Construction Documents – 100% Submittal: Design Narrative

Reissued February 18th, 2026

Department of Veterans Health Administration

Electronic Health Record Modernization (EHRM) Infrastructure Upgrades – Togus, ME

Project No. 402-22-700

Contract No. 36C77623C0002

Togus VA Medical Center

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US Department of Veterans Affairs

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2 Executive Summary

A/E Part One Services (also known as Design Phase Services) for this design project includes site visits, field investigation, studies, and user interviews to prepare drawings, specifications, and cost estimates for all facets of work and disciplines/trades to facilitate a construction project.

This construction project upgrades the facilities electric and IT cabling to allow for the new Electronic Health Records Modernization (EHRM) system. The scope of this project includes but is not limited to the following infrastructure improvements: Electrical (electrical panel upgrade, power (normal, emergency), bonding UPS, building management system interfaces, assess for new and upgrades to existing HVAC, reconfiguration, expansion and renovation of existing spaces (demo, new construction, finishes), communication infrastructure (new data outlets, patch panels, upgrades to CAT 6A cable) in all buildings as necessary, physical security upgrades as necessary, assess and upgrade fiber infrastructure backbone campus wide to each IT closet, infrastructure within buildings, and infrastructure between buildings. Provide a redundant fiber run throughout the facility to each IT closet, and redundant fiber mains to the demarcation room from the provider point.

3 Scope of Work

Project scope locations include Buildings Q1, Q3, Q4, Q27, Q32, B69 B200, B200E, B201, B202, B203, B204, B205, B206, B207, B208, B209, B210, B211, B212, B221, B232, B235, B238, B239, B240, B248, B255, B300 and new underground power and cabling connections between buildings. Note, B248 and B300 are have been removed from scope at the VA's direction. The TR in B240 will service B235 and B240. These buildings are physically connected with a circulation corridor. The TR in B201 will service B201 and B238. These two buildings are physically connected through the basement and a first floor connector. Project scope also includes the construction of a new, free standing Main Computer Room (MCR), located at the northeast campus boundary next to B209; building number to be determined. We have included as part of the 100% CD drawing submittal the scope of work in each of the buildings.

Preliminary work description for new, relocated, or expanded TRs below has received final VA Approval. Refer to the TR X Matrix for a full breakdown of upgrades for existing TR spaces to remain.

4 Reference Documents

Contractor is responsible for comporting with all current revisions of these documents.

4.1 VA Office of Electronic Health Record Modernization OEHRM Site Infrastructure and End User Device (EUD) Requirements

VA Office of Electronic Health Record Modernization OEHRM Site Infrastructure and End User Device (EUD) Requirements April 15, 2021 (Version 2.0 for Concurrence) Paragraph 2.9 Physical Security Design Requirements states:

New TR rooms and existing rooms undergoing modifications and upgrades shall comply with the following design manuals:

- U.S. Department of Veterans Affairs Office of Constructions & Facilities Management Telecommunications and Special Telecommunications Systems Design Manual.
- U.S. Department of Veterans Affairs Office of Information & Technology (OIT) Infrastructure Standards for Telecommunications Spaces Version 3.1 July 1, 2021
- VA Physical Security and Resiliency Design Manual.
- Telecommunications Industry Association ANSI/TIA-942-B Telecommunications Infrastructure Standard for Data Centers (See Page 16 paragraph 4.1 Architectural Standards and Space Design of VA Office and Information and Technology Infrastructure Standard for Telecommunication Spaces. Rev3.1).

4.2 Accessibility Codes

- Federal Architectural Barriers Act Accessibility Standards (ABASS)
- PG-18-13 VA Fire Barrier (A Supplement to Federal Barriers Act Accessibility Standards) Fire Design Guide, Dec 2011

4.3 International Code Council (ICC)

- IPC—International Plumbing Code, 2021

4.4 National Fire Protection Association (NFPA)

- NFPA 10 Standard for Portable Fire Extinguishers, 2022
- NFPA 13 Standard for the Installation of Sprinkler Systems, 2022
- NFPA 70 National Electric Code, 2020
- NFPA 70E Standard for Electrical Safety in the Workplace, 2021
- NFPA 72 National Fire Alarm and Singling Code, 2022
- NFPA 75 Standard for the Fire Protection of Information Technology Equipment, 2020
- NFPA 101 Life Safety Code, 2021
- NFPA 855 Standard for the Installation of Stationary Storage Systems, 2020
- NFPA 2001 Standard for Clean Agent Fire Extinguishing Systems, 2022

4.5 VA Design Manuals

- VA Office of Construction and Facility Management Design Manual August 1, 2014
- PG-18-1 Master Construction Specifications
- PG-18-3 Design and Construction Procedures—April 15, 2019
- PG-18-14 Room Finishes, Door and Hardware Schedule – March 2010
- PG-18-15 VOL CA/E submissions instruction of minor and NRM Construction Program Nov 2008.
- VA Fire Protection Design Manual— July 1, 2021
- VA HVAC Design Manual—November 1, 2017, Rev May 1, 2019, rev 3/1/2020
- VA Interior Design Manual for New Construction and Renovations of Hospitals and Clinics—November 1, 2020
- VA Electrical Design Manual – July 1, 2021
- VA Lighting Design Manual — December 2015
- VA Seismic Codes and Standards, H-18-8
- VA Sustainable Design Manual – Rev 1 August 18, 2017
- VA Asbestos Abatement Design Manual for New Hospitals, Replacement Hospitals, Ambulatory Care, Clinical Additions, Energy Centers, Outpatient Clinics, Animal Research Facilities, Laboratory Buildings – July 2011
- Physical Security and Resiliency Design Manual – October 1, 2020 (rev. Sept.1, 2021).
- Appendix A1 – VA Standard Security Door Types – October 1, 2020 (rev. Sept.1, 2021).
- Appendix A2 – Security Door Opening Schedule – October 1, 2020 (rev. Sept.1, 2021).
- Appendix A3 – Security Door Opening Matrix – October 1, 2020 (rev. Sept.1, 2021).
- Appendix 4 – Security System Application Matrix – October 1, 2020 (rev. Sept.1, 2021).

4.6 VA Directives

- 0055-Energy and Water Management Program—December 10, 2014
- 055- VA Sustainable Building Program—October 11. 2012
- 1028 FACILITY ELECTRICAL POWER SYSTEMS, dated February 24, 2020
- 6500 VA CYBERSECURITY PROGRAM Reissue 4 dated January 29, 2019
- 6512 SECURE WIRELESS TECHNOLOGY dated October 12, 2017

4.7 EHRM Program Design Alerts

- #1 HEFP 10NA5G 29 April 2020-Unshielded Twisted Pair Cable Length Limitations
- #2 HEFP 10NA5G 16 March 2021 VA OEHRM Help Desk Relocation
- #3 HEFP 10NA5G 20 April 2021 End User Training Requirements
- #4 HEFP 10NA5G 07 June 2021-Telecomm Room Space Requirements in Existing Buildings
- #5 HEFP 10NA5G 17 Aug 2021-Data Center Fire Suppression Requirements
- #6 HEFP 19HEFG 14 Oct 2021-Geographically Diverse Paths
- #7 HEFP 10NA5G 10 Dec 2022-Telecommunication Enclosures
- #8 HEFP 10NA5G 18 Apr 2022-Temperature and Relative Humidity in Telecomm Spaces
- #9 HEFP SEP 07 January 2023-Telecommunication Enclosures
- #11 HEFP SEP 14 Apr 2023-Power cord sets connecting Rack Power Distribution Units
- #12 HEFP SEP 02 May 2023-A/E Submission Instructions – Minor and NRM
- Added as part of this modification:
    - #15 HEFP SEP 16 May 2024 – Abeyance Guidance on TR MiniSplits
    - #16 HEFP SEP 12 August 2024 Telecommunication Room (TR) Adjustments and Active Work Area Outlet (WAO) Planning

5 Architectural Design Narrative

5.1 TR Location Requirements

- There must be at least one telecommunications room TR in a building under the EHRM program requirements.
- Each floor receives a minimum of one TR regardless of the size of the serving zone/number of Work Area Outlets (WAOs).
- TRs are not located adjacent to or under spaces with water (restrooms, break rooms, kitchens, et cetera). If unavoidable, water barrier is required between the spaces.
- TR's will be dedicated to telecommunications, allowing for the necessary mechanical, electrical, and infrastructure components to support the space.

5.2 Proposed New TR Locations

- See Drawings and the following Table summarizing the new TR and TE locations for Scope of Work.

BLDG.	PROPOSED ROOM NUMBER	ROOM AREA (sf)	DEPARTMENT	ROOM TYPE	CABINET TYPE	TE/TR NUMBER	APPROVED YES/NO	COMMENTS
Q1	106A	41	Administrative Quarters	TE Cabinet	Wall mount	TE #1		
Q3	110	29	Medical Lodgers Quarters	TE Cabinet	Wall mount	TE #2		
Q4	110	63		TE Cabinet	Wall mount	TE #3		
Q27	102A	68		TE Cabinet	Wall mount	TE #4		
Q32	105B	32		TE Cabinet	Wall mount	TE #5		
B69	102B	32		TE Cabinet	Wall mount	TE #6		
	C009A	132	OIT	TR		TR #7A		
	149	103	Telecomm	TE	Wall	TE #8C		
	196A	121	Pharmacy	TR	mount	TR #8A		
	210	153	Spinal Cord Injury	TR		TR #9A		
	358J	124	Same Day Surgery	TR		TR #10A		
	413	120	Medical Unit	TR		TR #11		
	C501B	97	General	TR		TR #12		
B200	635	111	OIT	TR		TR #13		TR #13 to serve 7th floor
	E13i	122	Patient Experience	TR		TR #7B		
	E122	111	Nuclear Med.	TR		TR #8B		
	E201	128	Audiology	TR		TR #9B		
B200E	E341	106	Renal clinic	TR		TR #10B		
B201	001A	36	Plant Operations	TE Cabinet	Wall mount	TE #37A		B201 will serve B238.
B202	207E		Engineering	TR		TR #44		Existing TR space
	---	---		TR		---		B203 Level 1 is served from TR #38 in B240
B203	302	111	OIT / Admin	TR		TR #17		B203 Level 2 is served from B203 Level 3
B204	200A	120	Nutritional Serv.	TR		TR #19		TR #19 is new room in Cafeteria space; TR #19 is to serve first floor of B204.
	108B	141	Primary Care	TR		TR #20		
	230A	122	HR	TR		TR #21		
B205	307E	135	Administration	TR		TR #22		
	145A	193		TR		TR #23		
	213	135		TR		TR #24		
B206	366	103		TR		TR #25		

BLDG.	PROPOSED ROOM NUMBER	ROOM AREA (sf)	DEPARTMENT	ROOM TYPE	CABINET TYPE	TE/TR NUMBER	APPROVED YES/NO	COMMENTS
	132A	117	Hospice	TR		TR #26		
	207	134	CLC Rehab	TR		TR #27		
B207	307A	127	CLC Dementia	TR		TR #28		
B208	107	93	Pain Clinic	TR		TR #29		
	123A	117	Police	TR		TR #30		
B209	203B	146	IT Administration	TR		TR #31		
B210	109	151	Theater	TR		TR #32		
B211	101	N/A	Fire Station	TE Cabinet	Wall mount	TE #33		Locked cabinet in Living Room
B212	100F	36	Laundry	TE Cabinet	Wall mount	TE #34		
B221	109	125	O.T & M.A.T. Shops	TR		TR #35		
B232	202	90	Gym, Pool	TR		TR #36		
B235	---		Chappel					B235 served from TR #38 in B240
B238	---		Chiller					Served by B201
B239	100-239A	35	Plant Operations	TE Cabinet	Wall mount	TE #37B		
B240	100A	99	Warehouse			TR #38		Serves B235 and Level 1 of B203
B248	020D 102G 202H	119 138 125	Veteran Benefits Administration	TR TR TR		TR #39 TR #40 TR #41		TR #39 to be built after MCR servers are relocated. TR #40: North wall of Office 102D will need to be dismanteled and re-assembled after TR construction
B255	106	33	Neurology	TE Cabinet	Wall mount	TE #42		
B300	109A	39	Hotel	TE Cabinet	Wall mount	TE #43		
MCR			OIT					

5.3 100% TR update.

- All TR's and TE's have received final approval from the VA.

5.4 All TR Locations

- The following table summarizes the status of all TRs at the Togus campus. Many of the spaces are existing to remain, some will be reused as LVSR's with existing equipment to remain, others will be expanded, and some will get new locations in buildings.

5.5 TR Sizing

- The size of the telecommunications spaces will meet the size standard for TR's based on the facility type and number of Channel Racks required.

- 1 Channel Rack model TR 80 sf 8' x 10'
- 2 Channel Racks Base model TR 100 sf 10' x 10'
- 3 Channel Racks Expanded TR 120 sf 10' x 12'
- 4 Channel Racks Expanded TR 140 sf 10' x 14'
- Additional racks will require approximately 20 sf per additional rack.

- Where TRs are being designed, replaced, expanded, or otherwise considered for use specifically in EHRM Modernization projects in existing buildings that provide healthcare, the guidance in HEFP SEP (SOCAMES 6) Design Alert 4 shall be used. This guidance requires a minimum of a 100 square foot 2-Channel Rack TR in a 10' x 10' form factor in lieu of the 170 square foot TRs required of new construction.
- TRs conform to the rectangular form factor described in Appendix B of the VA Infrastructure Standard for Telecommunications Spaces. Essentially, room width will vary per area and number of Channel Racks, and space provided by VA for new TRs. However, the typical room depth should be 10 feet, and the typical room width should be 8, 10, 12 or 14 feet.
- There are specific circumstances when construction of a conditioned Telecommunication Room (TR) is infeasible or impractical in non-clinical buildings such as engineering/maintenance buildings, warehouses, temporary modular trailers, and quarters that were converted to administrative space. In cases where existing space, structural or other constraints do not practically allow for construction of a TR, the use of a Telecommunication Enclosure (TE) is appropriate. Refer to HEFP SEP (SOCAMES 6) Design Alert 7 and HEFP SEP (SOCAMES 6) Design Alert 9.
  - Usage is limited to 96 or fewer WAO's.
  - Where 1-48 WAO's are planned a 12 RU (half-height) Standard TE is used where 49-96 WAO's are planned a 26 RU (full height) standardized TE is used

5.6 TR Doors

- Door Swing: Any new doors to the telecommunications rooms will open 180 degrees outward swinging.
- Door Rating: TRs are not required to have rated walls.
- Door Width: They will be a minimum of 36" wide.
- Door Height: 8 ft desirable. 7 ft minimum. No door sills. Existing doors housing TEs in Q buildings will remain as is. A variance request will need to be submitted to keep existing legacy doors at 7'-0".
- Door Types: New doors exposed to public view will be 1-3/4" solid core wood to match existing finishes. New doors in "back of the house" areas will be 16 gauge, ¾ hour fire rated painted hollow metal.
- Door Frame: New doors/frames will be equipped with a gasket. For security reasons doors must be equipped with mortise locks.
- New doors in existing rated corridor walls will have a rating corresponding to the wall type.

5.7 TR Door Hardware

- Mortise Lock: Manufacturer/Supplier—VA to Provide
- Core: Removable ## pin key-core Manufacturer/Supplier—VA to Provide.
- Carder Reader: Each telecommunications room will also be accessible with two factor ID authentication – PIN Pad and VA Programmed PIV Card access.
- Electronic Access Control Panel: Make/Model PACS controls and card readers.
- GDM will request information for the access control panels, card readers, scramble proximity sensors, RTE sensors, etc.
- Operation:

- Outside lever always rigid
    - Card reader retracts strike.
    - Inside lever retracts latch bolt at all times
    - Door monitor alarmed to existing central monitoring station at Campus Police Office

5.8 TR Windows

- Telecommunications rooms must not have windows.
- Existing windows in selected TR room locations will either be filled in or will have security grilles installed.

5.9 TR Flooring

- Carpet is not permitted in any telecommunications equipment spaces by VA Design Manuals and EHRM program standards. Static controlled vinyl tile is the proposed floor coverings.
- Floor Surface - Static dissipative tile
- Manufacturer quality and color to comply with VA Design Standards

5.10 TR Walls

- All new TR Walls shall be Type X gypsum board and metal studs, or CMU faced extended to underside of structure.
- Three walls must be lined with ¾" A-C grade (or better) plywood. The plywood will be fire retardant and coated with at least two coats of fire-retardant paint on all sides. The paint color will be semi-gloss bright white to aid with lighting in the rooms. The bottom of the plywood should be mounted 6" above finished floor (AFF). No electrical conduits, junction boxes or any other non-telecommunication systems equipment should be mounted on or across any backboard area.

5.11 TR Ceilings

- Drop ceiling or suspended ceilings are not allowed in telecommunication spaces.
- The minimum acceptable ceiling height is 8.5'. It will be unobstructed as much as possible to provide space over the equipment Channel Racks for suspended wire basket cable trays.
- Floor to ceiling: 12 ft minimum will be achieved to the maximum extent possible.
- Existing Dropped Ceilings will be removed from TR's.

5.12 MCR free-standing building

- Reference drawings for location of MCR.
- Approximately 3,400 gsf of building & 1,000 gsf of service yard will be required. Building to be comprised of the following:
    - Secured entrance Vestibule
    - Data Center
    - Fiber Entrance Rooms
    - Receiving
    - Unboxing

- Supply Room
- Storage Room
- Unisex toilet
- Housekeeping closet
- Workstations / Imaging
- Free Agent (gas) room
- Mechanical room
- Electrical room
- Utility yard to include generator / fuel storage tank

6 Mechanical Design Narrative

6.1 Codes and Standards

- American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE)
- Standard 62.1 – Ventilation for Acceptable Indoor Air Quality, 2019
- Standard 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings, 2019
- Standard 170 - Ventilation of Health Care Facilities, 2017

- International Code Council (ICC)
  - IECC – International Energy Efficiency Code, 2021
  - IFGC – International Fuel Gas Code, 2021
  - IMC – International Mechanical Code, 2021
  - IPC – International Plumbing Code, 2021

- National Fire Protection Association (NFPA)
  - 75 – Standard for the Fire Protection of Information Technology Equipment, 2020
  - 90A – Standard for the Installation of Air-Conditioning and Ventilating Systems, 2021
  - 99 – Health Care Facilities Code, 2021 (Chapters 8 & 9)
  - 101 – Life Safety Code, 2021

- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- HVAC Duct Construction Standards – Metal and Flexible
- HVAC Systems Commissioning Manual, 2nd Edition, 2013
- Seismic Restraint Manual Guidelines for Mechanical Systems, 3rd Edition, 2008

- US Department of Veteran's Affairs (VA)
- Computational Fluid Dynamics (CFD) Modeling Guidance, 13 February 2020
- HVAC Design Manual (Revision 3), PG18-10, 1 November 2021
- Infrastructure Standard for Telecommunications Spaces (version 4.0), 1 June 2023
- OEHRM Site Infrastructure and End User Device (EUD) Requirements (Version 2.0), 15 April 2021
- Requirements for VA Minor New Construction and Renovation Projects (i.e. Under $20,000,000)
- Sustainable Design Manual (Revision 1), 18 August 2017
- Telecommunications and Special Telecommunications Systems Design Manual, February 2016
- Whole Building Commissioning Manual (Revision 1), November 2013
- HEP SEP Design Alerts

6.2 Mechanical Design for the New Main Computer Room

- New Dedicated CRAC units (with humidification/dehumidification capabilities) will provide cooling & conditioning for the new MCR.
  - CRAC unit type will be selected to suit the requirements of the MCR space and data cabinet configuration.
  - CRAC unit capacity will meet or exceed the minimum N+1 capacity required by VA/DCIE requirements for each containment area.

  - Each CRAC unit will be connected to a dedicated outdoor condensing unit (where DX systems are used). Should hydronic systems be utilized for MCR CRAC units, a minimum of (2) dry coolers and (2) pumps will be provided for redundancy.
  - Refrigerant-side economizers will be provided for each CRAC system to maximize efficiency.
- Hot- aisle containment will be provided for the data cabinets (refer to architectural section).
- Design Criteria: Load calculations and equipment selections will be designed to meet VA HVAC Design Manual & OIT OEHRM Program requirements (72-81°F temperature range, 30-60% relative humidity, non-condensing).
- CRAC units will be networked together to allow automated staging of all units.
- CRAC unit operation will be managed by a Data Center Cooling Optimization (DCCO) system. This system will monitor the MCR space and rack environment as well as CRAC unit power usage, and provide enable/disable, temperature setpoints, and fan speed setpoints (capacity control) for the CRAC units in order to optimize energy usage in the system. The DCCO system will also manage unit teaming & load sharing as well as lead-lag duty rotation. The DCCO system will communicate with the CRAC units via the facility DDC system & LAN. The DCCO system platform will be installed on a virtual server assigned by VA OIT, and will be accessible via web browser.
- CRAC units will be networked by a wall-mounted switch with touchscreen, providing access to information for all connected CRAC units from a single point in the MCR.
- The MCR will be configured for positive pressurization. This will be provided by a small ERV unit with powered supply & exhaust and a heat recovery core. An electric duct heater will be provided to preheat incoming outside air as required.
- Wall-mounted HVAC shutdown switches will be provided for emergency shutdown of all mechanical equipment serving the MCR.
- HVAC equipment will also be configured for emergency shutdown triggered by the fire alarm system as well as the EPO (emergency power off) system. Refer to electrical documents for EPO system information.
- HVAC equipment will also be configured for emergency shutdown triggered by the fire alarm system.

6.3 Mechanical Design for the MCR Building Entrance Rooms

- New Dedicated CRAC units (with humidification/dehumidification capabilities) will provide cooling & conditioning for the entrance rooms.
- CRAC unit capacity will meet or exceed the minimum N+1 capacity required by VA/DCIE requirements for the entrance rooms.
- Each CRAC unit will be connected to a dedicated outdoor condensing unit.
- CRAC systems will utilize R-410a refrigerant.
- Design Criteria: Load calculations and equipment selections will be designed to meet VA HVAC Design Manual & OIT OEHRM Program requirements (72-81°F temperature range at rack inlet, 30-60% relative humidity, non-condensing).
- CRAC units will be networked together to allow automated staging of all units based on the manufacturer's built-in multi-unit controls.

6.4 Mechanical Design for the New MCR Building (Non-Data Spaces)

- New VRF (variable refrigerant flow) systems will be provided for heating & cooling of spaces outside the MCR space.
- Ventilation for the building will be provided by DOAS (dedicated outside air system) units.
- Electric unit heaters will provide additional heating at main entry points to the building (main entry vestibule & loading dock).

6.5 Mechanical Design for Telecommunication Rooms (TR's)

- New or relocated TR spaces, as well as existing TR spaces without dedicated cooling (as indicated on the X-Matrix document), will be provided with new dedicated conditioning systems. A dedicated DX-based mini-split system will provide cooling for these rooms.
- Mini-split units will be provided as single units without any redundancy for most TR spaces. In some TR spaces with higher loads, multiple systems may be utilized to meet the load requirements. Mini split systems will utilize R-454B refrigerant.
- Multiple mini-split systems may also be utilized in larger TR spaces where single systems are not capable of meeting the required space loads, as well as to provide some redundancy in the design.
- Mini-split system indoor units will have dedicated outdoor units.
- Design Criteria: Space conditions will be designed to meet the relaxed requirements of VA Design Alert 15 (8-80% relative humidity, non-condensing). These spaces will be included in the abeyance memo required by Design Alert 15.
- Based on recent guidance from DCIE & OIT on other EHRM projects we plan to use diversity to size the cooling equipment in the new TR spaces. Cooling loads will be as follows: 1 rack = 5kW, 2 racks = 7KW, 3 racks = 8.5kW, 4 racks = 10kW.
- Where possible to easily provide positive space pressurization using existing HVAC systems (such as TR spaces with existing supply ductwork), the TR space will be provided with limited direct supply air to positively pressurize the space.
- Spaces without existing easily-accessible/extendable sources of space pressurization airflow will not include any pressurization provisions, as allowed by Design Alert 15. These exceptions will be included in the abeyance memo required by Design Alert 15.

6.6 Mechanical Design for Telecommunication Enclosures (TE's)

- For buildings where a TE is being utilized but existing HVAC does not meet the standards identified in Design Alert 7, new mini-split units will be provided as single units without any redundancy.
- Optionally, data cabinets with integrated active cooling units may be provided, in which case separate mini-split units would not be provided.
- For buildings where a TE is being utilized but existing HVAC does meet the standards identified in Design Alert 7, no additional HVAC work will be included in the design.
- Mini-split system indoor units will have dedicated outdoor units. Mini split systems will utilize R-454B refrigerant.
- Design Criteria: Space conditions will be designed to meet VA Design Alert 7 (41-95°F ambient air temperature, 8-80% relative humidity range, dew point less than 82.4°F measured at the intake point of the TE).
- Basis of design for cooling loads at TE locations is 2kW per rack/cabinet.

6.7 Ventilation

- The existing ventilation systems for the building are intended to be re-used where possible and will be re-routed as necessary to accommodate the new data room configurations.
- Where re-routed, the modified systems will generally be assumed to have the same capacity & performance as the original systems.
- Generally it is assumed that the data spaces are not considered occupied spaces and will not require specific ventilation air provisions.
- For any new or modified non-data spaces, existing building ventilation systems (VAV and/or exhaust systems) will be utilized to provide ventilation for the new or modified space.

- Minimum ventilation airflow will be provided to meet VA standards and standard design practice.

6.8 Ductwork

- Ductwork will be steel sheet metal, fabricated rectangular or premanufactured oval or spiral wound round ductwork, all constructed per SMACNA guidelines.
- Flexible ductwork will be provided for connections to air inlets & outlets located in ceiling systems. Flexible duct sections will be limited to a maximum length of 5'.

6.9 Filtration

- Replaceable filters will be provided at each CRAC unit.
- Replaceable filters other than OSA intakes will generally be MERV-8 rated unless otherwise noted.

6.10 Air inlets/outlets

- Air inlets and outlets will be provided in each space as required to distribute airflow.
- Air inlets and outlets will be of aluminum or steel construction. They will be provided with a painted/coated finish as required to match surrounding surface finishes.

6.11 Louvers

- Fixed blade aluminum drainable-type weatherproof aluminum louvers will be provided where exterior wall louvers are required.

6.12 Insulation

- Ductwork will be externally insulated to meet IECC requirements.
- Duct insulation will be fiberglass wrap for interior applications.
- Piping will be insulated to meet or exceed IECC requirements.
- Hydronic piping insulation will be pre-formed fiberglass with an all-service jacket.
- Condensate piping insulation (where required) will be closed-cell elastomeric type.
- Refrigerant piping insulation will be closed-cell elastomeric type.
- Domestic water piping insulation will be pre-formed fiberglass with an all-service jacket.
- Exterior pipe or duct runs will be provided with aluminum jacketing over the insulation.
- Where required, jacketing will be painted to blend in with adjacent building construction.

6.13 Lining

- Close-cell neoprene or similar duct lining will be utilized where necessary for sound dampening within ductwork near fan-powered equipment.

6.14 Control Dampers

- Motorized 2-position (open/closed) dampers will be provided for all outside air intake & exhaust outlet locations. Shutoff dampers at OSA inlets and exhaust outlet locations will meet IECC leakage requirements.
- Modulating dampers will be provided at locations where control of airflow is required.

6.15 Fire/Smoke Dampers

- Fire and smoke dampers (or combination fire/smoke dampers) will be provided at all locations required by code.
- Combination fire/smoke dampers will be provided at all duct penetrations of data spaces if new rated enclosure assemblies are provided or existing for each space.
- Smoke dampers (and combination fire/smoke dampers) will be provided with integral duct smoke detectors or separately mounted duct smoke detectors. All duct smoke detectors will be addressable type and will be connected to the existing building fire alarm system.

6.16 Firestopping

- All firestopping installation locations will be Hilti fire stopping systems and comply with all applicable NFPA 101 requirements for firestopping identification and inspection at health care facilities.

6.17 Hydronic Systems

- Hydronic piping will be steel with grooved, welded, or threaded fittings, or Type-L copper with brazed or sweat fittings.
- 2-way or 3-way control valves will be provided for all new hydronic coil connections. The valves and actuators will be selected to be compatible with the existing DDC system and hydronic system operation.
- Coil connection kits will be provided for all new unit connections, and will include flexible piping (if required), control valve, wye strainer, isolation valves, and test ports.

6.18 Refrigerant Piping

- Refrigerant piping will be brazed copper.
- Isolation valving will be provided at each indoor & outdoor unit for ease of servicing.

6.19 Mechanical Controls

- The existing control systems at the facility are a mix of Honeywell XL500 and pneumatic systems. There is an upcoming project in development to replace the existing Honeywell DDC systems with a more current system, but the project has not been constructed yet and a new DDC vendor has not been selected at this time.
- GDM will specify a BACNet-based DDC system, with components that could be integrated into the future DDC system upgrade.
- A JACE or similar web server may be included with this project to allow complete system functionality in the case that the EHRM project is completed prior to the planned DDC system upgrade.
    - The JACE would enable the DDC system constructed under this project to be accessible over the LAN.
    - No dedicated head end computer would be provided with this project unless specifically requested by the VA.
- GDM recommends that a dedicated VLAN be set up on the updated LAN system being installed under the EHRM project. The VLAN will allow the facility DDC system to operate on the main VA LAN and remove the requirement for a fully separate LAN to exist on the campus.
- Existing DDC controls in TR spaces will be removed and replaced with new controls.
- TR spaces will be provided with combination temperature/humidity sensors connected to the DDC system.
- The MCR will have multiple combination temperature/humidity sensors connected to the DDC system to monitor the average temperature in the space.

- All new equipment (CRAC units, mini-splits, leak detectors, etc.) will be connected to the DDC system for monitoring.

6.20 MCR Data Cabinet Monitoring

- The temperature/humidity and temperature sensors will be connected to a smart controller device that will be connected to the DCCO system.
- The data cabinet sensors will be visible using the DCCO system web page.
- Selected data cabinets within the MCR will be monitored, to comply with OIT ISTS v4.0 requirements:
    - Cabinets at the ends of a contiguous row.
    - At least every third cabinet in the middle of a contiguous row.
- Monitored cabinets will have sensors at the following locations:
    - Temperature sensor at front/top of cabinet.
    - Temperature/humidity sensor at the front/middle of the cabinet.
    - Temperature sensor at the front/bottom of the cabinet.
    - Temperature sensor at the rear/top of the cabinet.

6.21 Variable Frequency Drives (VFD's)

- VFD's will be provided for various fan and pumping equipment provided under this project.
- VFD's will be connected to the DDC system for monitoring and control.
- VFD's will be Yaskawa per VA request.

6.22 Mechanical Alternative Systems Considered

- Campus Chilled Water Cooling: The existing campus chilled water system is drained down during the winter. This makes it unsuitable for use in providing cooling for data spaces, which will require cooling throughout the entire year.
- Existing HVAC Systems: The existing building HVAC systems are not controlled to maintain environmental conditions (particularly humidity) within ranges that meet the ISTS requirements. These systems are therefore not suitable for use to condition the data spaces.
- Snowmelt Systems: Snowmelt systems were considered for the project but have been deemed unnecessary per VA direction. The facility has established snow removal procedures for all areas and does not rely on snowmelt systems for outdoor safety purposes.
- Campus Steam System: The campus steam system was considered as an energy source for the new MCR building, particularly for snowmelt systems. The snowmelt systems have been removed from the project scope. Other systems have been selected due to efficiency as well as cost purposes – primarily due to expenses related to routing steam & condensate piping to & from the new MCR building location.

6.23 Plumbing Systems

- Domestic CW system connections will be provided for CRAC units to enable humidification functions.
- Each water connection to a CRAC unit will be provided with a strainer and isolation valve located outboard of the CRAC unit for ease of maintenance access.
- Sanitary drain connections will be provided for CRAC units to allow condensate drainage and drainage for dehumidification functionality.
- Existing plumbing system piping (such as vent, CW, HW, HWC, stormwater/roof drain) will be relocated to move liquid-carrying piping out of data spaces.

- Where it is not possible to relocate piping from within data spaces, leak prevention and mitigation provisions will be included.
    - The preferred option for piping will be to utilize double containment systems with leak detection in the data spaces with critical equipment. Where possible, drip legs for leak detection will be located outside of the data spaces.
    - A drain pan will be provided where double containment piping cannot be utilized. Each drain pan will be provided with a condensate pump with reservoir which will be pumped into the condensate drain line leaving the space from the indoor unit.
- Domestic Water Piping:
    - General Use: Type-L copper with brazed or sweat fittings.
- DWV Systems:
    - General Use: Solid-core PVC or ABS DWV piping or hubless cast iron DWV piping shall be used for new DWV systems.
- Domestic Hot Water Systems:
    - Water heating for the new MCR building will be provided by point of use water heaters at each fixture location.
    - Hot water will be delivered at 140°F for mop sink fixtures.
    - Hot water will be delivered at approximately 104°F for lavatory fixtures.
- Plumbing fixtures:
    - New sinks or lavatory fixtures will be commercial type, either stainless steel or vitreous china construction. Sink will be provided with a manual faucet.
    - New sinks or lavatory fixtures will be provided with thermostatic mixing valves for scald protection.
    - Floor drains and trench drains will be provided where required.
- Storm Drain/Rainleader Systems:
    - Solid-core PVC or ABS DWV or hubless cast iron DWV piping shall be used for new storm drain/rain leader piping.
    - Perforated PVC, ABS, or HDPE piping shall be used for footing drains at the new MCR building.
    - Roof drains with adjacent overflow drains will be located at low points on the roof of the new MCR building.
    - Roof drains and overflow drains and downstream piping within 10’ of drain locations will be provided with electrical heat trace.

6.24 Mechanical & Plumbing Space Coordination

- Where existing mechanical systems (HVAC duct, VAV units, mechanical piping, plumbing, etc.) are in data spaces, these items will be relocated to the greatest extent possible to be out of the data room space.
- Any liquid-carrying piping will be relocated to be outside of MCR space (wherever possible).
- Where existing plumbing fixtures are removed, branch piping will be demolished back to mains.
- Pipe Routing: Wherever possible, new piping runs will be located in ceiling spaces, existing or new mechanical chases, soffits, or furred-out areas where the piping is concealed from view. Piping in data or utility spaces will be run exposed except where required for leak prevention purposes as noted above.
- Where liquid-carrying piping cannot be relocated or removed, drip pans are provided above data equipment. Drip pans are specified with condensate pumps for drainage and leak detection which will be monitored by the facility DDC system.
- Exposed exterior pipe routes (such as refrigerant piping) will be grouped and arranged to maintain access to other equipment and systems.

- New mechanical equipment is selected and located to maintain all required clearances for the mechanical equipment as well as other equipment (such as data equipment, racks, electrical panels, etc.) in the space.

6.25 Mechanical & Plumbing Unknowns/Questions

- None

6.26 Mechanical & Plumbing Studies & Calculations

- HVAC load calculations for all new & modified spaces.
- CFD model for new MCR HVAC system.
- Plumbing sizing calculations for new MCR building.
- MCR fuel tank sizing calculations.
- MCR roof drainage sizing calculations.

7 Electrical Power System Design Narrative

7.1 Codes and Standards

- NFPA 70, National Electrical Code, 2023
- NFPA 72 National Fire Alarm Code, 2019
- NFPA 75 National Fire Protection of Information Technology Equipment, 2020
- NFPA 101 Life Safety Code, 2021
- VA Seismic Design Requirements (H-18-8)
- Underwriter's Laboratory, Inc (UL) Standards - 2019
- ANSI/TIA/EIA-568-B series, Commercial Building Telecommunications Cabling Standard, and its published addenda. -2017
- ANSI/TIA/EIA 568-C.0, Generic Telecommunications Cabling for Customer Premises, and its published addenda. - 2017
- ANSI/TIA/EIA 568-C.1, Commercial Building Telecommunications Cabling Standard, and its published addenda. - 2017
- ANSI/TIA 568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components. - 2017
- ANSI/TIA/EIA 568-C.3, Optical Fiber Cabling Components Standard, and its published addenda. - 2017
- ANSI/TIA/EIA-569-C, Commercial Building Standard for Telecommunications Pathways and Spaces, and its published addenda. - 2017
- ANSI/TIA/EIA-606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, and its published addenda - 2017
- ANSI/J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, and its published addenda. – 2017
- Building Industries Consulting Services International (BICSI) – 2019
- Telecommunications Distribution Methods Manual (TDMM) -2020

7.2 TR Electrical Power

- All new and existing TRs will have two 20A rack-mounted Power Distribution Units (PDU) and a 5kVA rack-mounted UPS per the OIT standards. All new and existing racks will have A/B side vertical 20A PDU's. Multi-rack rooms will have a 30A zone PDU fed from two L21-30R receptacles (serving 2 racks) or 60A zone PDU and two 60A circuits with direct wiring to a junction box (serving 3 racks)
- A minimum of two duplex convenience outlets should also be installed in the telecommunications spaces, located in a readily accessible location.
- Distribution equipment will be split between an A/B redundant systems as required by the OIT standards. 'A-side' systems will be fed from existing onsite diesel generation via a new Equipment Branch ATS. Any equipment with only one power supply shall be plugged in to the 'A-side.' 'B-side' systems will come from the existing normal (non- generator backed) power distribution system.

7.3 MCR Electrical Power

- A new incoming primary feed to new medium pad mount transformer from primary switchgear in Building 246 will be required.
- The power distribution system will consist of a 480Y/277V, 3-phase, 4-wire service to the new MCR building, including two (2) new Automatic Transfer Switches, various 480Y/277V and 208Y/120V distribution panels, two (2) 100kVA UPSs, and 208Y/120V, 3-phase, 4-wire branch circuit panelboards. Reference the Power One-Line Diagram and Specifications for equipment types, sizes, and quantities.
- Standby power is provided by (1) new 300KW diesel-powered generator.
- The entire electrical distribution system will be backed up by the generator system.
- Distribution equipment will be split between an A/B redundant systems as required by the OIT standards. 'A-side' systems will be fed from existing onsite diesel generation via a new Equipment Branch ATS. Any equipment with only one power supply shall be plugged in to the 'A-side.' 'B-side' systems will come from a separate ATS that is generator backed. A tie breaker will be required between the 'A-side' and 'B-side' distribution to allow N+1 redundancy with the ATS.
- The new UPS system in the MCR will be an N+1 configuration is still under investigation. We will upgrade and replace the existing ones as necessary to meet the requirements. MCR power distribution will be via busway, with power requirements for a raised floor room per ISTS and DCIE clarification in recent projects. MDA cabinets will be sized for 3.5kW each, with one passive A-side and one passive B-side location. HDA racks will be sized at 2.8kW per. Server/equipment distributor racks will be sized at 3.5kW per.
- An emergency power off (EPO) push button will be located at each exit within the data center room to shut down power.
- Lightning protection system will be provided based on a class II building per VA and NFPA 780 requirements.

7.4 Wiring Methods

- General wiring methods are to be in conduit. Minimum conduit size shall be 3/4".
- All conductors shall be copper with type THHN/THWN-2, or XHHW-2 insulation.
- Wiring for power and lighting will be solid conductors for #10 AWG and #12AWG, and stranded conductors for all cables #8 AWG and larger. Minimum size conductors for lighting and power wiring will be #12 AWG.
- Neutral conductors will be full size throughout the system as a minimum. Provide oversized neutrals for telecom distribution. No shared neutrals will be provided.
- The minimum size conductors for control wiring will be #14 AWG.
- The minimum size conductors for signal wiring will be # 22 AWG.

7.5 Grounding and Bonding

- Grounding for the building will be in compliance with Article 250 of the National Electrical Code. All electrical power and communication systems shall be bonded to the equipment grounding system for both safety and ground potential differences. All branch circuit conduits will contain an equipment ground conductor from panel ground bus to the devices and equipment served.
- The minimum size of any bonding conductor shall be #6 AWG copper.
- All conductor connections to bonding busbars shall be a 2-hole lug connector.
- All communication rooms will be provided with a bonding busbar connected to the building grounding electrode system.
- Per NEC and ANSI/EIA/TIA-607 requirements, the telecommunications grounding and bonding infrastructure shall be designed and routed through each telecommunications space. Each telecommunications room should be equipped with a Secondary Bonding Busbar (SBB) bonded directly to

the Telecommunications Bonding Backbone (TBB). The busbars should be a minimum of 12" in length, 4" in width and ¼ thick. They shall be drilled and tapped to accommodate standard NEMA complaint grounding hardware. The TBB should be a minimum of #6 AWG stranded copper grounding conductor and should be in conduits. All TBBs must be tied to the Primary Bonding Busbar (PBB) located in the equipment room (or main telecommunications room). The PBB must be bonded to the building system ground with a minimum of 3/0 AWG stranded copper bonding conductor (BC) The ohmic resistance to ground from any point to the telecommunications grounding system must not be more than 3 ohms.

- Each telecommunications room rack shall be equipped with a Rack Bonding Busbar (RBB) to connect active equipment via a #6 AWG Unit Bonding Conductor (UBC). Each UBC shall run individually from the equipment bonding lug directly to the RBB. RBB is connected to the SBB via the Telecommunications Equipment Bonding Conductor (TEBC) via a #6 AWG Rack Bonding Conductor (RBC). The rack itself shall be bonded to the RBB.

7.6 Lighting System

- Design of lighting and electrical power distribution systems shall comply with the PG-10 Lighting Design Manual (LDM) http://www.cfm.va.gov/til/dManual/dmLighting.pdf,
- Electrical Design Manual (EDM) http://www.cfm.va.gov/til/dManual/dmElec.pdf , and
- Physical Security Resiliency Design Manual where applicable.
    - Lighting will be served at 120V, single-phase, 60 hertz.
    - All lighting will be energy star rated. ASHRAE 90.1 – will be used for lighting power density and voltage drop calculations.
    - Emergency/egress and exit lighting will have emergency LED drivers.
    - Illumination levels will be provided to meet the requirements of the Illuminating Engineering Society Standards and VA requirements in PG 18-12. All stated illumination levels will be at average-maintained levels, calculated at the work surface using an 80% maintenance factor.
    - Spaces with exposed ceilings will be illuminated with direct/indirect, pendant mount LED fixtures.
    - LED lighting will be provided throughout the new spaces.
    - Exit identification will be provided to identify egress pathways in accordance with building codes.
    - Lighting controls will utilize stand-alone occupancy sensor wall switches and ceiling mounted occupancy sensors where required due to the size/layout of the new/modified areas.

7.7 Wiring Devices

- Specification grade 20-ampere switches and receptacles will be installed. Special ampere and voltage outlets are provided for specific equipment as programmed.
- Receptacles for telecommunications racks shall be locking type, 3-phase, 4-wire with ground, 20A rated (L21-20R) for single rack TRs and 30A rated (L21-30R) for dual rack TRs. Dual receptacles will be provided at each rack location, fed from separate sources, per the OIT standards.
- Receptacles for maintenance and special equipment will be provided as required by code. Receptacles will be provided per equipment layouts and equipment requirements.
- Receptacles will be provided in each space per program requirements.
- Receptacle and faceplate color shall be red for devices served from the UPS system, and white for all others.

- All receptacles in exterior locations will be in-use extra duty weatherproof with weather resistant GFCI type receptacles.

7.8 Raceways:

- A complete raceway system will be provided for all lighting and power conductors.
- Rigid metal conduit, intermediate metal conduit and/or electrical metallic tubing will be used within the building. Rigid metal conduit will be used where conduit is installed both exposed and in location that is susceptible to damage. Electric metallic tubing may be used in all other interior locations.
- If required, underground conduit will be PVC schedule 40 with Galvanized Rigid Steel bends, concrete encased.
- If used, exposed exterior conduit will be Galvanized Rigid Steel.
- Empty conduit raceway systems will be provided for any communication cables located in areas with non-accessible ceilings or exposed structure and coordinated with IT.

7.9 Miscellaneous

- Electrical power panels audio-visual (AV) systems, intercoms and similar in-house paging devices will not be located in any TR.

8 Telecommunication System Design Narrative

8.1 Codes and Standards –

- Contractor must conform to most currently adopted revisions available of the following at time of bid:
- NFPA 70, National Electrical Code
- VA Seismic Design Requirements (H-18-8)
- VA Infrastructure Standard for Telecommunications Spaces
- Telecommunications and Special Telecommunications Systems Design Manual
- VA Enterprise Facility IT Support Infrastructure Standards
- Underwriter's Laboratory, Inc (UL) Standards
- NFPA 101 Life Safety Code
- NFPA 72 National Fire Alarm Code
- NFPA 75 Standard for the Fire Protection of Information Technology Equipment
- NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems
- ANSI/TIA-526-7-A Measurement of Optical Power Loss of Installed Single-Mode Fiber Cabling Plant
- ANSI/TIA/EIA-568-B series, Commercial BuildingTelecommunications Cabling Standard, and its published addenda.
- ANSI/TIA/EIA 568-C.0, Generic Telecommunications Cabling for Customer Premises, and its published addenda.
- ANSI/TIA/EIA 568-C.1, Commercial Building Telecommunications Cabling Standard, and its published addenda.
- ANSI/TIA 568-C.2, Balanced Twisted-Pair TelecommunicationsCabling and Components.
- ANSI/TIA/EIA 568.3-D., Optical Fiber Cabling Components Standard, and its published addenda. ANSI/TIA/EIA-569-C, Commercial Building Standard for Telecommunications Pathways and Spaces, and its publishedaddenda.
- ANSI/TIA/EIA-606-C, Administration Standard for the Telecommunications Infrastructure
- ANSI/J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, and its published addenda.
- Building Industries Consulting Services International (BICSI)ANSI/BICSI N1-
- Telecommunications Distribution Methods Manual (TDMM) -14th Edition
- 802.3at-2009 - IEEE Standard for Information Technology—Local and metropolitan area networks—Amendment 3: Data Terminal Equipment (DTE) Power via the Media Dependent Interface (MDI) Enhancement
- 802.11ac – IEEE Standard for Information technology –Telecommunications and information exchange between systems – Amendment 4: Enhancements for Very High Throughput for Operation in Bands below 6 GHz.
- Wireless LAN (WLAN) Standard and WLAN Controller – Secure Configuration Baseline

8.2 Fiber Optic cabling:

- The new Telecommunication Rooms (TR) will provide a central termination point for fiber optic backbone cables. This room will provide space for required communications electronic equipment.
- Inter-building OS2 fiber optic backbone cabling will be provided from the MCR to TRs as called for on Fiber one-line sheets. New fiber optic patch panels, cable managers, and cassettes shall be provided within the new communication spaces as required.
- Intra-MCR OM4 fiber optic cabling shall be provided from MDA to MDA cabinets, HDA TO HDA cabinets, MDA to HDA Cabinets, and HDA to ED cabinets in the form of custom factory terminated trunks cables. New fiber optic patch panels, cable managers, and cassettes shall be provided within the new MCR as required.
- All TRs shall have fiber installed for A-route and B-routes.
- A-route and B-route underground fiber optic lines will be run underground via new and existing conduits, manholes and vaults.
- New TR spaces will be provided as shown in contract documents to provide compliance with OIT Infrastructure Standards.

8.3 New Workstation Outlets

- Single gang or two gang Stainless steel faceplate as required based on quantity of jacks at location. Typical will be two cables per standards, with single cables for wall phones, elevator controllers, WAP's, cameras, etc., and 4-port outlets where higher density is required per the station.
- All new 4-pair UTP horizontal cabling shall be Category 6A, LP rating of .5A or greater, outer diameter of .250" or smaller by design.
- Cables and faceplate shall be labeled in accordance with ISTS and ANSI/TIA-606-D
- The new surface mount workstation outlet locations shall be housed in Wiremold aluminum surface mount raceway
- Sized to accommodate four WAO cables with 40% spare capacity for future needs.
- New above ceiling and camera device cables shall be terminated using 2-port biscuit blocks, any unused ports will have blanks mounted in them, the same color as the provided jack.
- A minimum of a ¾" conduit is required for a two cable WAO. Where the existing conduit is not sized adequately for a standard or High Density outlet install new backbox and conduit stub up above ceiling grid.
- Spaces, pathways, outlet boxes, Category 6A cable to meet OEHRM requirements, workstation jacks, patch panel and mounting racks will be provided to serve as infrastructure for owner-provided data communication system. Provide Channel Racks in spaces where new racks are required.

8.4 Cable Pathways

- The horizontal pathway system is the pathway through which cables are pulled from the TR to the data outlets located throughout the floor or area. Pathways shall not be placed above private offices. Pathways over inaccessible spaces shall have correctly sized conduits or sleeves to transit the space. Outlets will only be connected to a TR on the same floor. Wiring pathways will be at least 12 inches from unshielded power lines of less than 480 volts and least 5" from any fluorescent light fixtures. Copper communications cable shall be supported at maximum of 5' distances by J-hooks sized along pathways for a maximum of 40% fill at any given location. Cable gravity droop shall not exceed 12".
- Fiber Optic communications cable shall be run in Plenum Rated orange corrugated innerduct or EMT.

- Penetrations through walls or fire barriers shall pass through via Hilti SpeedSleeves or equivalent EMT as called out on drawings.
- All penetrations shall be appropriately fire stopped and labeled.
- Existing cable tray will be re-used to the extent possible. New J-hook pathways will be installed above accessible ceilings for new cabling pathways.
- It is important that the path for the new cable J-hooks be clear of obstructions, such as HVAC ducts, large pipe and structural beams within the building. Where fire or smoke barriers are penetrated by the cable routing, Hilti Speed Sleeves shall be used to maintain the ratings of the fire barrier. The number of sleeves required depends on the number of cables. Use 50% fill ratio to determine the number of sleeves. Two additional spare sleeves should be installed to accommodate future cable placement.
- Cable pathway J-hooks will be placed above drop ceilings in corridors at distances no more than 5' on center. Pathways shall not be placed above private offices Pathways over inaccessible spaces shall have correctly sized conduits or sleeves to transit the space. There will be at least 4 inches of vertical spaces between the suspended ceiling tile and the bottom of the cable droop; 12 inches of vertical clearance from the top of the H-hook assembly to the floor or roof deck; and 2' total side clearance. See details for quantity of J-hooks required per location.
- J Hooks will not be attached to any existing ceiling grid wire or other existing supporting structure. Where cable routing pathway is passing through a hard-lid ceiling a minimum of 2 4" conduits shall be installed to transit hard-lid area. Conduits shall be fire blocked to maintain fire rating of any penetrated barriers. Conduits will not exceed 40% fill ratio, add 4" conduits as needed.
- Reuse exiting pathways as much as possible.
- The number of locations is based on the number of active ports plus 20%. With the exception that Bio-Med requires more medical equipment locations.

8.5 Main Computer Room (MCR)

- MCR will serve as the data communications center for the VA Togus campus.
- MCR building will have two divergent incoming pathways from service providers, 20meters (66') or more separation.
- MCR building will have two divergent outgoing pathways for A & B side fiber optic cable to each TR.
- Cabinets shall be cooled by perimeter wall CRAC units. See Mechanical narrative for details.
- All MCR copper cabling shall be distributed via cable tray mounted above the server cabinets on an all-thread and Unistrut trapeze. All MCR fiber optic cabling shall be distributed via a covered fiber optic channel system suspended above cable tray on a second level of the all-thread Unistrut trapeze. Intra-MCR cabinet cabling shall be factory terminated trunk assemblies.
- All fiber optic cables entering MCR from campus TRs shall be routed to their A and B MDA cabinets via the covered fiber optic channel system with appropriate service loop and TR location identification.
- MCR cabinets, RBBs, and cable trays, shall be bonded to the MCR SBB, SBB to the TBB.
- MCR shall have ten 24"x48"x45ru server cabinets, two contractor provide Oracle cabinets 24"x48", and Eight 48"x48"x45ru Telecomm cabinets.
- MCR and ERs shall be powered by utility and dedicated MCR building UPS.
- MDA, HDA, and Server cabinets shall have Equipment Distributer (ED) equipment packages in quantities as described in specifications and drawings. All fiber optic and copper cabling from MDA to HDA, and HDA to Server cabinets shall be factory terminated trunk assemblies.

8.6 Perimeter Raceway System

- In a perimeter raceway, power and telecommunications cables must be in separate compartments and must comply with applicable electric codes. When metallic barrier is provided it must be bonded to ground. The barrier must run continuously throughout the length of the raceway.
- A double –gang pull box must be placed in the wall at 10-foot intervals along the length of the raceway. Each box must have a 1-1/4 conduit to the cable pathway J-hooks.

8.7 Riser Conduits

- A minimum of four 4-inch vertical riser conduits are required between TRs with an additional 4” conduit for each additional 40,000’ of floor space above or below depending on floor of primary entrance.

8.8 Racks

- Racks in TRs shall be Channel Racks per OIT requirements. Provide the number of Channel Racks per TR as shown in enlarged details on TN sheets.
- All Channel Racks shall be equipped with vertical cable managers and populated with new equipment as shown on Rack Elevations sheets and called for on equipment schedules, which includes but is not limited to:
  - Horizontal cable managers
  - Angled 1 RU Fiber Optic Panels, rear cable manager, and related breakout cassettes.
  - Angled 1 RU unloaded copper patch panel(s) with rear cable manager and Cat 6A jack modules in colors appropriate to the application.
  - Empty rack space blanking panels
  - Two vertical PDUs and 5 kW UPS (see 7.2 for electrical requirements)
  - Zone PDU (zPDU) for TRs with multiple Channel Racks (see 7.2 for electrical requirements)
- All new TRs shall have horizontal cable distribution basket tray as shown in enlarged details on TN sheets.
- All new TR spaces shall have an SBB connected to the PBB via the Telecommunications Bonding Backbone (TBB).
- All new Channel Racks shall be equipped with an RBB connected to the TR SBB.
- A few smaller buildings, like quarters and some smaller buildings with historical preservation requirements, will have TE enclosures in lieu of TR’s built out.

8.9 Security System

- Card readers will be provided at interior doors of new IT spaces and tied into access control panels where possible.
- Existing card access controllers will be relocated from abandoned TR spaces to the new TR locations as required.
- Provide new access control panels for MCR building and all other locations that have insufficient capacity to support new card readers.
- New wiring from existing card readers will be provided from existing card reader locations to the new controller locations if a panel is relocated.
- Motion intrusion detection shall be provided in new TR spaces. Existing access controllers that do not have intrusion expansion cards installed shall have them provided to accommodate the new motion detectors.

- In addition to the space for existing controllers, a 4' x 4' section of wall shall be reserved within the TRs for the installation of the new card access controllers in future projects.

8.10 Video Surveillance System

- All TRs and both ERs shall have a digital IP-PoE camera(s) to cover the entrance and the entire room.
- MCR shall have digital IP-PoE cameras to cover all doors and complete coverage of the entire room including within HVAC containment.
- All cameras shall tie back to a new campus SSTV system.

8.11 MCR Duress Reporting

- MCR shall be provided with employee duress buttons at each entrance. The buttons shall be tied to the nearest existing panel, and report to the SCC via the existing system.

8.12 Paging

- MCR shall be provided with a paging Head End and speaker array compatible with and tying into the existing campus paging system.
- TRs shall be provided with a paging speaker tied into the existing, adjacent corridor system and zone.

8.13 MCR and TR Grounding and Bonding

- Grounding for the MCR and TRs will be in compliance with Article 250 of the National Electrical Code. All electrical power and communication systems shall be bonded to the equipment grounding system for both safety and ground potential differences. All branch circuit conduits will contain an equipment ground conductor from panel ground bus to the devices and equipment served.
- All communication rooms will be provided with new bonding system as shown on drawings to include bonding bars (wall and rack/cabinet) and copper bonding conductors. This will include bonding of racks, pathways and equipment bonding in rack/cabinet.

8.14 MCR and TR Fire Alarm

- MCR shall be provided notifications and detection devices.
- MCR shall be provided with a suppression system. See Fire Alarm specifications for details and requirements.

8.15 Phasing

- The design is to build the new MCR and new TR rooms first, then install the "A or B" side fiber backbone from the new MCR to the new TR's. Terminate test and label.
- Reuse existing WAO locations, ¾"conduit stub ups, cable trays, sleeves and "J" hook pathways as much as possible. Installation of new cat6A 4pair UTP WOA cabling will be installed, terminated and labeled at the new TR end, coiled as close as practical to the WOA location.
- Work at the WAO shall be coordinated with the COR, only work in one TR at a time should be attempted. Plan on only having a WAO location down for 4 hours maximum.
- After the first fiber backbone is installed, terminated, labeled and tested and the first core is moved over and activated the demolition of abandoned fiber backbones from the existing duct bank system can begin and then using the new spare conduits the other side of the redundant fiber design shall be installed, terminated, labeled and tested.

- To limit construction disturbance to the medical facility Identification of the locations of unidentified existing WOA's should be determined before new WOA cabling is installed. The goal is to install new cabling in any given area at one time, opening pathways for the installation of the new cabling as few times as possible.
- Test reports are to be submitted to the AE and approved before authorization to use cutover to the new infrastructure will be given by the AE.
- Switches are to be provided by the VA, all patch cables are provided by the contractor.
- VA devices cannot stay offline for longer than 30 days without being purged from the network. If a device is required to stay offline for longer than 30 days, the VA must be made aware prior to work so they can proactively address the issue.
- Inpatient buildings are to be constructed after hours, unless VA approves otherwise.
- ISP proprietary equipment to remain in the existing entrance rooms. Moving this equipment to the new ER's will only be scheduled after ISP coordination has been completed.

8.16 Demolition

- Demolition of all unused abandoned fiber optic backbone and 4pair WAO UTP cable, supporting pathways, sleeves, racks, and trays is included in this scope and will take place only after the VA has cut over to the new infrastructure.
- Demolition of all abandoned WAO locations from the patch panel/wall field port to the faceplate is required. Install a blank stainless-steel faceplate on all abandoned outlet boxes. This includes all legacy end user devices like surface mounted biscuit boxes, flush faceplates and surface mounted raceway. Remove all abandoned cable support systems in the ceilings not having been utilized in the installation of the new infrastructure.
- Demolition of the abandoned TRs will consist of existing racks and abandoned components. Patch panels, wire managers, fiber enclosures and patch cords. Floor mounted bolts will be rendered flush with the floor or removed. Wall mounted termination blocks that do not have any cabling connections will be demolished. Coordinate with the COR for any station request to retain any items before disposing of everything else.
- Abandoned surface raceway shall be removed, walls patched and painted to match existing.
- Ceiling tiles damaged during construction shall be replaced with new like tiles, any tiles with abandoned pathway sleeves shall be replaced with new like tiles without sleeves or holes.
- Firestopping and patching all rated walls and sleeves is required per code.
- Demolition of the existing MCR will be done after all the active equipment has been migrated to the new MCR.

8.17 MCR Migration Cabling and Power Cords

- No coordination with local OIT staff could be completed to acquire true quantities for patch cabling and fiber strands required for the core-to-core umbilical.
- Patch cable quantities for the MCR were developed using the Patch Cable Count calculation spreadsheet provided by SEP.
- SEP advised adding 72-Strand MM OM4 and 24-Strand SM OS2 for the temporary umbilical between core switches. Being that the new MCR will be in a different building. Per ISTS inter building fiber should be single mode OS2. Contractor is to provide 96-strand SM OS2 umbilical from the new MCR to the existing core switch location.

9 Fire Protection Engineering Design Narrative

9.1 Life Safety and Fire Code Compliance

The building modifications to house and accommodate the new EHRM system do not change the building construction type classifications or the building occupancy totals for the existing facility as defined under the IBC and NFPA building and fire codes. The new MCR building will meet NFPA 101 requirements for new construction. All new work within existing buildings for the EHRM modernization will meet NFPA 101 requirements for existing buildings as determined by the level of work being conducted. The majority of work is anticipated to meet the requirements of either a renovation or modification as defined by NFPA 101 Section 43.2.2.

Areas with the level of work meeting the definition of a modification will meet NFPA 101 Section 43.5, and newly constructed elements will comply with the requirements of NFPA 101 for new construction in accordance with NFPA 101 Section 43.5.1.3. Areas with the level of work meeting the definition of a renovation will meet NFPA 101 Section 43.4, and all new work will comply with the requirements of NFPA 101 for existing buildings in accordance with NFPA 101 Section 43.4.1.3.

There may be compliance issues with existing conditions. In accordance with NFPA 101 Section 43.4.1.4, no modifications will make the existing buildings less conforming with the code. The Togus VAMC campus is listed on the National Register of Historic Places, and buildings within this scope may qualify as historic buildings in accordance with NFPA 101 Section 4.6.4. Existing noncompliant conditions will be addressed on a case-by-case basis as appropriate to ensure a reasonable degree of safety is provided for all identified concerns.

The new MCR building is classified as a Business Occupancy per NFPA 101-2021 6.1.11.1. One-hour fire-resistance-rated construction is provided between the Data Center (Room 111) and adjacent spaces in accordance with NFPA 75-2020 6.1.3.2, and 45-minute rated doors and glazing assemblies are specified at all penetrations of this enclosure. Smoke-rated partitions are used where required by NFPA 101.

The Veterans Health Administration Office of Occupational Safety Health (19 HEF) has issued the ninth edition of the VA Fire Protection Design Manual, dated November 1, 2023, superseding the eighth edition of June 1, 2021. The requirements of the latest edition are incorporated into this project. Telecommunication spaces will be protected to meet the appropriate planned ANSI/TIA-942-B ratings as identified in the OIT Infrastructure Standard for Telecommunication Spaces for the respective space. In addition, the prescriptive requirements of NFPA 75 will be met for the MCR as an Information Technology Equipment area as defined by NFPA 75.

The MCR will be protected in accordance with NFPA 75. The Information Technology Equipment (ITE) will be housed in Data Center Room 111, designated as the ITE Room. Adjacent spaces within the Main Computer Room (including the Hot Aisle Containment) are protected by both wet-pipe sprinklers and a clean-agent total-flooding system. The following requirements will be met within the Data Center in accordance with NFPA 75:

- A clean-agent suppression system, including detection, notification appliances, and a releasing panel;
- 1-hour separation of the ITE Room;
- Combination fire/smoke dampers in duct penetrations of all boundaries of the ITE Room;
- Emergency lighting;
- Emergency power-off switches for electrical power;
- Emergency-off switches for HVAC.

Clean-agent discharge coverage includes both the main computer room volume and the hot-aisle containment volume, each with “double-knock” (two-detector) activation logic. Smoke detectors are spaced based on a 19-ft

ceiling height with an adjusted coverage area of 160 ft² per detector. Pre-discharge amber and discharge red strobes, manual release and abort stations, and NFPA 2001-compliant warning signage are provided inside and outside the protected space.

Data Center Room 111 will house UPS equipment with lead-acid batteries. Where the UPS battery capacity exceeds the kWh threshold quantities outlined in NFPA 855 Table 1.3, the fire-separation and suppression requirements of that standard will be implemented, including enclosure rating and sprinkler/clean-agent coverage as applicable.

9.2 Fire Extinguishers

Extinguishers will be provided in accordance with the VA Fire Protection Design Manual and NFPA 10. Clean-agent or CO_2 extinguishers are required for telecommunications rooms and enclosures, located outside each room but within 75 ft travel distance. Two clean-agent extinguishers and cabinets are provided within the MCR, and additional clean-agent extinguishers are provided for Entrance Rooms A 100 and B 112) A UL-rated 2A:10B:C 10-lb ABC extinguisher in a recessed cabinet is provided in Corridor 115, and two 40-B 20-lb extinguishers in weather-resistant outdoor cabinets are provided in the Utility Yard for generator protection.

Flag-type signage measuring 9 in × 9 in will be provided above every new extinguisher location per VA Signage Design Manual PG-18-10, Sign IN-01.31.

9.3 Fire Stopping of Wall Penetrations

The contractor will pull a permit on all fire- and/or smoke-rated walls that require new penetrations. They will also seal any penetrations in rated walls that are abandoned due to work completed for this scope in accordance with a listed penetration assembly corresponding to the appropriate rating of the barrier being penetrated.

UL-listed fire-stopping systems are required for all rated penetrations, including cable trays, conduits, piping, ducts, and any 1-, 2-, or 3-hour rated walls. A qualified third-party inspector must verify and document all installations.

9.4 Fire Detection and Notification

As part of the EHRM project, any new fire-alarm devices will be integrated into and be compatible with the existing campus fire-alarm network.

Both audible and visual alarms will be provided throughout the new spaces to meet NFPA and VA requirements. Smoke detection will be provided in telecommunication spaces in accordance with the VAFPDM and NFPA 72. Fire-alarm notification and detection devices will not be provided inside Telecommunication Rooms rated ANSI/TIA-942-B Class 1, consistent with VA guidance.

A new fire-alarm control panel will be provided for the MCR Building, connected to the campus fire-alarm fiber network via a dedicated conduit from Building 209 Room 4. The new panel will be designated with a unique node and integrated into the campus fire alarm network.

All fire-alarm wiring will be in red EMT conduit, and all sprinkler control valves, tamper switches, and water-flow switches will be monitored through the building fire-alarm system. Duct smoke detectors are provided for CRAC Units 1 and 2 and for all fire/smoke dampers serving the Data Center and Clean Agent Room. A local weatherproof water-flow alarm bell will be installed above the FDC. Communication between the MCR FACP and the main campus network is Class X.

9.5 Fire Suppression

Contractors for suppression systems are required to provide calculations and working drawings for new or modified systems. Contractors are required to provide updated flow-test information prior to submitting shop drawings for review.

In accordance with the VA Fire Protection Design Manual, telecommunication spaces will be provided with a wet-pipe sprinkler system. The new MCR Building will require a new underground fire service line installed in accordance with NFPA 24. The site plan specifies a 6-in PVC fire service connected to the campus main via a supervised post-indicator valve, transitioning to 6-in ductile-iron pipe 10 ft from the building. A hydrant is located 96 ft from the FDC, and a new two-way FDC connection is provided within 150 ft of that hydrant.

The sprinkler system within the MCR Building is designed per NFPA 13-2022, primarily Ordinary Hazard Group 1, with Light Hazard and Ordinary Hazard Group 2 areas as identified on the fire sprinkler hazard classification plans. Upright and pendent sprinklers are fusible-link, standard-response, intermediate-temperature type with UL-listed mechanical guards. Telecommunication zones are valved separately from other building systems. All sprinkler piping is Schedule 40 metal pipe painted red when exposed, and seismic bracing is required in accordance with NFPA 13. Fire Department Connection piping includes a bypass for forward-flow testing per NFPA 25.

An inert-gas clean agent suppression system will be provided in the Data Center Room 111 in accordance with the VAFPDM. The system will comply with NFPA 2001 and manufacturer specifications. The agent cylinders and releasing panel are located in Clean Agent Room 107, with pre-discharge amber strobes, discharge red strobes, and pressure-relief venting in accordance with NFPA 2001.

Existing and new telecommunication rooms will be protected by the existing sprinkler systems as light-hazard spaces and will not be provided with additional fire protection such as fire-rated walls, smoke detection, or gaseous suppression. Existing fire sprinklers will be relocated as needed for new ceiling configurations, and new upright sprinklers will be installed. Temporary sprinkler coverage is required when ceilings are removed during construction in accordance with NFPA 241.

The fire-sprinkler riser includes double-check backflow prevention with supervised butterfly valves, flow and tamper switches, a test and drain assembly, and a spare-head cabinet located near the riser. All acceptance tests including hydrostatic, underground flush, and backflow forward-flow, will be documented using NFPA 24 and NFPA 13 test certificates prior to final acceptance.

10 Structural Engineering Design Narrative

10.1 Structural Design

All new facilities, new additions, and existing buildings requiring major renovations and/or seismic strengthening have been designed in accordance with VA and local Standards for Togus, ME.

Where applicable, we have verified the load-bearing capacity of the existing structural elements to support the new design loads including all previous renovations. Where additional alterations need to be made to the structural elements in existing buildings, these elements individually and the buildings as units, must maintain adequate strength to safely resist both gravity and lateral loads. Any resulting deficiencies will be reinforced accordingly.

All structurally modified components will be brought into accordance with current code. Renovations that serve to increase the gravity load on any structural element by more than 5% will be brought into compliance with current code. Renovations that serve to increase the seismic force in any structural element by more than 10% will be brought into compliance with current code. We will evaluate and identify whether or not a full or partial seismic renovation is recommended per codes or VA Design Guides. No existing structural elements are being modified to require structural renovations.

10.2 Design Codes

A. International Building Code (IBC 2021)
B. American Concrete Institute (ACI 2019)
C. American Institute of Steel Construction (AISC 15TH Edition)
D. American Society of Civil Engineers (ASCE 7-16)
E. VA Seismic Codes and Standards (H-18-8)

10.3 Design Loading Criteria:

A. Minimum uniform basic design live loads will conform to current code. Increase live load above code limits where current and future program flexibility is required as discussed with the COR.
B. We will provide a 20 psf allowance for partitions on floors where the specified live load is less than 100 psf.
C. Provisions shall be made in designing floors for a concentrated load of 2000 lb, placed upon any space 2.5ft square, wherever this load upon and otherwise unloaded floor would produce stresses greater than those caused by the uniform load.
D. All building modifications and building components will be designed in accordance with a minimum IBC and ASCE Occupancy Category III per code regardless of building program. New work in essential Facilities will be classified as Occupancy Category IV per VA Design Guide.

10.4 Structural Systems

A. Foundation
    1. New foundations have been designed based on available geotechnical reports for the site. The geotechnical report has indicated a minimum 5,000 psf allowable soil bearing capacity on structural fill and a 5’-0” frost depth. Foundations have been designed with this criterion to comply with geotechnical engineering recommendations.
    2. The selected foundation system is a typical concrete spread footing and stem wall system. Where brick veneer requires support, an accessory CMU support wall is utilized from top of footing to bottom of brick.
B. Structural Steel Framing

1. We have provided Design Criteria including Governing Codes and Reference Standards, Deign Live and Dead Loads, Seismic and Wind Load and Factors; Material Strengths and Types of Concrete and Concrete Materials, Reinforcing Steel, Masonry, Structural Steel including Metal Deck, Welding, and Bolts, Miscellaneous Steel and Cold-Formed Steel within the Construction Documents and Specifications.
2. The structural framing option selected is Structural Steel beams and columns with Cold-Formed Steel interior and exterior wall framing. Primary structure consists of wide-flange steel beams supported by tube steel (HSS) columns. Exterior walls are designed with as a bypass system on the exterior of the steel frame and will provide the lateral resistance for the building.
3. We've compared the advantages and disadvantages for the various structural options with respect to the vertical gravity system, lateral load resisting systems, construction schedule impacts, campus construction activity impacts, and cost effectiveness to determine the selected structural system.
4. Where applicable, structural systems will utilize sustainable and low VOC materials and building practices where practical in accordance with sustainability and LEED requirements as required by VA Design Guides.
5. We have identified anticipated primary structure vertical and lateral deflections and designed the structural system to comply with the requirements of the coordinated exterior façade joints, movement of façade between level and façade support details. Requirements were determined based on acceptable levels of façade performance relative to building function after extreme seismic events.

10.5 Lateral System

1. Lateral load resisting systems shall be code compliant and detailed for post elastic ductility and energy dissipation with limited damage. The selected lateral system consists of structural steel building frame system with cold-formed steel framing sheathed with wood structural panels. Overturning in the lateral elements is resisted by steel holdown type anchors at each panel end as indicated in the Construction Documents.

11 Civil Engineering Design Narrative

11.1 Design Codes and Standards

- Site Development Design Manual
- Physical Security Design Manual
- VA Accessibility Barrier Free Design Standard
- OIT – Infrastructure Standard for Telecommunication Spaces Version 3.1
- VA Master Specifications
- Maine Department of Transportation
- International Building Code (IBC)

11.2 Project Description

- Per the VA provided Self-Assessment X-Matrix and the Scope of Work, the existing exterior fiber runs on campus will be replaced for the entire campus. A-route and B-route buried fiber optic lines will be run underground via new concrete encased 4” conduits, manholes and vaults. The construction of the new concrete encased conduits occurs under existing site improvements and will require trenching and trench restoration to existing or better conditions. Conduits will be buried typically 12” below frost line which in this region is roughly 6 feet below existing ground using multiple conduits and manholes at junction points not to exceed 300 feet or three 90 degree bends between manholes.
- A new MCR building has been proposed and sited. New utilities will be run to serve the building.

11.3 Site Preparation

- Site preparation for the new duct banks will consist of demolishing and removing existing landscaping, irrigation, hard surfaces such as asphalt and concrete, and other existing site improvements. These improvements will be restored to their existing or better condition upon completion of the new fiber optic runs.
- MCR building will involve clearing and excavation of an existing hill side adjacent to building 209. Approximately 1,000 cy yards of cut volume will be removed from the site and hauled offsite.

11.4 Site Grading

- There will be limited site grading in areas disturbed by the new duct banks. Site grading will be restored to match existing conditions.
- MCR building site grading will follow the VA site planning master specifications.
- Barrier free design standards criteria will be met.
- A two-tier rockery wall ranging from 0’ to 13’ in height and approximately 6’-6” in width will be surrounding the rear and sides of the new MCR. There will be approximately 10’ between the two walls and the area will be sloped towards to the back of the wall. The first wall which is closest to the new MCR will be approximately 335’ in length and a maximum height of 12’. The second wall will be located east of the first wall and will be approximately 215’ in length and a maximum height of 13’.
- Surface grading will shed water away from the building at a slope of 5% to 10%.

11.5 Asphalt and Concrete Pavement Section

- It is anticipated that the fiber optic lines will disturb existing asphalt and concrete surfaces. Disturbed asphalt and concrete surfaces will be restored to their existing condition. All trenches shall be backfilled and compacted appropriately.

- MCR building will receive concrete sidewalks, ramps, stairs, and curb ramps to allow pedestrian access to the building.
- An asphalt drive will connect to the existing pavement to the front of the new building.
- A two-foot loading bay well will be installed with drainage.

11.6 Drainage

- MCR building will be equipped with perimeter underground drainage network of catch basins, manholes, and culverts.
- The network will ultimately discharge at the adjacent ice pond through an outlet culvert on to riprap.
- Overland flow will route runoff to the catch basins via swales, flow lines, and warp lines.
- The wall footings will have an underdrain that will connect to the drainage system.

11.7 Domestic Water Distribution

- A 6” water service will be connected to the existing water main and routed to the back of the MCR building and stubbed to the proposed mechanical room.
- Two connections will be provided.
  1. 1.5” Domestic water service
  2. 6” Fire Service
- A fire hydrant will be installed to serve the building at the street.
- A Post Indicator Valve will be installed at the shared connection point at the water main.
- Sample point locations are provided for testing.
- Fill and flush locations are provided via double valved connection points at the existing main.

11.8 Sanitary Sewer Collection System

- Sewer service will be proposed to connect to the MCR from a newly proposed sewer main that flows via gravity to an existing manhole Number 6 between Building 200 and 209.
- The new main will maintain minimum slopes of 0.5%
- The main will core and connect to exiting manhole number 6.

11.9 Landscaping

- There will be no trees removed. The fiber optic lines will avoid existing trees. Landscaping areas disturbed will be restored to their existing condition. Where trees come within close proximity, root barriers may be required to avoid future conflicts.

11.10 Existing Utilities

- The fiber optic lines will be designed to provide appropriate vertical and horizontal clearance to avoid conflict with known existing utilities such as gas, electric, stormwater, domestic water, sanitary sewer, steam, and irrigation systems.

11.11 Pathways for Campus Fiber Backbone

- A field investigation of the existing telecommunication vaults confirmed the existing pathways were not usable and a new complete A and B side fiber OSP network was designed. The design considered the drone survey of the campus along with VA provided utility records. All known existing utility crossings have been captured on the fiber ductbank profiles for conflict resolution and separation.

12 Regulated Materials Abatement

Asbestos

GDM will be responsible for verifying all routes of work during the schematic design phase where Asbestos Containing Materials (ACM) will be disturbed by the new work. If any ACM is found along the route of construction GDM will complete a full survey that will be compliant with the sampling protocols of the Asbestos Hazard Emergency Response Act (AHERA) by inspecting the materials for damage, measuring the amount of material, and obtaining sample(S) for laboratory analysis. GDM will also provide a Certified Asbestos Inspector to complete a walk through and survey if any ACM is found along the construction route.

The contractor shall remove all hazardous materials as necessary to fulfill the demolition and construction requirements of this project. The contractor shall prepare an abatement plan in accordance with the requirements of the Maine Department of Environmental Protection.

The hazardous materials survey has been submitted as part of this design package, as *402-22-700 36C77623C0002 Togus EHRM - 100% Construction Documents Hazardous Materials Report 8-15-2023.*

Lead Paint and Flashings

GDM will be responsible for verifying all routes of work where Lead-Based Paint will be disrupted by completing a walk through. The objective of completing a walk through is to compare routes with the Togus VA Lead-Based Paint Program to determine if more testing for inspections is needed before construction phase. GDM will also provide a Certified Lead Inspector to perform inspection and testing if needed for the project. GDM will follow the guidelines, rules and regulations of federal and state agencies pertaining to lead programs on inspecting and testing measures.

The contractor shall remove all hazardous materials as necessary to fulfill the demolition and construction requirements of this project. The contractor shall prepare an abatement plan in accordance with the requirements of the Maine Department of Environmental Protection.

The hazardous materials survey has been submitted as part of this design package, as *402-22-700 36C77623C0002 Togus EHRM - 100% Construction Documents Hazardous Materials Report 8-15-2023.*

13 Infection Control

13.1 Infection Control Risk Assessment (ICRA)

It is important that during the bidding process, the construction contractor understands the ICRA precautions that will be required to accomplish this work.

The VA has provided the Patient Risk Groups for the various areas throughout the facility. After the extent of construction has been well defined, GDM has proposed Construction Project Types and Classes of Precautions to the VA for further review and approval.

14 Interim Life Safety Measures (ILSM)

The design for this project will include requirements for the construction contractor to provide Interim Life Safety Measures (ILSMs). An ILSM is an administrative action required to be taken to temporarily compensate for the hazards posed by construction activities. Measures taken that are designed to protect patients, staff, visitors and property from fire and smoke products of combustion, and may include but not be limited to the following:

The design will specify that a fire watch must be provided by the contractor when a fire alarm or sprinkler system is out of service more than 4 hours in a 24-hour period in an occupied building. Notification and fire watch times are to be documented.

Free and unobstructed egress must be maintained at all times. Prior to actions that would compromise normal exits and or egress routes, alternative or temporary exits will be identified, altered exit paths of travel clearly marked, and staff trained.

Access to building entrances, fire department connections, medical gas systems access points and fire or other emergency equipment will be free and unobstructed at all times.

Temporary construction partitions shall be constructed to assure that the potential for transmission of smoke, dust and contagious organisms are minimized. The partitions shall be constructed of materials that are non-combustible and smoke tight.

Smoking shall be prohibited in all construction and maintenance areas in addition to the general no smoking policies on campus. Use of heat sources for cutting, welding, or other operations shall be managed in accordance with NFPA 51B and OSHA standards.

The construction contractor’s debris-removal procedures shall effectively reduce the flammable and combustible fire load to the lowest level necessary for daily operations.