

DEPARTMENT OF FACILITIES

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MEMO

TO: Dr. Jesse Bacon, Superintendent

FROM: Tony Roth, Director of Buildings and Grounds *Tony*

Date: March 7, 2023

RE: Schematic Design Approval-Bullitt East High School BG23-050

Attached for the Board's review is the schematic design of the addition and renovations to Bullitt East High School. This submission has been prepared by both Studio Kremer Architects and CMTA Engineers.

At this time, I am asking the Bullitt County Board of Education to approve these documents to the Kentucky Department of Education.

If you have any questions, please call me at 502-869-8021.

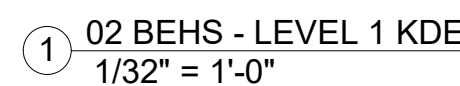
Attachments:

- BEHS - Phase 1 - Schematic Design Floor Plans
- BEHS - Phase 1 - Schematic Design Site Plan
- BEHS - Phase 1 - KDE Model Program - *Full Campus after All Phases are Complete*
- BEHS - CMTA Narrative on MEP Systems

*Work*

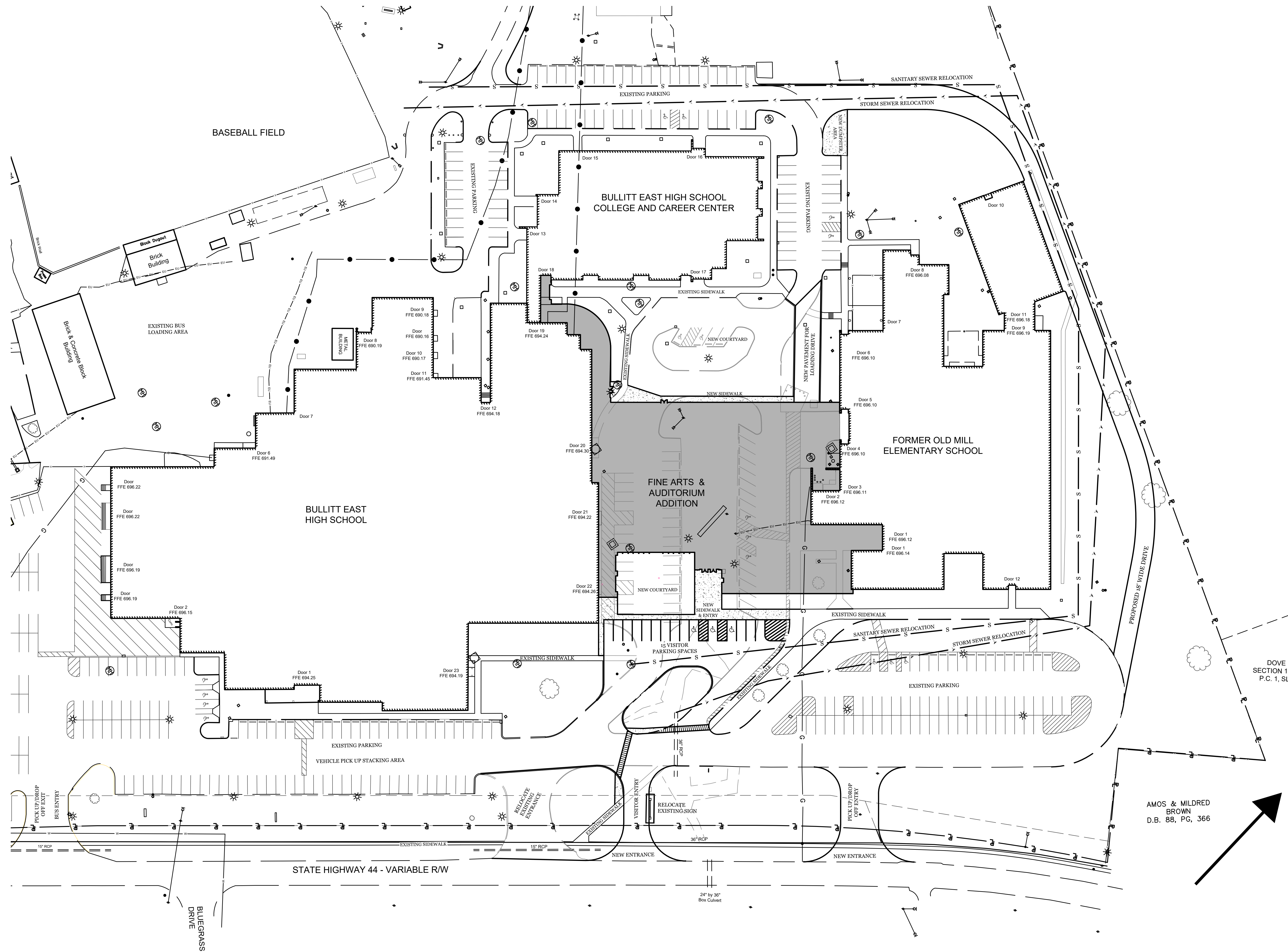
OUR MISSION IS TO INSPIRE AND EQUIP OUR STUDENTS TO SUCCEED IN LIFE

BULLITT COUNTY PUBLIC SCHOOLS IS AN EQUAL EDUCATION AND EMPLOYMENT INSTITUTION



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Schematic Design

Schematic Site Plan - Phase 1

Bullitt County Public Schools

Bullitt East High School - Fine Arts Addition

11450 KY-44

Mt. Washington, KY 40047

BG#

23-050

DATE :

03/16/23

DRAWN BY :

Horizon

CHECKED BY :

SKA

REVISIONS :

2022-35

KDE.1

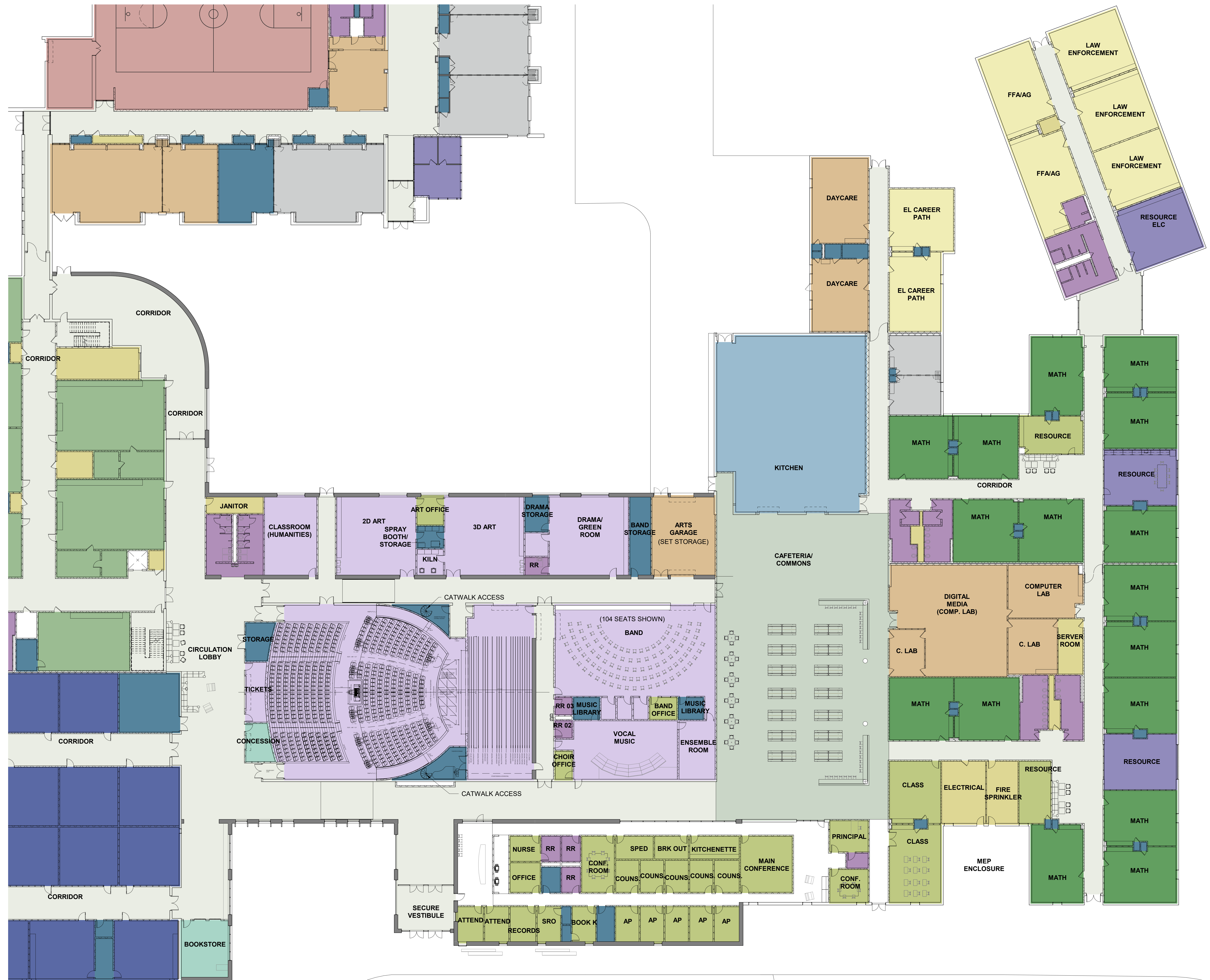


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① 03 ENLARGED PLAN - FINE ARTS ADDITION  
1/16" = 1'-0"



**Bullitt East High School - Phase 1 & 2 - Complete Campus**

ska# 2022-35

**Model Program Comparison**

KDE STATE STANDARDS (1500 Students)				Pro-Rate for 2000 Students		COMBINED BEHS + OMES   Comparison to 1,952 Capacity			
PROGRAM SPACE	no. of Rooms	SF area (for each)	TOTAL SF area	no. of Rooms	TOTAL SF area	PROGRAM SPACE	no. of Rooms	Versus Model Program	TOTAL SF area
Standard Classroom	45	750	33,750	60	45,000	Standard Classroom	62	493	45,493
Special Education (self-contained)	1	825	825	2	1,650	Special Education (self-contained)	3	2,211	3,861
Resource Room	10	375	3,750	14	5,250	Resource Room	12	1,987	7,237
Science Classrooms	6	1,000	6,000	7	7,000	Science Classrooms	8	3,857	10,857
Science Lecture Labs	3	1,625	4,875	4	6,500	Science Lecture Labs	4	(1,000)	5500
Art Classroom	1	1,200	1,200	2	2,400	Art Classroom	2	252	2,652
Band /Vocal Classroom	1	2,500	2,500	1	2,500	Band Classroom	1	569	3,069
Vocal Music Classroom	1	900	900	1	900	Vocal Music	1	508	1,408
Computer Classroom	3	1,280	3,840	4	5,120	Computer Classroom	4	(1,542)	3,578
Locally Identified Career Tech	1	7,900	7,900	1	9,900	Locally Identified Career Tech	Allowance	2,313	12,213
Locally Identified Program Space	1	17,040	17,040	1	23,040	Locally Identified Program Space	Allowance	(6,362)	16,678
Total:			82,580	109,260		3,286			Total: 112,546
Library   Media Center			8,375	10,500		(25)			10,475
Auditorium / Theater			5,500	6,500		2,687			9,187
Kitchen			4,700	5,600		(950)			4,650
Cafeteria			7,800	9,300		496			9,796
Physical Education			17,100	18,500		3,750			22,250
Administrative Area			2,320	2,750		5,331			8,081
Family Resource Area (FRYSC)			300	300		1,965			2,265
Custodial Receiving			250	250		634			884
Total:			46,345	53,700		13,888			Total: 67,588
Total Net Area:			128,925	162,960		17,174			Total Net Area: 180,134
Elementary building assignable space (TARGET 68%)									
Total Gross Area (SFA):			189,596	68.00%	239,647	Efficiency			68.06% 264,676
Area (square feet) per pupil			126		137	Area (square feet) per pupil 1,952 Students):			135.59
						Existing Bullitt East High School SF:			162,030
						Existing Old Mill Elementary SF:			57,896
						Total Size of Combined Facilities (No Additions) (SF):			219,926
						Fine Arts Addition (SF):			44,750
						Total Size of Faciliy w. Addition (SF):			264,676
						Percentage over Model Program (%):			9%



## **Mechanical, Electrical, Plumbing and Fire Protection Narrative Bullitt East High School Renovation/Addition**

### **Background, Codes and Standards**

The renovation consists of a single story, ~40,000 sq ft fine arts addition and connector with light renovation to the previous old mill elementary school with new ~5,300 sq ft kitchen and 15,000 sq ft renovation area(s). Most systems at the previous Od Mill Elementary school are to remain unless rework is required for renovation. The scope of work shall be designed to meet the requirements of the following:

- 2018 Kentucky State Building Code (IBC2015 with KY Amendments)
- IECC 2012 Energy Code
- 2017 National Electrical Code (NFPA 70)
- 2016 National Fire Alarm and Signaling Code (NFPA 72)
- 2012 Life Safety Code (NFPA 101)
- ASHRAE Guidelines 55 and 62.1

### **Division 21 – Fire Suppression**

#### **a) Codes and Standards**

See above for requirements.

The entire building shall be provided with a new fully automatic fire suppression system designed in accordance with all applicable standards of NFPA (including but not limited to NFPA 13 & 20), state, and local codes.

#### **b) Incoming Service**

Existing 4" metered fire protection main to the elementary school will be relocated within the fine arts addition via an underground supply from the local water company's existing water main infrastructure (Mt. Washington Sewer & Water). The incoming fire service shall include a post indicator valve (PIV), a fire department connection (FDC), and reduced pressure backflow prevention device. The fire entrance to the high school will remain and be re-used.

#### **c) Building Distribution:**

The building is currently divided into multiple fire zones, and be provided with a control valve, tamper/flow switches, and drain assemblies (Floor Control Valve Assembly).

The incoming fire service entrance and each fire zone will be fully monitored via the building fire alarm system.



Piping infrastructure will be a combination of schedule 10/40 black steel pipe with grooved Victaulic type fittings. Utilize flexible sprinkler connections for all sprinklers with exception of areas where there are no ceiling present.

#### SPRINKLERS:

Sprinklers shall be recessed, quick response, pendant type sprinklers in areas containing ceilings. Upright sprinklers shall be used in areas containing no ceilings, such as mechanical rooms, etc. Dry pendant/upright type sprinklers shall be utilized in the areas subject to freezing temperatures such as the loading dock and all freezer/cooler boxes. High temperature sprinkler will be required in areas similar to the kitchen, mechanical rooms, art kiln rooms, etc. Areas where sprinklers will be subject to damage, sprinkler will be provided with heavy duty wire cages.

#### SPRINKLER ACCESSORIES

Sprinkler drain risers will be provided to allow system to be fully drained. Sprinkler drain piping shall be routed and spilled to grade.

#### **d) Fire Hydrant Flow Test:**

A new fire hydrant flow test will need to be performed to determine available static pressure, residual pressure and flow. A new flow test shall also be conducted by the awarded project sprinkler contractor to utilize as part of their shop drawings and hydraulic calculations.

### **Division 22 – Plumbing**

#### **a) Codes and Standards**

See above for requirements.

Public utilities will be provided to the job site for all major utilities.

#### **b) Sanitary Sewer Service:**

Sections of sanitary sewer below building will be replaced due to damages to the existing piping. Existing sanitary pipe to be snaked/ camera'ed to identify damaged piping and extents of replacement.

The building sanitary sewer will utilize a network of sanitary piping sized in accordance with the current Kentucky Plumbing Code and shall drain via gravity to an existing exterior manhole(s) and sanitary sewer system (Mt. Washington Sewer & Water).

Multiple sanitary sewer exit points will be utilized for this project. All grease production from kitchen equipment and associated plumbing fixtures will be drained via grease



waste piping to an exterior grease trap(s) which will be sized and located adjacent to the kitchen.

Mandatory cleanouts every 100' (minimum) for all sanitary piping.

**c) Domestic Water Service:**

The existing (3") metered domestic water main will be re-located in the elementary school via underground water main piping from the local water company (Mt. Washington Sewer & Water). The incoming water service will be provided with a backflow preventer in accordance with local water company standards. The incoming service within the high school will remain.

Domestic Water Heating System:

The domestic water heating is divided into two separate system designs - Kitchen service and a Classroom/Admin building service. Those systems will be provided as follows:

**KITCHEN** - A high efficiency gas fired water heater, with separate storage tank will be provided for the kitchen and replace the existing water heater. The water heater will produce 140°F domestic hot water for distribution to the dishwasher equipment, pot washing, etc. Booster heaters (only as necessary) shall be utilized at the kitchen equipment to increase the hot water temperature to 180°F. Mixing valves will be provided as necessary to limit hot water to hand washing sinks or similar plumbing fixtures.

**CLASSROOMS/ADMIN** – Existing water heater to be replaced. The new water heater will produce approx. 120°F hot water, which will be distributed to the building group restrooms and various sinks located throughout the building. Thermostatic Mixing Valves will be provided to maintain safe discharge temperature at each location. The building will be broken down into multiple zones to minimize energy loss to the greatest extent possible.

Both water heating systems will be fully re-circulated to maintain a minimum of 10°F temperature loss throughout the respective hot water loops.

**d) Roof Drainage System**

Roof storm drainage will be collected via multiple combination primary/overflow roof drains. All roof drains will be sized in accordance with the requirements of the current Kentucky Plumbing Code. All primary roof drain piping will be collected and distributed out to site via a new underground pipe system. All overflow roof drain piping will be routed to the building exterior and spill to daylight.

The typical roof drains will be a dual outlet type drain body, similar to a Zurn model Z103-45 or equal, with a 2" internal dam.



**e) Natural Gas System**

Existing gas meter to be relocated to new mechanical room for gas entrance to elementary school building. New metered natural gas service (LG&E) will be supplied to the elementary school building to serve the domestic water heating, kitchen equipment, gas fired HVAC equipment and range hood make-up air unit in the elementary school and fine arts addition. All piping on the house side of the meter will be sized based on 7"-11"w.c.

**f) Piping Materials**Plumbing Waste and Vent Piping Materials:

All above & below slab sanitary waste & vent piping shall be schedule 40 PVC piping and fittings with solvent cement joints will be utilized throughout the building with the exception of the kitchen related areas, where drainage temperatures may reach approx. 140°F, these areas will be provided with service weight, hubless, cast iron piping for above slab installation and service weight, hub & spigot piping for below slab installation.

Domestic Water Piping Materials:

Underground (MAIN WATER SERVICE) -Type L Hard Copper with lead free solder. 150 lb, flanged or screwed, gate or ball, bronze valves.

Underground (EQUIPMENT) - Pex piping manufactured by Zurn or Uponor. No joints will be allowed below slab.

Above ground – (Mechanical rooms & building water mains) - Type L Hard Copper with lead free solder. 150 lb, flanged or screwed, gate or ball, bronze valves.

Above ground (branch piping to plumbing fixtures) - Pex piping manufactured by Zurn or Uponor.

Natural Gas Piping Materials:

All piping on the house side of the meter shall be Schedule 40 black steel piping and fittings.

**g) Plumbing Fixtures**

Existing plumbing fixtures within the school are to be replaced. New drinking fountains with bottle fillers to be installed throughout school. New plumbing fixtures for this project shall be similar to the following:

WATER CLOSET – Floor mounted, manual flush valve (American Standard, Zurn, etc.)

LAVATORIES – Wall hung, vitreous china with Delta model 86T1153 metered faucet(s) or multiuser wash stations (Bradley)

URINALS – Wall mounted, manual flush valve (American Standard, Zurn, etc.). Must have integral strainer.

SINKS – Countertop, stainless steel, drop in (Elkay) with gooseneck faucet and wrist blade handles.

DRINKING FOUNTAINS – Bi-level, wall hung with bottle filling station (ELKAY)

MOP BASIN – Standard floor set, 24"x24" (MUSTEE)

## **Division 23 – Heating, Ventilating and Air-Conditioning (HVAC)**

### **a) Codes and Standards**

See above for requirements.

### **b) Design Criteria**

The design criteria to be utilized for HVAC design and Heating/Cooling Load Calculations is as follows:

#### **Site Data:**

- Building Location: 11450 KY-44, Mt Washington, KY 40047 (Bullitt County)
- Building Orientation: Long Axis is Northeast / Southwest
- ASHRAE 90.1 Climate Zone: 4A

#### **Design Conditions:**

- The HVAC design parameters have been determined per ASHRAE Handbook - Fundamentals for Louisville, Kentucky
- Summer Outdoor Air Dry Bulb: 95° F with Mean Coincident Outdoor Air Wet Bulb: 74° F (ASHRAE 1% Peak Design Condition).
- Summer Outdoor Air Wet Bulb: 79° F with Mean Coincident Outdoor Air Dry Bulb: 84° F (ASHRAE 0.4% Peak Design Condition).
- Winter Outdoor Air Dry Bulb: 5° F (ASHRAE 99.6% Peak Design Condition)
- Indoor space conditions, based on project requirements, space type and occupancy, as indicated.
- **Occupied Space Setpoints:** Equipment serving classrooms, offices, and similar occupancy spaces shall be designed and sized to maintain the following setpoints within a 2.5-degree F deadband:

*Cooling Season:*                      Occupied mode:                      74°F



	Vacant mode:	78°F
	Un-Occupied mode:	80°F
<i>Heating Season:</i>	Occupied mode:	70°F
	Vacant mode:	68°F
	Un-Occupied mode:	65°F

- **Transient/Variable Occupancy Space Setpoints:** Equipment serving dining, media center, corridors, and similar variable occupancy spaces shall be designed and sized to maintain the following setpoints within a 2.5-degree F deadband:

<i>Cooling Season:</i>	Occupied mode:	74°F
	Vacant mode:	78°F
	Un-Occupied mode:	80°F
<i>Heating Season:</i>	Occupied mode:	70°F
	Vacant mode:	68°F
	Un-Occupied mode:	65°F

- **IDF/Electrical/Mechanical Space Setpoints:** Equipment serving mechanical and electrical spaces, IDF rooms, and similar spaces shall be designed with ventilation only and sized to maintain the following setpoints:

<i>Cooling Season:</i>	Occupied mode:	85°F
<i>Heating Season:</i>	No added heat	

- **MDF spaces:** Equipment serving Server room and MDF rooms shall be designed and sized with air condition systems to maintain the following setpoints:

<i>Cooling Season:</i>	Occupied mode:	78°F
<i>Heating Season:</i>	No added heat.	

- **Kitchen Space Setpoint:** Equipment serving kitchen area shall be designed to temper the space, based on following set points:

<i>Cooling Season:</i>	Occupied mode:	80°F
	Un-Occupied mode:	85°F
<i>Heating Season:</i>	Occupied mode:	70°F
	Un-Occupied mode:	65°F

- **Restrooms:** Ventilated/Exhausted – Restrooms with exterior walls will receive some supplemental heating.

### **Design Occupancy:**

The HVAC will be designed based on occupancy density indicated in the ASHRAE and Mechanical code. In general, occupancy is as follows:

- Person heat load (250 Btu/Hr sensible/200 Btu/Hr latent)
- Design Total School Occupancy: 1525 students + 175 staff
- Classrooms: Quantity of students plus staff, typically 25 students plus teacher.
- Music Classrooms: Quantity of students plus instructor
- Art Classrooms: Quantity of students plus instructor.
- Dining: Quantity of students, divided by number of planned lunch sessions.
- Media Center: Quantity of students plus instructor to be determined.
- Special Education rooms: Quantity of students plus instructor to be determined.
- Band Rooms: Quantity of Students plus instructor
- Auditorium: Max occupancy plus performers

### **Annual Schedule:**

The building will be occupied year-round with some summer usage and typical holidays observed. A building schedule is included which indicates occupied and un-occupied operation, expected occupancy, and which extended schedule areas are in use.

- Typical annual schedule:
  - First Week of August to Third Week of May
- Extended school scheduling
  - TBD
- Summer school scheduling
  - TBD

### **Envelope:**

- Roof: R-30 c.i.
- Framed Walls: R-13 + R-7.5 c.i.
- ICF Walls: R-30 c.i.
- Windows/Storefront: Solarban 70XL clear (64% visible transmission,  $u = 0.29$ , SHGC = .27) with thermally broken aluminum framing ( $u=1.04$ ).
- Foundation Slab: 6" concrete with perimeter insulation.



- **Building Pressure Testing:** A building pressure test shall be performed to guarantee envelope performance at 0.20 cfm/ft<sup>2</sup>. Blower door pressure test shall be performed after exterior envelope has been sealed but prior to interior and exterior finish application in order to maintain access to potential leakage points that need to be fixed.

#### **Lighting:**

- Building lighting includes full occupancy sensor coverage.
- Classroom Lighting Density: 0.5 W/sf (LED Troffers).
- Art Classroom Lighting Density: 0.7 W/sf
- Administration Lighting Density: 0.4 W/sf (LED Troffers).
- Gym Lighting Density: 0.65 W/sf (High-bay LED).
- Media Center Lighting Density: 0.65 W/sf
- Cafeteria Lighting Density: 0.4 W/sf
- Corridor Lighting Density: 0.4 W/sf
- Exterior lighting with photocell/timeclock control. (LED poles and wallpacks).

#### **Equipment/Plug Load Inputs:**

- Classrooms = Assuming 1 laptop computer at 50.
- Building has no central computer lab.
- Kitchen = 180 kW electric (heating only cooking equipment) with type 2 hood.
- Refrigeration Equipment = 22 kW (geothermal cooled).
- MDF room = 2000 watts computer equipment (Conditioned).
- IDF room = 1000 watts computer equipment (ventilated/exhausted space).
- Electrical rooms - 500 watts internal space heat (ventilated/exhausted space).

#### **Domestic Hot Water Generation:**

- High efficient gas fired water heaters.
- 120°F Water Temperature delivered to the building. Booster provided at dish washer to provide 180°F water.

#### **Ventilation Rates:**

- Compliant with ASHRAE 62 and LEED Requirements. Occupancy based ventilation control in classrooms, and demand control ventilation using CO<sub>2</sub> sensors in the cafeteria and auditorium.
- 62.1 ventilation calculations for room-by-room ventilation data.

#### **HVAC Equipment Operation:**

- Controls to include programming and scheduling for occupied and un-occupied operation.
- Space temperature and outside air ventilation shall be interlocked to room occupancy sensors.
- Occupancy sensors controls occupied and vacant mode of operation:
  - Minimum ventilation rates

Occupied: ventilation at minimum 62.1 airflow rate (SF component).

Vacant: Ventilation at zero (terminal unit damper closed).

- Auditorium, Dining, and other large occupancy zones to include CO2 sensors to reduce ventilation rates during non-peak occupancy. CO2 controls from design airflow to minimum 62.1 requirement (SF component) during building occupied operation.

### c) Heating and Air Conditioning Systems

The existing HVAC systems for this project Includes:

- Bullitt East High School – Geothermal Heat pump system
- Old Mill Elementary – Indoor and outdoor air handling units w/ VAV reheat

Existing Systems will remain and be modified to fit new floorplan changes. Zoning and quantity will be determined as the floor plan design progresses. The ventilation (outside) air is de-coupled from the HVAC heating and cooling with each space (or zone) receiving outside air separately utilizing demand control ventilation.

Regarding the new Fine Arts addition to Bullitt East High School, the new system shall be a stand-alone geothermal heat pump system. Zoning and quantity will be determined as the floor plan progresses. The ventilation (outside) air is de-coupled from the HVAC heating and cooling within each space (or zone) receiving outside air separately utilizing demand control.

Each heat pump will be a high efficiency, two-stage or single stage heat pump unit with an ECM fan motor. Most of the units will be mounted in a closet or mechanical room. Each heat pump unit will utilize refrigerant R-410A and will have an ozone depleting potential (ODP) of 0.05 or less.

Each zone will have a heat pump with a thermostat (adjustable) and associated space temperature sensors. For demand control ventilation, appropriate spaces will also include CO2 and occupancy sensors. The thermostat/sensors, CO2 and occupancy sensors are to interface to the building automation system. The CO2 and occupancy sensor inputs will be utilized to control the space ventilation terminal unit and space temperature set points.



All heat pump units shall have fully ducted supply and return sheet metal ductwork with flexible runouts to diffuser and grilles. Existing ductwork for demolished heat pumps will remain and be re-used where applicable. All supply air ductwork shall be insulated with 2.2" thick,  $\frac{3}{4}$  pcf duct wrap with vapor barrier (installed R-value  $R>6$ ). Return air ductwork will not be insulated. Each heat pump unit will include a duct-mounted pre-filter rack. The pre-filters shall be 24"x24" Flanders/FFI PrePleat 40. Each heat pump shall include integral disconnect. Condensate for each unit will be disposed of through a floor drain or open receptacle into the sanitary system.

The Fine Arts addition system will utilize a central pumping system. The system will consist of two (2) base-mounted end-suction variable speed pumps. Each pump will be sized at 100% of the building's block load (~375 gpm each). Flexible stainless steel braided hoses shall be used at the connection of each heat pump unit. The hose kits shall include shut-off valves on each the supply and return and a strainer on the supply hose. The return hose kit shall also contain a two-way, two-position control valve and flow control device. New piping will be laid throughout the new addition to feed the new heat pumps and all other associated equipment.

#### **d) Ventilation Systems**

The outside air systems for the Fine Arts addition shall be de-coupled. Preliminary design will include one 5,000 cfm unit to cover the whole addition. In general, outside air shall be provided directly to the occupied space. The dedicated outside air handling units will be indoor type and include supply/exhaust plenum fans. The units shall be variable volume air flow, energy recovery type units utilizing building exhaust and general exhaust air to precondition the outside air through a total energy recovery wheel. All conditioned outside air ductwork shall be insulated and building exhaust air ductwork will not be insulated – this applies to positive pressure outside air ductwork and negative pressure exhaust air ductwork. All un-conditioned air ducts shall be insulated with 3" thick,  $\frac{3}{4}$  pcf duct wrap with vapor barrier – this applies to negative pressure outside air ductwork and positive pressure exhaust air ductwork.

The outside air systems for Bullitt East High School shall be renovated to serve new floor plan changes to the school. System to be de-coupled from heat pumps. Preliminary design will include multiple units at various sizes to serve the entire school. In general, outside air shall be provided directly to the occupied space. The dedicated outside air handling units will be indoor type and include supply/exhaust plenum fans. The units shall be variable volume air flow, energy recovery type units utilizing building exhaust and general exhaust air to precondition the outside air through a total energy recovery wheel. All conditioned outside air ductwork shall be insulated and building exhaust air ductwork will not be insulated – this applies to positive pressure outside air

ductwork and negative pressure exhaust air ductwork. All un-conditioned air ducts shall be insulated with 3" thick,  $\frac{3}{4}$  pcf duct wrap with vapor barrier – this applies to negative pressure outside air ductwork and positive pressure exhaust air ductwork.

The outside air units will consist of the following sections/components: stacked on top and in the direction of air flow will be an inlet filter, energy recovery wheel, and plenum type, exhaust air fan (sized at 100% airflow), on the bottom will be a inlet filter, energy recovery wheel, access, gas heat / DX coil with face and bypass damper, access, plenum type, supply air fan (each sized for 100% airflow). Each fan will be controlled by a VFD for varying airflow conditions. During low ventilation conditions, only one of the fans would be needed to meet the ventilation requirements. The exhaust fan is sized at 20% reduction in capacity (thus maintaining building pressurization). The supply air distribution system will supply outside air to VAV terminal units for distribution of outside air to each zone.

To control outside air, two strategies will be employed. In large, varying occupancy spaces (Cafeteria, Auditorium and others), a CO2 sensor will be used for ventilation control. The VAV terminal serving these areas will modulate in accordance with the CO2 measurements. In other locations, the VAV terminal will also be interlocked with room occupancy sensor. The ventilation rate will be modulated based on occupied and vacant spaces conditions. The total space by space occupancy count is expected to exceed actual building occupancy; however, the building occupancy is 1500 students and 175 staff. Designing a variable ventilation system based on actual building occupancy reduces the central ventilation system by ~30 percent, thus reducing the HVAC load.

#### **e) Geothermal Well Field and Piping System**

Sizing of the well field is based on block/diversified internal loads and designed for 80-85°F geothermal supply water temperature. The well field will be preliminarily sized for 120 tons of capacity requiring ~70 wells (7 circuits with 10 wells each). While the well field isn't designed with spare or redundant capacity, the loss of one circuit would still allow building operation with geothermal supply water temperature rising approximately 5°F.

The geothermal well field will consist of 400' deep wells. The bores will be 6" in diameter and will include a factory-made DR-9, 1-1/4" U-tube, fully grouted well. An underground vault will be utilized to header the circuits together. The wells shall be installed on a 20' by 20' grid system in the field behind the new school building. All horizontal mains shall be a minimum of four feet below grade and the trenches shall be 100% back filled with rock or other suitable materials.

All geothermal piping exterior of the building shall be HDPE butt-fused joints and fittings. All geothermal piping mains interior of the building shall also be HDPE butt-fused joints and fittings so as to eliminate steel piping in this geothermal/hydronic loop. Heat pump



run outs shall be copper or HDPE. The well field piping and building piping will be purged to remove dirt, debris and air. The system will include side stream filtration, air elimination equipment, isolation zone/valves, central chemical treatment and fill, and a purge pump.

With typical geothermal supply water temperatures operating higher than the space dew point, only concealed geothermal piping (HDPE) will be insulated with ½" thick fiberglass. Startup of the system shall be initiated and operated as required to prevent below dew point distribution water temperatures until steady state operating temperatures are achieved and maintained. However, concealed, non-accessible geothermal piping interior of the building and metallic branch piping may be insulated with 1" thick fiberglass insulation.

**f) Temperature Control**

Existing control system to be re-used within existing High school. The new Fine Arts addition will be added to the existing system. Existing system is currently Tracer SC. All new/replaced equipment will be tied into Tracer SC system. The controls system will also include a JACE panel to communicate (wired/wireless) over the web-based area network. The BAS shall also interface with the building lighting, exterior lighting, and switch gear / electric metering. BTUH metering shall be provided for the central geothermal system, kitchen systems, etc. The system shall be ASHRAE 135 BACnet compliant using BTL listed components (to the extent possible)

## **Division 26 – Electrical**

**a. Codes and Standards**

See above for requirements.

**b. Demolition**

Existing overhead primary electrical service and fiber service shall be reworked around south end of site as required for addition. Existing distribution equipment shall be completely replaced in new location with new service. Existing service entrance secondary shall be replaced to new location. Existing feeders shall be reutilized where possible and provided new as required. Existing lighting, power and systems shall remain at the previous old mill elementary school. Existing system head ends shall be modified as required for project.

**c. Power Distribution System**

Existing utility transformer shall be relocated as required for the additional and a new underground, concrete encased secondary service will be extended from the relocated

utility transformer to feed a new replacement 3000A/120/208V/3PH/4W switchboard located in a new Main Electric Room.

The service switchboard shall be circuit breaker type with copper bussing, neutral and ground bars. The main breaker shall be electronic trip type with arc fault reduction maintenance switch and phase loss protection. The main breaker shall contain a separate external metering system for BAS tie in over overall electric usage and demand. The service entrance switchboard shall contain a dedicated SPD device.

The existing kitchen currently serving the high school to be relocated to the old elementary school. New kitchen equipment and mechanical systems associated to be provided along with new electrical support and distribution equipment. New cafeteria and commons space associated with kitchen to be provided.

A new grounding electrode system consisting of (3) 10'-0" copper ground rods, a ufer ground in the building foundation, a connection to a copper water line (where present) and building steel shall be provided. A dedicated systems interconnection ground bar will be provided.

Each new area of the addition shall be served by dedicated 120/208V electrical distribution breaker panels and multiple branch circuit panelboards separated for certain specific loads. Receptacle, lighting and emergency panels will be provided with SPD devices. The devices will be provided integral to the equipment its protecting. Provide UL-1449, 3<sup>rd</sup> edition-listed devices, 200kA per phase for branch panels, 400kA per phase for distribution panels and switchboards. Panelboards shall be provided with copper bussing, neutral and ground bars, door-in-door arrangement and bolt on breakers.

Lighting, power and mechanical circuits will be routed to separate panelboards. All panels will have a minimum of 25% spare capacity and space based on connected loads at the completion of design.

All wiring shall be copper, minimum #12AWG THHN/THWN installed in conduit with compression fittings, minimum size 3/4". MC cable will not be acceptable. Exposed exterior conduit will be rigid steel with threaded fittings. Underground exterior conduit for service entrance, floor boxes, etc. 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. Under-slab/in-slab raceways will not be allowed unless specifically permitted on the drawings. Existing to remain underslab feeders will not be touched unless they cannot be intercepted. Underslab raceways will be minimum of 24" below grade. Where technology raceways are provided underslab, they will be concrete encased, minimum of 12" deep. Raceways and boxes in ceiling for 120/208V will be standard factory EMT color, 277/480V will be orange.

Power connections and code required disconnecting means will be provided for all HVAC, plumbing and electrical equipment. Combination starter/fusible disconnects will

be provided for selected equipment as required where 1HP and larger or without VFD control. All disconnects shall be heavy-duty type.

All wiring devices will be specification grade, 20A tamper resistant shutter type with nylon unbreakable coverplates. All back boxes will be 4-11/16" square x 2-1/8" deep, galvanized steel, with knockouts and appropriate mud ring for number of device gangs required.

All 125V and 250V non-locking receptacles will be tamper resistant, shutter type. GFCI protected, Weather Resistant (WR) receptacles will be used in wet locations and elsewhere as necessary and where required by code. All exterior receptacles will be provided with a diecast in-use, lockable covers.

All outlet covers will be provided with clear adhesive labels and black lettering indicating panel number and circuit number. The inside of the outlet box will also be labeled with panel and circuit.

Lamacoid labels will be provided for all electrical distribution equipment.

All Electrical equipment and components will have a full one-year parts and labor warranty from the date of substantial completion. All luminaire ballasts, drivers and lamps will have a manufacturer's five-year unconditional warranty. This will run concurrently with the one-year parts and labor warranty.

#### **d. Legally required and Optional Standby Emergency Power Systems**

A new 150KVA generator will provide emergency backup power for code required egress lighting in the addition, college and career center and previous elementary school. An additional optional standby transfer switch will allow additional non-code-required loads to be placed on the generator. This is to include IT systems, Intercom, Kitchen Freezer/Cooler and utility space heaters for freeze concerns.

#### **e. Lighting Systems**

##### Interior Lighting

Interior Lighting will be designed in accordance with IESNA guidelines including the Illuminating Engineering Society of North America (IESNA) Handbook, IESNA Recommended Practices and Kentucky Department of Education Facility Programming and Construction Criteria Planning Guide.

Interior artificial lighting will be largely accomplished with suspended high-performance LED direct/indirect fixtures and 2x4 recessed troffers throughout the facility with specialized LED lighting in selected spaces such as Media Center, Entry Lobby, etc.

Lighting in the Gymnasium will be LED high bays with wire guards.

Lighting in enclosed stairwell spaces will be LED wall mounted direct/indirect fixtures.



Lighting in the mechanical and electrical rooms will be 4' LED chain hung strips with acrylic diffusers and wireguards. These fixtures will be non-dimmed and switched.

Exit signage will be white, die-cast aluminum type with red lettering. Ceiling or wall mounted as necessary for the location.

Emergency lighting throughout the building will be handled via integral battery inverters. Egress lighting will be equipped with a transfer relay to allow local control during normal operation.

#### Lighting Levels

Provide average maintained horizontal light levels, in foot-candles (fc), as noted below:

- Corridor/ Lobby 20 fc
- Kitchen 50 fc
- Dining Areas 50 fc
- Offices 30 fc
- Meeting Rooms 50 fc
- Admin Support Spaces 30 fc
- Stairwell 20 fc
- Building Services 20 fc
- Mechanical Spaces 20 fc
- Electrical Spaces 20 fc
- Telecomm Closets 50 fc
- Classrooms 50 fc
- Pre-K and K Classroom 75 fc
- Art Classroom 100 fc
- Music 75fc
- Media Center 75fc

#### Exterior Lighting

Dark sky compliant LED exterior lighting will be provided around the exit doors and to light the perimeter of the building. Parking lot lighting will be LED fixtures on aluminum poles with concrete pole bases.

#### Lighting Controls

100% occupancy/vacancy sensor coverage will be provided throughout except in electrical and mechanical rooms or areas where safety or security is a concern. Vacancy sensors will be manual on/automatic off.

Digital lighting controls will provide preset lighting levels in each classroom consisting of 25%, 50%, 75% and 100% output.

Spaces other than corridors, electrical/mechanical rooms, public lobbies, restrooms, stairways and storage rooms shall be provided with raise/lower dimming controls for lighting.

Automatic daylight control will be provided where required.

Ganged restrooms shall utilize fork key control for disabling automatic turn on.

Exterior lighting will be controlled through a local lighting contactor panel that will be BAS controlled. It will contain three zones of override lighting as follows:

- Parking lot lighting
- Building mounted lighting

#### **f. Fire Alarm System**

A new fully addressable fire alarm system shall be provided with mass notification voice evacuation and initiation devices per NFPA requirements. All peripheral devices shall be installed per ADA requirements. Connections will be provided to all fire suppression equipment, air handling units over 2,000CFM, door access controls, etc. CO detection will be provided at all gas fired appliances (typically one in the boiler room and one in the kitchen). Smoke detection will be provided at storage rooms, janitor closets, elevator rooms/lobbies and electrical/data rooms. Heat detectors will be provided in mechanical rooms and other dusty environments requiring early warning, kitchens and science classrooms.

The system will be activated by manual means at exits and as required by Code.

The system will be activated by automatic means on sprinkler water flow, control locations, smoke doors and air handling units as required by Code.

All fire alarm cabling will be routed in factory red raceways.

Poly carbonate protective covers will be provided in all ganged restrooms.

### **Division 27 – Communications**

Telecommunications Systems and Specialty Systems will be provided in the project. Intercom and clock system and intrusion will be provided as part of the contract.

Contractor will provide a complete system (rough-in's, cabling paths, cabling, devices, etc.) for all of the above, unless otherwise noted. Access control, IP CCTV systems, data/voice and AV Systems will be rough-in and stub out only. Minimum stub-out conduit size will be 1" and cabling paths will consist of 12" and 18" cable tray paths. Multiple dedicated distribution frame rooms will be provided for the facility.

New fiber and copper utilities will be demarcated in a new service entrance MDF IT room.

A telecommunications main grounding system will be provided consisting of copper grounding interconnection between each MDF/IDF closet and the grounding electrode system.

Classroom AV systems will consist of rough-in, raceways, power and cabling for OFOI interactive cart mounted displays and sound reinforcement systems.

The intercom system will consist of expansion of the building wide interior and exterior paging and two-way communications systems at instructional spaces. Basis of design for the intercom system will be Rauland Telecenter U. Existing head end shall remain. Downstream devices, speakers, wiring, etc will be replaced completely.

Analog doorbell systems with individual push button stations will be provided at the main entrance, kitchen receiving entrance and the PO office entrance.

The security system will consist of monitoring exterior access locations, locations with window access either from the floor or lower roof level, the mechanical yard and phase loss detection on the main switchboard. The system basis of design will be Bosch.

CCTV equipment will be POE and OFOI. The contractor will provide a CAT6 connections to all camera locations with a 10'-0" service loop located on a j-hook for future installation by BCPS.

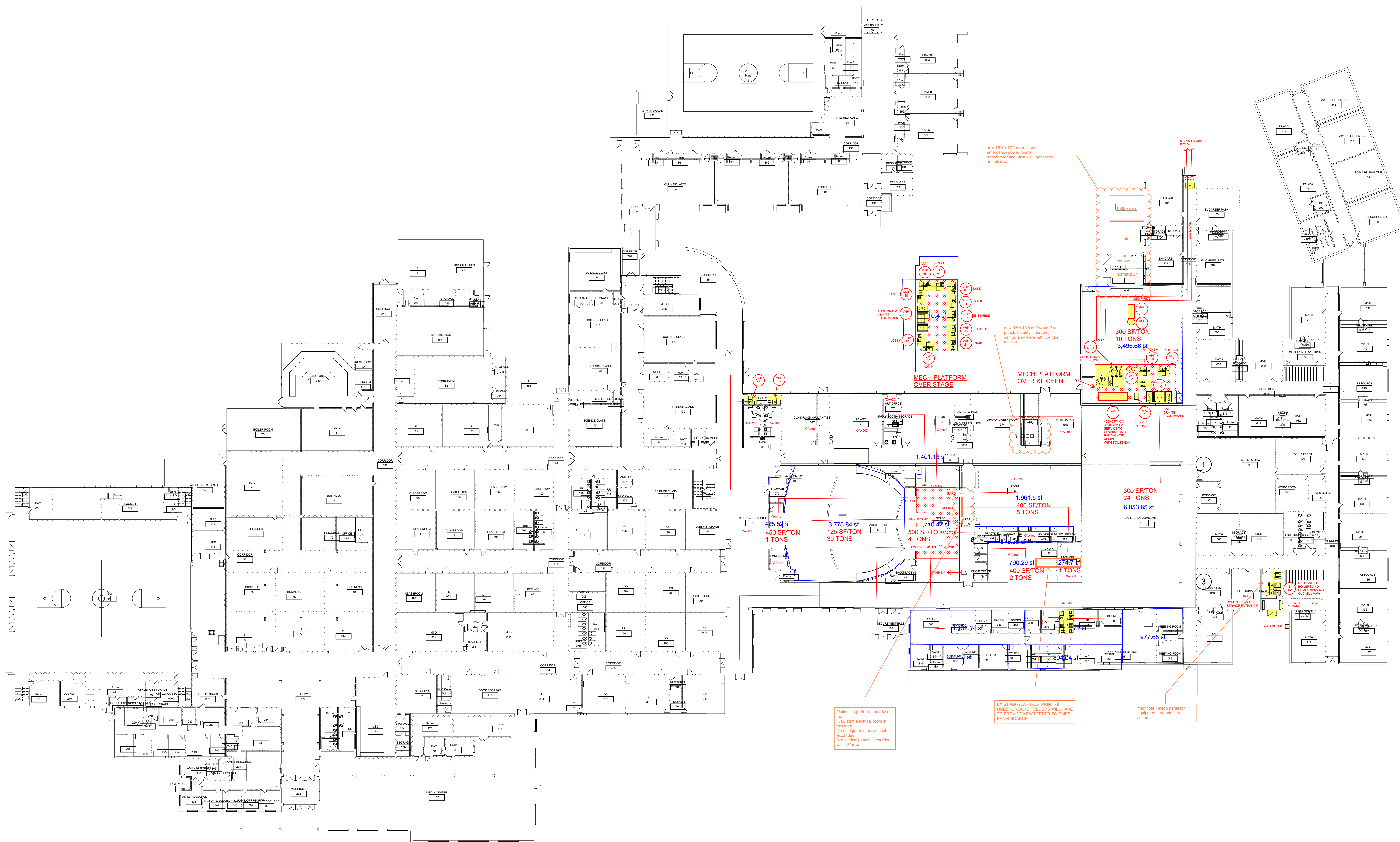
Access Control head end equipment will be OFOI. Select doors will be provided with card reader functionality utilizing electric strike/latch retraction systems. Access control door will be provided with an IP POE camera, OFOI. All cabling and door hardware will be CFCI.

New IP based door intercom system will be provided for the main entrance. The system will tie into the access control system for remote door release. Basis of design is the iPhone IP system.

All IP cabling will be bid and provided by a separate telecom bidder through a separate telecom package coordinate by the architect.

## END OF NARRATIVE







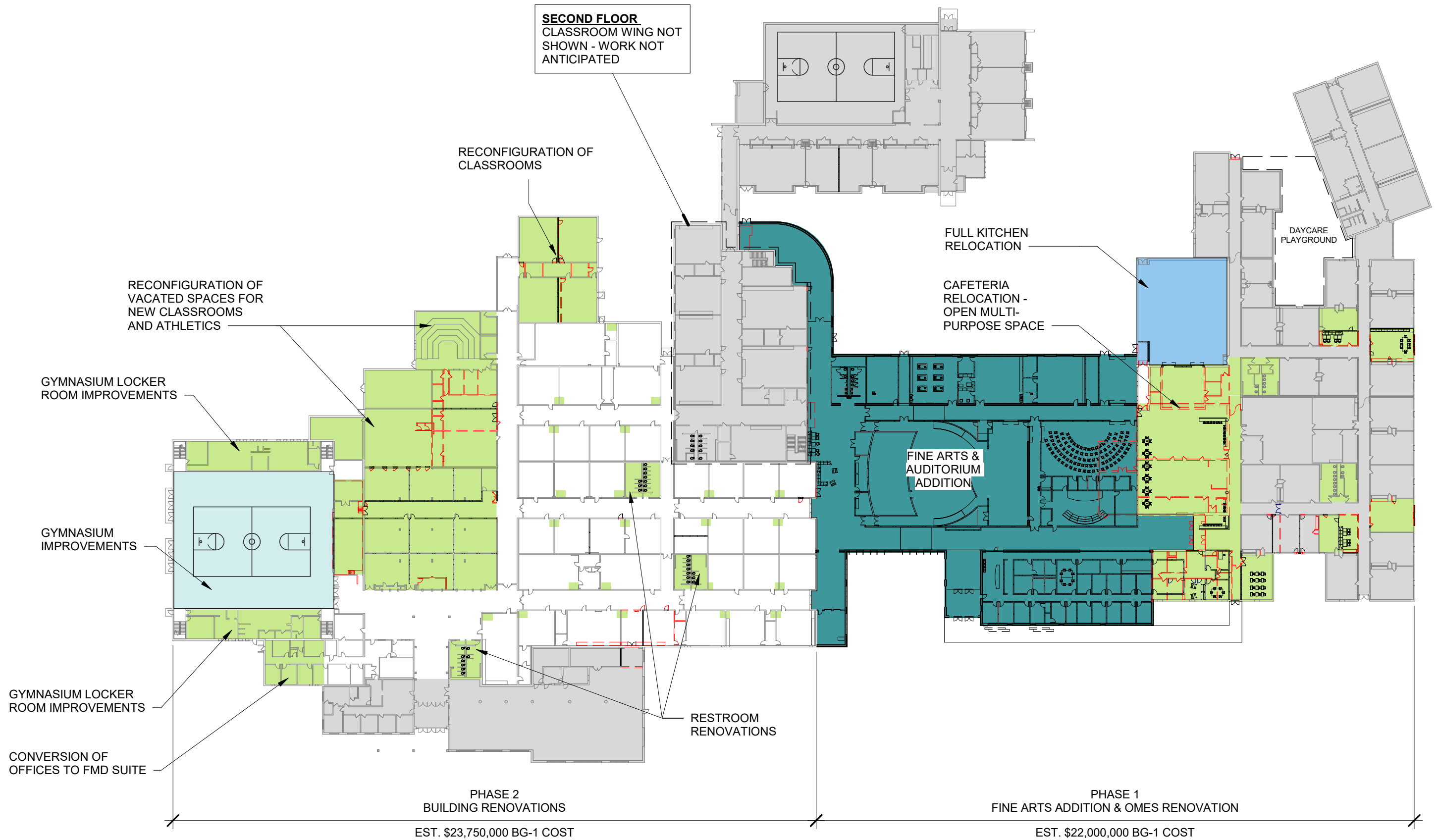
**BULLITT EAST HIGH SCHOOL  
FINE ARTS ADDITION**

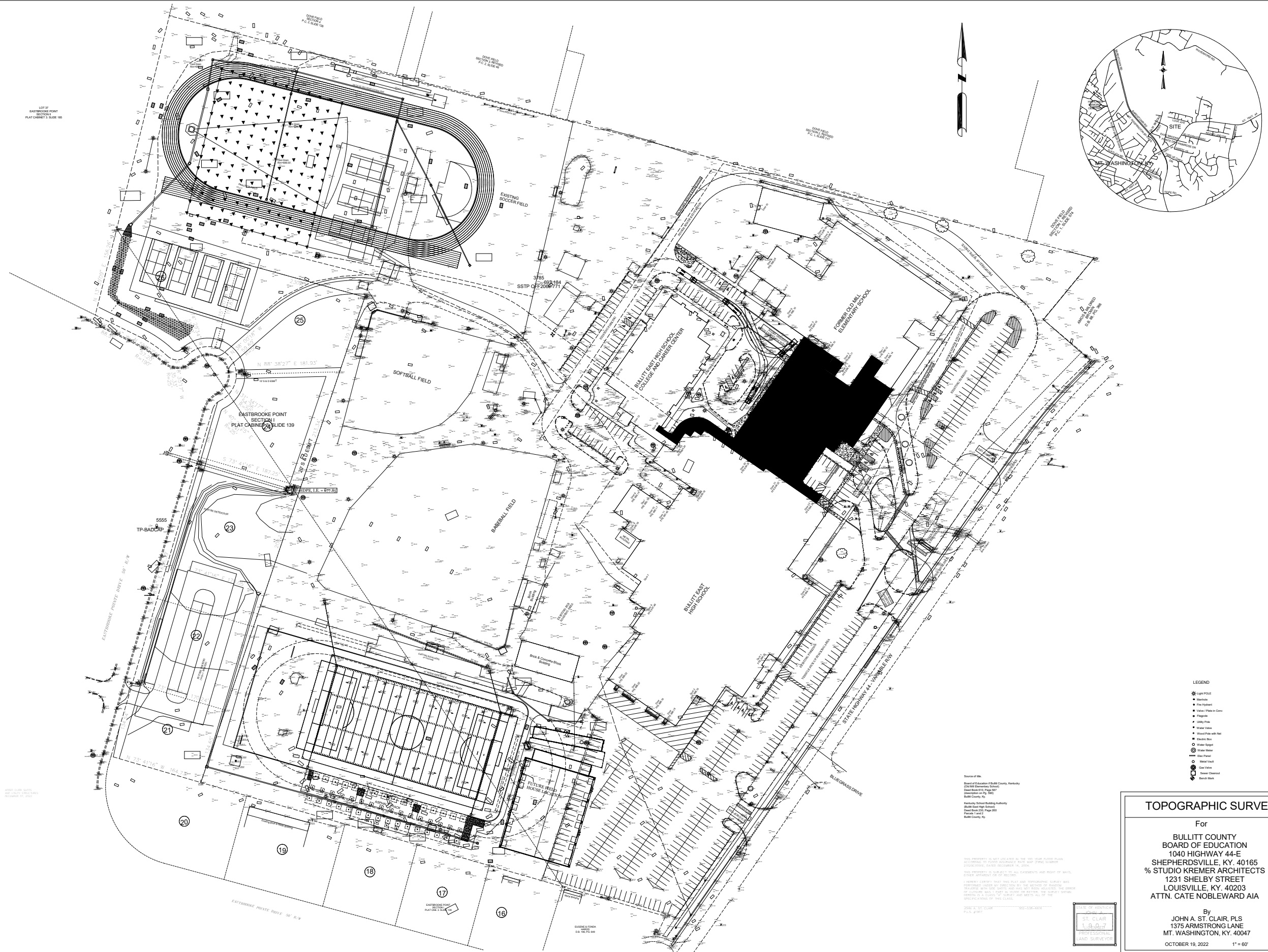
**PROJECT OBJECTIVES:**

- FINE ARTS ADDITION W/ AUDITORIUM
- NEW ADMIN SUITE + SECURE ENTRY
- RELOCATION OF KITCHEN + CAFETERIA
- COMBINE EXISTING BEHS + OMES
- IMPROVED HALLWAY TRAFFIC + WAYFINDING









LEGEND

- Light Pole
- Manhole
- Fire Hydrant
- Water (Pipes in Cont)
- Manhole
- Utility Pole
- Water Valve
- Water Valve with Net
- Storm Drain
- Water Supply
- Water Meter
- Gas Meter
- Mail Vault
- Gas Valve
- Power Conduit
- Search Mark

TOPOGRAPHIC SURVEY

For  
BULLITT COUNTY  
BOARD OF EDUCATION  
1040 HIGHWAY 44-E  
SHEPHERDSVILLE, KY. 40165  
% STUDIO KREMER ARCHITECTS  
1231 SHELBY STREET  
LOUISVILLE, KY. 40203  
ATTN. CATE NOBLEWARD AIA

By  
JOHN A. ST. CLAIR, PLS  
1375 ARMSTRONG LANE  
MT. WASHINGTON, KY. 40047  
OCTOBER 19, 2022 1" = 60'

## Department Legend

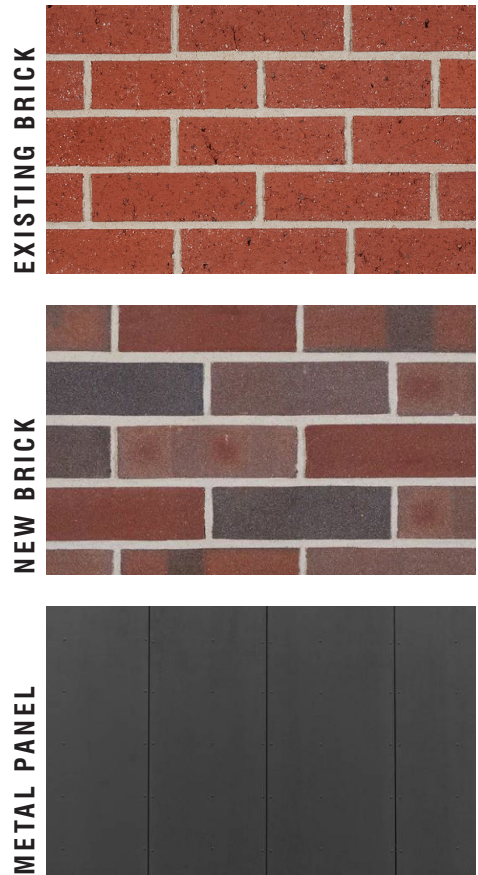
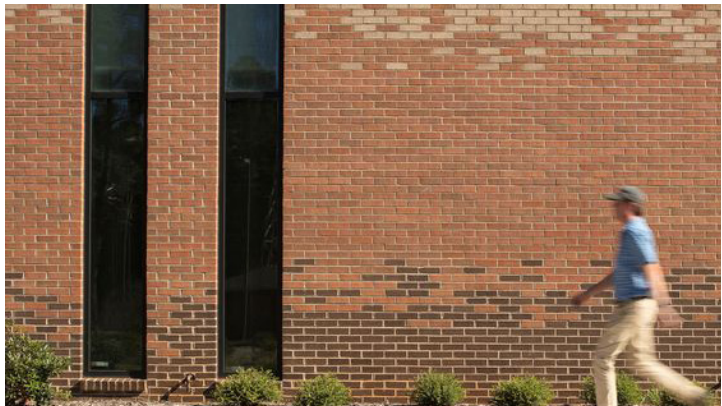
ADMIN	LOCALLY IDENTIFIED
ARTS	MATH
ATHLETICS	MECH
BUSINESS	MEDIA CENTER
CAFETERIA	RESOURCE
CAREER TECH	RESTROOM
CIRCULATION	SCIENCE
CLASSROOM	SOCIAL STUDIES
ENGLISH	STORAGE
FAMILY RESOURCE	VENDING
FMD	
FOREIGN LANGUAGE	
KITCHEN	







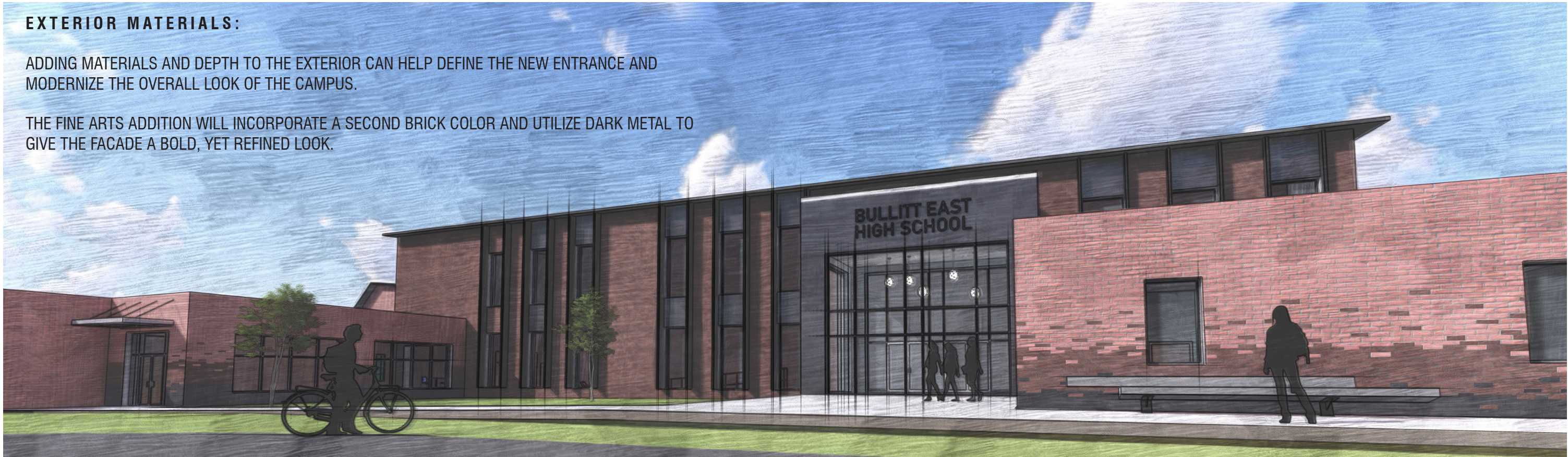




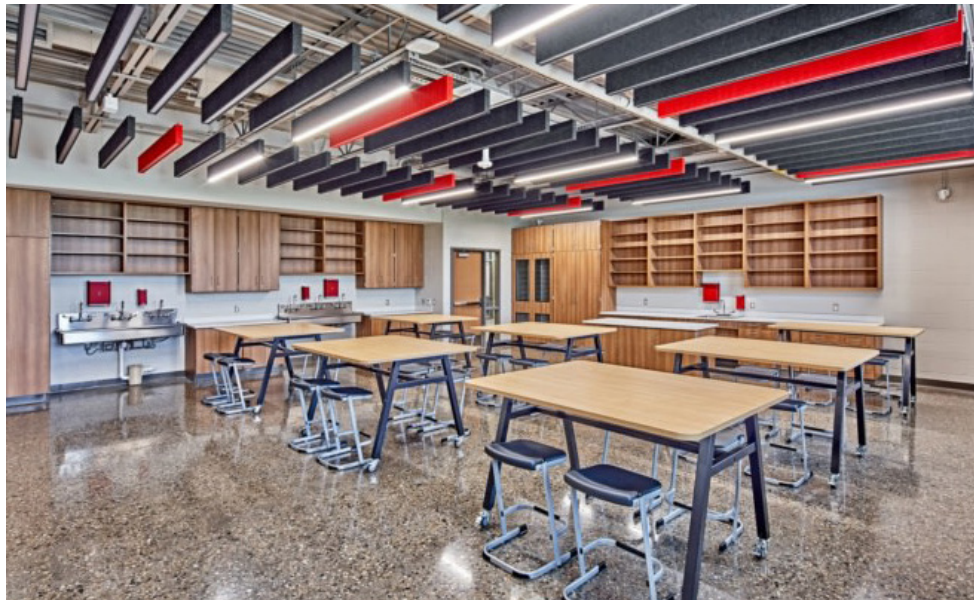
**EXTERIOR MATERIALS:**

ADDING MATERIALS AND DEPTH TO THE EXTERIOR CAN HELP DEFINE THE NEW ENTRANCE AND MODERNIZE THE OVERALL LOOK OF THE CAMPUS.

THE FINE ARTS ADDITION WILL INCORPORATE A SECOND BRICK COLOR AND UTILIZE DARK METAL TO GIVE THE FACADE A BOLD, YET REFINED LOOK.





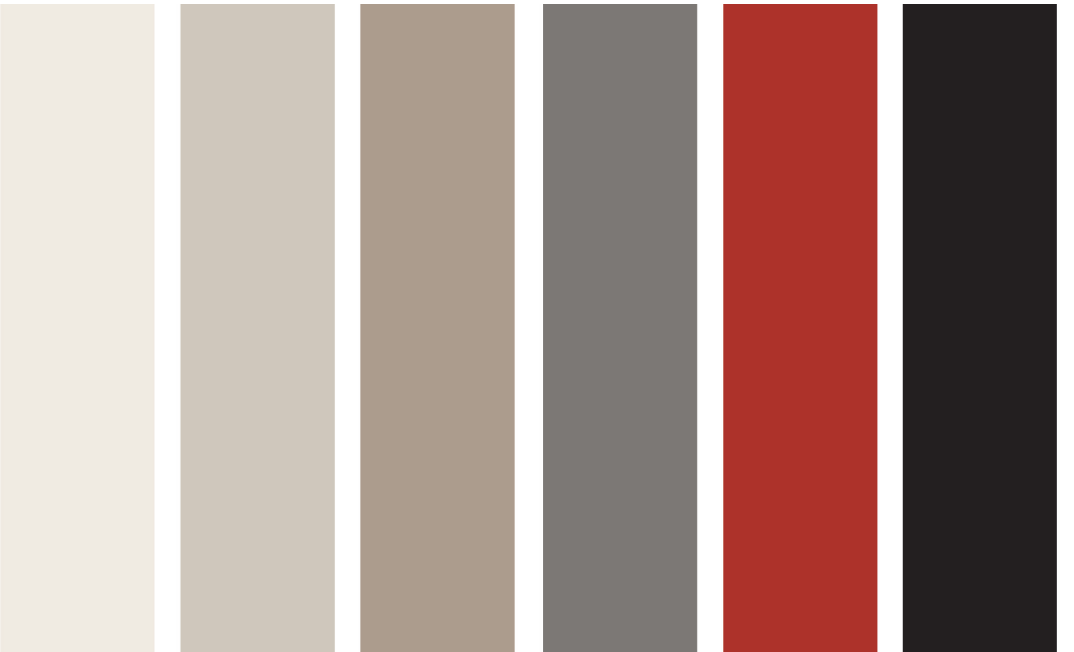


RESOURCE ROOM IN EXISTING OMES BUILDING

### INTERIOR PALETTE:

THE INTERIOR WILL BE LIGHT AND SPACIOUS, GIVING REPRIEVE FROM SOME OF THE TIGHTER EXISTING SPACES. THE COLOR PALETTE WILL LEAN NEUTRAL WITH SOME POPS OF RED FOR SCHOOL SPIRIT.

FLOOR & WALL FINISHES ARE TO BE DURABLE AND TIMELESS, WHILE ACOUSTIC TREATMENTS AND FURNISHINGS CAN BE MORE PLAYFUL AND BOLD. THIS AIDS IN THE LONGEVITY OF THE DESIGN.







**PERFORMING ARTS DESIGN:**

STUDIO KREMER WILL COORDINATE WITH THEATER CONSULTANT, HMBA, TO MEET THE TECHNICAL AND ACOUSTICAL NEEDS OF THE AUDITORIUM, BAND, AND CHORAL ROOMS.

THE INTERIOR FINISHES WILL BE A DARKER VERSION OF THE OVERALL SCHOOL PALETTE TO FIT THE LOOK OF A COMMUNITY THEATER.

