Smith Seckman Reid, Inc.

Mohawk Valley Health System – New Hospital

SSR Project No. 17420570

November 1, 2017

MEP DESIGN NARRATIVE

Project Description:

Project location: Utica, NY.

The project will be classified as Institutional I-2 per 2012 NFPA 101.

The building consists of approximately 670,000 square feet of new construction. The highest occupied floor will be at the ninth level. There is no basement or occupied floor below grade.

The building will be classified as a High Rise building as defined in IBC Chapter 2 and will be designed to comply with the requirements of IBC 403.

Codes and Standards:

The project will be designed under the following codes, standards and guidelines:

- NY State Building Code (adoption of the International Building Code, 2015, with amendments)
- NY State Energy Conservation Code (adoption of the International Energy Conservation Code, 2015)
- FGI/ASHRAE 170 Ventilation for Healthcare Facilities, 2014
- ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality
- ASHRAE 55 Environmental Conditions for Human Occupancy
- ASHRAE 90.1 Standard for Energy Conservation, 2013 (printing 2014)
- NFPA 10 Portable Fire Extinguishers
- NFPA 13 Installation of Sprinkler Systems
- NFPA 14 Installation of Standpipe and Hose Systems
- NFPA 30 Flammable and Combustible Liquids
- NFPA 45 Laboratories Using Chemicals
- NFPA 70 National Electric Code
- NFPA 90A Air Conditioning and Ventilation Systems
- NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Operations
- NFPA 99 Health Care Facilities Code, 2012

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- NFPA 101 Life Safety Code, 2012
- NFPA 110 Emergency and Standby Power Systems
- ANSI 9.5 Laboratory Ventilation
- OSHA 29 CFR 1910 Occupational Exposure to Hazardous Chemicals in Labs
- NIH Design Requirements Manual
- AAMI (Central Sterile environmental conditions)
- USP 797 Pharmaceutical Compounding
- USP 800 Pharmaceutical Compounding of Hazardous Drugs

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MECHANICAL SYSTEMS

Design Criteria

Outdoor design conditions:

Building envelope heat gain	ASHRAE 0.4% DB/MCWB
Building envelope heat loss	ASHRAE 99.6% DB

Indoor design conditions and air change rates:

Space Type	Heating	Cooling
Hospital spaces	ASHRAE Table 7-1 as listed in NY DOH Center for Healthcare Planning, Bureau of Architecture and Engineering Review	
Non Hospital spaces	Per IECC	

Space Type	Filtration
Spaces used for in-patient care and treatment	MERV-8 prefilters upstream of fans and cooling coils at central air handling units MERV-14 final filters downstream of fans and cooling coils at central air handling units
Non patient care areas	MERV-8 prefilters upstream of fans and cooling coils at central air handling units MERV-13 final filters downstream of fans and cooling coils at central air handling units

System Description - Airside

Central station air handling units will be provided on the roof. The air handling units will be double wall construction with no thru-metal thermal conduction and consist of the following sections:

- Return plenum
- Return fan array- provide design cfm with 1 fan down; 2 VFDs (N+1) to serve fan array
- Return damper
- 4" MERV-8 prefilter
- Access section
- Enthalpy plate/plate heat exchanger connected to exhaust air stream for heat recovery to comply with IECC requirements
- Access section
- Hot water preheat coil
- Access section

- Steam humidifier
- Chilled water cooling coil
- Ultraviolet light section
- Supply fan array- provide design cfm with 1 fan down; 2 VFDs (N+1) to serve fan array
- 12" cartridge MERV -14 final filters
- Discharge plenum

Return air from spaces shall be ducted back to the air handling unit.

Air from spaces such as toilets, etc. shall be ducted to the roof and exhausted via roof mounted exhaust fans.

Provide separate exhaust fan systems for following equipment (lab hoods in same space may be manifolded together; kitchen hoods will have separate exhaust systems):

- Lab fume hoods
- Lab Bio Safety Cabinets (separate from fume hoods)
- Pharmacy Compounding hoods
- Kitchen hoods
- Dishwasher hood
- Isolation room exhaust (multiple isolation rooms may be manifolded together)
- General exhaust

Supply, return and exhaust ductwork passing through 1 and 2 hour rated walls shall have type C curtain dynamic rated fire dampers. Ductwork passing through smoke barriers shall have airfoil blade fire/smoke dampers with end switches. Duct mounted smoke detectors shall be located within 5 ft. of smoke dampers. BAS shall monitor and report fire/smoke damper position by monitoring end switches on dampers.

System – Terminal Devices

The air handling units will supply conditioned air via medium pressure ductwork to double wall, pressure independent constant and variable volume terminal boxes with hot water reheat coils. Tempered air from the boxes shall be supplied via low pressure ductwork to ceiling diffusers. Terminal units shall reheat supply air from 55 F to 90 F using 130 F hot water supply.
Pressure independent air valves, equal to Phoenix, Tek-Air or Accuvalve, will be utilized in following areas:

- Operating rooms- supply and return, for night setback; provide hot water reheat coils on supply valves.
- Laboratory- supply and exhaust, for pressure control; provide hot water reheat coils on supply valves.
- Isolation rooms – supply and exhaust, for pressure control; provide hot water reheat coils on supply valves.

Air inlets and outlets in spaces shall be as follows

- Ceiling diffusers unless noted otherwise: Titus TMS louvered face, 4 way blow
- Ceiling diffusers (Waiting areas, public corridors): slot diffusers, Titus MLF

- Ceiling diffusers (OR, Isolation rooms, labs with fume hoods): laminar flow Titus TLF
- Ceiling return registers: 1/2'" eggcrate aluminum grid Titus 50 F
- Sidewall supply and return registers: Titus 350

Hot water radiant panels will be used along the perimeter wall of patient rooms.
Hot water fin tube heating, pedestal mount, with extruded aluminum grilles and custom color architectural enclosures, shall be utilized in the following spaces:

- Lobbies with curtain wall glazing
- Vestibules

System – Heat/Cool Source

New centrifugal water cooled chillers will be located in the CEP.

- Centrifugal chillers: 3 chillers at 750 tons each
- Cooler capacity: 52 F entering chilled water, 42 F leaving chilled water
- Compressor efficiency: maximum .52 kw/ton full load
- Condenser capacity: 85 F entering condenser water, 95 F leaving condenser water
- Motor / drive: hermetic motor, unit mounted VFDs
- Arrangement/operation: parallel, variable primary flow
- Chillers are sized so that, if largest chiller is down, remaining chillers can provide 80 % of peak cooling demand.
- Chilled water pumps shall be arranged and sized one per chiller using VFDs.
- Cooling towers: induced draft, cross or counterflow, arranged in parallel.
- Cooling towers shall have remote sump inside the CEP
- Cooling tower quantity and size: 3 towers, each at 2250 gpm from 95 F to 85 F, 76 F ent wb
- Condenser water pumps shall be arranged and sized one per tower.
- 16" chilled water mains will be extended from the CEP to the hospital.
- Double wall plate/frame exchanger to preheat domestic hot water from condenser water
- Closed circuit cooler: 1 cooler at 400 tons to provide chilled water in winter conditions

New heat recovery chiller shall be located in the CEP.

- Quantity and size: 1 chillers at 300 tons.
- Arrangement/operation: sidecar, upstream of centrifugal chillers
- Cooler capacity: 52 F entering chilled water, 42 F leaving chilled water
- Condenser capacity: reject heat to 130 F heating hot water system
- Chilled water and condenser pumps sized for the heat recovery chiller shall use VFDs.

New steam boilers will be provided in the boiler room for domestic hot water, sterilizer and humidifier steam.

- Operating pressure: 150 psig design pressure, 80 psig operating setpoint.
- Type: equal to Fulton VMP
- Fuel: natural gas and #2 fuel oil
- Quantity and size: 4 boilers at 5000 lb/hr each.
- Boilers shall be sized to provide redundancy so that, if the largest boiler is down, the remaining boilers can provide 100% of the peak demand.

- Dearator: .005 cc/L, 5 psig operating pressure, sized for the total capacity of all connected boilers; equal to Fulton FD-400H

New hot water heating condensing boilers will be provided in the boiler room.

- Supply water temp: 130 F
- Fuel: natural gas and #2 fuel oil
- Arrangement/operation: variable primary flow (boilers shall not require separate primary circulating pumps)
- Quantity and size: 8 boilers at 6 mmBtu/hr input each
- Boilers shall be sized to provide redundancy so that, if the largest boiler is down, the remaining boilers can provide 100 % of the peak space heating demand.
- New heating hot water pumps each sized at 50% of peak load (2 and 1 standby, VFD control) will be installed in the central energy plant.
- 12" hot water mains will be extended from the CEP to the hospital

Systems- Fuel Systems

One fuel oil tank, 50,000 gallons, will be installed to store No. 2 fuel oil.

- Location: underground
- Type: double wall, fiberglass, U.L. listed.
- Connecting supply and return piping: double wall, U.L listed for fuel oil piping
- Size: to provide 60 hours of operation of the generator at a demand of 100% of full load demand and 48 hours of operation of the boilers at a demand of 70% of full load demand.
- Circulating pumps: rotary gear, one and one standby, located in the boiler room to draw fuel from the main storage tank, circulate fuel to the generator day tanks and boilers and return unused fuel to the main storage tank.
- A fuel oil filtration system will be provided to periodically clean the fuel when there is no demand for fuel supply.
- Packaged controls for operation of fuel oil circulating pumps, tank level monitoring and leak detection of tank and underground piping; provide safeties and alarms with communication capability to the Building Automation System. Control and interface between generator controls and pump controls shall be hard-wired.

Controls

All valve and damper actuators and thermostats shall be DDC.

A new Building Automation System will be installed to monitor and have central control capability for all mechanical equipment, including replicating information from equipment VFDs. The BAS shall web-based communication capability. The BAS shall also monitor room pressure monitors, domestic hot water supply temp as well as misc equipment alarms (lab and pharmacy refrigerator temperatures, etc.).

Commissioning

The owner will direct the services of an independent Commissioning Agent. The CxA will develop and establish a commissioning plan for all of the systems listed herein.

Special Project Requirements

Isolation rooms will have Phoenix air valves on the exhaust air system.

Room pressure monitors equal to Setra will be provided for each Isolation room, each OR, Central sterile clean/dirty area boundaries, laboratory area boundaries and shall communicate to the BAS. Isolation room exhaust fan systems shall be plume type with effective stack height of 25 ft. with redundant fan equal to Strobic Air.

The laboratory area will have Phoenix tracking air valves on supply and exhaust to maintain negative pressure in the lab area. Lab hoods shall use sash monitors to control exhaust air valves. The laboratory exhaust system shall be plume type with effective stack height of 25 ft. with redundant fan equal to Strobic Air.

Stair pressurization fans shall be provided on the roof near each patient tower stairwell. Elevator shafts shall have smoke dampered roof hoods. A fireman's control panel shall be provided in accordance with operational capability per state and local fire marshal requirements.

Materials of Construction

- Medium pressure ductwork: galvanized steel sheet metal, SMACNA pressure class 6"
- Low pressure supply ductwork: galvanized steel sheet metal, SMACNA pressure class 1"
- All ductwork longitudinal and transverse seams and joints shall be sealed using water based brush-on mastic UL 181 compliant (pressure sensitive tape not acceptable).
- Ductwork insulation (all materials to have max flame spread/smoke developed rating of 25/50):
    - Concealed supply: 2", ¾ lb density fiberglass batt, alum foil facing
    - Exposed supply in mechanical rooms: 2", 1-1/2 lb density rigid fiberglass, alum foil facing
    - Insulate return duct in top floor same as supply.
    - Exposed insulation (supply, return, exhaust) on roof: 2" rigid fiberglass with weather proof wrap. Use 1" on exhaust to hold the weatherproof covering.
- Return ductwork: galvanized steel sheet metal, SMACNA pressure class 2".
- Exhaust ductwork: galvanized steel sheet metal, SMACNA pressure class 2"
- Fume hood and BioSafety Cabinet ductwork: match same material as hood or cabinet connection.
- Kitchen hood grease duct: welded black steel installed per NFPA 96
- Dishwasher exhaust duct: welded aluminum or stainless steel
- Sterilizer exhaust duct: welded aluminum or stainless steel to riser
- HVAC water piping: black steel, schedule 40, threaded or welded joints or Type L copper with soldered joints
- HVAC steam and condensate piping: black steel, seamless, threaded or welded joints; use schedule 40 for steam and 80 piping for condensate
- Refrigerant piping: ACR copper, flared fittings
- Piping insulation (all materials to have max flame spread/smoke developed rating 25/50 and thickness in accordance with IECC):
    - Chilled water: rigid fiberglass

  - Heating hot water: rigid fiberglass
  - Refrigerant piping: closed cell preformed, Armaflex
  - Steam and condensate: rigid fiberglass
- Valves: HVAC circulating water:
  - Isolation valves: 2" and below- full port, 600 psi, bronze ball valves; 2-1/2" and above- lug type 200 psi, class 125, iron body butterfly valves. All isolation valves shall be bi-directional and rated for dead end service.
  - Check valves at pumps: iron body, bronze seat, class 125 non-slam check valves.
  - Check valves at coils: iron body, bronze swing check valves, class 125
  - Balancing valves at terminal devices with water coils: Autoflow pressure independent valves preset for terminal water flow.
  - Balancing valves at air handling units and fan coils: B & G circuit setter.
- Valves: Steam and Condensate:
  - Isolation valves: 2" and below- class 150 bronze gate valves; 2-1/2" and above- class 125 iron body gate valves.
  - Check valves: 2" and below- class 150 bronze swing check valve; 2-1/2' and above- class 125 iron body swing check valve.

ELECTRICAL SYSTEMS

Utility Service

Underground utility service will be provided by National Grid from the Terminal Substation. Two independent 13.2kV utility feeders will be terminated in a hospital-owned 15kV metal-clad primary switchgear assembly located in the hospital central plant. The normal power primary switchgear assembly will use ANSI class construction and contain draw-out style vacuum breakers, and be arranged in a main-tie-main configuration, with a closed-transition auto transfer scheme between utility sources. It is 500 mVA rated and will feed 480Y277V secondary unit substations in the Hospital.

Two means of egress per National Electrical Code (NEC) requirements will be provided from the normal power service switchgear room.

Normal Power Distribution

The secondary unit substations will be radially fed from the 15KV normal service switchgear and constructed as double-ended with main-tie-main secondary's utilizing auto transfer to provide full redundancy. Each will consist of primary vacuum breakers close-coupled to a cast coil transformers connected to a secondary buses with electrically-operated low-voltage, draw-out, power circuit breakers, all constructed to ANSI requirements. Transformer protection will be provided via a transformer differential protective relay which will minimize the arc flash incident energy level on the transformer secondary bus. All unit substations will be 13.2kV-480Y277V switchgear and will be metal-enclosed, rear-connected, with secondary main buses braced for 100,000 AIC fault duties. Available interrupting capacities will range from 65,000A to 100,000A. Power for the hospital will originate from four (4) unit substations and power for the central plant will originate from one (1) unit substation. Each unit substation transformer will be dual rated, utilizing forced air cooling to achieve a power capacity rating that is 133% of the base power rating. The secondary main and feeder distribution breakers in the substation switchgear will also be provided with ground fault protection to provide the two levels required by the National Electrical Code (NEC).

The secondary main overcurrent protective devices will be electrically-operated low voltage power circuit breakers, draw-out type, 100%-rated with adjustable trip units with long time, short time and ground fault (LSG) characteristics. Each main breaker will display, as a minimum, voltage, current, real, reactive and apparent power, frequency, and power factor as well as perform diagnostic functions in an integrated digital display.

The distribution sections in the switchgear will serve the distribution switchboards, power panelboards, and the normal feed to all automatic transfer switches. The overcurrent protective devices in the distribution sections of the switchgear will be electrically-operated, 100% rated low-voltage, draw-out power circuit breakers. Trip units on the breakers will have long time, instantaneous and ground fault (LIG) tripping characteristics. The distribution circuit breakers will have the same interrupting capacity as the secondary main breakers.

Distribution panelboards (1200A-rated and below) or switchboards (1200A-2000A rated) will serve the remainder of the building loads, including mechanical equipment, branch circuit panelboards, and elevators. This equipment will utilize molded case circuit breakers equipped with solid state, electronic trip units. All panelboards and switchboards will be provided with 25% spare capacity, for both available ampacity and circuit breaker spaces.

Two means of egress per NEC requirements will be provided from all electrical switchgear rooms, including those of the Essential Electrical System (EES), which fall under NEC Article 110-26 requirements.

Grounding System

The facility electrical system will utilize a solid grounded system. Main switchgear grounds will be bonded to the incoming main water line, the existing tri-pod ground rod system, any building steel components as well as the existing two 500 kcmil bare copper conductors in the footing under one wall of the Main Electrical Room. 500 kcmil bare copper conductors will be routed from the main switchboard ground bus to each Electrical and Telecommunications equipment room and extended vertically up through the building. The bare conductors will terminate at two 4" x ¼" x 24" long copper ground bars with two 500 kcmil lugs. Additional holes will be provided in the ground bars to terminate eight (8) #2 lugs. The eight lugs will be available to ground transformer secondaries and telephone backboard grounding conductors.

Surge Protection

A surge arrester will be installed at the 15kV main service switchgear. A minimum of three (3) levels of surge protection equipment will be provided in the power distribution system downstream of the unit substations. Surge protective devices will be installed at unit substation secondary mains (load side) and at all downstream locations such as switchboards, distribution panelboards, branch circuit panelboards, including the Essential Electrical System (EES). They will be installed at the fire pump controller, all automatic transfer switches, and panelboards on secondary, separately derived systems.

Motor Control

No motor control centers are projected for the Hospital. Equipment requiring starters will be provided with individual combination starters. Variable Frequency Drives (VFD) will be provided for fan and pump motors noted indicated. VFD's will serve as disconnecting means if within sight of the motors. Harmonic mitigation measures will be required due to the significant number of VFD-controlled motors.

Uninterruptible Power System (UPS)

UPS power will be provided by a central 750 kVA, 480Y/277V static system. Power will be distributed to each telecommunications equipment room, the central hospital lab, and the central pharmacy via a dedicated distribution system. The UPS system will be connected to both normal power and the Essential Electrical System (EES) via automatic transfer switches. This system will provide adequate "ride-through" time to allow the generator system to pick up these loads.

Essential Electrical System (EES) Power Distribution

Emergency power will be provided by two (2) paralleled 1750kW diesel generators at 13.2kV. Paralleling switchgear construction will match the normal power 15kV switchgear construction with respect to style and type. The paralleling switchgear will feed the secondary unit substations dedicated to essential systems in the hospital and central plant. These substations will match the normal power secondary unit substations with respect to style and type.

The Essential Electrical System (EES) will be sized to supply generator power for the hospital and central plant automatic transfer switches supplying loads from the Life Safety, Critical, and Equipment Branches. It will also provide limited generator power for the chilled water system, enabling some areas of the hospital to maintain cooling. Automatic transfer switches will be three or four pole, closed transition, bypass isolation type.

Loads served from the Life Safety branch will include:

- Egress lighting
- Exit signs
- Fire Alarm Systems
- Medical Gas Alarm Systems
- Communications systems used for issuing instructions during emergency situations
- Elevator cab lighting, control, communications, and signal systems
- Generator set locations, accessories, and auxiliaries
- Automatic doors used for building egress

Loads served from the Critical branch will include:

- Critical Care spaces utilizing anesthetizing gases, task illumination, selected receptacles and fixed equipment
- Isolated power systems
- Patient care spaces, task illumination and selected receptacles in Infant Nurseries, Medication Prep areas, Pharmacy Dispensing areas, Acute Nursing areas, Psychiatric bed areas, and Nurse Stations
- Nurse Call System
- Code Blue System
- Blood, Bone and Tissue Banks
- Telecommunications equipment rooms
- Specimen and lab refrigeration equipment
- Task lighting, selected receptacles, and power circuits for general care patient beds, Angio labs, Cath labs, CCU, hemodialysis areas, Emergency room treatment areas, human physiology labs, ICU, and postoperative recovery rooms
- Patient Information Network data servers
- Security Systems

Loads served from the Equipment branch will include:

- Medical air compressors (but will have power restored in 10 seconds or less)
- Medical vacuum pumps (but will have power restored in 10 seconds or less)
- Selected elevators
- Kitchen hoods, including the hood fire suppression system

- Stair pressurization fans
- Smoke control fans and smoke control system auxiliaries
- Sump pumps, sewage ejector pumps, and sanitary pumps
- Domestic water booster pumps
- Hospital boiler system, including controls and fuel oil pumps
- Exhaust fans removing toxic, explosive or flammable fumes
- Air handling equipment
- Water treatment equipment
- Building Automation Control System
- Pneumatic tube system
- Fire suppression jockey pump
- Electrically-driven fire pump (but will have power restored in 10 seconds or less)
- Selected Kitchen refrigeration
- General purpose receptacles for Electrical Rooms, Elevator Equipment Rooms and Telecommunications equipment rooms
- Sterilizers
- Automatically operated doors

Isolated Power System (IPS)

Isolated power panelboards will be provided in Operating Rooms, Cath Labs, and Trauma Rooms, and any other locations which are deemed "wet location" and interruption of power due to ground fault cannot be tolerated. The isolated power panelboards will be rated at 7.5kVA and include an isolation transformer and line isolation monitor. Each isolation panelboard will include provisions for twelve circuits. A separate 3-phase isolated power panel shall feed laser outlets in the operating rooms.

Vertical Power Distribution

Separate vertical conduit and wire risers will be provided in the tower for normal, Life Safety, Critical, and Equipment branch systems. These risers will be located in stacked electrical rooms in order to minimize horizontal offsets. "Emergency" feeders as defined by the NEC will be protected either by installation in fully sprinklered spaces or by the use of 2-hour rated installations.

Power Monitoring

All medium voltage switchgear, unit substation main breakers and automatic transfer switches will be provided with multi-function meters with Modbus RTU (RS-485) and Ethernet connectivity. These meters will be networked and include waveform capture as well as harmonics measurement capability. All draw-out breaker trip units will be monitored for status and alarm conditions, and will include basic metering of volts, amperes, frequency, and power functions.
All unit substation transformers will be provided with temperature monitor and fan controls with Modbus RTU and/or Ethernet connectivity.

Power Distribution System Coordination

Protective device selective coordination for all systems, including normal power, will meet the 0.1 msec threshold. This exceeds the requirement as listed in the NEC, Article 517.31, paragraph G.

Lighting System

An LED type lighting system will be provided for both interior and exterior lighting. The Illuminating Engineering Society's Illuminance Selection Procedure will be used for establishing target maintained illumination levels throughout all areas. Specific influences of glare, task complexity, surface reflectance characteristics, veiling brightness and user age are addressed with this procedure.

Local codes will take precedence when they dictate the use of alternative procedures or require minimum lighting levels for specific areas. Lighting power density requirements indicated in the energy code will be observed.

Lighting and Receptacle Controls

Control of lighting and selected receptacles will comply with IECC 2015 (as amended) and/or ASHRAE 90.1, 2013 edition (as amended).

Lightning Protection System

The building shall be provided with a lightning protection system, which shall conform to the requirements of Underwriter's Laboratories for a Master Label. The lightning protection system will include roof-mounted air terminals, down conductors and grounds. All metal items on roofs, such as exhaust fans, pipes, gutters, downspouts, and ladders will be connected to the lightning protection system. Conductors, terminals and fittings at the roof line will be aluminum. Components below the roof line will be copper. Down conductors will be installed in PVC conduit.

Fire Alarm System

The building will be provided with automatic, multiplexed, addressable, microprocessor based fire alarm system. The main fire alarm control will be located in the Fire Command Center. Supplementary power supply and terminal cabinets will be required in different areas and floors of the building.

Manual pull stations will be provided at egress stair entries, building exits and nurse stations. Automatic, ceiling mounted smoke detectors will be located 30 feet on center in all corridors, in all patient bedrooms, at all elevator lobbies, at the top of stairways and hoistways, in Electrical Rooms, Telecommunications Rooms, Mechanical Rooms, Storage Rooms and Elevator Equipment Rooms. Duct-mounted smoke detectors will be provided in the supply and return ducts of every air handling unit. The fire protection systems (wet pipe, dry pipe, and pre-action) will be supervised via flow and tamper switches.

Occupant notification of an alarm will be achieved with ADA-compliant audio/visual appliances in the corridors, lobbies and general/common use areas, and visual only appliances in Restrooms. Interlocks will be provided for smoke dampers, air handling unit controllers, and smoke evacuation control as well as all smoke door hold open devices, with elevator control panels (for elevator recall), with air handling unit controllers (for shutdown) and with smoke removal systems. The fire alarm system will be capable of being connected, through a telephone line, to a remote monitoring station utilizing a built-in modem.

The fire alarm system will comply with applicable high-rise codes. A fireman's control panel shall be provided in accordance with operational capability per local fire marshal requirements.

Medical Gas Wiring System

Power wiring will be provided to medical gas alarm panels, bulk gas supplies, and manifolds. Signal wiring will be provided between alarm panels, manifolds, bulk gas supplies, sensors, pressure and vacuum switches.

Commissioning

The owner will direct the services of an independent Commissioning Agent (CxA). The CxA will develop and establish a commissioning plan for all of the systems listed herein.

PLUMBING, FIRE PROTECTION, MEDICAL GAS SYSTEMS

Design Criteria

System Descriptions

Domestic Water

The domestic water system will be supplied by a new domestic water service as shown on civil drawings. Two separate water utility mains will serve the facility. The incoming service lines will connect to reduced pressure backflow preventers located in the CEP. Separate backflow preventer assemblies shall be provided for the following building services:

- Main building domestic water supply: 2 assemblies
- Central Energy Plant boiler/cooling tower make up water supply: 2 assemblies
- Central Sterile domestic water supply: 4 assemblies
- Laboratory domestic water supply: 2 assemblies
- Landscape irrigation water supply: 1 assembly
- Medical equipment chiller backup domestic water: 2 assemblies
- Each janitor closet mop sink: 2 DCV assemblies each sink or EVS faucet

A new domestic water booster pump will be provided to serve the upper levels as follows:

- Type: multiple centrifugal pumps, arranged in parallel, with factory control system
- Quantity: 3 pumps, each at 135 gpm, 165 ft. head, 10 hp with variable frequency drives and sized to provide 100% demand with one pump down.

A copper-silver ionization system will be provided on the building's domestic water service.

Domestic Hot Water

New domestic hot water heaters will be provided for domestic hot water service to the building. Two separate systems will serve lower levels and upper levels as follows:

Main building (lower levels):

- Type: steam fired, semi-instantaneous, equal to Aerco SWDW 45
- Quantity: 2 (N + 1)
- Incoming water supply temp: 45 F
- System delivery supply temp: 140 F
- Outlet mixing valves: Armstrong (2)-DRV50 dual pre-piped digital temp control (N+1) set at 120 F supply temp

Main building (upper levels):

- Type: steam fired, semi-instantaneous, equal to Aerco SWDW 45
- Quantity: 2 (N + 1)
- Incoming water supply temp: 45 F
- System delivery supply temp: 140 F
- Outlet mixing valves: Armstrong (2)-DRV50 dual pre-piped digital temp control (N+1) set at 120 F supply temp

Heaters will be sized so that, if one heater is out of service, remaining heater can supply 100% of demand.

Each domestic hot water heating system will have a recirculation system:

- Flow balancing valves sized to maintain a maximum of 5 degree drop
- Recirculation pumps with variable frequency drives

In addition, there will be the following separate domestic hot water systems:

- Laboratory area:
  - Type: electric
  - Incoming water supply temp: 40 F
  - System delivery supply temp: 120 F
- Dishwashing:
  - A booster heater will be provided by the dishwashing equipment vendor

The main building domestic hot water heating system will connect to the mechanical chiller condenser water system to preheat domestic hot water using chiller condenser water via a double wall water/water plate frame heat exchanger.

Filtered/Reverse Osmosis Water System

A pure water system will supply water to the Central Sterile and lab areas with reduced pressure backflow preventers at each system.

Fire Suppression Systems

Fire suppression systems will be supplied by a new fire water service as shown on civil drawings. The service line will be provided with a free standing post indicator valve located on site. Service line will be routed to connect to a reduced pressure backflow preventer located in a mechanical room inside the building with free standing fire department Siamese connection (FDC) will be located on site. A remote fire department connection will be provided. All valves will be electronically supervised by fire alarm system.

The facility will utilize 6" standpipes and 3" standpipe drains in all egress stairwells.

Fire department valves shall be located at intermediate landing of all egress stairs and provided within 200 ft. of any location, including adjacent to both sides of horizontal exits in compliance with NFPA 14.

The facility will be fully sprinklered throughout in compliance with NFPA 13 and insuring agent requirements. All sprinkler heads will be fully concealed, quick response type. Sprinkler heads are to be located in center of ceiling tiles. Extended coverage heads will not be allowed. All major components will be UL/FM rated. The system will be hydraulically calculated.

A dry pipe system will be used for coverage for the following areas:

- Loading dock
- Unheated soffits between interior spaces and outside
- Emergency generator room

A double interlocked pre-action system will be utilized for the following spaces:

- Backup for IT (telecom) rooms primary FM-200 systems
- MRI/medical equipment rooms

A new fire pump and associated emergency storage supply tank will be provided as follows:

- Type: electric centrifugal pump with jockey pump and U.L. factory control system
- Pump shall provide 1000 gpm, 560 ft. head, 250 hp
- 30,000 gallon above ground storage tank with heater, solenoid fill valves, ladder, ultrasonic level controls, monitored by BAS. Tank will comply with NFPA 22.
- (2) 4" dry pipe valves will be provided in the loading dock and ED ambulance areas

Recessed wall mounted fire extinguisher cabinets (ABC type) will be located throughout the facility in accordance with NFPA 10. In addition, surface wall mounted fire extinguishers will be located in the following rooms:

Space type	Extinguisher type
Electrical equipment rooms	CO2
Fire pump room	CO2
Information technology rooms	CO2
Kitchen	Type K wet agent for grease fires
Mechanical equipment rooms	ABC
Operating rooms	CO2

Fixtures

Plumbing fixtures will be hospital grade. Electronic sensor controls will be provided on water closet flush valves and lavatory faucets in public restrooms.
Freeze proof wall hydrants will be installed every 100' around perimeter of building and two free standing type hydrants on roof.

Compressed Air System (Non-Medical)

Compressed air will be supplied by a new medical grade air compressor system as follows:

- Type: scroll
- Quantity: multiple compressors, to provide 100% demand with one compressor down; provide with factory packaged controls.

Non-Medical Vacuum Pump

Vacuum for non-medical use will be supplied by a new vacuum system as follows:

- Type: claw compressors with silencers and mufflers
- Quantity: minimum of two pumps

Medical Gas Systems

Oxygen will be supplied by a new oxygen park provided by others. Oxygen supply will be routed underground from the oxygen park to the building. Oxygen Park will be located in accordance with NFPA 55. Emergency oxygen connection will be provided.

Medical air will be supplied by a new medical air compressor system as follows:

- Type: scroll compressors
- Quantity: multiple compressors manifolded together, sized to provide 100% demand with one compressor down; provide with factory packaged controls.
- System will be located in a conditioned space

Medical vacuum will be supplied by a new medical vacuum system as follows:

- Type: claw type pumps with VFDs
- Quantity: multiple pumps manifolded together, sized to provide 100% demand with one pump down; provide with factory packaged controls.
- System will be located in a conditioned space

Nitrous oxide will be supplied by a new cylinder storage area with supply/distribution 14 x 14 primary/reserve high pressure cylinder manifold located in a conditioned space.

Nitrogen will be supplied by a new cylinder storage area with supply/distribution 14 x 14 primary/reserve high pressure cylinder manifold located in a conditioned space. Nitrogen control panels for pressure regulation will be located near the point of use.

CO2 will be supplied by a new cylinder storage area with supply/distribution 14 x 14 primary/reserve high pressure cylinder manifold located in a conditioned space.

Each medical gas system shall be installed in accordance with NFPA 99 and will have the following components:

- Outlets per FGI space requirements
- Area zone locking service valves
- Zone pressure area alarm panels
- Two master alarm panels
- Communication of alarms to the Building Automation System

Natural Gas System

Natural gas will be supplied by a new service as shown on civil drawings. The gas line will enter the mechanical room at 5 psig. Natural gas pressure will be reduced to 2 psig for distribution to the boilers and kitchen requirements.

Softeners

New domestic water softener will be provided as follows

- Location: Central plant
- Service: boiler makeup water

Storm Water System

The primary storm water system will be roof drains that will be collected together and routed down through the building to below slab to underground storm water mains, which will exit the building and connect to the site storm water system. Drip pans will be provided beneath all drainage piping above areas listed in FGI guidelines.

The secondary storm water system will be overflow drains that will be collected and routed down through the building, separately from the primary roof drain system, and will terminate to daylight at the ground floor. Overflow drains and the daylight termination will be heat traced. Drip pans will be provided beneath all drainage piping above areas listed in FGI guidelines.

Foundation drains will be routed along the underground structure to connect to the site storm water system. All sub-surface drainage systems will be designed by Geotechnical Engineer.

Waste and Vent System

Waste piping will be routed through the building to below slab to underground waste mains, which will exit the building and connect to the site sanitary sewer system. Vent piping will be routed to the roof and terminated as required to maintain code clearances from outdoor intakes to the building. Drip pans will be provided beneath all drainage piping above areas listed in FGI guidelines.

Sewage ejection pumps/lift stations and/or sump pumps will be provided to route waste to the site sanitary sewer system connection points from the following points:

- Elevator pits (pump to include oil filter/collection if the elevator is hydraulic type)

The emergency department will have a decontamination tank from the decontamination shower drain(s) with high water alarm monitored by the BAS.

The laboratory area will have acid waste and vent piping with an acid neutralization basin located on site.

The kitchen will have two grease interceptor traps located on site.

Metering and Building Control interface

The following services will be metered with interface to the Building Automation System:

- Building main incoming water use– gal/day
- Boiler water use – gal/day
- Central sterile water use – gal/day
- Cooling tower water use – gal/day
- Domestic hot water use –gal/day
- Domestic hot water delivery temperature – degrees F
- Food service water use – gal/day
- Food service hot water delivery temperature – degrees F
- Irrigation system water use – gal/day
- Laboratory water use – gal/day
- Natural gas use – ccf/day (coordinate metering with gas company)

All usages shall be totaled and trended per day, per month and for one, three and five year periods.

The Building Automation System shall receive and report the following alarms:

- Domestic hot water temp above/below setpoint
- Food service hot water temp above/below setpoint
- Medical gas pressure alarms
- Sewage lift station high level alarms
- Holding tank high level alarms

Commissioning

The owner will direct the services of an independent Commissioning Agent. The CxA will develop and establish a commissioning plan for all of the systems listed herein.

Materials of Construction

- Domestic water and hot water: type L copper, soldered joints
- Filtered/Reverse Osmosis water: schedule 80 CPVC meeting ASTM E-84 and UL 723 for flame and smoke spread/generation
- Fire suppression: black steel, schedule 40 for piping through 2 ½" and schedule 10 for 3" and up, threaded or grooved joints
- Compressed air: type L copper, soldered joints
- Insulation: rigid fiberglass; ASJ covering indoors, aluminum covering exposed to weather; provide on cold water, ½" thickness, hot water, thickness sized per energy code, and on horizontal runs of storm water piping, 1" thickness.
- Medical gases: type K copper, seamless, brazed joints per NFPA 99. Route underground piping inside protective outer pipe of standard weight cast iron.
- Natural gas: black steel, threaded or welded joints
- Storm water:
  - Below grade: cast iron, standard weight, gasket, bell/spigot or PVC
  - Above ground: cast iron, standard weight, no-hub heavy duty 4-band ASTM 1540C couplings
- Waste and vent:
  - Below grade: cast iron, standard weight, gasket, bell/spigot or PVC
  - Above ground: cast iron, standard weight, no-hub heavy duty 4-band ASTM 1540C couplings
- Valves:
  - Isolation valves: full port, 600 psi, bronze ball valves. All isolation valves shall be bi-directional and rated for dead end service.
  - Check valves: bronze body, bronze seat, swing check valves.

TELECOMMUNICATIONS SYSTEMS

Telecommunications Entrance Facilities

Telecommunications Entrance Facilities shall consist of redundant and physical diverse data communications entrances into the new hospital. Each path (Primary and Redundant) shall consist of (3) 4" metallic conduits (total of 6) originating from the new hospital's property line into two different Ground Level TER/EF/TR (Telecommunications Equipment Room/Entrance Facility/Telecommunications Room). Connection to the health system's network shall be through data service from the Mohawk Valley Health System (MVHS) selected service provider as part of the master MVHS network expansion and disaster recovery plan. The physical separation of the two conduit paths shall be as great as practical, but no less than 20ft as per BICSI Standards. Appropriate lightning protection shall be installed for copper services entering the Facility.

Telecommunications Room/Telecommunications Equipment Rooms (TR/TERs)

Each TRs/TER shall be located to meet the NFPA 99 2012 code which states that a TR/TER can only serve 20,000 sq. ft. of usable space and where the longest distance to any Work Area Outlet (WAO) is less than 275'. TRs shall be stacked vertically to decrease the length of riser conduit and riser cables. A minimum of two walls of the TR shall be expandable meaning two walls that are not adjacent to non-movable building structure. Each TR shall be 12' x 14' in size. The TER shall be 15' x 20'. As a rule, horizontal WAO connections shall start and finish (TR to WAO) on the same floor (no cross-floor connections). Columns in the middle of the room or curved walls are not acceptable in any of the TRs/TER.

Each TR/TER shall contain both building and emergency power as well as separate UPS unit/s (provided by MVHS IT) to manage any transition (loss of service) to emergency power. The number, type and location of emergency power outlets shall be confirmed with MVHS IT before installation. Two convenient building power quadruplex outlets, 20A, 110V shall be installed on each wall at a height of 6" AFF.

HVAC design for the TRs/TER shall be designed to maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). Remote monitoring by MVHS Facilities of the room cooling will be provided. Cooling size requirements shall be designed by the project's mechanical engineer (SSR) with help from SSR and MVHS IT to determine each room's BTU requirements. The room's HVAC shall maintain positive pressure with a minimum of one air change per hour. These rooms shall maintain a temperature and humidity level at 18 °C to 24 °C (64 °F to 75 °F). The humidity range shall be 30% to 55% relative humidity.

TRs shall have a monitored door with card reader access and an IP addressable camera system located within the room with temperature and humidity trending capabilities. All walls within the rooms including above the door shall be covered with four by eight foot ¾ AC grade plywood, mounted vertically from six inches above the finished floor, painted with fire retardant paint. The plywood shall be installed with grade C surface facing the wall. No infrastructure of element shall be mounted directly to any wall without plywood. Each room shall be equipped with a grounding bar connected to the building ground system (provided and installed by the project's Electrical Contractor). All low voltage equipment housed in the TR shall be grounded back to the room's ground bar. Automatic, quick response sprinkler heads with head guard protection shall be

provided to ensure 100% A/S coverage per local authority having jurisdiction. The rooms do not require a drop ceiling and the floor shall be sealed concrete. Lighting shall be mounted at a minimum of 9' AFF and shall be centered above the workspace not the racks. Doors shall be 36" wide and 84" tall. Each TR/TER shall be equipped with a 1-port data outlet for a wall mounted telephone.

TRs/TER shall be equipped with 18" wide ladder rack installed around the perimeter of the room and over the floor mounted racks. Ladder rack shall be installed at a height of 8' and a minimum of 7' 4" to the bottom. Floor mounted racks shall be 7' h x 19" w installed with front mounted 10" w vertical cable management on each side of the rack. There shall be a minimum of 36" in front and behind the row of racks.

Primary and Horizontal Cable Pathways

A cable tray system shall be installed above ceiling as the primary horizontal pathway for all low voltage cables. Cable tray size shall be 24" w x 6" h. Cross corridor sleeves, TR/TER entrance sleeves and vertical conduit sleeves shall be a re-penetrable sleeve (Hilti Speed Sleeve or equivalent). (2) 2" entrance sleeves shall be required for any patient care rooms (patient rooms, ED Exam, Prep/Recovery, PACU, etc.) and (1) 2" for all other locations. Conduit sleeves shall be used for cables passing over a hard ceiling area. Conduit pathway is required for any cable when passing through or being installed in an open ceiling area.

The following wall outlet conduit and back box sizes shall be required:
Data Outlet: 1.00", 4" X 4" X 2.125" with a single gang plaster ring
CATV Outlet: 1.00", single gang box with 1.875" minimum depth
Wall Telephone Outlet: 1.00", 4" X 4" X 2.125" with a single gang plaster ring
Nurse Call Devices: 1.00", determined as needed
Security Devices: 1.00", determined as needed

All conduits shall be installed with pull string.

Structured Cabling System

The new facility shall have backbone cables from the two entrance facility rooms to each TR in the facility to provide main and redundant connections respectively. Each pathway shall be installed to achieve the most physically diverse path as possible. TRs/TERs shall be connected using 4" conduits for riser installation. Each 4" conduit shall be installed with one (3) 4" cell Maxcell innerduct or approved equal. There shall be a minimum of (4) 4" conduits connecting TRs/TER. All conduits/innerducts shall be installed with pull strings.

Fiber riser shall be a combination of multi-mode optical fiber (850nm laser-optimized 50/125 um OM3 bend insensitive) and single mode optical fiber. Fiber riser shall be terminated in rack mounted fiber patch panels (LC or MTP/MPO type connectors). Fiber riser cables shall be placed in flex duct in the ladder rack between the backbone pathway and the rack mounted fiber panel. Copper riser shall consist of Category 3 multi-pair cable originating in the TER and extending into each new TR room. Copper riser shall be terminated on 110 blocks equipped with 5-pair connector blocks. Copper riser pairs shall be determined by SSR and MVHS IT.

Voice, data and networked video requirements will be supported using Category 6 non-plenum Unshielded Twisted Pair (UTP) cables extending from each TER/TR to each Work Area Outlet (WAO). Each typical WAO will contain at least two (2) CAT 6 cables (more if equipment needs require) terminated in a 4-port faceplate with 2 blanks. Each cable shall be considered Universal (not dedicated to a specific technology). Certain exceptions to the Outlet Standard include single CAT 6 non-plenum cables located for but not limited to employee timekeeping systems, wall mounted telephone sets, and medicine distribution cabinets.

In the TRs, all horizontal station cables will be terminated rack mounted 110 style patch panels with rear cable management bar.

PBX/VoIP

This is the system over which all voice communications will travel and be routed. The system will include wired and wireless Voice over IP (VoIP) and a limited PBX presence to service those functions that are not appropriate for the proposed IT network.

Wireless Local Area Network (WLAN) / Wireless Voice / Distributed Antenna System

A building wireless system will accommodate real-time point of care/activity information retrieval (802.11) as well as radio frequency identification (staff locating, patient tracking, asset management). WLAN access point coverage shall be designed to carry wireless traffic for voice and data systems including but not limited to internal wireless device communication, wireless patient charting, RTLS, Security, Nurse Call, Patient Monitoring, Alarm/Alert Notification and Management, and Patient Registration capabilities. The locations of the wireless antennas devices shall be dependent upon several factors including structural makeup of the new facility, desired coverage areas, signal strength of accessing device, and frequencies required. Wireless access points shall be connected to the hospital's network via horizontal data cabling and will be powered via Power over Ethernet technology. Each wireless access point location shall be installed with (2) Category 6A cables terminated on a surface mount box with 20' of cable slack for future adjustments. All horizontal cables installed for wireless access points shall terminate on a separate, dedicated Category 6A patch panel.

Wireless data access shall be accessible in all elevator cars and stairwells for continuity of service. There shall be two (2) Ethernet wires (Cat 6) included in the elevator travel cable served from the TR to the elevator control rooms. Travel cable to be provided and installed by the Elevator Contractor. Access points shall be mounted on the top of each elevator car. The data cable shall be designed to be installed utilizing the same travel cable as the Elevator Emergency Phone.

A separate Distributed Antenna System shall be installed to enhance cellular signal, repeat UHF and 700/800mhz. Separate radio repeaters shall be installed for two-way radio systems.

Audio Visual Systems

Systems providing audio visual services and teleconferencing services external and internal. The new hospital will contain several conference, training and educations rooms, patient entertainment spaces (clinical and non-clinical), and employee lounges that may be used for presentations.

Typical Conference Room Audio Visual Design: (2) large flat panel wall mounted monitors with audio visual connections, data and quad power outlet mounted behind each. Ceiling speakers and microphones, floor connections with data and audio visual connections. Floor connection box requires a 1" conduit direct from the floor outlet to the wall mounted monitor back box and (2) 1.25" conduits stubbed up above ceiling installed with pull strings. Wall mounted touchscreen control unit and wireless audio visual connection device. The project shall utilize electronic scheduling screens for Conference Rooms.

Cable Antenna Television (CATV)

Systems providing patient information and entertainment information in patient rooms, waiting areas, treatment areas, etc. Cable television shall feed the new facility via external connections from the MVHS preferred service provider. Cable television service shall be distributed to each TR over RG-11 coaxial cable. Homerun RG-6 coaxial cable and Category 6 cable will provide connectivity from the TR to each individual television set. At the television set, coax cables shall be terminated with an "F" connector housed in a faceplate that shall contain data and nurse call connections for televisions in patient rooms. In the TR, these cables shall be terminated on taps and/or splitters which will provide connectivity to amplifiers and/or direct connection to the CATV system equipment. In addition, via the Category 6 cable, live feeds from in-house seminars, Chapel Services, telemedicine, and pre-recorded feeds to such services as patient and staff education and training and movie stations shall be available to each television set. Television sets shall be hospital-grade where required. The recommended minimum television display size for patient rooms is 42".

Public Address

One to one, one to group, one to all paging and two-way voice communications. System performs in alarm and non-alarm conditions. Overhead paging shall be provided through a series of paging amplifiers and overhead speakers, some of which may be controlled through individual volume controls. This system shall provide a means of public broadcast for life-safety announcements or any other desired public announcements. The system will provide "zoned" and "all call" paging as required. Amplifiers shall be distributed throughout the TRs. The new hospital shall plan for 2' x 2' "drop-in" paging speakers.

Real Time Locating System (RTLS)

The new hospital shall be equipped with a Real Time Locating System. The system's backbone shall be carried over the hospital's wireless network with Power over Ethernet (PoE) devices providing room level accuracy. Each patient care area shall require a PoE device to track staff and integrate with the Electronic Medical Record. Wireless temperature monitoring shall be required for medication, lab and pharmacy refrigerators. MVHS currently utilizes the Stanley Aeroscout system.

Nurse Call System

A new nurse call/code blue system will be required. The new system will be comprised of nurse master stations, patient stations, staff stations, emergency call stations, dome lights and tracking sensors. Individual systems will be required for each floor and will be networked together to facilitate centralized management functions. The new system will provide a means of two-way communication between patients and clinical staff. The new system shall interface with the Voice over IP (VoIP) telephony system and shall offer such integration of nurse calls, lab results and physiological monitoring to the wireless handset. The code blue feature shall provide the capability of alerting the staff of life threatening code conditions that need immediate response. The system shall be capable of interfacing with hard-wired or wireless telephone service and overhead paging system. The system shall interface with other HL-7 compliant systems, i.e. ADT and electronic medical record systems, providing patient information in a fashion that enhances efficient delivery of patient care and improves patient satisfaction. With the exception of staff toilets, all restrooms shall contain Emergency Pull Cord elements.

The Nurse Call devices for the new Facility shall be planned per NFPA 99, FGI Guidelines for design and construction of healthcare facilities requirements, and user's requests. 37-pin bed connector shall be required in all patient rooms with beds. The bed connector is not required for room utilizing stretchers only.

Wireless Clock System

System consisting of clocks, transmitters, and receivers using global positioning system (GPS) wireless technology to synchronize time without the need to re-set clocks for time changes or power outages. System shall include additional roof transceiver and transceivers in IT rooms where required by system manufacturer to expand existing system signal coverage.

Analog Clocks shall be battery powered models located in staff areas and above elevators only. Digital Clocks and Digital timers in procedure rooms shall be wired or wireless communication AC powered (hardwired) models. The current MVHS wireless clock system is Primex.

Access Control and CCTV System

Systems allowing authenticated access to restricted areas, and general public access control. Various devices and methodologies exist to allow authenticated, monitored physical access. Card readers/keypads are utilized for internal and external access control. Currently MVHS utilizes proximity card technology. CCTV cameras and network video servers are used for security surveillance. Both of these systems are "networkable" and allow system access as needed to provide real time monitoring and archival and retrieval of stored data. IP cameras are used and 30 days of storage are required. System components shall be installed as specified by the owner. Parking lot gates for physician parking, site emergency phones and site cameras shall be required. The project shall also include a Pediatric Abduction System interfaced with building security (door and elevator control). Hugs is the current MVHS Pediatric Abduction System. MVHS utilizes Special Care System as a staff duress system that notifies security through radios. The panic devices are wireless. The EZ Lobby system is currently used for visitor management. Visitors are issued a sticker badge at Front Entrance, ED and Maternity has a visitor badge

station.

All door hardware is installed by a door hardware provider, the Access Control Contractor will install a coil of wire in ceiling above locking mechanism long enough for the hardware installer to wire to their lock.

Typical MVHS Areas of Control:

Pharmacy, Medication Supply Rooms, ICU, Surgery, Peds, LDR, Lab, Behavioral Health, Maternity Elevators, Staff Lounge, Dr. Lounge, Retail Pharmacy, Emergency Department, Imaging.

Radio Systems

The project shall require multiple radio systems. A two-way radio system with repeaters will be installed for use by Security, Facilities, Incident Command, Surgery (a local, departmental system). The Emergency Department will be equipped with an EMS radio system to communicate with the incoming ambulance service. MVHS utilizes pagers for EVS and Bed Tracking communication. Long-range signal shall be required for radio systems.