PROJECT OVERVIEW AND BACKGROUND

The purpose of this project is to provide a design for the construction of a new ANSI/TIA-942-B Rated-3 (Tier III) Main Computer Room/Campus Support Center (MCR/CSC) to replace the existing MCR 3A109 (hereafter referred “Project”). The Project is located on Floor 3 of Building 77 located at James H. Quillen VA Medical Center (JHQVAMC).

The new MCR will be constructed within the space presently occupied by the existing Support Vista 3A112, Toilet 3A112D, Staff Lounge 3A113A, and IRM Vista Support 3A113 and other adjacent/nearby spaces as necessary. The new MCR construction will incorporate fire-rated assemblies and sealing to support the protection of an clean agent fire protection system.

The new MCR will be configured with cold air aisles and hot-air containment/ducted return. A cold-air aisle will defined by the down the center of the MCR between the two rows of network/server cabinets. Network cabinets will be supplied with hot-air containment/heat-rejection chimneys. Heat rejected from network cabinets will be collected utilizing a ducted hot air containment.

The floor, walls, and ceiling will be sealed/painted to reduce dust and static conditions. The existing floor will be stripped to concrete, leveled and epoxy-coated, anti-static sealed to promote a clean environment.

The Project will also be constructed with the following system/building entities in support of the Projects 2N/N+1 reliability for operations, servicing, and maintenance:

- A telecommunications grounding and bonding system bonded to the buildings Primary Bonding Busbar (PBB).
- Horizontal and vertical cable management for fiber-optic and copper infrastructures.
- Fiber-optic and copper MCR infrastructure cable plant.
- Electronic Personal Protection System (EPPS).
- Extension Physical Access Control System (PACS).
- Intrusion Detection System (IDS).

- Security Surveillance Television System (SSTV).
- An emergency power off (EPO) system, integration, and EPO stations.
- Coordination with mechanical and electrical systems.
- 2N Uninterruptible Power Supply (UPS) providing redundant A/B power sources with static/maintenance by-pass. UPS will be served with two feeders: a primary and a by-pass feeder.
- N+1 Facility Power Input Source: One commercial power service-entrance and an emergency power generation source (+1)
- 2N MCR Electrical Power Distribution supporting redundant A/B power source distribution.
- N+1 Environmental Conditioning support (HVAC)
    - Heat rejection from network cabinets will utilize integrated heat-rejection chimneys. HVAC will connect to each and return "hot-air" back to the CRU's. Supplemental return air will be provided to collect heat rejection from the UPS units and return air from the Clean Agent Storage 3A112A.computer room air conditioning units (CRU).
    - The cold aisle will be supplied with cold air generated from two CRU delivering to the front cold air entry of each server/network cabinet.
- An LED lighting system will provide a minimum of 500 lux at the horizontal plane and 200 lux in the vertical plane measured at 36” above the working/finished floor in the center of all aisles. Three levels of lighting control will be provided and controlled by motion sensors located within the lighting zoned areas.

ULTIMATE DESIGN CAPACITY

Following the completion of the equipment layout and selection of design criteria–driven basis-of-design equipment, calculations identified a projected telecommunications load of 90 kW. To adequately support this load, the basis of design includes a 100 kW UPS system. The overall design has been coordinated across all disciplines around two 100 kW UPS systems to provide

redundancy and ensure capacity for the 90 kW telecommunications load. The ultimate design capacity of the MCR will be 100 kW.

TELECOMMUNICATIONS CODES AND STANDARDS

The following codes, standards, and guidelines will be followed throughout the design of this project:

- ICC/A117.1 Accessible and Usable Buildings and Facilities (2017)
- VA Design Alerts 1-16
- OIT Infrastructure Standard for Telecommunications Spaces v4.0 (01 July 2023)
- IBC 2024 – International Building Code
- IEBC 2024 – International Existing Building Code
- NFPA 70-2023 - National Electrical Code (NEC)
- NFPA 75-2020 - Standard for the Fire Protection of Information Technological Equipment
- NFPA 99-2024 – Health Care Facilities Code
- NFPA 101-2024 – Life Safety Code
- VA Office of Information & Technology (OIT) Infrastructure Standards for Telecommunication Spaces (ISTS) Version 4.0 – June 1, 2023
- ANSI/TIA-942-B Data Center Infrastructure Standard
- VA Office of Information & Technology (OIT) Design Guide Templates for Critical Telecommunication Spaces – December 2018
- VA PG-18-10 Telecommunications and Special Telecommunications Systems Design Manual – February 2016
- VA PSRDM Physical Security and Resiliency Design Manual 2020, June 2025 Revision
- BICSI and EIA/TIA Standards as defined in VA PG-18-10

PHASING OF CONSTRUCTION

PHASE 1 – DEMOLITION & PREPARATION

- Vacate rooms as indicated in demolition drawings.
- Demolish existing walls, ceiling systems, plumbing, HVAC, electrical, and telecommunications infrastructure.
- Cut new door openings and infill existing openings as required.
- Apply fire/smoke sealants to penetrations.
- Maintain existing cabling pathways where needed until replacement systems are installed.

PHASE 2 – NEW MCR CONSTRUCTION

- Construct new 1-hour fire-rated walls for the Main Computer Room (MCR).
- Perform mechanical, electrical, telecom, and fire protection rough-ins.
- Finish MCR interior surfaces to create sealed, clean-agent-compatible environment.
- Verify enclosure continuity floor-to-deck above.
- Apply dust mitigation materials (gasketed tiles, caulking, epoxy coatings, etc.).

PHASE 3 – INFRASTRUCTURE INSTALLATION

INSTALL:

- Redundant ups systems (Liebert Vertiv apm2 or approved equal), dual A/B feed
- Overhead distribution busways with l21-20 tap boxes
- MDA and HDA cabinets (partial)
- Cable tray and raceway systems
- Bonding and grounding (TIA-607-D compliant)
- Security, lighting, CRU units on raised stands

All systems sized per ultimate design capacity.

WAN DEMARCATION & CARRIER CUTOVER

- Install fiber optic cabling, geo-diversely routed from each of the two exchange carrier's point of presence in the existing Demarc Room (Telecom A006) to new MCR.
- These links shall extend the WAN demarcation point to the new MCR.
- If new cabinets have not been installed prior to fiber optic cabling from Demarc, provide service loop and enclosure for fiber optic cabling to keep safe during construction until which time the fiber optic cabling can be terminated.
- Coordinate with the Local Exchange Carrier (LEC) for service handoff, splicing, and termination requirements.
- Label fiber type, termination points, and routing on final telecom drawings.

PHASE 4 – NETWORK MIGRATION, TESTING & COMMISSIONING

CORE SWITCH MIGRATION

- **PHASE 1**: Deploy core A in new MCR. Create a temporary interconnect ("umbilical") to CORE B IN THE EXISTING MCR TO MAINTAIN NETWORK REDUNDANCY.
- **PHASE 2**: Migrate core B to new MCR. Complete permanent dual-core configuration.
    - **MIGRATION WINDOW**: The migration of cabling from the existing MCR to the new MCR for the Telecommunications Rooms shall be completed within the designated 90-day migration window.
    - **CORE SWITCH CONTINUITY**: The core switches shall not remain split or in a transitional configuration beyond the 90-day window. All associated connectivity must be fully migrated and operational within this period.

BACKBONE FIBER MIGRATION

- Extend backbone fiber from existing MCR to new MCR.
    - To be done while backbone for respective core switches which feed the backbone is being deployed to new MCR.
- Use existing pathways where possible.
- Re-terminate or fusion splice existing fibers to meet TIA-568 and HEFP standards.

- When necessary, deploy temporary parallel backbone routes to avoid service disruption.
- All fiber cabling to be labeled on both ends per VA OIT standards.

EQUIPMENT MIGRATION

- Coordinate migration of network/server equipment cabinet-mounted equipment (e.g., Cerner FDSS, IaaMD, Biomed).

PRIOR TO MOVE:

- Inventory cabinet contents.
- Validate destination cabinet locations and power (dual L21-20 feeds).
- Ensure UPS, CRU, bonding, and grounding are operational.
- Migrate equipment during low-usage windows to reduce impact.
- Maintain service redundancy through temporary cross-patching and umbilical links.
- Post-move: verify connectivity and operability before decommissioning legacy connections.

BUILDING TELECOMMUNICATIONS SYSTEMS

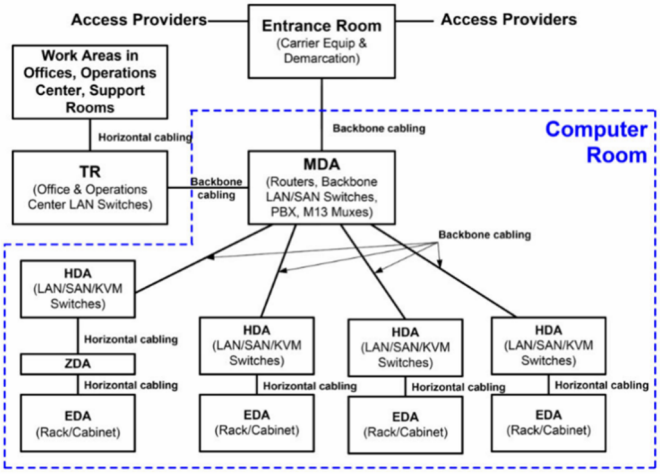
The new MCR will be configured with server and network cabinets to support existing and future operations. The new MCR will be configured to support future A/B fiber-optic/copper redundancy from the MDA to all HDA's.

- Network cabinets (nominal 24-inches wide, 48-inches deep, and 84-inches high/44RU with 6-inch-wide cabling sidecars) will be utilized for all Main Distribution Area (MDA) and Horizontal Distribution Area (HDA) cabinets. The MDA will house terminations for all backbone fiber-optic cabling from all buildings and their TR's on the campus including but not limited to cross-connection fiber-optic/copper to the HDA's equipment rows; core switches/WAN elements; and spine/aggregation/OOB switches/LAN elements. High-density, pre-terminated 1RU high fiber-optic (FO) and pre-terminated

copper (CU) patch panels will be provided to terminate all required backbone and horizontal cross-connections.

- A section of MDA-A will be used for the termination of existing backbone fiber-optic cabling from the existing MCR. It is anticipated that these will be removed/repurposed once the EHRM A/B redundant fiber installation project is completed.

- The Project design will follow basic data center topology as outlined in ANSI/TIA-942 (see Diagram 1).



(Diagram 1)

- Server cabinets (nominal 24-inches wide, 44-inches deep, and 84-inches high/45RU) will be utilized for all Equipment Distributors to house all servers, storage equipment, and required high-density FO/CU cabling termination/patch panels.
- New cable sleeves will be provided for all cabling entering the new MCR. Sleeves shall be sealed airtight. Re-enterable sleeves with airflow control may be used if approved for use with clean agent containment air-tight requirements.
- Horizontal wirebasket-style cable tray and FO tray will be installed to support all backbone and horizontal distribution throughout the new MCR. Cable trays will maintain a maximum 8” clearance between cable trays when stacked. Cable trays will align with cable entries of network and server cabinets as well as any supplemental equipment installed. Waterfalls at rack and cabinet locations will be installed to maintain FO/CU cable bend radius protection and promote smooth transitions into the racks and wall

mounted equipment. Ladder-style runway cable tray will only be utilized in support of vertical risers of cable.

- Multiple supplemental bonding busbars (SBB) will be provided strategically located at four points within the new MCR. Each SBB will be bonded back to the existing buildings Primary Bonding Busbar located at the electrical service-entrance. SBBs hole patterns will accommodate two-hole lugs in compliance with ANSI/BICSI N3-20 and ANSI/TIA-607 standards. SBBs will be provided with insulated isolating stand-off brackets to isolate busbars from conductive wall or other mounting surfaces.

GENERAL TELECOMMUNICATIONS EQUIPMENT

Work Area Outlets (WAO) Cable Raceways, Pathways, Cable Trays, Cable Ducts, and Conduit and Boxes:

- All telecommunication CU cabling shall comply with Category-6A performance and routed in approved pathways utilizing conduit/raceways and wirebasket-style cable trays.
- Minimum raceway size for all telecommunications work shall be trade-size 1-1/4”. Maximum conduit fill will not exceed 40% fill based on ISTS basis-of-design (BOD) 0.30” O.D., plenum-rated Cat6A, 10G+ cable.
- Minimum cable tray size will be 12” wide with 4” high sidewalls. Maximum cable tray fill will not exceed 50% (plus 25% spare capacity) fill based on ISTS basis-of-design (BOD) 0.30” O.D., plenum-rated Category-6A, 10G+ cable.
- WAO’s will consist of 4-11/16” SQUARE, 3-5/8” backboxes with single-gang, four-port faceplates. Unused blanks will be provided with matching faceplate blanks as required.
- Wall-mounted telephone outlets will consist of 4-11/16” SQUARE, 3-5/8” backboxes with single-gang, single-port faceplates allowing for (1) RJ-45 jack. Faceplate will be provided with phone mounting lugs/studs.

GENERAL ELECTRONIC SECURITY SYSTEM EQUIPMENT

- All security devices shall be connected to the local panel served with control cables through conduit.
- All electronic security systems shall be integrated with existing campus security control center (SCC) located in Building 204, Police Dispatch L100K. System compatibility shall be verified.

BUILDING PANIC/DURESS SYSTEM

- Panic/duress pushbuttons shall be provided within MCR 3A112.
- Link all panic/duress to the SCC located in Building 204, Police Dispatch L100K.
- Additional required system licensing will be provided as well as all re-configuration/programming/updates of the existing panic/duress system server/gateways/graphics.

BUILDING PHYSICAL ACCESS CONTROL SYSTEM

- A Physical Access Control System (PACS): The existing PACS will be extended to new PACS devices controlling all entries into the new MCR as well as any internal secured cabinets or panels as required.
- New PACS devices, including dual-authentication (PIV and PIN code) card readers, electric strike locks, and infrared request to exits, shall be in accordance with VA standards and the physical security risk assessment.
- Card readers shall be FICAM compliant and compatible with US access badges.
- Additional required PACS licensing will be provided as well as all re-configuration/programming/updates of the existing PACS system server/gateways/graphics.

BUILDING INTRUSION DETECTION SYSTEM

- An Intrusion Detection System (IDS): The existing IDS will be extended to new IDS devices controlling all entries into the new MCR as well as any internal secured cabinets or panels as required.

- New IDS devices, including door position switches and radar-based IDS sensors, shall be in accordance with VA standards and with the physical security risk assessment.
- Additional required IDS monitoring licensing will be provided as well as all re-configuration/programming/updates of the existing IDS system server/gateways/graphics.

BUILDING SECURITY SURVEILLANCE TELEVISION SYSTEM

- The buildings existing security surveillance television system (SSTV) will be extended to the new MCR. SSTV cameras will be strategically placed and positioned at each entry and at other locations to provide required protection and surveillance protection/monitoring.
- SSTV cameras will be motion activated and tied to the Security Control Center (SCC) located in Building 204, Police Dispatch L100K. Upon motion, the SCC will be notified and recording to VMS will be activated recording 10-seconds before and after motion activity. Cameras will be integrated with PACS and IDS to activate cameras immediately upon detection of an alarm or forced door entry (if system supports this level of integration).
- Additional required camera/point licensing will be provided as well as all re-configuration/programming/updates of the existing SSTV system server/gateways/graphics.

GROUNDING AND BONDING

- Grounding and bonding shall be provided in accordance with the NEC, VA PG-18-10 and EIA/TIA 607 standards latest additions.
- Multiple Secondary Bonding Busbars (SBB) will be located throughout the new MCR and will be utilized for Project telecommunication bonding requirements. All SBB’s will be bonded back to the buildings PBB utilizing a new Telecommunications Bonding Backbone (TBB).

- All new metallic cabinets, raceways, racks, horizontal wirebasket-type cable trays and vertical ladder-runways shall be bonded to the SBB.
- Rack Bonding Busbars (RBB) shall be provided in all server, network, and equipment racks for the bonding of cabinet/rack mounted equipment to the SBB. A minimum #6 AWG stranded copper Telecommunication Equipment Bonding Conductor (TEBC) will be provided and terminated with non-reversing compression connectors to the nearest SBB in the MCR.