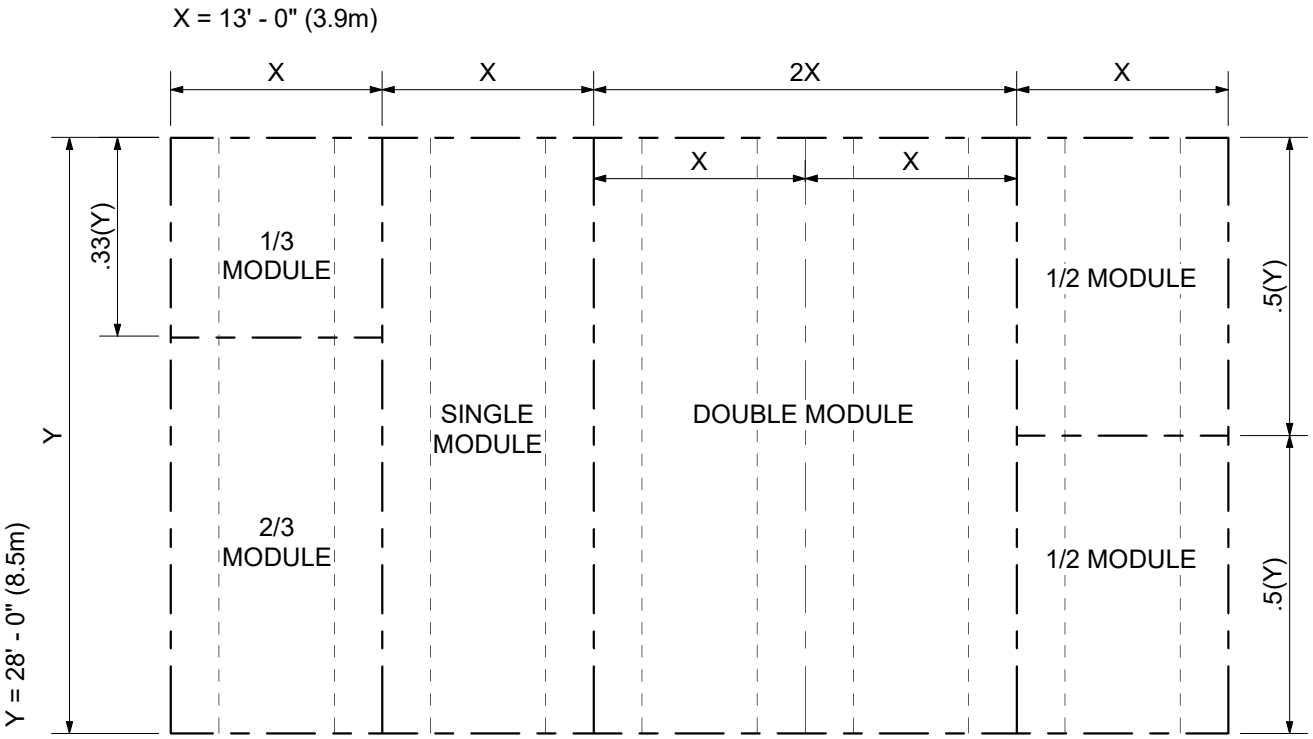

- VMU LAB MODULE - SINGLE MODULE
- SMALL ANIMAL HOLDING - SINGLE MODULE
- LARGE ANIMAL HOLDING - SINGLE MODULE+
- NECROPSY - 1/2 MODULE+
- STUDY SUITE PREPARATION - SINGLE MODULE
- STUDY SUITE INDIVIDUAL - 1/2 MODULE

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC702) BLR&D BENCH UNIT, R&D (SC704) BLR&D BENCH SUPPORT, R&D (SC703) BLR&D GHOST CORRIDOR, R&D
AXONOMETRIC

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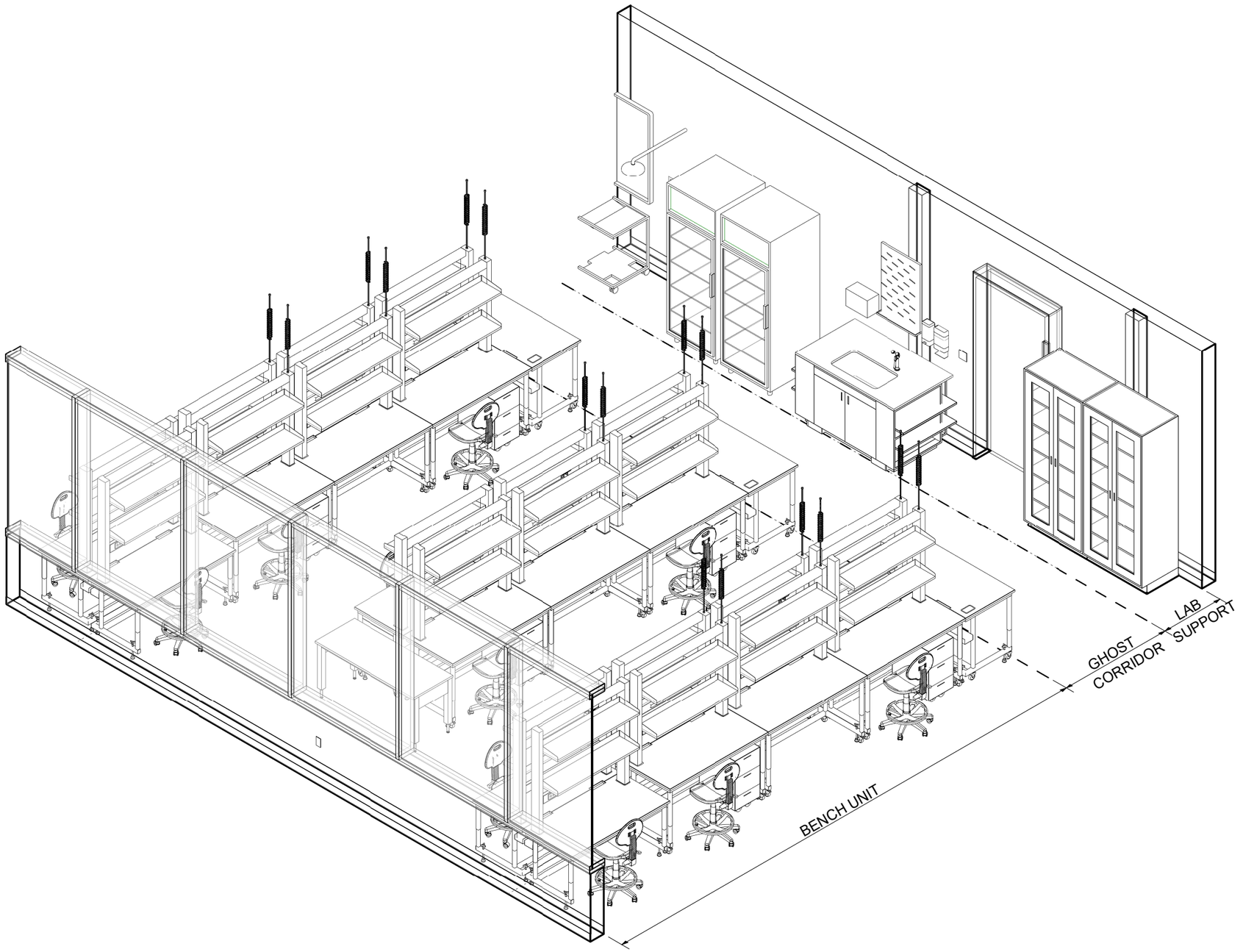

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INTERACTIVE 3D PDF

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(SC702) BLR&D BENCH UNIT, R&D (SC704) BLR&D BENCH SUPPORT, R&D (SC703) BLR&D GHOST CORRIDOR, R&D
FLOOR PLAN

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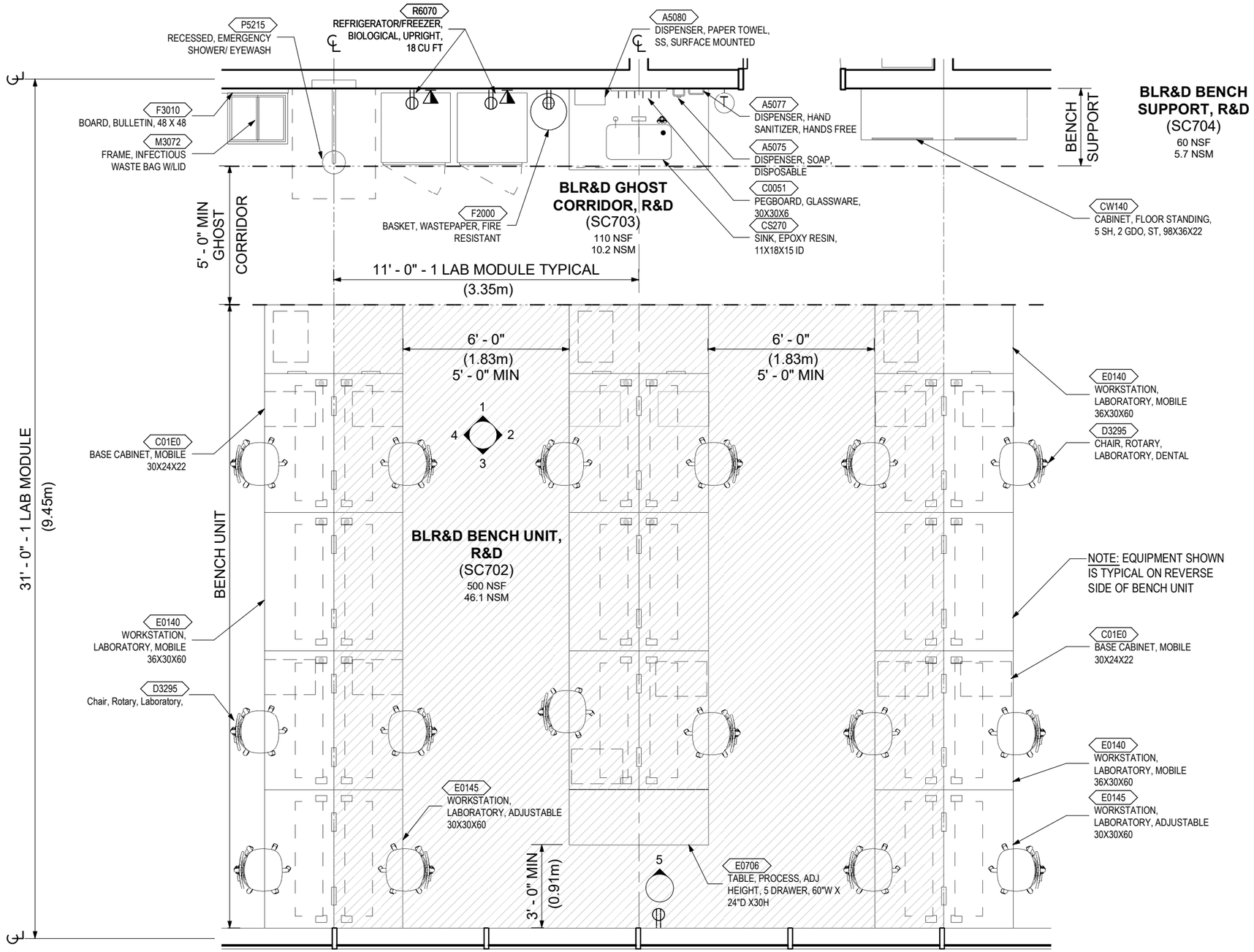

NOTE: POWER AND DATA LOCATION NEED TO BE COORDINATED WITH LAB SPECIFIC FURNITURE AND SITE SPECIFIC REQUIREMENTS

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(SC702) BLR&D BENCH UNIT, R&D (SC704) BLR&D BENCH SUPPORT, R&D (SC703) BLR&D GHOST CORRIDOR, R&D
REFLECTED CEILING PLAN

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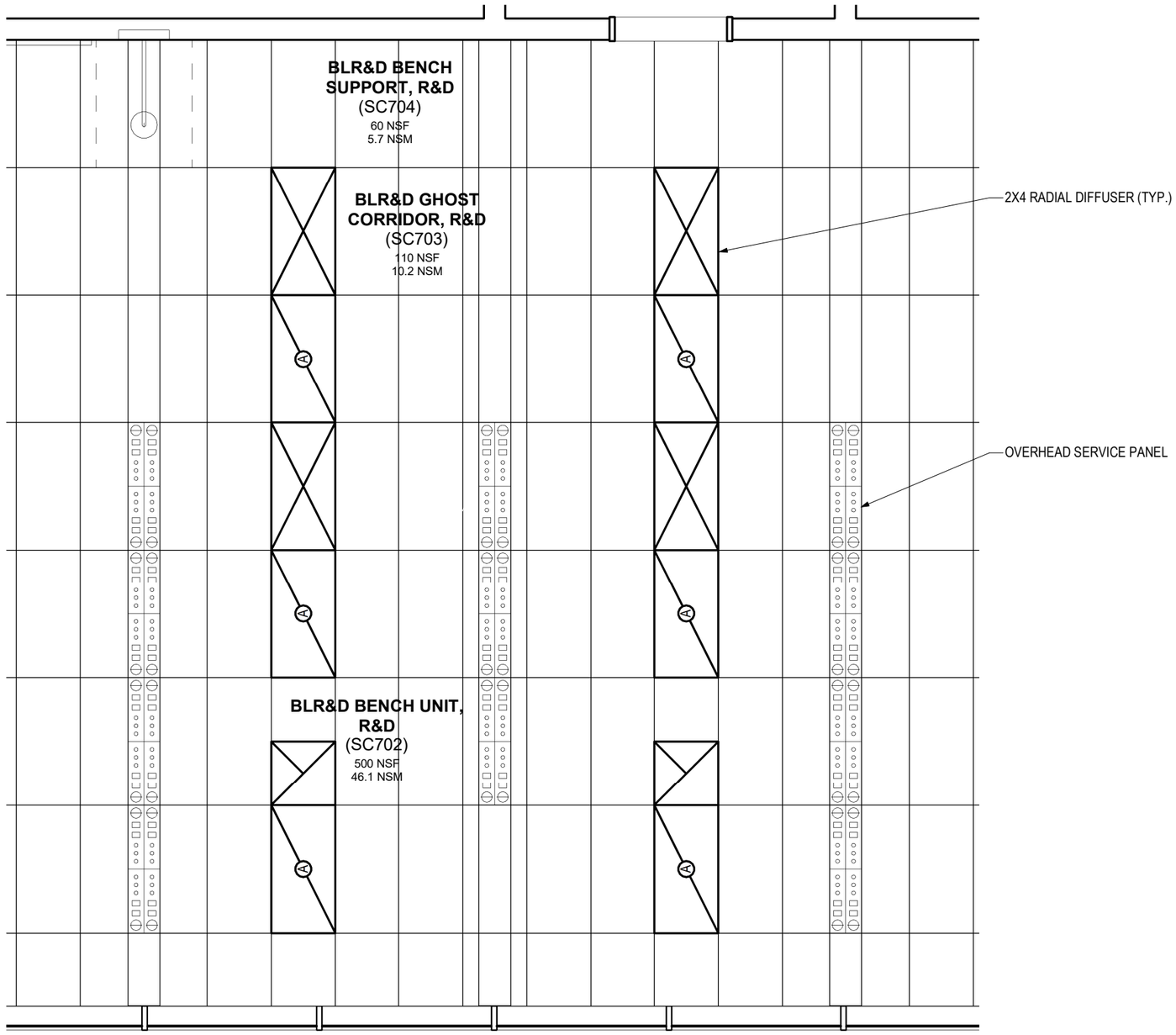

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC702) BLR&D BENCH UNIT, R&D (SC704) BLR&D BENCH SUPPORT, R&D (SC703) BLR&D GHOST CORRIDOR, R&D ELEVATIONS

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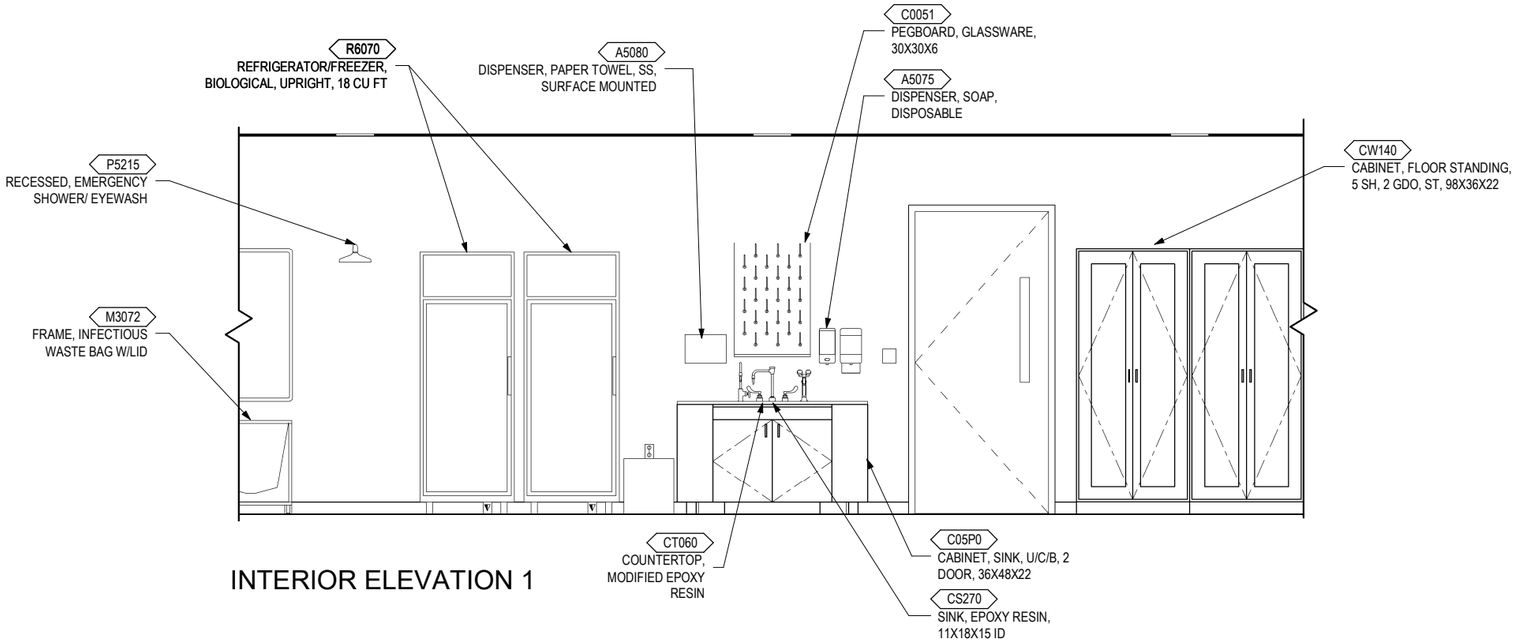
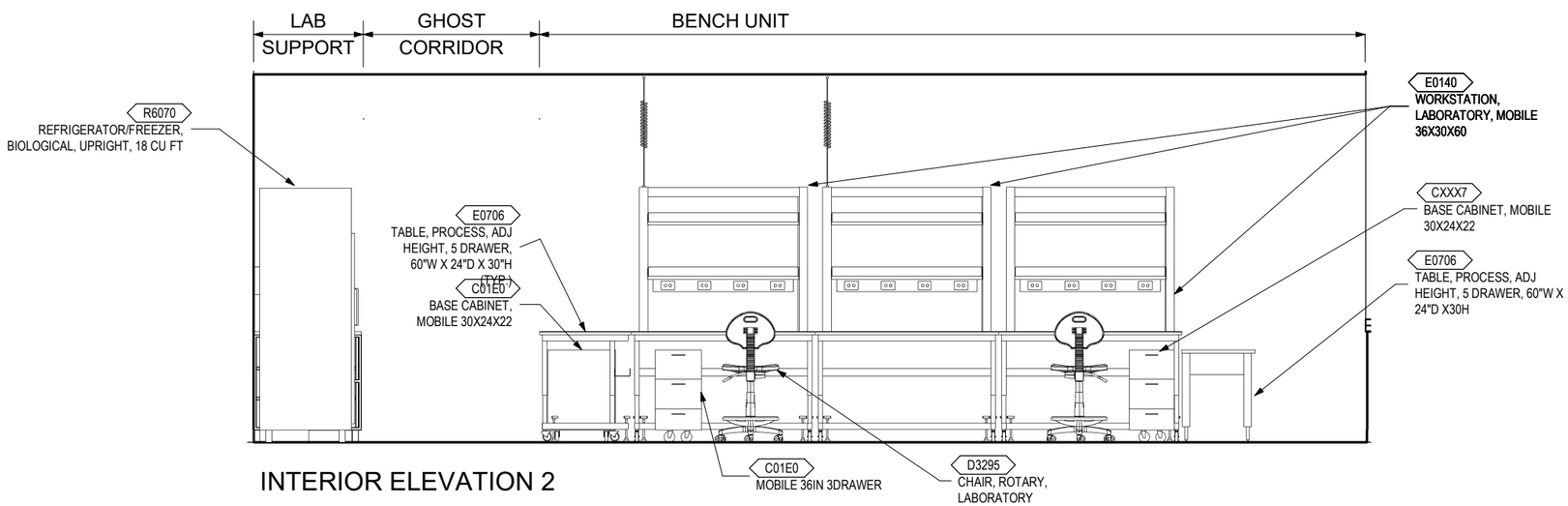


INTERIOR ELEVATION 1



INTERIOR ELEVATION 2

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC702) BLR&D BENCH UNIT, R&D
ELEVATIONS

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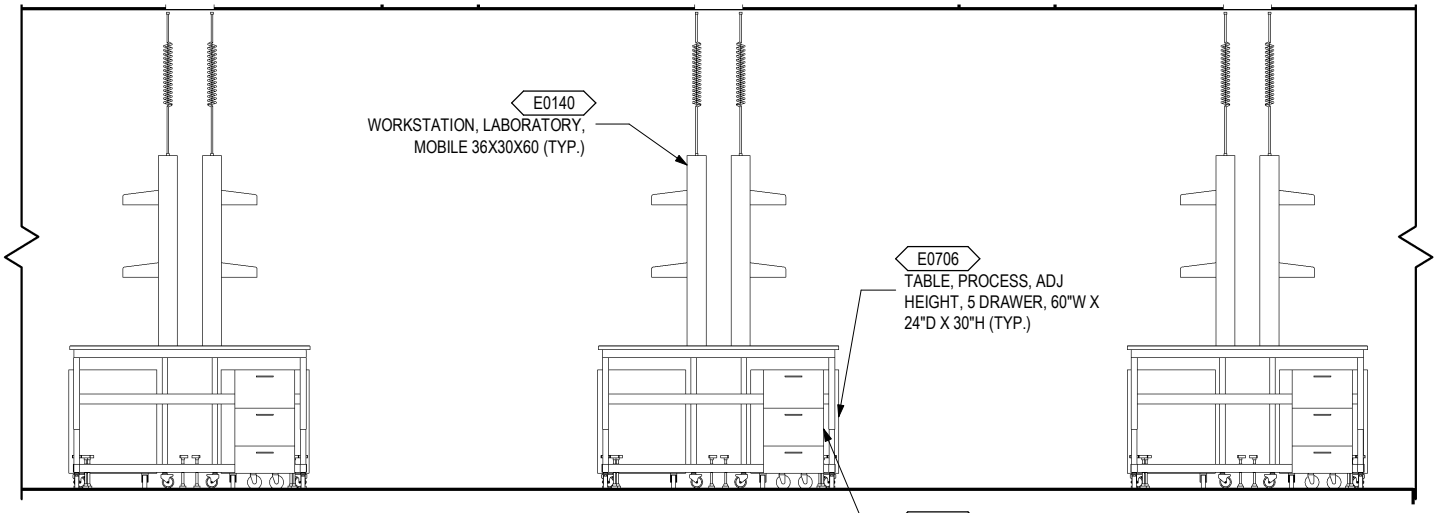
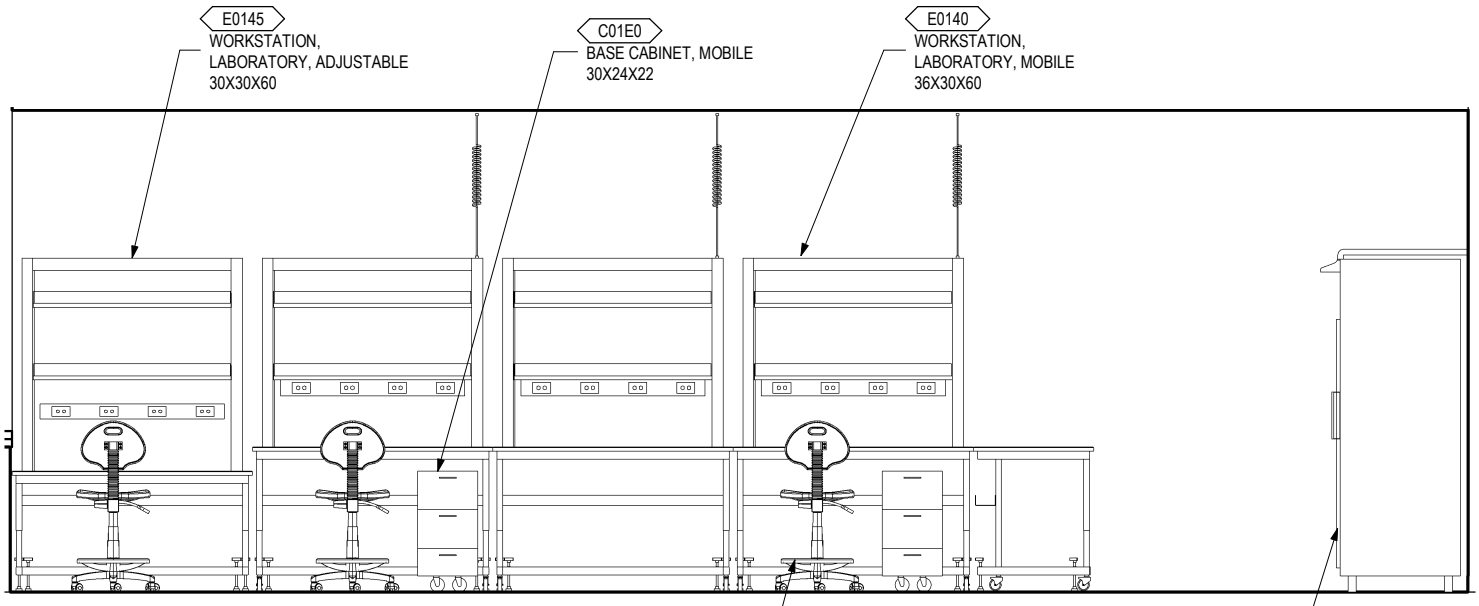


INTERIOR ELEVATION 3



INTERIOR ELEVATION 4

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC702) BLR&D BENCH UNIT, R&D
ELEVATIONS

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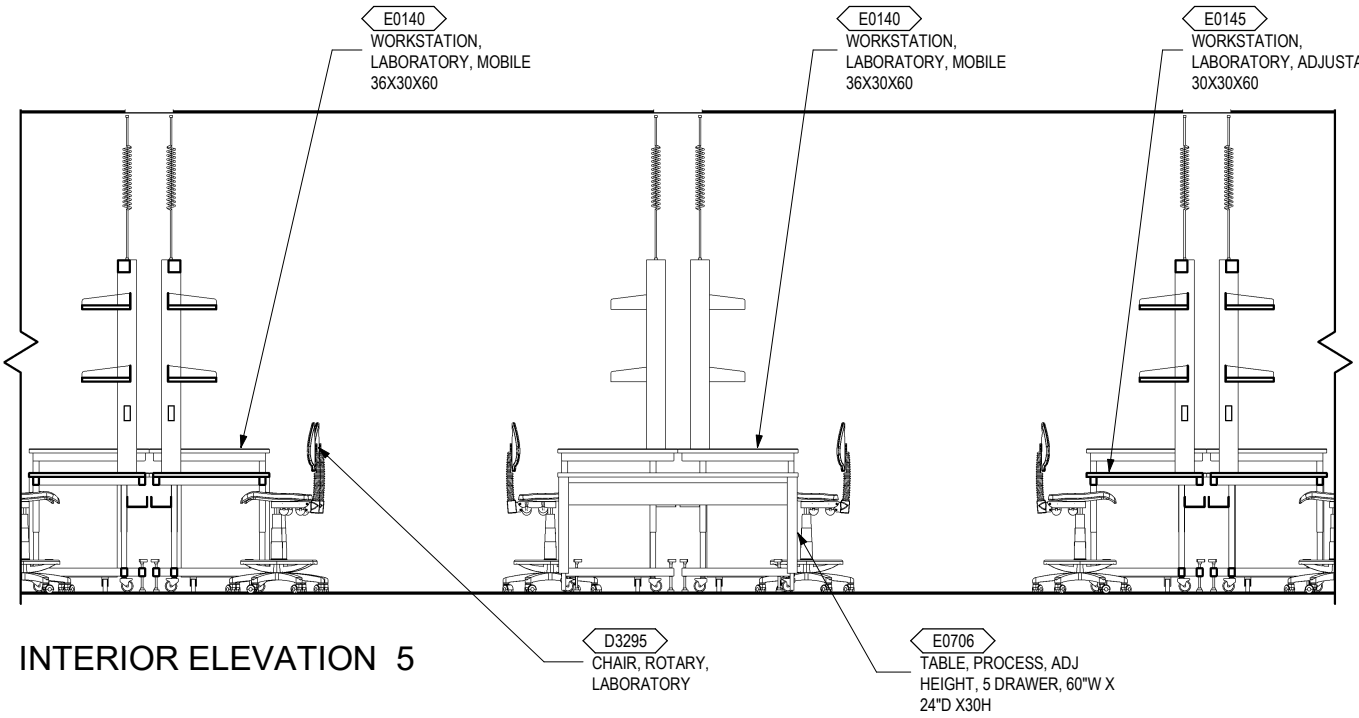

INTERIOR ELEVATION 5

Room Data: BLR&D BENCH UNIT, R&D (SC702) BLR&D BENCH SUPPORT, R&D (SC704) BLR&D GHOST CORRIDOR, R&D (SC703)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	AT
Ceiling Height:	10’-0”
Ceiling Finish:	m:AT
	:EXP
Wall Finish:	m:GWB f:P
	m:CMU f:SC
Wainscot:	N/A
Base:	m:RB h:4"
	m:RES h:4"
	m:WSF h:4
Floor Finish:	m:SVT
	m:RES
	m:WSF
Slab Depression:	N/A
Sound Protection:	STC 50
Doors:	Size U (3’-6”W x 7’-0”H)

Special Requirement:

1) Exposed ceilings are to have a clear ceiling height as listed above and at minimum 4’-0” clear below the structural beams and slab for MEPT equipment.
2) Hardware SH-3E

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	80 FC @ Bench Top
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for lighting requirements in Laboratories.

POWER

Normal Power:	No
Emergency Power:	Yes
Special Requirement:	Yes

Notes:

1) Power for laboratory benches shall generally be provided by twist lock receptacles in ceiling service panels.
2) Provide convenience receptacles throughout laboratory.
3) Dual channel raceways at laboratory benches shall contain duplex receptacles and data spaced 18” O.C.

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	Yes
Telephone:	Yes
Cable Television:	--
Duress Alarm:	Yes
Electronic Access and Door Control:	Yes
Intercom:	Yes
Motion Intrusion Detection (MID):	Yes
Nurse Call	--
Code Blue:	--
Public Address:	--
Security Surveillance Television (SSTV)	Yes
VA Satellite TV:	--
Video Teleconferencing (VTEL):	--
Special Requirement:	

Notes:

1) Data for laboratory benches shall generally be provided by ceiling service panels.
2) Refer to VA Physical Security and Resiliency Design Manual for information on security devices.

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for Room Codes SC702, SC703, and SC704.

PLUMBING AND MEDICAL GASES

Cold Water:	Yes
Hot Water:	Yes
Sanitary/Vent:	Yes
Laboratory Air:	Yes
Laboratory Gas:	Yes
Laboratory Vacuum:	Yes
Reagent Grade Water:	Yes
De-ionized Water	Yes
Medical Air:	No
Medical Vacuum:	No
Oxygen:	No
Special Requirement	

Notes:

1) Laboratory gas and air shall be provided by hoses connected to ceiling outlets with DISS connections serving lab gas valves located throughout lab benches.

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	Yes
Alarm Annunciator:	Yes
Sprinkler:	Yes

Room Contents: SC702 BLR&D Bench Unit, R&D

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5107	Dispenser, Glove, Surgical/Examination, Wall Mntd	1	VV	Examination glove dispenser box for wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
F2000	Basket, Wastepaper, Fire Resistant	1	VV	Wastepaper basket, fire resistant, approximately 40 quart capacity. This unit is used to collect and temporarily store small quantities of paper refuse in patient rooms, administrative areas and nursing stations. Size and shape varies depending on the application and manufacturer selected.
M3072	Frame, Infectious Waste Bag w/Lid	1	VV	Frame for an infectious waste collection bag. Made of heavy tubular stainless steel with heavy gauge welded steel platform. Adjust to hold 18" or 25" trash bags. Mounted on ball bearing casters and includes permanently mounted hinged lid. Provides means of bagging infectious waste at point of waste generation.
C05P0	Cabinet, Sink, U/C/B, 2 Door, 36x48x22	1	CC	Standing height under counter base sink cabinet with solid hinged doors. Also referred to as a double-door sink cabinet. For general purpose use throughout the facility where a sink is to be used. Coordinate actual clear cabinet dimension with the actual

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				outside dimension of sink that is specified to ensure that they are compatible.
CW140	Cabinet, Floor Standing, 5 SH, 2 GDO, ST, 98x36x22	1	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
C01E0	Base Cabinet, Mobile 30x24x22	10	CC	Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.
E0140	Workstation, Laboratory, Mobile 36x30x60	12	CC	Floor standing mobile self supported bench on casters with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
E0145	Workstation, Laboratory, Adjustable 30x30x60	2	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
E0706	Table, Process, Adj Height, 5 Drawer, 60"W x 24"D x 30"H	2	CC	Height adjustable table. The table is available in plastic laminate or chemical resistant material (Chem-Surf). Casters or glides are options with some tables. All surfaces will accept various storage components underneath. These tables are available in 24" or 30" depth. THIS TYPICAL INCLUDES: 1 height adjustable table; 1 storage frame; 3 drawers, 3"H; 1 drawer, 6"H; 1 drawer, 9"H and drawer organizer bins.
CT060	Countertop, Modified Epoxy Resin	1	CC	Modified epoxy resin countertop (composition of molded epoxy resins and inert materials) having a low sheen surface finish, standard thickness of 1", and a 4" butt backsplash/curb. Also referred to as a work surface or work top. Available in a choice of colors and depths. Used in lab areas requiring optimum physical and chemical resisting properties.
D3295	Chair, Rotary, Laboratory,	10	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
F3010	Board, Bulletin, 48 x 48	1	VV	Open face bulletin board. Cork posting panel with moisture proof backing. Variety of frames to choose from. Used for posting notes and messages.
R6070	Refrigerator/Freezer, Biological, Upright, 18 Cu Ft	2	VV	Biological refrigerator with freezer. This unit includes a freezer compartment for general laboratory use. Its independent direct-set temperature controllers allow temperature selection for +2° to 14°C for the refrigerator, and from -20° to -30°C for the freezer.

Room Contents: SC704 BLR&D Bench Support, R&D

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5107	Dispenser, Glove, Surgical/Examination, Wall Mntd	1	VV	Examination glove dispenser box for wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
A5145	Hook, Garment, Double, SS, Surface Mounted	1	CC	A surface mounted, satin finish stainless steel, double garment hook. Equipped with a concealed mounting bracket that is secured to a concealed wall plate. For general purpose use

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				throughout the facility to hang various items of apparel.
F2000	Basket, Wastepaper, Fire Resistant	1	VV	Wastepaper basket, fire resistant, approximately 40 quart capacity. This unit is used to collect and temporarily store small quantities of paper refuse in patient rooms, administrative areas and nursing stations. Size and shape varies depending on the application and manufacturer selected.
M3072	Frame, Infectious Waste Bag w/Lid	1	VV	Frame for an infectious waste collection bag. Made of heavy tubular stainless steel with heavy gauge welded steel platform. Adjust to hold 18" or 25" trash bags. Mounted on ball bearing casters and includes permanently mounted hinged lid. Provides means of bagging infectious waste at point of waste generation.
CT060	Countertop, Modified Epoxy Resin	1	CC	Modified epoxy resin countertop (composition of molded epoxy resins and inert materials) having a low sheen surface finish, standard thickness of 1", and a 4" butt backsplash/curb. Also referred to as a work surface or work top. Available in a choice of colors and depths. Used in lab areas requiring optimum physical and chemical resisting properties.
C0051	Pegboard, Glassware, 30x30x6	1	CC	Glassware pegboard with drip trough and pegs, suitable for holding a wide variety of lab glassware. The pegboard is available in various materials (epoxy resin, stainless steel, and wood) and with or without finished back. The pegs are generally made of polypropylene and are available in various lengths which determines the number of pegs that are provided. Pricing is based upon an epoxy resin construction without finished back, 6.5" length pegs, and a 5" depth drip trough.
C05P0	Cabinet, Sink, U/C/B, 2 Door, 36x48x22	1	CC	Standing height under counter base sink cabinet with solid hinged doors. Also referred to as a double-door sink cabinet. For general purpose use

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				throughout the facility where a sink is to be used. Coordinate actual clear cabinet dimension with the actual outside dimension of sink that is specified to ensure that they are compatible.
CW140	Cabinet, Floor Standing, 5 SH, 2 GDO, ST, 98x36x22	2	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
CS270	Sink, Epoxy Resin, 11x18x15 ID	1	CC	One-piece cast epoxy resin sink (composition of molded epoxy resins and inert materials) connected with a drain and provided with a mixing faucet. For use in U/C/B sink cabinets and mounted under the epoxy resin countertops/work surfaces found in lab areas requiring optimum physical chemical resisting properties. For general purpose use in a lab area.
P5215	Recessed, Emergency Shower/ EyeWash	1	CC	Deluge safety shower. This is a complete, maximum protection safety station consisting of a Recessed emergency shower and an eye/face wash fixture. Used anywhere exposure to hazardous substances may occur.

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#1)
AXONOMETRIC

Plot Date: 3/14/2022 2:26:26 PM

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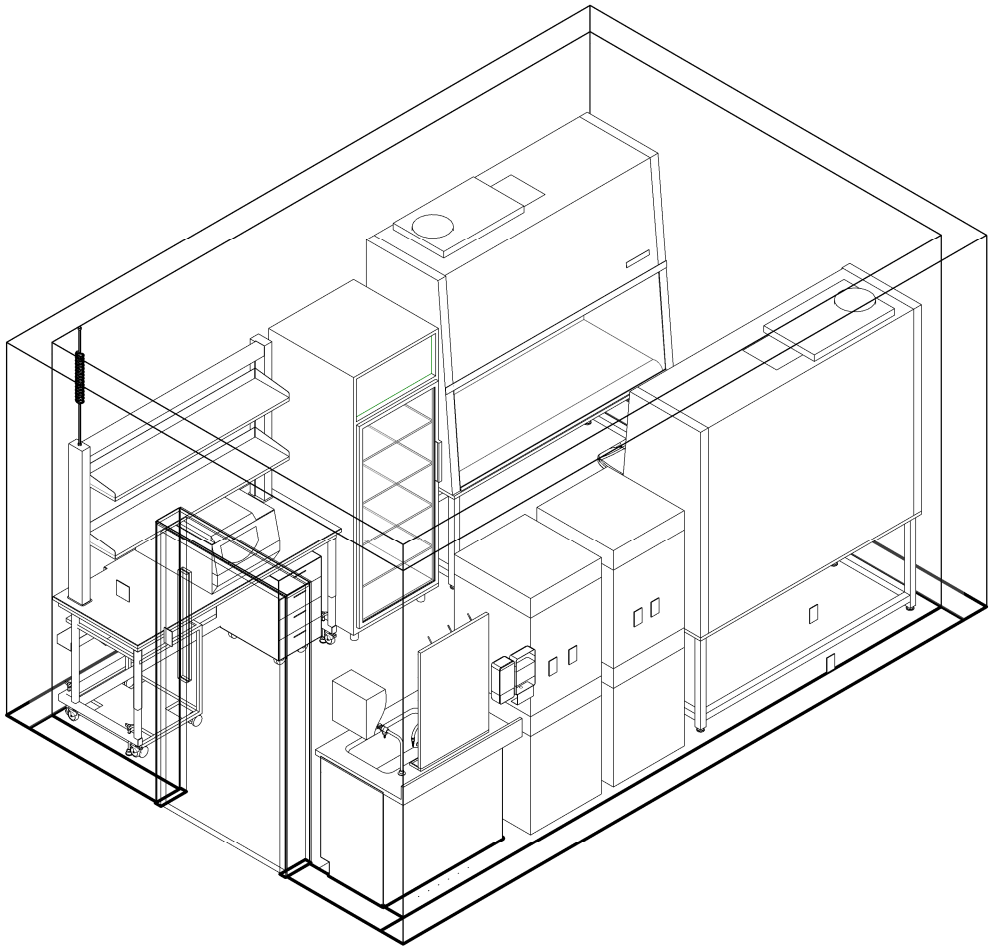

DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#1)
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:26:31 PM

SCALE: NOT TO SCALE

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#1)
FLOOR PLAN

Plot Date: 3/14/2022 2:26:34 PM

SCALE: 1/4" = 1'-0"

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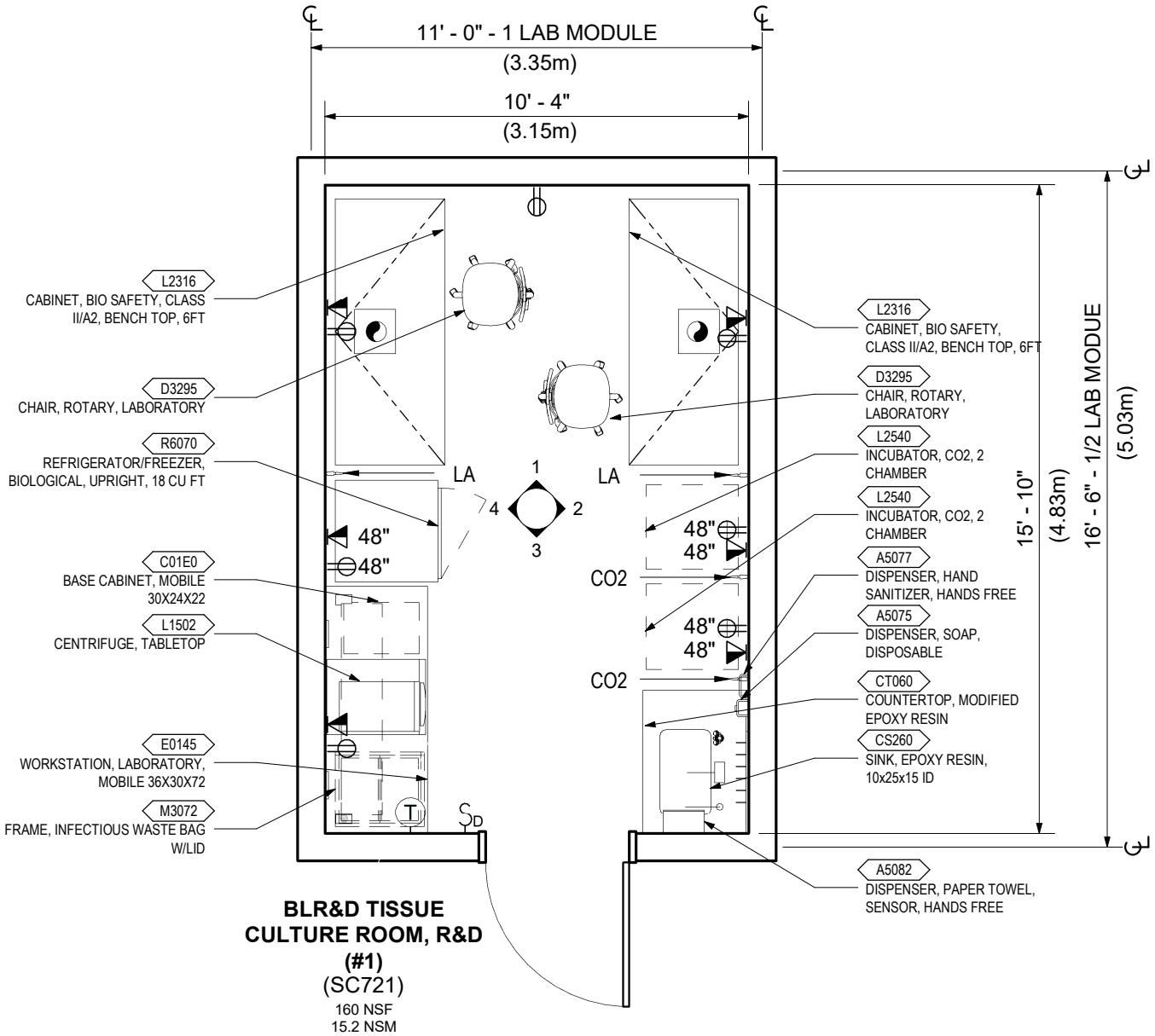

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#1)
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:26:39 PM

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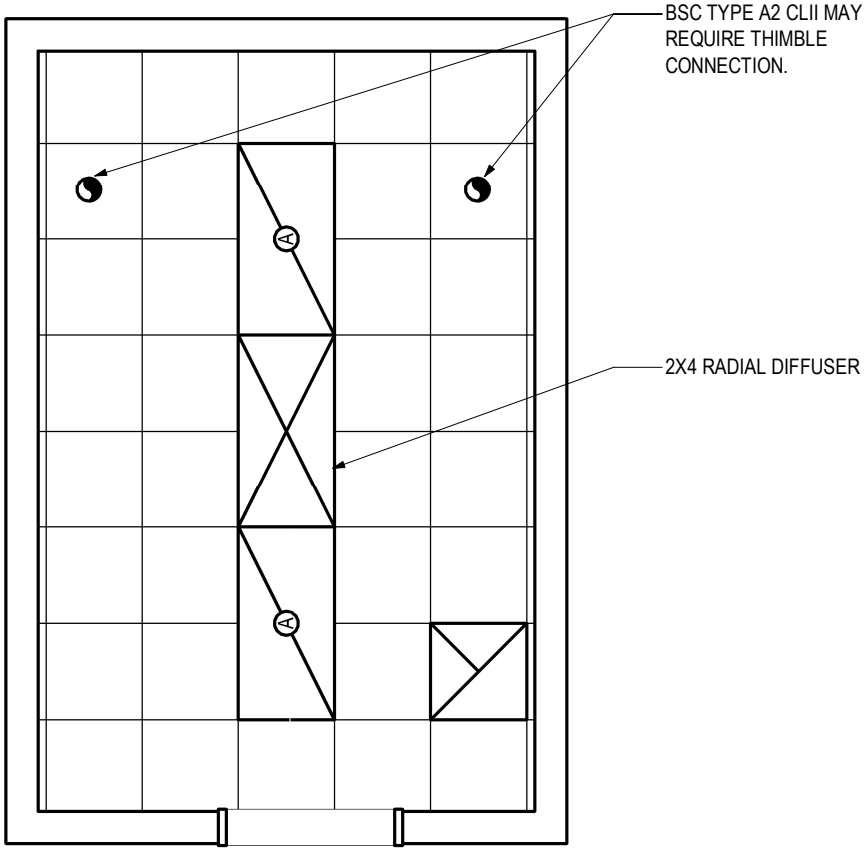
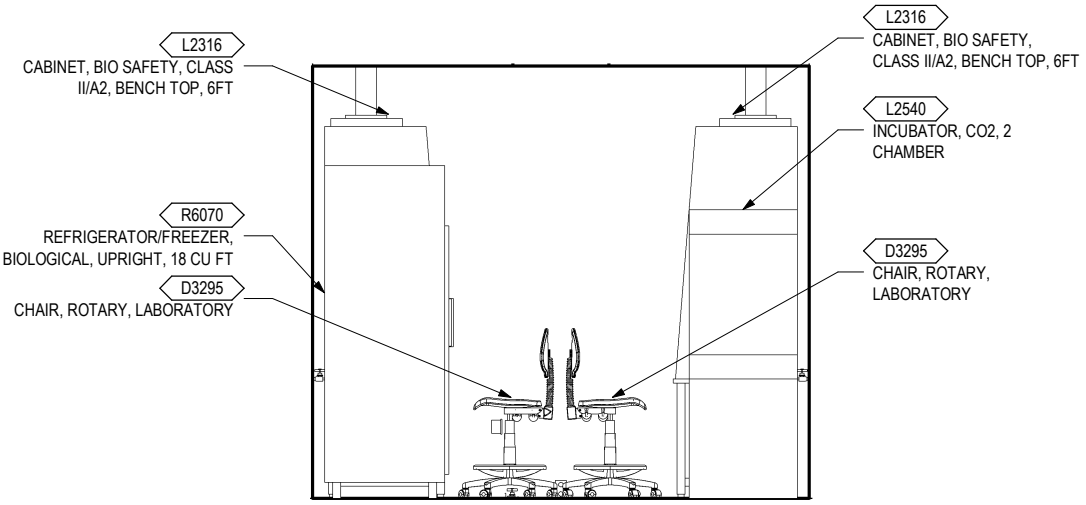


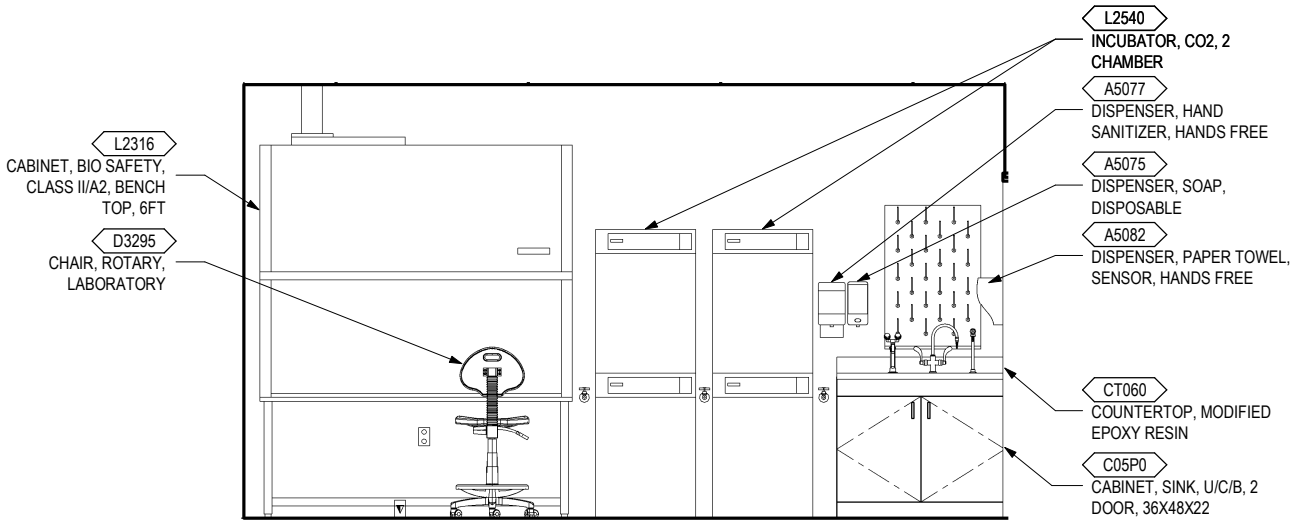
BLR&D TISSUE CULTURE ROOM, R&D (#1)
(SC721)
160 NSF
15.2 NSM

Plot Date: 3/14/2022 2:26:44 PM SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



ELEVATION 2

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#1)
ELEVATIONS

Plot Date: 3/14/2022 2:26:49 PM

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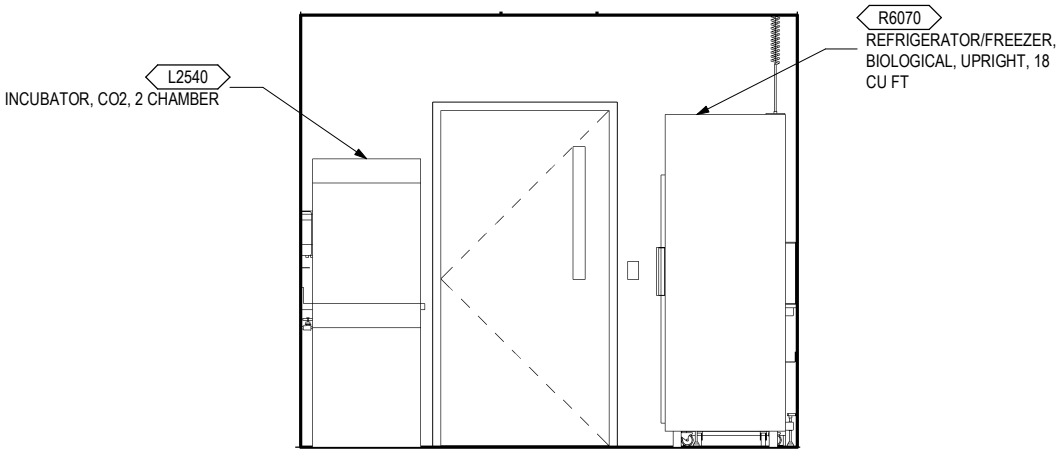
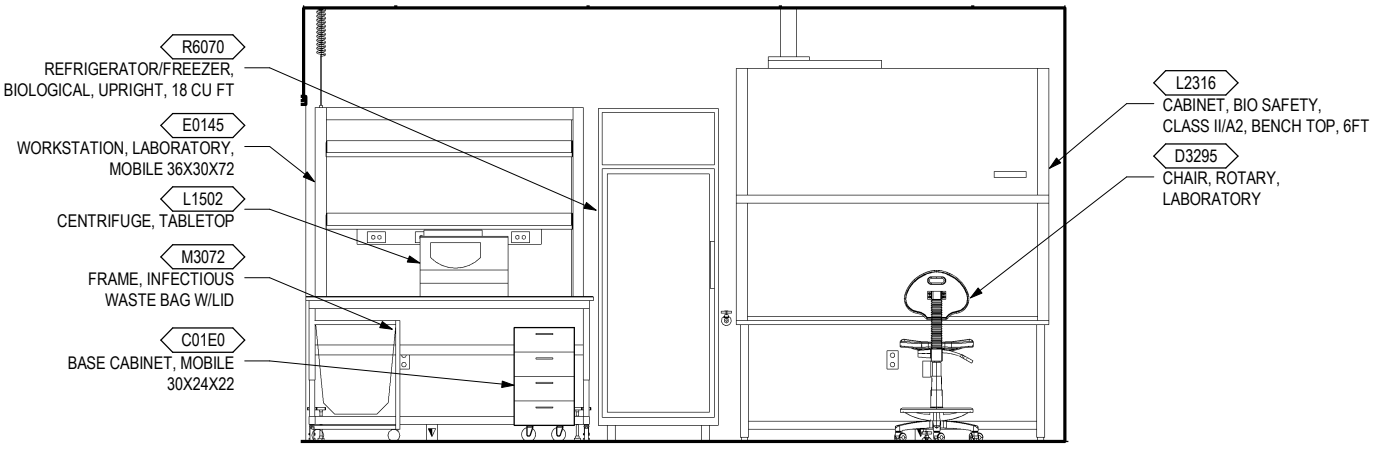


ELEVATION 3



ELEVATION 4

Room Data: BLR&D Tissue Culture Room, R&D (SC721)

ARCHITECTURAL & INTERIOR DESIGN	
Ceiling Type:	m:AT or EXP
Ceiling Height:	10’-0”
Ceiling Finish:	NA
Wall Finish:	m:GWB f:P m:CMU f:SC
Wainscot:	NA
Base:	m: RB, RES, or WSF h:4”
Floor Finish:	m: SVT, RES, or WSF
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Wood t:1 dg:T Size: U (3’-6”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) Door hardware set 4K.

LIGHTING	
Maintain Average Illumination:	50 FC
Task Illumination:	80 FC @ Work Surface
Luminaire Type:	1x4/2x2/2x4 Troffer

1)

POWER	
Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS	
Data:	YES
Telephone:	--
Cable Television:	--
Duress Alarm:	--
Electronic Access and Door Control:	YES
Intercom:	--
Motion Intrusion Detection (MID):	--
Nurse Call	--
Code Blue:	--
Public Address:	--
Security Surveillance Television (SSTV)	--
VA Satellite TV:	--
Video Teleconferencing (VTEL):	--

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the BLR&D Tissue Culture Room, R&D.

PLUMBING AND MEDICAL GASES	
Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO
Laboratory Air:	YES
Laboratory Vacuum:	YES
Laboratory Gas:	YES
Carbon Dioxide:	YES

FIRE PROTECTION AND LIFE SAFETY	
Alarm Detection:	NO
Alarm Annunciator:	NO
Sprinkler:	YES

Room Contents: BLR&D Tissue Culture Room, R&D (SC721)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5107	Dispenser, Glove, Surgical/Examination, Wall Mntd	1	VV	Examination glove dispenser box for wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
CS260	Sink, Epoxy Resin, 10x25x15 ID	1	CC	One-piece cast epoxy resin sink (composition of molded epoxy resins and inert materials) connected with a drain and provided with a mixing faucet. For use in suspended or U/C/B sink cabinets and mounted under the epoxy resin countertops/work surfaces found in lab areas requiring optimum physical chemical resisting properties. For general purpose use in a lab area.
C0051	Pegboard, Glassware, 30x30x6	1	CC	Glassware pegboard with drip trough and pegs, suitable for holding a wide variety of lab glassware. The pegboard is available in various materials (epoxy resin, stainless steel, and wood) and with or without finished back. The pegs are generally made of polypropylene and are available in various lengths which determines the number of pegs that are provided. Pricing is based upon an epoxy resin construction without finished back, 6.5" length pegs, and a 5" depth drip trough.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
CT060	Countertop, Modified Epoxy Resin	1	CC	Modified epoxy resin countertop (composition of molded epoxy resins and inert materials) having a low sheen surface finish, standard thickness of 1", and a 4" butt backsplash/curb. Also referred to as a work surface or work top. Available in a choice of colors and depths. Used in lab areas requiring optimum physical and chemical resisting properties.
C05P0	Cabinet, Sink, U/C/B, 2 Door, 36x48x22	1	CC	Standing height under counter base sink cabinet with solid hinged doors. Also referred to as a double-door sink cabinet. For general purpose use throughout the facility where a sink is to be used. Coordinate actual clear cabinet dimension with the actual outside dimension of sink that is specified to ensure that they are compatible.
C01E0	Base Cabinet, Mobile 30x24x22	1	CC	Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.
E0145	Workstation, Laboratory, Adjustable 30x30x60	1	CC	Floor standing mobile self supported bench on casters with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
E0965	Pippet cart	2	VV	54x54x12 cart on casters with chemical resistant worksurfaces that is easy to disinfect for storage of instruments and supplies for assiting in tissue culture work
L2316	Cabinet, Bio Safety, Class II/A2, Bench Top, 6ft	2	VC	Class II, Type A2, benchtop biological safety cabinet. The unit includes two HEPA filters, one supply and one exhaust, zero probed, high intake velocity that averages 105 fpm, an audible alarm to notify operator of unsafe window positions an audio-visual alarm to monitor exhaust pressure, interior of type 304 stainless steel with side walls slotted for high velocity air return, an exterior of 16 gauge or heavier steel, two ground key

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				petcocks, a grounded duplex receptacle. This unit requires 30/70% exhaust/recirc to the atmosphere, other sizes are available.
L2540	Incubator, Co2, 2 Chamber	2	VV	Dual chamber Co2 incubator. The unit includes a temperature range of from 5 above ambient to 60 degrees centigrade, stainless steel construction, adjustable shelves, inner glass doors, 10 to 12 cubic foot capacity and a temperature safety controller. This is a fully automatic unit. It is used in laboratories to grow anaerobic bacterial cultures.
D3295	Chair, Rotary, Laboratory,	2	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
F2010	Basket, Wastepaper, Step-On	1	VV	"Step-on" wastepaper basket with inner liner and foot petal activated flip top.
F3010	Board, Bulletin, 48 x 48	1	VV	Open face bulletin board. Cork posting panel with moisture proof backing. Variety of frames to choose from. Used for posting notes and messages.
L0080	Microscope, Binocular	1	VV	Inverted phase contrast microscope. Can be easily changed to accommodate various brightfield, darkfield or phase contrast transmitted light techniques. Unit has a selective light source, fluorescence system for maximum transmission and various filter and objective combinations to meet specific requirements while using different techniques. Used for tissue culture research and routine medical laboratory examinations. Unit to be equipped with lighting and exposure controls suitable for photomicroscopy. Provided with optional camera mount,

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				and 35mm camera back. Unit includes inverted stage and light sources to accommodate tissue culture bottles. This is not a stereo microscope. Models identified are representative systems; specific configurations will result in varying costs.
L1502	Centrifuge, Tabletop	1	VV	Tabletop laboratory centrifuge. This unit has a variable speed range of 1500 to 13000 RPM in part dependent on rotor assembly used. It includes a no brake option allowing rotor to spin to a gradual stop as well as the capability to enter combinations of time and RPM into the memory, and a door lock safety system. Heads accommodate a wide variety of tubes and can accommodate up to at least 76 tubes. Used in laboratories to prepare samples for further analysis.
M3072	Frame, Infectious Waste Bag w/Lid	1	VV	Frame for an infectious waste collection bag. Made of heavy tubular stainless steel with heavy gauge welded steel platform. Adjust to hold 18" or 25" trash bags. Mounted on ball bearing casters and includes permanently mounted hinged lid. Provides means of bagging infectious waste at point of waste generation.
R6070	Refrigerator/Freezer, Biological, Upright, 18 Cu Ft	1	VV	Biological refrigerator with freezer. This unit includes a freezer compartment for general laboratory use. Its independent direct-set temperature controllers allow temperature selection for +2° to 14°C for the refrigerator, and from -20° to -30°C for the freezer.

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2)
AXONOMETRIC

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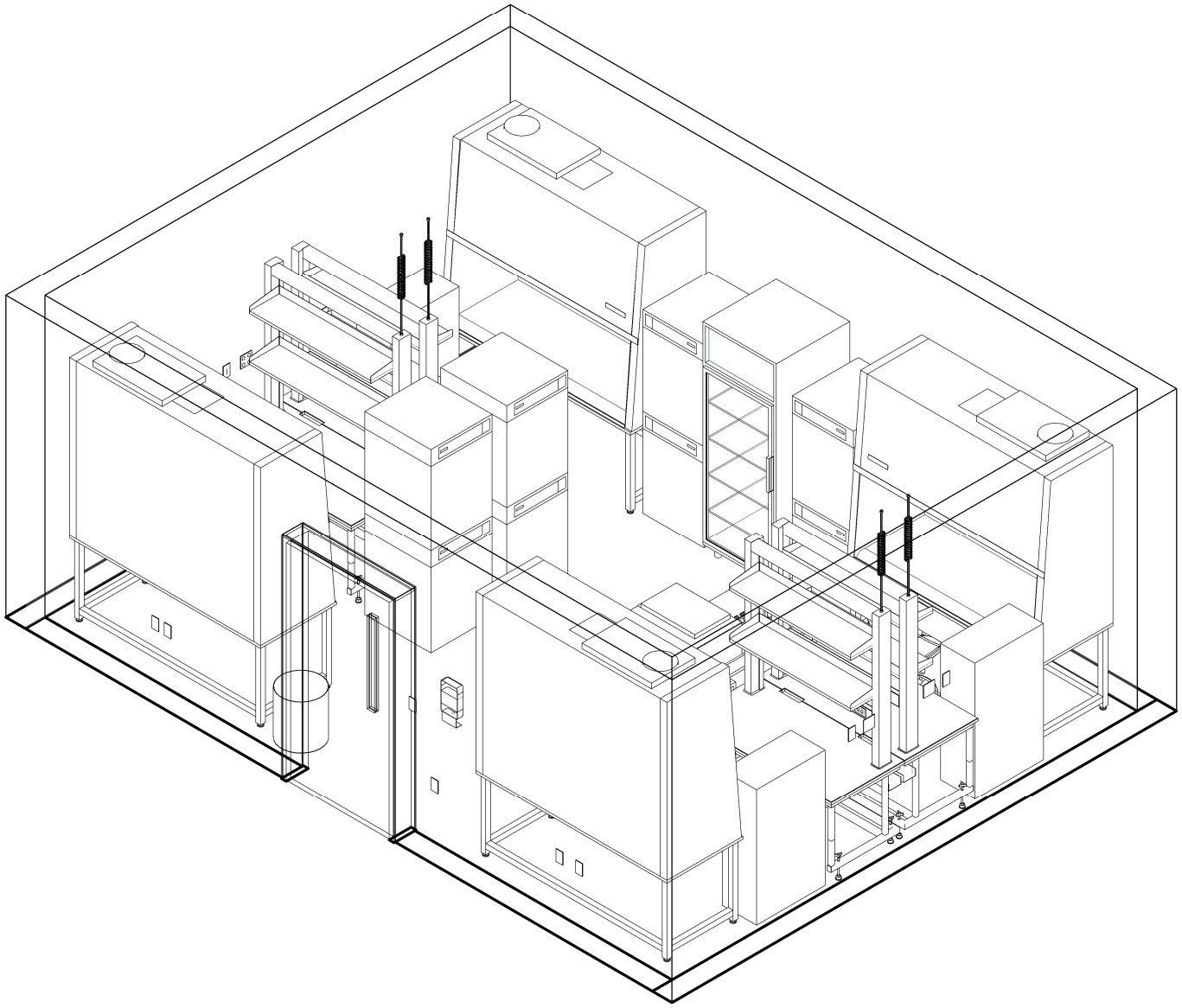

NOTE: TISSUE CULTURE ROOM #2 COMBINES 4 STATIONS FOR SPACE OPTIMIZATION AND REDUCES THE RISK OF CONTAMINATION BY ELIMINATING CIRCULATION BEHIND EACH STATION.

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2)
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 3:49:36 PM

SCALE:

NOTE: TISSUE CULTURE ROOM #2 COMBINES 4 STATIONS FOR SPACE OPTIMIZATION AND REDUCES THE RISK OF CONTAMINATION BY ELIMINATING CIRCULATION BEHIND EACH STATION.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2)
FLOOR PLAN

Plot Date: 3/14/2022 3:49:32 PM SCALE: 1/4" = 1'-0"

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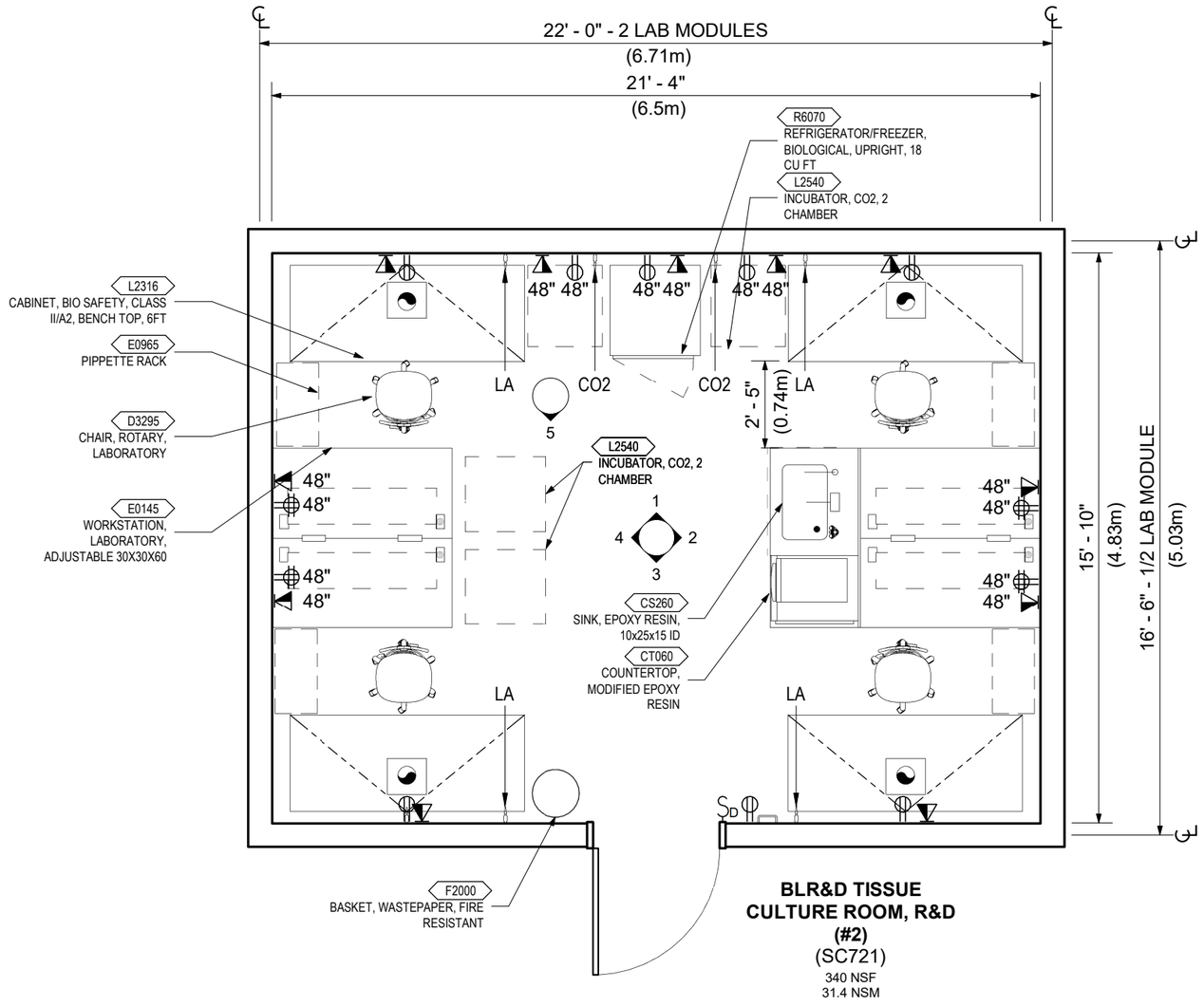

NOTE: TISSUE CULTURE ROOM #2 COMBINES 4 STATIONS FOR SPACE OPTIMIZATION AND REDUCES THE RISK OF CONTAMINATION BY ELIMINATING CIRCULATION BEHIND EACH STATION.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2)
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:27:09 PM

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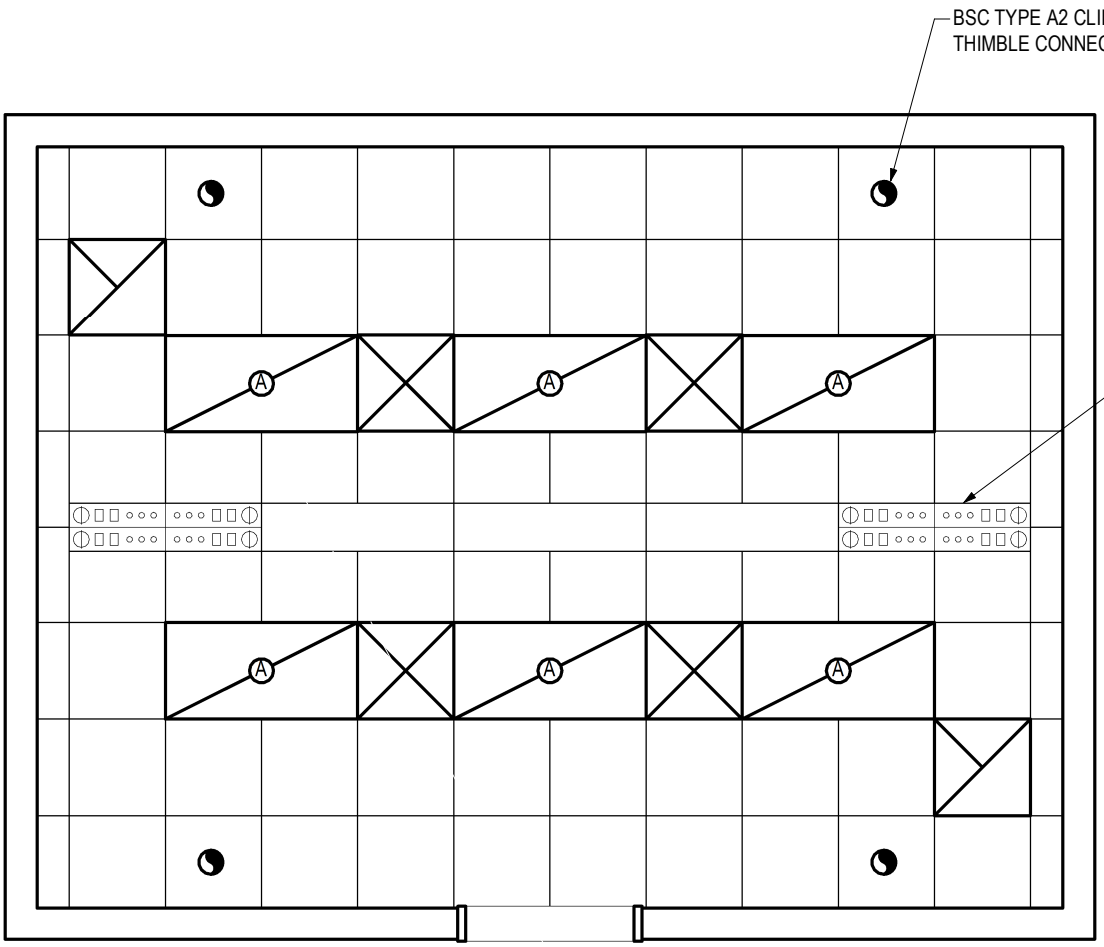
0' 4' 8' 16'



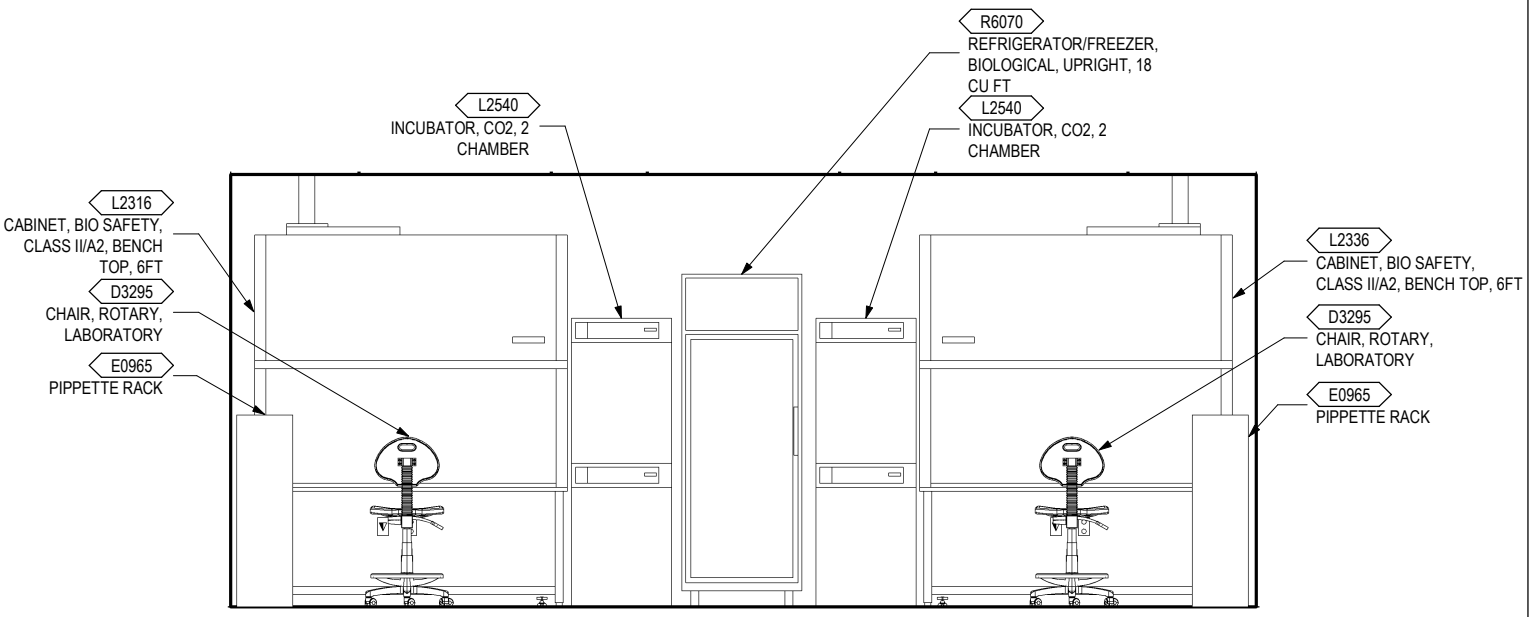
BLR&D TISSUE CULTURE ROOM, R&D (#2)
(SC721)
340 NSF
31.4 NSM

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2) ELEVATIONS

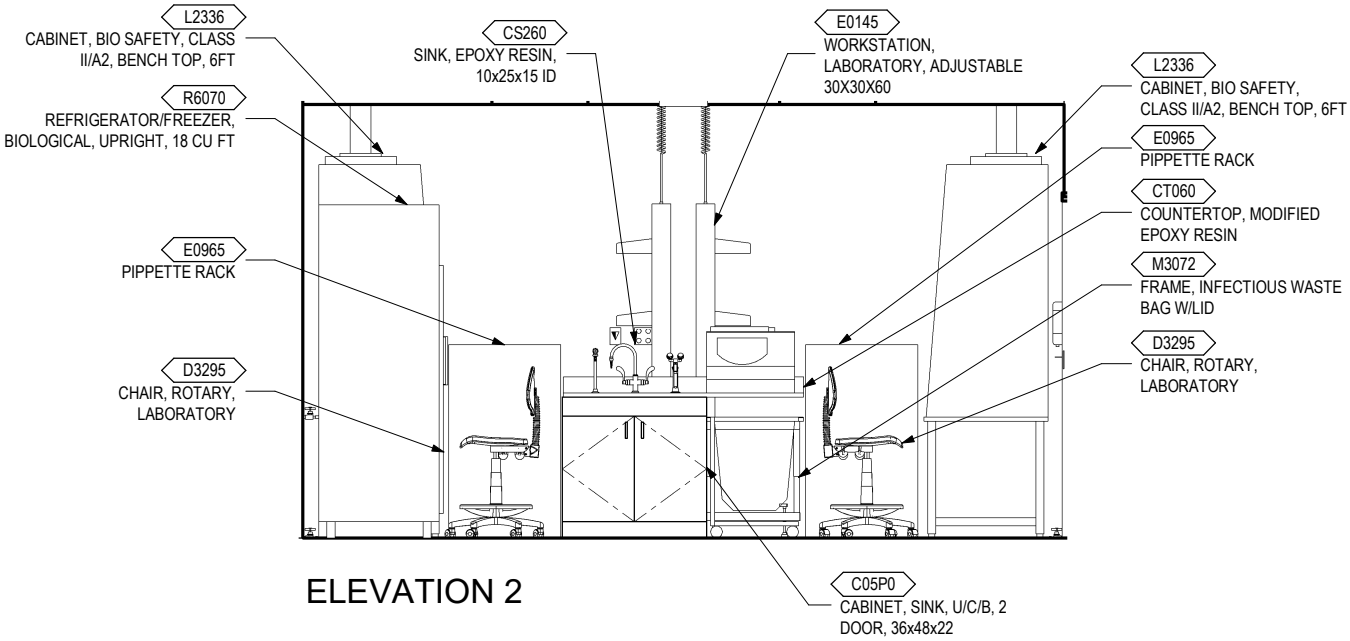
Plot Date: 3/14/2022 2:27:13 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



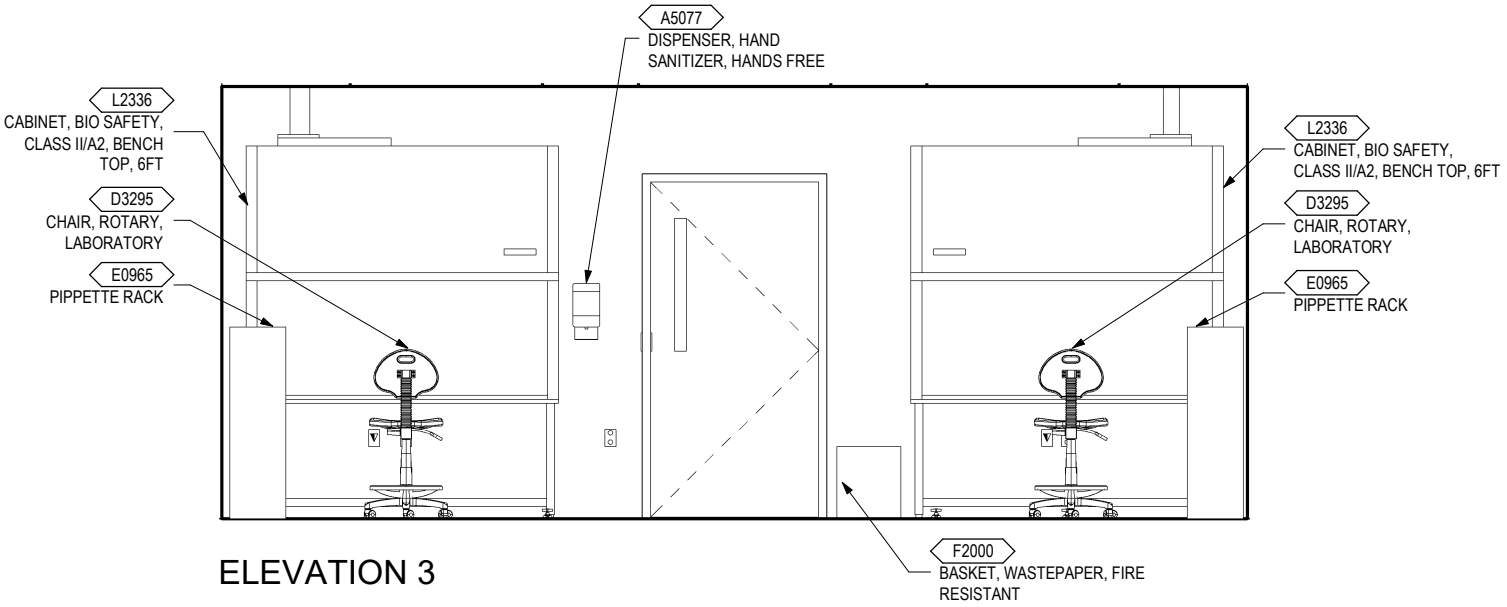
ELEVATION 2

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC721) BLR&D TISSUE CULTURE ROOM, R&D (#2)
ELEVATIONS

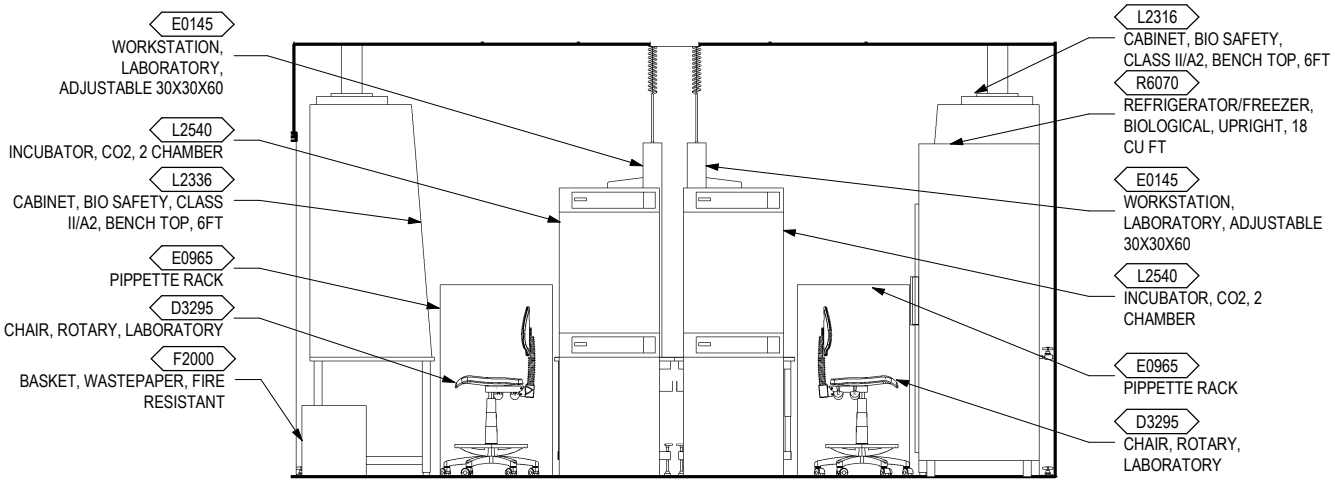
Plot Date: 3/14/2022 2:27:17 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

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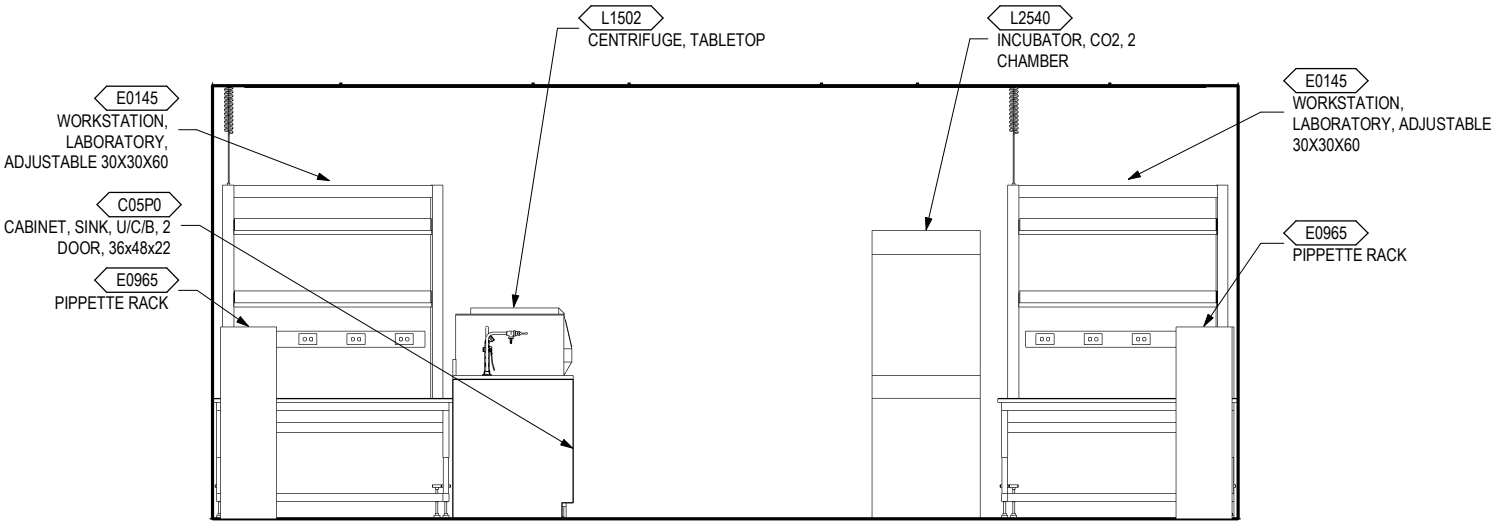
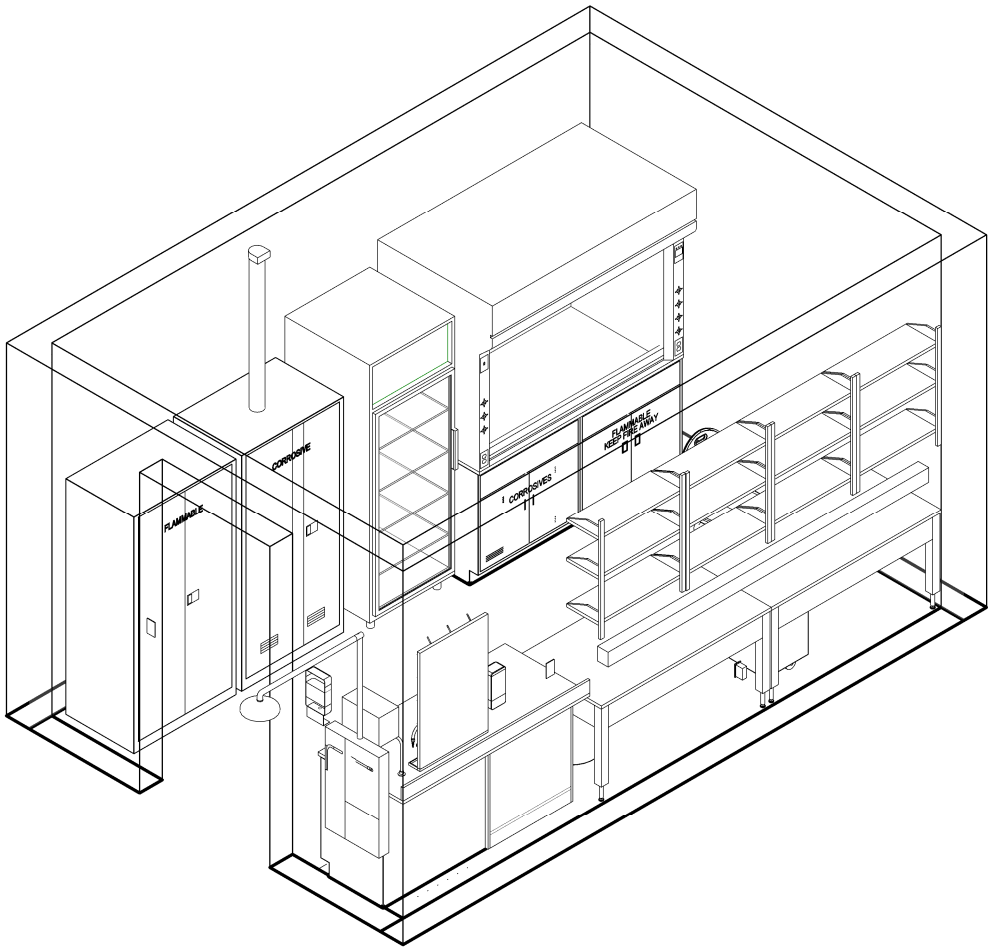


ELEVATION 5

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#1)
AXONOMETRIC

Plot Date: 3/14/2022 2:27:24 PM

SCALE: 0' 4' 8' 16'



U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#1)
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:27:27 PM

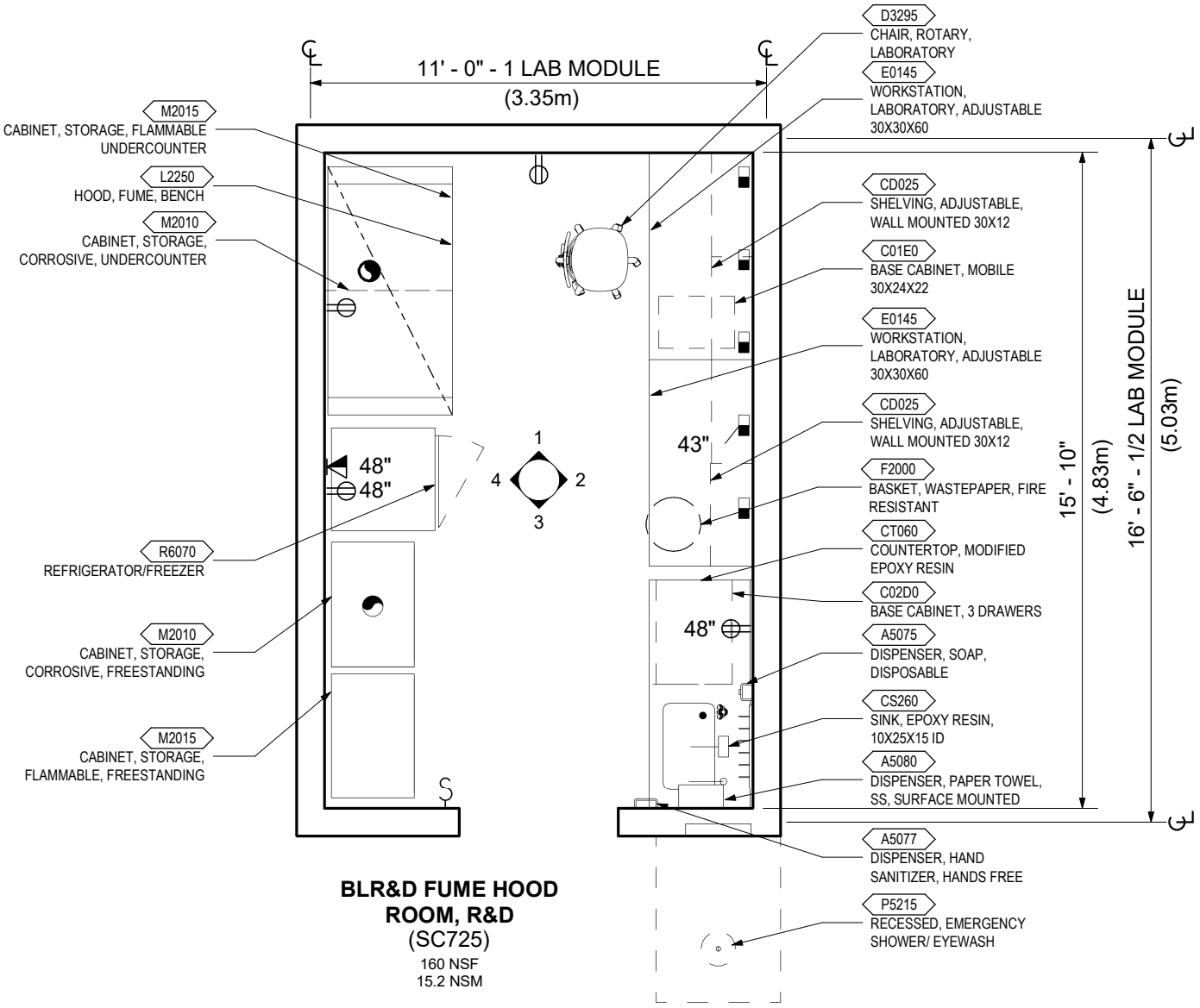
SCALE:

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#1)
FLOOR PLAN

Plot Date: 3/14/2022 2:27:30 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



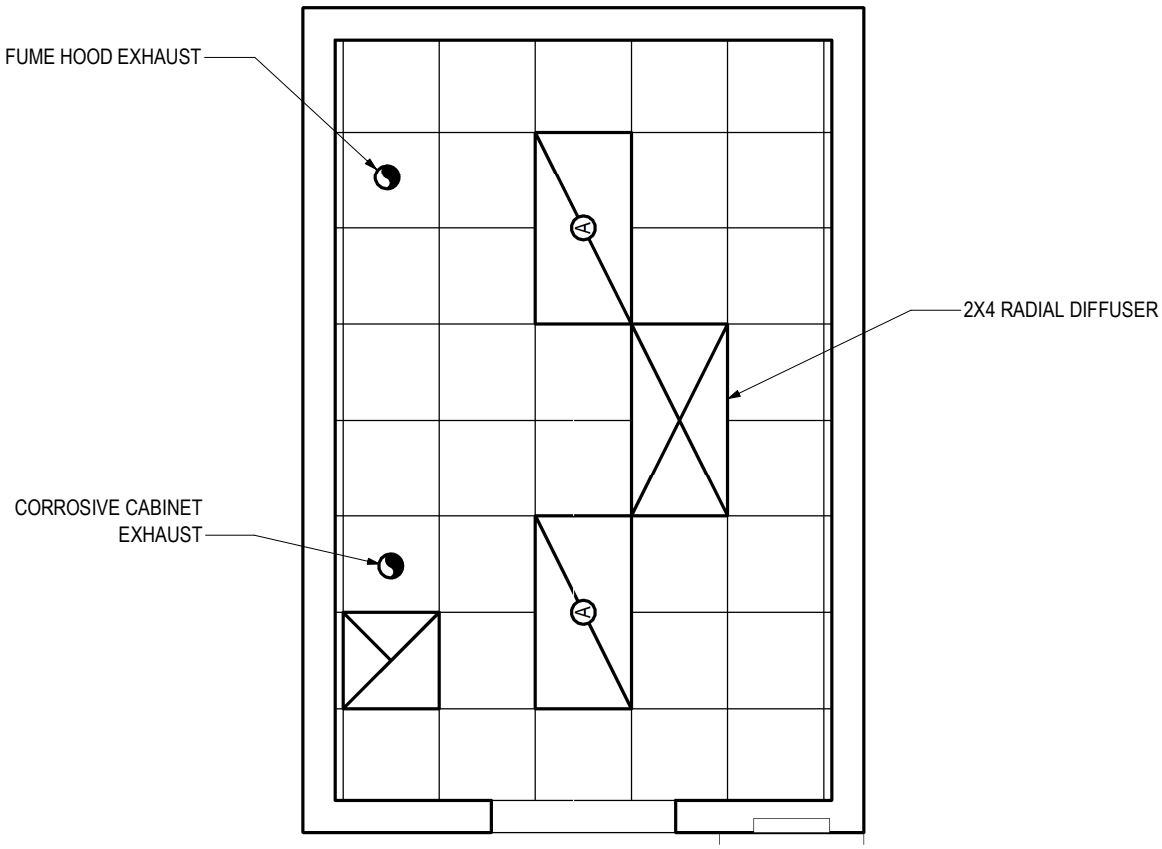
BLR&D FUME HOOD ROOM, R&D
(SC725)
160 NSF
15.2 NSM

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#1)
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:27:33 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



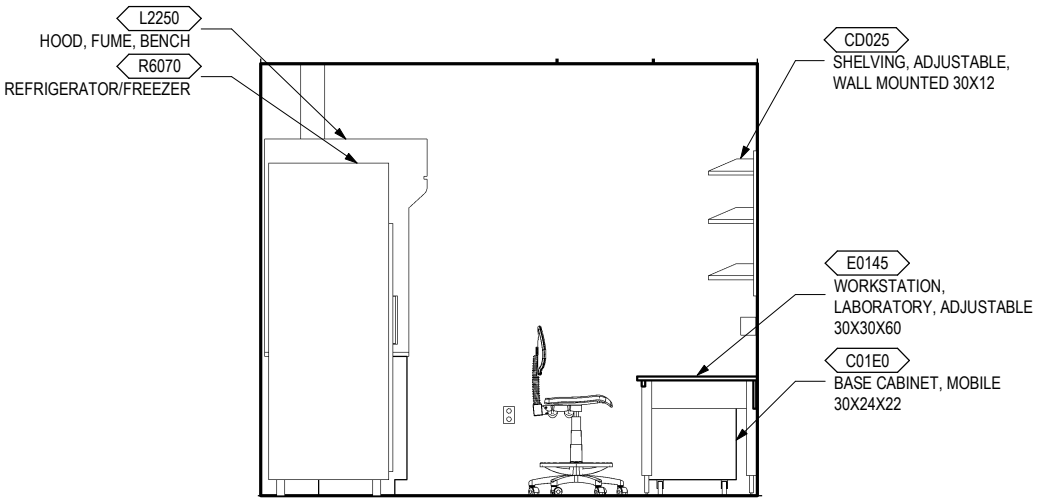
BLR&D FUME HOOD ROOM, R&D
(SC725)
160 NSF
15.2 NSM

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC725) BLR&D FUME HOOD ROOM, R&D (#1) ELEVATIONS

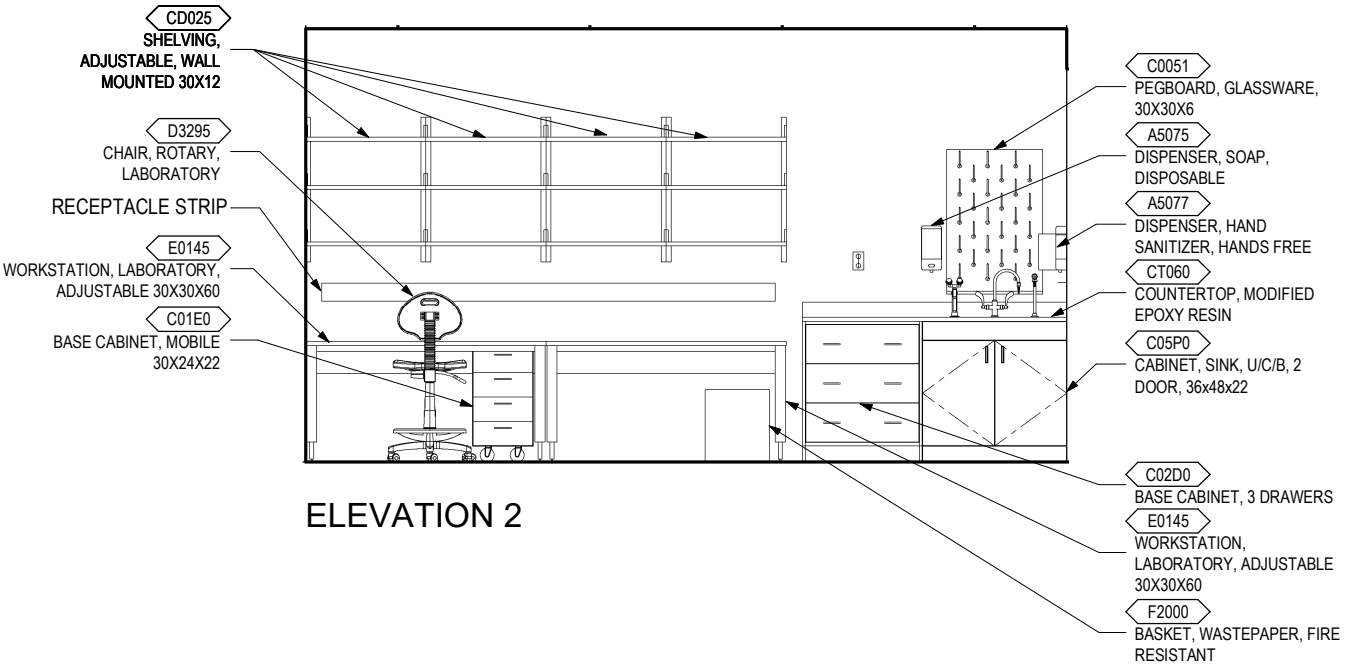
Plot Date: 3/14/2022 2:27:37 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1

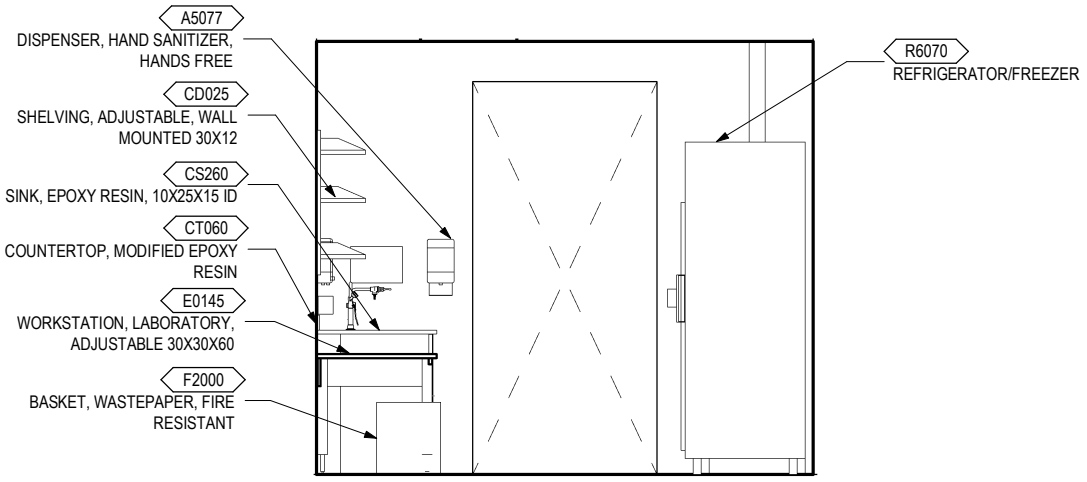


ELEVATION 2

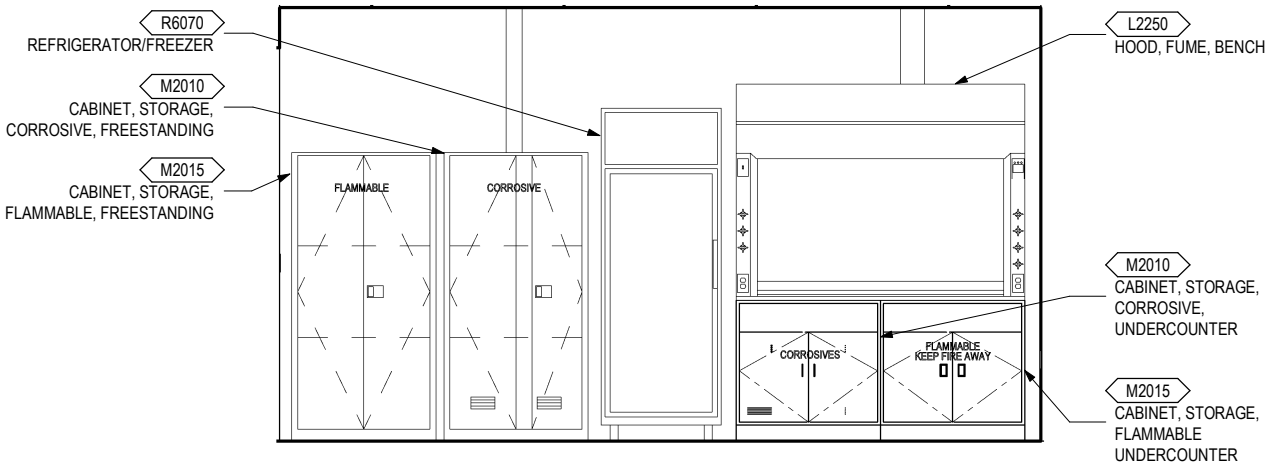
DISCLAIMER: ROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

Plot Date: 3/14/2022 2:27:41 PM SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: BLR&D Fume Hood Room, R&D (SC725)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	AT
Ceiling Height:	9’-0”
Ceiling Finish:	NA
Wall Finish:	m:GWB f:P m:CMU f:SC
Wainscot:	NA
Base:	m:RB, RES, or WSF h:4"
Floor Finish:	m:SVT, RES, or WSF
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Wood t:1 dg:T Size: U (3’-6”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) Door hardware set 4K

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	80 FC @ Bench
Luminaire Type:	2x2/2x4 Troffer
Special Requirement:	NO

Notes:

1) Refer to VA Lighting Design Manual

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

Notes:

1) Provide dual channel surface mounted raceway at laboratory benches.

TELECOMMUNICATION/
SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	NO
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	NO
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual identifies the HVAC requirements for the BLR&D Fume Hood Room.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO
Laboratory Air:	YES
Laboratory Vacuum:	YES
Laboratory Gas:	YES

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	NO

Room Contents: BLR&D Fume Hood Room, R&D (SC725)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5107	Dispenser, Glove, Surgical/Examination, Wall Mntd	1	VV	Examination glove dispenser box for wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
P5215	Recessed, Emergency Shower/ EyeWash	1	CC	Deluge safety shower. This is a complete, maximum protection safety station consisting of a Recessed emergency shower and an eye/face wash fixture. Used anywhere exposure to hazardous substances may occur.
C04P0	Cabinet, Sink, U/C/B, 2 Door, 36x36x22	1	CC	Standing height under counter base sink cabinet with solid hinged doors. Also referred to as a double-door sink cabinet. For general purpose use throughout the facility where a sink is to be used. Coordinate actual clear cabinet dimension with the actual outside dimension of sink that is specified to ensure that they are compatible.
CW130	Cabinet, Floor Standing, 5 SH, 2 GDO, ST, 98x30x22	2	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
C01E0	Base Cabinet, Mobile 30x24x22	1	CC	Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
E0145	Workstation, Laboratory, Adjustable 30x30x60	2	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
CD025	Shelving, Adjustable, Wall Mounted 30x12	4	CC	3 adjustable wall mounted laboratory Epoxy, steel or stainless steel shelving with metal brackets and wall standards
CS260	Sink, Epoxy Resin, 10x25x15 ID	1	CC	One-piece cast epoxy resin sink (composition of molded epoxy resins and inert materials) connected with a drain and provided with a mixing faucet. For use in suspended or U/C/B sink cabinets and mounted under the epoxy resin countertops/work surfaces found in lab areas requiring optimum physical chemical resisting properties. For general purpose use in a lab area.
C0051	Pegboard, Glassware, 30x30x6	1	CC	Glassware pegboard with drip trough and pegs, suitable for holding a wide variety of lab glassware. The pegboard is available in various materials (epoxy resin, stainless steel, and wood) and with or without finished back. The pegs are generally made of polypropylene and are available in various lengths which determines the number of pegs that are provided. Pricing is based upon an epoxy resin construction without finished back, 6.5" length pegs, and a 5" depth drip trough.
CT060	Countertop, Modified Epoxy Resin	1	CC	Modified epoxy resin countertop (composition of molded epoxy resins and inert materials) having a low sheen surface finish, standard thickness of 1", and a 4" butt backsplash/curb. Also referred to as a work surface or work top. Available in a choice of colors and depths. Used in lab areas requiring optimum physical and chemical resisting properties.
L2250	Hood, Fume, Bench	1	CC	Benchtop fumehood. This is an restricted bypass type to be sized as required. a LED light, an acid resistant fan and blower housing. The minimum average face velocity shall be 100 fpm. It shall include a steel frame sash that is

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				heat resistant to 171 degrees centigrade. The static pressure loss shall not exceed 0.22 inches of water at 100 fpm face velocity. Other accessories and gases are as defined during the design of the facility.
M2010	Cabinet, Storage, Acid, Undercounter	2	VV	Floor standing acid storage cabinet. A 30 gallon capacity standard two door cabinet with adjustable shelves, three-point latch with key-lock and 2" raised leak proof sill. An 18-gauge steel frame with vents, 1 1/2" airspace between walls and epoxy finish resistant to chemical attack. Note: Not for use with nitric and sulfuric acids.
M2015	Cabinet, Storage, Flammable, Undercounter	2	VV	Undercounter flammable safety storage cabinet. Size as required. Unit is of all welded steel wall construction with vented grounding attachments, raised leak proof door sill and adjustable shelving. Equipped with swinging doors and built-in key lock. Designed for storage of flammable fluids. Complies with OSHA standards, is FM approved and designed IAW NFPA 30.
D3295	Chair, Rotary, Laboratory,	2	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
F2010	Basket, Wastepaper, Step-On	1	VV	"Step-on" wastepaper basket with inner liner and foot petal activated flip top.
F3010	Board, Bulletin, 48 x 48	1	VV	Open face bulletin board. Cork posting panel with moisture proof backing. Variety of frames to choose from. Used for posting notes and messages.

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
AXONOMETRIC

Plot Date: 3/14/2022 3:49:41 PM

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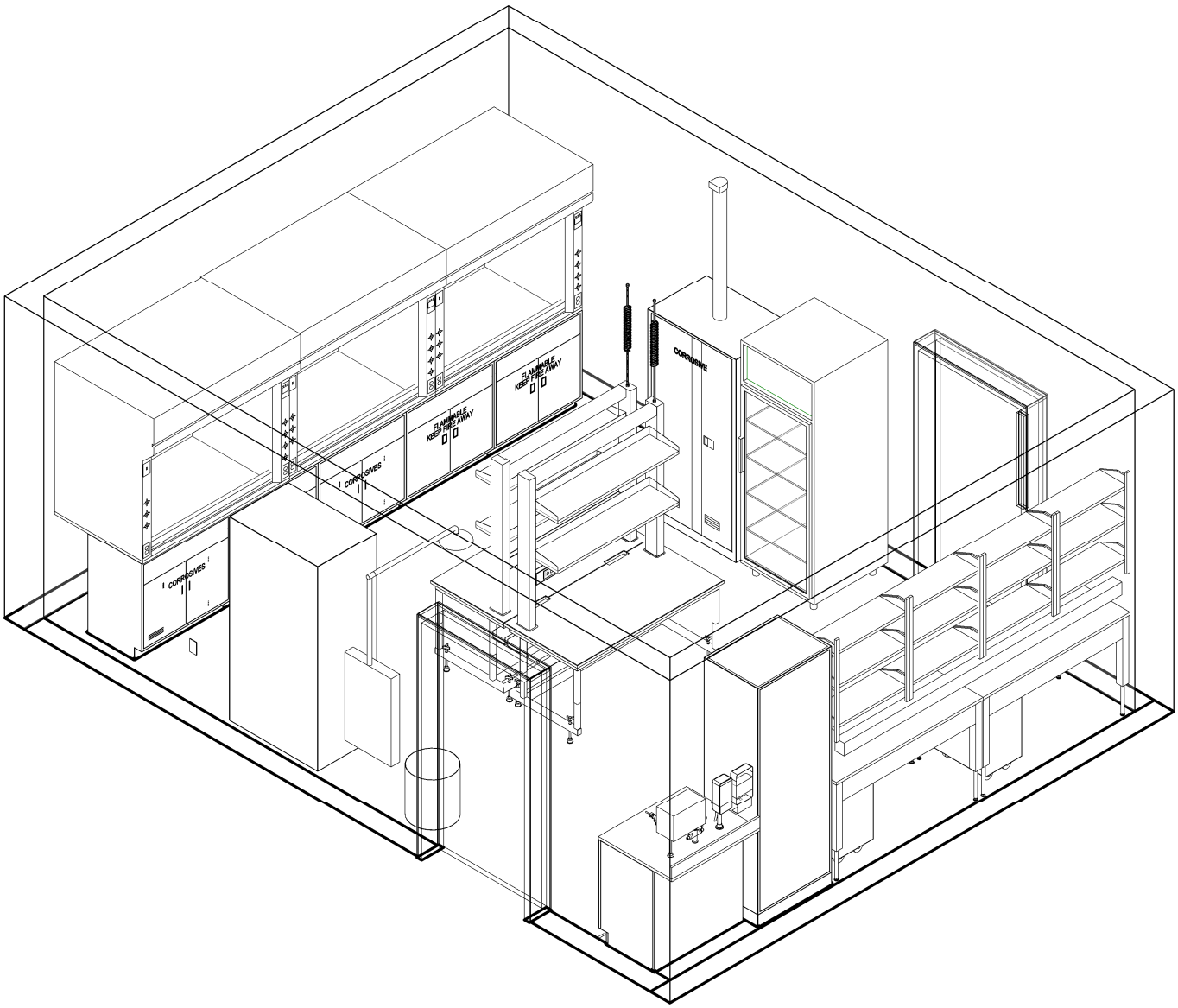


NOTE: FUME HOOD #2 TO CO-LOCATE FUME HOODS FOR SPACE OPTIMIZATION, SHARED EQUIPMENT AND RISK BASED ZONING.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 3:49:42 PM

SCALE:

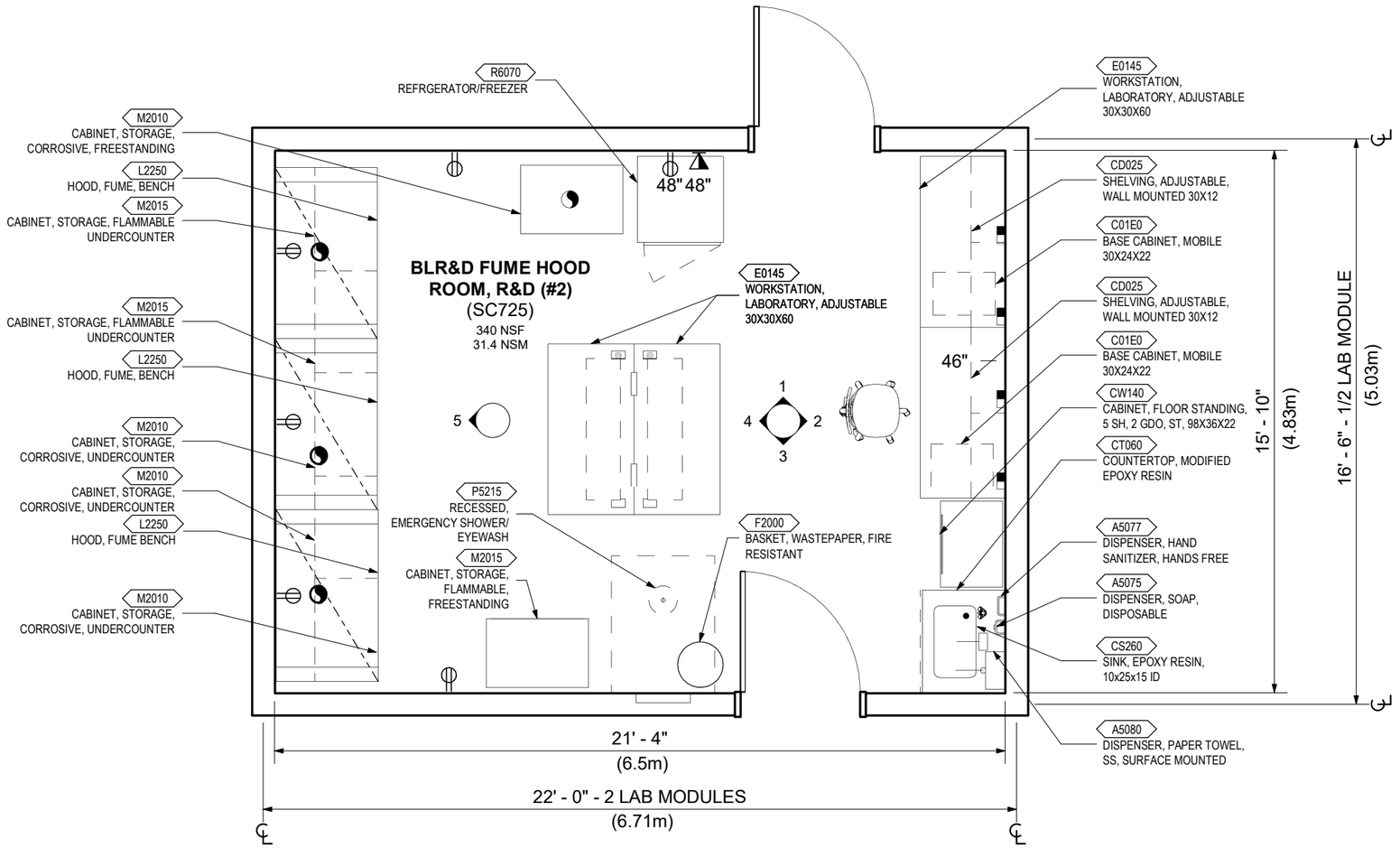
NOTE: FUME HOOD #2 TO CO-LOCATE FUME HOODS FOR SPACE OPTIMIZATION, SHARED EQUIPMENT AND RISK BASED ZONING.

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
FLOOR PLAN

Plot Date: 3/14/2022 3:49:39 PM SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



NOTE: FUME HOOD #2 TO CO-LOCATE FUME HOODS FOR SPACE OPTIMIZATION, SHARED EQUIPMENT AND RISK BASED ZONING.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:27:57 PM

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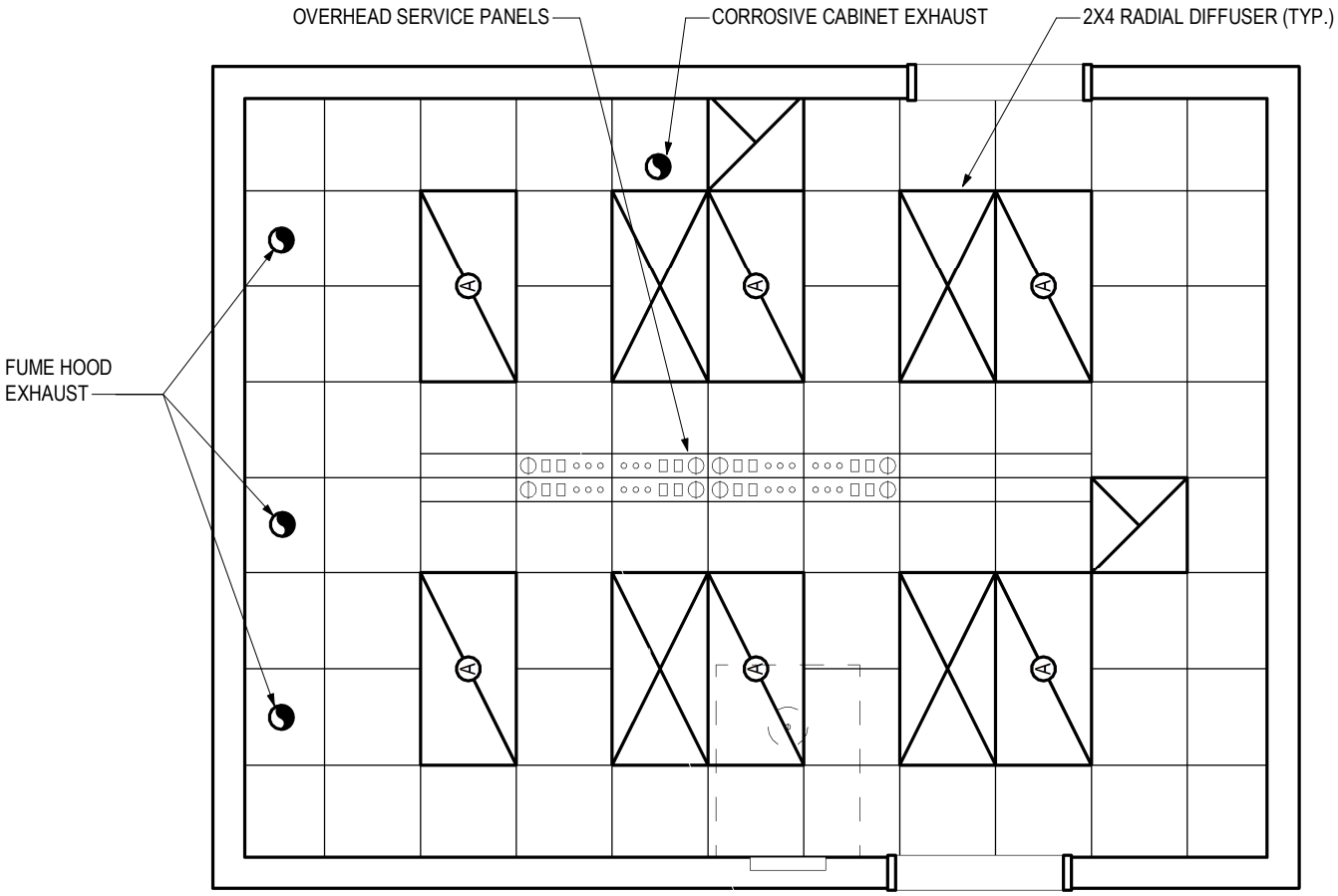
0' 4' 8' 16'



BLR&D FUME HOOD ROOM, R&D (#2)
(SC725)
340 NSF
31.4 NSM

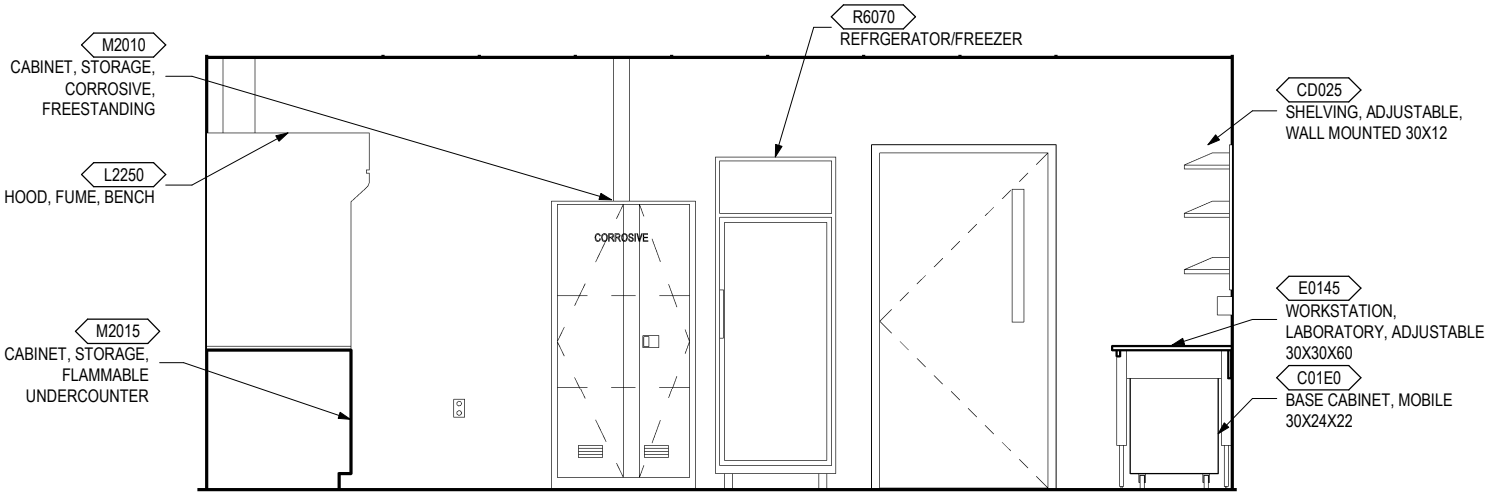
NOTE: THIS ROOM TEMPLATE DEPICTS A COMBINATION OF MULTIPLE SINGULAR FUME HOOD SPACES FOR MAXIMIZING EFFICIENCY.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
ELEVATIONS

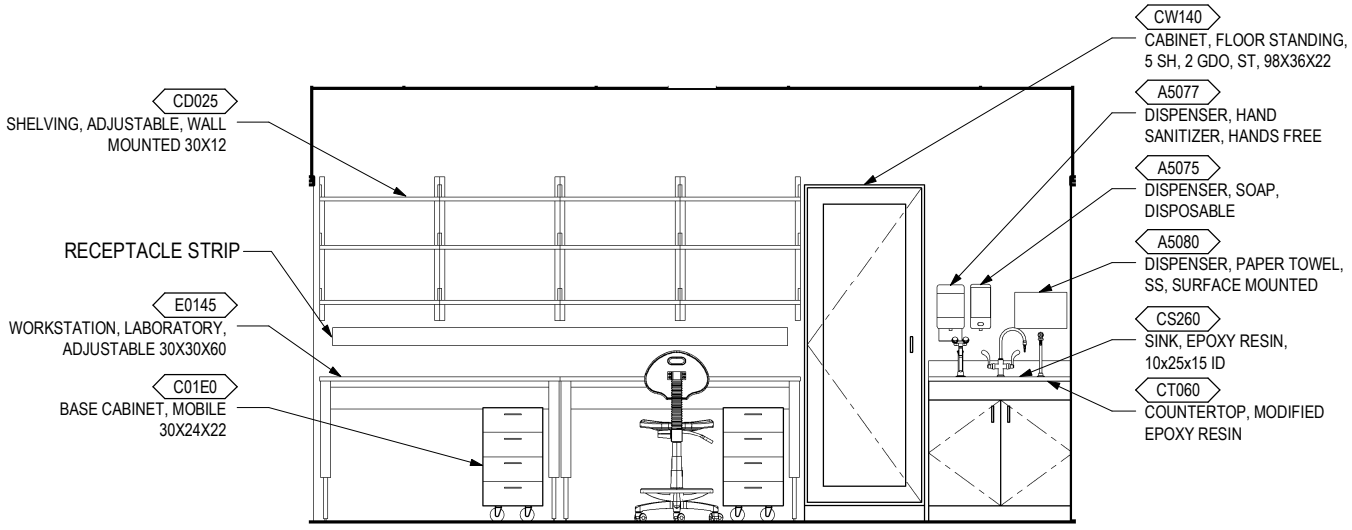
Plot Date: 3/14/2022 2:28:01 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



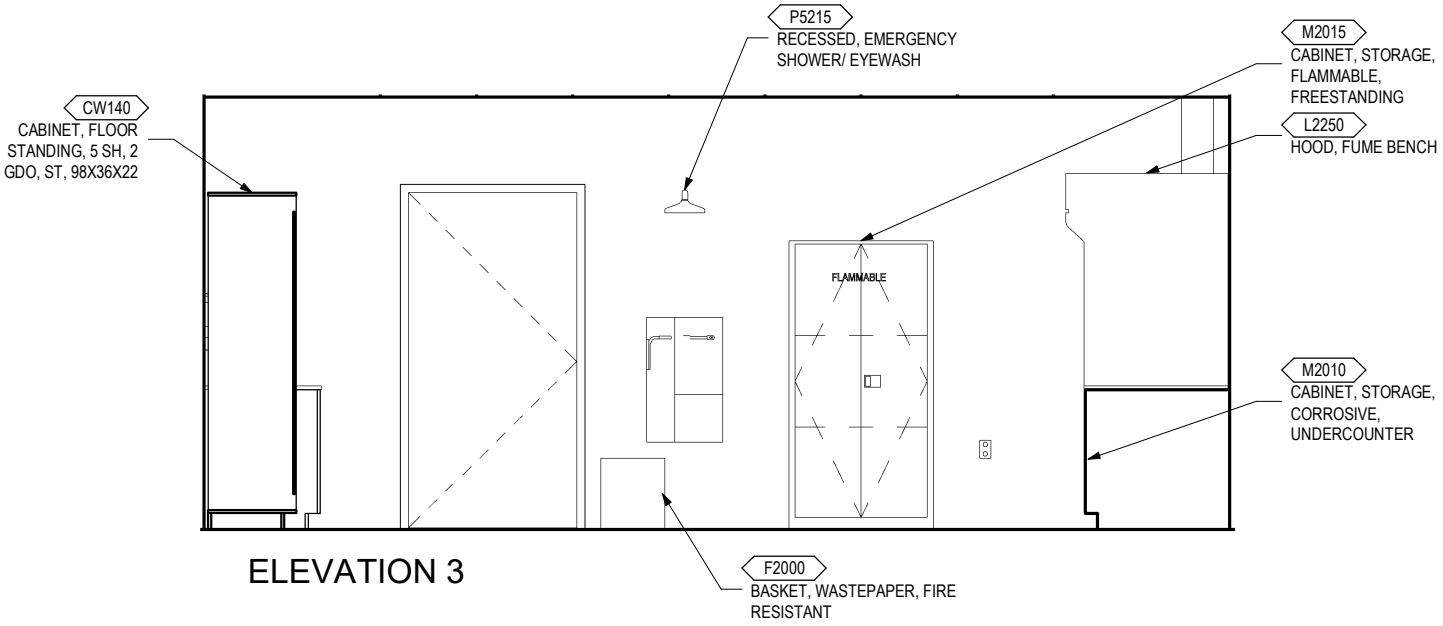
ELEVATION 2

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC725) BLR&D FUME HOOD ROOM, R&D (#2)
ELEVATIONS

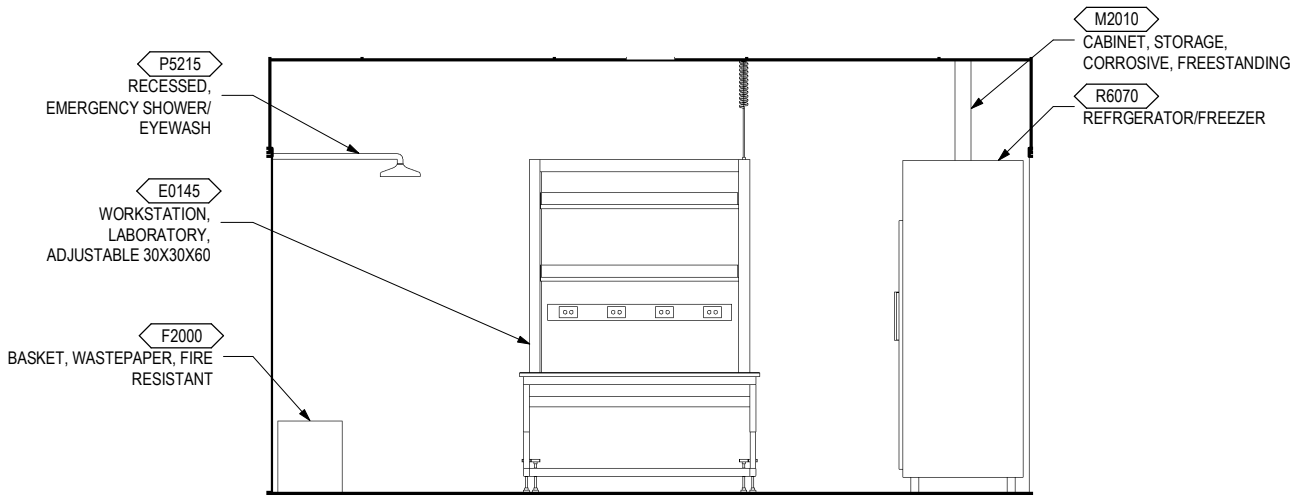
Plot Date: 3/14/2022 2:28:05 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

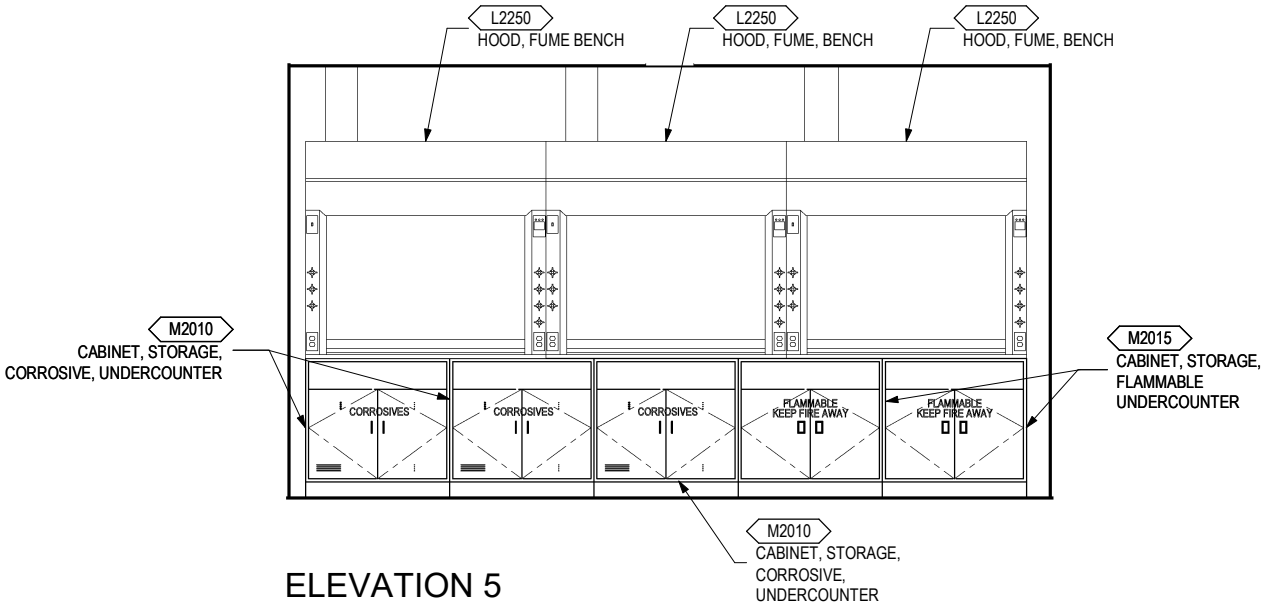
DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC725) BLR&D FUME HOOD ROOM, R&D (#2) ELEVATIONS

Plot Date: 3/14/2022 2:28:09 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



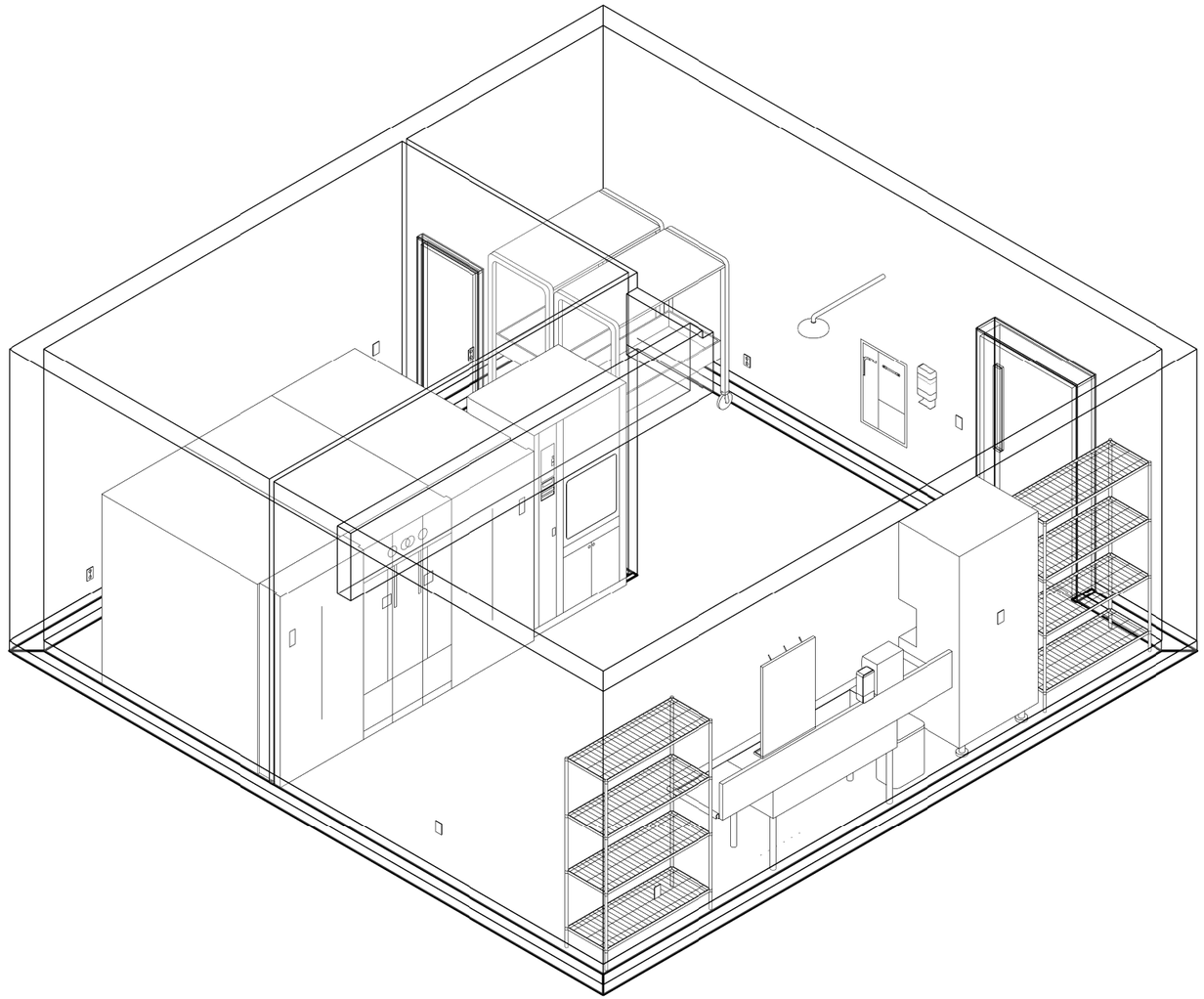
ELEVATION 5

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:28:13 PM SCALE:

0' 4' 8' 16'



DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:28:19 PM

SCALE:

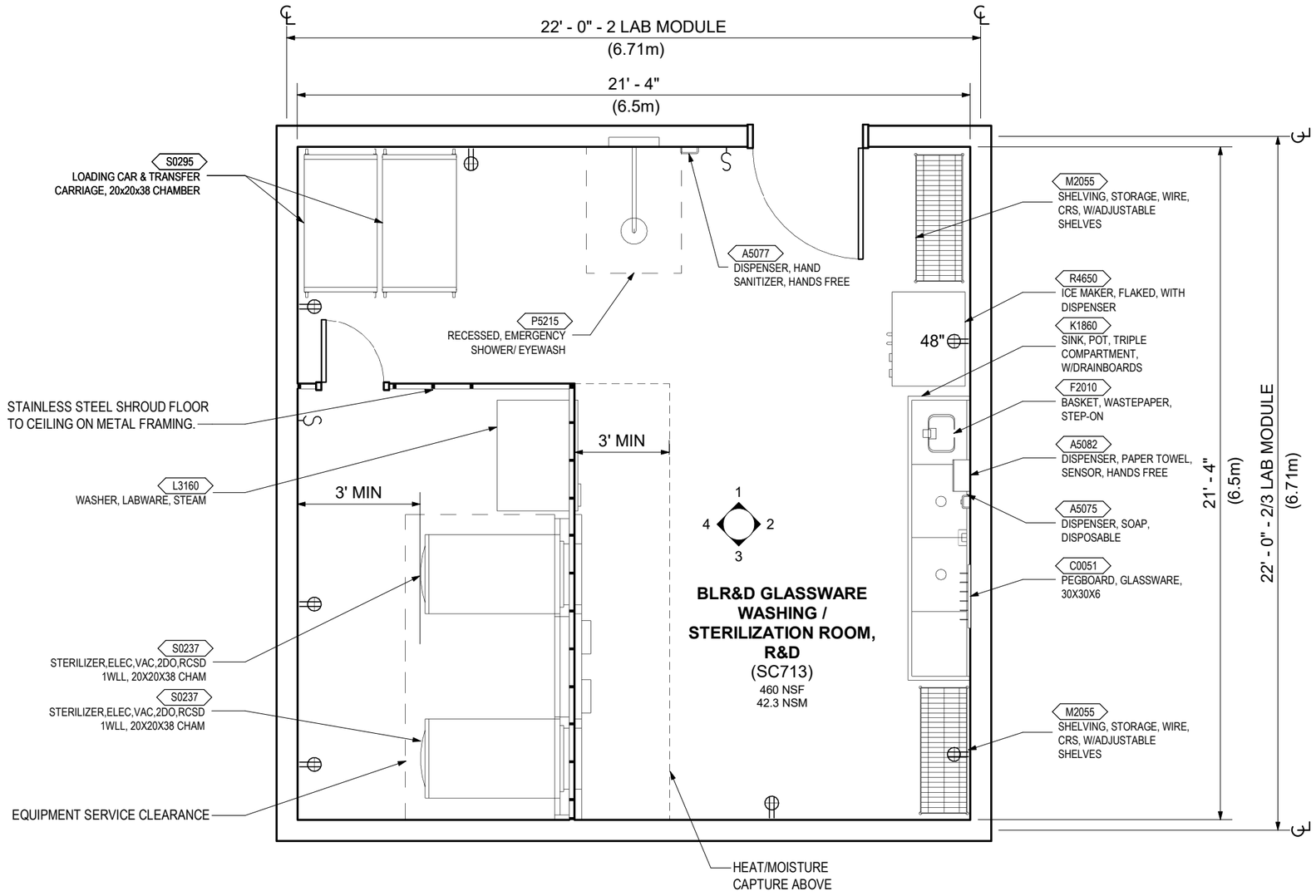
DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:28:21 PM SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



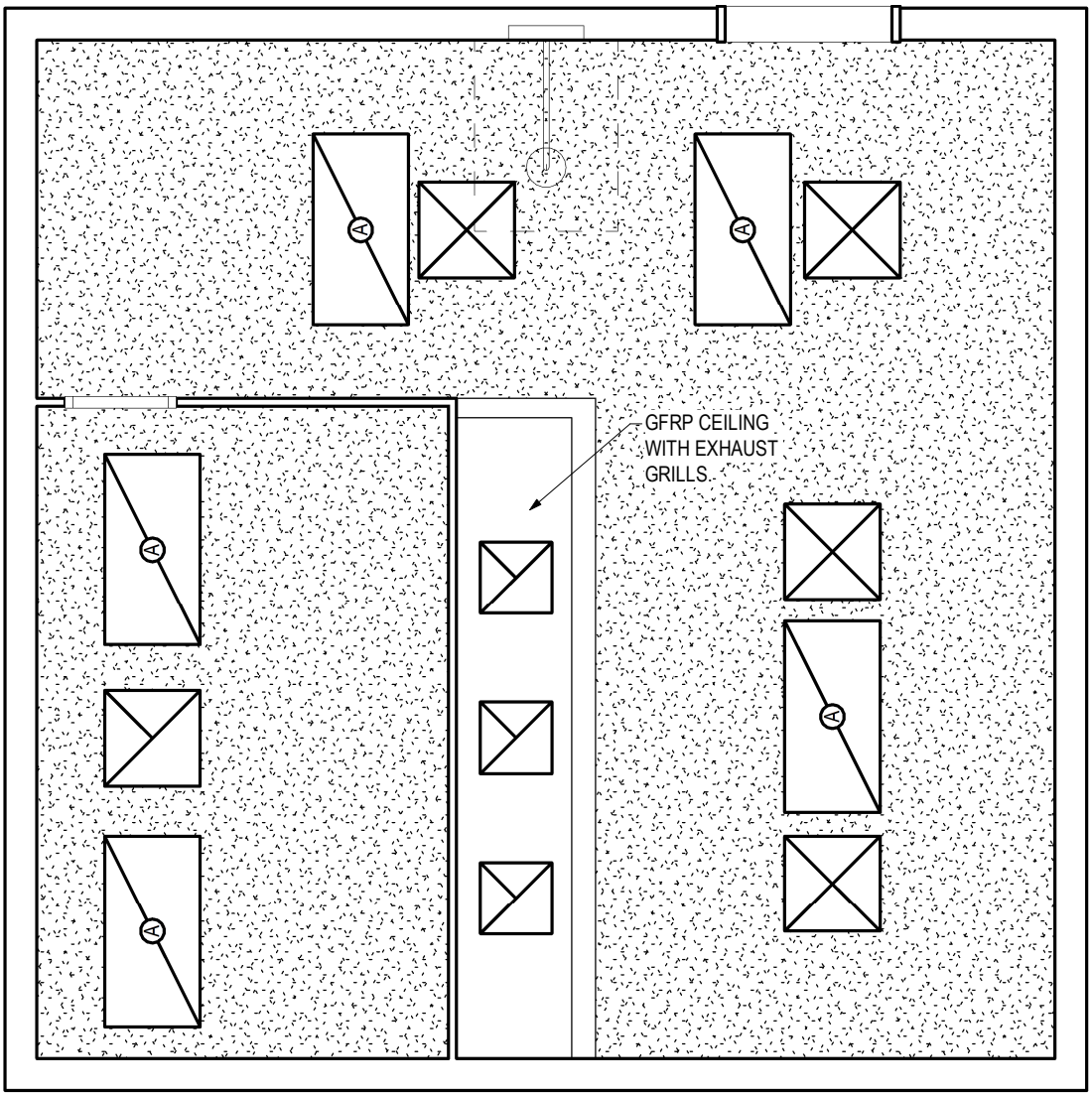
DISCLAIMER: ROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:28:28 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



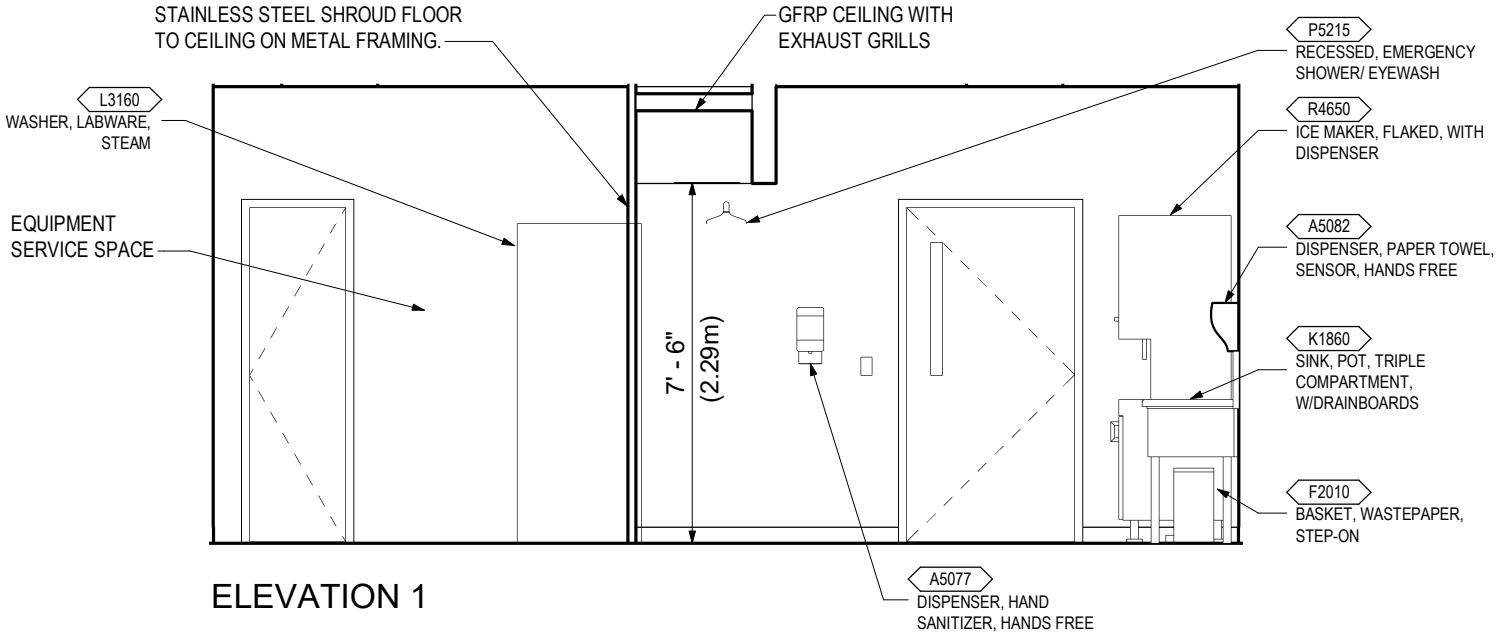
BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D
(SC713)
460 NSF
42.3 NSM

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D ELEVATIONS

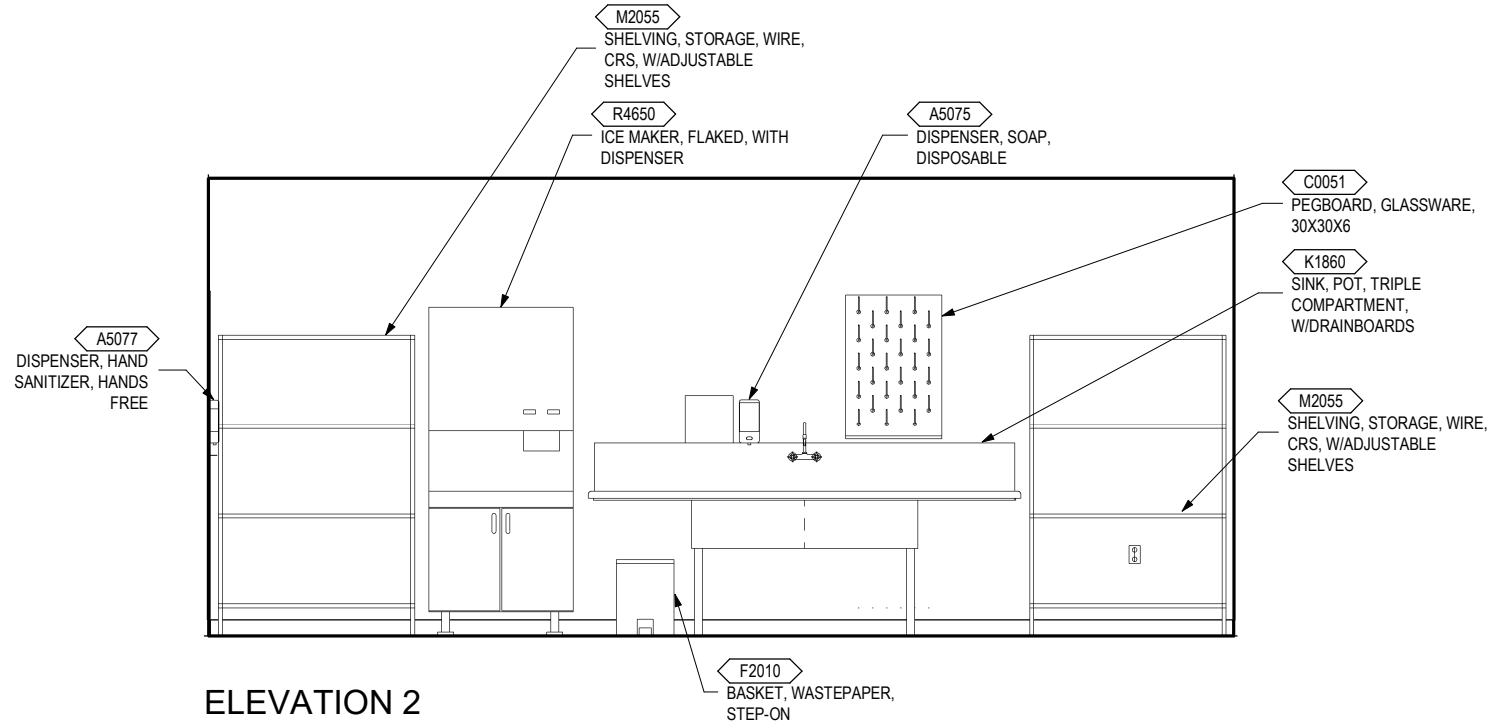
Plot Date: 3/14/2022 2:28:33 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



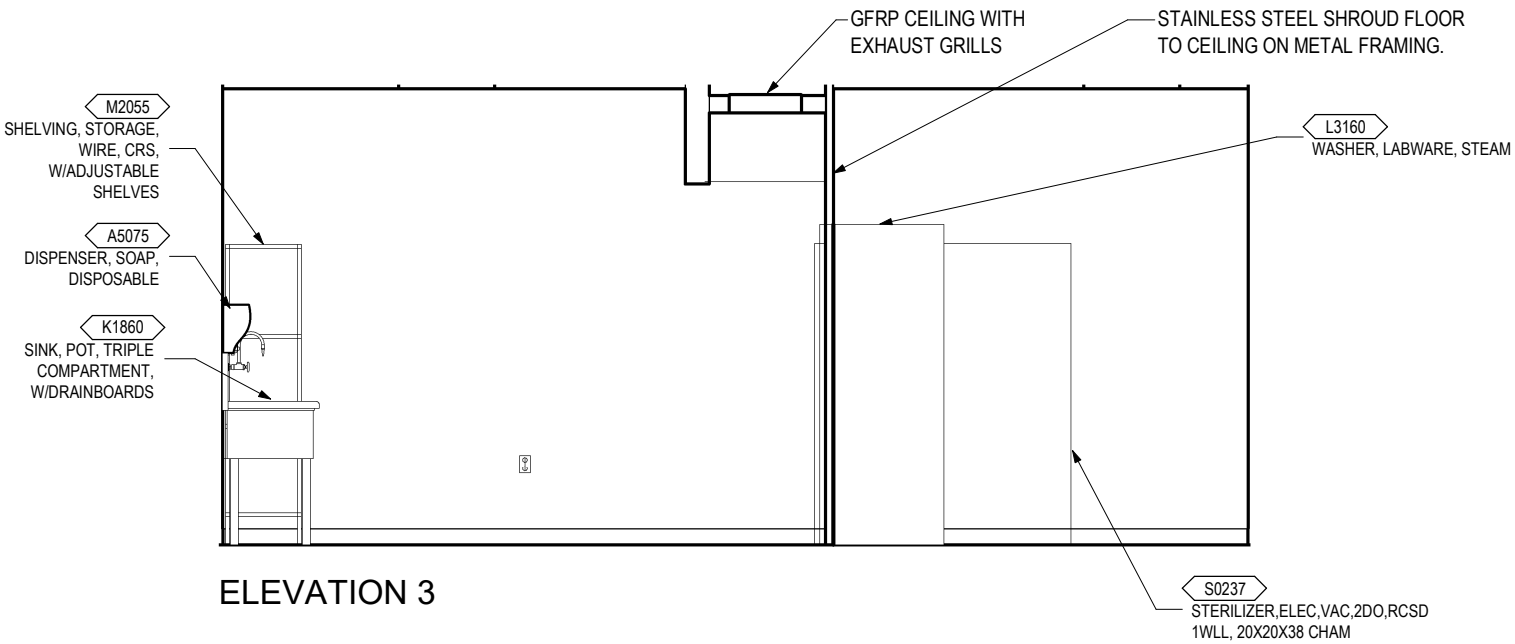
ELEVATION 2

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE (SC713) BLR&D GLASSWARE WASHING / STERILIZATION ROOM, R&D ELEVATIONS

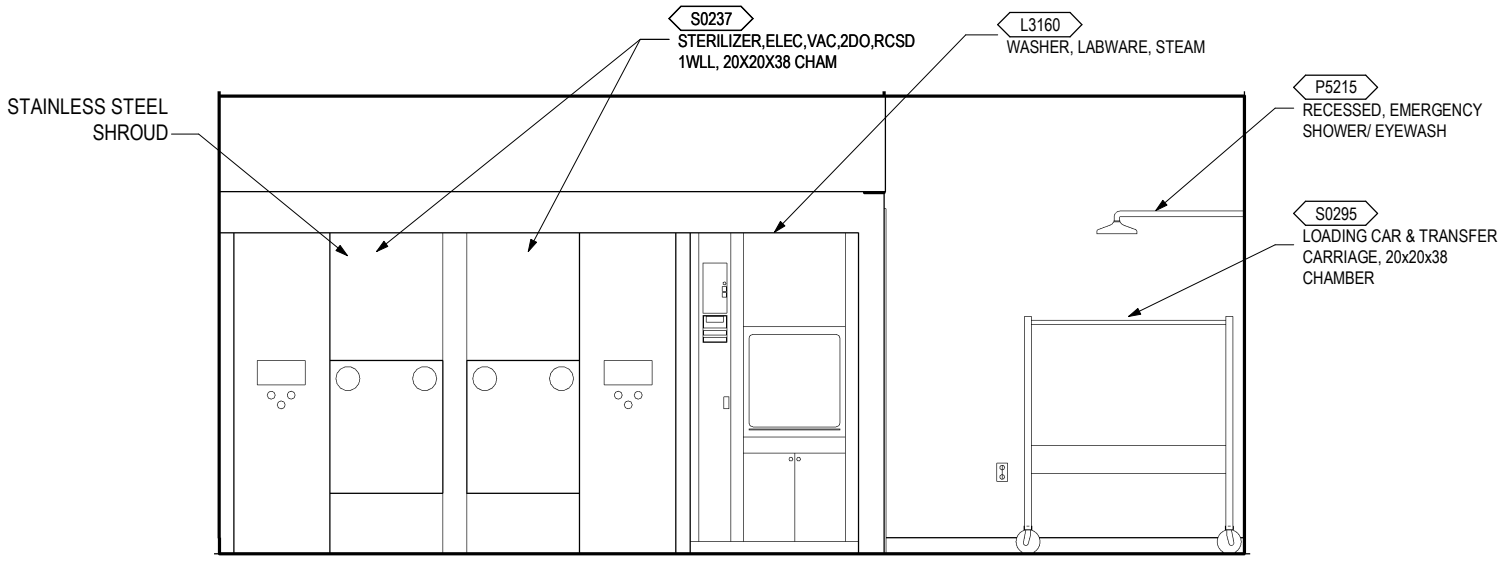
Plot Date: 3/14/2022 2:28:37 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: BLR&D Glassware Washing/Sterilizer Room, R&D (SC713)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	GWB
Ceiling Height:	9’-0”
Ceiling Finish	RES-W
Wall Finish:	m:GWB f:SC m:CMU f:SC
Wainscot:	NA
Base:	m:RES h:4” m:WSF h:4”
Floor Finish:	m:RES m:WSF
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Wood t:1 dg:T Size U (3’-6”W x 7’-0”H)
Special Requirement:	NA

Notes:
1) Door hardware set 4S

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	50 FC @ 2’-6”
Luminaire Type:	2x2/2x4 Troffer

Notes:
1) Refer to VA Lighting Design Manual.
2) Fixtures to be sealed and gasketed with a minimum rating of IP65.

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	NO
Telephone:	NO
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	NO
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO
Special Requirement:	

Notes:
1) X
2) X

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the BLR&D Glassware Washing/Sterilizer Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO
Laboratory Air:	YES
Laboratory Vacuum:	YES
Laboratory Gas:	YES

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	NO
Sprinkler:	YES

Room Contents: BLR&D Glassware Washing / Sterilization Room, R&D (SC713)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
P5215	Recessed, Emergency Shower/ EyeWash	1	CC	Deluge safety shower. This is a complete, maximum protection safety station consisting of a Recessed emergency shower and an eye/face wash fixture. Used anywhere exposure to hazardous substances may occur.
K1860	Sink, Pot, Triple Compartment, w/Drainboards	1	CC	Pot washing and scraping counter. This unit has three sink compartments and is constructed of stainless steel. The dimensions should be specified as required. See JSN K2620 for disposers and K9320 for pre-rinse hoses. Some models are built to accommodate two faucets. See related dishwashing and scullery triple compartment sinks at JSNs K1800 and K6660. This unit is used to wash pots in food service operations of hospitals, hotels and restaurants.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
C0051	Pegboard, Glassware, 30x30x6	1	CC	Glassware pegboard with drip trough and pegs, suitable for holding a wide variety of lab glassware. The pegboard is available in various materials (epoxy resin, stainless steel, and wood) and with or without finished back. The pegs are generally made of polypropylene and are available in various lengths which determines the number of pegs that are provided. Pricing is based upon an epoxy resin construction without finished back, 6.5" length pegs, and a 5" depth drip trough.
M2055	Shelving, Storage, Wire, CRS, w/Adjustable Shelves	2	VV	Stationary, wire, shelving unit. Unit has fully adjustable shelves constructed of stainless steel. For use in general purpose storage areas. Shelving is

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				provided in various sizes and configurations. Price provided is for a unit approximately 74"H x 18"D x 48"W with four shelves.
L3160	Washer, Labware, Steam	1	CC	Single door, steam operated, cabinet mounted, metalware and glassware washer, approximately 80" H x 39" W x 31" D. Used in hospitals to wash glassware and metal utensils. Optional electric heating may be available (add 40 Amps to power requirements).
S0237	Sterilizer,ELEC,VAC,2DO,RCSD 1WLL, 20x20x38 Cham	2	CC	A recessed mounted (through one wall), double power doors (vertical sliding), vacuum, sterilizer with integral steam generator. The unit is controlled by a microcomputer that monitors and controls all unit operations and functions and provides both audible and visual indications of deviations. A printer-recorder documents and records each cycle performance. For general purpose pre-vacuum or gravity steam sterilization of hospital and laboratory supplies at temperatures in the range from 110Â°C to 135Â°C (230Â°F to 275Â°F). A liquid cycle is also provided at temperatures in the range from 100Â°C to 121Â°C (212Â°F to 250Â°F). NOTE: Various electrical configurations are available for the integral steam generator, for pricing purposes 208V, 50/60HZ, 3PH, 84AMPS is used.
S0295	Loading Car & Transfer Carriage, 20x20x38 Chamber	2	CC	Loading car, transfer carriage, and chamber tracks, for use with sterilizers having a 20x20x38 chamber. Loading car is a welded, CRS framework with two removable shelves of CRS welded sheet metal and wire. Transfer carriage is constructed of welded stainless steel with bottom shelf and four swivel casters. For loading and unloading 20x20x38 sterilizers and for transferring goods to and from processing areas.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
R4650	Ice Maker, Flaked, With Dispenser	1	CC	Ice maker dispenser approximately 71" H x 19"D x 24"W. This unit provides flaked ice and cooled water automatically. The unit has a daily capacity up to 650 pounds and a 100 pound capacity stainless steel storage compartment with water station. Unit may be free-standing or counter-mounted, automatic load ice dispenser for food service and healthcare use. The unit is used in healthcare institutions and various commercial food service operations for dispensing ice.

U.S. Department of Veterans Affairs

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC712) BLR&D MICROSCOPY ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:28:41 PM

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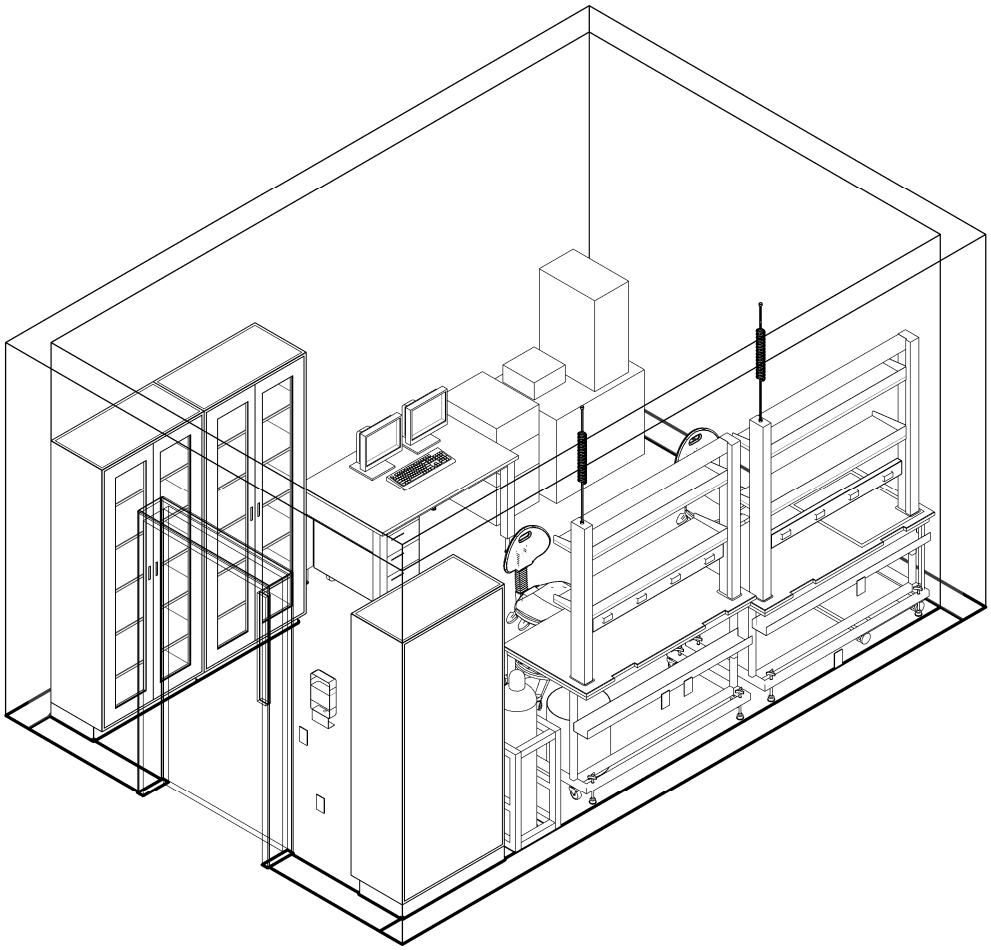

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Plot Date: 3/14/2022 2:28:45 PM

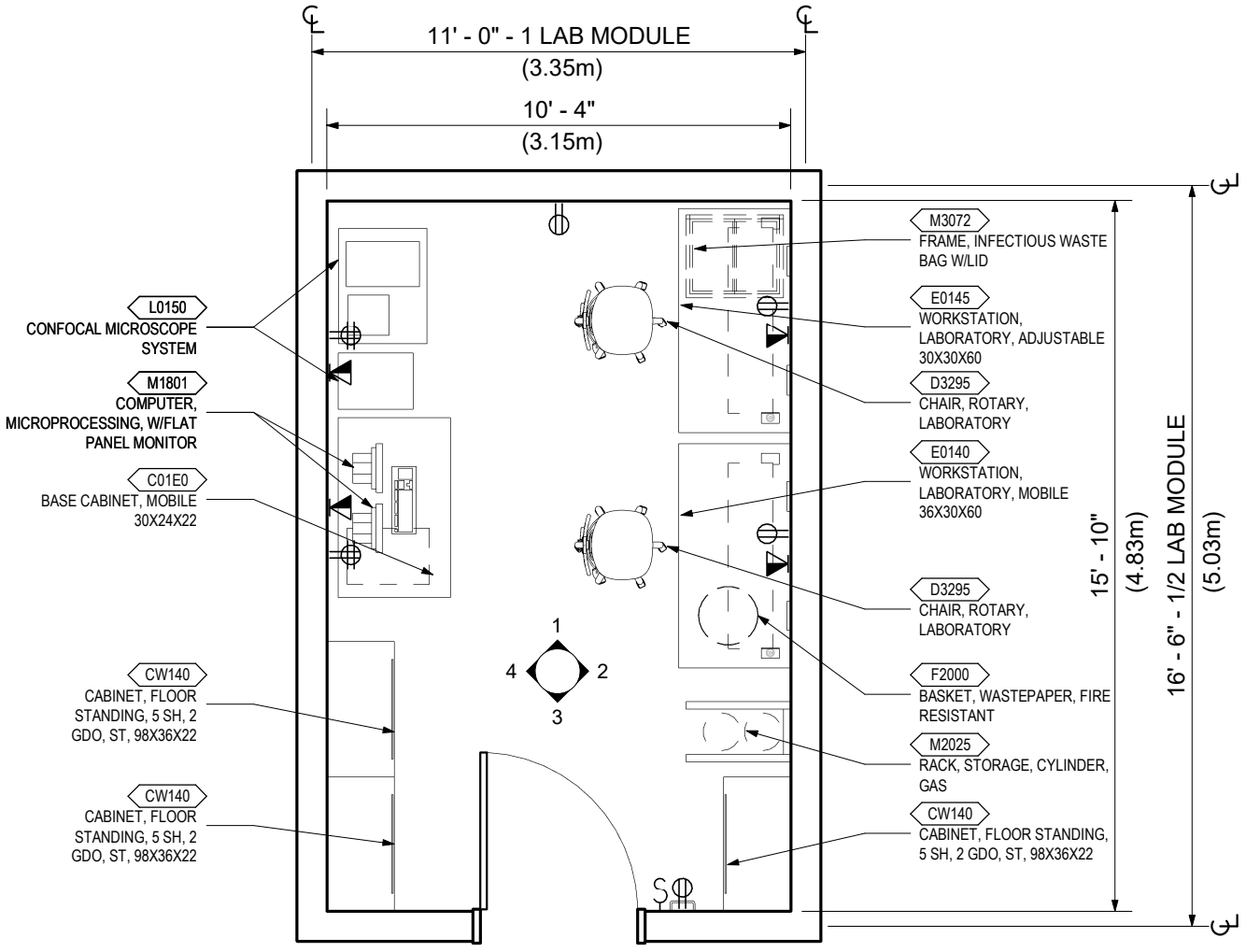
SCALE:

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC712) BLR&D MICROSCOPY ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:28:47 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



BLR&D MICROSCOPY ROOM, R&D
(SC712)
160 NSF
15.2 NSM

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BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC712) BLR&D MICROSCOPY ROOM, R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:28:51 PM

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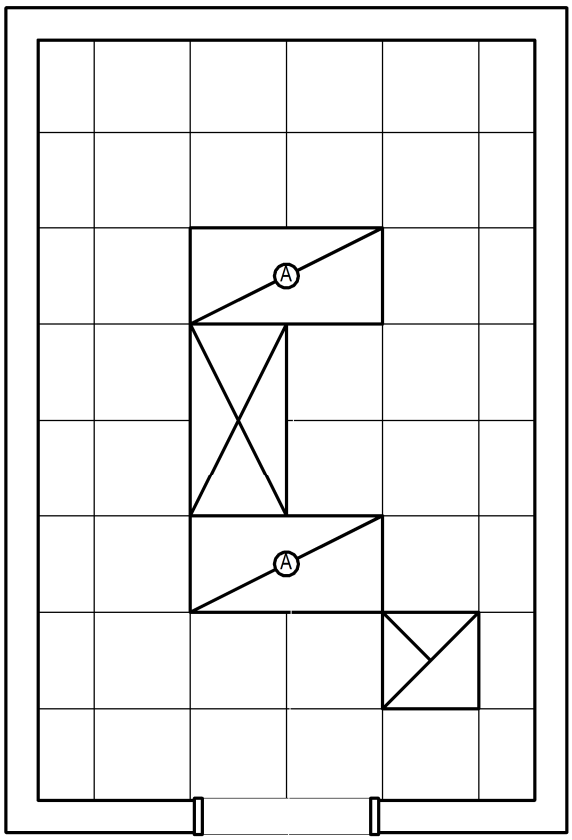

BLR&D MICROSCOPY ROOM, R&D
(SC712)
160 NSF
15.2 NSM

BIOMEDICAL LABORATORY RESEARCH & DEVELOPMENT (BLR&D) SERVICE
(SC712) BLR&D MICROSCOPY ROOM, R&D
ELEVATIONS

Plot Date: 3/14/2022 2:28:55 PM

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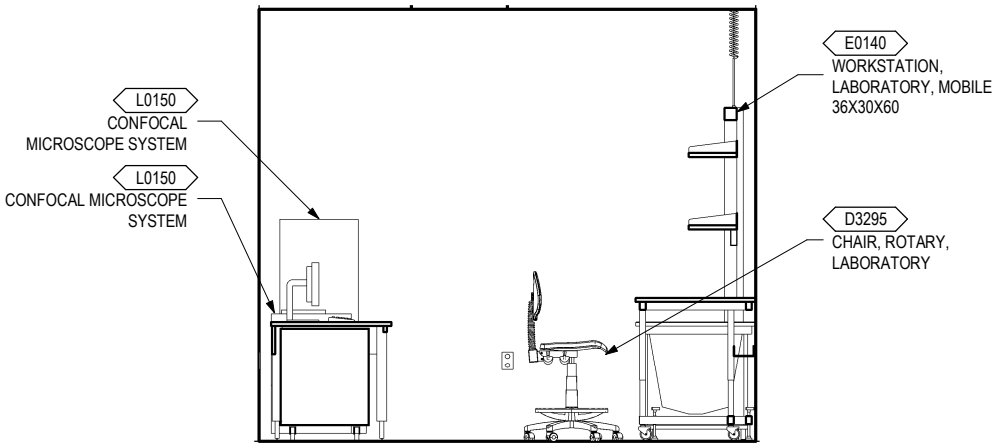
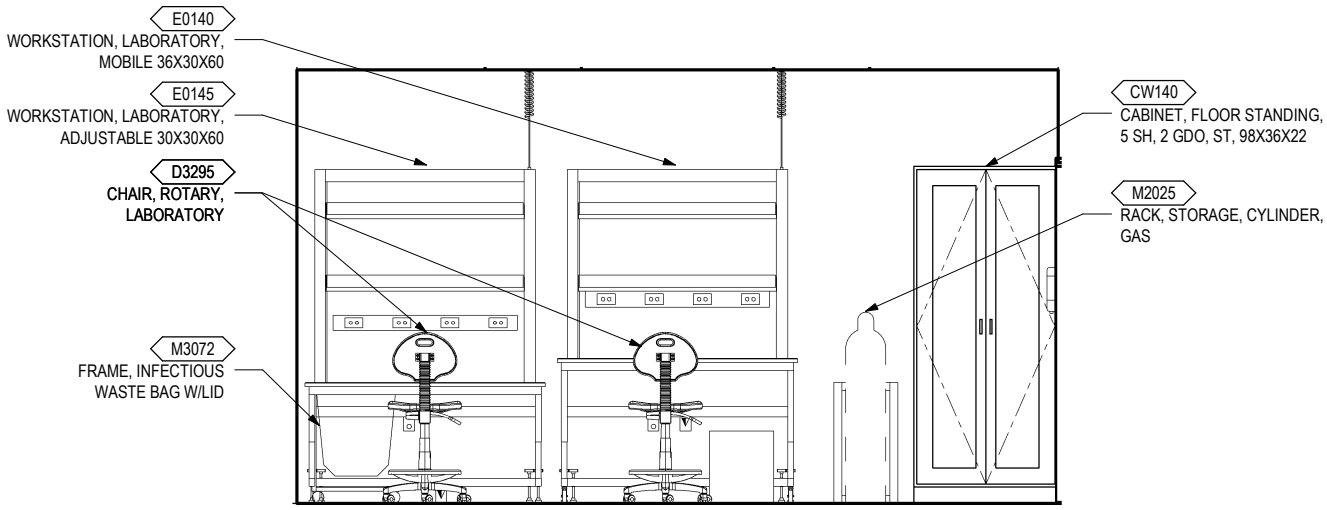
0' 4' 8' 16'



ELEVATION 1



ELEVATION 2

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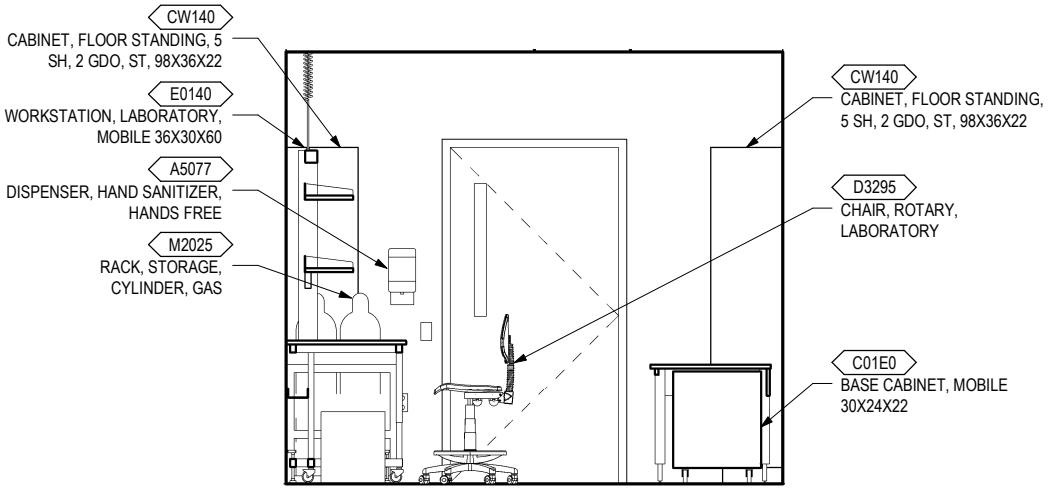
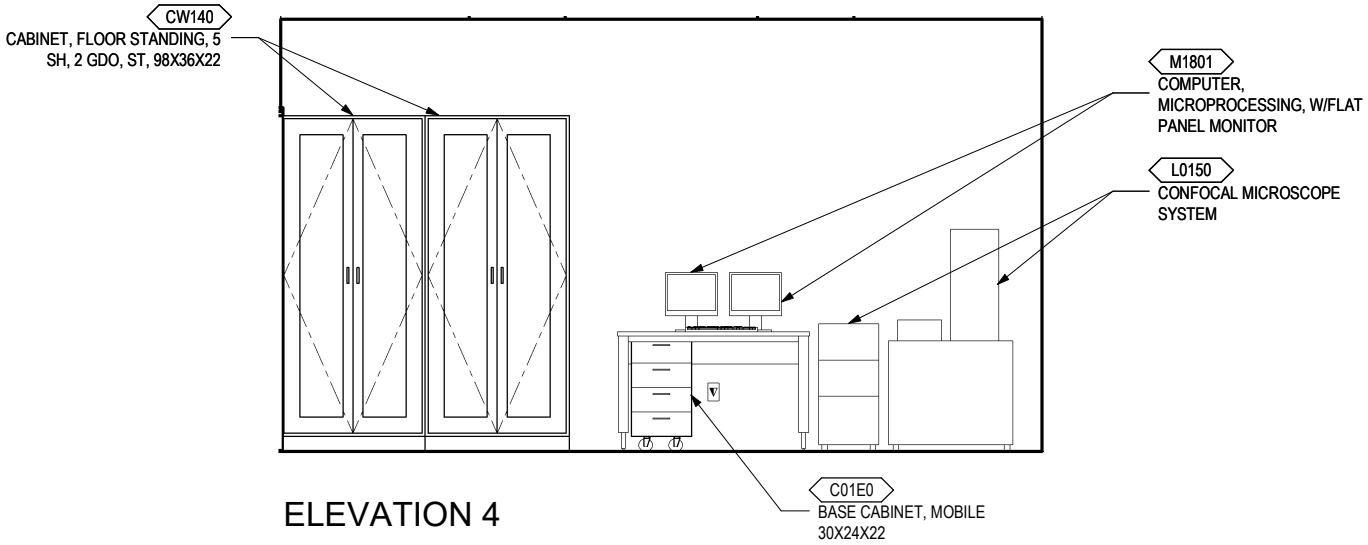


ELEVATION 3



ELEVATION 4

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Room Data: BLR&D Microscopy Room, R&D (SC712)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	CAT, gasketed tiles
Ceiling Height:	9’-0”
Ceiling Finish:	NA
Wall Finish:	m:GWB f:SC
Wainscot:	NA
Base:	m:RES h:4”
	m:WSF h:4”
Floor Finish:	m:RES
	m:WSF
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:HM t:1 dg:T
	Size U (3’-6”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) Door hardware set 3F
2) Add light seals

LIGHTING

Maintain Average Illumination:	50 FC
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for Laboratories.

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the BLR&D Microscopy Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	NO
Hot Water:	NO
Drain:	NO
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO
Laboratory Air:	YES
Laboratory Vacuum:	YES
Laboratory Gas:	YES

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: BLR&D Microscopy Room, R&D (SC712)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
CW140	Cabinet, Floor Standing, 5 SH, 2 GDO, ST, 98x36x22	3	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
C01E0	Base Cabinet, Mobile 30x24x22	1	CC	Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.
E0140	Workstation, Laboratory, Mobile 36x30x60	1	CC	Floor standing mobile self supported bench on casters with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
E0145	Workstation, Laboratory, Adjustable 30x30x60	1	CC	Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
D3295	Chair, Rotary, Laboratory,	2	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
F2000	Basket, Wastepaper, Fire Resistant	1	VV	Wastepaper basket, fire resistant, approximately 40 quart capacity. This unit is used to collect and temporarily store small quantities of paper refuse in patient rooms, administrative areas and nursing stations. Size and shape varies depending on the application and manufacturer selected.
M3072	Frame, Infectious Waste Bag w/Lid	1	VV	Frame for an infectious waste collection bag. Made of heavy tubular stainless steel with heavy gauge welded steel platform. Adjust to hold 18" or 25" trash bags. Mounted on ball bearing casters and includes permanently mounted hinged lid. Provides means of bagging infectious waste at point of waste generation.

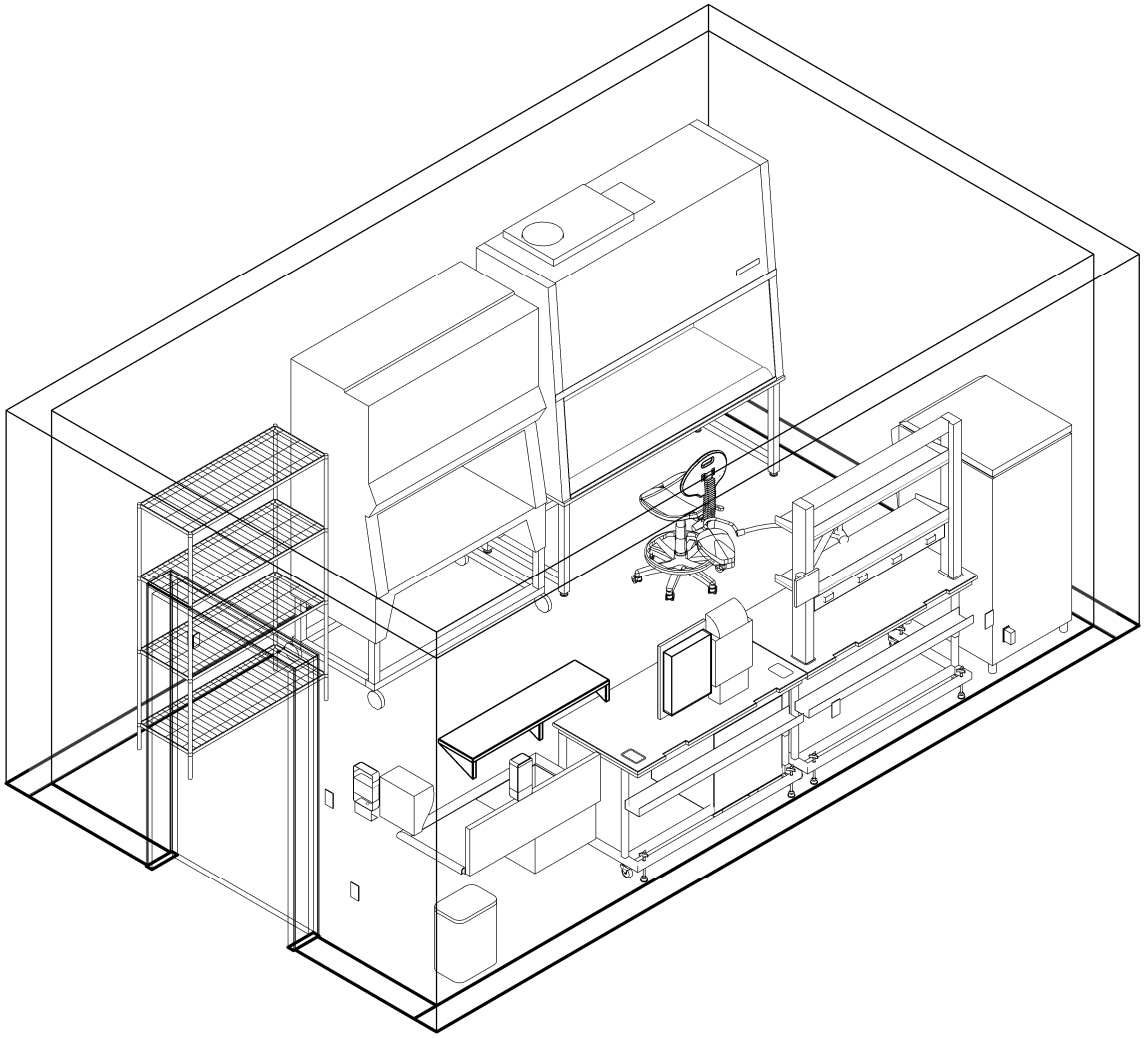
JSN	NAME	QTY	ACQ/INS	DESCRIPTION
M1801	Computer, Microprocessing, w/Flat Panel Monitor	1	VV	Desk top microprocessing computer. The unit shall consist of a central processing mini tower, flat panel monitor, keyboard, mouse and speakers. The system shall have the following minimum characteristics: a 2.8 GHz Pentium processor; 512 MB memory; 80GB hard drive; 32/48x CD-ROMDVD combo; 1.44MB network interface card; video 32 MB NVIDIA; a 18 inch flat panel monitor. The computer is used throughout the facility to input, manipulate and retrieve information.
L0150	Confocal Microscope system	1	VV	Confocal Microscope is a fluorescence imaging equipment which utilizes a laser point source to scan the sample and a pinhole to reduce collection of light from outside the focal plane. Comprises of several electronic elements.
M2025	Rack, Storage, Cylinder, Gas	1	VV	Medical gas cylinder storage rack. Unit is a modular cage frame for holding various sizes of gas cylinders. Nylon or fabric securing straps can be attached to the frame bars to stabilize gas cylinders. Add additional units or specify size as required when ordering. This item is often locally fabricated.

U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:29:04 PM

SCALE: 0' 4' 8' 16'



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VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:29:08 PM

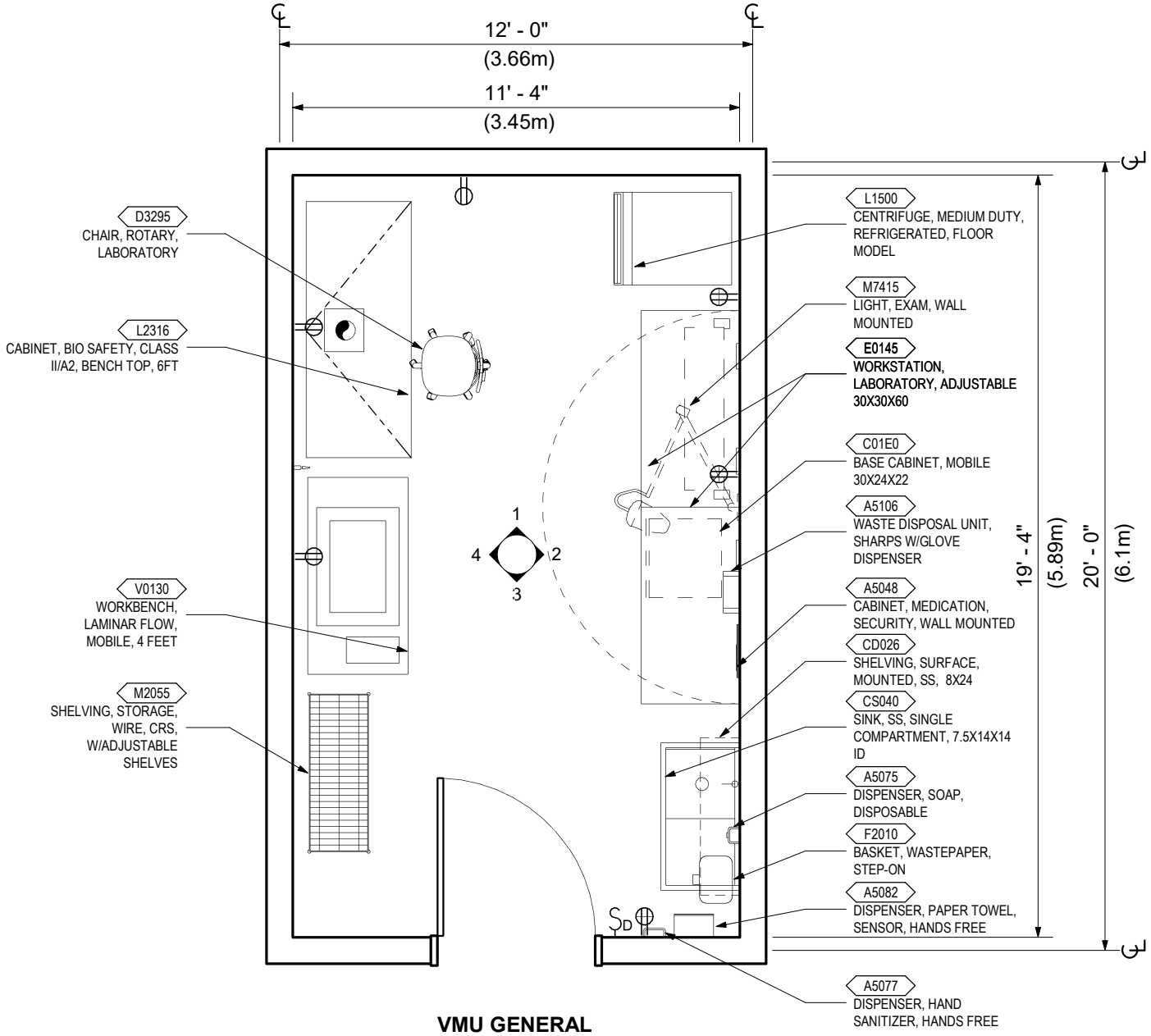
SCALE: 0' 4' 8' 16'

VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:29:10 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



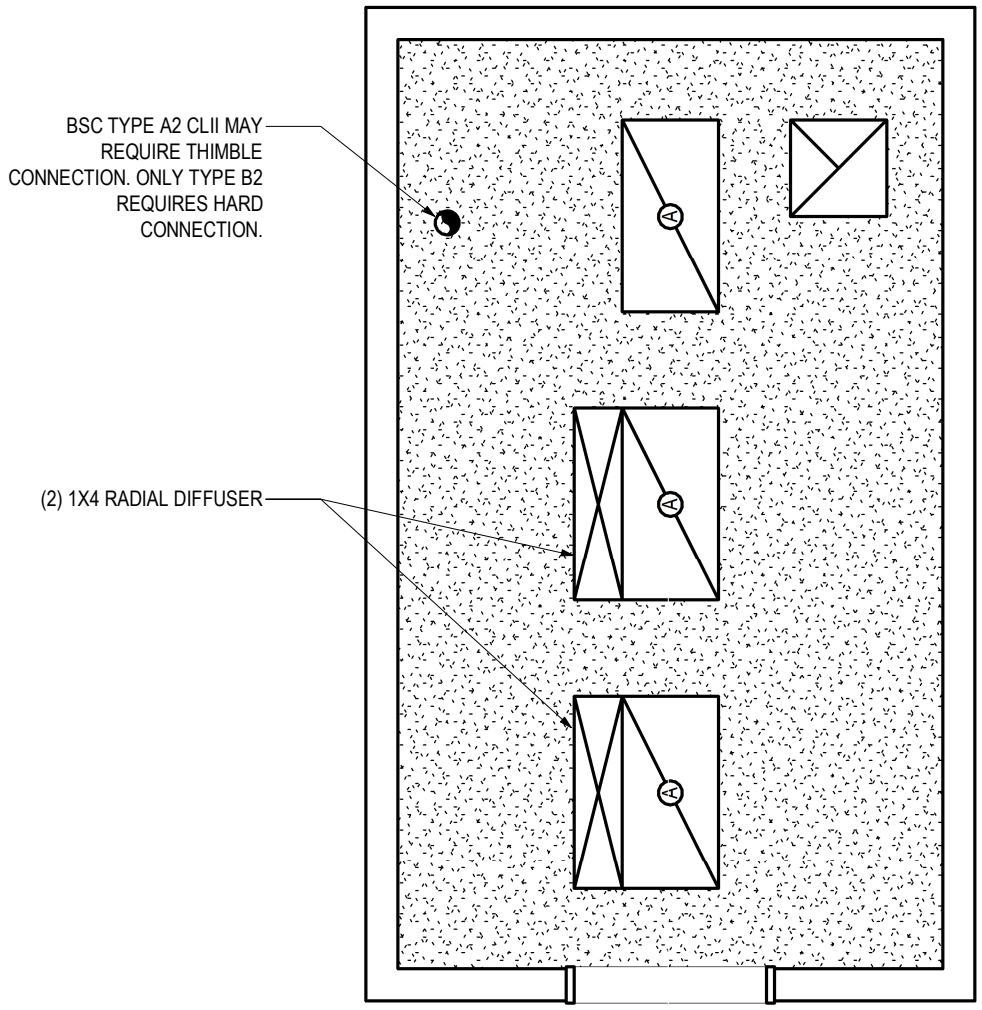
VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
(SC741)
220 NSF
20.4 NSM

VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:29:14 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



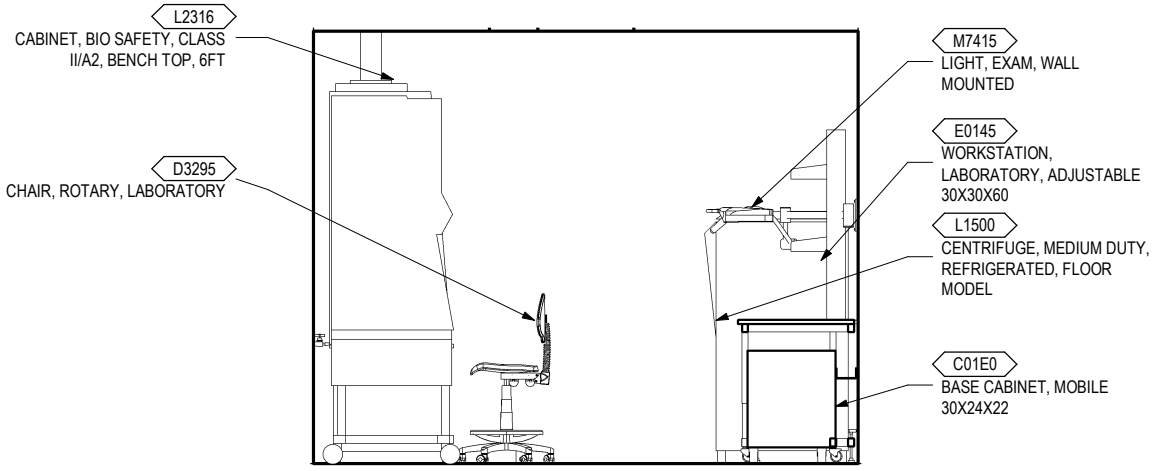
VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
(SC741)
220 NSF
20.4 NSM

VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
ELEVATIONS

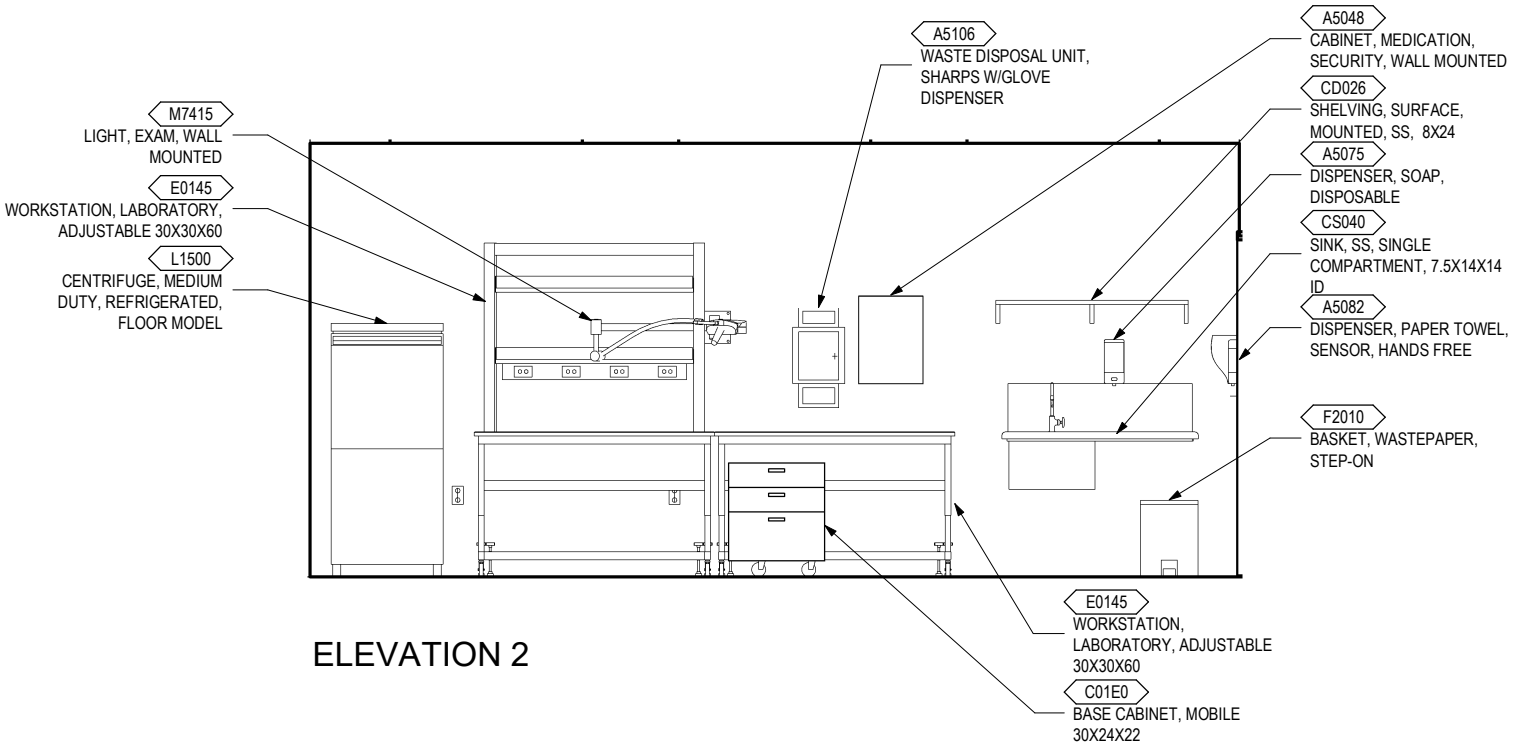
Plot Date: 3/14/2022 2:29:18 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



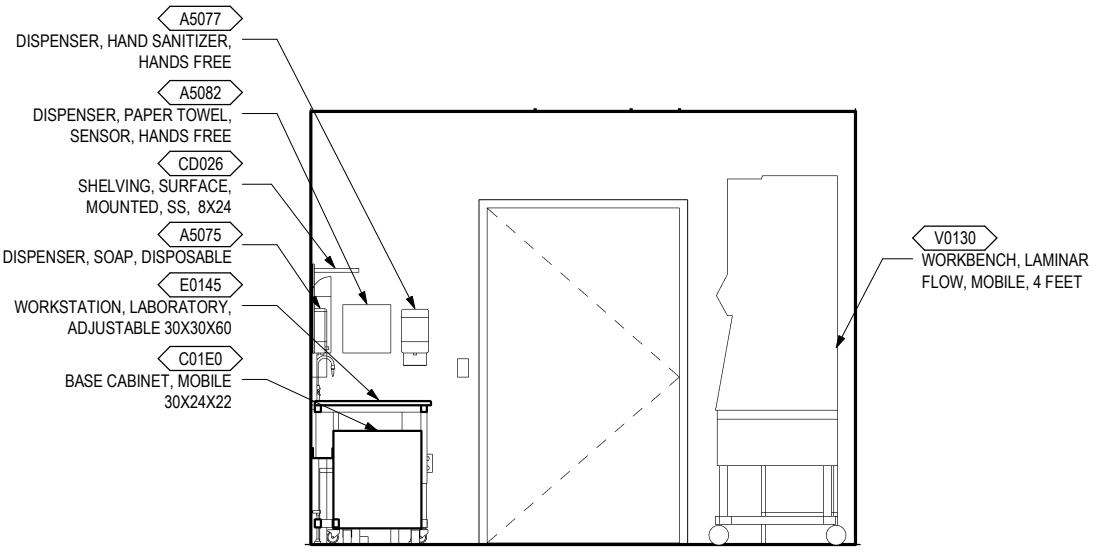
ELEVATION 2

VETERINARY MEDICAL UNIT (VMU)
(SC741) VMU GENERAL PROCEDURE/TREATMENT ROOM, R&D
ELEVATIONS

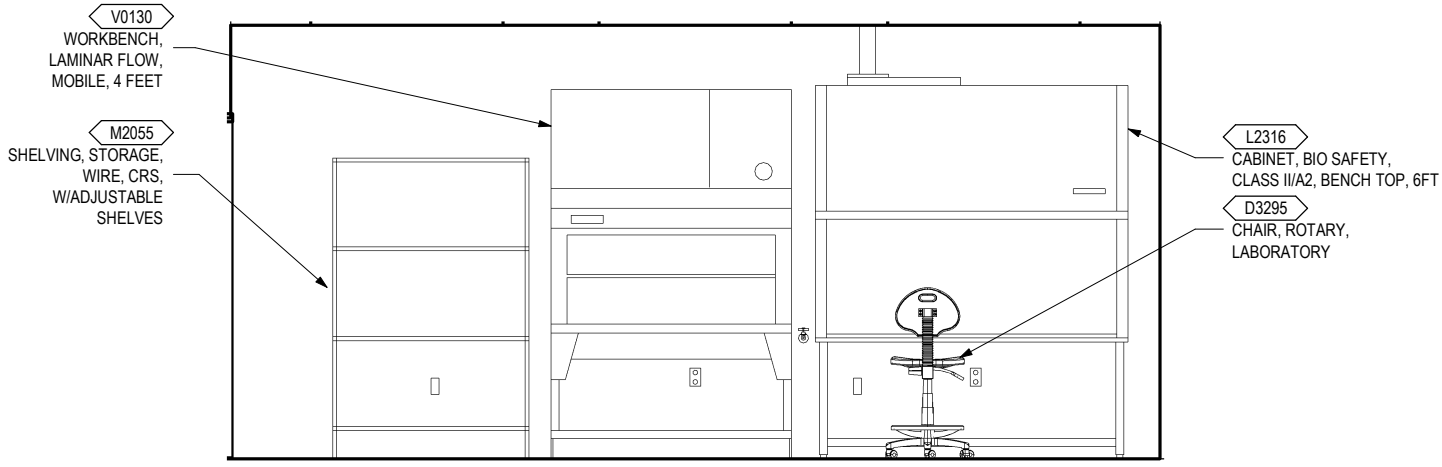
Plot Date: 3/14/2022 2:29:22 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: VMU General Procedure/Treatment Room, R&D (SC741)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB
Ceiling Height:	9’-0”
Ceiling Finish:	f:RES-W
Wall Finish:	m:GWB, f:RES-W; m:GFRP, f:PF; m:CMU, f:SC
Wainscot:	NA
Base:	m:RES [Note 3] h:4"
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	Sliding door, automated with paddles m:Steel t:20 dg:T Size X (4’W x 7’H)
Special Requirement:	NA

Notes:

1) See Specification 08 32 13 ICU Sliding Door and 08 71 13 Automatic Door Operators.
2) Sliding automated door with paddle
3) Resinous Flooring-Wall-Base application over concrete backer board.

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	80 FC @ Bench
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the VMU General Procedure/Treatment Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	YES
Medical Vacuum:	YES
Oxygen:	YES

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	NO
Sprinkler:	YES

Room Contents: VMU General Procedure / Treatment Room, R&D (SC741)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5160	Shelf, 8" Depth, SS, Surface Mounted	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in scrub areas/rooms or other areas of the facility where a SS shelf is required. Pricing based upon a 36" width.
CS040	Sink, SS, Single Compartment, 7.5x14x14 ID	1	CC	Single compartment stainless steel sink, drop-in, self-rimming, ledge-type, connected with a drain and provided with a mixing faucet. It shall also be provided with pre-punched fixture holes on 4" center, integral back ledge to accommodate deck-mounted fixtures, brushed/polished interior and top surfaces, and sound deadened. Recommended for use in suspended or U/C/B sink cabinets having a high plastic laminate or Chemsurf laminate countertop/work surface. Coordinate actual outside sink dimensions with the actual clear dimension of cabinet specified to ensure that they are compatible. For general purpose use

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				throughout the facility.
CT050	Countertop, Stainless Steel	6	CC	Stainless steel countertop (composition of heavy-gauge Type No. 304 stainless steel) having a smooth satin finish and integral 4" backsplash/curb. Also referred to as a corrosion-resistant steel work surface or work top. Available in various depths. Used in areas where excellent ease of cleaning, abrasion resistance, bacteria resistance, impact resistance, load capacity and moisture resistance, are of concern. Pricing based upon a 24" depth.
M2055	Shelving, Storage, Wire, CRS, w/Adjustable Shelves	1	CC	Stationary, wire, shelving unit. Unit has fully adjustable shelves constructed of stainless steel. For use in general purpose storage areas. Shelving is provided in various sizes and configurations. Price provided is for a unit approximately 74"H x 18"D x 48"W with four shelves.
F2010	Basket, Wastepaper, Step-On	1	VV	"Step-on" wastepaper basket with inner liner and foot petal activated flip top.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
M7415	Light, Exam, Wall Mounted	1	VV	Wall mounted examination light. Unit features high intensity color-corrected lighting, a tungsten halogen lamp and a supporting arm with minimum reach of 45 inches. Physical dimensions refer to the retracted light; one length of the dual swing arm from the wall mount in width and depth and the combined height of the lamp head and folded

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				arms. See manufacturer's requirements for screws and pull-out strengths for mounting. Unit may also have a center mount detachable and sterilizable control handle. The unit is used in clinical treatment rooms and hospital rooms.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.
A5048	Cabinet, Medication, Security, Wall Mounted	1	VV	Wall-mounted cabinet for secure storage of medications. Unit has adjustable shelves, may be keyed or electronic combination lock. Cabinet is made of metal and exterior finish may be powder coat paint or wood laminate. Size is approximately 25" H x 20" W x 7" D.
D3295	Chair, Rotary, Laboratory,	2	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
R6200	Refrigerator, U/C or F/S, 5 Cu Ft	1	VV	Utility refrigerator approximately 35" H x 24" W x 26" D. The unit has a two tray ice cube cooling system. The refrigerator fits standard architectural dimensions for undercounter installation. The unit is perfect for use in nurses' station, wards, and laboratories, pharmacies or wherever space is limited.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
E0145	Workstation, Laboratory, Adjustable 30x30x60	2	CC	Stainless steel Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
C01E0	Base Cabinet, Mobile 30x24x22	2	CC	Stainless steel Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.
L2316	Cabinet, Bio Safety, Class II/A2, Bench Top, 6ft	1	VC	Class II, Type A2, benchtop biological safety cabinet. The unit includes two HEPA filters, one supply and one exhaust, zero probed, high intake velocity that averages 105 fpm, an audible alarm to notify operator of unsafe window positions an audio-visual alarm to monitor exhaust pressure, interior of type 304 stainless steel with side walls slotted for high velocity air return, an exterior of 16 gauge or heavier steel, two ground key petcocks, a grounded duplex receptacle. Used for low to moderate risk biological agents treated with toxic chemicals and radionucleotides. This unit requires 100% exhaust to the atmosphere. 4 foot model presented, other sizes are available. 8" sash opening
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.
L1500	Centrifuge, Medium Duty, Refrigerated, Floor Model	1	VV	Laboratory centrifuge. This is a medium to large capacity unit with an operating range of -20 degrees to 40 degrees C. It permits running samples at body temperature. It also has a rotor imbalance detector and an auto-shut down capability if the rotor load is out of balance. The unit is constructed of a stainless steel chamber with a rear exhaust and is a low heat output unit. Used in laboratories to spin samples for further analysis.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
D3295	Chair, Rotary, Laboratory,	2	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
R6070	Refrigerator/Freezer, Biological, Upright, 18 Cu Ft	1	VV	Biological refrigerator with freezer. This unit includes a freezer compartment for general laboratory use. Its independent direct-set temperature controllers allow temperature selection for +2° to 14°C for the refrigerator, and from -20° to -30°C for the freezer.

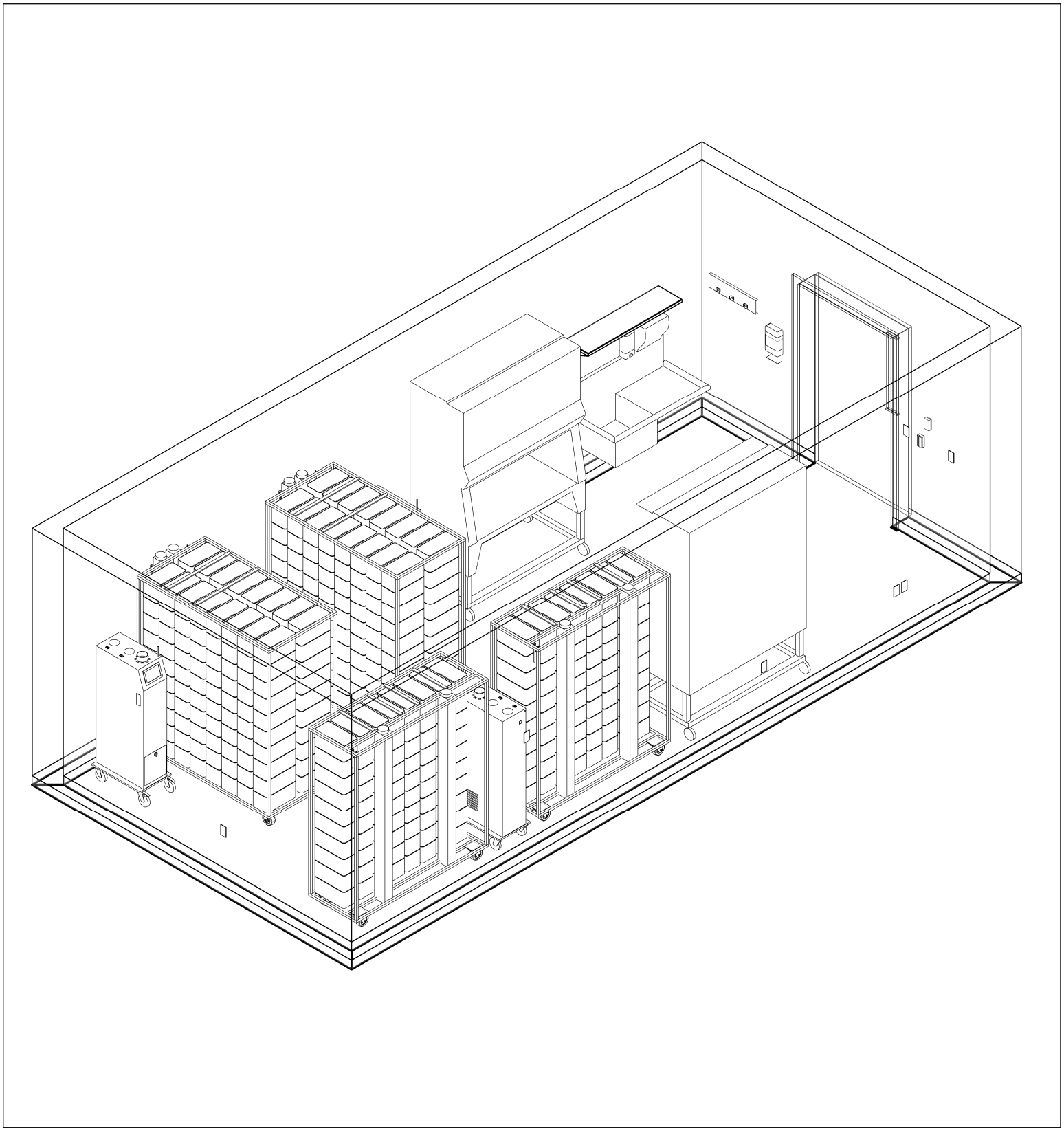
U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:29:27 PM

SCALE: NOT TO SCALE

0' 4' 8' 16'



DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:29:31 PM

SCALE: NOT TO SCALE

DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

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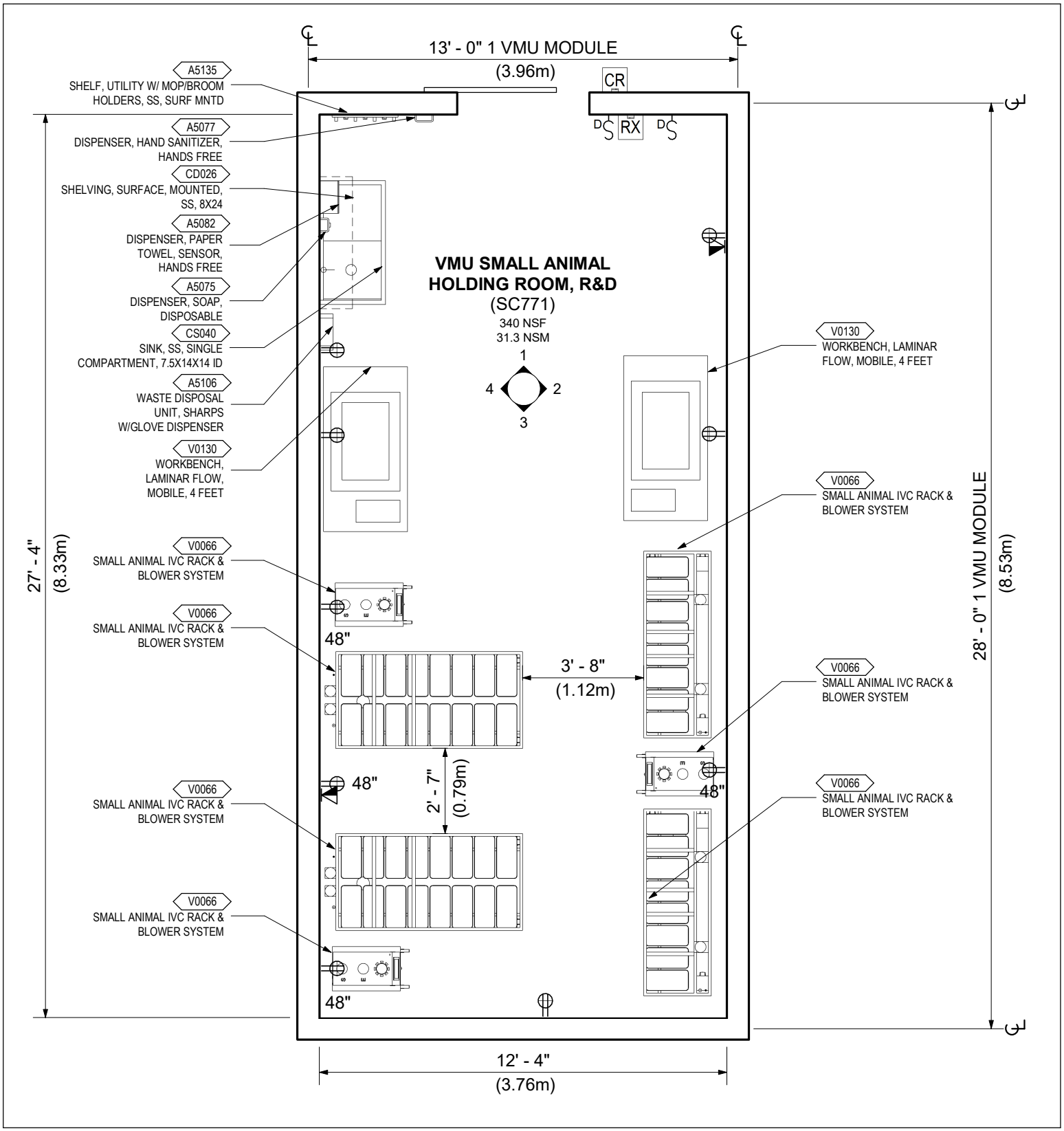
VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:29:33 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



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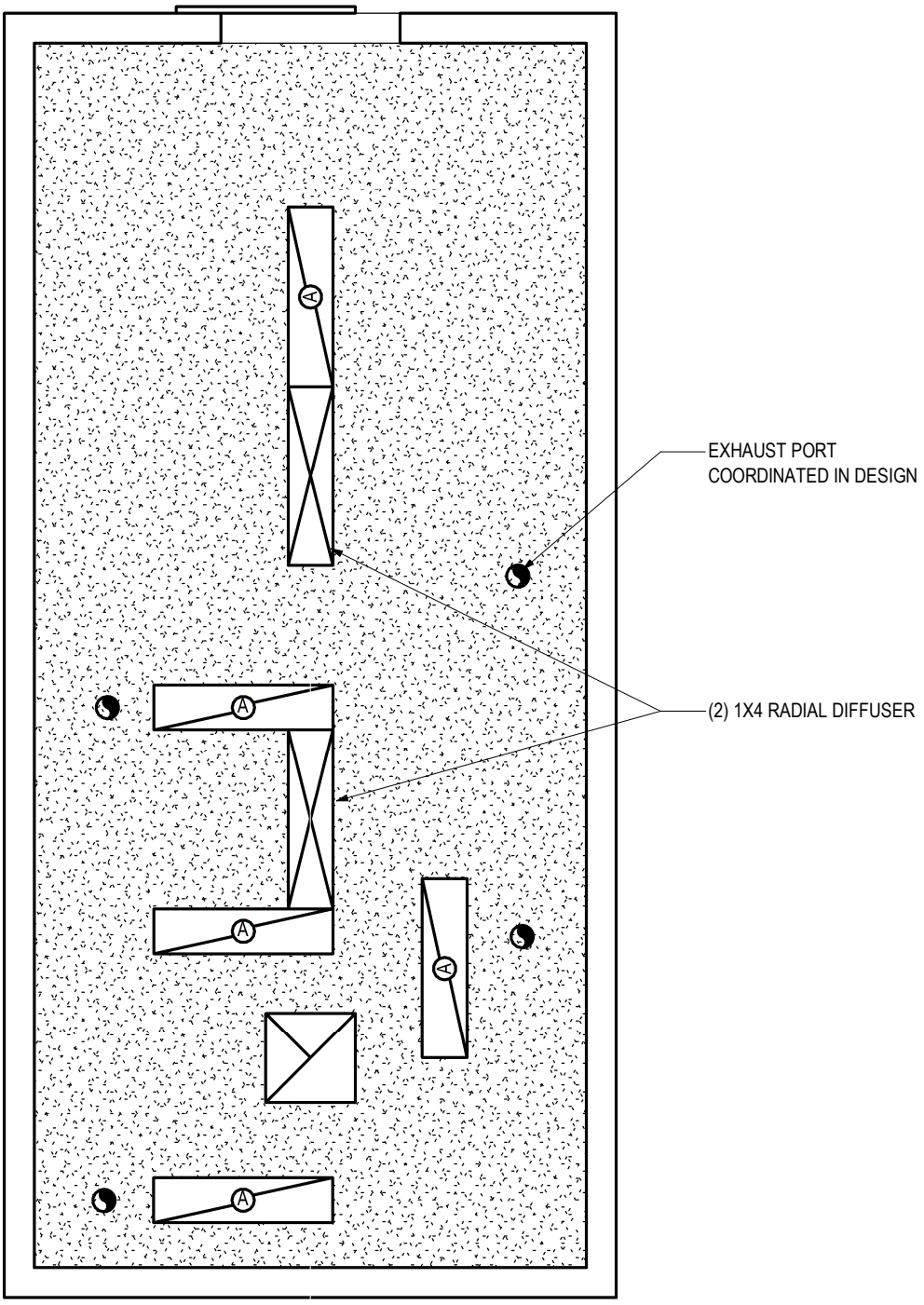
VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:29:37 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



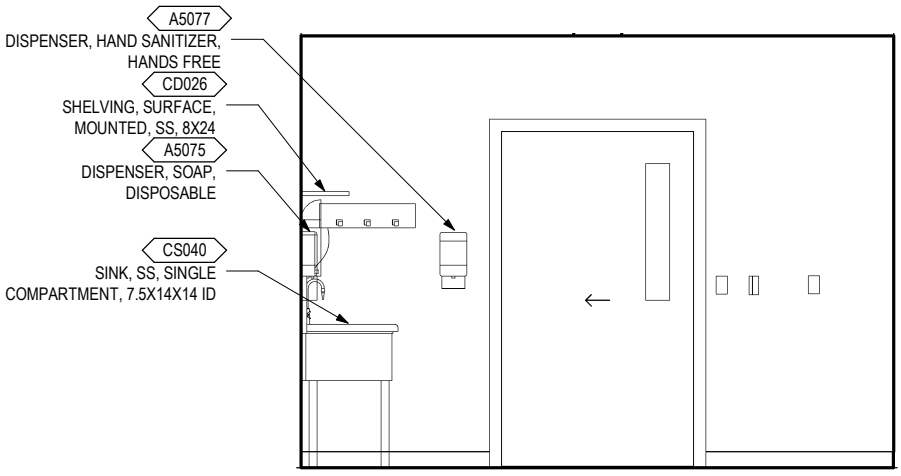
VMU SMALL ANIMAL HOLDING ROOM, R&D
(SC771)
340 NSF
31.3 NSM

VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D ELEVATIONS

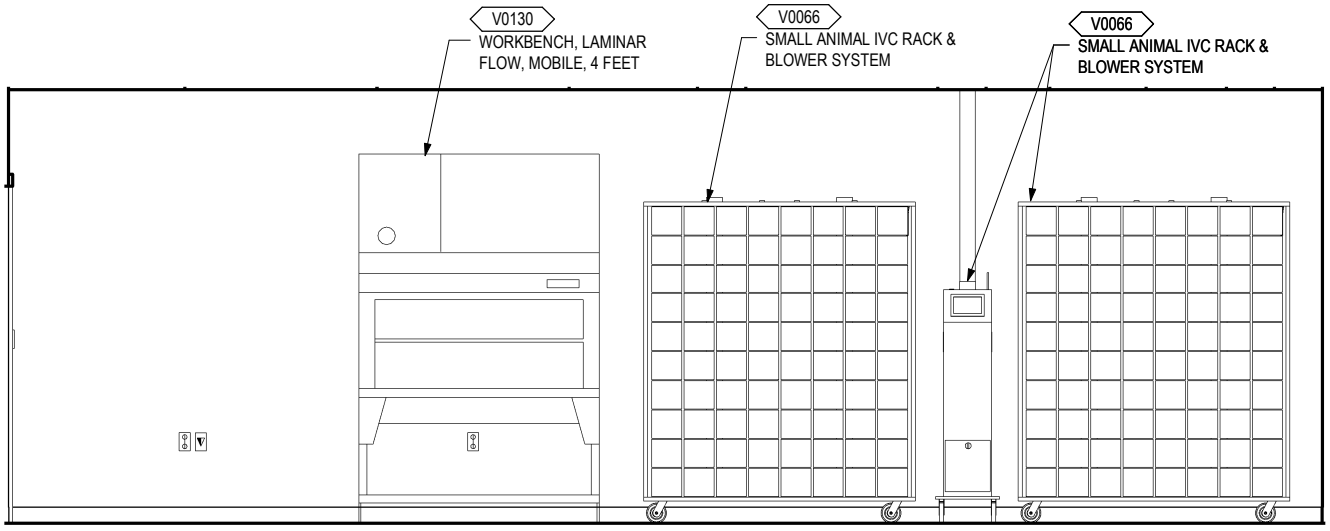
Plot Date: 3/14/2022 2:29:43 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



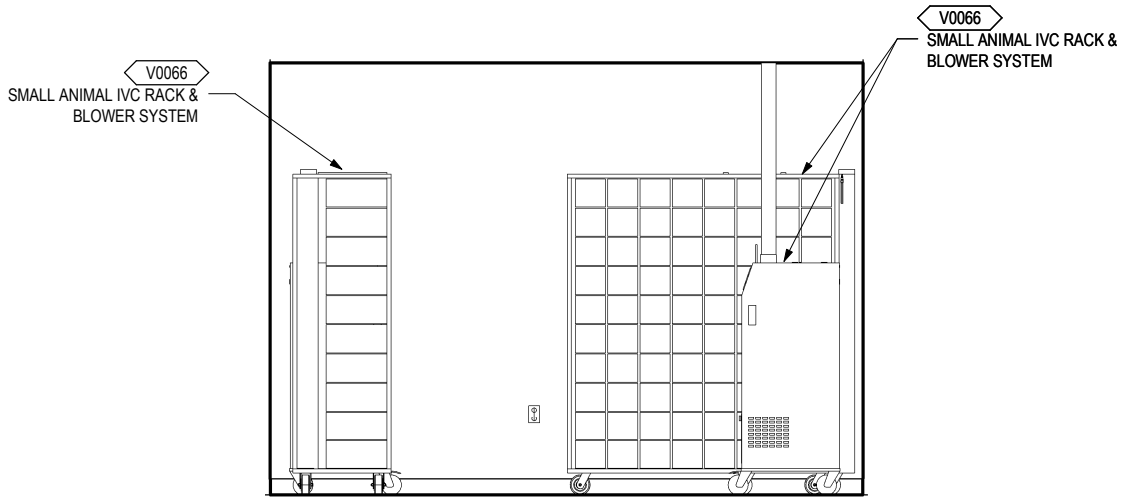
ELEVATION 2

VETERINARY MEDICAL UNIT (VMU)
(SC771) VMU SMALL ANIMAL HOLDING ROOM, R&D ELEVATIONS

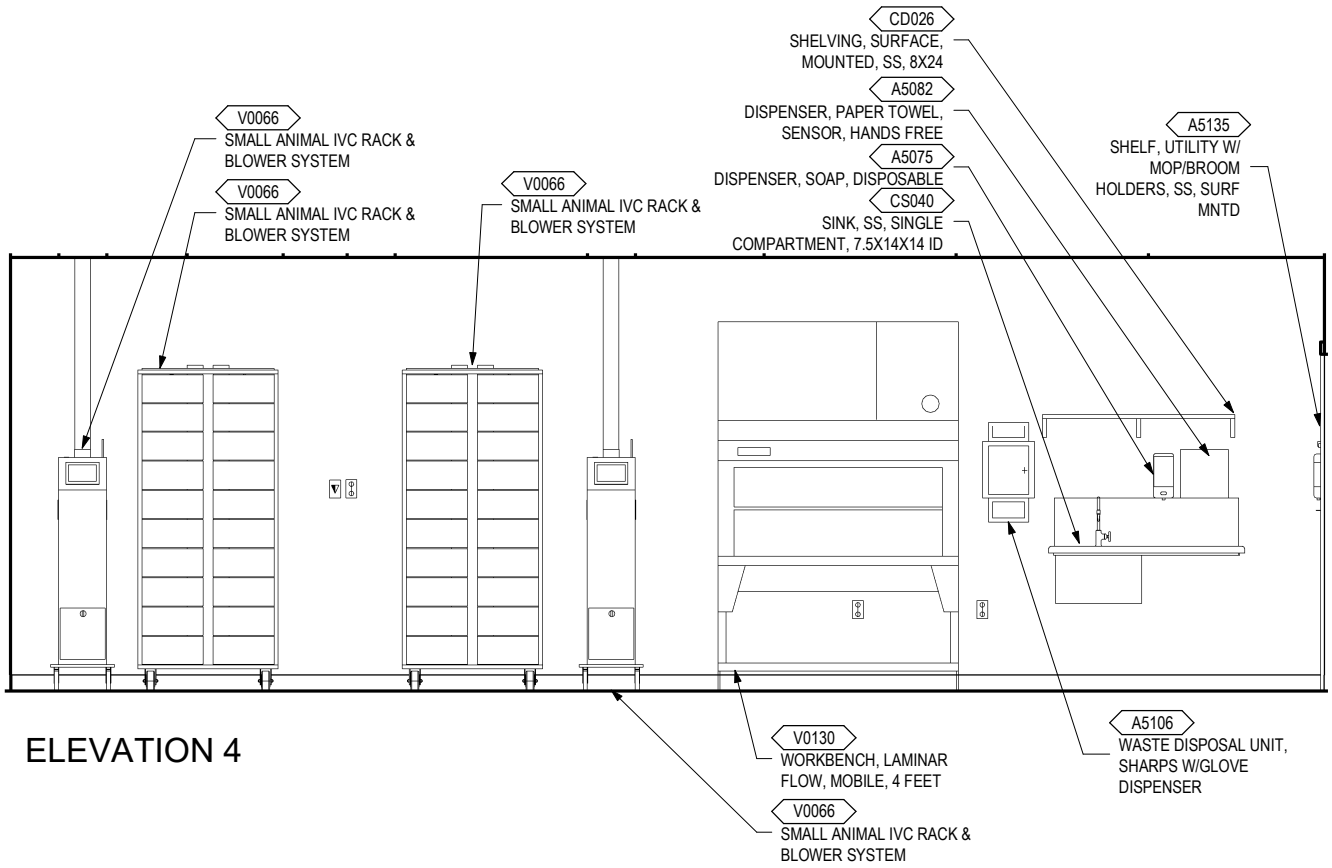
Plot Date: 3/14/2022 2:29:47 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

DISCLAIMER: ROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

Room Data: VMU Small Animal Holding Room, R&D (SC771)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB [Note 1]
Ceiling Height:	10’-0”
Ceiling Finish:	f:RES-W
Wall Finish:	m:GWB [Note 1] f:RES-W m:GFRP f:PF m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 2]
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	STC 60
Doors:	Sliding door, automated with paddle m:Steel t:20 dg:[Note 3] Size: X (4’-0”W x 7’-0”H)
Special Requirement:	[Note 4]

Notes:

1) May need shielding, depending upon use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Resinous Flooring-Wall-Base application over concrete backer board.
3) Provide red glass with door to cover.
4) Add light and acoustic seals.
5) See Specification 08 32 13 ICU Sliding Door and 08 71 13 Automatic Door Operators

LIGHTING

Maintain Average Illumination:	25 FC
Task Illumination:	75 FC
Luminaire Type:	Recessed, Gasketed IP65
Special Requirement:	YES

Notes:

1) General illumination shall be provided by recessed or surface mounted, gasketed IP65 1X4/2X2/2x4 fixtures or similar.
2) VA Lighting Design Manual provides more information on the diurnal light system.

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	YES

Notes:

1) Provide watertight, twist lock receptacles for blower units in animal holding rooms.

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	NO
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	YES
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	YES
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO
Special Requirement:	

Notes:

1) All devices in animal holding room shall be suitable for a wet location.

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the VMU Small Animal Holding Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Sanitary/Vent:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	NO
Sprinkler:	YES

Notes:

1) Fire alarm annunciators shall not be installed in animal holding rooms.

Room Contents: VMU Small Animal Holding Room, R&D (SC771)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
CD026	Shelving, Surface, Mounted, SS, 8x24	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30"

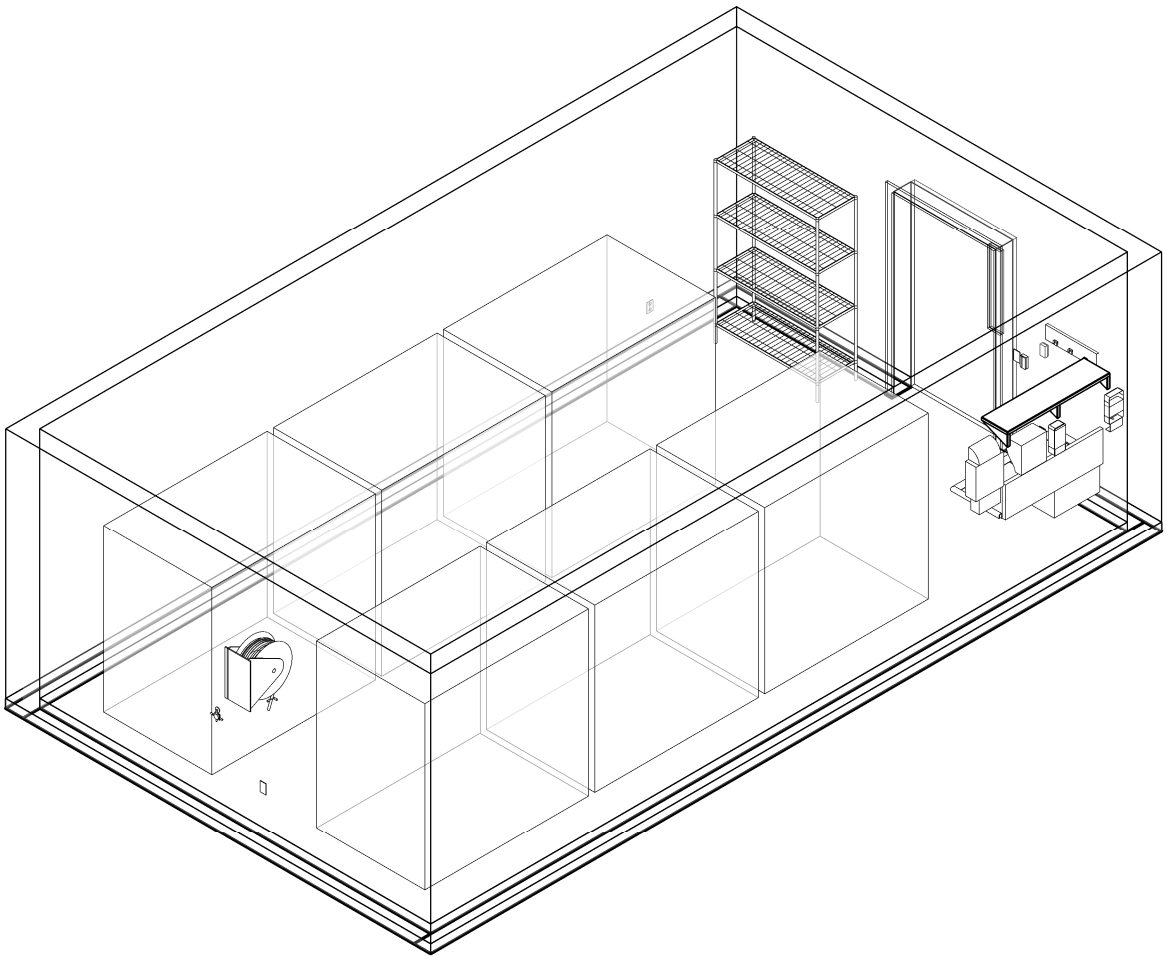
JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
V0066	Small animal IVC Rack & blower system	4	VV	IVC Rack is designed to hold IVC cages. The Individual ventilated caging system is a HEPA filter technology built to protect animals and human researchers and staff so animal research can be performed to meet animal welfare standard in a safe and ergonomic environment for people. typically the IVC caging system consist of removable caging housed in a steel rack which is connected to a recirculated air blower which is either mounted on the unit on the wall or on the floor.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	2	VC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.

U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:29:51 PM

SCALE: 0' 4' 8' 16'



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U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:29:55 PM

SCALE:

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VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:29:57 PM

SCALE: 1/4" = 1'-0"

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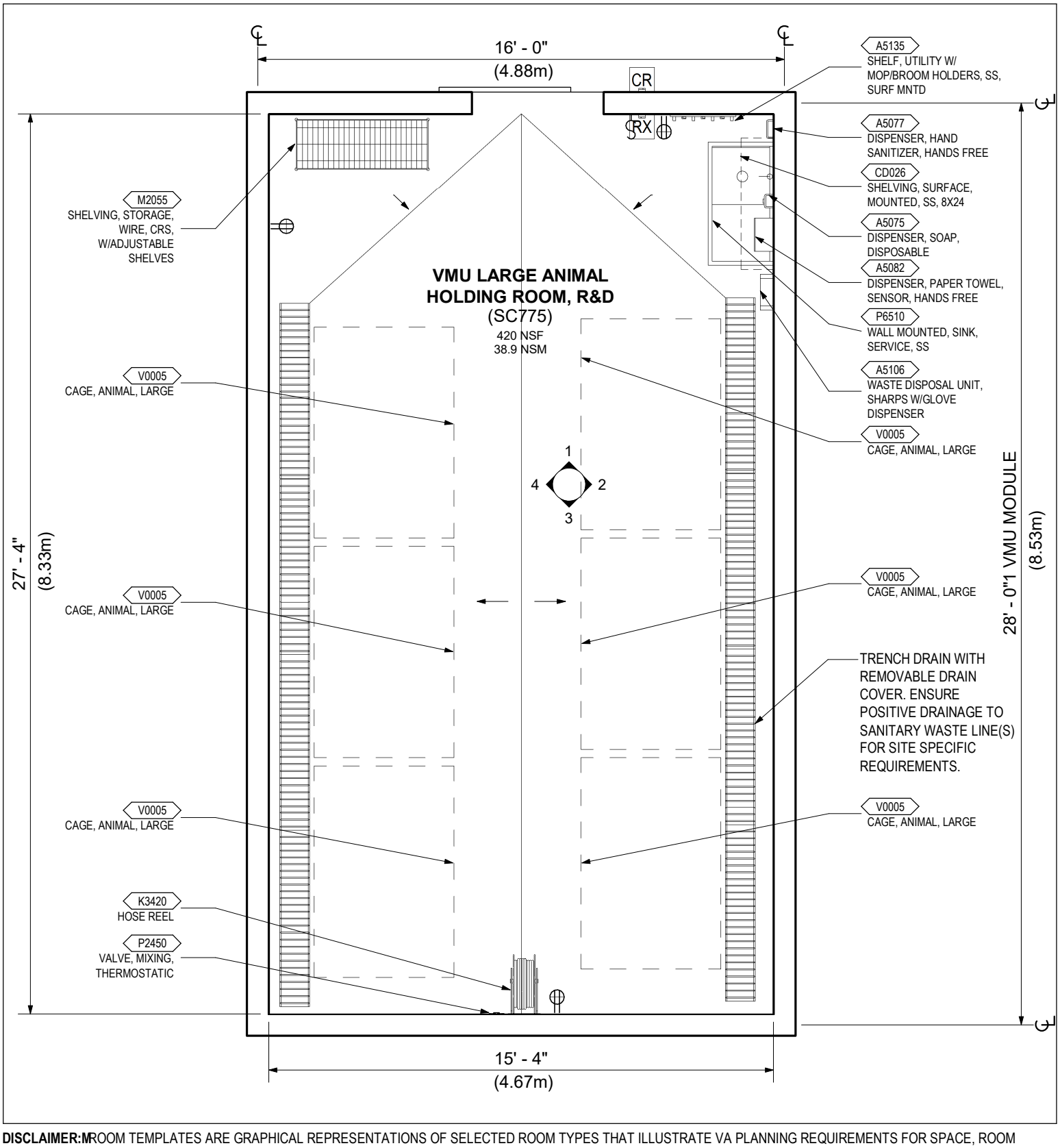

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VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:30:02 PM

SCALE: 1/4" = 1'-0"

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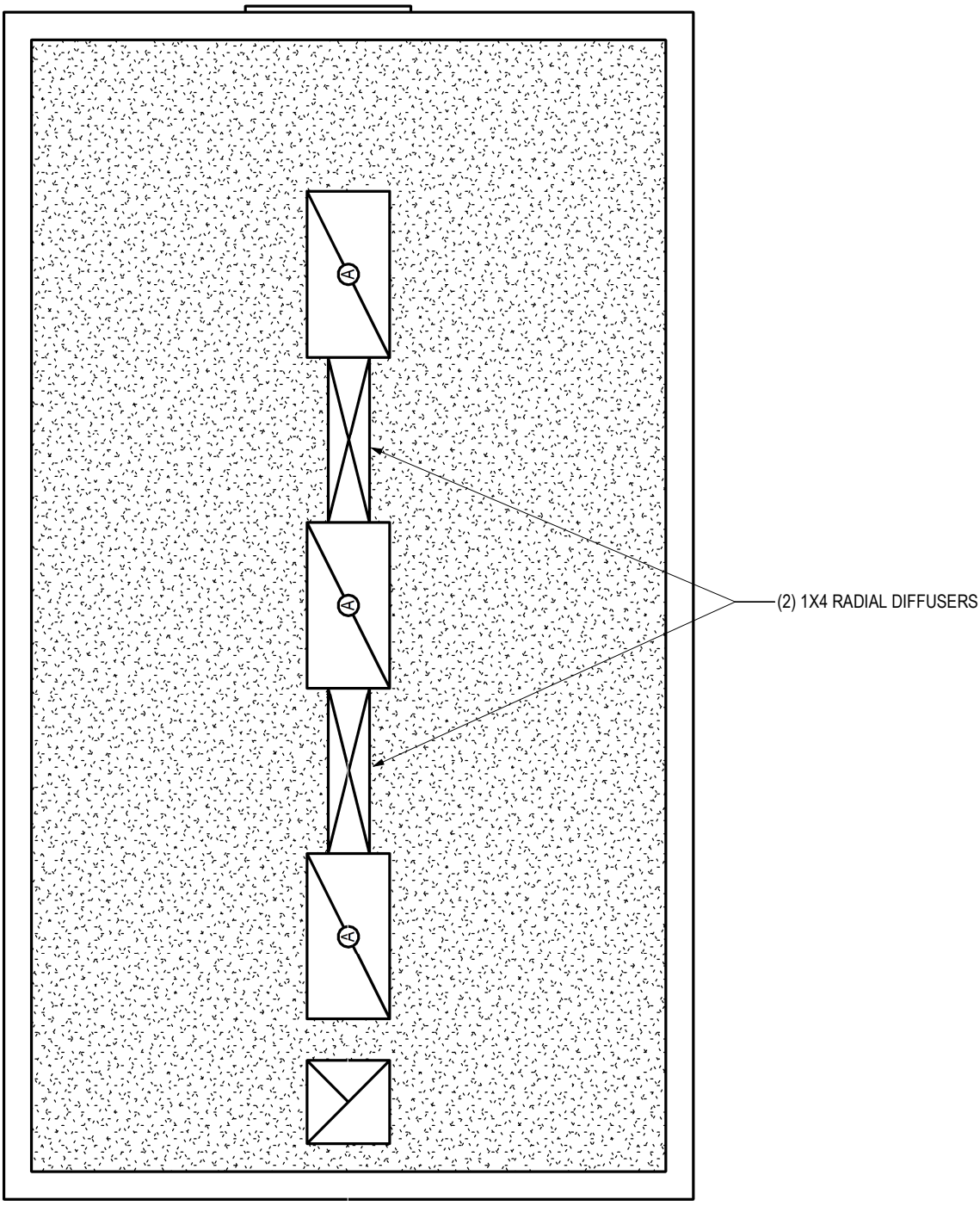

VMU LARGE ANIMAL HOLDING ROOM, R&D
(SC775)
420 NSF
38.9 NSM

VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
ELEVATIONS

Plot Date: 3/14/2022 2:30:09 PM

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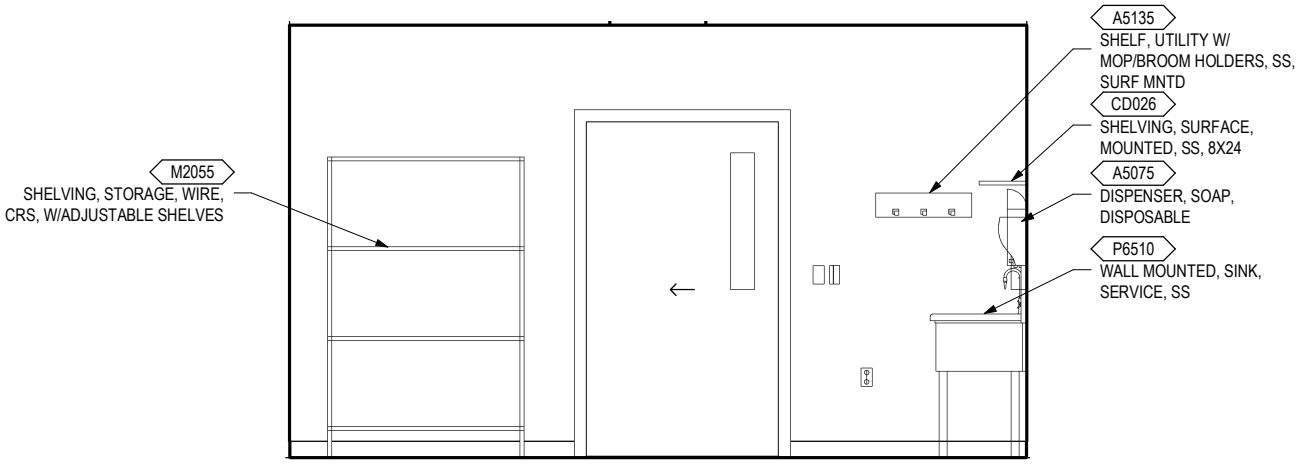
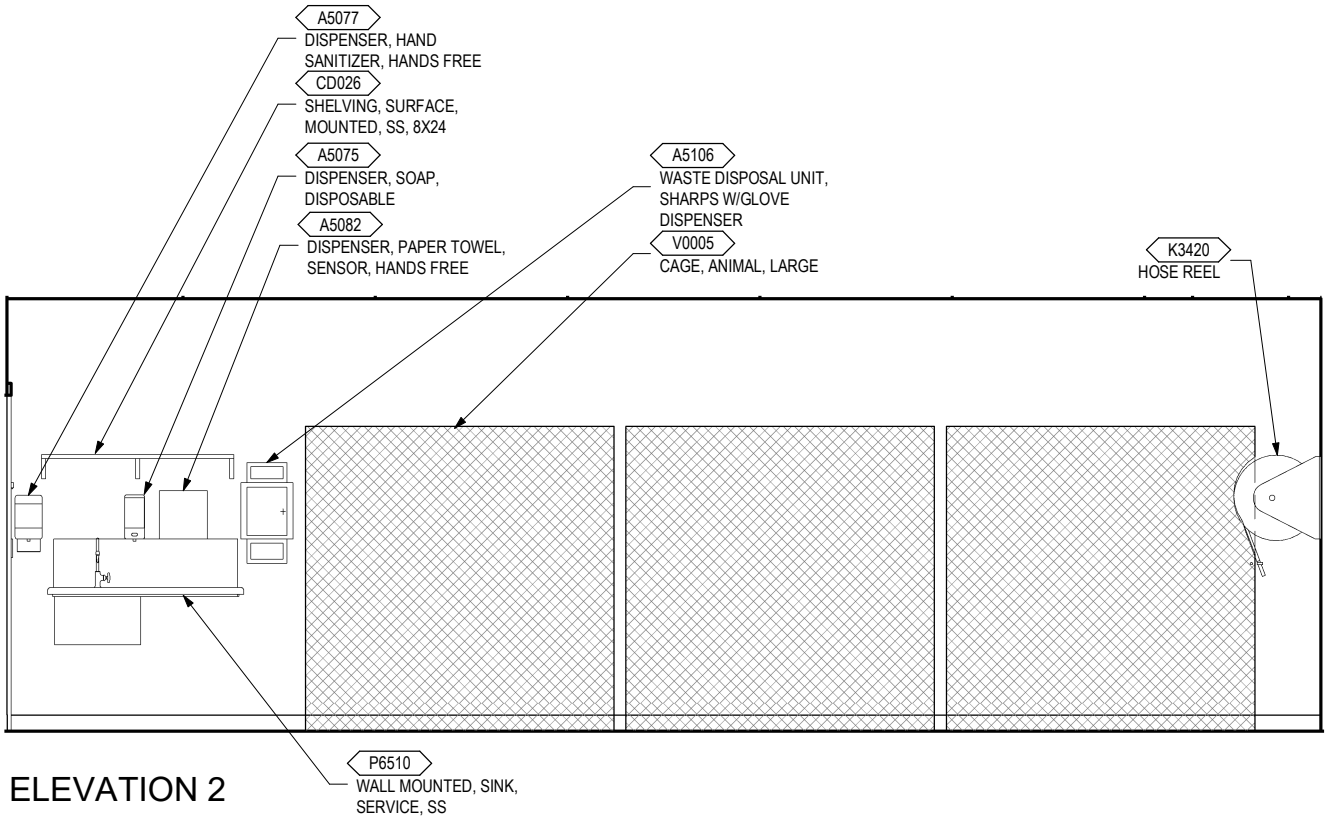


ELEVATION 1



ELEVATION 2

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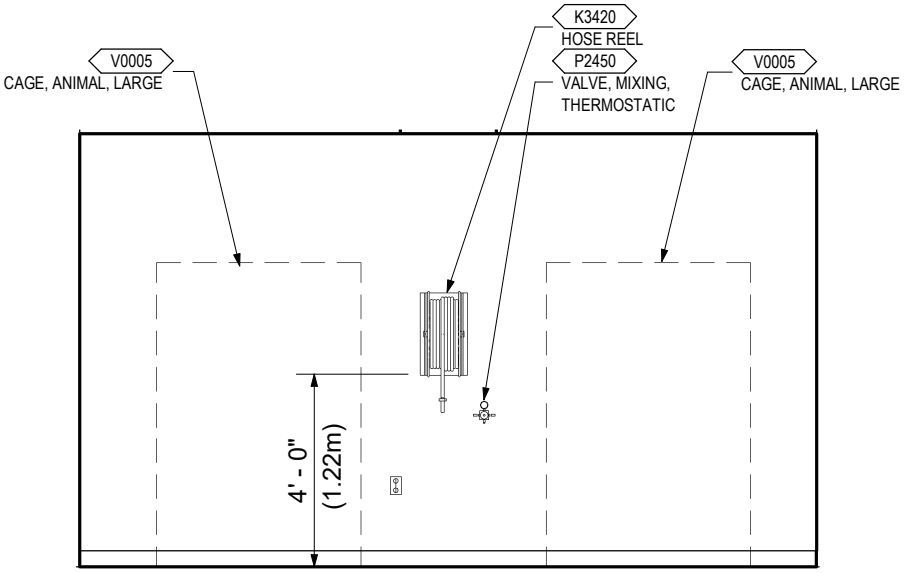
VETERINARY MEDICAL UNIT (VMU)
(SC775) VMU LARGE ANIMAL HOLDING ROOM, R&D
ELEVATIONS

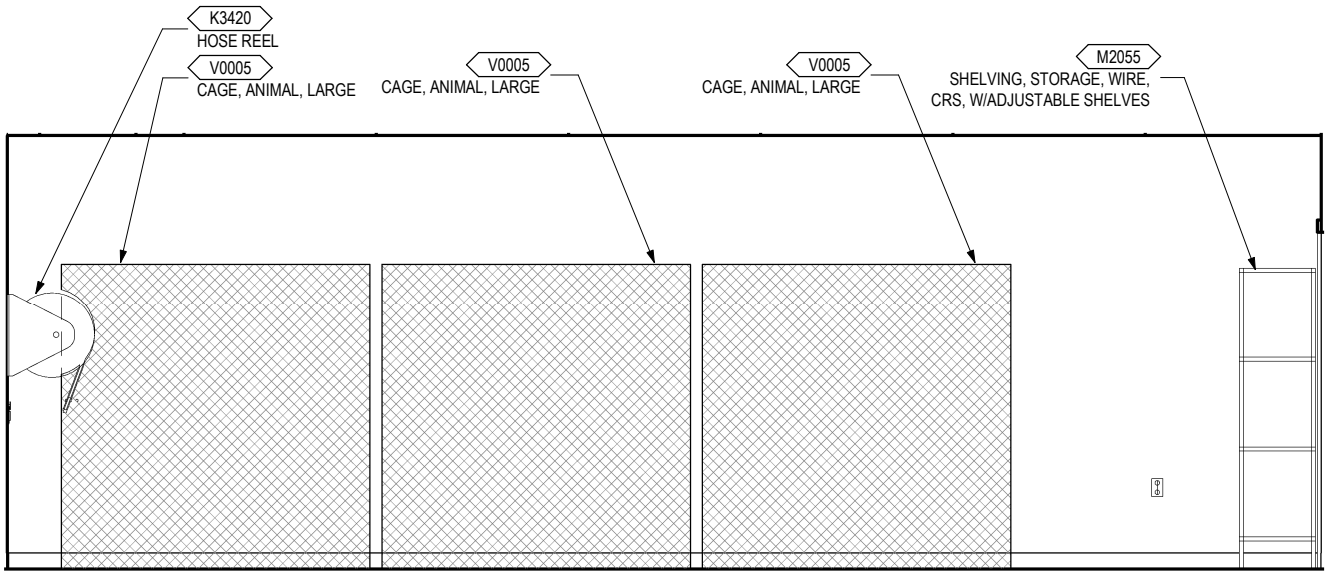
Plot Date: 3/14/2022 2:30:14 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: VMU Large Animal Holding Room, R&D (SC775)

ARCHITECTURAL & INTERIOR DESIGN	
Ceiling Type:	GWB [Note 1]
Ceiling Height:	10’-0”
Ceiling Finish:	RES-W
Wall Finish:	m:GFRP [Note 1] f:PF m:GWB f:RES-W m:CMU f:SC
Wainscot:	NA
Base:	RES [Note 2] h:4”
Floor Finish:	RES
Slab Depression:	NA
Sound Protection:	60 STC
Doors:	m:Steel t:20 dg:T Red glass with door to cover Size: X (4’-0”W x 7’-0””H)
Special Requirement:	Add light and acoustic seals

Notes:

1) May need shielding, depending upon use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Resinous Flooring-Wall-Bass application over concrete backer board.
3) See Specification 08 32 13 ICU Sliding Door and 08 71 13 Automatic Door Operators

LIGHTING	
Maintain Average Illumination:	50 FC
Task Illumination:	75 FC
Luminaire Type:	Gasketed IP65, 2x4

POWER	
Normal Power:	NO
Emergency Power:	YES

Notes:

1) Provide watertight receptacles in animal holding rooms.

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS	
Data:	NO
Telephone:	NO
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the VMU Large Animal Holding Room.

PLUMBING AND MEDICAL GASES	
Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY	
Alarm Detection:	NO
Alarm Annunciator:	NO
Sprinkler:	YES

Room Contents: VMU Large Animal Holding Room, R&D (SC775)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
CD026	Shelving, Surface, Mounted, SS, 8x24	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30"

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
M2055	Shelving, Storage, Wire, CRS, w/Adjustable Shelves	4	VV	Stationary, wire, shelving unit. Unit has fully adjustable shelves constructed of stainless steel. For use in general purpose storage areas. Shelving is provided in various sizes and configurations. Price provided is for a unit approximately 74"H x 18"D x 48"W with four shelves.
V0005	Cage, Animal, Large	6	VV	Large animal cage. Characteristics/components include durable and reinforced fiberglass; a shell that resists stains, scratches and wear; mildew resistant; and a drain with strainer. Cage used to house large animals. Unit price is based on requester requirements.
P2450	Valve, Mixing, Thermostatic	1	CC	Thermostatic mixing valve with washout hose. Used with portable whirlpool equipment. Thermostatic valve is used to maintain temperature between 70 and 110 degree Fahrenheit, with a flow rate of 20 gallons a minute. The washout hose assembly is used to wash out tanks after treatment. Used in physical therapy department to provide comfortable water temperature for patient treatments.
K3420	Hose Reel	1	CC	Retractable hose. The hose is wall mounted and has a stainless steel casing. The unit is used for washing and spraying down areas in commercial and institutional food service operations.

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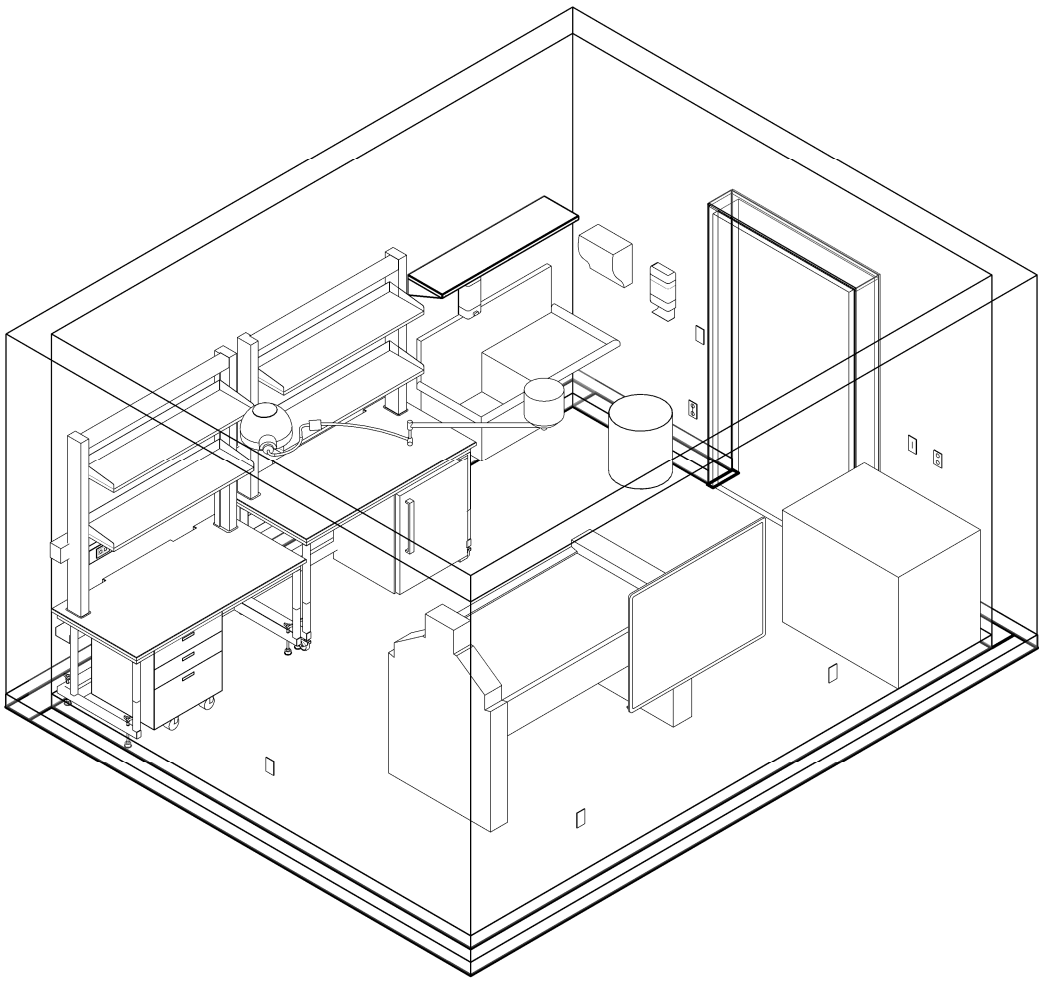
VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
AXONOMETRIC

Plot Date: 3/14/2022 2:30:18 PM

SCALE: 0' 4' 8' 16'



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VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:30:22 PM

SCALE:

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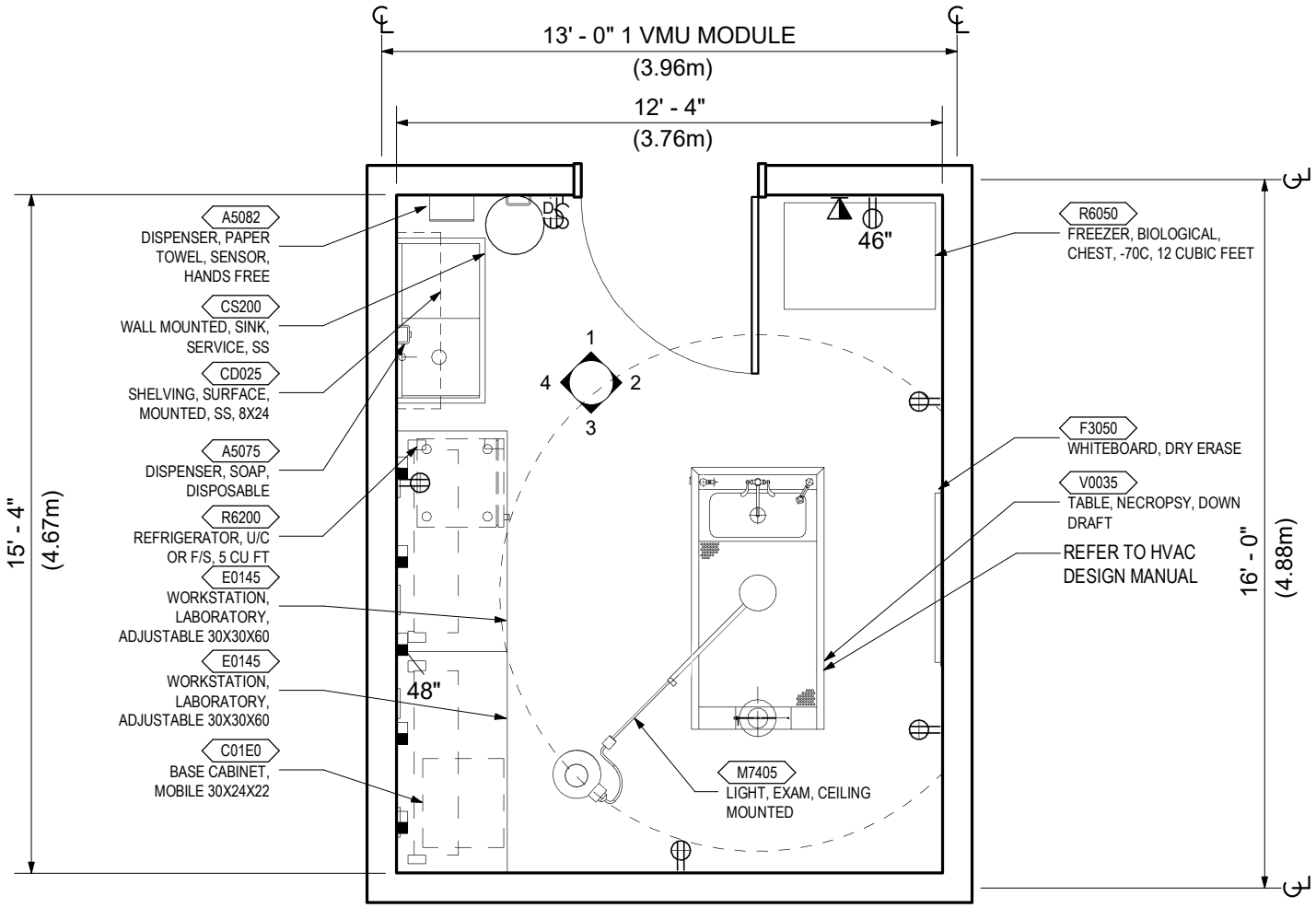
VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:30:24 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



NECROPSY ROOM
(SC781)
190 NSF
17.6 NSM

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VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:30:28 PM

SCALE: 1/4" = 1'-0"

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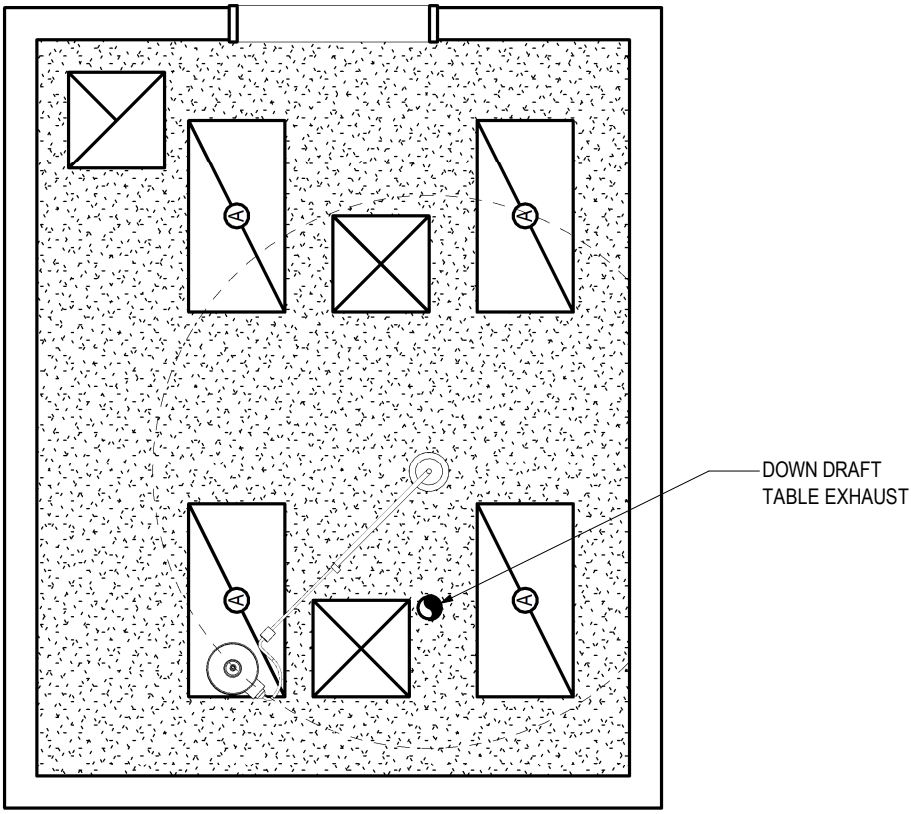


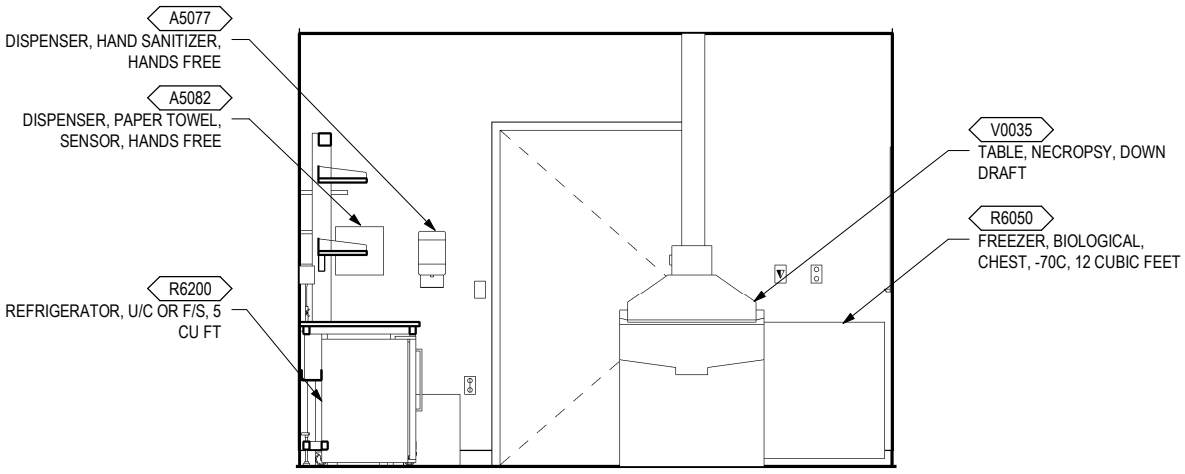
NECROPSY ROOM
(SC781)
190 NSF
17.6 NSM

VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
ELEVATIONS

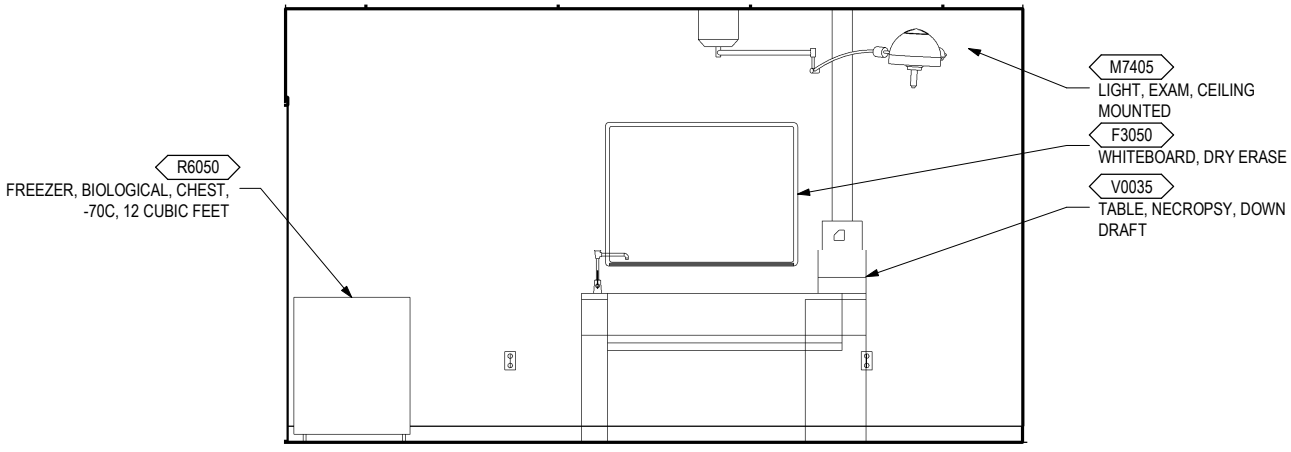
Plot Date: 3/14/2022 2:30:33 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



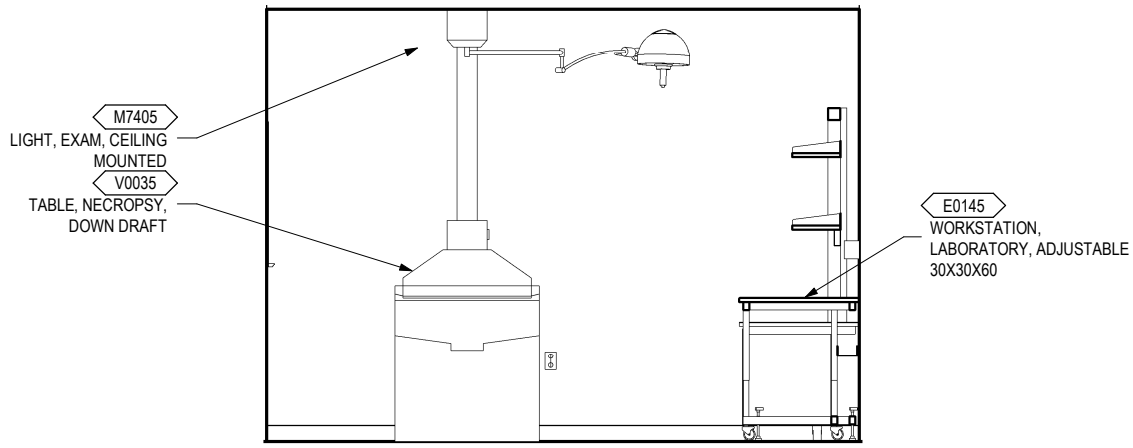
ELEVATION 2

VETERINARY MEDICAL UNIT (VMU)
(SC781) VMU NECROPSY ROOM, R&D
ELEVATIONS

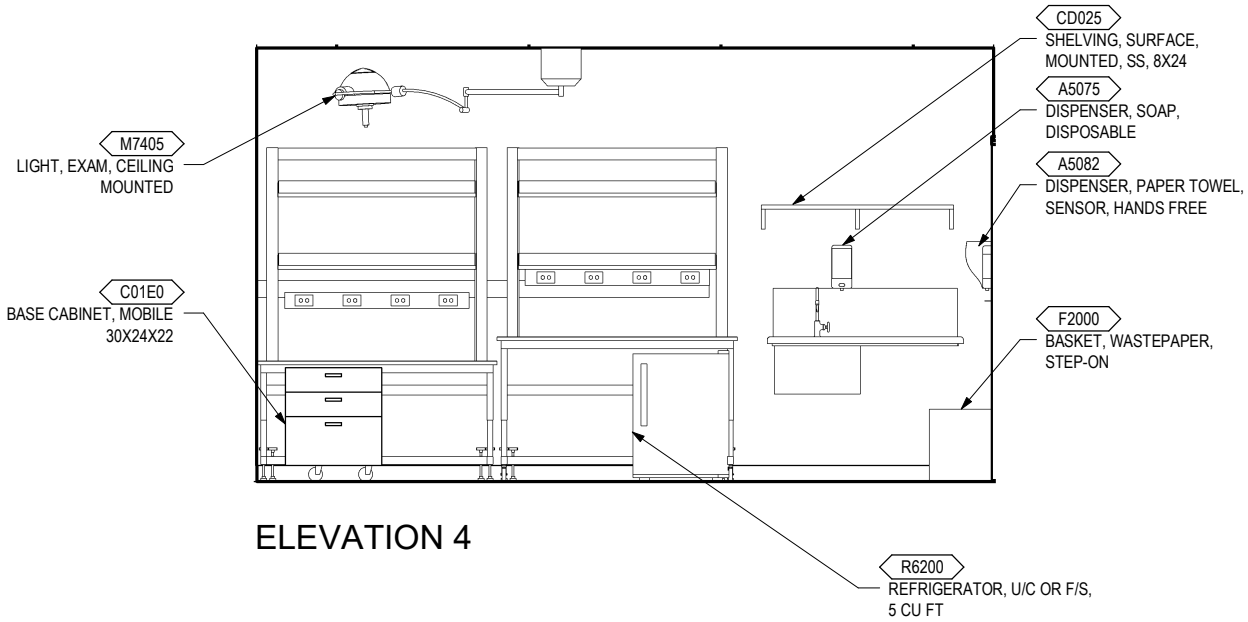
Plot Date: 3/14/2022 2:30:37 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: VMU Necropsy Room, R&D (SC781)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB
Ceiling Height:	9’-0”
Ceiling Finish:	f:RES-W
Wall Finish:	m:GRRP f:PF m:GWB f:RES-W m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1]
Floor Finish:	RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Steel t:2 dg:T Size: U (3’-6”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) Resinous Flooring-Wall-Base application over concrete backer board.
2) Door hardware set 4C

LIGHTING

Maintain Average Illumination:	1OO FC @ 2’-6”
Task Illumination:	
Luminaire Type:	2x2/2x4 Troffer

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the VMU Necropsy Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: VMU Necropsy Room, R&D (SC781)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
A5145	Hook, Garment, Double, SS, Surface Mounted	1	CC	A surface mounted, satin finish stainless steel, double garment hook. Equipped with a concealed mounting bracket that is secured to a concealed wall plate. For general purpose use throughout the facility to hang various items of apparel.
CT020	Countertop,Stainless steel	1	CC	A solid, nonporous countertop with a smooth seamless appearance. Easy to clean and maintain and with proper cleaning does not support the growth of mold. An acrylic-based solid surface product. Standard thickness of 1", and a 4" butt backsplash/curb. Also referred to as a work surface or work top. Available in a choice of colors and depths. Used in lab and other hospital

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				areas requiring optimum physical and chemical resisting properties.
CS200	Sink, SS, Single Compartment, 12x28x16 ID	1	CC	Single compartment stainless steel sink, drop-in, self-rimming, ledge-type, connected with a drain and provided with a mixing faucet. It shall also be provided with pre-punched fixture holes on 4" center, integral back ledge to accommodate deck-mounted fixtures, brushed/polished interior and top surfaces, and sound deadened. Recommended for use in suspended or U/C/B sink cabinets having a high plastic laminate or Chemsurf laminate countertop/work surface. Coordinate actual outside sink dimensions with the actual clear dimension of cabinet specified to ensure that they are compatible. For general purpose use throughout the facility.
CD025	Shelving, Adjustable, Wall Mounted 30x12	4	CC	Stainless steel 3 adjustable wall mounted laboratory Epoxy, steel or stainless steel shelving with metal brackets and wall standards
E0145	Workstation, Laboratory, Adjustable 30x30x60	2	CC	Stainless steel Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
C01E0	Base Cabinet, Mobile 30x24x22	4	CC	Stainless steel Floor standing storage base cabinet with casters, three drawers. With epoxy top. For general purpose use throughout the facility.
CW090	Cabinet, Floor Standing, 5 SH, 2 GDO, ST, 95"x36"	1	CC	Floor standing storage cabinet approximately 95" H x 36" W x 16" D with five adjustable shelves, framed glass hinged doors, and sloping top. Also referred to as a framed glass hinged double door case. For general purpose use throughout the facility.
F2010	Basket, Wastepaper, Step-On	1	VV	"Step-on" wastepaper basket with inner liner and foot petal activated flip top.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
F3050	Whiteboard, Dry Erase	1	VV	Whiteboard unit, approximately 36" H x 48" W consisting of a white porcelain enamel writing surface with an attached chalk tray. Magnetic surface available. Image can be easily removed with a standard chalkboard eraser. For use with water color pens. Unit is ready to hang.
V0035	Table, Necropsy, Down Draft	1	CC	Tables designed to hold animal cadavers during necropsy and tissue trimming procedures. Available in a range of sizes tailored for specific animals; may include a built-in downdraft ventilation system, integral sink, and/or spray hose assembly.
M7405	Light, Exam, Ceiling Mounted	1	CC	Ceiling exam light. Consists of a lightheaded reflector supported by a ceiling mounted radial arm assembly that provides a wide range of positioning capabilities. Halogen bulbs and an intensity control provide cool, color corrected light. The minimum ceiling height in most cases is 8'-0"; refer to each manufacturer's specific installation requirements. Physical dimensions refer to the retracted light; one length of the dual swing arm around the center mount in width and depth and the combined height of the lamp head and folded arms. Unit may also have a center mount detachable and sterilizable control handle. For use in minor procedure or examination room applications.
R6200	Refrigerator, U/C or F/S, 5 Cu Ft	1	VV	Utility refrigerator approximately 35" H x 24" W x 26" D. The unit has a two tray ice cube cooling system. The refrigerator fits standard architectural dimensions for undercounter installation. The unit is perfect for use in nurses' station, wards, and laboratories, pharmacies or wherever space is limited.
R6050	Freezer, Biological, Chest, -70c, 12 Cubic Feet	1	vv	Biological freezer. This is a chest type, 12 cubic feet, ultra-low unit. Characteristics include two

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				hermetically sealed compressors and 5 inches of rigid non-setting urethane foam insulation..
P5215	Recessed, Emergency Shower/ EyeWash	1	CC	Deluge safety shower. This is a complete, maximum protection safety station consisting of a Recessed emergency shower and an eye/face wash fixture. Used anywhere exposure to hazardous substances may occur.

U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D (SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D
(SC763) VMU BEHAVIORAL STUDY ROOM, R&D (SC764) VMU IMAGING STUDY ROOM, R&D
AXONOMETRIC

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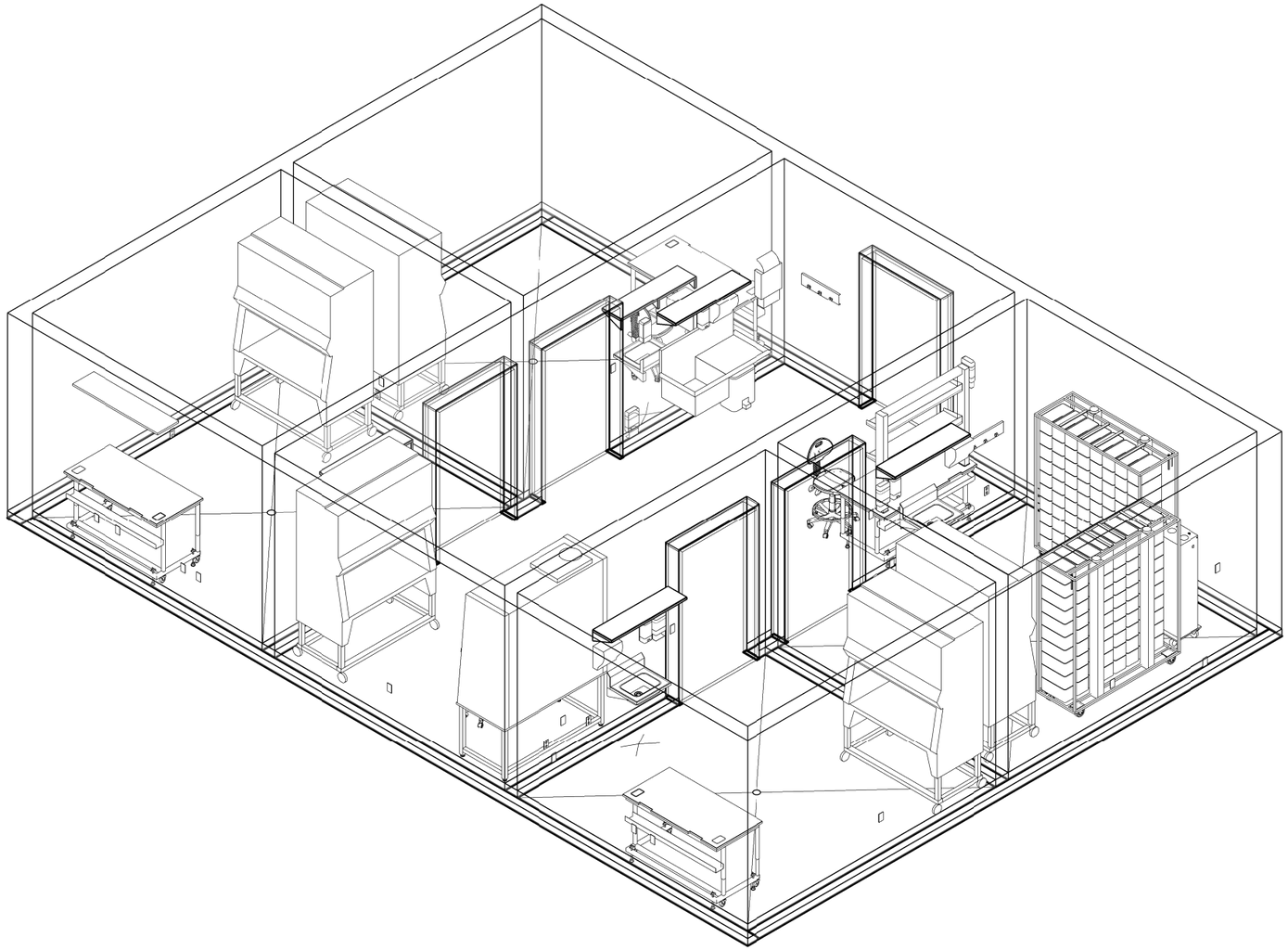

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U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D (SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D
(SC763) VMU BEHAVIORAL STUDY ROOM, R&D (SC764) VMU IMAGING STUDY ROOM, R&D
INTERACTIVE 3D PDF

Plot Date: 3/14/2022 2:30:49 PM SCALE:

0' 4' 8' 16'

VETERINARY MEDICAL UNIT (VMU)
(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D (SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D
(SC763) VMU BEHAVIORAL STUDY ROOM, R&D (SC764) VMU IMAGING STUDY ROOM, R&D
FLOOR PLAN

U.S. Department of Veterans Affairs

Plot Date: 3/14/2022 2:30:51 PM SCALE: 1/4" = 1'-0"

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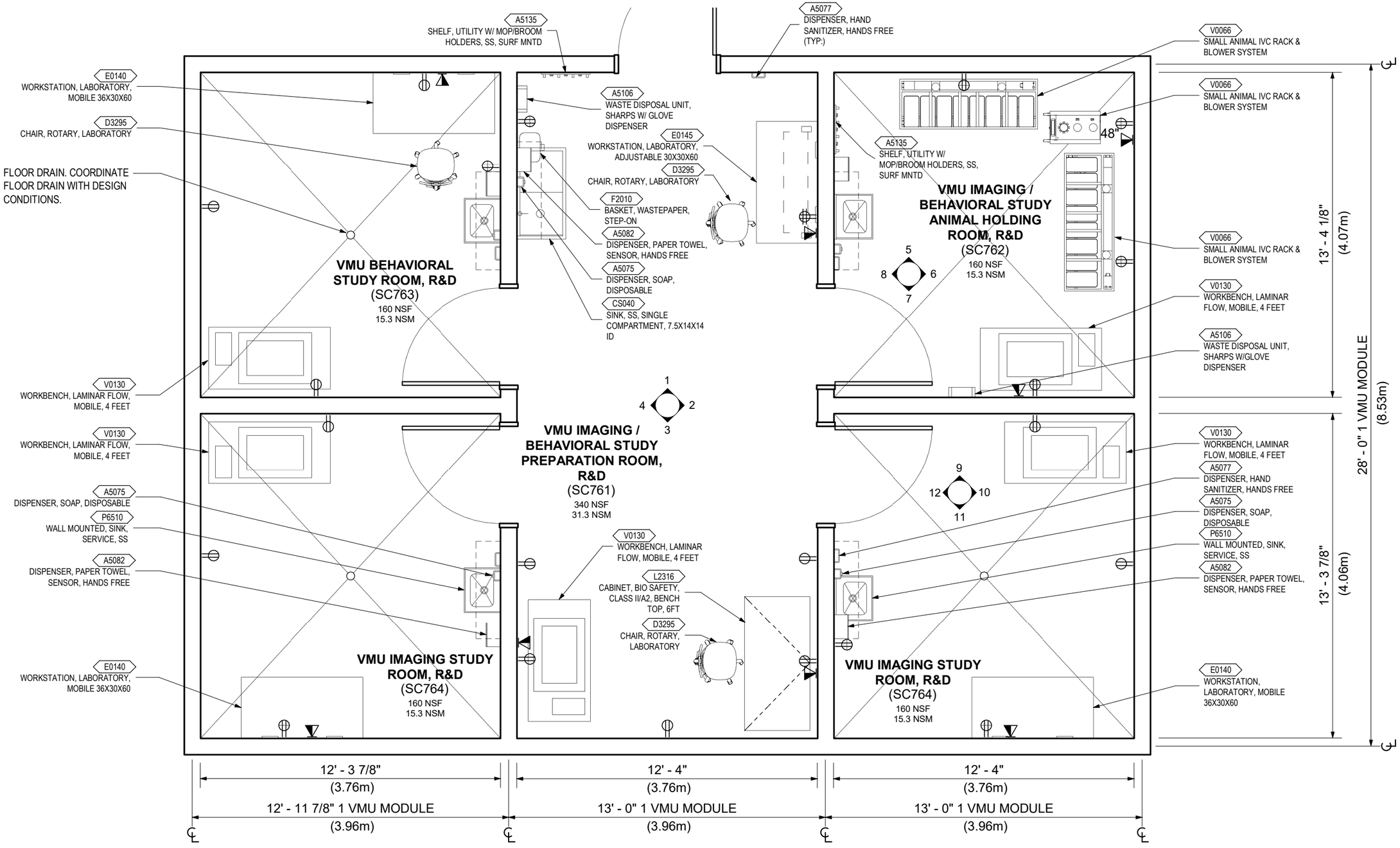

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VETERINARY MEDICAL UNIT (VMU)

(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D (SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D (SC763) VMU BEHAVIORAL STUDY ROOM, R&D (SC764) VMU IMAGING STUDY ROOM, R&D

REFLECTED CEILING PLAN

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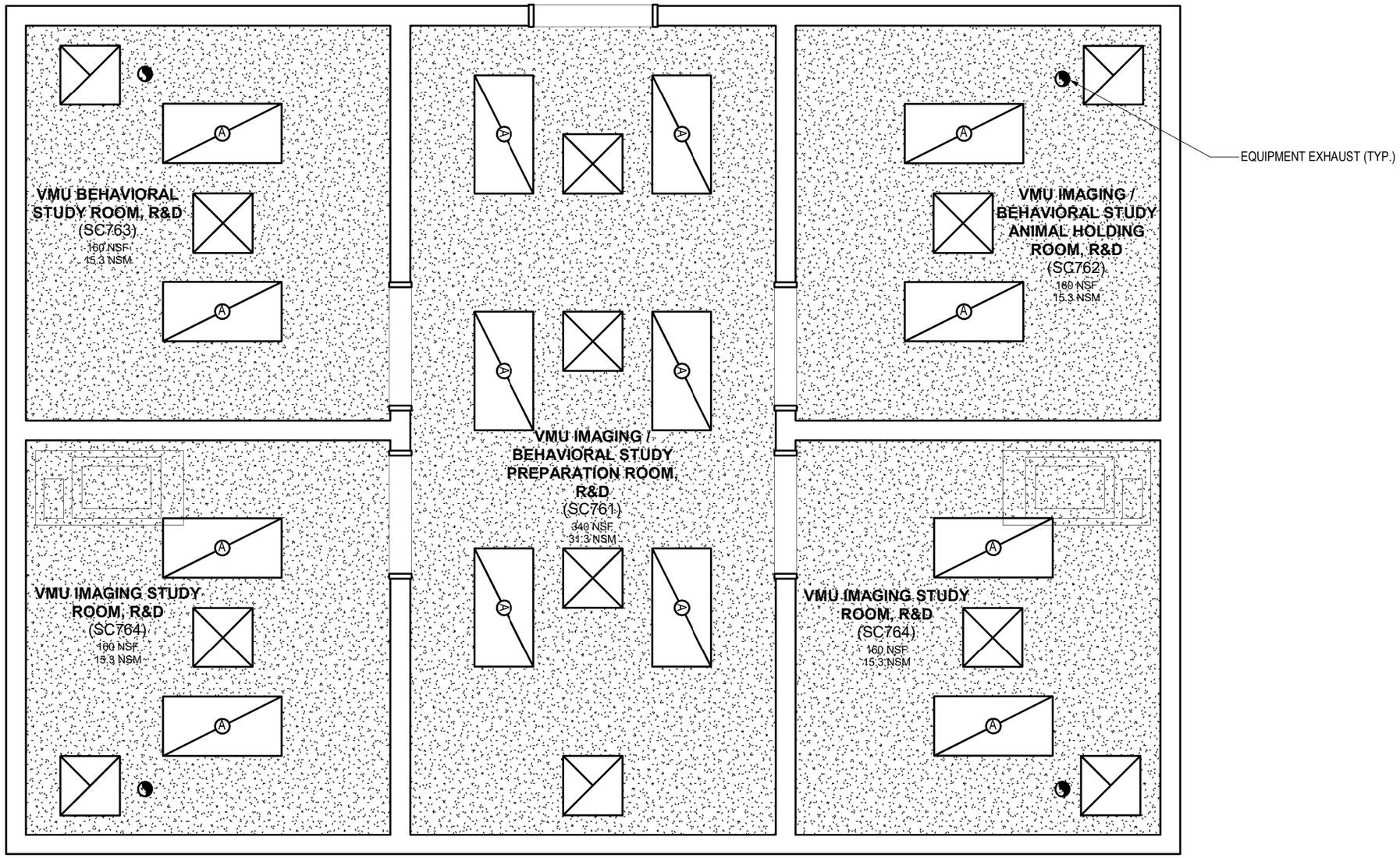

VETERINARY MEDICAL UNIT (VMU)
(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D
ELEVATIONS

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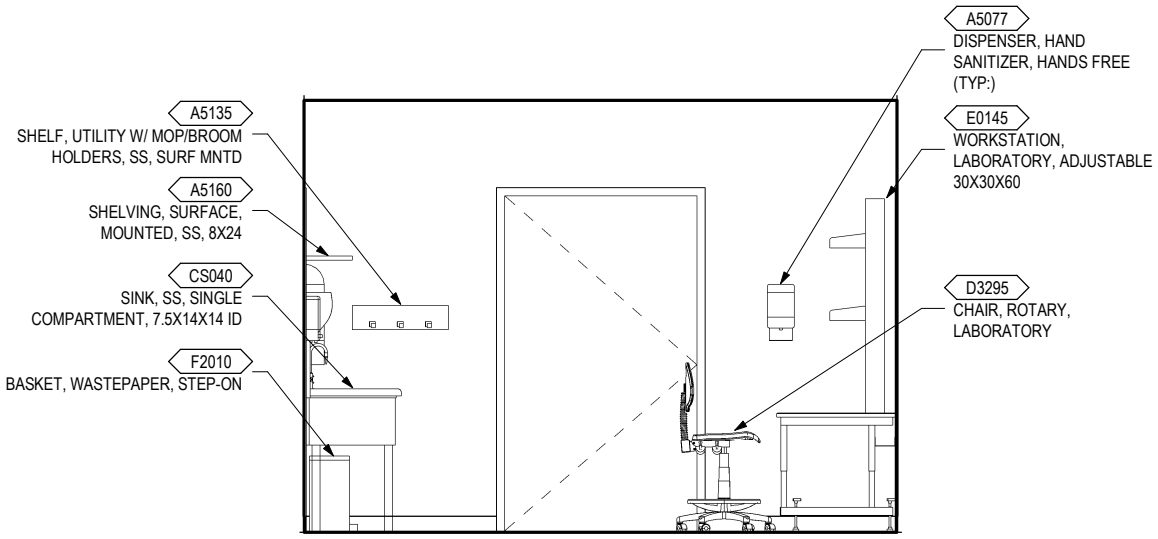
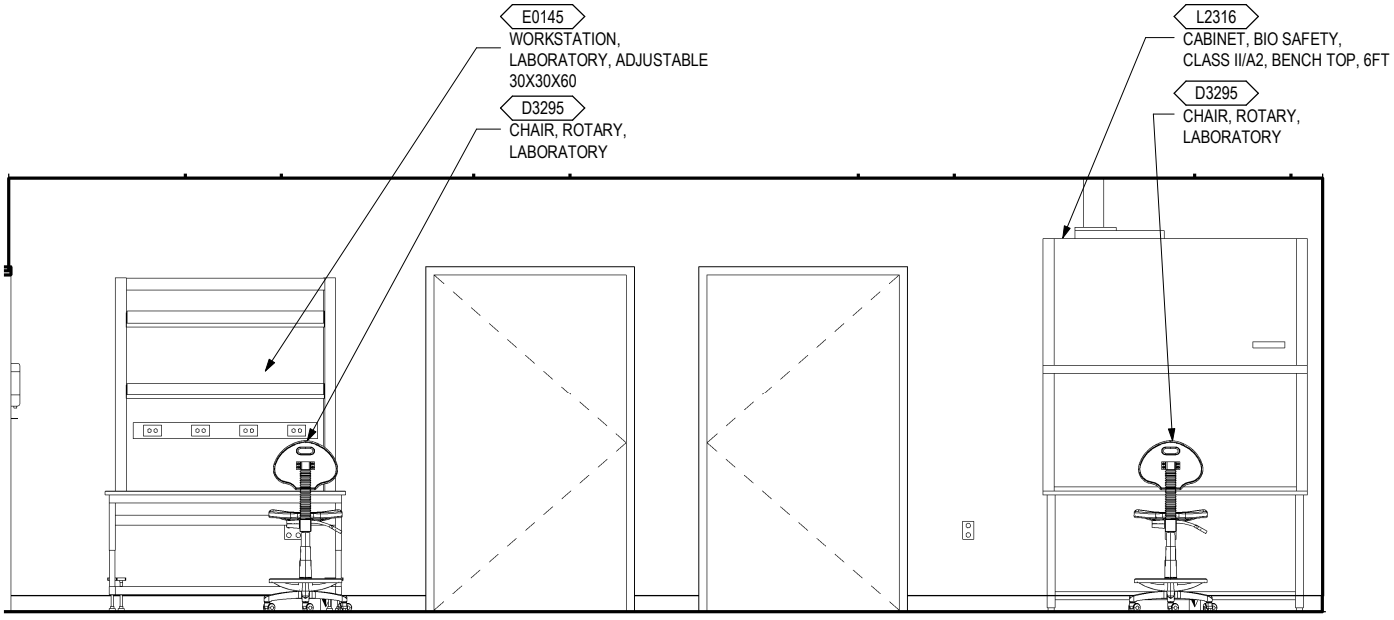


ELEVATION 1



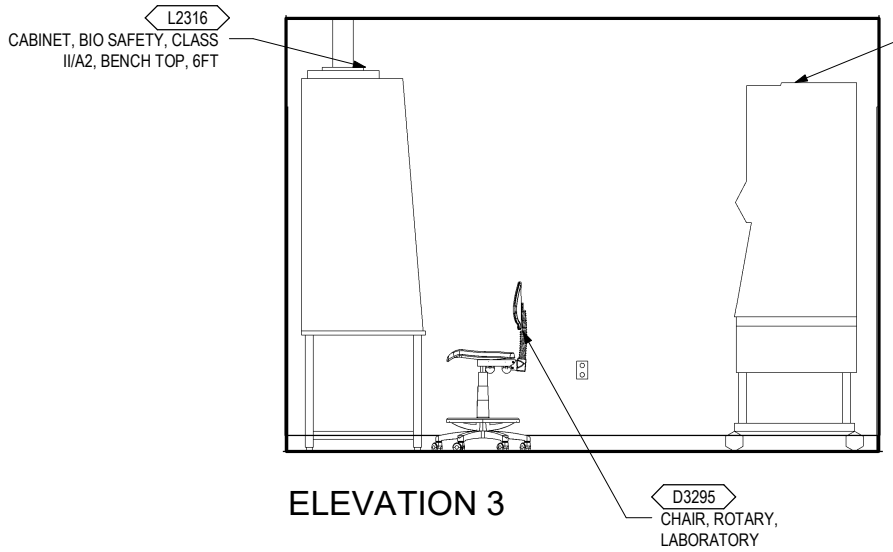
ELEVATION 2

VETERINARY MEDICAL UNIT (VMU)
(SC761) VMU IMAGING / BEHAVIORAL STUDY PREPARATION ROOM, R&D
ELEVATIONS

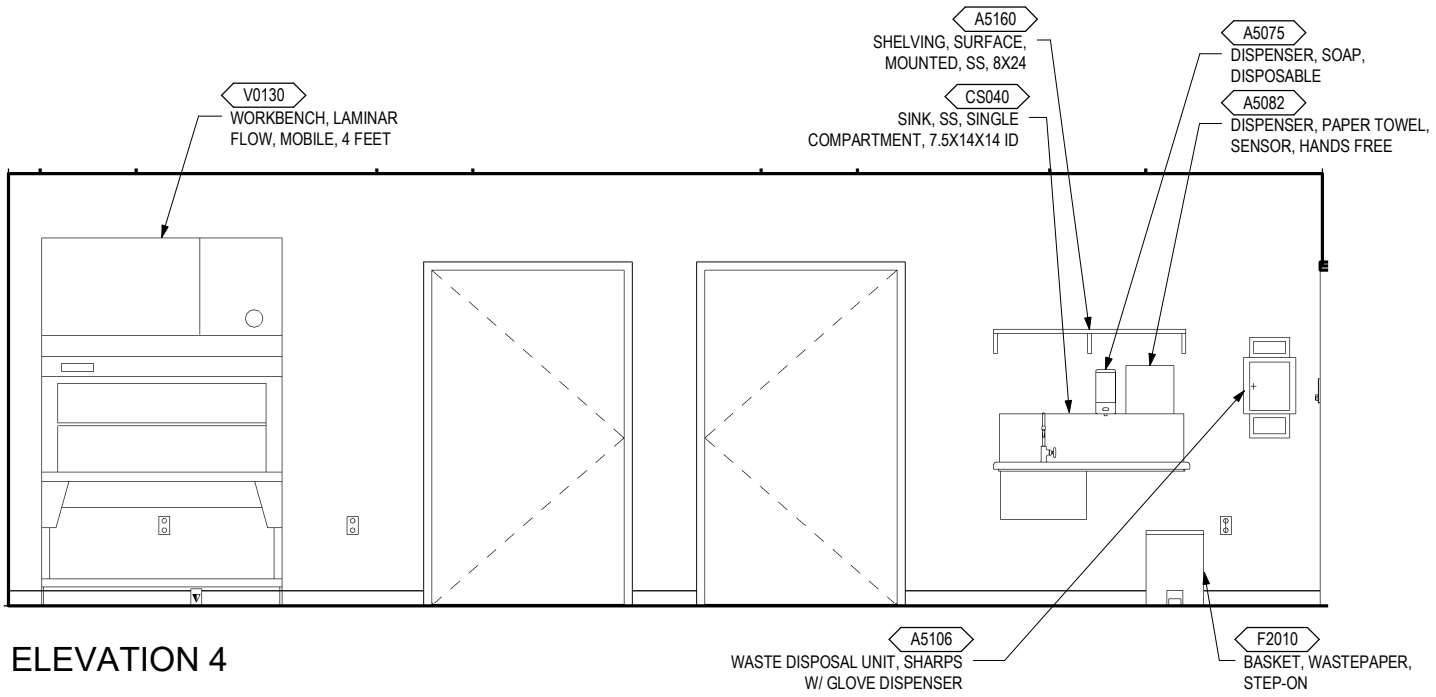
Plot Date: 3/14/2022 2:31:10 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

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VETERINARY MEDICAL UNIT (VMU)
(SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D ELEVATIONS

Plot Date: 3/14/2022 2:31:15 PM

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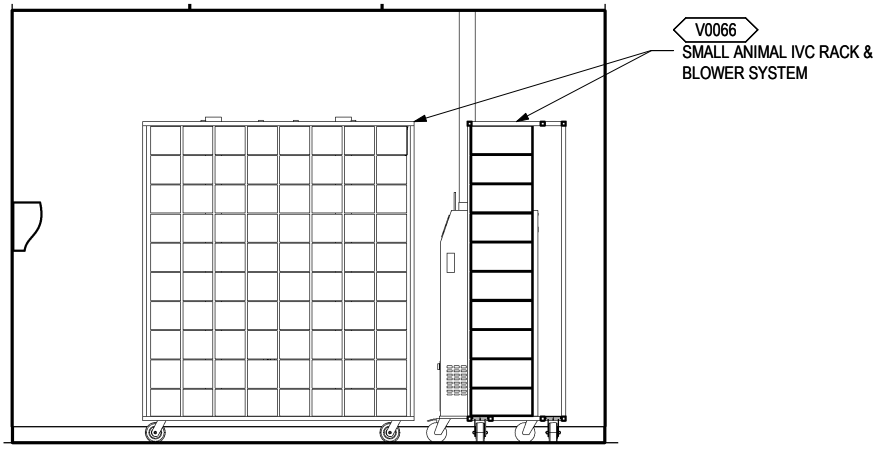
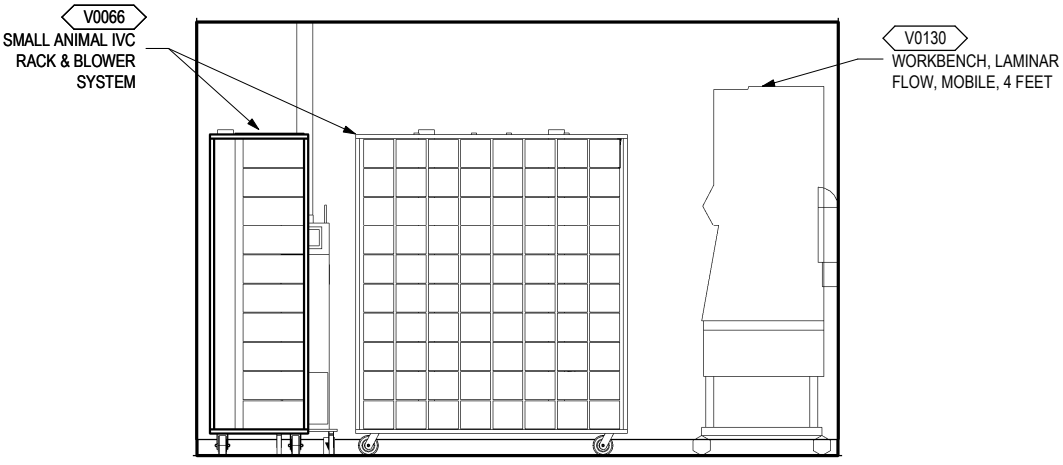


ELEVATION 5



ELEVATION 6

DISCLAIMER: ROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

VETERINARY MEDICAL UNIT (VMU)
(SC762) VMU IMAGING / BEHAVIORAL STUDY ANIMAL HOLDING ROOM, R&D ELEVATIONS

Plot Date: 3/14/2022 2:31:19 PM

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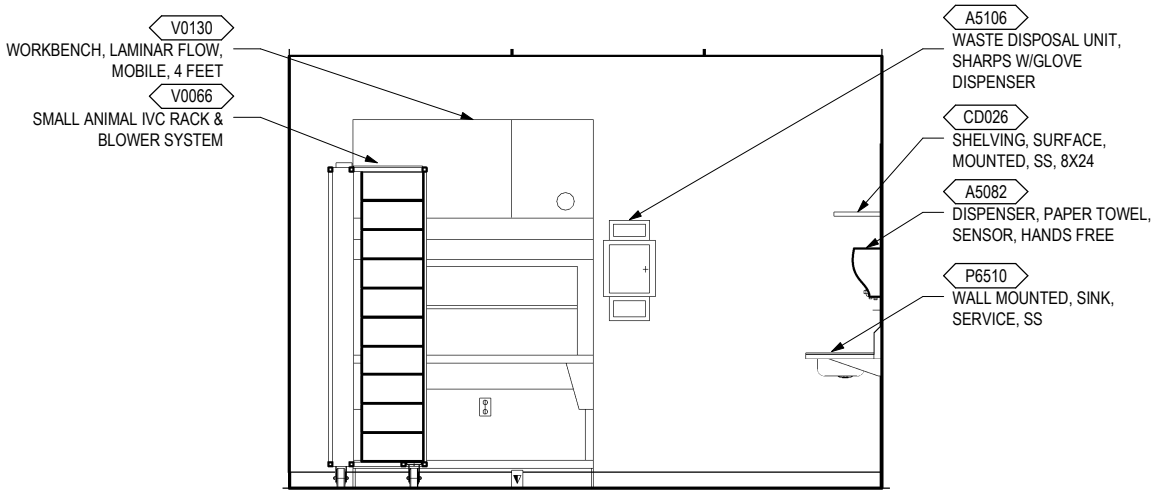
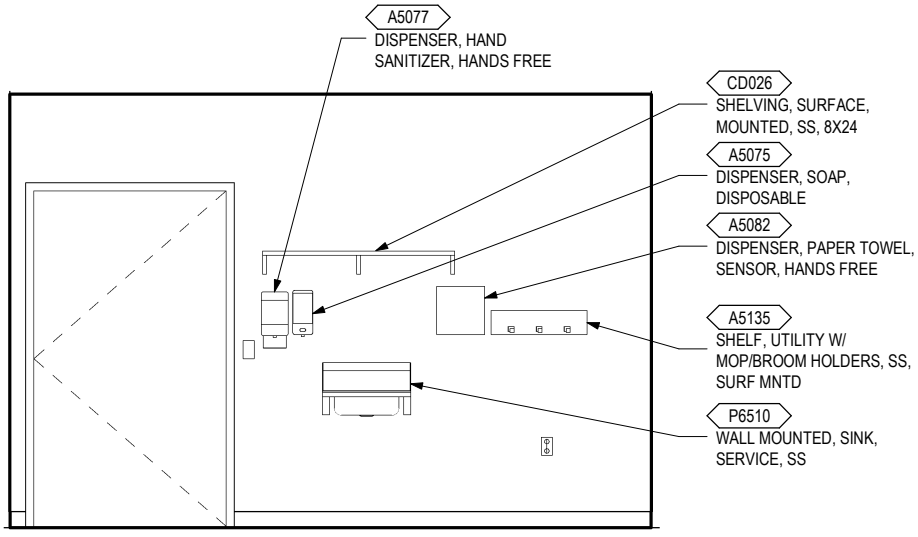


ELEVATION 7



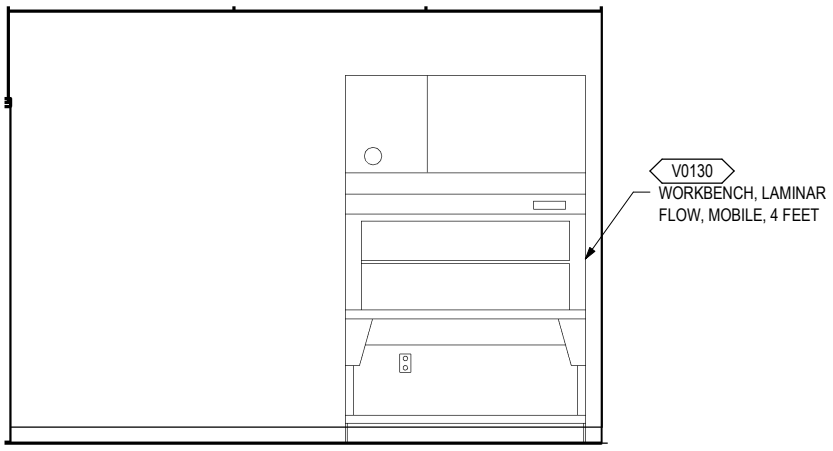
ELEVATION 8

VETERINARY MEDICAL UNIT (VMU)
(SC764) VMU IMAGING STUDY ROOM, R&D
ELEVATIONS

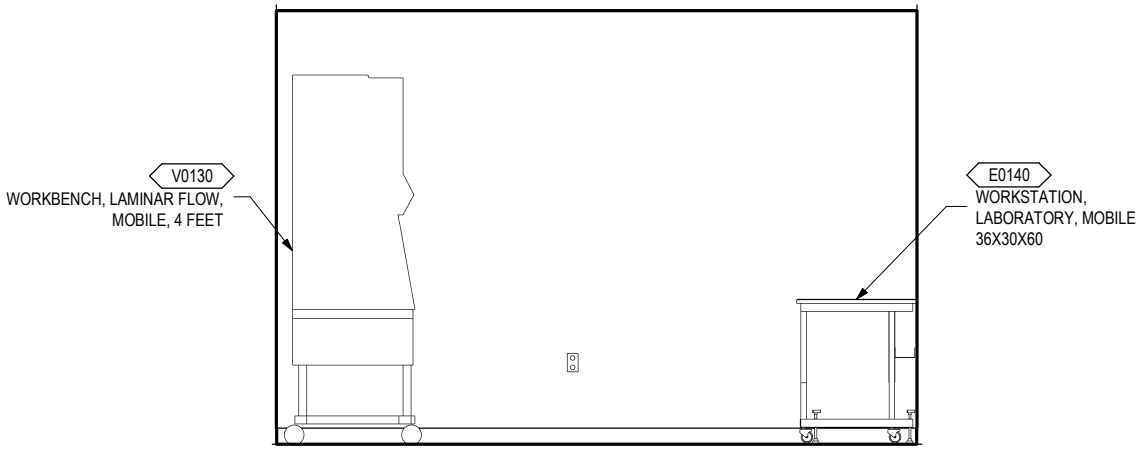
Plot Date: 3/14/2022 2:31:24 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 9



ELEVATION 10

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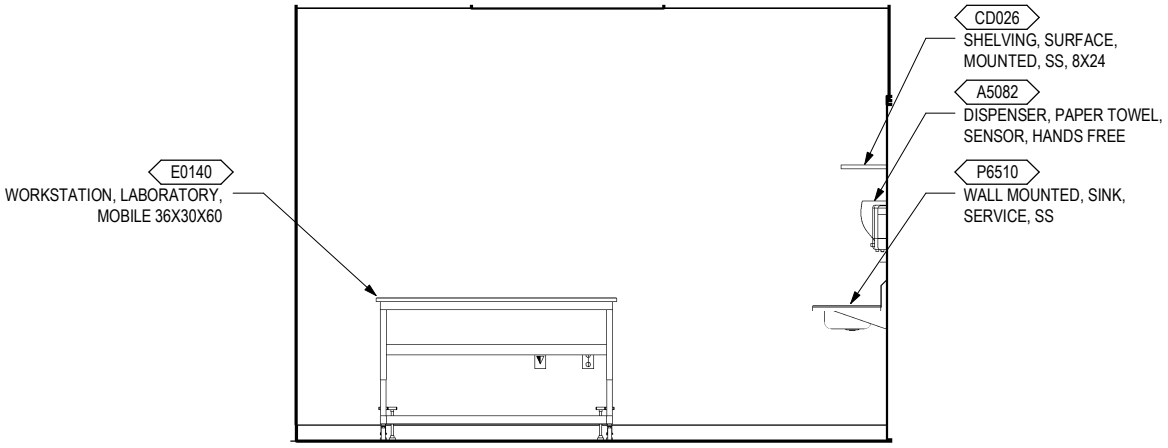
VETERINARY MEDICAL UNIT (VMU)
(SC764) VMU IMAGING STUDY ROOM, R&D
ELEVATIONS

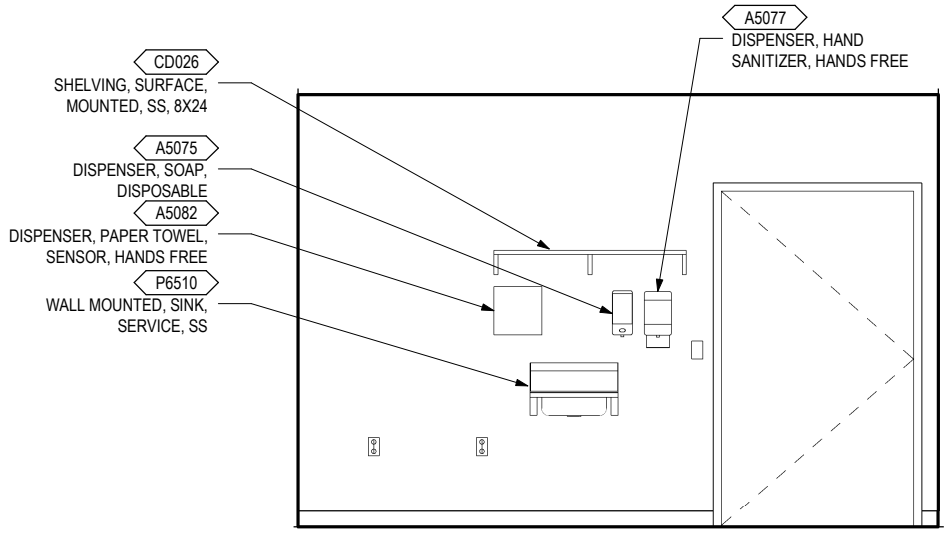
Plot Date: 3/14/2022 2:31:28 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 11



ELEVATION 12

Room Data: VMU Imaging / Behavioral Study (SC761)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB [Note 2]
Ceiling Height:	9’-0”
	9’-0” (Rooms larger than 200 SF)
Ceiling Finish	RES-W
Wall Finish:	m:GWB [Note 2] f:RES-W
	m:GFRP f:PF
	m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1] h:4”
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Steel t:15
	Size: X (4’-0”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) May need shielding, depending on use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Door hardware set 4Q.

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	40 FC @ Finished Floor
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for Diagnostic Imaging Room.

POWER

Normal Power:	NO
Emergency Power:	YES

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for Room Codes SC761, SC762, SC763, and SC764.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: Imaging / Behavioral Study Preparation Room, R&D (SC761)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
E0145	Workstation, Laboratory, Adjustable 30x30x60	2	CC	Stainless steel Floor standing adaptable bench with 3 adjustable shelves prewired power and gas services as required. For general purpose use throughout the facility.
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
A5107	Dispenser, Glove,	1	VV	Examination glove dispenser box for

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
	Surgical/Examination, Wall Mntd			wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
D3295	Chair, Rotary, Laboratory,	5	VV	Polyurethane high bench height adjustable chair with ergonomic features like foot rest, seat heigh and locking back ergonomic adjustments. Nylon reinforced fiberglass base with dual wheel self braking non marring casters suitable for hard floors in chemical, soil and punctureresistant polyurethane.
F2010	Basket, Wastepaper, Step-On	1	VV	"Step-on" wastepaper basket with inner liner and foot petal activated flip top.
M0755	Flowmeter, Oxygen, Low Flow	1	VV	Oxygen flowmeter. Consists of a clear crystal flowtube calibrated to 3.5 or 8 LPM depending on manufacturer. For oxygen regulation in hospital settings. Database pricing includes DISS fitting and DISS power outlet and wall adapter. Other fitting and adapter configurations are available.
L2316	Cabinet, Bio Safety, Class II/A2, Bench Top, 6ft	2	CC	Class II, Type A2, benchtop biological safety cabinet. The unit includes two HEPA filters, one supply and one exhaust, zero probed, high intake velocity that averages 105 fpm, an audible alarm to notify operator of unsafe window positions an audio-visual alarm to monitor exhaust pressure, interior of type 304 stainless steel with side walls slotted for high velocity air return, an exterior of 16 gauge or heavier steel, two ground key petcocks, a grounded duplex receptacle. This unit requires 30/70% exhaust/recirc to the atmosphere, other sizes are available.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5080	Dispenser, Paper Towel, SS, Surface Mounted	1	CC	A surface mounted, satin finish stainless steel, single-fold, paper towel dispenser. Dispenser features: tumbler lock; front hinged at bottom; and refill indicator slot. Minimum capacity 400 single-fold paper towels. For general purpose use throughout the facility.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30" (minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
V0066	Small animal IVC Rack & blower system	3	VV	IVC Rack is designed to hold IVC cages. The Individual ventilated caging system is a HEPA filter technology built to protect animals and human researchers and staff so animal research can be performed to meet animal welfare standard in a safe and ergonomic environment for people. typically the IVC caging system consist of removable caging housed in a steel rack which is connected to a recirculated air blower which is either mounted on the unit on the wall or on the floor.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.

Room Data: VMU Imaging / Behavioral Study Animal Holding Room, R&D (SC762)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB [Note 2]
Ceiling Height:	9’-0”
	9’-0” (Rooms larger than 200 SF)
Ceiling Finish	RES-W
Wall Finish:	m:GWB [Note 2] f:RES-W
	m:GFRP f:PF
	m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1] h:4”
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Steel t:15
	Size: X (4’-0”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) May need shielding, depending on use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Door hardware set 4Q.

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	40 FC @ Finished Floor
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for Diagnostic Imaging Room.

POWER

Normal Power:	NO
Emergency Power:	YES

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for Room Codes SC761, SC762, SC763, and SC764.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: VMU Imaging / Behavioral Study Animal Holding Room, R&D (SC762)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
CD026	Shelving, Surface, Mounted, SS, 8x24	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30"

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
V0066	Small animal IVC Rack & blower system	2	VV	IVC Rack is designed to hold IVC cages. The Individual ventilated caging system is a HEPA filter technology built to protect animals and human researchers and staff so animal research can be performed to meet animal welfare standard in a safe and ergonomic environment for people. typically the IVC caging system consist of removable caging housed in a steel rack which is connected to a recirculated air blower which is either mounted on the unit on the wall or on the floor.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.

Room Data: VMU Behavioral Study Room, R&D (SC763)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB [Note 2]
Ceiling Height:	9’-0”
	9’-0” (Rooms larger than 200 SF)
Ceiling Finish	RES-W
Wall Finish:	m:GWB [Note 2] f:RES-W
	m:GFRP f:PF
	m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1] h:4”
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Steel t:15
	Size: X (4’-0”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) May need shielding, depending on use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Door hardware set 4Q.

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	40 FC @ Finished Floor
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for Diagnostic Imaging Room.

POWER

Normal Power:	NO
Emergency Power:	YES

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for Room Codes SC761, SC762, SC763, and SC764.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: SC763 VMU Behavioral Study Room, R&D (SC763)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
CD026	Shelving, Surface, Mounted, SS, 8x24	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30"

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.

Room Data: VMU Imaging Study Room, R&D(SC764)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB [Note 2]
Ceiling Height:	9’-0”
	9’-0” (Rooms larger than 200 SF)
Ceiling Finish	RES-W
Wall Finish:	m:GWB [Note 2] f:RES-W
	m:GFRP f:PF
	m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1] h:4”
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	m:Steel t:15
	Size: X (4’-0”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) May need shielding, depending on use. See Standard Details PG-18-4 for shielding (Radio Frequency, Lead, or Electromagnetic).
2) Door hardware set 4Q.

LIGHTING

Maintain Average Illumination:	50 FC
Task Illumination:	40 FC @ Finished Floor
Luminaire Type:	2x2/2x4 Troffer

Notes:

1) Refer to VA Lighting Design Manual for Diagnostic Imaging Room.

POWER

Normal Power:	NO
Emergency Power:	YES

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	NO
Duress Alarm:	NO
Electronic Access and Door Control:	YES
Intercom:	NO
Motion Intrusion Detection (MID):	NO
Nurse Call	NO
Code Blue:	NO
Public Address:	NO
Security Surveillance Television (SSTV)	NO
VA Satellite TV:	NO
Video Teleconferencing (VTEL):	NO

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for Room Codes SC761, SC762, SC763, and SC764.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	NO
Medical Vacuum:	NO
Oxygen:	NO

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: VMU Imaging Study Room, R&D (SC764)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A5075	Dispenser, Soap, Disposable	1	VV	Disposable soap dispenser. One-handed dispensing operation. Designed to accommodate disposable soap cartridge and valve.
A5082	Dispenser, Paper Towel, Sensor, Hands Free	1	CC	A surface mounted, sensor activated, automatic, roll paper towel dispenser. The unit dispenses a paper towel automatically only when hands are place in position below the dispenser for maximum sanitation and hygiene. May include adjustable settings for sheet length, time delay, and sensor range. Unit is battery operated or with optional AC power adapter.
CD026	Shelving, Surface, Mounted, SS, 8x24	1	CC	A surface mounted, satin finish, stainless steel shelf with a minimum depth of 8". Mounting brackets are welded to shelf. Shelf is available in various widths. For general purpose use in
P6510	Wall Mounted, Sink, Service, SS	1	CC	An 18g Stainless Steel single compartment sink without drain boards and approximate basin dimensions of 18" W x 21" D, for use in laundry or utility areas. Sink includes backsplash and two holes for a wall mounted faucet assembly. The faucet flow rate is 2 GPM, connection is 1/2" NPT. Faucet holes are 8 inches center and spout is 12" in length, swing type. See comments.
A5135	Shelf, Utility W/ Mop/Broom Holders, SS, Surf Mntd	1	VV	A surface mounted, satin finish stainless steel, utility shelf with a maximum of 6 mop/broom holders and 5 rag hooks. Utility shelf features: 8" deep shelf; mounting brackets welded to shelf; spring activated rubber cam holders; and drying rod. Unit is available in various widths 30"

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(minimum, 3 holders and 2 hooks) to 48" (maximum, 6 holders and 5 hooks). For use in janitor closets. Pricing based on a 36" width.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.
V0130	Workbench, Laminar Flow, Mobile, 4 Feet	1	CC	Workbench, stay-clean, with laminar flow hood, mounted on casters. Air flow is horizontal positive. Work area dimensions are approximately 46W X 22D. Other sizes available.

U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
AXONOMETRIC

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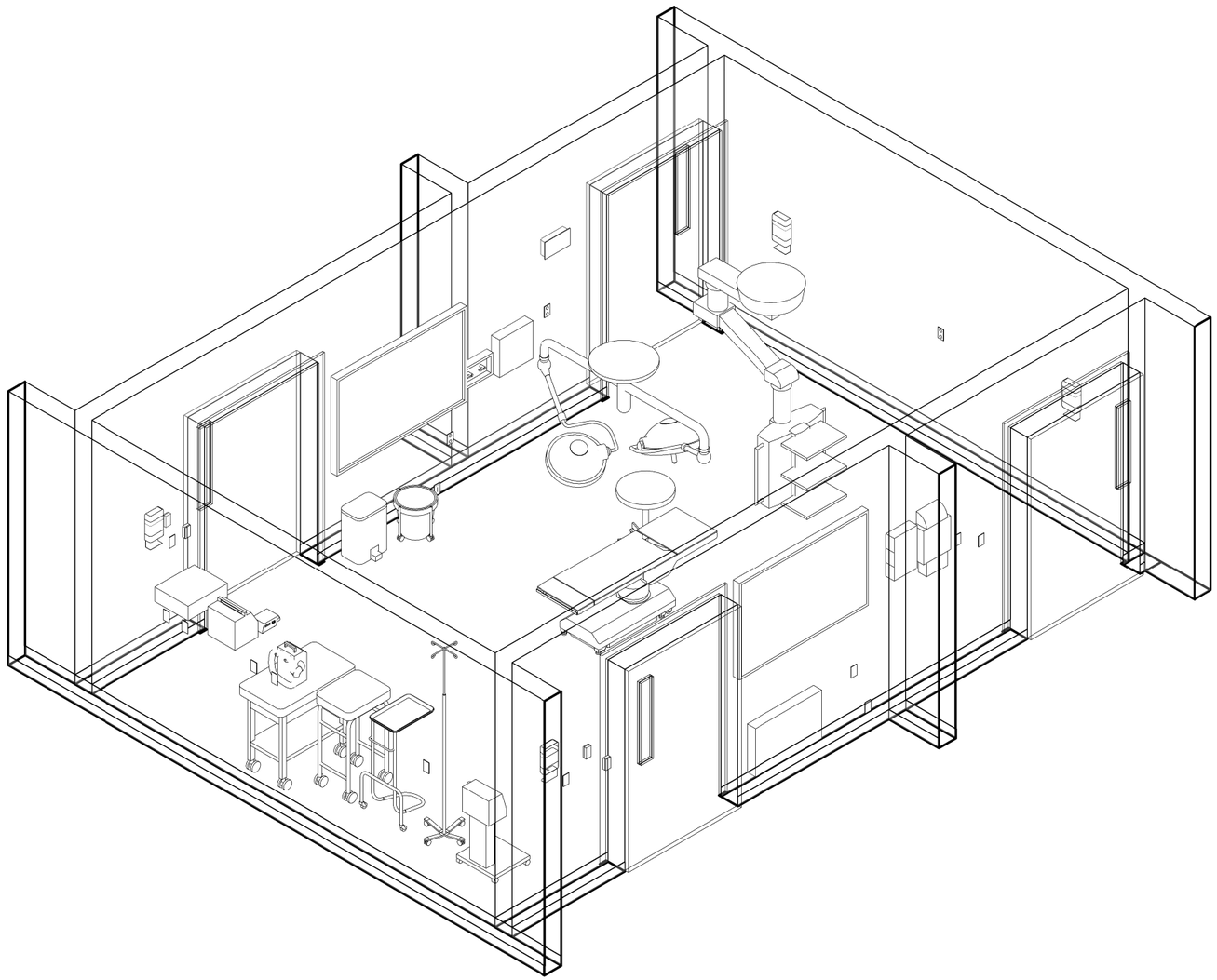

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U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
INTERACTIVE 3D PDF

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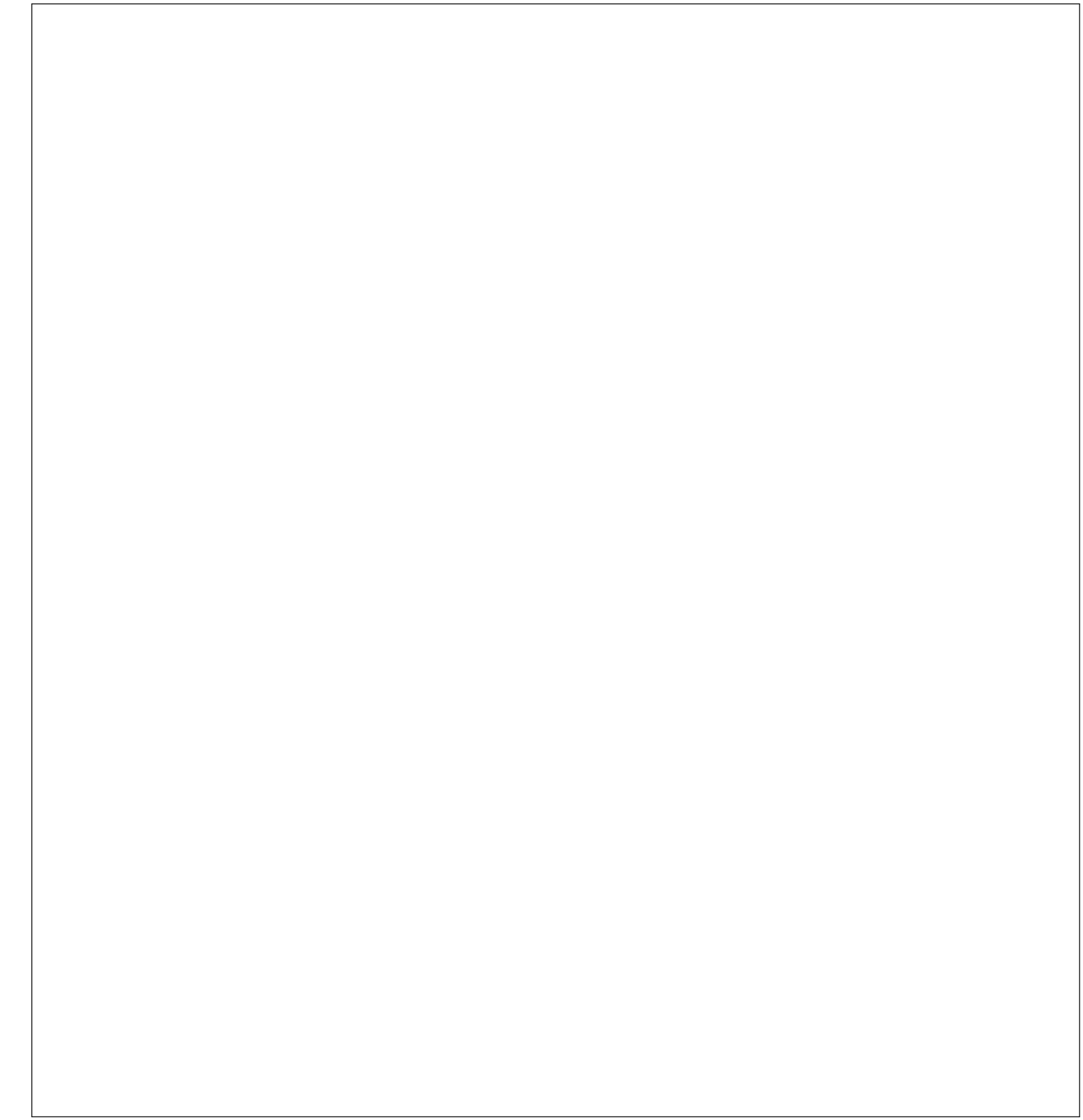


DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

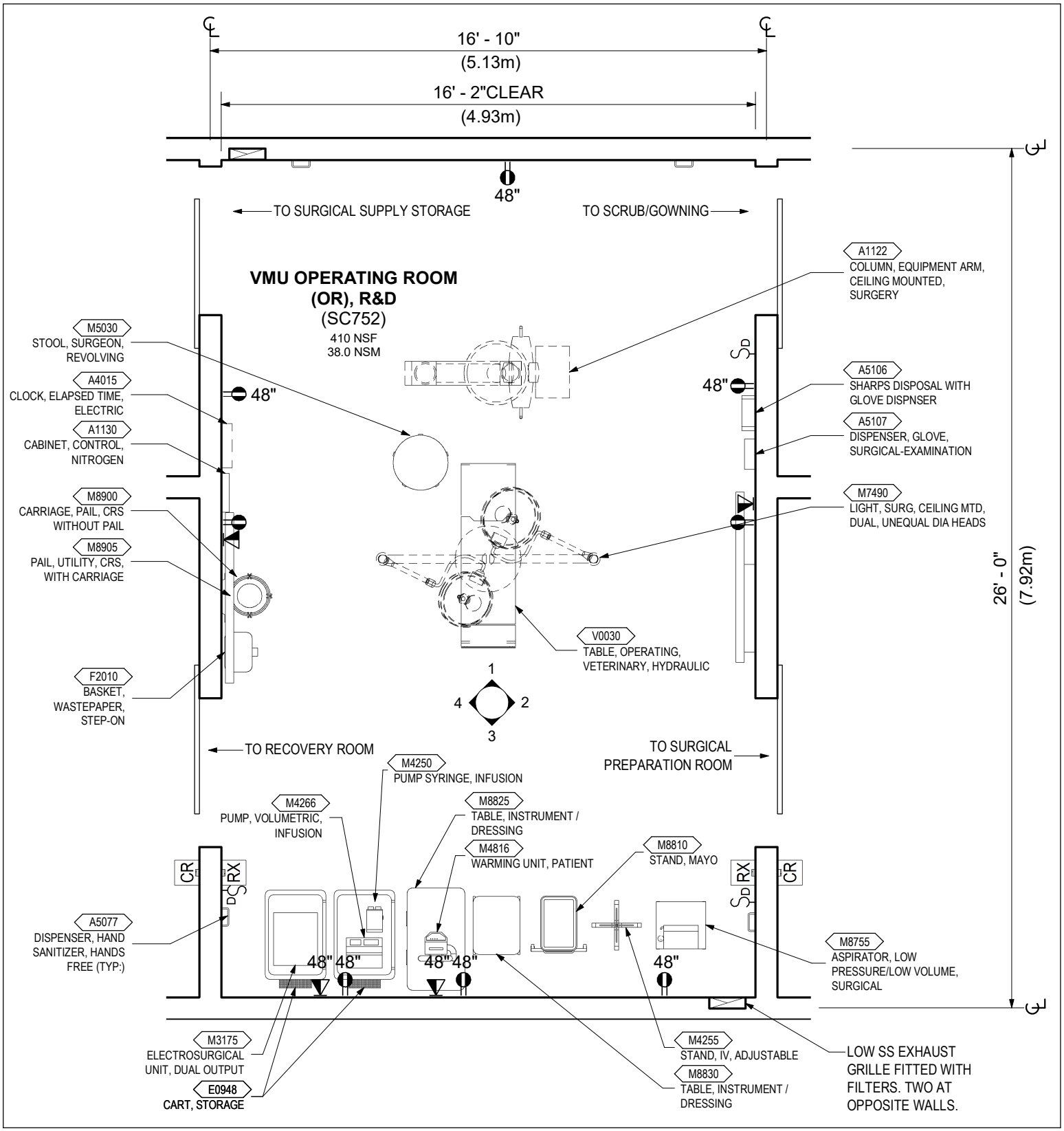
U.S. Department of Veterans Affairs

VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
FLOOR PLAN

Plot Date: 3/14/2022 2:31:42 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



DISCLAIMER:MROOM TEMPLATES ARE GRAPHICAL REPRESENTATIONS OF SELECTED ROOM TYPES THAT ILLUSTRATE VA PLANNING REQUIREMENTS FOR SPACE, ROOM CONTENTS, AND ROOM SPECIFIC ENGINEERING SYSTEMS. THEY PROVIDE TYPICAL CONFIGURATIONS, PLANNING CRITERIA, AND GENERAL TECHNICAL GUIDANCE, AND ARE NOT INTENDED TO BE PROJECT SPECIFIC REQUIREMENTS.

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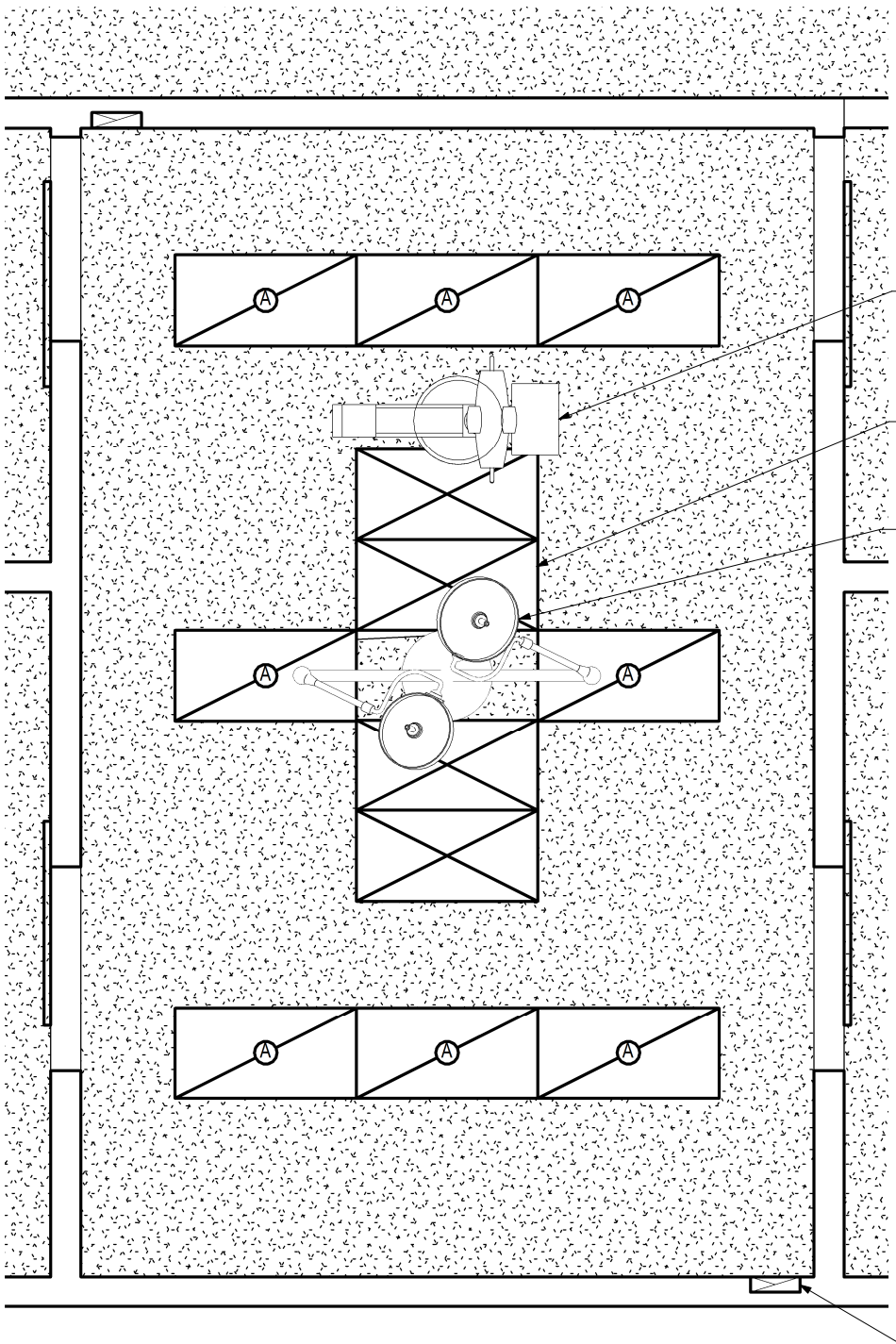
VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
REFLECTED CEILING PLAN

Plot Date: 3/14/2022 2:31:47 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'

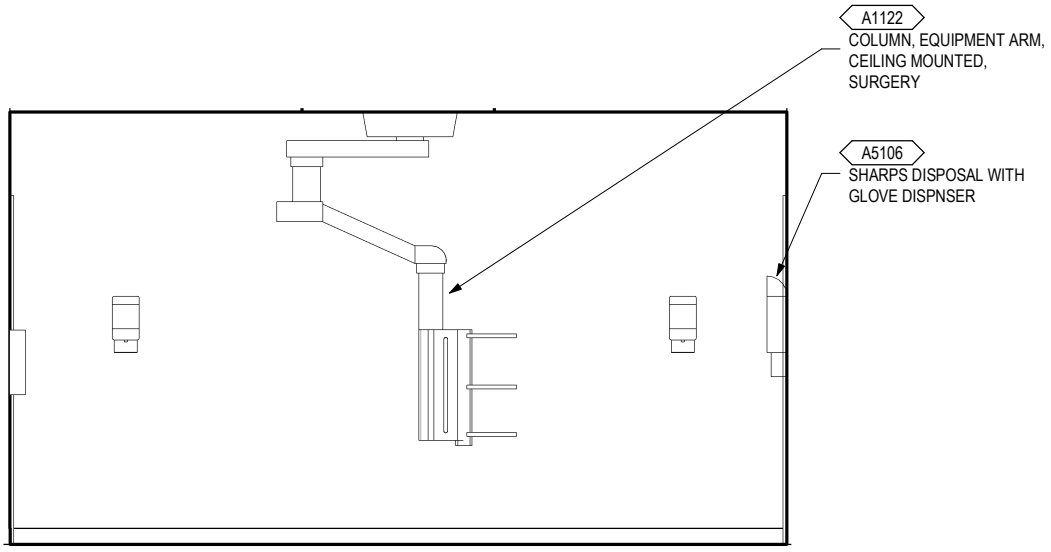


VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
ELEVATIONS

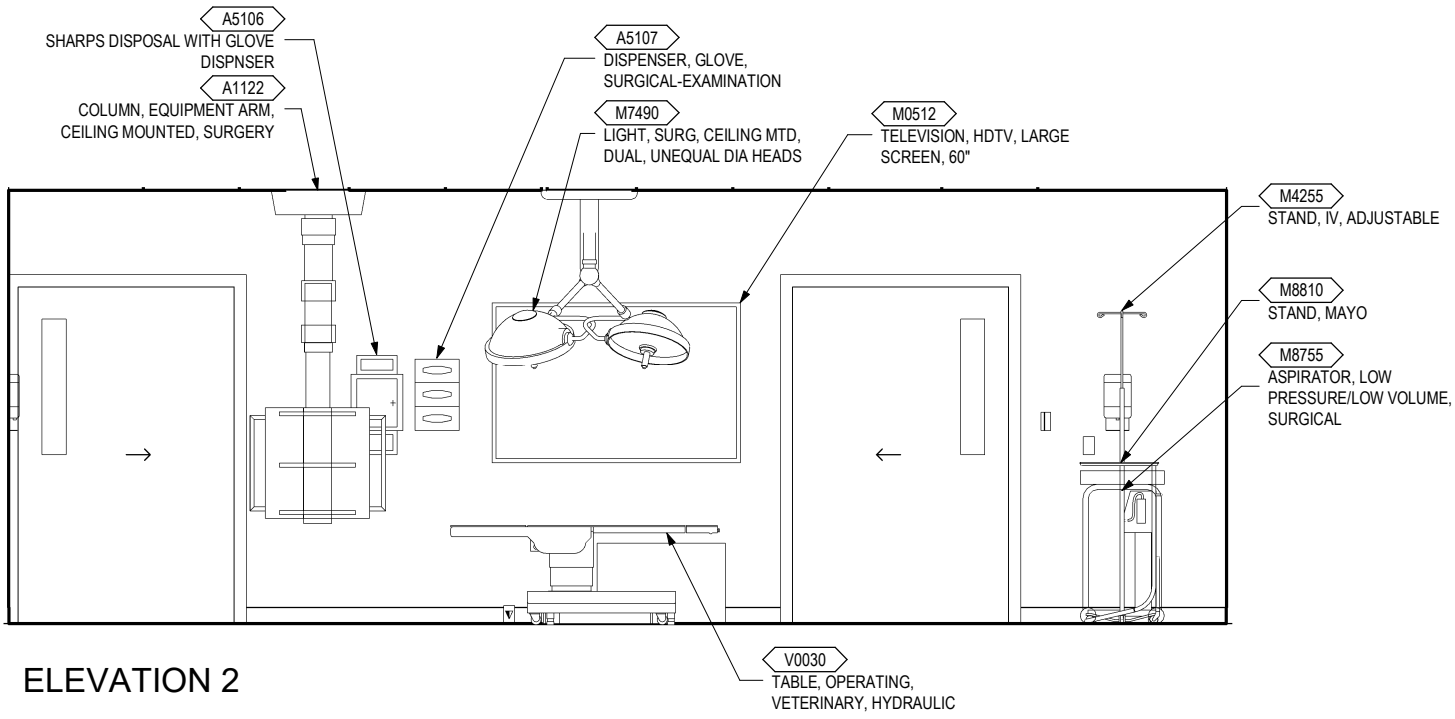
Plot Date: 3/14/2022 2:31:53 PM

SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 1



ELEVATION 2

VETERINARY MEDICAL UNIT (VMU)
(SC752) VMU OPERATING ROOM (OR), R&D
ELEVATIONS

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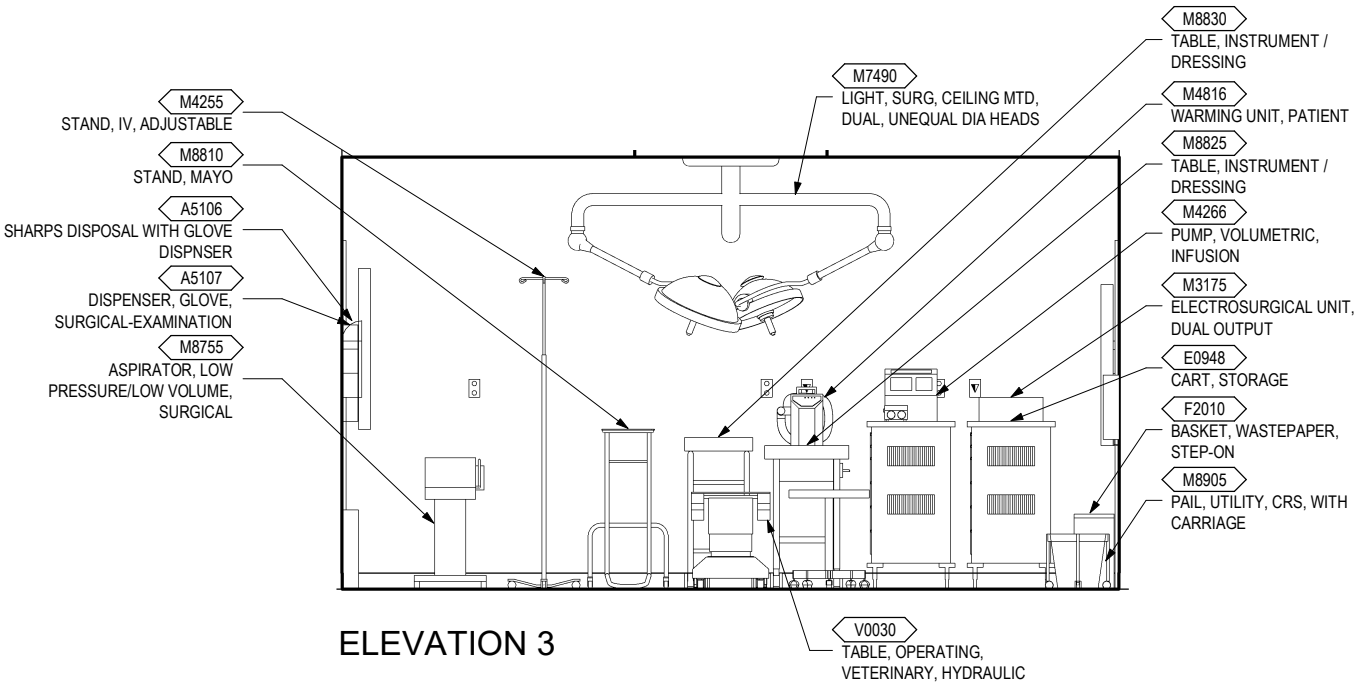
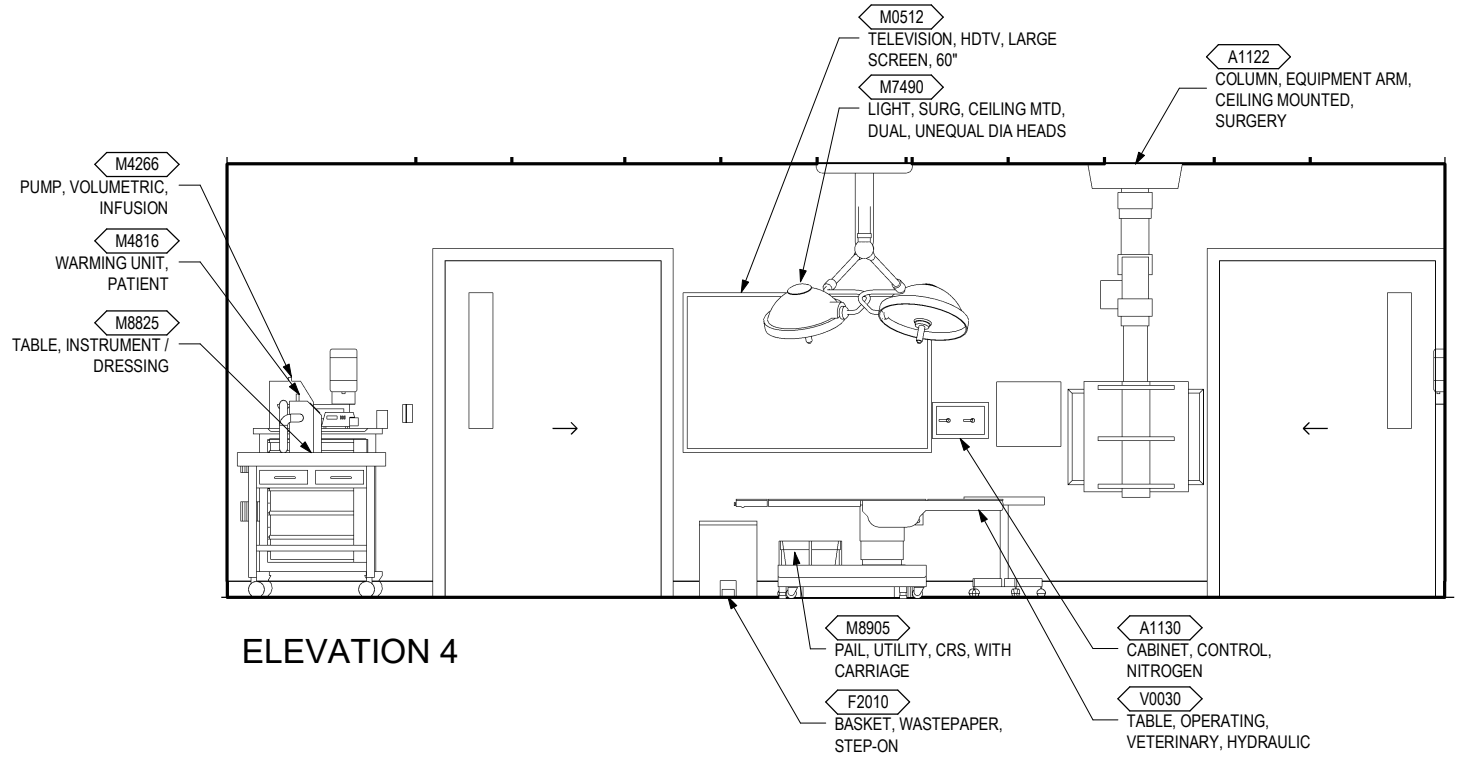
SCALE: 1/4" = 1'-0"

0' 4' 8' 16'



ELEVATION 3



ELEVATION 4

Room Data: VMU Operating Room (OR), R&D (SC752)

ARCHITECTURAL & INTERIOR DESIGN

Ceiling Type:	m:GWB
Ceiling Height:	10’-0”
Ceiling Finish:	f:RES-W
Wall Finish:	m:GWB f:RES-W m:GFRP f:PF m:CMU f:SC
Wainscot:	NA
Base:	m:RES [Note 1] h:4”
Floor Finish:	m:RES
Slab Depression:	NA
Sound Protection:	NA
Doors:	Sliding door, automated with paddles m:Steel t:20 dg:T Size: X (4’-0”W x 7’-0”H)
Special Requirement:	NA

Notes:

1) Resinous Flooring-Wall-Base application over concrete backer board.
   a. See Specification 08 32 13 ICU Sliding Door and 08 71 13 Automatic Door Operators

LIGHTING

Maintain Average Illumination:	100 FC
Task Illumination:	200 FC @ Operating Table
Luminaire Type:	2x2/2x4 Troffer

POWER

Normal Power:	NO
Emergency Power:	YES
Special Requirement:	NO

TELECOMMUNICATION/ SPECIAL TELECOMMUNICATION SYSTEMS

Data:	YES
Telephone:	YES
Cable Television:	--
Duress Alarm:	--
Electronic Access and Door Control:	YES
Intercom:	--
Motion Intrusion Detection (MID):	--
Nurse Call	--
Code Blue:	--
Public Address:	--
Security Surveillance Television (SSTV)	--
VA Satellite TV:	--
Video Teleconferencing (VTEL):	--

HEATING, VENTILATING AND AIR CONDITIONING

The VA HVAC Design Manual provides the HVAC requirements for the VMU Operating Room, R&D.

PLUMBING AND MEDICAL GASES

Cold Water:	YES
Hot Water:	YES
Drain:	YES
Reagent Grade Water:	YES
Medical Air:	YES
Medical Vacuum:	YES
Oxygen:	YES
Nitrogen:	YES

FIRE PROTECTION AND LIFE SAFETY

Alarm Detection:	NO
Alarm Annunciator:	YES
Sprinkler:	YES

Room Contents: VMU Operating Room (OR), R&D (SC752)

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5077	Dispenser, Hand Sanitizer, Hands-Free	1	VV	A touch free wall-mounted hand sanitizer dispenser. For use throughout a healthcare facility. Unit does not include the sanitizing liquid. Units are battery operated.
A1122	Column, Equipment Arm, Ceiling Mounted, Surgery	1	CC	A ceiling mounted retractable equipment arm for use in the OR. Designed to provide equipment placement support, power receptacles including low-voltage panels, gas outlets and flat screen mounting for a surgical suite. Unit will provide a range of motion of up to 330 degrees with arm providing additional vertical movement. Units are custom configured with multiple options available. Price is based on a unit with two (double) retractable arms. Also available are units for use in anesthesia, ICU and ER.
A1130	Cabinet, Control, Nitrogen	1	CC	Nitrogen control cabinet. Unit consists of supply cut-off valve, supply pressure gauge, pressure regulator (adjustable 0 to 200 PSI), outlet pressure gauge, nitrogen outlet and connection to surgical gas column. Specify recessed or surface mounting. Designed for powering surgical pneumatic tools.
A4015	Clock, Elapsed Time, Electric	1	CC	Elapsed time digital electric clock. Single display time that can be used either as a clock or elapsed time indicator. Clock consists of buttons to set minutes, and hours for the time. For use in operating and delivery room, and medical service columns. Analog or digital displays may be provided as specified by the user.
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	VV	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
A5107	Dispenser, Glove, Surgical/Examination, Wall Mntd	1	VV	Examination glove dispenser box for wall mounting. Fabricated of either cold rolled steel with a white baked enamel finish, plastic or acrylic. Provided with wall bracket to facilitate mounting and demounting.
A5212	Bracket, Television, Wall-Mounted, Tilt/Angle	1	VV	A wall mounted, tilt/angled TV bracket for 37" to 80" TVs. Mount will be a universal and VESA compliant unit with a load capacity of up to 130 lbs.
A5220	Bracket, Television, Wall Backing	1	CC	Wall mounted television bracket backing which provides additional support and strength for the installation of the television bracket. Option available for interior or exterior plate and sized for 12” 16” or 24” stud spacing.
E0948	Cart, General Storage, Mobile, 42"H x 32"W x 22"D	2	VV	THIS TYPICAL INCLUDES: 1 Cart Body, Style-A Narrow, w/Raised Edge Top 2 Drawers, 3" H 4 Drawers, 6" H 1 Accessory Rail, Side Drawer Organizer Bins
M0512	Television, HDTV, Large Screen, 60"	2	VV	A high definition (HDTV) multimedia, slim design, 60"W to 65"W color television. The TV will have a 16.9 wide screen aspect ratio with full HD 1080p resolution and HDMI connections. TV may be LED, Plasma or LCD. TV will include a stand.
M3175	Electrosurgical Unit, Dual Output	1	VV	Dual output electrosurgical unit. Solid state power source with foot switch jacks, monopolar and bipolar outputs, and four independent modes of operation. Used in the operating room or surgicenter as an alternative to the scalpel for cutting tissue.
M4250	Pump, Syringe, Infusion	1	VV	The infusion syringe pump ensures highly accurate volume delivery and consistent flow for small volumes (<50 ml) of pharmacologic agents or thick feeding solutions. It shall be small, lightweight construction, making it transportable. Shall have menu-driven programming capable of flow rates

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
				(e.g. 0.1 or 1.0 mL/hr) that are intended for long-term bedside use and/or critical care patient transport, plunger positioning sensor, LCD display for easy viewing, volume limit programming to serve as a convenient cue of volume or dose delivery completion and multiple delivery modes for all applications requiring precisely controlled infusion rates. The infusion pump shall have automatic syringe size sensing which will give the flexibility to accept a wide range of syringe sizes (up to 60 mL) from different manufacturers. Shall be battery powered/AC adapter.
M4255	Stand, IV, Adjustable	2	VV	Adjustable IV stand with 4-hook arrangement. Stand has stainless steel construction with heavy weight base. It adjusts from 66 inches to 100 inches and is mounted on conductive rubber, ball bearing, swivel casters. Stand is used for administering intravenous solutions.
M4266	Pump, Volumetric, Infusion, Multiple Line	2	VV	Volumetric infusion pump. Pump is self-regulating with automatic sensor and adjustable rate. Equipped with visual and audible alarms and up to 10 hour capacity battery. For the administration of a wide variety of therapeutic agents where precise control is required. Unit provides individual control to IV lines simultaneously.
M4816	Warming Unit, Patient, Automatic/Manual, Air	1	VV	Automatic/manual patient warming unit. Unit delivers a flow of warmed air through a perforated plastic blanket. Used primarily for postoperative patients to speed recovery of normal body temperature.
M5030	Stool, Surgeon, Revolving	2	VV	Revolving stool. Consists of a padded upholstered seat with height adjustment. Unit rotates and is mounted on ball bearing swivel casters. Designed for use in examinations, treatment, and surgical procedures.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
M7490	Light, Surg, Ceiling Mtd, Dual, Unequal Dia Heads	1	VC	Dual head surgical light ceiling mounted from a single pole. Unit has two lamp heads of differing sizes mounted on individual swing arms. Unit features multiple lighting pods in each lamp head, deep cavity illumination, color-corrected light, intensity control and sterilizable handles. Refer to the manufacturers' specifications for minimum ceiling heights and installation data. The database height dimension below refers to the height of the lamp head itself. The width and depth measurements are the larger of the two sums of the swing arm length and the head diameter. For use in general purpose surgical suites.
M8755	Aspirator, Low Pressure/Low Volume, Surgical	1	VV	Low pressure, low volume surgical aspirator. Stand mounted stainless steel unit. 1/8 HP motor with variable suction intensity. It includes 600 ml graduated collection bottle, hydrophobic bacteria filter, a precision suction regulating valve, timer and a foot regulator. For post operative surgical wound drainage and general suction use.
M8805	Table, Instrument, Straddle	1	VV	Instrument table to straddle an operating table. All stainless steel welded construction, mounted on 3" ball-bearing casters with foot brakes. Adjustable height from approximately 40 to 60 inches. For instruments and diagnostic equipment during surgery.
M8810	Stand, Mayo	2	VV	Adjustable instrument table. Table is corrosion resistant stainless steel construction and is mounted on two casters with two skid rails. It has telescopic upright adjusts from 39 inches to 60 inches with automatic locking device, and removable 13"x19" instrument tray. Designed for use in operating and procedure rooms.

JSN	NAME	QTY	ACQ/INS	DESCRIPTION
M8820	Table, Instrument/Dressing, CRS	1	VV	Mobile instrument and dressing table, approximately 34"H x 33"W x 18"D. The cart shall be built of stainless steel and mounted on 2" swivel casters for easy mobility. The unit shall include a table top and a bottom shelf with a continuous guard rail on both surfaces.
M8840	Table, Back, Instrument/Dressing	1	VV	A specialty back table for large cases such as orthopedics, spinal fusions, neuro and craniotomies. The table has a pneumatic tuck-away cantilevered shelf which can hold multiple trays and is angled for clear observation of instruments. It comes with 4" diameter heavy-duty ball bearing brake/swivel casters. Construction is all stainless steel.
M8900	Carriage, Pail, CRS, Without Pail	2	VV	Carriage, pail (kick bucket) CRS. Consists of a stainless steel ring type carriage mounted on ball bearing casters. Includes circular non-marring bumper. For use in the surgical operating room.
M8905	Pail, Utility, CRS, With Carriage	2	VV	Utility pail (kick bucket). Shall be a stainless steel 12 quart bucket for use in surgical operating rooms.
V0030	Table, Operating, Veterinary, Hydraulic	1	VV	Veterinary operating table. Characteristics/components include stainless steel; corrosion resistant construction; elevation adjustment range from approximately 36" to 49" high; sanitary design to minimize places for debris; accommodates animals weighing up to 300 pounds; and has waterproof outlets. Table is used for surgical procedures on medium to large animals.
V0150	Anesthesia/Ventilator System, Veterinary	1	VV	Veterinary anesthesia/ventilator delivery system. Maintains independent regulation of inspiratory time, inspiratory flow, and respiratory pause. Monitors tidal volume, system leaks, and automatic overflows of high gas inflows during spontaneous manual bag or mechanical ventilation, with mounting adapter extension pipe and

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				clamp for attachment to horizontal or vertical surface. Tidal volume range is 0-300ml or 300-1600ml. Contains an internal battery backup.