

**NKU Student Housing
MEP Narrative 1.30.2020****HVAC Systems****Geothermal Heat Pump System:**

A geothermal wellfield will be located in the southeast parking lot. The driller will install 82 wells at a depth of 290 feet. The fully grouted bores are 6" in diameter and will include a factory made DR-11, 1-1/4" U-tube. The wellfield will have 4 circuits each containing 20-21 wells. The circuits will be piped with horizontal piping at a depth of 4 feet. Each circuit will enter in the main mechanical room and header together. Flushing and air purging of the wellfield will be accomplished in this location.

The geothermal system is to have variable speed centralized pumping. Two (2) base mounted pumps will be located in the mechanical room. One (1) pump will be redundant. Vertical heat pumps will provide heating/cooling to the different zones. Single stage units will be used for units that are less than 2 tons and dual stage units will be used for units 2 tons and larger. Each heat pump, mounted in a closet or mechanical room, shall have an exterior mounted filter rack.

Dedicated Outside Air System:

Two Packaged Outside Air Handling Units will be provided to serve all the required ventilation to the facility. These will be located on the roof. The dedicated outside air units will serve the toilet and shower exhaust ducted through an energy recovery wheel to maintain building pressure. All zones will deliver fresh air into the return air ductwork to the heat pump.

MDF and IDF Rooms

The Main Communication Room will be served by a ductless split system. The Intermediate Communication Rooms will be ventilated with a ceiling exhaust fan controlled by a wall mounted thermostat.

Building Automation System:

A web-based DDC controls system shall be provided for the entire building and associated systems. The BAS shall also interface with the building lighting controls, and switch gear / electric metering.

Plumbing Systems

Provide new domestic water and sanitary systems complete, including termination to the existing utilities. Refer to the civil drawings for piping 5'-0" outside of the building.

Water Service:

The main mechanical room will house the 4" domestic water service entry, main building shut-off valve, full-sized reduced pressure backflow preventer, and booster pump.

Domestic Hot Water Service:

Domestic hot water will be produced from four (4) 500 MBH gas fired water heaters. Water temperature will be designed to maintain a hot water temperature of 120 degrees Fahrenheit.

Natural Gas Piping:

A new natural gas service will be provided, and will serve the domestic water heaters. Piping for the natural gas system will be Schedule 40 Steel with threaded or welded fittings. All exterior piping shall be painted, color selected by the architect, and all piping in the mechanical room and above ceiling shall be painted safety orange.

Fire Protection

The Fire pump room will house the new 6" service and fire pump. The entire building shall be 100% covered with a wet type fire protection system in accordance with NFPA 13 and all other applicable standards. Standpipes will be located in the Stairwells.

Electrical

Utilities

Power for this facility will be provided by a university owned 750kVA outdoor pad mount utility transformer and connected into the 15kV campus primary distribution system that runs Lot F with a new pad-mount medium voltage sectionalizing switch. Concrete pads, primary raceway, primary conductors, and full coordination provided by awarded contractor. Duct Banks will be concrete encased and provided with (2) spare conduits.

(3) 4" underground conduits will be provided to the building MDF from the existing manhole at Carroll and Kenton Dr for telecom services including voice/data and fire alarm. 24-strand Single mode fiber optic cable will run from the new building MDF to the existing MDF at University Suites to connect the new building into the campus network.

Facility Power Distribution

The main electrical service will be a 2500A 208Y/277V, 3-phase, 4 wire main switchboard located in the main electrical room. The main switchboard will have a surge protection device, ground fault protection, and arc flash reduction maintenance switch. The main switchboard will also include an integral power meter. The switchboard will provide power to large mechanical loads, elevators, and distribute power through the building to 208Y/120V branch circuit panels on each floor.

On-site power generation will be provided to supply back-up power to the fire pump and key building loads in the event of normal power loss. The system will consist of a 208Y/120V 175kW packaged natural gas generator installed adjacent to the site service transformer, (1) emergency branch and (1) legally required stand-by branch automatic transfer switches (ATS) located in the main electrical room, and Emergency Branch Circuit Panels. The Emergency branch panels will feed egress lighting, exit signs, voice evacuation, and fire alarm system. The legally required standby system will feed the elevator. All emergency panels will have integral surge protection devices.

Electrical Specifications:

- Switchboards and panelboards will have copper bussing and will have 25% spare capacity. AIC rating will exceed the available fault current determined by a power system study.
- Panelboards to have door-in-door trim.
- Disconnects will be heavy duty type with NEMA ratings suitable for the environment in which they are installed.
- Lamacoid labels will be provided for all electrical distribution equipment.
- EMT conduit, 3/4" minimum, will be provided in interior areas.
- Exposed exterior conduit will be rigid steel with threaded fittings. Underground exterior conduit will be PVC with rigid steel ells.
- Flexible metal conduit will be allowed in lengths no longer than 6' and only for lighting whips, motor connections, and final equipment connections.
- Conduit to have unique color to identify power, telecom, and fire alarm separately.
- All conductors will be copper, THHN/THWN, solid for #10 AWG and smaller. All circuits will be provided with dedicated neutrals. No aluminum or MC cable will be allowed.
- Conductors will be sized to limit voltage drop to 2% for feeders and 3% for branch circuits. Minimum wire size will be #12 AWG.
- All boxes will be 4" square x 2-18" deep, galvanized steel, with knock-outs. Provide with mud ring for number of device gangs required.
- All wiring devices will be 20 amp minimum, specification grade, heavy duty, tamper resistant with stainless steel covers.
- Arc fault circuit interrupter protection will be provided for all sleeping units and ground fault circuit protection will be provided for bathrooms and laundry rooms in accordance with NFPA 70 requirements

Bonding and Grounding

Dedicated ground conductors will be provided in all electrical pathways, conduit will not be the only source of a ground pathway.

The main ground bus bar will be located in the main electrical room and will connect to the cold water service (if metallic), service ground rod system, structural steel, concrete encased electrode, ground bars in each telecom room, and lightning protection system.

Lighting

Interior and Exterior Lighting will be designed in accordance with IESNA guidelines including the Illuminating Engineering Society of North America (IESNA) Handbook and IESNA Recommended Practices. Lighting shall be largely accomplished with surface rough service LED fixtures, recessed flat panel LED troffers, and downlights throughout the facility. Decorative lighting in selected spaces such as entries, lobbies, and other public spaces shall be provided. Pole mounted area lights, pole mounted pedestrian scale lights, and Wall mounted LED fixtures will be used to light exterior spaces around the building.

Fixtures will be selected to follow NKU standards. Varying LED lumen packages will be used to reduce overall lighting power density and energy usage.

Code required automatic controls shall be provided for lighting shut-off in required interior areas and for all exterior lighting. Lighting controls shall be accomplished with an electronic relay panel system as controlled by the Building Automation System (BAS). Vacancy sensors shall be provided in sleeping units and selected areas such as study rooms, storage and supply rooms, restrooms, workrooms, etc. Exterior lighting will be controlled through lighting relay panel with photocell input.

Designated lighting will be served from the life safety branch of the emergency power system to provide egress illumination during loss of power.

Voice/Data Network

A telecommunications structured cabling system will be provided to support the voice/data needs of the various system in the building. It will generally consist of the following:

- A Main Telecom Equipment Room for housing, campus and building fiber optic distribution, network servers/switches, and system head-end equipment.
- Additional intermediate telecom rooms on each floor to support length limitations of horizontal cabling.
- Fit-out of telecom rooms will include racks/cabinets, rack/cabinet power, cable runway, cable management, cable connecting hardware, rack bonding, and fire rated plywood backboards.
- OM4 Multi-mode fiber optic backbone cable will be used to connect intermediate telecom rooms to the main telecom room thru (3) 4" floor sleeves in each IDF.
- Cat6A Copper Horizontal cabling will be used for connectivity.
- A telecom grounding system will be provided that will including ground bars in each telecom room and bonding backbone conductors.
- Minimum conduit size shall be 1" and stubbed to the corridor.
- Corridor cabling paths shall consist of j-hooks back to the telecom rooms.
- WAPs are furnished and installed by owner. One data drop will be provided to each location indicated on plans with a 20' coil of cable at each location.

Fire Alarm System

A complete voice evacuation multiplex addressable fire alarm system shall be provided throughout the facility in accordance with building code and NFPA requirements. It shall be connected to the campus fire alarm network and central receiving station. Connections shall be provided to all fire suppression equipment, air handling equipment over 2,000 CFM, door access controls, elevator control, etc. All peripheral devices shall be installed per ADA requirements. Cabling will be installed in conduit or fire alarm MC cable. Emergency power will be provided for the fire alarm system. A separate mass notification system will be provided in accordance with NKU standards and integrate into the fire alarm system.

Security systems



An electronic access control system will be provided to secure the building perimeter and compartmentalize each floor. A Video Surveillance system will be provided to monitor building entry points. Both systems will be an extension of the overall campus security systems.

Lightning Protection System

A UL Master Label Lightning Protection system will be provided for the building in accordance with NFPA 780. Surge protection will be provided on all services entering the building. The lightning protection system will be connected to the electrical main ground bus bar.