February 23, 2024

VA Leased R&D Design Narrative

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# SECTION 1 - INTRODUCTION

* 1. The purpose of this Leased R&D Design Narrative is to consolidate the governing codes, standards, references, and guidelines in a document that provides performance-based standards for a VA leased R&D facility.
	2. The governing codes, standards, and references are based on VA affiliated R&D facilities.
	3. The design of the VA leased R&D facility is based on the Research and Development (R&D) Design Guide PG-18-12 (R&D DG). The Research and Development (R&D) Design Guide PG18-12 references requirements in many other VA guides, manuals, and specifications. If the referenced document is listed in section 2 of this LDN under codes or standards, then it is a requirement. If it is not than it is a reference.
	4. Commonly Used Acronyms and Definitions:

R&D Research and Development

R&D DG Research & Development Design Guide

PFD Program for Design

Net square feet (NSF) listing of all spaces and rooms that are to be included in a construction project.

VA Veterans Affairs

VHA Veterans Health Administration

VISN Veterans Integrated Services Network

# SECTION 2 – GENERAL REQUIREMENTS

* 1. General
		1. The codes, standards, and references listed below indicate minimum performance requirements. Minimum requirements or standards may be exceeded by site specific project design.
		2. Compliance is required with applicable codes and standards throughout the process of design, construction, acceptance, and on-going maintenance of the facility.
		3. Design and construction of the R&D facility shall be in compliance with the requirements of the GSA Form L100 Global Lease and the codes, standards, and references listed below. This Leased R&D Design Narrative covers construction materials and standards not fully addressed by the codes, standards, and references below.
		4. Use the most current edition at the date and time of bid submission
	2. Codes
		1. All VA leased R&D facilities are to conform to the most recent applicable codes, which include but is not limited to following:
			1. National Fire Protection Association (NFPA) 70 National Electric Code, NFPA 75 Standard for the Fire Protection of Information Technology (applicable when R&D Facility contains a Data Center), NFPA 101 Life Safety Code, NFPA 110 Standard for Emergency and Standby Power Systems, current editions.
			2. Architectural Barriers Act Accessibility Standards (ABAAS), current edition.
			3. International Building Codes (IBC): 2018 or latest edition (within 2 years of release). The latest edition shall be used for structural and seismic design.
				1. International Building Code
				2. International Energy Code
				3. International Mechanical Code
				4. International Plumbing Code
			4. State and local codes as required by the local Authority Having Jurisdiction (AHJ).

\*\*\*Note\*\*\* IPT should input number of patients incapable of self-preservation.

*Additional Code information:*

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* 1. Standards
		1. All leased R&D facilities are to conform to the following standards:
			1. VA Research and Development (R&D) Design Guide PG18-12.
			2. VA HVAC Design Manual PG18-10.
			3. VA Room Finishes, Door, & Hardware Schedule PG18-14.
			4. VA Signage Design Manual PG 18-12.
			5. VA Seismic Design Handbook H 18-8.
			6. Facility Security Level (FSL) shall be as outlined in GSA Form L100 Global Lease.
			7. Sustainability standards shall be as outlined in GSA Form L100 Global Lease.
			8. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Laboratory Design Guide
			9. ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality, current edition (referred to as ASHRAE 62.1 herein)
			10. ANSI/ASHRAE/IES Standard 90.1-2019 -- Energy Standard for Buildings Except Low-Rise Residential Buildings
			11. Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Standard, HVAC Duct Construction Standards - Metal and Flexible.
			12. Association for the Advancement of Medical Instruments (AAMI) standards as applicable to SPS and RME storage
			13. Illuminating Engineering Society North America (IESNA) Handbook - latest edition
			14. AAALAC – Guide for the Care and Use of Laboratory Animals
			15. ANSI/AIHA Z9.5 – 2012 Laboratory Ventilation
			16. ANSI Z358.01 Emergency Eyewash and Shower Standard
			17. CDC – Biosafety in Microbiological and Biomedical Laboratories 6th Edition
			18. Scientific Equipment and Furniture Association (SEFA)
			19. NIH Design Requirements Manual
	2. References
		1. The following guides, manuals, and other references developed by VA are for reference only, however, they are applicable to VA leased R&D facilities:
			1. VA Infrastructure Standard for Telecommunications Spaces, most current.
			2. PG18-9 Space Planning Criteria, Chapter 278 Research and Development Space Planning Criteria.
			3. PG18-5, Chapter 278 Research and Development Equipment Guide List.
			4. VA Architectural Design Manual
			5. VA Plumbing Design Manual
			6. VA Lighting Design Manual
			7. VA Electrical Design Manual

**SECTION 3 – PLANNING AND DESIGN CRITERIA**

* 1. Background
		1. This LDN along with the PG18-12, PG18-9, PG18-5, PG 18-10, and PG18-14 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.
	2. R&D Guiding Principles
		1. The Research and Development (R&D) Design Guide provides the guiding principles that shall be incorporated into the planning and design of this leased R&D facility.
	3. HVAC Requirements
		1. The HVAC design requirements for the R&D facility are within the PG18-10 HVAC Design Manual. All HVAC systems and components shall be priced as shell and included in the rental rate per the L100 Global Lease.
	4. Finishes, Doors, and Door Hardware
		1. The required finishes, doors and door hardware for the R&D facility are with the PG18-14 Room Finishes, Door, & Hardware Schedule. The offeror shall work with the VA to finalize selections during the design development.

**SECTION 4 – TECHNICAL NARRATIVE**

* 1. Site/Civil
		1. Pedestrian and Vehicle Access & Circulation
			1. Minimum traffic lane width is 12 feet, and minimum sidewalk width is 4 feet. Curves for traffic lanes and radii at intersections must be adequately sized to prevent vehicles from encroaching on an opposing lane of traffic.
			2. Provide a service area with a loading dock designed to accommodate truck (WB-62) maneuverability. Loading dock shall be 4 feet above the driveway. Platforms shall have a minimum depth of 8 feet front to back or between dock lift/leveler and back wall. Provide canopy over the platform with 14 feet of clearance from grade to the underside of the canopy. Canopy shall extend minimum of 4 feet beyond the edge of the dock for weather protection. Provide stair or ramp to the platform. Provide hydraulic dock levelers with 25,000 pounds capacity for recessed installation at loading dock.
			3. Service area shall accommodate vehicles that pick-up trash and recycled materials. Locate service area away from public and patient areas.
			4. Provide reflective traffic control signs as required for intersections, no parking lanes, and guidance of site traffic.
		2. Physical Security
			1. The R&D DG references the VA Physical Security and Resiliency Design Manual (PSRDM), however the requirement for the leased R&D facility is to follow the ISC risk assessment process to determine the physical security requirements.

*Additional Site/Civil Requirements:*

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* + 1. Parking
			1. Parking lots with 90-degree stalls must have minimum parking stall dimensions of 9 feet by 18 feet, and a minimum drive aisle width of 24 feet. Angled parking must have one-way drive aisles with the same stall sizes as 90-degree parking. Angled parking drive aisle width must comply with a published design standard for a designated parking angle.

*Additional Parking Requirements:*

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* + 1. Site Grading
			1. Roads and walks should have a typical cross slope of 2% unless adequate surface drainage is provided by other slope conditions.
	1. Architecture
		1. General Criteria
			1. Refer to VA R&D DG PG18-12 and the Room Finishes, Door, and Hardware Schedule PG18-14 for specific architectural design requirements. The VA Architectural Design Manual, PSRDM and VA Fire Protection Design Manual can be referred to for preferred design requirements.
		2. Equipment/Accessories/Furnishings
			1. Refer to Project Contents List and Room Template sheets provided with the RLP for equipment, accessories, and furnishings descriptions and locations. Items to be provided and/or installed by Lessor are noted on the list. Provide partitions, partition backing, and above ceiling structural support as required for wall and/or ceiling mounted equipment, accessories, and furnishings. Provide required utility connections for scheduled equipment.
		3. Signage and Wayfinding
			1. Refer to VA Signage Design Manual in Section 2.4 for signage standards and requirements.

*Additional Signage Requirements:*

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* + 1. Entry Canopies
			1. Provide non-combustible canopies over the following locations facility entrance and receiving area/loading dock.
		2. Doors and Frames
			1. Refer to R&D DG and PG18-14 for door and frame requirements by room type.
			2. Finish: Prefinished in compliance with AWI Section 1500.
			3. Automatic Sliding Doors: Single Slide Automatic Sliding Door, Class 1 Clean Room Certified, narrow stile, 84” wide w/ 35.3” nominal clear door opening, trackless, clear anodized finish, and touchless actuators.
				1. Comply with BHMA Standard ANSI A156.10 (BHMA 1601), Power Operated Pedestrian Door Standard and UL Standard UL 325, Electric Door, Drapery, Gate, Louver and Window Operators and Systems.
				2. Service Life: Provide automatic sliding doors capable of operating without failure of any component, for not less than 300,000 open and close cycles, with normal maintenance as defined in manufacturer's standard operating manual.
			4. Access Panels:
				1. Flush stainless steel at toilet areas.
				2. Flush gypsum board surface with concealed hinges at public and office areas.
				3. Fire rated steel at rated construction.
		3. Hardware
			1. General Note
				1. Hardware sets shall be provided as per R&D DG and PG18-14. Provide extra heavy duty, Grade 1 hardware for all components.
			2. Major components and finishes are as follows:
				1. Cylinders and Keying: Key locks/cylinders in groups with new master key or grandmaster key system as directed by Owner. Provide three (3) keys per lock. Provide construction master keying. Cylinders shall meet the requirements of ANSI/BHMA A156.5-14.
				2. Low Energy Automatic operators, ANSI A156.19-07. Heavy duty commercial grade. Provide complete with drop plates, bracket, or adapters for arms as required to suit details. Provide a terminal strip in an enclosed box near or above door that indicates connections for Security and Fire Alarm equipment and for electrified hardware items associated with proper door operation, as indicated by hardware group operational description. Refer to floor plans for type of actuation devices and bollards if required. Coordinate with Security Contractor for doors actuated by electronic access control system.
				3. Electronic access control: Electronic access control system/device(s), power supplies (unless otherwise noted in hardware group) and monitoring/alarm(s) are provided with Security System. General Contractor to coordinate the provision and installation of the products. Refer to documents with Security Information for location(s) and type(s) of control(s). Connection by Electrical.
		4. Radiation Shielding / Magnetic Resonance Imaging (MRI) Radio Frequency Interference Shielding
			1. For Animal Imaging Rooms, obtain the services of a physicist to design, specify the level of radiation protection required, test and certifies the installations.
			2. Comply with requirements of the National Council on Radiation Protection and Measurement (NCRP) Report #49.
			3. Provide lead lining of gypsum wall board, wood doors and hardware, hollow metal frames, and lead glass view window.
	1. Interior Design
		1. General Criteria
			1. Refer to VA R&D DG PG18-12 and the Room Finishes, Door, and Hardware Schedule PG18-14 for specific interior design considerations and for finish requirements listed by room type. The offeror shall work with the VA to make final finish selections that meet the intent of listed finishes in the PG18-12 and provide comparable durability of the material specifications required in the corresponding VA Master Specification section and the requirements listed below.
		2. Window Shades
			1. Manually operated window shade, chain driven, vertical roll-up, stainless steel bead chain with hold down clips, extruded aluminum rollers, and bottom slats. Aluminum headbox with endcaps and fascia with powder coat finish. Light gap reduction channels available for black out shades. PVC-free shades, Flame-Resistance Ratings: NFPA 701. Comply with WCMA A100.1. Window treatments should not compromise patient safety.
		3. Privacy Curtains / Screens
			1. Provide curtain tracks with carriers and hooks (curtains shall be provided by the VA). Tracks shall be of extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers. End stop connectors, ceiling flanges and other accessories shall be fabricated from the same material with the same finish as the tracks or from nylon.

 *Additional Architectural Requirements:*

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* 1. Structural Design
		1. General Criteria
			1. The R&D DG references the VA Structural Design Manual, this is a reference for the leased R&D facility to provide the offeror the VA preferred structural design requirements.
		2. Seismic Design Criteria
			1. The leased R&D facility shall meet the requirements in the R&D DG and the VA Handbook 18-8, Seismic Design Requirements.
	2. Mechanical
		1. General Criteria
			1. Refer to the R&D DG PG18-12 and the VA HVAC Design Manual for the mechanical requirements of the leased R&D facility.
		2. References
			1. The following publications shall be referenced for applicable systems calculations and design information.
				1. ASHRAE Handbooks.
		3. HVAC Design Basis
			1. Indoor design conditions:
				1. Design conditions shall be in compliance with the requirements of the ASHRAE Laboratory Design Guide with the VA HVAC Design Manual taking precedence and/or indicating required space design conditions when ASHRAE does not fully address a space or room type.
				2. Imaging Equipment Space Design Conditions

Equipment manufacturer requirements shall be followed.

* + - * 1. Basic MEP Equipment Room Design Conditions:

4.7.2.1.5.1 Design conditions shall be as required to ensure tenant space design conditions are maintained.

* + - * 1. Loading Docks:

Space shall have provisions to limit the intrusion airborne particulate and insects through dock door openings.

* + - 1. Outdoor design conditions:
				1. ASHRAE 99.6% (winter) and 0.4% (summer) conditions associated with the site-specific location.
		1. Testing, Adjusting and Balancing
			1. An independent third-party NEBB, ABBC or TABB certified test and balance contractor shall be hired by the general contractor to balance and document all air and hydronic systems within project scope. All ductwork shall be constructed and properly sealed in accordance with applicable energy code requirements. All ducts operating at 2 inches water gauge (wg) or greater shall be pressure tested based on code requirements for 3 in wg or greater pressure classification.
			2. The balance contractor shall review all plans, components, access, etc. to ensure balancing activities may be successfully performed.

*Additional Mechanical Requirements:*

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* 1. Plumbing
		1. General Criteria
			1. Plumbing systems design requirements for leased 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 the R&D DG.
		2. References
			1. The following publications shall be referenced for applicable systems calculations and design information:
				1. ASPE Handbooks
		3. Materials
			1. The VA Plumbing Design Manual and the R&D DG shall be used for general plumbing requirements, however materials used shall be in compliance with local codes and standards required of the AHJ.

*Additional Plumbing Requirements:*

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* 1. Electrical
		1. General Criteria
			1. Electrical systems for R&D facilities shall comply with the applicable codes and standards listed in section 2. The VA Electrical Design Manual should be referenced for preferred design requirements and specific R&D requirements shall be followed that are listed in the R&D DG.
		2. Standby Generator
			1. Packaged Engine Generator
				1. An exterior diesel fuel generator, in weatherproof sound attenuated enclosure, kW/kVA size as determined for loads noted below, will be provided supplying emergency power for the facility.
				2. Engine: NFPA 37 compliant.
				3. Cooling System: Closed-loop, liquid-cooled, radiator mounted on generator set base.
				4. Fuel Tanks: 72 hour run time at full load sub-base tank
				5. Engine Exhaust System: Critical silencing muffler.
				6. Combustion Air-Intake System: Filter type air intake silencer, intake duct and connections.
				7. Starting System: Electric with negative ground.
			2. Automatic Transfer Switches: 4-pole switches are required.
			3. Loads shall be determined as per the requirements detailed in the R&D DG.

*Additional Electrical Requirements:*

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* 1. Lighting
		1. General Criteria
			1. At a minimum, lighting systems design and installation shall be designed based on latest edition of the IESNA Handbook, as well as applicable IESNA standards. In Addition, the VA R&D DG includes specific R&D requirements that shall be followed.

*Additional Lighting Requirements:*

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* 1. Telecommunications
		1. Scope of Work
			1. The Lessor shall provide the following:
				1. Telephone cabling, pathways (conduit and cable tray), outlets, faceplates, terminal blocks, backboards, cable terminations and cable testing.
				2. Data cabling (fiber optic and copper), pathways (conduit and cable tray), outlets, faceplates, patch panels, server cabinets, network equipment racks, network equipment cabinets, cable terminations and cable testing.
			2. The VA IT department will provide the following:
				1. Telephone System hardware and electronics such as voice mail servers and telephone handsets.
				2. Data network electronics such as concentrators, Ethernet switches, servers, PCs, Wireless Access Points and other electronic equipment.
		2. Pathways
			1. Boxes and Conduits
				1. Voice and data outlets shall be provided with a 4” square by 2-1/8” deep box with a single gang, telecommunication rated work box with a minimum of a ¾” conduit routed up to an accessible ceiling space.
			2. Sleeves
				1. Where cables penetrate through walls, conduit sleeves with bushings on both ends, shall be provided. All penetrations through fire rated walls shall be fire stopped.
				2. Where cables penetrate through floors of telecommunications rooms, a minimum of four (4) 4-inch conduit sleeves with bushings on both ends, shall be provided. All penetrations through floors shall be fire stopped.
				3. Conduit sleeves shall be sized to be filled with cables to no more than 40 percent of the cross-sectional area of the conduit.
			3. Cable Support
				1. Wire mesh cable tray a minimum of 4” deep x 12” wide shall be provided and supported from the structural steel or concrete structure with a minimum of 3/8” diameter threaded rods to support the horizontal and backbone communications cables along the main pathways above the suspended ceiling space. In finished spaces without a suspended ceiling, provide a minimum of 4” deep x 12” wide Solid Bottom cable tray instead of Wire Mesh cable tray along the main pathways. Cable trays shall be sized to be filled with cables to no more than 50% of the cross-sectional area of the cable tray. Where the cable tray fill ratio exceeds 50% of the cable tray cross-sectional area, provide a larger cable tray or two cable trays.
				2. A minimum of 12 inches of free access shall be provided and maintained above the cable trays and along one side of the cable trays.
				3. Where cables are routed in the open outside of the cable tray above the suspended ceiling space, adequate cable support via J-hooks shall be located at a maximum of 48" intervals.
				4. As per National Electrical Code and TIA-569 standard, the suspended ceiling support wires or support rods shall not be used as a means of cable support. Cables shall not be laid directly on the ceiling tile, ceiling grid rails, or on the structural steel (bar joists). An independent hanger system shall be used.
		3. Spaces
			1. Entrance Room (AKA Demarcation Point- Demarc)
				1. The Entrance Room is the location where the Local Exchange Carriers and other communications Service Providers such as telephone, data, and MATV/CATV install their cabling and equipment to bring services into the building. It also establishes the physical point where the service provider’s responsibilities for service and maintenance end.
				2. The minimum size of the Entrance Room shall be 80 sq. ft. with an additional 20 sq. ft. for every additional rack required.
				3. The Entrance Room shall be separate from other telecommunications spaces in the facility.
				4. The room shall not be located directly below or adjacent to laboratories, kitchens, laundries, rest rooms, showers, or other facilities where water service is provided.
				5. Any pipe or duct system foreign to the room installation shall not enter or pass through the room. The design professional shall ensure that foreign piping such as water pipes, steam pipes, medical gas pipes, sanitary waste pipes, roof drains, AC ducts, and other unrelated piping containing liquids or gases are not installed or pass through the room. Sprinkler piping shall not be routed through the room, unless it serves to protect the installation.
				6. A minimum of (2) 4” conduits shall be installed out to the property line to provide pathways for the services providers to install their cabling.
				7. All the walls of the room shall be constructed from drywall deck to deck, not just from floor to suspended ceiling height. All the walls of the room shall be covered from the floor to a minimum height of 8’-0” above the floor with 3/4-inch exterior AC grade flame retardant plywood and painted a light color to reflect the room light and reduce dust.
				8. The lighting shall be a minimum of 500 lux in the horizontal plane and 200 lux in the vertical plane when measured at 3 feet above the finished floor.
				9. The door shall be a minimum of 36 inches wide and 96 inches high, hinged to open outward and fitted with a card reader security lock.
				10. Protective cages shall be installed on all water-based fire protection sprinkler heads located within the room.
				11. The Service Provider IT equipment installed in the Entrance Room will be required to operate 24 hours a day and 365 days a year. The HVAC system shall be designed and installed to maintain a room temperature of 64-75 degrees Fahrenheit and relative humidity of 30-55 percent noncondensing on a 24-hour basis.
			2. Computer Room
				1. The Computer Room is a centralized space for telecommunications and computer equipment that serves the entire leased R&D facility. Typical equipment includes phone switches, voice mail servers, file/application servers, video surveillance storage and core Ethernet switches. Each leased R&D facility shall have one Computer Room.
				2. The location of the Computer Room should be determined after careful consideration. Locations should be avoided that restrict expansion of the room due to building construction such as elevators, mechanical rooms, core hallways, outside walls, or other fixed building walls. The location should consider accessibility requirements for the delivery of large equipment to the room and be located away from EMI sources that limit EMI field strength to no more than 3.0 V/m throughout the frequency spectrum.
				3. The room shall not be located directly below or adjacent to laboratories, kitchens, laundries, rest rooms, showers, or other facilities where water service is provided.
				4. Any pipe or duct system foreign to the room installation shall not enter or pass through the room. The design professional shall ensure that foreign piping such as water pipes, steam pipes, medical gas pipes, sanitary waste pipes, roof drains, AC ducts, and other unrelated piping containing liquids or gases are not installed or pass through the room. Sprinkler piping shall not be routed through the room unless it serves to protect the Computer Room installation.
				5. The Computer Room shall be dedicated to telecommunications and computer equipment. The room shall not be shared with electrical equipment, heating/ventilating and air conditioning equipment, fire detection systems, or other mechanical systems unless these systems are specifically needed and dedicated to support the computer room and its functions.
				6. The Computer Room shall have physical access control (card and PIN), door contacts for intrusion detection, a fixed or pan-tilt-zoom dual technology passive infrared security camera, and a motion sensor.
				7. The minimum size of the Computer Room shall be based on the gross VA-occupied space at the R&D facility as follows:

Up to 50,000 sq. ft. shall be 170 sq. ft.

50,001 sq. ft. – 100,000 sq. ft. shall be 190 sq. ft.

100,001 sq. ft. - 150,000 sq. ft. shall be 210 sq. ft.

150,001 sq. ft. – 200,000 sq. ft. shall be 230 sq. ft.

200,001 sq. ft. - 250,000 sq. ft. shall be 250 sq. ft.

250,001 sq. ft. – 300,000 sq. ft. shall be 270 sq. ft

* + - * 1. All the walls of the Computer Room shall be constructed of drywall deck to deck, not just from the floor to the suspended ceiling height. The floor, walls, and ceiling shall be sealed/painted to reduce dust and shall be light colored to reflect room light.
				2. Flooring materials shall be used that have antistatic properties.
				3. Three of the walls of the room shall be covered from the floor to a minimum height of 8’-0” above the floor with 3/4-inch exterior AC grade flame retardant plywood and painted a light color to reflect the room light and reduce dust.
				4. 12” wide wire basket cable tray shall be provided and supported from the structure above with a minimum of 3/8” diameter threaded rods over the rows of equipment racks/cabinets to support the horizontal and backbone communications cables through-out the Computer Room.
				5. The lighting shall be a minimum of 500 lux in the horizontal plane and 200 lux in the vertical plane when measured at 3 feet above the finished floor in between all rows of equipment cabinets and equipment racks.
				6. The door shall be 36 inches wide and 96 inches high and fitted with a card reader security lock.
				7. Protective cages shall be installed on all water-based fire protection sprinkler heads located within the Computer Room.
				8. The IT equipment installed in the Computer Room will be required to operate 24 hours a day and 365 days a year. The HVAC system shall be designed and installed to maintain a room temperature of 72-81 degrees Fahrenheit and relative humidity of 6-60 percent non-condensing on a 24-hour basis.
			1. Telecommunications Room (TR)
				1. There shall be at least one Telecommunications Room on each floor. Each work area shall be served by a Telecommunications Room that is located on the same floor that the work area is located. There shall be a minimum of one (1) Telecommunications Room in each building.
				2. The Telecommunications Room shall not be located directly below or adjacent to laboratories, kitchens, laundries, rest rooms, showers, or other facilities where water service is provided.
				3. Any pipe or duct system foreign to the Telecommunications Room installation shall not enter or pass through the room. The design professional shall ensure that foreign piping such as water pipes, steam pipes, medical gas pipes, sanitary waste pipes, roof drains, AC ducts, and other unrelated piping containing liquids or gases are not installed or pass through the room. Sprinkler piping shall not be routed through the Telecommunications Rooms, unless it serves to protect the installation.
				4. The location of the Telecommunications Rooms shall be as close as possible to the central core of the building floor to keep horizontal cable lengths to a minimum. Additional Telecommunications Rooms shall be provided where the horizontal cable length from the telecommunications room to the farthest workstation location exceeds 90 meters (295 feet).
				5. Telecommunications Rooms located on the same floor shall be no farther than 150 meters (500 feet) apart to limit horizontal cable lengths to 90 meters (295 feet) or less.
				6. The Telecommunications Room shall be dedicated to telecommunications facilities and function. The room shall not be shared with electrical equipment, heating/ventilating and air conditioning equipment, or other mechanical systems unless these systems are specifically needed and dedicated to support the Telecommunications Room and its functions.
				7. The Telecommunications Rooms on each floor shall be vertically aligned between floors in a multistory building to allow for the ease of installing vertical backbone cabling.
				8. Each Telecommunications Room shall have physical access control (card and PIN), door contacts for intrusion detection, a fixed or pan-tilt-zoom dual technology passive infrared security camera, and a motion sensor.
				9. For each 25,000 sq. ft. of space on each floor, provide a 2-rack TR (100sf, 10’x10’ form factor). For reference, see Sheet 5 of 57 of the v4 Appendix B of the Infrastructure Standard for Telecommunications Spaces, [Telecommunications Rooms](https://www.cfm.va.gov/til/dguide/OIT-InfrastrucStdTelecomSpaces-AppxB.pdf#nameddest=Telecommunications%20Rooms).
				10. All of the walls of the Telecommunications Rooms shall be constructed from drywall deck to deck, not just from floor to suspended ceiling height. A minimum of 3 of the walls of the Telecommunications Room shall be covered from the floor to a minimum height of 8’-0” above the floor with 3/4-inch exterior AC grade flame retardant plywood and painted a high gloss white with two coats of fire-resistant paint. Reserve a minimum of 12” dedicated space in front of the walls to accommodate equipment being mounted to the wall.
				11. The floor shall be covered with light colored anti-static luxury vinyl floor tile to reflect the room light and reduce dust.
				12. 18” wide basket cable tray shall be provided and supported from the structure above with 3/8” diameter threaded rods over the equipment racks and the side walls to support the horizontal and backbone communications cables through-out the Telecommunications Room.
				13. The lighting shall be a minimum of 500 lux in the horizontal plane and 200 lux in the vertical plane when measured at 3 feet above the finished floor.
				14. The door shall be a minimum of 36 inches wide and 96 inches high, hinged to open outward and fitted with a card reader security lock.
				15. Protective cages shall be installed on all water-based fire protection sprinkler heads located within the telecommunications rooms.
				16. The IT equipment installed in the Telecommunications Room will be required to operate 24 hours a day and 365 days a year. The HVAC system shall be designed and installed to maintain a room temperature of 64-80 degrees Fahrenheit and relative humidity of 30-55 percent non-condensing on a 24-hour basis.
		1. Telecommunications Bonding and Grounding
			1. Telecommunications Primary Bonding Busbar
				1. Each Entrance Room shall contain a Telecommunications Primary Bonding busbar for providing a central location for bonding all telecommunications equipment in the Entrance Room per the TIA-607-D Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, local codes, the VA Electrical Design Manual, and National Electrical Safety Code.
				2. The Telecommunications Primary Bonding busbar shall consist of a predrilled copper busbar with TIA-607 standard sizing and spacing. It shall have minimum dimensions of ¼ inch thick, 4 inches wide, and the length shall be a minimum of 23 inches. The bonding busbar shall be insulated from its support by a minimum of a 2-inch separation.
				3. Building structural steel (beams and/or columns) within 6 feet of the bonding busbar shall be bonded to the bonding busbar with a minimum of a 6 AWG copper conductor.
			2. Telecommunications Secondary Bonding Busbar
				1. Each Computer Room and Telecommunications Room shall contain a Telecommunications Secondary Bonding Busbar for providing a central location for bonding all telecommunications equipment in the room per the TIA-607 standard.
				2. The Telecommunications Secondary Bonding Busbar shall consist of a predrilled copper busbar with TIA-607 standard sizing and spacing. It shall have minimum dimensions of ¼ inch thick, 2 inches wide, and the length shall be a minimum of 12 inches. The bonding busbar shall be insulated from its support by a minimum of a 2-inch separation.
				3. Building structural steel (beams and/or columns) within 6 feet of the bonding busbar shall be bonded to the bonding busbar with a minimum of a 6 AWG copper conductor.
			3. Telecommunications Rack Bonding Busbar
				1. Racks located in the Entrance Room, Computer Room, and the Telecommunications Rooms shall have a horizontal Rack Bonding Busbar installed in the top of the rack/cabinet in rear RU 45 to provide effective bonding of the rack/TE to the Primary bonding busbar or Secondary Bonding Busbar and provide a central location for the bonding of all telecommunications equipment located in the rack/TE per the TIA-607 standard. The busbar shall consist of a pre-drilled copper busbar with TIA-607 standard sizing and spacing.
				2. The Rack Bonding Busbar shall be bonded to the Telecommunications Primary Bonding busbar or Telecommunications Secondary Bonding busbar in the room with a minimum of a 6 AWG copper conductor.
				3. Rack mounted IT equipment with integral bonding terminals shall be bonded to the Rack Bonding Conductor (RBC) or to a vertical/horizontal Rack Bonding Busbar (RBB). An RBC is a bonding conductor from the rack or RBB to the TEBC. Each cabinet or equipment rack will have a suitable connection point to which the bonding conductor can be terminated. Properly sized listed two-hole compression lugs or listed terminal blocks with two internal hex screw or equivalent torque characteristics shall be used at the connection point.
			4. Telecommunications Bonding Backbone Cable
				1. The Telecommunications Primary Bonding Busbar in the Entrance Room and Telecommunications Secondary Bonding Busbars in the Computer Room and Telecommunications Rooms shall be bonded to the building grounding electrode system with a bonding backbone cable that is a minimum of a 3/0 AWG stranded copper conductor.
				2. The building structural steel shall not be used as a replacement for the bonding backbone cable.
			5. Bonding of Cable Tray and Equipment
				1. Cable tray shall be bonded to the Primary Bonding Busbar or Secondary Bonding Busbar with a minimum of an insulated #6 AWG stranded copper conductor and connectors designed for the specific purpose.
				2. Bonding of other telecommunications equipment in the Telecommunications Rooms or Computer Room to the bonding busbars shall be executed as required by the equipment manufacturer.
		2. Equipment Racks and Equipment Cabinets
			1. Ensure that IT equipment racks are installed flush to one another without air gaps between the racks. Use appropriate materials to fill gaps between the racks to prevent recirculation of exhaust air to the cold aisle. Meet the following requirements:
				1. Style: Channel
				2. Height: 84 inches, Width: 24 inches, Depth: 30 inches minimum.
				3. Equipment Mounting Width: 19 inches.
				4. Equipment Mounting Height: 45 RUs.
				5. Front and Rear rails: EIA threaded or Square Holes for cage nuts.
				6. Rail Marking: Rack unit markings present on front and rear rails starting at one RU at the bottom.
				7. Weight Capacity: 2,500 lbs. minimum.
				8. Cable Management: Built-in overhead water fall and cable management strap attachment points.
				9. Seismic bracing where required by Code.
				10. Provide rack PDU brackets.
				11. Color: White.
			2. Equipment Cabinets shall be installed in the Computer Room for the housing of server/storage equipment meeting the following requirements:
				1. Style: Enclosed equipment cabinet with side panels and front and rear doors.
				2. Height: 84 inches, Width: 24 inches, Depth: 48 inches maximum with all doors and accessories installed.
				3. Equipment Mounting Width: 19 inches.
				4. Equipment Mounting Height: 45 RUs.
				5. Front and Rear rails: Square Holes for cage nuts. Toolless adjustable.
				6. Rail Marking: Rack unit markings present on front and rear rails starting at one RU at the bottom.
				7. Weight Capacity: 2,500 lbs. minimum.
				8. Front Door: Single perforated, minimum of 63% open.
				9. Rear Door: Single solid OR Split, perforated where vertical exhaust ducts cannot be implemented.
				10. Latches: Keyed lock upgradeable to keyless system compression latch.
				11. Top panel: Vertical exhaust duct (heat containment) and high-capacity cable access with brush grommets.
				12. Side Panel: Solid, Locking.
				13. Bottom Panel: Solid with high-capacity cable access with brush grommets or air dam foam.
				14. Seismic bracing where required by Code.
				15. Accessories: Zero U vertical single mount PDU brackets, castors for safe movement of cabinet, leveling legs, and air dam/sealing kit.
				16. Color: White.
		3. Power Distribution Units (PDUs) and Uninterruptable Power Supplies (UPSs)
			1. Equipment Rack and Equipment Cabinet 120/208 Volt PDUs for Entrance Rooms and Telecommunications Rooms
				1. Input: 20 Amp Three-phase; 120/208V, L21-20P Plug.
				2. Circuit Breakers: 3 x 2 Pole 20 Amp Hydraulic Magnetic breakers.
				3. Receptacles: (30) C13 receptacles 208 Volt, (6) C19 receptacles 208 Volt, (2) 5-20 receptacles 120 Volt.
				4. IP and Serial monitoring.
				5. Ethernet, USB, and Environmental sensor ports.
				6. Mounting: Vertically on the rear rails of the rack.
				7. Quantity: Provide two (2) PDUs in each equipment rack in Entrance Rooms and Telecommunications Rooms.
			2. Equipment Rack and Equipment Cabinet 120/208 Volt PDUs for Computer Rooms
				1. Input: 20 Amp Three-phase; 120/208V, L21-20P Plug.
				2. Circuit Breakers: 3 x 2 Pole 20 Amp Hydraulic Magnetic breakers.
				3. Receptacles: (30) C13 receptacles and (6) C19 receptacles, 208 Volt.
				4. IP and Serial monitoring.
				5. Ethernet, USB, and Environmental sensor ports.
				6. Mounting: Vertically on the rear rails of the rack.
				7. Quantity: Provide two (2) PDUs in each equipment rack and each equipment cabinet in Computer Room.
			3. Equipment Rack and Equipment/Cabinet UPSs
				1. Input: 20 Amp Three-Phase; L21-20P Plug.
				2. Output: One (1) L21-20R receptacle
				3. Capacity: 5 kW
				4. Run time at full capacity: Minimum of 10 minutes.
				5. Mounting: Rack or Cabinet 19-inch TIA-310 mounting width.
				6. Quantity: Provide one (1) UPS in each equipment rack/cabinet in Entrance Rooms, Computer Room, and Telecommunications Rooms.
			4. Zone Power Distribution Units (PDUs)
				1. Telecommunications Rooms and Main Computer Rooms with more than one equipment rack and/or more than one equipment cabinet shall be provided with Zone PDUs used for power distribution to the rack mounted and cabinet mounted PDUs and UPSs.
				2. Input: Two (2) 30 Amp Three-Phase L21-30P plugs. Power cords on the Zone PDU shall be of sufficient length to reach the supply branch circuit receptacles suspended over the rack or cabinet.
				3. Output: Four (4) L21-20R receptacles.
				4. Quantity: One (1) Zone PDU for every two (2) equipment racks/cabinets.
				5. Supply Branch Circuits: Provide two (2) 30 amp 3-phase 120/208 Volt (Wye) circuits with L21-30R receptacles for each Zone PDU. If a Generator is installed at the site, connect the branch circuits to a Panelboard connected to the Generator. Suspend the receptacles over the equipment racks/cabinets from the ceiling for each Zone PDU.
		4. Telecommunications Infrastructure Plant (TIP)
			1. Horizontal Cabling
				1. Cable

The horizontal cabling shall consist of a minimum of two (2) Category 6A UTP LP rated cables to each work area outlet for voice and/or data. The color of the cable jacket shall be blue.

The horizontal cabling shall consist of a minimum of two (2) Category 6A UTP LP rated cables to each wireless LAN outlet. The color of the cable jacket shall be blue.

The length of the horizontal cables shall not exceed 90 meters (295 feet) from the telecommunications room to the work area outlet or the wireless LAN outlet.

Provide plenum rated cable above ceilings used as a return air plenum.

* + - * 1. Workstation Outlets

Each Category 6A horizontal cable shall be connected to category 6A RJ45 jacks at work area outlets.

Each Category 6A horizontal cable shall be connected to category 6A RJ45 plugs at wireless LAN outlets.

The pin configuration for each RJ45 jack shall conform to the TIA/EIA T568B standard.

Refer to room matrix for work area outlet locations/quantities.

One (1) wireless LAN outlet shall be provided for each 625 square feet of floor space.

The typical standard density work area outlets will consist of two RJ45 interfaces. This provided connectivity for one IP telephone and one workstation.

Laboratory work area outlets will typically consist of four RJ45 interfaces, mounted overhead of the workbench area.

* + - * 1. Patch Cords

Patch cords shall be factory terminated and shall match the category of the associated patch panel, work area outlet, and horizontal cable.

* + - * 1. Cable Termination Hardware

The Category 6A UTP horizontal cables shall be connected, in the Telecommunications Room, to Category 6A RJ45 48 port rack mounted angled patch panels. Angled patch panels containing more than 48 ports shall not be used. The pin configuration for each RJ45 jack shall conform to the TIA/EIA T568B standard.

The horizontal cables shall be continuous from the angled patch panels to the work area outlet jacks and wireless LAN outlet plugs.

The 48 port angled patch panels shall be mounted in 19-inch floor mounted equipment racks that are 84 inches tall. Wall mounted racks shall not be used except in facilities under 3,000 sq. ft.

Front and rear six (6) inch wide vertical cable managers shall be installed on each side of the 19-inch equipment racks on the end of the row of racks and ten (10) inch wide vertical cable managers shall be installed between each rack.

No more than eight (8) 48 port angled patch panels shall be installed in a single 84-inch-tall equipment rack. This allows for the lower half of the equipment rack to be used to mount Ethernet switches, UPS equipment and other network electronics. If more than eight (8) 48 port angled patch panels are required to terminate the horizontal cabling, then another equipment rack shall be installed.

* + - 1. Backbone Cabling
				1. Cable
				2. The backbone cable from the Computer Room to each Telecommunications Room shall consist of a minimum of one 25-pair Category 5e UTP copper cableand 24 strands of 850 nm laser-optimized (OM4) 50/125 multimode fiber optic cable. If the Telecommunications Rooms are located in a separate building with no environmentally controlled connecting pathway, single-mode fiber shall be used instead.
				3. The backbone cable from the Entrance Room to the Computer Room shall consist of a minimum of 100 pairs of Category 5e UTP copper cable and 24 strands of 850 nm laser optimized (OM4) 50/125 multimode fiber optic cabling and terminations. If the Entrance Facility and Computer Rooms are located in different buildings with no environmentally controlled connecting pathway, single-mode fiber shall be used instead.
				4. Provide plenum rated cable above ceilings used as a return air plenum.
				5. Provide indoor armored fiber optic backbone cable or provide unarmored fiber optic backbone cable installed in inner duct.
				6. Copper Backbone Cable Termination Hardware

The Category 5e UTP copper backbone cable shall be connected, in the Telecommunications Rooms, to 24-port rack mounted angled patch panels. (48-port angled patch panels are acceptable if more than one 25-pair backbone cable is specified.) Patch panels containing more than 48 ports shall not be used. One pairs of the backbone cable shall be terminated on each patch panel port (two pairs on port 24).

The RJ45 angled patch panels shall be mounted in 19-inch floor mounted equipment channel racks that are 84 inches tall.

Front and rear six (6) inch wide vertical cable managers shall be installed on each side of the 19-inch equipment racks on the end of the row of racks and ten (10) inch wide vertical cable managers shall be installed between each rack.

No more than eight (8) 48 port angled patch panels shall be installed in a single 84-inch-tall equipment rack. This allows for the lower half of the equipment rack to be used to mount Ethernet switches, UPS equipment and other network electronics. If more than eight (8) 48 port angled patch panels are required to terminate the backbone cabling, then another equipment rack shall be installed.

* + - * 1. Fiber Optic Backbone Cable Termination Hardware

The fiber optic backbone cables shall be connected at each end to fiber optic cable connectors in one rack position height angled high density fiber distribution panels located in the Telecommunications Room, Computer Room, or Entrance Room. The high-density fiber distribution cabinets shall have the capacity to terminate a minimum of 144 strands of fiber optic cabling.

All fiber optic backbone cable strands shall be terminated on fiber optic connectors. No fiber strands shall be left unterminated. Fusion splicing to the pigtails of splice cassettes is specified.

The fiber distribution panels shall be mounted in 19-inch floor mounted equipment racks that are 84 inches tall. Wall mounted racks and/or wall mounted fiber distribution panels shall not be used.

Front and rear six (6) inch wide vertical cable managers shall be installed on each side of the 19-inch equipment racks on the end of the row of racks and ten (10) inch wide vertical cable managers shall be installed between each rack.

No more than twelve (12) one rack position height angled high density fiber distribution panels shall be installed in a single 84-inch-tall equipment rack. This allows for the lower half of the equipment rack to be used to mount Ethernet switches, UPS equipment and other network electronics. If more than twelve (12) one rack position height fiber distribution panels are required, then another equipment rack shall be installed.

* + - 1. Installation Requirements
				1. All cabling shall be installed without twists and kinks. Cables should not be looped around themselves or other objects.
				2. Use cable management components and techniques to maintain clean, clear, and safe work environment. Do not mount cabling in locations that block access to other equipment inside and outside of equipment racks and cabinets.
				3. Route cables with gentle loops to avoid damage due to exceeding bend radius limitations. Fiber optic cabling can be easily broken with rough handling or tight bends.
				4. Cable slack should be concealed within the equipment racks and cabinets either vertically or within cable managers. Slack should not be looped. With the use of correct length cables, there should not be enough slack to require looping.
				5. Patch cables should follow the side of the IT equipment rack closest to the assigned Network Interface Connection (NIC). Use correct length patch cables.
				6. Label the cables, equipment cabinets and equipment racks as indicated in the VA [Infrastructure Standard for Telecommunications Spaces](https://www.cfm.va.gov/til/spclRqmts.asp#TelecomInfraStds).
			2. Cable Testing
				1. Horizontal Cable

Prior to the cut-over of the equipment, test 100% of the UTP category 6A horizontal cables for performance to TIA-568-C.2, category 6A, permanent link requirements. The test instrument shall conform to the TIA-1152 Level III-e, measurement accuracy.

Replace and retest any cables that fail to pass the performance requirements.

Record the results of each test with cable identification. The test results shall be given to the VA Office of Information Technology (OIT) for each horizontal cable in electronic format.

The VA Project Manager shall be immediately notified if any horizontal cable fails due to link length.

* + - * 1. Backbone cable

Copper cable

Prior to the cut-over of the equipment, test 100% of backbone copper cable pairs for: DC loop resistance, opens, shorts between conductors, reversed pairs, split pairs, and transposed pairs.

Replace and retest any cables that fail to pass the performance requirements.

Record the results of each test with cable identification. The test results shall be given to the VA Office of Information Technology (OIT) for each backbone cable.

Fiber Optic cable

Prior to the cut-over of equipment, test one hundred percent (100 percent) of all terminated backbone fiber strands in both directions with an Optical Power Meter and Light source to ensure the fiber strands meet or exceed the cable performance requirements of TIA/EIA-568.3-D.

Test instruments shall meet or exceed applicable requirements in TIA-568.1-D. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

Test multimode backbone links in both directions at both operating wavelengths in accordance with TIA/EIA-526-14-C, Annex A, One Cord Reference Method. The tester shall be encircled flux compliant. The Channel loss shall be 2.5 dB or less for each fiber strand.

Replace and retest any cables with fiber strand(s) that fail to pass the performance requirements.

Record the results of each test with cable identification. The test results shall be given to the VA Office of Information Technology (OIT) for each backbone cable in electronic format.

* + 1. Special Systems
			1. TV Distribution System
				1. The Lessor will provide the following: Video cabling, pathways (conduit and cable tray), outlets, faceplates, amplifiers, splitters, backboards, cable terminations and cable testing.
				2. The VA will provide the following: Video recorders, video signal processors, and Monitors.
				3. A wired television distribution system connected to an antenna system or cable TV utility will be provided. Cabling will consist of 0.50” hardline or RG-11 trunk distribution cabling and RG6 horizontal cabling. Splitters and line amplifiers shall support 750 MHz minimum video bandwidth.

Splitters and amplifiers shall be located in the Computer Room and Telecommunications Rooms.

Locations: Waiting Rooms, Conference Rooms, Breakrooms, Police Operations.

* + - 1. Access Control System
				1. The Lessor shall design, install, and maintain an Access Control System for the facility IAW the Facility Security Level.
				2. Access Control equipment shall be located in the Computer Room and Telecommunications Rooms.
			2. Closed Circuit Television System (CCTV)
				1. The Lessor shall design, install, and maintain an CCTV system for the facility IAW the Facility Security Level.
				2. CCTV equipment shall be located in the Computer Room and Telecommunications Rooms.
			3. Intrusion Detection System (IDS)
				1. The Lessor shall design, install, and maintain an Intrusion Detection System for the facility IAW the Facility Security Level.
				2. IDS equipment shall be located in the Computer Room and Telecommunications Rooms.
			4. Duress Alarm
				1. The Lessor shall design, install, and maintain a Duress Alarm System for the facility IAW the Facility Security Level.
				2. Duress Alarm equipment shall be located in the Computer Room and Telecommunications Rooms.
			5. Public Address (PA):
				1. Provide public address and mass notification (PA) system(s) covering the full VA space. Ceiling mounted speakers shall be located a maximum of 20 linear foot center to center throughout the facility. The system shall be capable of being dialed into from any telephone for paging. System shall have the capability of paging each zone of the building separately, or to page the entire building. The minimum number of zones shall be equivalent to the number of functional areas listed in the PFD. Review zones with the government during design. The head-end equipment for the public address system shall reside within the Computer Room and Telecommunications rooms.
			6. Intercommunication System
				1. Provide intercommunications system(s) and cabling as required. Intercom system shall be located at the loading dock in view of CCTV camera. The intercom shall communicate with another intercom and be capable of dialing the front desk. The security office shall have a door release button for the loading dock entrance.
			7. Wireless Communications
				1. The VA space shall be served by two (2) separate wireless networks. The Guest Wi-Fi and VA Wi-Fi networks are separate
				2. The Lessor shall provide and install the cabling infrastructure for the VA Wi-Fi network. The final location of the access points will be determined by the VA prior to the installation of said access point devices by the VA. The lessor shall provide one (1) Cat6a cable per 625 SF of ceiling space, one (1) cable in each corner (interior corners of exterior walls) and one (1) cable every 40 linear feet along the interior perimeter of the building. These cables shall be evenly spaced and distributed throughout the celling to provided adequate points of connections for the access points. Each cable shall be terminated in a biscuit jack. The VA may develop and provide a coverage area map noting where the Wi-Fi access points will go. In these cases, use the area map provided.
				3. The Lessor shall provide Guest Wi-Fi access including installation, design, service, and operational costs. The Guest Wi-Fi system shall be designed to provide 100% coverage with established signal strength and through heat maps as identified by a wireless pre and post area coverage survey and frequency coordination study. Ensure sufficient signal strength to provide “Excellent” signal strength in the Waiting and Reception areas, and “High” signal strength throughout the rest of the Clinic Proper. Guest Wi-Fi may be unsecured and may be from common or adjacent multi-tenant space, provided the system is managed by the Lessor and is not another tenant’s signal. The guest Wi-Fi system should be separate from and with no access to VA network.