Kenton County School District | *It's about ALL kids.*

Issue Paper

DATE:
04/23/2025

AGENDA ITEM (ACTION ITEM):
Consider / Approve the schematic design and design development plan for the Kenton Elementary renovation project (BG 25-352) from Emboss Design.

APPLICABLE BOARD POLICY:
01.1 Legal Status of the Board; 04.31 Authority to Encumber and Expend Funds; 702 KAR 4:160

HISTORY/BACKGROUND:
After a thorough review of the 2023-2027 District Facility Plan (DFP) and the physical condition of each building and building system by the Operations team, Kenton Elementary was identified for a renovation project focused on HVAC upgrade/replacement, roof replacement, and interior and exterior renovations in the 1950 and 2001 sections of the building. The District has continued our partnership with Emboss Design and CMTA Engineers to provide the schematic design of the proposed renovation. Emboss has presented a detailed narrative of the project which will become the basis of design for the construction drawings. The initial construction cost estimate for the renovation is $10,500,000. The project will tentatively begin in the spring of 2026.

FISCAL/BUDGETARY IMPACT:
None

RECOMMENDATION:
Approve the schematic design and design development plan for the Kenton Elementary renovation project (BG 25-352) from Emboss Design.

CONTACT PERSON:
Matt Rigg, Chief Operations Officer

Principal/Administrator	*District Administrator*	*Superintendent*

KENTON ELEMENTARY RENOVATION Project No. 25-012

SCHEMATIC DESIGN NARRATIVE

2025.04.22

Addressee
Kenton County School District
1055 Eaton Drive
Fort Wright, KY 41017

Submitted By
e*M*BOSS Design PSC
906 Monmouth Street
Newport, KY, 41071

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EXECUTIVE SUMMARY:

The proposed renovation of Kenton Elementary School includes interior updates to the 1950 and 2001 sections of the building. Architectural scopes include main office slab repair; classroom, restroom, corridor, media center and gymnasium finishes; door, marker/tackboard, and cubby/cabinet replacement; limited kitchen updates; new roofing with increased insulation for energy savings; a new awning/canopy at the main entrance; and limited concrete sidewalk replacement.

CODE COMPLIANCE + ACCESSIBILITY:

The renovation will be designed to meet the following Kentucky and local building codes and accessibility requirements.

Applicable building codes:

- 2018 Kentucky Building Code
- 2015 International Existing Building Code
- 2015 Kentucky Mechanical Code
- NFPA 70 2023 National Electrical Code
- NFPA 72 National Fire Alarm & Signaling Code
- Kentucky State Plumbing Code
- Commercial Energy Conservation Code 2012 of Kentucky
- NFPA 13 Kentucky Fire Sprinkler Code 2013

Cited References:

- ICC A117.1: Accessible and Usable Buildings and Facilities 2017
- ASHRAE Standard 62.1 – 2010
- ASHRAE Standard 90.1 – 2010

PROJECT SCOPE: (MEP Scope noted separately)

Civil & Landscaping:

- New marquee will be by Owner.
- Remove and replace areas of sidewalk around the school. Approximately 20%

Architecture | Interior:

- General/Miscellaneous
    - Patch floor (MCT and VCT) as required by mechanical scope of work and removal of existing built-ins.
    - Paint all walls, hard ceilings, HM and wood door frames, and HM doors.
    - Replace ACT ceilings only as required for MEP scopes of work.
    - New doors throughout. Frames are to remain unless noted otherwise.
    - Replace drinking fountains with new fountains/bottle fillers.
    - Replace tackboards and display rails in corridors. Replace markerboards and tackboards in classrooms.
    - Provide manually operated window shades at exterior windows.

- Main Office
    - Address / correct floor slab settling issue.

- Classrooms
    - At classrooms in original 1950 section, remove existing built-in classroom storage system in its entirety, including non-structural partition walls, doors, door hardware, shelving, countertops and cabinets. Construct new partition walls between classrooms.
    - Provide new student cubbies / cabinets and teacher storage in all classrooms.
    - Replace chalkboards, markerboards, and tackboards in 1950 section with new markerboards and tackboards.

- Restrooms
    - 2001 section restrooms to remain.
    - 1950 section restrooms:
        - Chase wall to be removed and new chase wall built.
        - Replace toilet partitions, accessories, and hand dryers.
        - Install new ceramic tile on walls and floors.
        - Install new plumbing fixtures.
    - Upgrade lounge restroom to make it ADA compliant.

- Media Center
    - Remove tiered seating reading nook and install power operated projection screen.

- Kitchen
    - Replace epoxy floor and cove base with quarry tile.
    - Replace both the walk-in cooler and freezer.
    - Replace the combi-oven.
    - Replace doors and frames.

- Gymnasium
    - Existing scoreboard to remain.
    - Remove existing height adjustable basketball goals and associated equipment. Install new retractable basketball goals with wireless controls.
    - Demo existing concrete bleachers if possible and install new power operated telescoping stands with handrails & guards. If demolition is not feasible, upgrade concrete bleachers with handrails and extruded plastic seats.
    - Remove existing gym wall pads & install new gym pads in existing locations. Provide cutouts for existing outlets and controls.
    - Existing rock-climbing wall to remain and be protected during construction.
    - Install new retractable divider curtain with wireless control.
    - Install new retractable archery net with wireless control.
    - Remove ACT ceiling and install new acoustic panels on roof deck
    - Paint walls, deck, and acoustic panels.
    - Replace wood floor with poured rubber floor. Extend court striping as much as possible.
    - Install new sound system.

Architecture | Exterior:

- Overlay additional roof insulation, install new SBS Modified Bit roof over entire roof; full tear-off at any locations identified as having wet insulation.
- Replace roof drains.
- Remove loading dock roof fence.
- Replace the storefront at the main entrance.
- Replace exterior doors.
- Add new overhang / canopy at the main entrance.
- Replace single pane windows in several locations of the 1950 section.

MECHANICAL (HVAC) BASE OPTION

A. Summary

The mechanical design includes all work related to the renovation of the existing school building and the new main entry way addition. The mechanical system will be comprised of the following components:

- Chillers
- Boilers
- Pumps
- Rooftop Units
- Makeup Air Unit
- Parallel Fan Powered VAVs
- Inline Exhaust Fan
- Unit Ventilators
- Cabinet Heaters
- Split Systems
- Thermostats

B. Codes and Standards

1. ASHRAE Standard 62.1 – 2010
2. ASHRAE Standard 90.1 – 2010
3. 2018 Kentucky Building Code (IBC 2015 with amendments)
4. 2015 Kentucky Mechanical Code (IMC 2015 with amendments)

C. Design Parameters

1. Outdoor Design Conditions
   a. Heating: 5.3° F DB
   b. Cooling: 91.4° F DB / 74.1°F WB

2. Occupied Indoor Design Conditions
   a. Heating: 68° F DB
   b. Cooling: 74° F DB

3. Non-Occupied Indoor Design Conditions
   a. Heating: 60° F DB
   b. Cooling: 80° F DB

D. Existing Equipment

1. Admin
   a. The Admin area is served by a 12.5-ton VAV Air Handling Unit with chilled water and hot water coils. Air is supplied to the rooms by 7 Parallel Fan Powered VAV's with Hot Water Reheat. There is one Cabinet Unit Heater in the Admin corridor and one in the vestibule. Both Cabinet Unit Heaters have a Hot Water Coil. There are 9 thermostats controlling this area.
2. Cafeteria
   a. The Cafeteria area is served by a 12.5-ton, single zone Air Handling Unit with chilled water and hot water coils. There is one thermostat controlling this area.
3. Kitchen
   a. The Kitchen is served by a 6.5-ton, single zone Air Handling Unit with chilled water and hot water coils. The Makeup Air Unit provides air to the kitchen hoods and provides 7000 cfm. There is a Cabinet Unit Heater in the storage area with a Hot Water Coil. There are two thermostats, one for the Air Handling Unit and one for the Cabinet Unit Heater.
4. Gym

a. The Gym has a 25-ton Air Handling Unit with chilled water and hot water coils. In the office bathroom there is an Inline Exhaust Fan. The gym is controlled by one thermostat.

5. Classroom Wing
   a. Each Classroom is served by a Unit Ventilator for a total of 35 units. Each Unit Ventilator has a Thermostat controlling it. Relief air is currently being transferred through the corridors which is not compliant with current codes. The Unit Ventilators have Hot Water supplied to each unit. There are seven inline exhaust fans to the individual bathrooms in the younger classrooms. These bathrooms also each have a Radiant Panel with a connected thermostat. There are three stairwell Cabinet Unit Heaters with Hot Water Coils. There is one Cabinet Unit Heater with Hot Water Coil at the end of the first-floor corridor. In the Speech Classroom, there is one Wall Mounted Split System and one Ceiling Mounted Split System. This room also has a data rack in the closet. The existing equipment does not have enough capacity to keep up with the cooling loads in this room.
6. Media Wing
   a. The Media Wing has its own DX Rooftop Unit with Hot Water for heating. The air is supplied to the spaces by 5 Parallel Fan Powered VAVs with Hot Water Reheat with one Thermostat per box. There is one VAV box in the Music Classroom, one in the STEM room, two in the Media Center, and one supplying the Office and Storage Room. There is a Cabinet Unit Heater with a Hot Water Coil in the Hallway.
7. Plant Equipment
   a. There are 3 Gas-Fired Hot Water Boilers located in the basement. There are (2) 1,800 Mbh and (1) 990 Mbh boilers. These Boilers each have one Primary Pump. There are two Secondary Pumps supplying the hot water to the entire building, except the Media Wing, which has its own pump. There are Three-way Valves on this system.
   b. There are (2) 180-ton Air Cooled Chillers outside the school, behind the kitchen. There are two Primary Pumps circulating water through the Chillers, and 2 Secondary Pumps supplying chilled water to the building. The system has a 30% Glycol solution.

E. New Equipment

1. Admin
   a. The Admin area will receive a new 12.5-ton Air Handling Unit with chilled water and hot water coils. There are 7 Parallel Fan Powered VAV's with Hot Water Reheat, each will be replaced. Branch piping will remain. All valves and piping accessories will be replaced in kind. The Cabinet Unit Heater in the Admin Corridor will be swapped in a one-for-one replacement and will require new piping connections. The Vestibule will receive a new Cabinet Unit Heater with Hot Water Coil, which will be upsized due to the existing not having enough capacity; this will need new piping connections into the Hot Water Main. All thermostats will need to be replaced to connect with new equipment.
2. Cafeteria
   a. The Cafeteria area will require a new 12.5-ton Air Handling Unit with chilled water and hot water coils. Branch piping will remain. All valves and piping accessories will be replaced in kind. The thermostat will be replaced.
3. Kitchen
   a. The Kitchen is served by a 6.5-ton Air Handling Unit with chilled water and hot water coils which will be replaced. Branch piping will remain. All valves and piping accessories will be replaced in kind. The Makeup Air Unit will remain. The Cabinet Unit Heater in the Storage Area will be replaced. Both thermostats in this area will be replaced.
4. Gym
   a. The Gym has a 25-ton Air Handling Unit with chilled water and hot water coils. This unit will be replaced. The existing system did not have relief built into the design. The new system will be designed for air relief. Branch piping will remain. All valves and piping accessories will be replaced in kind. The thermostat to the Air Handling Unit will be

replaced with one connected to the new equipment. Air devices and balancing dampers will be added to the ductwork feeding the office and storage area behind the gymnasium.

5. Classroom Wing
    a. Each Unit Ventilator will be replaced. This will require a new thermostat, valves and piping accessories, and piping connections for all 35 units. Per the school's request, controllers from the Unit Ventilators will be salvaged and reused. Relief air pathway needs to be reworked in the classroom wing to bring the system up to current code. Transfer air will need to flow above ceilings, so the corridor ceiling cavity will need to act as a return air plenum. This will require any cabling within the plenum to be plenum rated. The seven Inline Exhaust Fans will be replaced and reconnected into existing ductwork. The Cabinet Unit Heaters in the stairs and the corridor will be replaced and require a new thermostat and new piping connections into the Hot Water Mains. The Split System and Condensing Unit in the Speech Room will be replaced and require new refrigerant and condensate piping.
6. Media Wing
    a. The Media Wing has its own DX Rooftop Unit with Hot Water which will be replaced. The Five Parallel Fan Powered VAVs with Hot Water Reheat will be replaced. Branch piping will remain. All valves and piping accessories will be replaced in kind. The Cabinet Unit Heater with a Hot Water Coil in the Hallway will be replaced.
7. Plant Equipment
    a. Replace the 3 Gas-Fired Hot Water Boilers located in the basement with condensing boilers. Replace the 3 Inline Primary Pumps and 2 Inline Secondary Pumps and replace the inline pump serving the Media Wing. Existing three-way control valves will be replaced throughout the building. There is an existing chimney from the basement up through the building. New flues for the condensing boilers will be routed up through the chimney.
    b. Replace the (2) 180-ton Air Cooled Chillers and the 2 primary and 2 secondary pumps.

F. HVAC Testing and Balancing

a. All motors, bearings, etc., shall be checked and lubricated as required. All automatic, pressure regulating and control valves shall be adjusted. Excessive noise or vibration shall be eliminated.
    i. Thermometers and gauges shall be checked for accuracy. If instruments are proven defective, they shall be replaced.
    ii. System balancing, where required, shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.
    iii. Room air flow needs to be +/- 10% and meet all required air flows and space pressure relationships.
    iv. The contractor shall perform and be responsible for lubrication of all equipment prior to operation. Equipment damaged by failure to perform proper lubrication shall be repaired at their expense.
    v. For the purpose of placing the heating, ventilating and air conditioning system in operation according to design conditions and certifying same, final testing and balancing shall be performed in complete accordance with AABC or NEBB standards for field measurements and instrumentation form no. 81266, volume one, for air and hydronic systems as published by the associated air balance council. The contractor shall procure the services of an independent company, approved by the engineer, that specializes in and whose business is to balance and test mechanical systems. The company shall be equipped and have the qualified technical personnel as required by AABC or NEBB.

G. Controls

a. The contractor shall install a full, open sourced, non-proprietary building automation system built on the Tridium Niagara 4.7 framework. Network communication protocol(s) used throughout entire DDC system shall be open to Owner and available to other companies for use in making future modifications to DDC system. ASHRAE 135 communication protocol shall be sole and native protocol used throughout entire DDC system. The DDC system shall not require use of gateways except to integrate HVAC equipment and other building systems and equipment, not required to use ASHRAE 135 communication protocol. If used, gateways shall connect to DDC system using ASHRAE 135 communication protocol and Project object properties and read/write services indicated by interoperability schedule. Operator workstations, controllers and other network devices shall be tested and listed by BACnet Testing Laboratories.

H. Distribution Components

a. Ductwork and insulation – Ductwork shall be sized at .08" W.C. per foot for low pressure supply and exhaust, and .06" W.C. per foot for return and shall be fabricated and installed in accordance with the recommended methods outlined in the latest edition of SMACNA's duct manual and sheet metal construction for low velocity ventilating and air conditioning systems.
   i. Ductwork, plenums and other appurtenances shall be constructed of one of the following: Steel sheets, zinc coated, Federal Specification 00-S-775, Type I, Class E & ASTM A93-59T with G-90 zinc coating.
   ii. Insulated flexible duct: Owens/Corning or approved equivalent, one (1) inch thick fiberglass insulation; flexible liner with aluminum pigment vinyl vapor barrier facing. Insulated flexible duct shall not exceed 6'-0". Flex duct shall not be permitted to pass through walls, floors, or ceilings.
   iii. Access doors in ductwork: Where required for serving equipment, fabricated according to SMACNA recommendations; provide access door in duct adjacent to all dampers for the purpose of determining position and allowing manual reset.
   iv. Volume dampers: Ruskin, Air Balance, Louvers and Dampers, Titus or approved equivalent. Dampers shall be sized and shaped for the duct in which they are installed. Provide permanent mark on dial regulator to mark air balance point.
   v. External insulation (for low velocity rectangular supply air, low velocity round supply air, high velocity supply air, return air and outside air ductwork): Owens/Corning, FRK-25, series ED-75 or approved equivalent, 2.2" thick fiberglass duct wrap, factory laminated to a reinforced foil kraft vapor barrier facing (FRK) with a 2" stapling flange at one edge. Flame spread 24, smoke developed 50, vapor barrier performance 0.02 perms per inch. K factor shall not exceed .30 at 75-degree mean temperature.
   vi. Fire dampers shall be constructed and tested in accordance with U.L. safety standard 555. Each fire damper shall have a fire protection rating as required by fire wall. Damper shall have a 165F fusible link, and shall include a U.L. label in accordance with established U.L. labeling procedures. Fire damper shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing 16-gauge minimum steel sleeves, angles, other materials, and practices required to provide an installation equivalent to that utilized by the manufacturer when dampers where tested at U.L.
   vii. Where walls go to deck an air transfer will be provided to the plenum space on the other side of the wall. The transfer will include a grille, a minimum of two elbows, and a duct liner from the grill and a minimum of two feet past the first elbow.

b. Piping and Insulation - All piping shall be sized at a maximum head loss of 3'/100 ft for supply and return piping.

i. I. Hot-water heating piping and chilled water piping, NPS 2" and smaller, shall be Type L drawn-temper copper tubing, wrought-copper fittings, and soldered, or pressure-seal joints.
ii. Hot-water heating piping and chilled water piping, NPS 2-1/2 and larger shall be Schedule 40 steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
iii. Makeup-water piping installed aboveground shall be the Type L, drawn-temper copper tubing, wrought-copper fittings, and soldered joints.
iv. Piping Installation: Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas. Install piping indicated to be exposed and piping in equipment rooms and service areas, at right angles or parallel to building walls. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
v. Install unions in piping, NPS 2 and smaller, adjacent to valves, at final connections of equipment. Install flanges in piping, NPS 2-1/2 and larger. Install shutoff valve immediately upstream of each dielectric fitting. Install sleeves for piping penetrations of walls, ceilings, and floors. Install sleeve seals for piping penetrations of concrete walls and slabs. Install escutcheons for piping penetrations of walls, ceilings, and floors.
vi. Piping Insulation – Insulate per ASHRAE 90.1 – 2010 requirements.

c. Hanger and Supports - Piping support must account for expansion and contraction, vibration, dead load of piping and its contents, and seismic-bracing requirements.
i. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Adjustable roller hangers for individual horizontal piping 20 feet or longer.
3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
4. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
ii. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
1. NPS 3 and Larger: Maximum span, 12 feet.
iii. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
3. NPS 1-1/4: Maximum span, 7 feet; minimum rod size, 3/8 inch.
4. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
5. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
6. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.

MECHANICAL (HVAC) GEOTHERMAL OPTION

A. Summary

As an alternative solution to replacing all HVAC equipment in kind, a geothermal system could be installed which would provide long-term energy savings and reliability. The classroom wing would be converted to be fed from WSHPs. New closets would be built to fit the heat pumps. Roof mounted Air Handling Units would be replaced with roof mounted WSHPs and would reuse the existing air distribution. The mechanical system will be comprised of the following components:

- Water-source heat pumps (WSHP)

- Variable air volume terminal units (VAV)
- Geothermal wells
- Geothermal water pumps
- Geothermal air/dirt separator
- Geothermal expansion tank
- Geothermal stream filter
- Sorbent Air Filters for OA Reduction

B. Potential Tax Credits

1. As part of the IRA (Inflation Reduction Act) that was passed by US Congress in August of 2022, any geothermal and solar infrastructure that is installed on this project would potentially be eligible for the following Tax Credits:
    a. Investment Tax Credit (ITC), Clean Energy ITC (CEITC) & Direct-Payment for Private and Public Owners:
    b. Private clients and for-profit Healthcare continue to qualify for the ITC including ground source heat pumps and solar.
    c. Public K-12 School Systems, Universities, and Municipal City/Counties are tax exempt and therefore qualify for the direct-payment option of the ITC including ground source heat pumps and solar.
    d. Not-for-Profit Healthcare Systems and 501(c)(3) are tax exempt and therefore qualify for the direct-payment option of the ITC including ground source heat pumps and solar.
2. ITC Additional details:
    a. Taxable entities are not eligible for direct pay. However, these entities may utilize the tax benefits through a tax equity structure or elect to transfer the tax credits for cash. The IRA has modified these rules to include a 3 year credit carryback for when the tax credit is larger than your taxable income and better improved monetizing tax credits for cash for those with low to no taxable income.
    b. Additional technologies have been added which are now eligible for incentives. The Investment Tax Credit (ITC - Section 48) or Clean Energy Investment Tax Credit (CEITC – Section 48E) will be effective for the following technologies: solar energy, wind energy, geothermal energy, ground-source heat pumps, fiber-optic solar, fuel cell, microturbine, CHP, waste energy, energy storage, biogas, microgrid, dynamic glass and linear generators.
3. Ground Source Heat Pumps (GSHP) and Solar ITC Costs:
    The GSHP total cost would include:
    a. The entire GSHP HVAC system costs including materials and labor (likely entire Division 23)
    b. The electrical costs for electrical items connected to components of the GSHP system
    The solar PV total cost would include:
    c. The entire Solar PV system incl materials and labor
    d. The electrical costs for electrical items connected to components of the Solar PV system
4. Total ITC and Direct Payment Percentages (applicable for projects placed in service after 12/31/2022):
    a. 30% Base rate: The ITC/CEITC has a 30% Base Rate but is reduced to 1/5 (e.g., 30% ITC would be 6%) unless Prevailing Wages and Apprenticeship requirements are met. Wellfields smaller than approx. 284 tons (which this building will be) are exempt from prevailing wage.
    b. 10% Adder for Domestic Manufacturing: To qualify, any steel and iron or any manufactured product that is a component of the system, must be produced in the United States. We understand these requirements do not apply to steel or iron used as subcomponents of manufactured products and so don't expect the HVAC units or other subcomponents of GSHP HVAC Systems to be required to meet the requirements.

Therefore, major components of the GSHP system including the ductwork and GSHP piping are expected to apply.

C. Systems

a. Geothermal Well Field

i. Piping requirements:

1. PE Pipe: ASTM D 2239, SIDR Numbers 5.3, 7, 9, or 11.5; with PE compound number required to achieve required system working pressure.
2. Molded PE Fittings: ASTM D 2683 or ASTM D 3261, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
3. U-Bend Assembly: Factory fabricated with embossed depth stamp every 36 inches from U-bend.

ii. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warming tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a "GEOTHERMAL" description, with metallic core encased in a protective jacket for corrosion protection, detectable by a metal detector when tape is buried up to 30 inches deep.

iii. Borehole Backfill: Bentonite with thermal conductivity greater than 1.2 Btu/h x sq. ft. x deg F.

iv. Antifreeze Solution: Propylene Glycol Premix. Industrial grade premix solution of deionized water, propylene glycol and food grade corrosion inhibitors equal to DowFrost to protect the piping circuit and connected equipment from physical damage from freezing or corrosion.

v. Antifreeze Feed System

1. Provide a completely, preassembled package Glycol Feed System.
2. Pump – The pump shall be a bronze rotary gear pump with a capacity of 3 GPM at a pressure of 100 PSI. Pump shall be mounted below tank.
3. Tank – The tank shall be constructed of polyethylene and be provided with a four-leg carbon steel stand with four bolt pads. The tank stand shall have upper and lower steel support banding to ensure tank stability. Tank stand shall be painted with a two-coat system consisting of an oxide primer and alkyd enamel finish.
4. Piping – Pump suction piping shall be piped using PVC fittings and tubing. A PVC ball valve and a cast iron "Y" strainer shall be provided in the pump suction piping. Pump discharge manifold shall be piped using Schedule 40 brass fittings suitable for chilled or hot water service. A pressure switch, ball valve, brass check valve and brass relief valve shall be mounted on the pump discharge assembly manifold. Piping shall be supported at both the top and bottom of the tank frame. The brass relief valve shall be piped back to the tank using PVC tubing or fittings. A pressure gauge shall be mounted in the discharge piping.
5. Panel – A 120-volt control panel with NEMA 4X enclosure

vi. Vertical Piping Installation

1. Install PE piping in boreholes according to ASTM D 2774 or ASTM F 645.
2. Clean PE pipe and fittings and make heat-fusion joints according to ASTM D 2657. Minimize number of joints.
3. Purge, flush, and pressure test piping before backfilling boreholes.
4. After installation of loop pipe in borehole, fill piping loop with water or antifreeze solution, and pump backfill into borehole to discharge at base of borehole.

5. Fill borehole with backfill to a point at least 60 inches below grade and backfill remainder with surface seal material.
6. Extend piping and connect to water-source, ground-loop, heat-pump piping systems at outside face of building wall in locations and pipe sizes indicated.
7. Terminate water-service piping at building wall until building water-source, ground-loop, heat-pump piping systems are installed. Terminate piping with caps. Make connections to building water-source, ground-loop, heat-pump piping systems when those systems are installed.

b. Outdoor Air Ventilation Design Parameters
   i. Building ventilation rate shall be compliant with the Ventilation Rate and/or Indoor Air Quality Procedure as prescribed by ASHRAE Standard 62.1-2010.
   ii. Larger spaces with a dedicated heat pump will utilize demand control ventilation with carbon dioxide monitoring to maintain CO2 set points.
   iii. Ventilation will be provided by direct ducting to heat pumps.
   iv. To reduce outdoor air requirements and provide optimal clean air quality to occupied spaces, sorbent air filtration units will be installed.

c. Supply and Return Air
   i. Supply air will be provided by water source heat pumps located in the mechanical rooms around the building.
   ii. In each zone, one variable air volume terminal unit with hot water reheat will control the supply airflow based on need.
   iii. Return air from each zone will be collected through the ceiling plenum and returned to the mechanical rooms.

ELECTRICAL

Applicable Governing Criteria

1. American National Standard Institute (ANSI)
2. IEEE-C2 National Electrical Safety Code
3. IEEE Institute of Electrical and Electronic Engineers
4. IEEE 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems
5. NFPA 70 2023 National Electrical Code
6. NFPA 70E 2015 Standard for Electrical Safety in the Workplace
7. NFPA 780 2014 Standard for the Installation of Lightning Protection Systems
8. National Fire Protection Association (NFPA)
9. National Electrical Manufacturers Association (NEMA)
10. Any applicable Local and State Codes – Latest Approved Editions
11. Kentucky Building Code 2024
12. Illuminating Engineering Society of North America Handbook 10th Edition ASHRAE 90.1 2010

A. Electrical Site Power Distribution
   a. The existing main switchboard is sized at 1600 amp, 480Y/277 volt, 3-phase, 4-wire. Most equipment was installed in 2000 or earlier. This 1600 amp switchboard powers a 1200 amp, 120/208 volt, 3-phase, 4-wire switchboard through a 500kVA transformer. There is a main surge protection device on the main 1600 amp switchboard.
   b. Project scope also includes replacement of existing HVAC equipment and potentially switching to a Geothermal system. It is anticipated that the existing service is sufficient to support planned HVAC improvements. This will be confirmed as the HVAC design progresses. Where required, the existing distribution infrastructure will be reworked to support the HVAC equipment replacement and other planned scope for the project.

B. Electrical Facility Power
   a. 480Y/277V power is distributed through the building from the main HVDP switchboard. 480Y/277V panels power lighting, specialty equipment, and mechanical equipment. 208Y/120V power is distributed through the building from the main LVDP distribution switchboard. 208Y/120V panels power receptacles, fire alarm circuits, and classrooms.
   b. Most equipment is installed in 2000 or earlier and will be replaced in this project if most of the circuits are being replaced on that panel or if there is not ample capacity or spares.
      i. New panelboards will be door-in-door style with copper bussing and will have 35% spare capacity. The minimum general panelboard bus rating will be 225A and have a minimum 84 breaker spaces with the exception of Life Safety panelboards which will be sized per connected load. Panelboards will be located in electrical rooms on each floor.
      ii. Lamacoid labels will be provided for all electrical distribution equipment.

C. Electrical Emergency Power
   a. There is no generator or central emergency system for the building and there are no changes anticipated for this system.

D. Electrical Lighting
   a. All lighting fixtures and controls will be replaced throughout the entire building.
   b. The lighting will be designed per IESNA (Illuminating Engineering Society of North America) recommendations. The lighting will meet the requirements of ASHRAE 90.1 2010 energy code.
   c. All new lighting will be LED lighting to reduce maintenance costs and to provide energy savings. All indoor lighting sources will be 3500 Kelvin color temperature. Outdoor lighting pole lighting will be LED area lights, anticipated to be 4000 Kelvin. The outdoor pole-lights and bollards will be a 1-for-1 replacements.
   d. Emergency egress lighting throughout the facility will be powered by integral battery packs for each fixture. Code required egress corridor lighting will be connected as night lights to operate 24/7. Other egress lighting will be equipped with an integral automatic transfer relay to allow local control during normal operation.
   e. New outdoor lighting will be provided for walkways and entrances into the building and will match other lighting in the vicinity of the project. These will also be 1-for-1 replacements.

E. Electrical Luminaires
   a. All lighting in educational spaces will have 0-10V dimmable with code required ceiling mount occupancy sensors and daylight sensors (in rooms with large windows).
   b. Exterior: Pathways will be illuminated by new lighting bollards. Building egress points will have emergency illumination from recessed soffit lights when applicable or building mounted LED wall packs.

c. Stairwells: Lighting in the stairwell spaces will consist of LED recessed linear and/or wall mounted direct/indirect fixtures with integral occupancy sensors. These fixtures will be bi-level and operate at 50% when unoccupied and will go to 100% when occupied.
d. Exterior parking lot lighting will consist of new 20'-0" pole mounted led lights on existing 24" concrete pole base.
e. Exit signs will be die cast aluminum connected to emergency power. Ceiling or wall mounted as necessary for the location. Lithonia TLE or equal.
f. Emboss will take the lead in selecting lighting fixtures and establishing the design intent for the lighting system. This includes specifying fixture types, layouts, and aesthetic considerations to ensure that lighting aligns with the architectural vision and functional requirements of the spaces. CMTA will also conduct photometric calculations across all areas to verify that target lighting levels are achieved according to design standards and occupant needs.

F. Electrical Lighting Controls
a. The building lighting will have automatic shutoff controls based on occupancy and time of day. After hours lighting will be occupancy-controlled for corridors. Sensor Switch Light systems as basis of design.
b. Lobby and corridors will be connected to time-of-day controls via lighting relay panels. Time of day schedule be provided by the BAS system. These areas will have local switching and override capability. This system will interface with the facility energy management system for ease of reporting, programming, and scheduling.
c. Classrooms, admin space, and small support rooms will be provided with standalone dual-technology occupancy or vacancy sensors. Select areas will be provided with an input/output module for reporting of occupancy status to the mechanical BAS system if required for demand control ventilation.
d. Daylight harvesting and multi-level control of lighting will be provided in accordance with energy code requirements.

G. Electrical General Materials
   a. Conductors for 480V through 120V circuits will be copper THWN/THHN thermoplastic insulated. Color code will follow industry standards. Each circuit will have a dedicated neutral conductor.
   b. Conductors will be sized to limit voltage drop to 2% for feeders and 3% for branch circuits. Minimum wire size will be #12 AWG.
   c. All conduits to mechanical equipment will be copper.

H. Electrical Conduit
   a. All power wiring will be installed in conduit. Minimum size will be ¾" except communications which is discussed under that section. Supports will be installed per NEC.
   b. EMT will be utilized for general purpose locations within the building. Fittings will be compression type for ¾" to 2 ½" and double setscrew type for 3" and larger.
   c. Rigid steel conduit will be utilized in above-grade exterior locations, in mechanical spaces, and in other areas exposed to physical damage.
   d. Schedule 40 PVC will be used below slab and in any area necessary for corrosion resistance. No conduit will be installed within slabs.
   e. All interior conduit will be concealed except for mechanical and other unfinished spaces where appropriate.
   f. Area with exposed conduit shall be painted black.
   g. MC cable is allowed for final equipment connections.

I. Electrical Devices
   a. General use duplex receptacles will be 20 amperes, 125 volts, and tamper-resistant.
   b. General use light switches will be 20 amperes, 277 volts or low voltage type as necessary for the control system. Low-voltage switches will be equipped with multi-zone and dimming control.
   c. GFCI protected receptacles are used in wet locations and elsewhere as required by code. All exterior receptacles will be provided with a die-cast in-use cover.
   d. Floor boxes will be provided in select seating and collaboration spaces where wall power connections are not feasible. All floor boxes and poke-throughs to be Legrand Evolution series.
   e. All outlet covers will be labeled with panel number and circuit number. The inside of outlet box covers will also be labeled with panel and circuit.
   f. Classrooms: General purpose; four duplex receptacles (one per wall minimum).
   g. Classrooms: Technology; one double duplex for each student computer station, one double duplex for teacher computer, one double duplex for video/audio equipment, one double duplex receptacle for video projector, one simplex receptacle for charging cart, and two duplex receptacles with two USB charging receptacles each).
   h. Offices: Four general purpose duplex receptacles (one on each wall), one double duplex for a computer station, and one duplex receptacle with two USB charging receptacles above counter level at desk.
   i. Storage: One near door.
   j. Corridors: Approximately 30 feet apart.
   k. Receptacle Circuits: Branch circuit loading per Code. Generally, a circuit or multiple circuits are provided to serve receptacles within a single room. Dedicated circuits will be provided as required (e.g. circuit serving charging cart receptacle).
   l. Ground fault circuit interrupting (GFCI) receptacles shall be provided within 5 feet of all sinks, exterior, and other locations per NEC.
   m. Provide an exterior GFCI receptacle in weatherproof "in-use" type cover adjacent to all exterior doors
   n. All rooms or spaces will have at least one duplex receptacle.
   o. A maximum of four computers shall be on a single 20-amp, 120 volt branch circuit.

J. Electrical Fire Alarm
   a. A manual and automatic fire alarm system is outdated for the facility in accordance with the Kentucky Fire Code, Life Safety Code, National Fire Alarm and Signaling Code, and a new voice fire alarm system will be installed.
   b. New fire alarm devices will be needed throughout the building.
   c. All fire alarm cabling will be installed in a dedicated conduit system.
   d. Wire guards will be installed on fire alarm devices in gymnasium and locker rooms.

K. Electrical Lightning Protection
   a. Section includes lightning protection systems for structures and any roof top mounted equipment.
   b. The electrical contractor shall provide the necessary materials, services necessary to provide a complete lightning protection system. There is currently no lightning protection system in place for the building.
   c. This work shall include, but not limited to conductors, air terminals, connectors, splicers, ground rods, rod clamps, ground plates, bonding plates, and surge arrestors.
   d. Connections to the existing building lightning protection system.
   e. Provide a UL Master label for the complete new and existing system.

L. Electrical Emergency Response Radio System
   a. Provide allowance for an emergency responder radio system (ERRS). This will need to be tested before construction.
   b. The need for a distributed antenna system to amplify signal for first responder communications equipment is to be evaluated with the local Fire Department as progress continues. At time of submission of the SD package, the cost estimate should include costs for a full system throughout the building.
   c. Amplifiers shall be located in telecommunications closets.
   d. System main antenna located on roof with other communications antennas.
   e. System distributed antennas located at approximately 200 feet spacing throughout the building.
   f. Per all applicable national, state and local codes.
   g. System necessity based on post-construction testing by Contractor with assistance of local Authorities.
   h. Cost of system material and installation will be in project budget as an allowance, exact amount of which to be determined during the GMP Phase.

M. Electrical Low Voltage Systems (Rough-in Only)
   a. CMTA's scope of the work is to provide pathways for all low voltage systems. All other work designed by others. Rough data backboxes and pathways for all other low voltage systems based on the technology drawings designed by others.
   b. Telecomm rooms, cable trays, pathways, conduit, devices, cabling, terminations and testing will be provided. Racks, switches, patch panels, telecom room ladder tray, and UPS equipment will be furnished / designed by others.
   c. Combination telephone/data wall outlets will be provided throughout the facility for wired equipment needs. Cabling paths will consist of backbox with 1" conduit to above accessible ceiling, a J-Hook pathway within rooms, and wire basket cable tray in corridors.
   d. IDF and MDF rooms will have fire-retardant plywood backboards on all walls. Two 4" sleeves will connect between each telecom room. Where telecom rooms are vertically adjacent, EZ Path 44+ system pathways will be utilized.

INFORMATION TECHNOLOGY, SYSTEMS, AND SECURITY

A. STRUCTURED CABLING SYSTEM

1. There is (1) existing MDF room and (1) existing IDF room in this building. The MDF room is located behind curtains within a small multipurpose room. The scope for this project entails expanding the small MDF closet into the full room to phase the project.

2. The Fire Alarm Control panel is within the existing MDF room and will need to be replaced with a new voice fire alarm system.

3. All existing door access, cameras, intercom devices, and network devices will be refed with Category 6 cabling, the devices are to remain.

4. The clocks within the building are outdated and non-centralized. New clocks will be provided to KCSD's standards; battery powered and wirelessly controlled with the transmitter located in the new MDF room location.

5. The sound system in the gymnasium is to be replaced with new. The headend equipment located behind the stage is also to be replaced. Provide (4) wireless microphones within the gym. A new projector and projection screen is also to be provided within the gymnasium.

6. All DAS equipment is to be demolished in its entirety.

7. The new data network within the building shall consist of Category 6 cabling to each voice/data outlet. Voice/Data cables shall originate from ER/TR Telecom rooms connected to each other via Fiber Optic Backbone cabling. Any required voice public safety copper circuits like Fax machines, fire alarm dialer, burglar alarm dialer, emergency phones or Elevator phones shall be supported by multi-pair copper backbone cabling between telecom closets.

8. Within any new telecom closets, provide 2-post Equipment racks as required to support horizontal and backbone cabling. Provide ¾ inch 4'x 8' fire treated/painted plywood to surround walls of the telecom closets. Provide minimum 12-inch ladder rack from entrance point of the cabling conduits to over top of the equipment racks. Terminate data cabling on patch panels and voice cabling (non-VoIP) on 110 punch blocks. Provided grounding busbars and ground all equipment racks, ladder racking, etc.

9. Terminate data outlets on labeled wall plates with keystone terminal outlets.

10. Test and label all horizontal and backbone cables per BICSI standards.

11. Where Voice/Data drop locations are required, the contractor will provide all rough-in's, faceplates, cabling paths, cabling and patch panels for all data and communication systems. Provide conduit risers/sleeves with firestopping where penetrations are required.

12. Stub-out conduit size will be 1'' and cabling paths will consist of cable tray and J-hook assemblies on 48'' centers.

13. A typical data outlet will consist of 2 data outlets terminated to a wall plate as described above. Typical Voice/Data Outlet locations are as follows:

    a. (2) data outlets in each office, classroom, meeting room, conference room, breakout, or admin/shared office spaces. Within admin/shared offices spaces provide quantity of outlets per the expected number of working occupants of the space.

b. Provide a data drop to any systems that require interfacing with the voice/data network. This shall include, but is not limited to Printer/Fax machines, Emergency phones, Building Automation Systems (BAS), Fire Alarm Control Panels (FACP), Elevator phones, AV headend systems, Access control Systems, Intrusion detections Systems, etc.

c. Provide a data drop to all IP camera locations.

d. Provide data outlets to expand the building wide Wireless Access Point (WAP) system. WAP coverage shall be available throughout the facility spaced out a maximum of 50 feet apart between WAPs. Provide 2 data outlets and cabling to each WAP location. In addition to coverage throughout the facility, provide (1) WAP per 50 individuals within any gathering space where such quantities might exist.

B. OVERHEAD PAGING/INTERCOM SYSTEM

1. Expand building wide overhead paging/intercom system for voice announcements and office communications.

C. AV SYSTEMS

1. Provide rough-in for Local Audio/Video systems to be coordinated with the owner.

D. SECURITY ACCESS CONTROL

1. Expand the existing RS2 access control system to support each new access-controlled door at the facility. Provide rough-in at each access-controlled door location for card reader, door position switch, request to exit device and electronic locking hardware. Provide new licenses, intelligent controller panel and additional card reader and I/O panels as required to support all the doors. Mount head-end equipment within Telecom closets and provide multi-port door power supplies. Coordinate setup and programming with the owner. In addition, provide a door video intercom system with door stations located at strategic locations at the facility. Interface with the access control system for remote door release.

2. Provide access control at new doors including major entrances/exits to the building, all telecom room doors, electrical room doors and mechanical room doors. Provide at any spaces that house significantly valuable and large quantities of technology as well as any areas that handle and store monetary transactions.

3. Provide duress alarm buttons located at strategic locations for quick notification in the event of an emergency.

E. VIDEO SURVEILLANCE

1. Expand existing IP Video Surveillance system along with interior cameras and exterior cameras for monitoring entrances/exits, corridors and commons-spaces throughout the facility, elevators, and at exterior locations to cover pathways around the building. Provide all licensing and storage costs (1Tb per camera) required to support this new system.

F. ERRCS SYSTEM

1. An allowance will be provided for the testing and addition of an ERRCS (Emergency Responder Radio Communication System) DAS system

PLUMBING AND FIRE PROTECTION SYSTEMS

A. Plumbing Scope

1. This project includes all work related to the renovation of the existing school building. The group restrooms from the original building construction are getting reworked in their entirety and will be provided with new plumbing fixtures, floor drains, and piping as required. Water coolers without bottle fillers will be replaced with water coolers with bottle fillers. A new sink will be added in the STEM Classroom. The roof drains will be replaced in all the areas that the roof is being replaced. The floor sinks/drains in the kitchen will be replaced. The domestic water heater will be replaced, and piping rerouted as required.

B. Codes and Standards

5. ASHRAE Standard 90.1 – 2010
6. 2018 Kentucky Building Code (IBC 2015 with amendments)
7. Kentucky State Plumbing Code
8. Commercial Energy Conservation Code 2012 of Kentucky (IECC 2012)
9. Kentucky Fire Sprinkler Code 2013 (NFPA 13, 2013)

C. Domestic Cold Water System

1. Piping material for all domestic water service piping shall be type "L" copper pipe and fittings above floor and type "K" copper pipe and fittings below floor where under slab water piping is required. All fittings for copper piping are to be soldered.
2. The domestic water distribution system piping will be provided with broad, local and individual fixture shut off valves throughout the new building for complete control of these systems. Water hammer arresters will be provided to relieve the system of shocking and movement due to quick closing valve operations.
3. The entire length of the cold water piping will be provided with 1" insulation to control condensation on the pipes.
4. The maximum velocity for cold water in piping is to be 8 ft/sec.

D. Domestic Hot Water System

1. The domestic hot water system is to be recirculated within the code minimum lengths to each plumbing fixture with hot water.
2. Hot water and hot water return piping will be provided with 1" insulation on pipe sizes ½" – 1 ½", and 1 ½" insulation on pipes 2" and greater to minimize heat loss.
3. The maximum velocity for hot water in piping is to be 5 ft/sec.

E. Building Sanitary Waste and Vent Systems

1. Each plumbing fixture, floor drain or other equipment requiring plumbing drain connections will be provided with sanitary waste and vent piping in accordance with the State of Kentucky Plumbing Code. Sanitary vent piping will be gathered and routed through the roof to atmosphere. There will be multiple vent to roof locations in the building. Sanitary waste piping will be gathered and routed to the building exterior at a point which will be coordinated with the surrounding exterior sanitary sewer system.
2. Sanitary cleanouts shall be installed at 50 feet on center up to 4" diameter and 100 feet on center for 6" diameter and above, and at changes in direction of 90 degrees or more, at the bottom of vertical risers and as the sewer exits the building.
3. Piping materials for sanitary waste and vent piping will be extra heavy hub and spigot cast iron piping below grade, and no hub cast iron piping above grade. All no hub cast iron piping will be joined using 4 and 6 band heavy duty couplings. Vent piping above grade will be no hub cast iron.

F. Building Storm Sewer System

1. Storm water will be removed from the roof of the building through a network of roof drains. Overflow drains with 2" high water dams will be provided for each roof drain shown on the architectural roof plan. All overflow drain piping will be piped separate from the primary roof drain system and terminate at a point through the building exterior wall in site of maintenance personnel on the ground for visual verification of potential primary roof drain failure in accordance with the State of Kentucky Plumbing Code.
2. The primary interior roof drain system will be gathered together within the building and routed to the exterior. The final exit location will be coordinated with the site storm sewer system. The under floor storm water piping will terminate at a cleanout located at 5'-0" from building foundation wall.
3. Piping materials for storm sewer piping will be extra heavy hub and spigot cast iron piping below grade, and no hub cast iron piping above grade. All no hub cast iron piping will be joined using 4 and 6 band heavy duty couplings.
4. Storm sewer cleanouts shall be installed at 50 feet on center up to 4" diameter and 100 feet on center for 6" diameter and above, and at changes in direction of 90 degrees or more, at the bottom of vertical risers and as the storm sewer exits the building.

G. Natural Gas Piping System

1. Natural gas service will be provided to any new HVAC equipment that requires gas.
    a. If required based on loads of the building, the service meter may need to be upgraded.
    b. Material for natural gas piping shall be schedule 40 black steel, threaded for pipe sizes 3/4 to 2 inch.

H. Plumbing Fixtures

1. Water closets for this project will be white, vitreous china; wall hung for regular and handicapped accessibility.
    a. Flush valves for water closets will be automatic type, battery.
2. Urinals for this project will be white, vitreous china, wall hung for regular and handicapped accessibility.
    a. Flush valves for urinals will be automatic type, battery.
3. Lavatories for this project will be white, vitreous china; wall hung for regular and handicapped accessibility.
    a. Faucets for lavatories will be meter operation (push button).
5. Electric water coolers will be stainless steel, automatic, hi-low style with single chiller unit and bottle filler and mounted for regular and handicapped accessibility.
6. Mop basins will be floor mounted, molded stone, 24" x 24" with stainless steel splash guards and dropped front lip. Mop basins to include accessories such as mop hook, caulking and rubber hose.
    a. Faucets for mop basins will be all brass construction, 8" centersets, integral vacuum breaker, and wall mounted with threaded hose connection.
8. Staff breakroom sinks shall be undermount stainless steel with gooseneck faucets with wrist blade handles.
10. All plumbing fixtures and trim designed or designated for use by the handicapped shall meet the Americans with Disabilities Act guidelines.

I. General Plumbing Systems Information/Plumbing Specialties

1. Floor drains will be provided in all restroom groups. Floor drains will be provided with trap seals.
2. New cast iron roof drains on the roofs without scuppers will be combination primary / secondary, with a 2" overflow dam on the secondary drain. New roof drains on the roofs with scuppers and on the canopies will be a cast iron primary drain only.
3. Hose bibs will be provided in the main restroom groups.

4. Art room sinks will be regular and handicapped accessible and will have solids traps included at each sink. The trap shall be accessible for cleaning.
5. Piping shall be identified in mechanical rooms, unfinished spaces without ceilings, above suspended lay-in acoustical ceilings for the type of service and the direction of flow. Equipment shall be identified with name plates.
6. Operations and maintenance manuals for data and materials shall include the following:
    a. Operating & Maintenance (O & M) Manuals
    b. All required warranty certificates
    c. A letter from the general contractor stating the start date and duration of all warranty items
    d. The name and phone numbers of the general contractor's point of contact for all warranty repairs
    e. A list with contact information of the warranty providers for all systems and equipment

K. Wet Pipe Fire Protection Sprinkler System
1. The building is fully sprinklered.
2. New sprinklers will be provided in the Restrooms and anywhere there are new ceilings. The system will be modified as needed to maintain complete sprinkler coverage of the building in accordance with NFPA 13.
3. New sprinklers are to be "semi recessed" type, painted white.