



University of Kentucky®

Procurement Services

REQUEST FOR PROPOSALS
UK-2564.0-13-25
HEB – EARLY EQUIPMENT PURCHASES
ADDENDUM #2
09/30/2024

ATTENTION: This is not an order. Read all instructions, terms, and conditions carefully.

IMPORTANT: RFP AND ADDENDUM MUST BE RECEIVED BY: 10/04/2024 @ 3:00 P.M. LEXINGTON, KY TIME

Offeror must acknowledge receipt of this and any addendum as stated in the Request for Proposal.

ITEM #1: QUESTION AND RESPONSE LOG:

Offerors are directed to review and incorporate the attached Q&R Log into their proposals.

ITEM #2: CMTA ADDENDUM

Offerors are directed to include all work scope items, clarifications, and modifications as detailed consistent with their trade contract scope documents.

ITEM #3: DOCUMENT LIST:

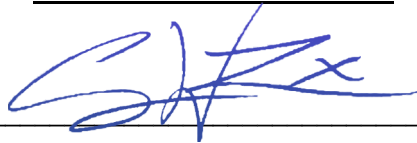
The following documents have been added or modified per this addendum:

26 0501.01	General
23 0240	Air Handling Units
26 0533	Raceways
26 3213.01	Emergency Generator
01 8113-00	Sustainable Design Requirements HEB BP2
01 8116-00	Low emitting materials HEB BP2
01 8119-00	Construction Indoor Air Quality Management BEB BP2
23 0230	Air Handling Units
20 0130	Riser Package General

- 00 3126-01 Kelley Hall and Medical Annex #5 Hazardous Materials Assessment
- 00 3132 FL UK HEB S&ME GEO Report 8-26-22
- 01 3132 FL UK HEB S&ME GEO Report Addendum 10-13-23
- 01 3233 Photographic Documentation
- 01 7419-00 Construction Waste Management and Disposal HEB BP2
- 00 3119 Existing Condition Information
- 00 3126 Existing Hazardous Material Information
- 00 3132 Geotechnical Data

ADDENDUM REFERENCE DRAWINGS

OFFICIAL APPROVAL
UNIVERSITY OF KENTUCKY



Corey W. Leslie, Purchasing Officer

SIGNATURE

Typed or Printed Name

CCK-2564.0-13-25
Question and Response Log
Question Deadline

#	Question	Response
1	Drawing E-406E shows generator enclosed with a wall. Specs do not call out generator enclosure. Can you confirm generator does not need enclosure?	Generator is located in an enclosed room (Generator Enclosure 121) and does not require an additional enclosure.
2	Spec 26 3213 Section 7.B- Day tank procured in future package. Please confirm no subbase fuel tank is needed for the generator.	Correct, Day tank and storage tank are to be procured in a future package. No additional subbase tank is required.
3	What is the schedule for the delivery of emergency equipment?	August 1st, 2025.
4	When are AHU's needed to be on site? Please clarify the schedule, whether they will be required to delivery all at same or in different phases/dates	Basement AHUs - June 16th, 2025 Penthouse Area A- August 4th, 2025 Penthouse Area B - September 8th, 2025
5	Please advise if UK will provide a place to store units indoors if desired to arrive early. The cost to ship/unload/store/do Prev Maint/then re-load/re-ship to site can be a couple to several hundred thousand dollars if vendors or contractors have to rent storage space. Please advise what UK's and CM's plan is.	There will be no onsite storage and the material should be procured to comply with "Just in time Deliveries".
6	It says a payment / performance bond is excluded. Please confirm suppliers do not need to include	No performance or payment bond is required for this purchase.
7	Are the ERC-1 and 2 part of the AHU pre-purchase? If not, which bid package are they in?	No, they will be part of the BP-04F risers package.
8	Please clarify what is meant by statement on p. 7 about Offeror "must offer a maintenance contract on the system with a single point of contact for all repairs." Does this mean provide an add for one year PM? An extended labor warranty? Please clarify.	This is about personnel rather than the warranty, which is described in better detail by others. The point of contact is what is important here. Which individual at the proposer's organization is responsible for warranty items on this purchase?
9	Who is providing the VFD's or VFD packages?	VFD's are provided by TC-025A Controls contractor.
10	Please clarify the statement about the electrical junction boxes: "a single j-box will be provided for each set of 2 supply fans and each set of 2 return fans". For fan arrays, there are more than 2 fans.	The single point connection shall server all supply fans and/or return fans, regardless of number per AHU. Refer to the attached AHU specification for additional information.
11	For rigging, are there any size/section limitations either dimensionally or weight-wise?	Refer to the attached drawings. These are provided for reference only and indicate the size of the louvers that are provided to allow AHU's to be brought into the Penthouse and Mechanical Room.
12	Are all AHU's going to be able to be rigged into building in sections? Or will knock-down be required? If knock-down, please advise which units and what the rigging pinch point is.	It is the design intent to provide all modular AHU's with no knock-down units. The unit shipping splits shall be sized such that they can fit through the building louvers.

SECTION 23 0240- HVAC EQUIPMENT - AIR HANDLING UNITS

1. GENERAL

- A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- B. The Contractor shall provide in complete working order the following heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.
- C. Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer's Checklist.
- D. Factory startup is required for the Air Handling Units. The successful bidder for the Air Handling Units shall coordinate with a Mechanical Contractor determined in a future bid package to ensure proposer installation and coordinate field required testing.
- E. All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90 and/or International Energy Conservation Code 2012, whichever is more stringent.
- F. Installation of all heating, ventilating and air conditioning systems shall be performed by a master HVAC contractor licensed in the state the work will be performed.
- G. Note to Suppliers and Manufacturers Representative furnishing proposals for equipment for the project:
 - (1) Review the Controls Section of these Specifications (if applicable) to determine controls to be furnished by the equipment manufacturer, if any. The Contractor shall provide all controls with equipment unless specifically listed otherwise.
 - (2) Review the section of these specifications entitle: SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS, TOOLS, ETC., and provide all documents called for therein.
 - (3) Ensure that the equipment which you propose to furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.
 - (4) Determine from the Bid Documents the date of completion of this project and ensure that equipment delivery schedules can be met so as to allow this completion date to be met.
 - (5) Where manufacturers' temperature controls are specified, they shall be in full compliance with International Mechanical Code Section 606 including automatic smoke shut down provisions.
 - (6) Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including fan coil units etc. Submit factory start-up reports to the Engineer.

- (7) Provide training to the Owner by a factory representative for each type of equipment. Training shall be a minimum of eight (8) hours on site and the Engineer shall be notified one (1) week in advance of the training. Training shall only occur when the systems are complete and 100% functional. All training shall be video taped.
- (8) Review the Section on Motor Starters and Electrical Requirements for Mechanical Equipment.
- (9) All condensate producing equipment shall be provided with a condensate trap as recommended by the equipment manufacturer and a condensate overflow switch.
- (10) Provide a complete air tight enclosure with opening door that seals air tight for all filters on air moving equipment.
- (11) All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.

2. EQUIPMENT

A. AIR HANDLING UNITS (SEMI-CUSTOM – ALL UNITS EXCEPT AHU-NP4)

SECTION INCLUDES

- (1) Indoor Air Handling Units.

REFERENCES

- (2) AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- (3) AMCA 99 - Standards Handbook.
- (4) AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- (5) AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- (6) AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- (7) AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- (8) AHRI 430 - Central-Station Air-Handling Units.
- (9) AHRI 435 - Application of Central-Station Air-Handling Units.
- (10) ASTM B117 - Standard Practice for Operating Salt Spray Apparatus.
- (11) NEMA MG1 - Motors and Generators.
- (12) NFPA 70 - National Electrical Code.
- (13) SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- (14) UL 723 - Test for Surface Burning Characteristics of Building Materials.
- (15) UL 900 - Test Performance of Air Filter Units.
- (16) UL 1995 - Standard for Heating and Cooling Equipment.
- (17) UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.
- (18) IBC 2000, 2003 - International Building Code.
- (19) NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- (20) NFPA 5000 - Building Construction and Safety Code.
- (21) ASHRAE 90.1 Energy Code.
- (22) AHRI Standard 1060 - Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
- (23) GSA 2003 Facilities Standard - 5.9 HVAC Systems and Components.

SUBMITTALS

- (24) Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Computer generated fan curves for each air handling unit shall be submitted with specific design operating point noted. A computer generated psychometric chart shall be submitted for each cooling coil with design points and final operating point clearly noted. Sound data for discharge, radiated and return positions shall be submitted by octave band for each unit. Calculations for required baserail heights to satisfy condensate trapping requirements of cooling coil shall be included.
- (25) Product Data:
 - a. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, finishes of materials, electrical characteristics, and connection requirements.
 - b. Provide data of filter media, filter performance data, filter assembly, and filter frames.
 - c. Provide manufacturer's installation instructions.

2. QUALIFICATIONS

- (1) Manufacturer: Company specializing in manufacturing Air Handler products specified in this section must show a minimum five years documented experience and complete catalog data on total product.

3. SAFETY AGENCY LISTED & CERTIFICATION

- (1) Air Handling units shall be cETLus safety listed to conform with UL Standard 1995 and CAN/CSA Standard C22.2 No. 236. Units shall be accepted for use in New York City by the Department of Building, MEA 342-99-E.
- (2) Air handler furnished with double width, double inlet (DWDI) fans and/or plenum fans where applicable, shall be certified in accordance with the central station air handling units certification program, which is based on AHRI Standard 430. (NOTE: Above does not apply to fan array)
- (3) Air handling unit water heating & cooling coils shall be certified in accordance with the forced circulation air cooling and air heating coils certification program, which is based on AHRI Standard 410.

DELIVERY, STORAGE, AND HANDLING

- (4) Deliver, store, protect and handle products to site.
- (5) Accept products on site on factory-furnished shipping skids. Inspect for damage.
- (6) Store in clean dry place and protect from construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

4. PRODUCTS

A. ACCEPTABLE MANUFACTURERS

- (1) The following manufacturers are approved for use.
 - a. Daikin Applied 'Vision' Air Handler shall be the basis of design.
 - b. JCI
 - c. Trane
 - d. Carrier

B. GENERAL DESCRIPTION

- (1) Configuration: Fabricate as detailed on drawings.
- (2) Performance: Conform to AHRI 430. See schedules on prints. (NOTE: above does not apply to fan array)
- (3) Acoustics: Sound power levels (dB) for the unit shall not exceed the specified levels shown on the unit schedule. The manufacturer shall provide the necessary sound treatment to meet these levels if required.

C. UNIT CONSTRUCTION

- (1) Fabricate unit with heavy gauge channel posts and panels secured with mechanical fasteners. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket. Shipped loose gasketing is not allowed.
- (2) Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.
 - a. The inner liner shall be constructed of G90 galvanized steel.
 - b. The outer panel shall be constructed of G90 galvanized steel.
 - c. The floor plate shall be furnished with 0.044 inch thick aluminum tread plate in sections as indicated on project schedule.
 - d. Unit will be furnished with solid inner liners.
 - e. A sound baffle shall be secured to the inner liner of selected fan, plenum, access, and manual sections. It shall be constructed of G60 galvanized perforated steel filled with fiberglass insulation.
- (3) Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.
- (4) The casing leakage rate shall not exceed 1% of supply air volume at design static pressure up to a maximum of +8" w.c. in positive pressure sections and -8" w.c. (1.99 kPa) in negative pressure sections.
- (5) The casing leakage rate shall not exceed 0.50 cfm per square foot of casing surface area at design static pressure up to a maximum of +5" w.c. in positive pressure sections and -6" w.c. in negative pressure sections (.0025 m3/s per square meter of cabinet area at 1.24 kPa static pressure)
- (6) Module to module field assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both mating modules to minimize on-site labor and meet indoor air quality standards.
- (7) Access doors shall be flush mounted to cabinetry, with minimum of two six inch long stainless steel piano-type hinges, latch and full size handle assembly. Access doors shall swing outward for unit sections under negative pressure. Access doors on positive pressure sections, shall have a secondary latch to relieve pressure and prevent injury upon access.
- (8) A 6-inch minimum formed G60 galvanized steel base rail shall be provided by the unit manufacturer for structural rigidity and condensate trapping. Refer to the Drawings for AHU's which may call for a deeper base rail. If a manufacturer requires a deeper base rail to allow for proper condensate trap above a floor slab, then the additional height base rail shall be provided. The base rail shall be constructed with 12-gauge nominal for unit sizes 003 - 035 and 10-gauge nominal for unit sizes 040 - 090. The following calculation shall

determine the required height of the baserail to allow for adequate drainage. Use the largest pressure to determine base rail height. $[(\text{Negative})(\text{Positive}) \text{ static pressure (in)}] (2) + 4" = \text{required baserail height.}$

- (9) A window inspection port shall be provided on unit section(s) as indicated on unit schedule and drawings.
- (10) Construct drain pans from stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil section. Drain connection centerline shall be a minimum of 3" above the base rail to aid in proper condensate trapping. Drain connections that protrude from the base rail are not acceptable. There must be a full 2" thickness of insulation under drain pan.
- (11) The Units shall be field tested for air leakage. The manufacturer's representative shall review the installation prior to testing.

D. FAN ASSEMBLIES

- (1) Acceptable fan array assembly shall consist of single width, single inlet, class II, direct-drive type plenum fans dynamically balanced as an assembly, as shown in schedule. Refer to the plans for the number of fans per AHU. Maximum fan RPM shall be below first critical fan speed. All fan assemblies shall be dynamically balanced by the manufacturer on all three planes.
 - a. Walk in access section placed downstream for motor access.
 - b. Unit shall come equipped with an isolation damper upstream of each fan in the array. Damper shall be equipped with an adjustable, weighted counter balance to minimize static pressure loss.
 - c. Fan array section shall come with sound absorbing panels installed around each fan.
- (2) Fan array shall have fans individually isolated with spring isolators.
- (3) Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.

E. BEARINGS, SHAFTS, AND DRIVES

- (1) Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be designed for service with an L-50 life of 200,000 hours and shall be a heavy duty pillow block, self-aligning, grease-lubricated ball or spherical roller bearing type.
- (2) Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.
- (3) V-Belt drives shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Fixed sheaves, matched belts, and drive rated based on motor horsepower. Minimum of 2 belts shall be provided on all fans with 10 HP motors and above. Standard drive service factor minimum shall be 1.1 S.F. for 1/4 HP – 7.5 HP, 1.3 S.F. for 10 HP and larger, calculated based on fan brake horsepower.

F. ELECTRICAL

- (1) Fan motors shall be manufacturer provided and installed, Open Drip Proof, premium efficiency (meets or exceeds EPC requirements), 1750 RPM, single speed, 460V / 60HZ

/ 3P. Complete electrical characteristics for each fan motor shall be as shown in schedule.

- (2) The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.
- (3) Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
- (4) Manufacturer shall provide ASHRAE 90.1 Energy Efficiency equation details for individual equipment to assist Building Engineer for calculating system compliance.
- (5) Air handler manufacturer shall provide and mount conduit and wiring from each fan motor terminated at an external junction box.

G. COOLING AND HEATING COILS

- (1) Certification: Acceptable water cooling, water heating, steam, and refrigerant coils shall be certified in accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer's certification and/or the range of AHRI's standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Forced Circulation Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.
- (2) Water cooling coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0095 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 5/8 inch OD seamless copper, 0.035 inch nominal tube wall thickness, expanded into fins, brazed at joints.
 - d. Coil connections shall be carbon steel, NPT threaded connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to ensure complete drainage and prevent freeze-up.

- e. Coil casing shall be a formed channel frame of stainless steel.
- (3) Water heating coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0095 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 1/2 inch OD seamless copper, inch nominal tube wall thickness, expanded into fins, brazed at joints.
 - d. Coil connections shall be carbon steel, connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to ensure complete drainage and prevent freeze-up.
 - e. Coil casing shall be a formed channel frame of galvanized steel.

H. FILTERS

- (1) Furnish combination filter section with 2-inch flat pre-filter and 4-inch final filter. Provide side loading and removal of filters.
- (2) Filter media shall be UL 900 listed, Class I or Class II.
- (3) Filter Magnehelic gauge(s) shall be furnished and mounted by equipment manufacturer.

I. ADDITIONAL SECTIONS

- (1) Plenum section shall be provided and properly sized for inlet and/or discharge air flow (between 600 and 1500 feet per minute). The plenum shall provide single or multiple openings as shown on drawings and project schedule.
- (2) Access section shall be provided for access between components.
- (3) Blender / air mixer section to provide proper air mixing and distribution of the outside and return airstreams. Provide proper spacing provided in the direction of airflow as recommended by the blender manufacturer.
- (4) Blender / air mixer section to provide proper air mixing and distribution of the outside and return airstreams. Provide proper spacing provided in the direction of airflow as recommended by the blender manufacturer.

- (5) Mixing box section shall be provided with top outside air opening and end return air opening with or without parallel low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.
- (6) Economizer section shall be provided with top outside air opening and end return air opening and top exhaust air opening with or without parallel low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes or very large dampers and exhaust dampers must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

5. EXECUTION

A. INSTALLATION

- (1) Install in accordance with manufacturer's Installation & Maintenance instructions.

B. ENVIRONMENTAL REQUIREMENTS

- (1) Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

C. EXTRA MATERIALS

- (1) Provide two sets of filters for the Construction period and two extra set(s) filters for each unit as shown on project schedule to be left for the Owner after Substantial Completion.

B. AIR HANDLING UNIT- (CUSTOM UNIT)- AHU-NP4 LAB AHU

PART 1 - GENERAL

1.01 SECTION INCLUDES

Design, performance criteria, controls, and installation requirements for Custom Air Handling Units.

1.02 REFERENCES

- A. AMCA Standard 99: Standards Handbook
- B. AMCA /ANSI Standard 204: Balance Quality and Vibration Levels for Fans
- C. AMCA Standard 210: Laboratory Methods of Testing Fans for Ratings

- D. AMCA Standard 300: Reverberant Room Method for Sound Testing of Fans
- E. AMCA Standard 500: Test Methods for Louvers, Dampers and Shutters
- F. AHRI Standard 410: Forced-Circulation Air-Cooling and Air-Heating Coil
- G. ASHRAE Standard 52: Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- H. ASHRAE/ANSI Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems
- I. UL Standard 1995: Heating and Cooling Equipment
- J. ASTM A-525: Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Division 1.
- B. Submittals shall include the following:
 - 1. Dimensioned plan and elevation view drawings, including motor starter and control cabinets, required clearances, and location of all field connections.
 - 2. Summary of all auxiliary utility requirements such as: electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
 - 3. Ladder type schematic drawing of the power and ancillary utility field hookup requirements, indicating all items that are furnished.
 - 4. Manufacturer's performance of each unit. Selection shall indicate, as a minimum, the following:
 - a. Input data used for selection.
 - b. Model number of the unit.
 - c. Net capacity.
 - d. Rated load amp draw.
 - e. Noise levels produced by equipment.
 - f. Fan curves.
 - g. Approximate unit shipping weight.

1.04 OPERATION AND MAINTENANCE DATA

- A. Include data on design, inspection and procedures related to preventative maintenance. Operation and Maintenance manuals shall be submitted at the time of unit shipment.

1.05 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in the design and manufacture of commercial / industrial custom HVAC equipment. Manufacturer shall have been in production of custom HVAC equipment for a minimum of 5 years.
- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating the complete unit is listed as an assembly. ETL or UL listing of individual components, or control panels only, is not acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under the supervision of the owner.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate work performed under this section with work performed under the separate installation contract.

1.08 WARRANTY

- A. The complete unit shall be covered by a parts warranty issued by the manufacturer covering the first year of operation starting at Substantial Completion of the project projected to be June 2027. This warranty period shall start upon receipt of start-up forms for the unit or eighteen months after the date of shipment, whichever occurs first.
- B. The installing contractor shall provide labor warranty during the unit's first year of operation.

PART TWO: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom indoor air handling units as manufactured by Climate Craft, Temtrol, Trane Custom, Air-Flow or Governair. acceptable considered provided the construction specifications capacities and performance criteria are met.

2.02 GENERAL

- A. Furnish and install where shown on the plans, mechanical frame style air handling units with construction features as specified below. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The contractor shall be responsible for any additional expenses that may occur due to any exception made.

2.03 Factory Testing and Quality Control

- A. Standard Factory Tests: The fans shall be factory run tested to ensure structural integrity and proper RPM. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass quality control and be thoroughly cleaned prior to shipment.
- B. Field Leak Testing: The unit shall be leak tested in the field. The Manufacturer's representative shall inspect the installed unit prior to testing and review all testing results.

2.04 UNIT CONSTRUCTION DESCRIPTION

- A. General: Provide factory-fabricated air handling units with capacity as indicated on the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. Units shall be completely assembled. Multiple sectioned units shall be shipped as a single factory assembled piece (except where shipping limitations prevent) de-mounted into modular sections in the field by the contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and AHRI 410. All electrical components and assemblies shall comply with NEMA standards. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." Units shall comply with NFPA 70, "National Electrical Code," as applicable for installation and electrical connections of ancillary electrical components of air handling units. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and maintenance manuals shall be furnished with each unit. Units shall be UL or ETL listed.

- B. Rigging Provision – Multiple Piece Units: Units shipped in multiple sections shall be engineered for field assembly. The base frame shall have integral lifting lugs. The lifting lugs shall be fabricated from structural steel with an appropriate rigging hole. Lifting lugs shall be located at the corner of each section (and along the sides if required) and sized to allow rigging and handling of the unit. All gasket and necessary assembly hardware shall ship loose with unit. Junction boxes with a factory supplied numbered terminal strip shall be supplied at each shipping split for reconnection of control wiring.
- C. Unit Base - Floor: Unit perimeter base rail shall be fabricated using heavy gauge steel. C-Channel cross supports shall be welded to perimeter base steel and located on maximum 24" centers to provide support for internal components. Base rails shall include lifting lugs at the corner of the unit or each section if de-mounted. Internal walk-on floor shall be .188" aluminum tread plate. The outer sub-floor of the unit shall be made from .04" aluminum. The floor cavity shall be spray foam insulated with floor seams gasketed for thermal break and sealed for airtight / watertight construction. Where access is provided to the unit interior, floor openings shall be covered with walk on phenolic coated steel safety grating. Single wall floors with glued and pinned insulation and no sub floor are not acceptable. Base frame shall be attached to the unit at the factory.
- D. Unit Casing – The construction of the air handling unit shall consist of a (1" x 2") roll formed steel frame with formed 16 gauge galvanized exterior casing panels. The exterior casing panels shall be attached to the gasketed (1 x 2) steel frame with corrosion resistant fasteners. All casing panels shall be completely removable from the unit exterior without affecting the unit's structural integrity. (Units without framed type of construction shall be considered, provided the exterior casing panels are made from 16 gauge galvanized steel, maximum panel center lines are less than 20 inches and deflection is less than L/200 @ 8" positive pressure). The air handling unit casing shall be of the "no-through-metal" design. The casing shall incorporate insulating thermal breaks as required so that, when fully assembled, there's no path of continuous unbroken metal to metal conduction from inner to outer surfaces. All panel seams shall be caulked and sealed for an airtight unit.

The exterior panel finish shall be: Corrosion resistant Galvanized (No paint)

- E. Double Wall Liner - Each unit shall have double wall construction with 16 gauge solid galvanized liner in the entire unit and stainless steel in the humidifier and cooling coil section. The double wall interior panel shall be removable from the outside of the unit without affecting the structural integrity of the unit.
- F. Insulation - Entire unit to be insulated with a full 3" (R24) thick closed cell foam insulation. Foam shall be ecomate 0-, 0-, (Non VOC) UL 94HF1 rated. All insulation edges shall be encapsulated within the panel. All field penetrations must be completely sealed by installing contractor.
Note: Non UL 94HF1 rated foam is not allowed.
- G. Access Doors - The unit shall be equipped with a solid double wall insulated, hinged access doors as shown on the plans. The doorframe shall be extruded aluminum, foam filled with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be powder coated steel. There shall be a minimum of two heavy duty handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

Note: If manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

- a. Access doors (in the fan section) (all sections) shall be provided with a 10 x 10 dual thermal pane safety glass window.

2.05 UNIT COMPONENT DESCRIPTION

A. FANWALL

The multiple fan array systems shall include multiple, direct driven, arrangement 4 plenum fans constructed per AMCA requirements for the duty specified class III as required. Class I fans are not acceptable. Fans shall be rated in accordance with and certified by AMCA for performance. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan array shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Each fan/motor cube or cell shall include a minimum 10 gauge, G 90 Galvanized steel intake wall and an 10 gauge G90 Galvanized steel motor support plate rail and structure. All motors shall be standard foot mounted type TEAO selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor or Toshiba for use in multiple fan arrays that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedule(s). Steel cased motors and/or ODP motors are not acceptable. All motors shall include permanently sealed (L10-200,000 hr) bearings and shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Motors provided with hybrid ceramic bearings, when specified, do not require shaft grounding devices. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .022" per second peak, filter in (.55mm per second peak, filter in). Fan and motor assemblies submitted for approval incorporating larger than 22" wheel size and 215 T frames size motors shall be balanced in three orthogonal planes to demonstrate compliance with the G.55 requirement with a maximum rotational imbalance of .022" per second peak filter in (.55 mm per second peak, filter in). Copies of the certified balancing reports shall be provided with the unit O&M manuals at the time of shipment. Submittals that do not include a statement of compliance with this requirement will be returned to the contractor without review.

The multiple fan array AHU unit shall provide the specified acoustical performance as scheduled for the unit supply discharge opening(s), RA opening(s), and the OSA and Exhaust air opening(s). Listed or alternate manufacturers, other than the basis of design, providing multiple fan arrays that incorporate fans which are not manufactured by the AHU manufacturer, must provide modeled acoustical performance of the AHU unit for pre-bid approval by the engineer 10 working days before the project bid date. Submitted sound and performance data for preapproval showing only single fan performance for multiple fan arrays will be returned without review. Approved alternate or listed manufacturers that do not manufacture their own fans for the specific purpose of use in multiple fan arrays, shall provide a letter guaranteeing submitted AHU performance for flow, pressure, and acoustics at the perimeter boundary of the unit signed by an officer of the OEM fan manufacturer being submitted on. The letter from the OEM fan manufacturer must clearly state that the submitted air handling unit perimeter boundary performance in the submitted AHU configuration is guaranteed, and that any deficiencies in performance from that as scheduled will be corrected at no cost to the owner. Submittals for listed and alternate manufacturers that do not contain the letter of guarantee as described above will be returned to the contractor disapproved and must be resubmitted for approval. Any corrective acoustical treatment, added airway tunnel lengths, increased electrical service, and any structural modifications necessary to meet specified and scheduled performance shall be provided at no additional cost to the owner to meet the specified performance criteria. All proposed

corrective actions, when required, must be submitted for approval and shall include a guarantee of performance, as listed above, at no additional cost to the owner.

The fan array shall consist of multiple fan and motor "cubes" or "cells", spaced in the air way tunnel cross section to provide a uniform air flow and velocity profile across the entire air way tunnel cross section and components contained therein. In order to assure uniform velocity profile in the AHU cross section, the fan cube dimensions must be variable, such that each fan rests in an identically sized cube or cell, and in a spacing that must be such that the submitted array dimensions fill a minimum of 90% of the cross sectional area of the AHU air way tunnel. There shall be no blank off plates or "spacers" between adjacent fan columns or rows to position the fans across the air way tunnel. The array shall produce a uniform air flow profile and velocity profile within the airway tunnel of the air handling unit to equal the specified cooling coil and/or filter bank face velocity by $\pm 10\%$ when measured at a point 36" from the intake side of the fan array intake plenum wall, and at a distance of 72" from the discharge side of the fan array intake plenum wall. Submittals for units providing less than the scheduled quantity of fans and/or spacing of the fans for multiple fan arrays shall submit CFD modeling of the air flow profile for pre-bid approval that indicates uniform velocity and flow across all internal components without increasing the length of the AHU unit or changing the aspect ratio of the unit casing as designed.

Each individual cube or cell in the multiple fan arrays shall be provided with an integral back flow prevention device that prohibits recirculation of air in the event a fan or multiple fans become disabled. The system effects for the back flow prevention device(s) shall be included in the criteria for TSP determination for fan selection purposes, and shall be indicated as a separate line item SP loss in the submittals. Submitted AHU performance that does not indicate allowance for system effects for the back flow prevention device(s) and the system effect for the fan and motor enclosure in which each fan is mounted, will be returned to the contractor disapproved and will need to be resubmitted with all of the requested information included for approval. Back Draft Damper performance data that is per AMCA ducted inlet and discharge arrangements will not be accepted. Damper data must be for the specific purpose of preventing back flow in any disabled fan cube and that is mounted directly at the inlet of each fan. Motorized dampers for this purpose are not acceptable. Submitted fan performance data which only reflect published performance for individual fans in AMCA arrangement "A" free inlet and discharge will not be accepted. AHU Manufacturers that do not manufacture the fans being submitted on must provide certified performance data for fans as installed in the AHU unit with Back Draft damper effects included. At the sole discretion of the engineer, such performance testing may be witnessed by the engineer and/or the owner's representative.

Each fan motor shall be individually wired to a control panel.

Each fan & motor assembly shall be removable through a 24" wide, free area, access door located on the discharge side of the fan wall array without removing the fan wheel from the motor. All fan/motor access doors shall open against pressure.

Motors

Motors shall be standard foot mounted type, TEFC or TEOA motors selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. The motor shall incorporate hybrid ceramic bearings on both bearings to prevent electrical arcing across bearing races and balls. Fiber type grounding devices are not permitted.

Provide NEMA Premium Efficiency induction motors that meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be available in ½ HP increments as nameplate HP ratings from 1 HP through 15 HP. Motors shall be manufactured by Toshiba or Baldor.

Provide FANWALL Ultra-Premium Efficient Motors IE5+ that meet IE5 efficiency levels.

Compare to NEMA Premium induction motors, these FANWALL Ultra-Premium Efficient

Motors shall have tested data that shows a 5HP motor having 4.5% improved efficiency at nominal nameplate speed and load and over 20% improved efficiency at 40% turndown speed along a fan curve.

category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .022" per second peak, filter in (.55mm per second peak, filter in).

MOTOR CIRCUIT PROTECTION:

All motors in the FANWALL Array shall be provided with individual Motor Protection for thermal overload protection. All motor circuit protectors can be located in starting device enclosure or, if required by design, in a separate enclosure. Motor circuit protector enclosure must be located and mounted at a minimal distance from motors in the FANWALL Array. Provide remote indication by means of aux contacts wired in series.

Pilot Lights:

Multiple (one per fan) cover mounted pilot lights for local monitoring

B. Heat Transfer Coils – Water Coil

- i. All coil assemblies shall be leak tested under water at 315 PSIG and PERFORMANCE is to be CERTIFIED under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.
- ii. COOLING COIL FOR THIS AHU ONLY SHALL BE A COONEY COIL. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.
- iii. Headers are to be seamless copper with die formed tube holes.
- iv. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass with 1/8" vent and drain provided for complete coil drainage. All coil connections shall be extended to the exterior of the unit casing by the manufacturer. Coils shall be suitable for 250 PSIG working pressure. Intermediate tube supports shall be supplied on coils over 44 IN fin length with an additional support every 42" multiple thereafter. Grooved pipe connections are acceptable.
- v. Water coils shall have the following construction:
Standard 5/8 IN:
 - vi. 5/8 IN o.d. x 0.035" wall copper tube with .028 return bends.
 - vii. .010 IN aluminum fins
 - viii. 16 gauge galvanized steel casing

- C. Condensate / Drain Pans - IAQ style drain pans shall be provided under all cooling coils as shown on the drawings. The drain pan shall be fabricated from 16 gauge 304 stainless steel. All pans are to be triple pitched for complete drainage with no standing water in the unit. They shall be insulated minimum 3-inch "Double Bottom" construction with welded corners. Provide stainless steel, 1-1/4" MPT drain connection extended to the exterior of the unit base rail. Units in excess of 200 inches shall have drain connections on both sides, or two connections on the same side. All drain connections shall be piped and trapped separately for proper drainage.
- D. Filters - Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Face loaded pre and final filters shall have Type 8 frames as manufactured by AAF, FARR or equal. Side service filter sections shall include hinged access doors on both sides of the unit. Internal blank-offs shall be provided by the air unit manufacturer as required to prevent air bypass around the filters. The filters shall be as manufactured by Farr, Purolator, AAF or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters.
- a. Filter Gauge: Each Filter bank shall be furnished with: (Magnehelic / Photohelic) filter gauge with a 4 3/4" OD white static pressure dial with black figures and zero pointer adjustment. / Dwyer Series 2000 Air filter gauge Dwyer Mark 25 Inclined manometer (DWYER 250 AF).
 - b. *Optional: Flat Racks* - Filter racks shall be completely factory assembled and designed for industrial applications. Filter racks shall be fabricated from no less than 16 gauge galvanized steel. Filter racks shall be applied in low efficiency filter applications and will be either upstream or side accessible. Side accessible filter racks shall have an oversized access door on the exterior of the air handler, centered on the filter rack for easy filter removal. Upstream access filter racks shall have one central access cover per row of filters centered in the unit for easy access. Filter racks over 72" in length shall require an angle center reinforcement support. Filter racks shall be designed for a maximum of 500 fpm, or meet or exceed the area specified in the mechanical schedule.
 - c. *Optional: High Efficiency Rigid Filters* - Filters shall be 12" deep high performance, pleated, totally rigid and totally disposable MERV 13 type. Each filter shall consist of high density glass fiber media, media support grid, contour stabilizers and enclosing frame. Filter media shall be laminated to a non-woven synthetic backing to form a lofted filter blanket. The filter media shall have an average efficiency of 85%. The media support shall be a metal grid with an effective open area of not less than 96%. The metal grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull-away. The metal grid shall be formed in such a manner that it effects a tapered radial pleat design. The grid shall be designed to support the media both vertically and horizontally. Filters shall be listed Class II under UL Standard 900. Filters shall be tested per ASHRAE Standard 52.1-76. Contour stabilizers shall be permanently installed on both entering air and exit air sides of the filter media pack to ensure that the tapered radial pleat configuration is maintained throughout the life of the filter. The filter shall be capable of withstanding a 10" wg pressure drop without noticeable distortion of the media pack. The enclosing frame shall be constructed of galvanized steel. It shall be constructed and assembled in such a manner that a rigid and durable enclosure for the filter pack is affected. The periphery of the filter pack shall be continuously bonded to the inside of the enclosing frame, thus eliminating the possibility of air bypass. The enclosing frame shall be equipped with protective diagonal support members on both the entering air and air exit sides of the filters.
- E. Dampers – Provide Class 1 rated, ultra low leak dampers (less than 3 cfm/sq ft. @ 1" w.g.) as indicated on the unit drawings. Low leakage dampers shall have extruded aluminum airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate santoprene

rubber edge seals and zinc plated or stainless steel tubular steel shaft for a non-slip operation. Shaft bearings shall be spherical – non corrosive nylon to eliminate friction and any metal to metal contact. Damper jamb seals shall be UV rated, nylon glass reinforced or stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge galvanized steel frame. (Operator furnished and installed by future bid package).

- F. Humidifier – Dispersion tubes will be field installed for an adiabatic humidification system. Manufacturer's representative shall review humidifier submittal drawings and approve the installation and mounting methods.

2.06 ELECTRICAL POWER AND CONTROLS

- A. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS. VFD's will be provided and installed in a future bid package.
- B. All wiring shall be (75°C) Insulated copper wires.
- C. The unit shall feature a mounted permanent nameplate displaying at a minimum the manufacturer, serial number, model number and current and amps voltage. The unit must have an ETL or UL Listing and bear the appropriate mark.
- D. Conduit shall consist of a combination of EMT or flexible metal conduit as required. Liquidtight flexible metal conduit may be used outside the air tunnel for wet locations.
- E. The fan motor shall be wired to a junction box mounted Motor Control Panel on unit exterior.
- F. Unit Convenience Features
 - 1. Each section (specified sections) shall be equipped with a vapor- proof LED service light with guard.
 - 2. Lights shall be controlled by one light switch mounted adjacent to the supply air fan access door.
 - 3. Furnish a 120 volt GFI duplex convenience outlet on the exterior of the unit..
 - 4. All lights, switches and outlets shall be wired to a fused or non-fused disconnect for a separate 120 volt external source.

6. FACTORY START-UP REPORT

- A. Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including pumps, VFD's, boilers, chillers, cooling towers, heat pumps, rooftop units, etc. Submit factory start-up reports to the Engineer. The Mechanical Contractor and the Controls Contractor shall have a representative on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action taken shall be submitted to Engineer.
- B. At a minimum, the report submitted to the Engineer shall include the following data:
 - (1) Blower Coil and Fan Coil Units
 - a. Fan bearings lubrication

- b. Fan not vibrating
- c. Fan motor volts / amps
- d. Fan belt tension, if applicable
- e. Sheave alignment, if applicable
- f. Coils clean
- g. Filters clean
- h. Fan rotation direction

END OF SECTION 23 0240

SECTION 26 0501.01 - GENERAL PROVISIONS – ELECTRICAL

PART 1 - GENERAL

- A. The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- B. Each Contractor shall be governed by any alternates, unit prices and Addenda or other contract documents insofar as they may affect his part of the work.
- C. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of complete and operating Electrical Systems indicated on the drawings and/or specified herein.
- D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Electrical Systems in a substantial manner, in compliance with the requirements stated, implied, or intended in the drawings and specifications, shall be included as part of this Contract. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensations.
- E. It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime contract, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be done through the Contractor to the Architect (if applicable), then to the Engineer.
- F. This section of the Specifications or the arrangement of the contract documents shall not be construed as an attempt to arbitrarily assign responsibility for work, material, equipment or services to a particular trade Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.
- G. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems, which interfere with new equipment or materials to be installed by other trades without additional cost to the Owner.
- H. In general, and to the extent possible, all work shall be accomplished without interruption of the existing facilities' operations. Each Contractor shall advise the Architect, Construction Manager, Owner and Engineer in writing at least one week prior to the deliberate interruption of any services. The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will occur. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed. Contractor will not be entitled to additional compensation due to work stoppage mandated by unscheduled interruption.

- I. Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without requests for extra compensation to the Owner, except where otherwise provided for in the contract for the work. The Vendor or Contractor shall abide by the requirements on the Special Conditions and the University's outage request program.
- J. Definitions:
 - 1. Prime Contractor - The Contractor who has been engaged by the Owner in a contractual relationship to accomplish the work.
 - 2. Electrical Contractor - Any Contractor whether bidding or working independently or under the supervision of a Construction Manager, that is: the one holding the Prime Contract and who installs any type of Electrical work, such as: power, lighting, television, telecommunications, data, fiber optic, intercom, fire detection and alarm, security, video, underground or overhead electrical, etc.
 - 3. Electrical Sub-Contractor - Each or any Contractor contracted to, or employed by, the Electrical Contractor for any work required by the Electrical Contractor.
 - 4. Vendor or Contractor – Any equipment supplier who proposes to furnish materials for this project.
 - 5. Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owner, Architect, other Engineers, etc.
 - 6. Architect - The Architect of Record for the project, if any.
 - 7. Furnish - Deliver to the site in good condition.
 - 8. Provide - Furnish and install in complete working order.
 - 9. Install - Install equipment furnished by others in complete working order.
 - 10. Contract Documents - All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to: Plans, Specifications, Addenda, Instructions to Bidders, (both General and Sub-Contractors), Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Construction Manager's Assignments, Architect's Supplemental Instructions, Periodical Payment Requests, etc.
- K. Note: Any reference within these specifications to a specific entity, i.e., "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity. Such assignments of responsibility are the responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.

PART 2 - INTENT

- A. It is the intent of these specifications and all associated drawings that the Contractor furnish and deliver finished products and equipment, tested, and ready for operation. Installation of equipment will be procured in a separate bid package.
- B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

PART 3 - ELECTRICAL DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Engineer for approval before proceeding with the work. The Contract Drawings are not intended to show every vertical or horizontal offset, which may be necessary to complete the systems. Contractors shall, however, anticipate that additional offsets may be required and submit their bid accordingly.

- B. The drawings and specifications are intended to supplement each other. No Contractor or supplier shall take advantage of conflict between them, or between parts of either, but should this condition exist, the Contractor or supplier shall request a clarification of the condition at least ten days prior to the submission of bids so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.
- C. The drawings and specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.
- D. This Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- E. The Engineer shall reserve the right to make minor adjustments in location of conduit, fixtures, outlets, switches, etc., where he considers such adjustments desirable in the interest of concealing work or presenting a better appearance.
- F. Each Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Electrical equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.
- G. Should overlap of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.
- H. The Electrical drawings are intended to show the approximate location of equipment, materials, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions whether given in figures or scaled shall be verified in the field. In case of conflict between small and large-scale drawings, the larger scale drawings shall take precedence.
- I. The Electrical Contractor and his Sub Contractors shall review all drawings in detail as they may relate to his work (structural, architectural, site survey, mechanical, etc.). Review all drawings for general coordination of work, responsibilities, ceiling clearances, wall penetration points, chase access, fixture elevations, etc. Make any pertinent coordination or apparent conflict comments to the Engineers at least ten days prior to bids, for issuance of clarification by written addendum.
- J. Where on any of the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornament or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
- K. Special Note: Always check ceiling heights indicated on Drawings and Schedules and insure that these heights may be maintained after all mechanical and electrical equipment is installed. If a conflict is apparent, notify the Engineer in writing for instructions.

PART 4 - EXAMINATION OF SITE AND CONDITIONS

- A. Each Contractor shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. All Contractors shall carefully examine all Drawings and Specifications and inform themselves of the kind and type of materials to be used throughout the project and which may, in any way, affect the execution of his work.
- B. Each Contractor shall fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of temporary or permanent utilities, etc. The Contractor shall include in his work all expenses or disbursements in connection with such matters and conditions. Each Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum. No allowance is to be made for lack of knowledge concerning such conditions after bids are accepted.

PART 5 - EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests review of substitute materials and/or equipment, and when under an approved formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without additional cost regardless of changes in connections, spacing, service, mounting, etc. In all cases where substitutions affect other trades, the Contractor offering such substitutions shall advise all such Contractors of the change and shall reimburse them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Special Note: Review of Shop Drawings by the Engineer does not absolve the Contractor of this responsibility.
- B. References in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Each Contractor, in such cases, may, at his option, use any article, device, product, material, fixture, form, or type of construction which in the judgment of the Engineer is equivalent to that specified, provided the provisions of paragraph (A) immediately preceding are met. Substitutions shall be submitted to the Engineer a minimum of ten days prior to bid date for approval to bid in written form thru addenda or other method selected by the Engineer. If prevailing laws of cities, towns, states or countries are more stringent than these specifications regarding such substitutions, then those laws shall prevail over these requirements.
- C. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the engineers.
- D. Each Contractor shall furnish along with his proposal a list of specified equipment and materials which he proposes to provide. Where several makes are mentioned in the Specifications and the Contractor fails to state, which he proposes to furnish, the Engineer shall have the right to choose any of the makes mentioned without change in price.

PART 6 - CODES, RULES, PERMITS, FEES, REGULATIONS, ETC.

- A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, and other costs including utility connections or extensions, in connection with his work. As necessary, he shall file all required plans, utility easement requests and drawings, survey information on line locations, load calculations, etc., prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all

required certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.

- B. Ignorance of Codes, Rules, regulations, utility company requirements, laws, etc., shall not diminish or absolve Contractor's responsibilities to provide and complete all work in compliance with such.
- C. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus or drawings required in order to comply with all applicable laws, ordinances rules and regulations, whether or not shown on drawings and/or specified.
- D. All materials furnished and all work installed shall comply with the current edition of the National Electrical Codes, National Fire Codes of the National Fire Protection Association, the requirements of local utility companies, and with the requirements of all governmental agencies or departments having jurisdiction.
- E. All material and equipment for the electrical systems shall bear the approval label, or shall be listed by the Underwriters' Laboratories, Incorporated. Listings by other testing agencies may be acceptable with written approval by the Engineer.
- F. All electrical work is to be constructed and installed in accordance with plans and specifications, which have been approved in their entirety and/or reflect any changes requested by the University Fire Marshal, as applicable or required. Electrical work shall not commence until such plans are in the hands of the Electrical Contractor.
- G. The Contractor shall insure that his work is accomplished in accord with OSHA Standards and any other applicable government requirements.
- H. Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.

PART 7 - COST BREAKDOWNS

- A. Within thirty days after acceptance of the Contract, each Contractor is required to furnish to the Engineer one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made on forms provided or approved by the Engineer or Architect. Payments will not be made until satisfactory cost breakdowns are submitted.

PART 8 - GUARANTEES AND WARRANTIES

- A. Each Contractor shall unconditionally guarantee all equipment, apparatus, materials, and workmanship entering into this Contract to be the best of its respective kind and shall replace all parts at his own expense, which fail or are deemed defective within one year from final acceptance of the work by the Engineer. The effective date of completion of the work shall be the date each or any portion of the work is accepted by the Engineer as being substantially complete.
- B. Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with

such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee.

PART 9 - PROTECTION OF EQUIPMENT

- A. The Vendor shall be entirely responsible for all material and equipment furnished by him until formally accepted by the Construction Manager or installing Contractor and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer. All rough-in conduit shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged while stored on site either before or after installation shall be repaired or replaced (as determined by the Engineer) by the responsible Contractor.

PART 10 - QUIET OPERATION, SUPPORTS, VIBRATION AND OSCILLATION

- A. All work shall operate under all conditions of load without any objectionable sound or vibration, the performance of which shall be determined by the Engineer. Noise from moving machinery or vibration noticeable outside of room in which it is installed, or annoyingly noticeable noise or vibration inside such room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor (or Contractors responsible) at his expense.
- B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc., by means of flexible connectors, vibration absorbers or other approved means. Surface mounted equipment such as panels, switches, etc., shall be affixed tightly to their mounting surface.
- C. The Contractor shall provide supports for all equipment furnished by him using an approved vibration isolating type as needed. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. No work shall depend on the supports or work of unrelated trades unless specifically authorized in writing by the Architect or Engineer.

PART 11 - INDEMNIFICATION

- A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

END OF SECTION 26 0501.01

SECTION 26 0533 – RACEWAYS AND FITTINGS

1. GENERAL

- A. This section is intended to specify the raceways, conduit, conduit fittings, hangers, junction boxes, splice boxes, specialties and related items necessary to complete the work as shown on the drawings and specified herein.
- B. This section specifies basic materials and methods and is a part of each Division 26, 27 and 28 that implies or refers to electrical raceways specified therein.
- C. The types of raceways specified in this section include the following:
 - (1) Steel electrical metallic tubing. (E.M.T.)
 - (2) Rigid galvanized steel conduit. (G.R.S.)
 - (3) Flexible metal conduit (aluminum or steel)
 - (4) Liquid - tight flexible metal conduit.
 - (5) Rigid nonmetallic conduit.
 - (6) Surface metal raceways.
 - (7) Wireways, wall ducts and trench ducts.
- D. All raceways, as listed in 1C. above and otherwise specified herein shall be provided in compliance with latest editions of all applicable U.L., NEMA, N.E.C. and A.N.S.I. standards. All conduit, raceways and fittings shall be Underwriters Laboratories listed and labeled, or bear the listing of an agency acceptable to the local authority having jurisdiction.
- E. Conduit and raceways, as well as supporting inserts in contact with or enclosed in concrete shall comply with the latest edition of all A.C.I. standards and the equipment manufacturer's recommendations for such work.
- F. P.V.C. or other non-metallic conduit shall be rated for the maximum operating temperature that could be developed by the conductors it encloses, while in normal operation.
- G. The decision of the Engineer shall be final and binding in any case where a question or inquiry arises regarding the suitability of a particular installation or application of raceways, supports or materials, if other than outlined herein.
- H. Minimum size of power conduit shall be 3/4" trade size. All conduit and raceways shall be sized for the number of conductors contained, in accord with the latest edition of the National Electrical Code or any other applicable standards. Refer to Division 27 specifications for low voltage conduit requirements.
- I. The installer of raceway systems shall avoid the use of dissimilar metals within raceway installations that would result in galvanic-action corrosion.

2. MATERIALS

A. STEEL ELECTRICAL METALLIC TUBING

- (1) Electrical metallic tubing, (E.M.T.) of corrosion-resistant steel construction shall be permitted for concealed installation in dry interior locations. Electrical metallic tubing shall not be installed in

concrete slabs or where exposed to physical damage. Electrical metallic tubing shall be permitted for exposed work in mechanical and electrical rooms and other exposed structure areas where not subjected to physical damage, as determined by the Engineer.

B. RIGID GALVANIZED STEEL CONDUIT

- (1) Rigid galvanized steel conduit shall be used where subject to physical damage for exposed work in mechanical spaces, within factory or other industrial work areas, for exposed fit-up work on machinery, for exposed exterior damp or wet location work, in hazardous atmospheres, in exterior underground locations where installed beneath roadways, where ells occur in underground P.V.C. conduits, or where turning out of concrete encased duct banks, and at other locations as specifically called out on the drawings.
- (2) Rigid galvanized steel conduit shall be used for all building interior power wiring or cables of over 600 Volts.

C. FLEXIBLE METAL CONDUIT

- (1) Flexible conduit shall be used where permitted by NEC. It may be constructed of aluminum or steel. It shall be installed with connectors designed for the purpose. All flexible metal conduit shall be installed as a single piece. No joints shall be installed. Flexible conduit shall not be used in wet or dusty locations or where exposed to oil, water or other damaging environments. An equipment grounding conductor or bonding jumper shall be used at all flexible conduit installations. Maximum permitted length of flexible metal conduit shall be 72", as for light fixture whips unless approved in writing by Engineer.

D. LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- (1) Weatherproof flexible metal conduit shall be wound from a single strip of steel, neoprene covered, equivalent to "Liquatite" or "Sealtite" Type "UA". It shall be installed in such a manner that it will not tend to pull away from the connectors. Provide strain relief fittings equivalent to "Kellems" as required where subject to vibration. Flexible connections to motors in dusty areas shall be dust-tight, in areas exposed to the weather - weatherproof.

E. RIGID NON-METALLIC CONDUIT

- (1) Rigid non-metallic conduit shall be constructed of P.V.C, nominally schedule 40 weight, except where encased in concrete, where it may be "EB" type. If installation will enclose utility company provided conductors, verify exact type required and install in accord with their standards, if more stringent than this specification.
- (2) Rigid non-metallic conduit may be used in exterior wet or damp locations where installed underslab or underground. It shall not be run in interior locations, except with special permission from the Engineer for use in corrosive environments, and then only if protected from physical damage. No rigid nonmetallic conduit may be installed in environmental air plenums or cast into above-grade concrete slabs. No rigid nonmetallic conduit may be installed in locations where the ambient temperature might exceed the rating of the raceway.
- (3) Where rigid non metallic conduit is placed underground, as for feeder circuits, secondaries or branch circuit runs and where ell is made upward thru a slab on grade, transition the turning ell and the riser to rigid steel conduit to a height of 6" above the concrete slab. Transition may then be made to E.M.T or other approved conduit for remainder of run.

- (4) Flexible nonmetallic conduit shall not be used, except by special permission, obtained in writing from the Engineer.
- (5) Provide equipment grounding conductors of copper, sized as required by codes, in all circuits installed in rigid nonmetallic raceways.

F. SURFACE METAL RACEWAYS

- (1) Surface metal raceways shall be constructed of code gauge corrosion-resistant galvanized steel or aluminum extrusions, and finished in an ivory, buff or grey color as selected by the Architect. Finishes shall be suitable for field painting, prepared by the installing contractor as necessary.
- (2) Surface metal raceways, where used as raceways only, shall be sized for the conductors indicated. Nominal minimum size of such raceways shall be equivalent to Wiremold Co. Series #700, or equivalent by Isotrol or other approved manufacturer.
- (3) Surface metal raceways to be furnished with integral receptacles shall have Simplex Nema 5-20R outlets spaced on centers as indicated on plans. These shall be Wiremold Co. #2200 Series or equivalent Isotrol or other approved manufacturer.
- (4) Surface metal raceways and all components and fittings shall be furnished by a single manufacturer, wherever practical. All trim and cover fittings, flush feed boxes, splices, outlet fittings, etc, necessary for a complete installation shall be provided by the installing contractor. These raceways shall be rigidly mounted with approved fasteners on not to exceed 24" centers in a run, or 6" from ends and on either side of a corner. Refer to plans for notations on exact types of these raceways and outlet configurations.

G. WIREWAYS

- (1) Wireways of painted steel construction shall be corrosion-resistant, moisture and oil resistant where indicated or necessary. Wireways shall be furnished in nominal sizes of 2 1/2" X 2 1/2", 4" X 4", 6" X 6", 8" X 8" or 12" X 12", as indicated on plans. Furnish with hinged covers on all runs and removable covers on all fittings, to allow a continuous unobstructed path for conductor installation. Provide knockouts on all runs, unless otherwise indicated or prohibited by codes.
- (2) Provide wireways with hangers of same manufacturer, installed so as to allow unobstructed access to wireway interior. Install at not to exceed 8'-0" centers, closer as needed at fittings and turns. Use 1/4" rod hangers minimum for up to 4"X4", 3/8" rod minimum up to 8"X8", 1/2" rod minimum for 12" X 12".
- (3) Wireways shall be equivalent to Square "D" Co. "LD" series, as a minimum standard of construction and quality.

H. RACEWAY FITTINGS

- (1) Raceway fittings (or condulets) shall be of gray iron, malleable iron or heavy copper-free cast aluminum. They shall be furnished in proper configurations, avoiding excessive plugged openings. Any openings that are left shall be properly plugged. All coverplates shall be gasketed with neoprene or similar approved materials, rated for the environment.

- (2) Where required, raceway fittings shall be provided in explosion-proof configurations rated for the atmosphere. Place conduit seal off fittings at each device in accord with applicable codes. Seal off fittings shall be packed with wadding, and poured with an approved non-shrink sealing compound.
- (3) Where conduit transitions in a run from a cold to a warm environment, (such as at a freezer, refrigerator or exterior wall) seal off fittings shall be placed on the warm side immediately at the boundary to prevent migration of condensation within raceway systems.
- (4) Expansion fittings shall be provided at all locations where conduits or other raceways cross over expansion joints. Provide copper ground bonding jumpers across expansion fittings.
- (5) Conduit bodies, junction boxes and fittings shall be dust tight and threaded for dusty areas, weatherproof for exterior locations and vapor tight for damp areas. Conduit fittings shall be as manufactured by Crouse Hinds, Appleton, Killark or approved equivalent. All surface mounted conduit fittings as with "FS", "FD", "GUB" Types etc., shall be provided with mounting hubs.
- (6) Where lighting fixtures, appliances or wiring devices are to be suspended from ceiling outlet boxes, they shall be provided with 3/4" rigid conduit pendants. Outlet boxes shall be malleable iron, provided with self-aligning covers with swivel ball joint and No. 14 gauge steel locking ring. Provide safety chain between building structure and ballast housing of light fixtures for all fixtures, appliances or devices greater than 10 lbs weight. Fixtures shall be installed plumb and level.
- (7) Fittings for threaded raceways shall be tapered thread with all burrs removed, reamed ends and cutting oil wiped clean.
- (8) Fittings for E.M.T. conduit shall be of the compression type. Conduit stops shall be formed in center of couplings. All EMT connectors and couplings shall be of formed steel construction.
- (9) Indentation or die-cast fittings shall not be permitted in any raceway system.
- (10) All conduit fittings shall be securely tightened. All threaded fittings shall be engaged seven full threads. Fasteners shall be properly torqued to manufacturer's recommendations.

I. SUPPORTS AND HANGERS

- (1) Supports and hangers shall be installed in accord with all applicable codes and standards. They shall be corrosion - resistant, galvanized or furnished with an equivalent protective coating. All electrical raceways shall be hung independently from the building structure with U.L. listed and approved materials. Hangers and supports depending from the support systems of other trades work shall not be permitted, except with specific approval in writing from the Engineer. The use of tie wire for support or fastening of any raceway system is prohibited. Perforated metal tape shall not be used for raceway support.
- (2) No raceway shall be installed on acoustic tile ceiling tees, or in any location that will impair the functioning, access or code-required clearances for any equipment or system.
- (3) Supports for raceways shall be of materials compatible with the raceway, of malleable iron, spring steel, stamped steel or other approved material. Die-cast fittings are not permitted for supports.

- (4) The installing contractor shall provide all necessary supports and braces for raceways, in a rigid and safe installation, complying with all applicable codes.
- (5) Individual conduits run on building walls or equipment shall be secured by one hole galvanized malleable iron or stamped steel pipe strap or "minerallac" 2-piece straps. The straps are to be anchored by an approved means such as expansion anchors, toggle bolts, through bolts, etc. Where required by codes or other standards, provide spacers behind mounting clamps to space conduits off walls.
- (6) Individual conduits run on building steel shall be secured by means of clamp supports similar and equal to those manufactured by the C.C. Korn Company, Elcen Co., B-Line or approved equivalent. Provide korn clamps, bulb tee clamps, flange clamps, beam clamps, "minerallacs", etc.
- (7) Where feasible, vertical and/or horizontal runs of conduit shall be grouped in common hangers on "trapezes" of channel stock as manufactured by "Unistrut" or equivalent, 1-5/8" minimum depth, 12 gauge. Utilize conduit clamps appropriate to the channel.
- (8) Channel strut systems for supporting electrical equipment or raceways in outdoor wet or corrosive locations shall be constructed of 12 gauge minimum hot dip galvanized steel with 9/16" diameter holes on 8" centers, with finish coat of paint as manufactured by Unistrut, B-Line, Kindorf, or approved equivalent. In indoor dry locations, factory finish paint will be acceptable.
- (9) The minimum diameter of round all-thread steel rods used for hangers and supports shall be 1/4", 20 threads per inch. All-thread rod shall be furnished with a corrosion-resistant finish.
- (10) Welding directly on conduit or fittings is not permitted.
- (11) Provide riser support clamps for vertical conduit runs. Riser support clamps shall be of heavy gauge steel construction. Install riser support clamps at each floor level penetration, or as otherwise required.
- (12) Provide conduit cable support clamps for vertical conductor runs as required or indicated on plans. Clamps to be insulating wedging plug, with malleable iron support ring. Install within properly sized and anchored junction box.
- (13) Spring steel clips and fittings such as those manufactured by HITT-Thomas, Caddy-Erico, or approved equivalent, with black oxide finish are permitted in any indoor dry location for concealed work, where acceptable to the local authority having jurisdiction.

3. COLOR

A. Conduit provided on this project shall adhere to the standard UK Campus coloring scheme:

- (1) Fire Alarm System – Red
- (2) Controls – Green
- (3) Data – Blue
- (4) Security/Access - Purple

4. INSTALLATION

- #### A. This Contractor shall lay out and install all conduit systems so as to avoid any other service or systems, the proximity of which may prove injurious to the conduit, or conductors which it confines. All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in

the building construction or run above ceilings. Size of all conduit shall as a minimum conform to the National Electrical Code, unless larger size is indicated on the Contract Drawings.

- B. No conduit shall be installed in poured concrete slabs except with permission of the structural engineer. All other shall be held below slab. Conduit shall be held at least 6" from flues or hot water pipes.
- C. All exposed conduit shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends unless otherwise shown. All conduit shall have supports spaced not more than eight feet apart.
- D. Conduit shall be installed in such a manner so as to insure against collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps. Trapped conduit runs shall be provided with explosion proof drains at low points. Runs of conduit between junctions shall not have more than the equivalent of three 90° bends.
- E. Junction boxes shall be installed so that conduit runs will not exceed 85'.
- F. No more than (3) electrical circuits may be housed in a single junction box.
- G. All underground or underfloor conduits shall be swabbed free of all moisture and debris before conductors are pulled.
- H. At least two 1 inch and four 3/4 inch conduits shall be stubbed from flush-mounted panelboards into the nearest accessible area for future use. Provide suitable closures for these stubs. Identify each stub with a suitable hang tag.
- I. Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of latest edition of the N.E.C., and NECA "Standard of Installation", complying with recognized industry practices.
- J. Coordinate with other trades, including metal and concrete deck trades, as necessary to interface installation of electrical raceways and components.
- K. Level and square raceway runs, and install at proper elevations and required heights. Hold tight to structure or route through joists webbing wherever possible, to maximize available space and not restrict other trades.
- L. Complete installation of electrical raceways before starting installation of cables or wires within raceways.
- M. All raceways shall be installed to maintain a minimum of 4" clearance below roof decking.

5. SPECIALTIES

- A. All EMT terminations at junction boxes, panels, etc. shall be made with case hardened locknuts and appropriate fittings, with insulated throat liners. Insulating terminations shall be manufactured as a single unit. The use of split sleeve insulators is not permitted.

- B. All rigid conduit, except main and branch feeders, shall have heavy fiber insulating bushings reinforced with double locknuts. All branch and main feeders shall have insulated bushings with grounding lugs and shall be bonded to enclosures with appropriately sized copper jumpers, except at pad mounted transformers. Bonding jumpers shall be installed as required by the N.E.C. and other applicable codes.
- C. All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be equivalent to Thomas and Betts, Ideal, Appleton, Efcor, or approved equivalent, rated for the environment.
- D. All pulling lines left in open conduit systems shall be non-metallic, left securely tied off at each end.
- E. Where spare raceways terminate in switchboards or motor control centers a fishtape barrier shall be provided.

6. FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

- (1) After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements.
- (2) Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable trays, vibrations, and thermal expansion and contraction conditions, which may cause or have caused damage.
- (3) Verify that the number, size, and voltage of cables in cable trays do not exceed that permitted by NFPA 70. Verify that communications or data-processing circuits are separated from power circuits by barriers or are installed in separate cable trays.
- (4) Verify that there are no intruding items such as pipes, hangers, or other equipment in the cable tray.
- (5) Remove dust deposits, industrial process materials, trash of any description, and any blockage of tray ventilation.
- (6) Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
- (7) Check for improperly sized or installed bonding jumpers.
- (8) Check for missing, incorrect, or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
- (9) Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable trays. Test entire cable tray system for continuity. Maximum allowable resistance is 1 ohm.

END OF SECTION 26 0533

SECTION 26 3213.01 - EMERGENCY GENERATOR

1. STANDBY GENERATOR SET

INTENT OF SPECIFICATIONS

Furnish a standby diesel engine-generator set, transfer switches, connection cabinet, load bank and related accessories of the latest commercial type and design as specified herein.

2. GENERAL

- A. All materials, equipment and parts comprising the units specified herein shall be new and unused, of current manufacturer and of highest grade.
- B. The engine generator set shall contain components as manufactured by Caterpillar, Cummins, Kohler, Generac, or approved equivalent.
- C. Equipment furnished under this section shall be guaranteed against defective parts or workmanship under terms of the manufacturer's and dealer's standard warranty, of not less than five years. The Contractor shall unconditionally guarantee the installation for a period of one year from the date of final acceptance. The Warranty period shall begin on the date of project substantial completion.
- D. The generator set shall receive the manufacturer's standard factory load testing. Prior to acceptance of the installation, equipment shall be tested to show it is free of any defects, will start automatically and shall be subjected to full building load for a period not less than four hours.
- E. On completion of the installation, start-up shall be performed by a factory trained dealer service representative. Operating and maintenance instruction books shall be supplied upon delivery of the unit. Maintenance and operation procedures shall be explained to the satisfaction of the operating personnel. A full set of brochures shall be furnished and stored at the generator installation.
- F. The generator set supplier must have the ability, from within his own operation, to service the engine, generator, automatic transfer switch and all auxiliary components, regardless of how major the repair. He must have local service available from within his own organization not more than five hours driving time from the installation site.

3. GENERATOR SET CHARACTERISTICS

Standby KW	As Indicated on Plans
Standby KVA	As Indicated on Plans
Voltage.....	480Y/277 V
Engine Rating Conditions	29.38 HG and 85°F
Power Factor at Specified KW.....	0.8%
Frequency	60 HZ
Maximum Ambient Temperature Rating.....	110°F
Minimum Ambient Temperature Rating – Outdoor.....	Minus 20°F
Minimum Ambient Temperature Rating – Indoor	30°F
All Ratings Shall Be Certified at 1800 RPM for Engine and Generator	

- A. The specified standby KW shall be for continuous electrical service during interruption of the normal utility source.

- B. The ratings must be substantiated by manufacturer's standard published data. Special ratings or maximum ratings are not acceptable. The specified rating shall be the net KW available after deducting all engine driven accessories.
- C. Gear reduction devices coupling the engine and generator shall not be used. The engine shall be directly coupled to the generator, in a 1:1 ratio.

4. ENGINE

- A. The engine shall be water cooled inline or vee form, four stroke compression ignition diesel. It shall meet these specifications when operating on No. 2 domestic burner oil. Diesel engines requiring premium fuels will not be considered. The engine shall be equipped with fuel, lube oil and intake air filters, lube oil coolers, fuel priming pump, fuel transfer pump, and water pump
- B. The engine governor shall maintain isochronous frequency regulation of 0.25%, plus or minus, from no-load to full load condition.
- C. The engine generator unit shall be mounted on a structural steel sub-base and shall be provided with suitable vibration isolators between generator set frame and the base mounting rails. The generator set shall be installed on a minimum 4" high concrete pad that is crowned in the center to permit full drainage from beneath the unit. It shall be securely fastened to the pad in a manner as approved by the generator set manufacturer. The concrete pad shall extend at least six inches beyond the generator outline or housing in all directions. For outdoor installations, the concrete pad shall extend 24" beyond the housing at access panels opening to control panels or equipment points requiring service.
- D. Safety Devices - Safety shutoffs for high coolant temperature, low coolant levels, low oil pressure, overspeed, and engine overcrank shall be provided.
- E. Lube oil shall be premium quality, furnished by the generator set supplier, as recommended by the engine manufacturer.
- F. Generator engine to have a Certificate of Conformity with the emissions standards of EPA 40 CFR Part 60 for the same model year and maximum engine power.

5. GENERATOR

- A. The generator (AC Alternator) shall be a 3 phase, 60 Hz, single bearing, synchronous type with brushed exciter and be built to NEMA Standards. Class "F" insulation shall be used on the stator and rotor, and both shall be further protected with 100% epoxy impregnation and an overcoat of resilient insulating material to reduce possible fungus and/or abrasion deterioration.
- B. A generator mounted regulator shall be provided to match the characteristics of the alternator and engine. Voltage regulation shall be $\pm 2\%$ from no load to full rated load. Readily accessible voltage level controls shall be provided. Voltage level adjustment shall be a minimum of $\pm 5\%$. The regulator shall be of the solid state type, compatible with and configured to control the engine properly in the presence of S.C.R. and other types of harmonic-producing electrical loads. The alternator shall contain a permanent magnet exciter to sustain a short circuit of 250% for ten seconds.

6. COOLING SYSTEM

- A. An engine mounted radiator with a blower type fan shall be sized to maintain full rated load safe operation at 110°F maximum ambient temperature. The radiator shall be equipped for a duct adapter flange. Air flow restriction from the radiator shall not exceed 1/2" water column or the maximum allowable per shop drawings, if less. For units provided without factory enclosure, the Contractor shall provide ductwork with flexible connecting sections between the radiator duct flange and exhaust damper. All sheetmetal work shall be in compliance with the current edition of SMACNA, installed by skilled tradesmen.
- B. The engine cooling system shall be filled with a solution of 50% ethylene glycol and 50% potable water.

7. FUEL SYSTEM

- A. Furnish an engine mounted fuel filter, fuel transfer pump as needed and heavy-duty flexible fuel connections at engine.
- B. Day tank and fuel storage tank will be procured by a future bid package.

8. EXHAUST SYSTEM

- A. Furnish a critical type silencer with aluminized coating, including an engine-mounted stainless steel corrugated flexible exhaust element. Use stainless steel hardware to fasten these components together and to the engine block. Exact configuration of the silencer shall be coordinated with the room configuration and Division 25 Contractor during BIM coordination.

9. AUTOMATIC STARTING SYSTEM

- A. A 12 or 24 volt DC electric starting system with positive engagement drive shall be furnished.
- B. Fully automatic generator set start/stop controls in the generator control panel shall be provided. Controls shall provide shut down for low oil pressure, high coolant temperature, low coolant level, overspeed, overcrank with one auxiliary convertible contact for activating accessory items. Controls shall include a thirty second single cranking cycle limit with lockout.
- C. A 12 or 24 volt lead acid storage battery set of the heavy duty diesel starting type shall be provided. The battery set shall be of sufficient capacity to provide for 12 minutes total cranking time without recharging, with sufficient amp hour rating to suit the engine selection. A corrosion-resistant battery rack, necessary cables and clamps shall be provided.
- D. A current limiting automatic two rate battery charger shall be furnished to automatically recharge batteries. Charger shall float at 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicone diode full wave rectifiers, voltage surge suppressors, DC ammeter, and fused AC input. AC input voltage shall be 120 volts. Amperage output shall be no less than ten amperes.
- E. A unit mounted thermal circulation type water heater(s) controlled by a thermostatic switch shall be furnished to maintain engine jacket water to 120°F. in an ambient temperature of 0°F. Furnish for 120 or 208 volt, single phase operation, per manufacturer's recommendation.

10. GENERATOR CONTROL PANELS

- A. A generator mounted NEMA 1 type vibration isolated dead front control panel constructed of code gauge steel shall be provided.
- B. Control panel shall contain, but not be limited to the following equipment:
 - 1) Voltmeter, analog gauge, 2% accuracy
 - 2) Ammeter, analog gauge, 2% accuracy
 - 3) Voltmeter and Ammeter phase selector switch
 - 4) Frequency meter, analog or vibrating reed type, 2% accuracy
 - 5) Automatic starting controls as specified
 - 6) Panel illuminating lights and test switch
 - 7) Voltage level adjustment rheostat
 - 8) Engine oil pressure gauge
 - 9) Engine water temperature gauge
 - 10) Contacts for remote alarms wired to terminal strips
 - 11) Fault indicators for low oil pressure, high coolant temperature and low coolant level, overspeed and overcrank
 - 12) Multi-position function switch with "Auto", "Manual", "Off/Reset" positions
 - 13) Engine running elapsed time meter, cumulative, non-resettable Emergency stop switch, with local audible alarm
- C. Digital metering may be substituted for analog style gauges, at the Contractor's option.
- D. Furnish controller with BACnet interface for monitoring all available functions by the building management system. Furnish translator from equipment native communication protocol as necessary. Generator manufacturer shall provide technical assistance for integration of all monitoring in cooperation with installing contractor.

11. MAIN LINE CIRCUIT BREAKER

- A. Generator mounted main line molded case circuit breakers (amps as indicated on power distribution riser diagram) shall be installed as a load circuit interrupting and protection device. They shall operate both manually for normal switching function and automatically during overload and short circuit conditions.
- B. The trip unit for each pole shall have elements providing inverse time delay during overload conditions and instantaneous magnetic tripping for short circuit protection. The circuit breaker shall meet standards established by Underwriter's Laboratories, National Electric Manufacturer's Association and National Electrical Code.
- C. Generator exciter field circuit breakers are unacceptable when utilized for line protection.

12. AUTOMATIC TRANSFER SWITCH

- A. Automatic transfer switch(es) shall be furnished as shown on the drawings and specified below. Switch shall be capable of switching all classes of loads and shall be rated for continuous duty when installed in a non-ventilated enclosure. Enclosures shall conform to UL and NEMA standards.
- B. The transfer switch shall be double throw, inherently interlocked mechanically and electrically, actuated by a single electrical operator which is momentarily energized. The switch shall be capable of transferring successfully in either direction with 70% of rated voltage and shall be mechanically held.

- C. The normal and emergency contacts shall be positively interlocked mechanically and electrically to prevent simultaneous closing. Mechanical interlock shall be separate from operating mechanism, providing positive interlock in the event of operator failure. Provide mechanism external to cabinet for manual operation of switch.
- D. If any phase of the normal source drops below 70% of rated line voltage, an engine start contact shall close to start the generating plant after the specified time delay. The transfer switch shall transfer to the emergency source after the alternator voltage and frequency have reached 90% of rating. After restoration of normal power on the normal source, retransfer to normal shall occur with delay set at five minutes, adjustable from zero to thirty minutes.
- E. As a precondition for approval, all switches, complete with timers, relays and accessories shall be listed by UL under Standard UL 1008 Automatic Transfer Switches and shall be approved for use on emergency power systems per NFPA and all applicable codes.
- F. Transfer switch ratings and accessories shall be as follows:

Amperage and Voltage ratings as indicated on power distribution riser diagram
3 phase, 4 wire, 60 Hz
4 pole
Closed Transition (except for Utility-to-Utility switch which shall be open transition)
Wall mounted for 400A and below. Floor mounted above 400A.
Totally enclosed, NEMA 1
Ground bar, bonded to enclosure

- G. Transfer Switch Accessories:

- (1) Time Delay for engine start on utility failure, factory set at 3 seconds, adjustable 1-60 seconds.
- (2) Adjustable time delay on retransfer to normal (motor driven type - 0 to 30 minutes, set at five minutes, arranged for five minute unloaded running time for standby plant cooldown).
- (3) Close differential relay protection on normal, using 3 phase, 4 wire relays when are factory set for 90% pick-up, 70% dropout. Relays shall be adjustable.
- (4) Test switch to be mounted on cabinet - to provide for load, no-load and off-line, operation of emergency plant and transfer switch.
- (5) Auxiliary contact to close when normal power fails (pilot contact to initiate starting controls on engine).
- (6) Pilot lights for indicating switch in emergency (red) and normal (green) position.
- (7) Two auxiliary contacts, 300 volt, 20 amp rated, on main shaft (closed on normal).
- (8) Two auxiliary contacts, 300 volt, 20 amp rated, on main shaft (closed on emergency).
- (9) Enclosures to be NEMA 1, or NEMA 3R, if outdoors.
- (10) Frequency relay - To prevent transfer to emergency until voltage and frequency of generating plant have reached 90 percent of rating.

- (11) Retransfer phase protection – The switch shall be equipped with an in-phase relay feature to prevent out-of-phase switching and permit closed transition operation. All settings shall be adjusted per manufacturer's recommended practice prior to energizing switch.

13. ANNUNCIATOR PANEL

- A. A fully flush-mounting trim panel shall be furnished for remote mounting to give audible and visual warning of fault or alarm conditions in the generator set. The panel shall conform with the requirements of the National Electrical Code, Section 700-12, and the National Fire Protection Association Publication NFPA 99 (NFPA 110 in health care installations). All necessary contacts shall be provided, including low fuel level in the storage tank. Locate as shown on plans or as directed by the Engineer and connect in accordance with shop drawing requirements.

14. GENERATOR INLET/OUTLET CABINET

- A. 3-way manual transfer switches shall be molded case circuit breaker type; knife switch or fused switches are not acceptable.
- B. Basis of Design: Triple Switch as manufactured by ESL Power Systems, Inc. or equal as approved by the Engineer.
- C. 3-way manual transfer switch shall consist of (2) mechanically-interlocked molded case circuit breakers, and (1) independent load bank breaker with a shunt trip (shunt trip voltage to be per the drawings), male cam-style inlet connectors, female cam-style outlet connectors, power distribution blocks and grounding terminals, all housed within a padlockable enclosure.
- D. 3-way manual transfer switch enclosure shall be Type 3R, constructed of continuous seam-welded, powder coated galvanized steel. The main access shall be through a hinged door that extends the full height of the enclosure. Access for both portable generator cables with female cam-style plugs and for load bank cables with male cam-style plugs shall be via a hinged lower flap door. Hinged flap door shall be provided to cover the cable openings when cables are not connected; the hinged flap door shall allow cable entry only after the main access door has been opened. Enclosure shall be powder coated after fabrication; color shall be gray RAL 7035.
- E. Cam-style male connectors (inlets) shall be UL Listed single-pole separable type and rated 400 amps at 600VAC. All cam-style connectors shall be color coded. Cam-style connectors shall be provided for each phase and for ground and shall also be provided for neutral. Each of the phase cam-style connectors and the neutral cam-style connectors within the enclosure shall be factory-wired to a molded case circuit breaker. The ground cam-style male connectors shall be bonded to the enclosure, and a ground lug shall be provided for connection of the facility ground conductor. None of the cam-style connectors shall be accessible unless all (3) molded case circuit breakers are in the "OFF" position and the main access door is open.
- F. Load bank outlet is to be configured with lugs for a permanently mounted load bank.
- G. A power distribution block shall be provided for load-side field wiring. The power distribution block shall be factory wired to the molded case circuit breakers.

- H. Molded case circuit breakers shall be UL Listed 3-pole and the short circuit interrupt rating shall be a minimum of 35kAIC at 480VAC (wall mount units) or 50kAIC at 480VAC (pad mount units). Trip rating of the molded case circuit breakers shall be as shown on the drawings. One molded case circuit breaker shall control the connection between the permanent generator and the automatic transfer switch. A second circuit breaker shall control the connection between the permanent generator and the load bank female cam-style connectors. A third circuit breaker shall control the connection between the portable generator (via male cam-style connectors) and the automatic transfer switch. All (3) molded case circuit breakers shall include UL Listed door-mounted operating mechanisms, preventing the opening of the main access door unless all (3) breakers are in the "OFF" position. All (3) molded case circuit breakers shall be mounted behind a deadfront panel. The load-side of the molded case circuit breakers shall not be energizable unless the main access door is closed and one of the molded case circuit breakers is in the "ON" position. The (2) molded case circuit breakers controlling the connections between the permanent generator and the automatic transfer switch, and the connection between the portable generator and automatic transfer switch shall be safety interlocked by mechanical means to ensure that only one of these breakers can be closed at any given time.
- I. An auxiliary contact shall be provided in the circuit breaker controlling the connection from the Permanent Generator to the ATS and shall be factory wired to terminal blocks within the enclosure. The auxiliary contact is provided in compliance with NEC 2017 700.3 (F)(5) which requires a means to activate an annunciator circuit.

15. LOAD BANK

- A. Furnish a permanently mounted resistive load bank sized as indicated on the drawings. The load bank shall have vertical exhaust air discharge. Coordinate dimension of unit furnished to fit within the allocated space shown on the drawings.
- B. The load bank shall be a completely self-contained, freestanding unit which includes all resistive load elements, load control devices, load element branch circuit fuse protection, main load bus and terminals, cooling system, control power supply, digital controller with malfunction detection system. Furnish with type 3R enclosure.
- C. Ratings shall be as follows:
 - a. Power: 1000KW
 - b. Voltage: 480V
 - c. Load steps: 25-25-50-100-100...250KW
 - d. Duty Cycle: Continuous
 - e. Ambient temp: 120 degF
 - f. Exhaust Temp Rise: 220 degF
 - g. Fan/Control: Internal with 120V control transformer. 100,000AIC rated.
- D. Load elements are to be UL/CUL Recognized component. Open wire, helically wound, chromium alloy, thermally derated to 60%. 5% tolerance, 2% balance. 0.995 power factor. Element wire mechanically supported over entire length such that if a wire should break, the broken wire segments

will not short to adjacent conductors or to ground. Load elements individually serviceable and replaceable in the field without major disassembly of load bank.

- E. Load elements installed in slide-out, removable trays such that any element is easily accessed without disturbing any other elements. All materials used in the mounting and installation of the load elements are suitable for the temperatures encountered, in both normal operation and under fault conditions. Materials in direct contact with the element wire are ceramic. Other materials which structurally support the load elements and/or which form the hot air duct within which the elements are mounted are steel, stainless steel or aluminum.
- F. Load control: Branch circuit contactors, each step or each 50kw circuit maximum, 3-pole, 600v, with enclosed silver surfaced contacts, 120V coils; electrically operated and electrically held. Furnish with local digital controller and programing for time/load sequencing.
- G. Cooling: Forced air, vertical airflow, top exhaust. 10HP, 3-phase, TEFC motor driving cast aluminum fan blade. Circuit breaker combination fan motor starter with adjustable overload relay.
- H. System protection: Fan failure, high exhaust temp, hi intake temp, fan motor overload; lockout and alarm message display on HMI. Airflow pressure differential switch; dual exhaust temperature thermocouples; intake air temperature thermocouple; fan motor overload relay. Display of temperatures on HMI

END OF SECTION 26 3213.01

DOCUMENT 00 3119 - EXISTING CONDITION INFORMATION

PART 1 - GENERAL

1.1 EXISTING CONDITION INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Existing Drawings that include information on existing conditions, including previous construction at Project site are available for viewing at the office of Construction Manager.
- C. Survey information that includes information on existing conditions, prepared by Endris Engineering, dated March 8, 2022, is available for viewing as part of Drawings.
- D. Related Requirements:
 - 1. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to Bidders.
 - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to Bidders.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 00 3119

DOCUMENT 00 3126 - EXISTING HAZARDOUS MATERIAL INFORMATION

PART 1 - GENERAL

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for the Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. An existing asbestos report for Project, prepared by S&ME, Inc., dated October 16, 2023, is available for viewing as appended to this Project Manual.
- C. An existing PCB (Polychlorinated Biphenyl) information report for Project, prepared by S&ME, Inc., dated October 16, 2023, is available for viewing as appended to this Project Manual.
- D. Related Requirements:
 - 1. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to Bidders.
 - 2. Document 003132 "Geotechnical Data" for reports and soil-boring data from geotechnical investigations that are made available to Bidders.
 - 3. Section 024116 "Structure Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 00 3126



October 16, 2023

University of Kentucky
Environmental Quality Management
355 Cooper Drive, Suite
Lexington, Kentucky 40508

Attention: Mr. Bob Kjelland, P.G., CHMM

Reference: **Report of Limited Hazardous Materials Assessment**
University of Kentucky – Kelley Hall
Lexington, Kentucky
S&ME Project No. 23830110

Dear Mr. Bob Kjelland:

S&ME, Inc. (S&ME) is pleased to provide this report detailing the results of our limited hazardous materials survey services at the referenced site. The purpose was to perform a limited assessment for the presence of polychlorinated biphenyls (PCBs) in caulk, asbestos, and universal wastes prior to the demolition of Kelley Hall on the University of Kentucky campus in Lexington, Kentucky. Our services were performed in general accordance with S&ME *Proposal No. 23-83-0110* dated June 21, 2023, and authorized under the Per Diem Agreement for Civil-Structural-Geotechnical Engineering Services Contract No. A231030 dated July 1, 2022, between the University of Kentucky and S&ME. The following report includes the project background, sampling and analysis procedures, findings, results, and conclusions.

This report is provided for the sole use of Mr. Bob Kjelland and the University of Kentucky. Use of this report by any other parties will be at such party's sole risk and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the assessment and of the specific areas referenced.

S&ME appreciates this opportunity to provide our services to you. Please contact us if you have questions concerning this report or any of our services.

Sincerely,
S&ME, Inc.

A handwritten signature in blue ink, appearing to read 'Vincent J. Epps'.

Vincent J. Epps, RG
Operations Manager

A handwritten signature in blue ink, appearing to read 'Thomas M. Reed'.

Thomas M. Reed, PG
Project Manager

Senior Reviewed by: R. Bruce



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Executive Summary

S&ME, Inc. (S&ME) conducted a limited hazardous materials assessment for Kelley Hall on the University of Kentucky campus in Lexington, Kentucky. The limited hazardous materials assessments included a survey of asbestos-containing materials (ACM), regulated materials and universal waste inventories, and polychlorinated biphenyls (PCB) in caulk. The purpose of the assessment was to identify hazardous materials that may require removal prior to implementation of proposed demolition activities at Kelley Hall. A summary of the results of the limited hazardous materials assessment is provided below.

Asbestos-containing Materials

Asbestos was detected greater than one percent in samples of the following materials:

- ◆ 12" x 12" white floor tile on the first and second floors of the offices;
- ◆ 12" x 12" tan tile with dark brown streaks in Room 121C;
- ◆ Silver caulk and paper on the warehouse skylight roof housing;
- ◆ Roof tar on the second from bottom layer of the flat roof;
- ◆ Pipe wrap above the drop ceiling in Rooms 112 and 100B; and
- ◆ Mudded elbows (assumed) above the drop ceiling in Rooms 112 and 100B.

Other Regulated Materials and Universal Wastes

- ◆ Polychlorinated biphenyls (PCBs): Approximately 286 fluorescent light ballasts (FLBs) were observed in this building.
- ◆ Chlorofluorocarbons (CFCs): Approximately nine items that potentially contain CFCs were observed in the building.
- ◆ Universal Wastes: Various quantities of battery-containing equipment, air conditioning units, fluorescent bulbs, and miscellaneous cleaning/household style chemicals were present in the building. Tritium-containing exit signs or pesticides were not observed.

Polychlorinated Biphenyls (PCB)-Containing Caulk

- ◆ The PCB-caulk samples submitted for chemical analysis revealed the presence of PCBs in concentrations below the Toxic Substances Control Act (TSCA) action level of 50 milligrams per kilogram (mg/kg).



1.0 Introduction

Mr. Bob Kjelland retained S&ME, Inc. (S&ME) to conduct a limited hazardous materials assessment of suspect asbestos-containing materials (ACMs), polychlorinated biphenyls (PCB) containing materials, and universal wastes on the University of Kentucky (UK) campus in Lexington, Kentucky. Mr. Vincent Epps of S&ME performed the assessment on August 25, 2023 in general accordance with S&ME *Proposal No. 23-83-0110* dated June 21, 2023.

2.0 Purpose and Site Description

2.1 Purpose

The purpose of the limited assessment was to identify the presence of PCBs in caulk, ACMs in building materials, and universal wastes prior to the demolition of the building. The assessment included the interior and exterior portions of the structure. An assessment strategy believed by S&ME to be appropriate for this purpose was presented in our proposal and is described in this report. The report should be interpreted only with regard to the specific location and materials referenced.

2.2 Site Description

Kelley Hall is located at 360 Huguelet Drive on the UK campus. Kelley Hall is an approximately 20,500-square-foot maintenance and office building completed in 1959. The maintenance portion of the building is one story with a basement. The office portion of the building is two stories with a basement. According to the provided information, the building is scheduled for demolition. It is understood that this project is to include the assessment of potential ACMs, PCB-containing caulk, and regulated and universal waste. A site location map is included as **Figure 1** in **Appendix I**.

3.0 Asbestos-containing Materials Sampling

3.1 Scope of Services

Demolition and renovation in public and commercial buildings is regulated by the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP). The EPA and KDEP require asbestos assessments, conducted by licensed and accredited individuals, prior to implementation of renovation and demolition projects. Code 40 of Federal Regulations Part 61, Subpart M, Final Rule, National Emissions Standards for Hazardous Air Pollutants (NESHAP) and KDEP require asbestos assessments, followed by the proper removal, and disposal of ACM that is affected by demolition. Identification of ACM is also required by the OSHA 1926.1101. The identification of ACMs will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. The EPA, OSHA and KDEP define ACM as materials containing greater than one percent asbestos in a representative sample. However, OSHA also regulates materials containing less than or equal to one percent asbestos.



S&ME performed a visual assessment of the referenced building to determine the homogenous areas (HAs) of suspect ACMs. Based on EPA definitions used in the Asbestos Hazard Emergency Response Act (AHERA), 40 CFR 763, an HA of asbestos-suspect building material has the same color and texture and is thought to be installed within the same timeframe. S&ME assessed the interior and exterior of the building (except for the roof) for suspect ACMs, including thermal system insulation (TSI), surfacing, and miscellaneous materials. S&ME collected representative samples of suspect ACMs from each HA in accordance with the US EPA AHERA protocol and applicable state regulations.

S&ME provided a KDEP licensed, and EPA accredited, Asbestos Inspector to conduct the asbestos survey and sample collection of the referenced building. On August 25th 2023, Mr. Vincent Epps conducted the asbestos survey in the building. A copy of Mr. Epps' asbestos inspector credentials area included in **Appendix II**. Bulk materials collected included, but were not limited to plaster, ceiling tile, drywall and joint compound, floor tile, cove base, pipe/joint insulation, caulk, window glazing, and various mastics and adhesives. During the survey, representative photographs of the interior and exterior finishes of the building were collected. A selection of these photographs with descriptions is included in **Appendix III**.

3.2 Methods

The asbestos survey was performed to comply with the NESHAP regulations (40 CFR 61 (M)) issued by the US EPA as they pertain to requirements for an asbestos inspection prior to demolition projects. KDEP regulations are equivalent to the NESHAP regulations regarding pre-demolition asbestos inspection requirements.

Information regarding the bulk samples of each HA was collected, recorded on a chain-of-custody record, and submitted to the SanAir Technologies in Cincinnati, Ohio for analysis by Polarized Light Microscopy (PLM), coupled with dispersion staining in general accordance with the EPA 600/R-93/116 Method. SanAir Technologies is an accredited laboratory by the National Voluntary Laboratory Accreditation (NVLAP), which is administered by the National Institute of Standards and Technology (NIST). The laboratory analysis reports the specific type of asbestos mineral identified (if any) and the percentage present in each sample.

Wall finishes composed of drywall finished with joint compound observed only at drywall seams and fastener holes were sampled as a composite sample (samples include both the drywall and the joint compound). Current EPA interpretations allow that the components of these drywall systems may be considered as a single HA/material. Accordingly, the presence of greater than one percent asbestos in a composite sample analysis identifies the sample as ACM. If the composite sample analysis (both joint compound and drywall) is reported as "trace" or less than, or equal to one percent asbestos, the sample must be further analyzed using the Point Count Method or be considered to be ACM under US EPA and state regulations.

3.3 Results

Based on the results of the assessment, six building components were identified to contain asbestos at a concentration greater than one percent. **Table 3-1** below contains a summary of the identified materials.



Table 3-1 Identified ACM

Material Description	Material Location	Quantity	Category (F/I/II)	Type	Condition / Potential for Disturbance	Type and Percent Asbestos
12" x 12" White Floor Tile with Gray Streaks and Yellow Mastic	Rooms 200A, 207, 100, and 100A	1,850 SF	I	Misc.	Good/High	2% CH Tile ND Mastic
12" x 12" Tan Floor Tile with Dark Brown Streaks and Yellow Mastic	Room 121C	350 SF	I	Misc.	Good/High	2% CH Tile ND Mastic
Silver Caulk and Paper	Warehouse Skylights Roof Housing	300 LF	II	Misc.	Good/High	10% CH Caulk 85% CH Paper
Flat Roofing Tar	Flat Roof of Warehouse – Second Layer Above Decking	17,500 SF	I	Misc.	Good/High	5% CH
Black Roof Selant	Parapet Walls on Flat Roof	200 LF	II	Misc.	Good/High	3% CH
Pipe Wrap (6" pipe)	Rooms 112 and 100B Above Drop Ceiling	60 LF	F	TSI	Good/High	60% CH
Mudded Elbows	Rooms 112 and 100B Above Drop Ceiling	3 Units	F	TSI	Good/High	Assumed

SF = Square feet LF = Linear feet CH = Chrysotile Asbestos F=Friable I=Category I, Non-Friable II=Category II, Non-Friable

Misc. = Miscellaneous TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

The quantities of ACM provided in the report are for informational purposes only and should not be used for abatement contractor bidding purposes. Actual field measurements and quantity calculation should be performed by the prospective asbestos abatement contractor for bid purposes. If materials were assumed to contain asbestos and were not sampled, these materials must be treated as asbestos unless sampling indicates the materials are not ACM. Sample locations are depicted on **Figures 2-4 in Appendix I**. The summary of bulk asbestos results is provided in the Summary of Asbestos Sampling tables in **Appendix IV**. The laboratory report and chain-of-custody records are provided in **Appendix V**.



4.0 Other Regulated Materials and Universal Wastes

4.1 Regulated Waste

4.1.1 PCBs

Approximately 286 fluorescent light ballasts (FLBs) were observed to be present in the building. FLBs manufactured before July 1, 1979, may contain PCBs. FLBs manufactured between July 1, 1979, and July 1, 1998, that do not contain PCBs must be labeled “NO PCBs.” If a FLB is *not* labeled “NO PCBs,” it should be assumed to contain PCBs. FLBs manufactured after 1998 are not required to be labeled. If date of manufacture cannot be determined or verified on ballasts with no labeling indicating PCB content, they should be assumed to contain PCBs. S&ME did not observe “NO PCB” labels on the FLBs that were observed. For the purposes of this assessment, S&ME assumes all FLBs present on the building to contain PCBs.

PCB-containing fluid or oil has historically been used in various electrical components outside of FLBs, in switches, dampeners, and most commonly wet transformers either found on power poles or ground mounted on a concrete pad. We observed five pole-mounted transformers around the building. Labels indicating the presence of PCB fluids in the transformers were not observed; therefore, these transformers should be treated as potentially containing PCB fluid.

Along with PCB fluid/oil in electrical components, it has also been stated that PCBs have been found in older style door closers which are noted as being “kettle shaped.” S&ME observed 32 of this type of door closer during this assessment.

4.2 Chlorofluorocarbons (CFCs)

Potential CFC-containing equipment may include drinking fountains, window or portable air conditioning units, refrigerators, freezers, and exterior condenser units. A summary of the items and approximate quantities is presented in **Table 4-2** below.

Table 4-2 – CFC Inventory Summary

Drinking Fountains	Refrigerators/Freezers	A/C Units	Exterior Condenser Units
0	5	1	3

4.3 Universal Wastes

The federal universal waste regulations are set forth in Part 273 Title 40 of the Code of Federal Regulations (40 C.F.R. 273). Materials regulated under this rule include batteries or battery-containing equipment (exit signs, smoke detectors, and emergency lights), cleaning/household chemicals, pesticides, mercury-containing equipment (thermostats and switches), and bulbs (lamps). Management and disposal of fluorescent light bulbs are regulated under the Resource Conservation and Recovery Act (RCRA), the Universal Waste Rule (UWR), and



Subtitle C Hazardous Waste regulations. A standard fluorescent bulb contains eight to 14 milligrams of mercury. Fluorescent light bulbs that are not marked with green aluminum end caps are generally considered to be regulated universal waste after their useful life. Fluorescent bulbs with green end caps contain less mercury than standard fluorescent bulbs and are also generally considered to be regulated universal waste after their useful life. A summary of the items and approximate quantities is presented in **Table 4-3** below.

Table 4-3 – Universal Waste Summary

Exit Signs/Emergency Lights	Smoke Detectors	Tritium-containing Exit Signs	Fluorescent Bulbs	Mercury-containing Equipment	Cleaning/Household Chemicals	Pesticides
17	13	0	450	10	12	0

5.0 PCB-Containing Caulk

PCBs are a group of organic chemicals known as chlorinated hydrocarbons. These chemicals were manufactured between 1929 and 1979 and were used in a variety of building materials for their non-flammability, chemical stability, high boiling point, plasticizing, and electrical insulating properties. Specifically, PCBs in caulk may be present in buildings that were constructed or renovated during the 1950s through the 1970s. PCB caulk inspection and sampling methods are not regulated; however, the TSCA has established an action level of 50 milligrams per kilogram (mg/kg) or 50 parts per million (ppm).

The PCB-containing caulk assessment included the interior and exterior of the building. A visual assessment and sampling strategy was developed and representative samples of each type of caulk identified during the visual assessment were collected. Each sample consisted of an approximately 10-gram (4-inch long) piece of caulk that was collected using a utility knife with a new blade for each sample. A total of three caulk samples were collected as part of this assessment. Each caulk sample was placed in a laboratory-provided two-ounce unpreserved glass jar with a Teflon-lined lid. The samples were shipped overnight to a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory under chain-of-custody.

The samples were analyzed for the presence of PCBs using United States EPA Method 8082A. A copy of the laboratory analytical report is included in **Appendix VI** and a summary of results from the samples collected is provided in **Table 5-1** below. Please note that if multiple PCB compounds were identified in a sample, the total concentration of all identified PCB types in that sample is presented in the table below.

Table 5-1 – PCB Caulk Sampling Summary

Sample No.	Material Description and Location	Color	Result (mg/kg)	Action Level (mg/kg)
KH-17	Window Caulk	White	4.2	50
KH-22	Caulk	Silver	8.2	50
KH-24	Caulk	Gray	ND	50
KH-31	Door & Window Caulk	White	ND	50
KH-32	Caulk	White	ND	50

ND = Not Detected above laboratory detection limits

The PCB-caulk samples submitted for analysis did not reveal the presence of PCBs above the TSCA action level of 50 mg/kg.

6.0 Conclusions and Recommendations

6.1 Asbestos

ACM was identified in areas to be affected by the planned demolition. We recommend removal and disposal of the ACM by a KDEP licensed and EPA accredited asbestos abatement contractor, prior to activities that may disturb an ACM. State and federal regulations should be carefully considered in order to verify compliance before any actions are initiated that may disturb an ACM. If additional suspect ACMs not included in this report are discovered and will be disturbed by renovation activities, bulk samples must be collected by a KDEP licensed and EPA accredited asbestos inspector and analyzed for asbestos content, prior to disturbance of the suspect material(s).

Asbestos removal requires written notification to KDEP, specific removal procedures, proper transportation, and disposal per state and federal regulations. The identification and proper removal of ACM prior to demolition will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. If ACMs are managed in place, OSHA requirements apply to employees that may contact or disturb ACMs, including maintenance and custodial workers.

Removal of Category I Non-friable ACM may not be required by state and federal regulations if the probability is low that it will be rendered friable during demolition. Likewise, removal of Category II Non-friable ACM may not be required if the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition. The demolition procedures must follow NESHAP and KDEP regulations and the debris contaminated with asbestos must be disposed of as regulated asbestos-containing waste.



While there are numerous Category I and II Non-friable flooring and other materials found within the building, it is anticipated that contractors will not be able to remove these materials without rendering them friable, since they are multi-layered and/or attached to wooden or other porous substrates. Therefore, we recommend the removal of all asbestos-containing Category I and II Non-friable materials as regulated materials, prior to demolition activities and that air monitoring and 3rd-party observation be conducted during removal activities. Additionally, due to the quantities of ACMs to be removed, a project design will need to be prepared and transmission electron microscopy (TEM) clearance will need to be conducted at the end of the abatement process.

If non-sampled suspect materials are discovered that are similar to the sampled materials in appearance, age, or use, they should be treated the same as the similarly sampled materials.

6.2 Other Regulated Materials and Universal Wastes

It is recommended that the other regulated materials and universal wastes identified in Section 4.0 of this report be removed by qualified waste disposal contractor and properly recycled or disposed prior to renovation activities that may impact them in accordance with the applicable EPA regulations regarding these materials.

6.3 PCB-Containing Caulk

The PCB-caulk samples submitted for analysis did not reveal the presence of PCBs above the TSCA action level of 50 mg/kg and do not require removal before demolition activities.

7.0 Limitations

This report is provided for the sole use Mr. Bob Kjelland and the University of Kentucky. Use of this report by any other parties will be at such party's sole risk, and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the sampling and of the specific areas referenced. Under no circumstances is this report to be used as a bidding document, or as a project design or specification.

S&ME performed the services in accordance with generally accepted practices of reputable environmental consultants undertaking similar studies at the same time and in the same geographical area. S&ME has endeavored to meet this standard of care. No other warranty, expressed or implied, is intended or made with respect to this report or S&ME's services. Users of this report should consider the scope and limitations related to these services when developing opinions as to risks associated with the site.

The findings of the hazardous materials survey are based largely on visual observations within the amount of time available. The findings do not warrant that all hazardous materials have been identified; hazardous materials could be present in areas not readily accessible to observation. In addition, the actual locations and quantities of materials determined to contain asbestos will vary from those herein. Apparent homogeneous sampling areas may vary in actual asbestos content due to previous renovations, maintenance, or related operations.

If additional suspect materials are found, our firm should be notified so that our findings can be reviewed for modification or verification.



7.1 Asbestos

This report is not intended for use as an asbestos abatement specification. ***The quantities of ACM provided in this report are estimates for sample collection purposes and should not be used for asbestos abatement bidding purposes. The Asbestos Abatement Contractor is responsible for verifying the quantities of ACM for asbestos abatement purposes.*** It is not within the scope of this project to describe all appropriate precautions, safeguards and regulations relating to asbestos.

The possibility exists that suspect materials were undetected in inaccessible or concealed areas such as under carpeting or multiple flooring layers, and inside pipe chases or wall voids or were not observed during the assessment. If additional suspect materials are discovered during the planned renovation activities, bulk samples must be collected by a KDEP licensed and EPA accredited asbestos inspector and analyzed for asbestos content.

7.2 Other Regulated Materials and Universal Wastes

S&ME tried to identify hazardous materials or potentially hazardous wastes that should be removed prior to renovation or demolition and disposed of in accordance with state and federal regulations. Other hazardous materials or potentially hazardous waste may be present and identified during renovation or demolition. If additional hazardous materials or potentially hazardous wastes are identified, they should be disposed of in accordance with state and federal regulations pertaining to Universal Waste and hazardous waste.

Appendices

Appendix I – Figures



IMAGERY REFERENCE: ©2023 CNES/Airbus, Maxar Technologies, U.S. Geological Survey, ©Google
 COORDINATE REFERENCE SYSTEM: EPSG:3089 - NAD83 / Kentucky Single Zone (ftUS)



PROJECT LOCATION MAP

Kelley Hall
 360 Huguelet Drive
 Lexington, Kentucky

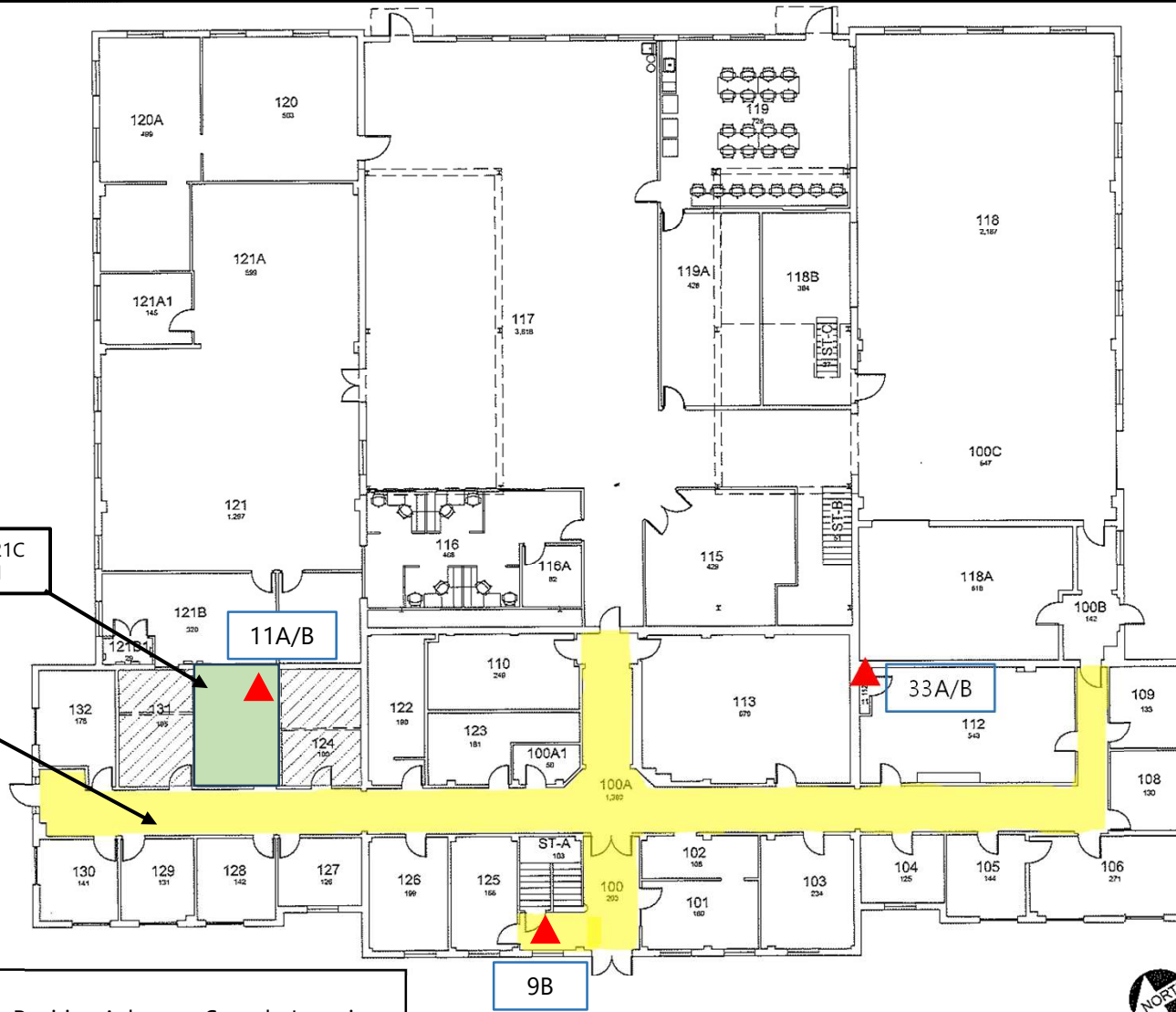
SCALE:
 Not to Scale

DATE:
 10-16-2023

PROJECT NUMBER:
 23830110

FIGURE NO.

1



Legend ▲ Positive Asbestos Sample Location

10A Sample ID



POSITIVE SAMPLE LOCATION MAP – FIRST FLOOR

Kelley Hall
360 Huguelet Drive
Lexington, Kentucky

SCALE:
Not to Scale

DATE:
10-16-2023

PROJECT NUMBER:
23830110

FIGURE NO.

2

BLDG #:
0075

KELLY HALL

DRAWN BY:
KS
DATE:
10-25-2007

REVISED BY:
JES
DATE:
07-05-2016

SHEET
3 OF 5



Legend ▲ Positive PCB Caulk Sample Location

10A Sample ID

HA 9



POSITIVE SAMPLE LOCATION MAP – SECOND FLOOR

Kelley Hall
360 Huguelet Drive
Lexington, Kentucky

SCALE:
Not to Scale

DATE:
10-16-2023
PROJECT NUMBER:
23830110

FIGURE NO.
3



University of
Kentucky

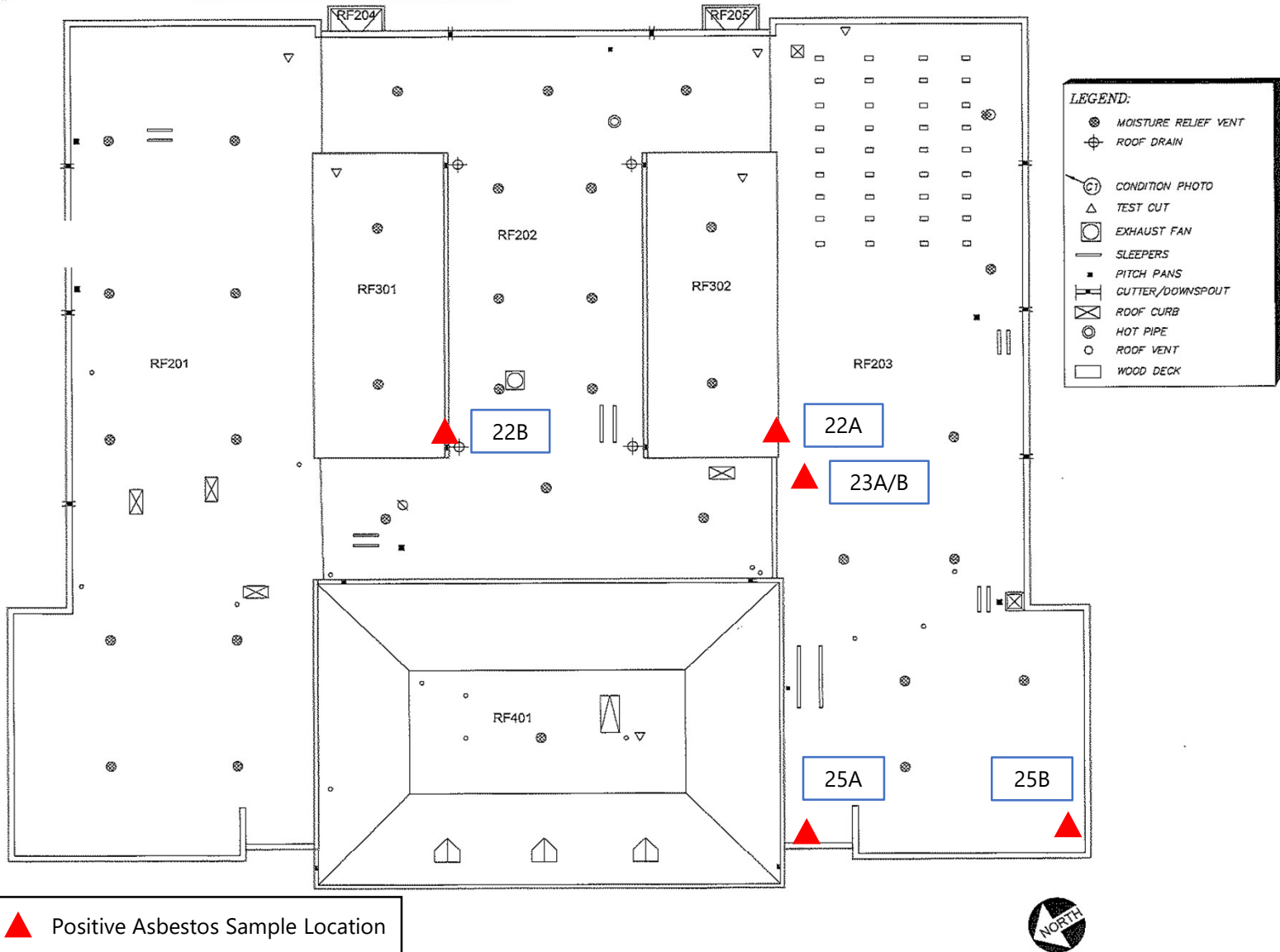
BLDG #:
0075

KELLY HALL

DRAWN BY:
KS
DATE:
10-25-2007

REVISED BY:
JCS
DATE:
06-04-2013

SHEET
5 OF 5



Legend ▲ Positive Asbestos Sample Location

10A Sample ID



POSITIVE SAMPLE LOCATION MAP – ROOF FLOOR

Kelley Hall
360 Huguelet Drive
Lexington, Kentucky

SCALE:
Not to Scale

DATE:
10-16-2023

PROJECT NUMBER:
23830110

FIGURE NO.

4

Appendix II – Asbestos Inspector Credentials



Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

March 8, 2023

Vincent J Epps
862 E Crescentville Rd
Cincinnati, Ohio 45246

Asbestos Management Planner
AI Number: 155508
License Number: 63211
Expires: December 21, 2023

Dear Vincent J Epps:

This is to acknowledge receipt of your application for accreditation as an asbestos abatement professional. Your application has been approved and the above-referenced card is enclosed.

Initial accreditation fee is \$100.00 per person per discipline, except for abatement worker (\$20.00). Renewal fees for accreditations within one year of the expiration date are one-half of the initial fees. Renewals for accreditations expired over one year require the initial fee. There is a \$10.00 duplication charge to replace a lost card. Please also note that the expiration date on your license is determined by the expiration date on the training certificate submitted with your application.

When submitting application packets, please note the following:

- do not staple any of the application materials;
- make sure to fill out the application completely, including your signature; and
- include current proof of training for the discipline(s) for which you are applying

If you have any questions regarding this matter, please call our office at (502) 782-6717.

Sincerely,

Emma Moreo

Emma Moreo
Field Support Section
Field Operations Branch

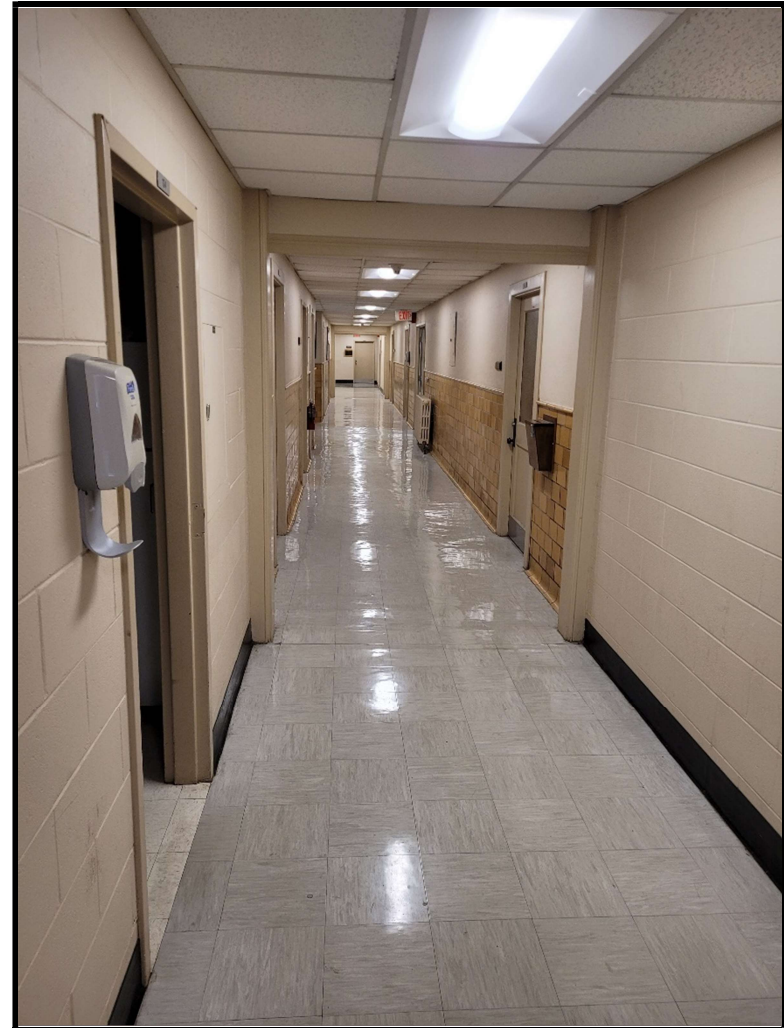


Appendix III – Photographic Log



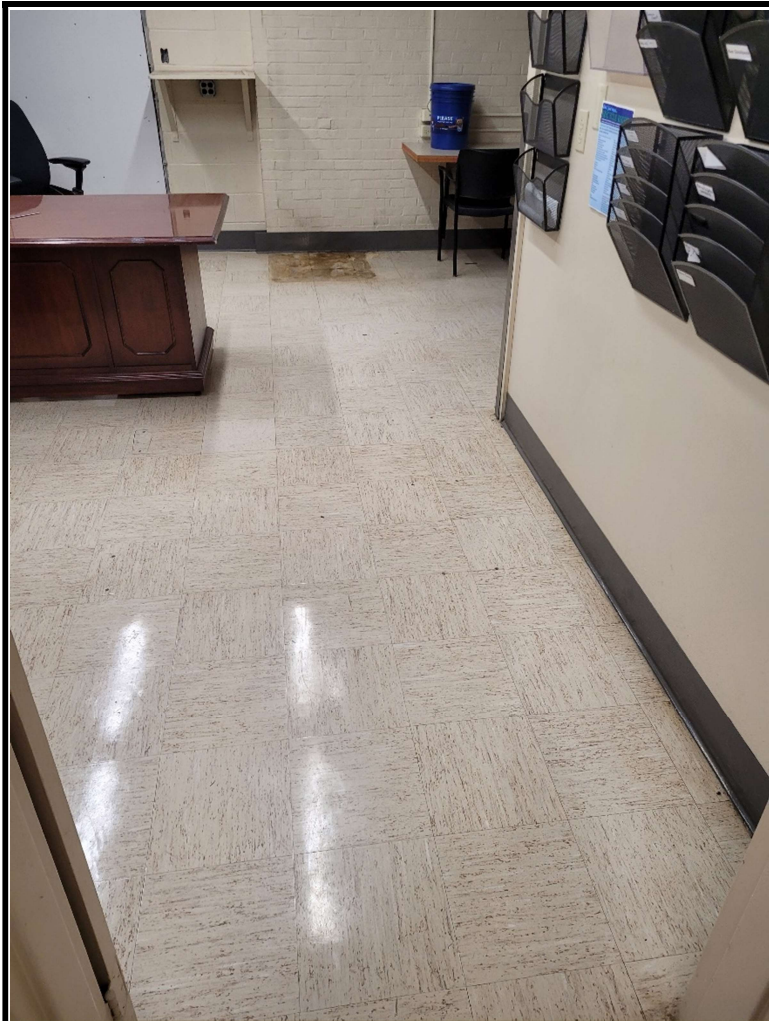
1 HA 9 Second Floor

Date: 08/25/2023
Photographer: VE



2 HA 9 First Floor

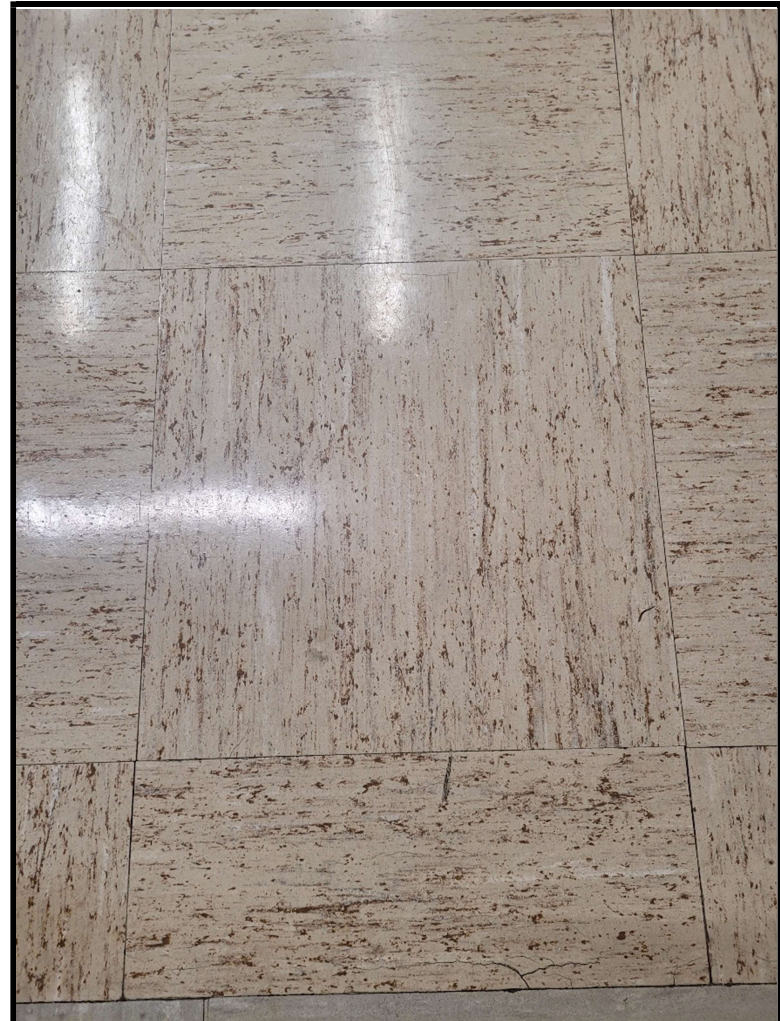
Date: 08/25/2023
Photographer: VE



3

HA 11

Date: 08/25/2023
Photographer: VE



4

HA 11 Close Up

Date: 08/25/2023
Photographer: VE



5

HA 22 Roof Housing

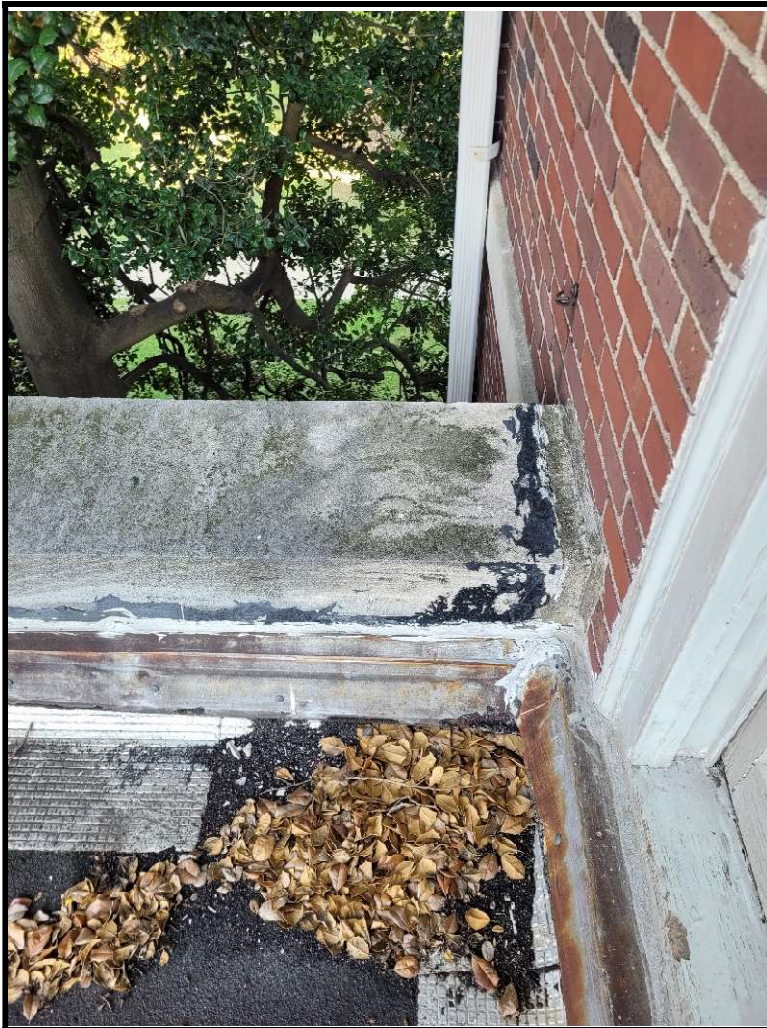
Date: 08/24/2023
Photographer: CR



6

HA 23 ACM Tar Layer

Date: 08/24/2023
Photographer: CR



7

HA 25

Date: 08/24/2023
Photographer: CR



8

HAs 33 and 34

Date: 08/24/2023
Photographer: CR

Appendix IV – ACM Summary Table

Summary of Asbestos Sampling

Project Name: UK Kelley Hall	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/25/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
1	Yellow Carpet Glue	Throughout Second Floor	NQ	NA	Misc.	Good/Low	1A	Room 204	ND
							1B	Room 206	
2	Black/Grey Cove Base with Yellow and Black Mastic	Throughout First and Second Floor	NQ	NA	Misc.	Good/Low	2A	Room 201	ND
							2B	Room 133	
3	2' x 4' Drop in Ceiling Tiles	Throughout First and Second Floor	NQ	NA	Misc.	Good/Low	3A	Room 206	ND
							3B	Room 112	
4	Plaster	Throughout Building	NQ	NA	Sur.	Good/Low	4A	Room 204	ND
							4B	Room 206	
							4C	Room 201	
							4D	Room 209	ND
							4E	Room 125	
							4F	Hallway, 100A	ND
							4G	Room 113	
5	Gray Duct Selant	HVAC System Throughout	NQ	NA	Misc.	Good/Low	5A	Room 206A	ND
							5B	Room 115	

NQ = Not Quantified

ND = Asbestos Not Detected

SF = Square feet

LF = Linear feet

CF = Cubic Feet

CH = Chrysotile

NA = Not Applicable

¹Category:

F=Friable

I=Category I, Non-Friable

II=Category II, Non-Friable

²Type;

Misc. = Miscellaneous

Sur = Surfacing

TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

Summary of Asbestos Sampling

Project Name: UK Kelley Hall	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/25/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
6	Drywall, Joint Compound, and Tape	Throughout First and Second Floor Offices	NQ	NA	Misc.	Good/Low	6A	Room 209	ND
							6B	Room 112	
7	2' x 2' Drop in Ceiling Tiles	Rooms 208 and 209	NQ	NA	Misc.	Good/Low	7A	Room 209	ND
							7B	Room 208	
8	Canvas Pipe Wrap Over Fiberglass	Throughout Building	NQ	NA	TSI	Good/Low	8A	Room 207	ND
							8B	Room 115	
9	12" x 12" White Floor Tile with Gray Streaks and Yellow Mastic	Rooms 200A, 207, 100, and 100A	1,850 SF	I	Misc.	Good/High	9A	Foyer, Room 200A	2% CH Tile Mastic ND
							9B	Hallway, Room 100	
10	Terrazzo	Front Stairs from First to Second Floors	NQ	NA	Misc.	Good/Low	10A	Top of Stairs	ND
							10B	Top of Stairs	
11	12" x 12" Tan Tile with Dark Brown Streaks and Yellow Mastic	Room 121C	350 SF	I	Misc.	Good/High	11A	Room 121C	2% CH Mastic ND
							11B	Room 121C	
12	12" x 12" White Tile with Lt. Brown Streaks and Yellow Mastic	Room 124	NQ	NA	Misc.	Good/Low	12A	Room 124	ND
							12B	Room 124	
13	Black/Gray Cove Bae with Yellow Mastic	Throughout First Floor Except Shop	NQ	NA	Misc.	Good/Low	13A	124	ND
							13B	121C	

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Misc. = Miscellaneous

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TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

Summary of Asbestos Sampling

Project Name: UK Kelley Hall	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/25/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
14	12" x 12" Tan Tile with Brown/White Streaks and Brown Mastic with Floor Leveling Compound	Men's and Women's Restrooms First Floor	NQ	NA	Misc.	Good/Low	14A	Men's Restroom (110)	ND
							14B	Women's Restroom (123)	
15	12" x 12" Black Floor Tile with Yellow Mastic	In-between Offices 105 and 106	NQ	NA	Misc.	Good/Low	15A	North Hallway (100A)	ND
							15B	North Hallway (100A)	
16	12" x 12" Black Rubber Tile with Yellow Mastic	Room 100B	NQ	NA	Misc.	Good/Low	16A	Room 100B	ND
							16B	Room 100B	
17	White Window Caulk	Interior Windows	NQ	NA	Misc	Good/Low	17A	Room 100B	ND
							17B	Room 118	
18	SAMPLE NOT SUBMITTED FOR ANALYSIS - FIBERGLASS								
19	Drywall, Joint Compound, and Tape	Wearhouse Office and Mechanical Room	NQ	NA	Misc.	Good/Low	19A	Mechanical Room (115)	ND
							19B	Office (116)	
20	Wood Pattern Vinyl Flooring with Gray Mastic and Floor Leveling Compound	Break Room (119)	NQ	NA	Misc.	Good/Low	20A	Room 119	ND
							20B	Room 119	

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Summary of Asbestos Sampling

Project Name: UK Kelley Hall	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/25/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
21	Window Glazing	Warehouse Skylights	NQ	NA	Misc.	Good/Low	21A	Warehouse Skylight	<1% CH Sample 21A ND Sample 21B
							21B	Warehouse Skylight	
22	Silver Caulk and Paper	Warehouse Skylights Roof Housing	300 LF	II	Misc.	Good/High	22A	Near Access Door	10% CH Caulk 85% CH Paper
							22B	Near Access Door	
23	Flat Roofing Tar (multiple layers)	Flat Roof of Warehouse – Second Layer Above Decking	17,500 SF	I	Misc.	Good/High	23A	Near Access Door	5% CH
							23B	Near Access Door	
24	Gray Caulk	Flat Roof at Wall Edges	NQ	NA	Misc.	Good/Low	24A	Original Building	ND
							24B	Parapet Wall	
25	Black Roof Selant	Along Parapet Walls on Flat Roof	200 LF	II	Misc.	Good/High	25A	Parapet wall	3% CH
							25B	Parapet wall	
26	Window Glazing (Original Building)	Exterior Windows	NQ	NA	Misc.	Good/Low	26A	Southwest Corner	ND
							26B	Northwest Corner	
27	Silver Roof Flashing	Flat Roof Edge Seams	NQ	NA	Misc.	Good/Low	27A	Near Access Door	ND
							27B	Original Building	

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Summary of Asbestos Sampling

Project Name: UK Kelley Hall	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/25/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
28	HVAC Duct Wrap	Room 115	NQ	NA	Misc.	Good/Low	28A	Room 115	ND
							28B	Room 115	
29	12" x 12" White Tile with Clear Mastic	Room 116	NQ	NA	Misc.	Good/Low	29A	Room 116	ND
							29B	Room 116	
30	12" x 12" Gray Floor Tile with Yellow Mastic	Basement Room 002	NQ	NA	Misc.	Good/Low	30A	Room 002	ND
							30B	Room 002	
31	White Caulk	Exterior Doors and Windows of Addition	NQ	NA	Misc.	Good/Low	31A	South Side	ND
							31B	East Side	
32	White Caulk	Exterior Windows and of Original Building	NQ	NA	Misc.	Good/Low	32A	West Side	ND
							32B	North Side	
33	Pipe Wrap (6" Pipe)	Rooms 112 and 100B Above Drop Ceiling	60 LF	F	TSI	Good/High	33A	Room 112 Closet	60% CH
							33B	Room 112	
34	Mudded Elbows	Rooms 112 and 100B Above Drop Ceiling	3 Units	F	TSI	Good/High	34A	Assumed – No Access	Assumed
							34B	Assumed – No Access	
35	Roofing Felt and Shingles	Pitched Roof	NQ	NA	Misc.	Good/Low	35A	Pitched Roof	ND
							35B	Pitched Roof	

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LF = Linear feet

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NA = Not Applicable

¹Category:

F=Friable

I=Category I, Non-Friable

II=Category II, Non-Friable

²Type;

Misc. = Miscellaneous

Sur = Surfacing

TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

Appendix V – Asbestos Analytical Laboratory Report



The Identification Specialists

Analysis Report
prepared for
S&ME, Inc.

Report Date: 9/5/2023

Project Name: UK-Kelley Hall

Project #: 23830110

SanAir ID#: 23047441



NVLAP LAB CODE 200870-0

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number

23047441

FINAL REPORT

9/5/2023 6:05:43 PM

Name: S&ME, Inc.

Address: 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226

Project Number: 23830110

P.O. Number: 23830110

Project Name: UK-Kelley Hall

Collected Date: 8/25/2023

Received Date: 8/28/2023 2:00:00 PM

Dear Jamie Bailey,

We at SanAir would like to thank you for the work you recently submitted. The 71 sample(s) were received on Monday, August 28, 2023 via Drop Box. The final report(s) is enclosed for the following sample(s): 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 4C, 4D, 4E, 4F, 4G, 5A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15A, 15B, 16A, 16B, 17A, 17B, 19A, 19B, 20A, 20B, 21A, 21B, 22A, 22B, 23A, 23B, 24A, 24B, 25A, 25B, 26A, 26B, 27A, 27B, 28A, 28B, 29A, 29B, 30A, 30B, 31A, 31B, 32A, 32B, 33A, 33B, 35A, 35B.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink that reads "Sandra Sobrino".

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:

- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:

- 71 samples in Good condition.



SanAir ID Number

23047441

FINAL REPORT

9/5/2023 6:05:43 PM

Name: S&ME, Inc.

Address: 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226

Project Number: 23830110

P.O. Number: 23830110

Project Name: UK-Kelley Hall

Collected Date: 8/25/2023

Received Date: 8/28/2023 2:00:00 PM

Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
1A / 23047441-001 Carpet Glue	Various Non-Fibrous Homogeneous		100% Other	None Detected
1B / 23047441-002 Carpet Glue	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
2A / 23047441-003 Cove Base w/ Adhesive, Cove Base	Black Non-Fibrous Homogeneous		100% Other	None Detected
2A / 23047441-003 Cove Base w/ Adhesive, Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
2A / 23047441-003 Cove Base w/ Adhesive, Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected
2B / 23047441-004 Cove Base w/ Adhesive, Cove Base	Black Non-Fibrous Homogeneous		100% Other	None Detected
2B / 23047441-004 Cove Base w/ Adhesive, Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
2B / 23047441-004 Cove Base w/ Adhesive, Mastic	Black Non-Fibrous Homogeneous		100% Other	None Detected
3A / 23047441-005 Ceiling Tile	White Fibrous Homogeneous	45% Cellulose 35% Glass	20% Other	None Detected
3B / 23047441-006 Ceiling Tile	White Fibrous Homogeneous	45% Cellulose 35% Glass	20% Other	None Detected

Analyst:

Approved Signatory:

Analysis Date: 9/5/2023

Date: 9/5/2023



SanAir ID Number
23047441
FINAL REPORT
9/5/2023 6:05:43 PM

Name: S&ME, Inc.
Address: 6190 Enterprise Court
Dublin, OH 43016
Phone: 6147932226

Project Number: 23830110
P.O. Number: 23830110
Project Name: UK-Kelley Hall
Collected Date: 8/25/2023
Received Date: 8/28/2023 2:00:00 PM

Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
4A / 23047441-007 Plaster, Plaster	Grey Fibrous Homogeneous		100% Other	None Detected
4A / 23047441-007 Plaster, Skim Coat			< 1% Other	None Detected
4B / 23047441-008 Plaster	Grey Non-Fibrous Homogeneous	< 1% Hair	100% Other	None Detected
4C / 23047441-009 Plaster, Plaster	Grey Non-Fibrous Homogeneous	< 1% Hair	100% Other	None Detected
4C / 23047441-009 Plaster, Skim Coat	White Non-Fibrous Homogeneous		100% Other	None Detected
4D / 23047441-010 Plaster, Plaster	Grey Non-Fibrous Homogeneous	< 1% Hair	100% Other	None Detected
4D / 23047441-010 Plaster, Skim Coat	White Non-Fibrous Homogeneous		100% Other	None Detected
4E / 23047441-011 Plaster, Plaster	Grey Non-Fibrous Homogeneous	< 1% Hair	100% Other	None Detected
4E / 23047441-011 Plaster, Skim Coat	White Non-Fibrous Homogeneous		100% Other	None Detected
4F / 23047441-012 Plaster, Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected

Analyst:

Approved Signatory:

Analysis Date: 9/5/2023

Date: 9/5/2023



SanAir ID Number
23047441
FINAL REPORT
9/5/2023 6:05:43 PM

Name: S&ME, Inc.
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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
4F / 23047441-012 Plaster, Skim Coat	White Non-Fibrous Homogeneous		100% Other	None Detected
4G / 23047441-013 Plaster, Plaster	Grey Non-Fibrous Homogeneous		100% Other	None Detected
4G / 23047441-013 Plaster, Skim Coat	White Non-Fibrous Homogeneous		100% Other	None Detected
5A / 23047441-014 Duct Sealant	Grey Non-Fibrous Homogeneous		100% Other	None Detected
5B / 23047441-015 Duct Sealant	Grey Non-Fibrous Homogeneous		100% Other	None Detected
6A / 23047441-016 DW/ JC/ Tape, Drywall	White Non-Fibrous Homogeneous	12% Cellulose	88% Other	None Detected
6A / 23047441-016 DW/ JC/ Tape, Joint Compound	White Non-Fibrous Homogeneous		100% Other	None Detected
6A / 23047441-016 DW/ JC/ Tape, Tape	White Fibrous Homogeneous		100% Other	None Detected
6B / 23047441-017 DW/ JC/ Tape, Drywall	White Non-Fibrous Homogeneous	12% Cellulose	88% Other	None Detected
6B / 23047441-017 DW/ JC/ Tape, Joint Compound	White Non-Fibrous Homogeneous		100% Other	None Detected

Analyst:

Approved Signatory:

Analysis Date: 9/5/2023

Date: 9/5/2023



SanAir ID Number
23047441
FINAL REPORT
9/5/2023 6:05:43 PM

Name: S&ME, Inc.
Address: 6190 Enterprise Court
Dublin, OH 43016
Phone: 6147932226

Project Number: 23830110
P.O. Number: 23830110
Project Name: UK-Kelley Hall
Collected Date: 8/25/2023
Received Date: 8/28/2023 2:00:00 PM

Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
6B / 23047441-017 DW/ JC/ Tape, Tape	White Fibrous Homogeneous		100% Other	None Detected
7A / 23047441-018 Ceiling Tile	White Fibrous Homogeneous	45% Cellulose 35% Glass	20% Other	None Detected
7B / 23047441-019 Ceiling Tile	White Fibrous Homogeneous	45% Cellulose 35% Glass	20% Other	None Detected
8A / 23047441-020 Pipe Wrap	Brown Fibrous Homogeneous	55% Cellulose	45% Other	None Detected
8B / 23047441-021 Pipe Wrap	Grey Fibrous Homogeneous	65% Cellulose	35% Other	None Detected
9A / 23047441-022 Floor Tile w/ Mastic, Tile	White Non-Fibrous Homogeneous		98% Other	2% Chrysotile
9A / 23047441-022 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
9B / 23047441-023 Floor Tile w/ Mastic, Tile	White Non-Fibrous Homogeneous		98% Other	2% Chrysotile
9B / 23047441-023 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
10A / 23047441-024 Terrazzo	Gray Non-Fibrous Heterogeneous		100% Other	None Detected

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Date: 9/5/2023



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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
10B / 23047441-025 Terrazzo	Gray Non-Fibrous Heterogeneous		100% Other	None Detected
11A / 23047441-026 Floor Tile w/ Mastic, Floor Tile	Gray Non-Fibrous Homogeneous		98% Other	2% Chrysotile
11A / 23047441-026 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
11B / 23047441-027 Floor Tile w/ Mastic, Floor Tile	Gray Non-Fibrous Homogeneous		98% Other	2% Chrysotile
11B / 23047441-027 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
12A / 23047441-028 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
12A / 23047441-028 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
12B / 23047441-029 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
12B / 23047441-029 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
13A / 23047441-030 Cove Base w/ Adh., Cove Base	Gray Non-Fibrous Homogeneous		100% Other	None Detected

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Date: 9/5/2023



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Dublin, OH 43016

Phone: 6147932226**Project Number:** 23830110**P.O. Number:** 23830110**Project Name:** UK-Kelley Hall**Collected Date:** 8/25/2023**Received Date:** 8/28/2023 2:00:00 PM

Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
13A / 23047441-030 Cove Base w/ Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
13B / 23047441-031 Cove Base w/ Adh., Cove Base	Gray Non-Fibrous Homogeneous		100% Other	None Detected
13B / 23047441-031 Cove Base w/ Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
14A / 23047441-032 Floor Tile w/ Mastic, Floor Tile	Tan Non-Fibrous Homogeneous		100% Other	None Detected
14A / 23047441-032 Floor Tile w/ Mastic, Mastic	Brown Non-Fibrous Homogeneous		100% Other	None Detected
14A / 23047441-032 Floor Tile w/ Mastic, Leveler	Gray Non-Fibrous Homogeneous		100% Other	None Detected
14B / 23047441-033 Floor Tile w/ Mastic, Floor Tile	Tan Non-Fibrous Homogeneous		100% Other	None Detected
14B / 23047441-033 Floor Tile w/ Mastic, Mastic	Brown Non-Fibrous Homogeneous		100% Other	None Detected
14B / 23047441-033 Floor Tile w/ Mastic, Leveler	Gray Non-Fibrous Homogeneous		100% Other	None Detected
15A / 23047441-034 Floor Tile w/ Mastic, Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected

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Date: 9/5/2023



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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
15A / 23047441-034 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
15B / 23047441-035 Floor Tile w/ Mastic, Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected
15B / 23047441-035 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
16A / 23047441-036 Rubber Tile w/ Mastic, Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected
16A / 23047441-036 Rubber Tile w/ Mastic, Mastic	Brown Non-Fibrous Homogeneous		100% Other	None Detected
16B / 23047441-037 Rubber Tile w/ Mastic, Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected
16B / 23047441-037 Rubber Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
17A / 23047441-038 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
17B / 23047441-039 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
19A / 23047441-040 DW/ JC/ Tape, Drywall	White Non-Fibrous Homogeneous		100% Other	None Detected

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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
19A / 23047441-040 DW/ JC/ Tape, Joint Compound	White Non-Fibrous Homogeneous		100% Other	None Detected
19A / 23047441-040 DW/ JC/ Tape, Tape	Brown Fibrous Homogeneous	99% Cellulose	1% Other	None Detected
19B / 23047441-041 DW/ JC/ Tape, Drywall	White Non-Fibrous Homogeneous		100% Other	None Detected
19B / 23047441-041 DW/ JC/ Tape, Joint Compound	White Non-Fibrous Homogeneous		100% Other	None Detected
19B / 23047441-041 DW/ JC/ Tape, Tape	Brown Fibrous Homogeneous	99% Cellulose	1% Other	None Detected
20A / 23047441-042 Vinyl Plank Flooring w/ Adhesive, Flooring	Brown Non-Fibrous Heterogeneous		100% Other	None Detected
20A / 23047441-042 Vinyl Plank Flooring w/ Adhesive, Adhesive	Tan Non-Fibrous Homogeneous		100% Other	None Detected
20A / 23047441-042 Vinyl Plank Flooring w/ Adhesive, Leveler	Gray Non-Fibrous Homogeneous		100% Other	None Detected
20B / 23047441-043 Vinyl Plank Flooring w/ Adhesive, Flooring	Brown Non-Fibrous Heterogeneous		100% Other	None Detected
20B / 23047441-043 Vinyl Plank Flooring w/ Adhesive, Adhesive	Tan Non-Fibrous Homogeneous		100% Other	None Detected

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Project Number: 23830110
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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
20B / 23047441-043 Vinyl Plank Flooring w/ Adhesive, Leveler	Gray Non-Fibrous Homogeneous		100% Other	None Detected
21A / 23047441-044 Window Glazing	White Non-Fibrous Homogeneous		100% Other	< 1% Chrysotile
21B / 23047441-045 Window Glazing	White Non-Fibrous Homogeneous		100% Other	None Detected
22A / 23047441-046 Caulk	Silver Non-Fibrous Heterogeneous		90% Other	10% Chrysotile
22B / 23047441-047 Caulk, Caulk	Silver Non-Fibrous Heterogeneous		90% Other	10% Chrysotile
22B / 23047441-047 Caulk, Paper	White Fibrous Homogeneous		15% Other	85% Chrysotile
23A / 23047441-048 Flat Roof Layers, Shingle	Black Non-Fibrous Heterogeneous	10% Glass	90% Other	None Detected
23A / 23047441-048 Flat Roof Layers, Tar	Black Non-Fibrous Homogeneous		100% Other	None Detected
23A / 23047441-048 Flat Roof Layers, Tar Paper	Black Fibrous Homogeneous	50% Glass	50% Other	None Detected
23A / 23047441-048 Flat Roof Layers, Tar	Black Non-Fibrous Homogeneous		95% Other	5% Chrysotile

Analyst:

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9/5/2023 6:05:43 PM

Name: S&ME, Inc.

Address: 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226

Project Number: 23830110

P.O. Number: 23830110

Project Name: UK-Kelley Hall

Collected Date: 8/25/2023

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Analyst: Hogrefe, Sarah | Drakes, Renaldo | Sanchez, Meivis

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
23A / 23047441-048 Flat Roof Layers, Insulation	Brown Fibrous Homogeneous	80% Cellulose	20% Other	None Detected
23B / 23047441-049 Flat Roof Layers, Shingle	Black Non-Fibrous Heterogeneous	10% Glass	90% Other	None Detected
23B / 23047441-049 Flat Roof Layers, Tar	Black Non-Fibrous Homogeneous		100% Other	None Detected
23B / 23047441-049 Flat Roof Layers, Tar Paper	Black Fibrous Homogeneous	50% Glass	50% Other	None Detected
23B / 23047441-049 Flat Roof Layers, Tar	Black Non-Fibrous Homogeneous		95% Other	5% Chrysotile
23B / 23047441-049 Flat Roof Layers, Insulation	Brown Fibrous Homogeneous	80% Cellulose	20% Other	None Detected
24A / 23047441-050 Caulk	Gray Non-Fibrous Homogeneous		100% Other	None Detected
24B / 23047441-051 Caulk	Gray Non-Fibrous Homogeneous		100% Other	None Detected
25A / 23047441-052 Roof Sealant	Black Non-Fibrous Heterogeneous		97% Other	3% Chrysotile
25B / 23047441-053 Roof Sealant	Black Non-Fibrous Heterogeneous		97% Other	3% Chrysotile

Analyst:

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
26A / 23047441-054 Window Glazing	White Non-Fibrous Homogeneous		100% Other	None Detected
26B / 23047441-055 Window Glazing	White Non-Fibrous Homogeneous		100% Other	None Detected
27A / 23047441-056 Roof Flashing	Silver Non-Fibrous Heterogeneous	5% Glass	95% Other	None Detected
27B / 23047441-057 Roof Flashing	Silver Non-Fibrous Heterogeneous	5% Glass	95% Other	None Detected
28A / 23047441-058 HVAC Duct Wrap, Wrap	White Non-Fibrous Heterogeneous	50% Cellulose	50% Other	None Detected
28A / 23047441-058 HVAC Duct Wrap, Insulation	Brown Fibrous Homogeneous	99% Glass	1% Other	None Detected
28B / 23047441-059 HVAC Duct Wrap, Wrap	White Non-Fibrous Heterogeneous	50% Cellulose	50% Other	None Detected
28B / 23047441-059 HVAC Duct Wrap, Insulation	Brown Fibrous Homogeneous	99% Glass	1% Other	None Detected
29A / 23047441-060 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
29A / 23047441-060 Floor Tile w/ Mastic, Mastic	Clear Non-Fibrous Homogeneous		100% Other	None Detected

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
29B / 23047441-061 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
29B / 23047441-061 Floor Tile w/ Mastic, Mastic	Clear Non-Fibrous Homogeneous		100% Other	None Detected
30A / 23047441-062 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
30A / 23047441-062 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
30A / 23047441-062 Floor Tile w/ Mastic, Level Compounding	Grey Non-Fibrous Homogeneous		100% Other	None Detected
30B / 23047441-063 Floor Tile w/ Mastic, Floor Tile	White Non-Fibrous Homogeneous		100% Other	None Detected
30B / 23047441-063 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
30B / 23047441-063 Floor Tile w/ Mastic, Level Compounding	Grey Non-Fibrous Homogeneous		100% Other	None Detected
31A / 23047441-064 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
31B / 23047441-065 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected

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Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
32A / 23047441-066 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
32B / 23047441-067 Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
33A / 23047441-068 Pipe Insulation	Grey Fibrous Homogeneous	30% Cellulose	10% Other	60% Chrysotile
33B / 23047441-069 Pipe Insulation	Grey Fibrous Homogeneous	30% Cellulose	10% Other	60% Chrysotile
35A / 23047441-070 Roof Shingles + Felt, Shingle	Various Non-Fibrous Homogeneous	5% Glass	95% Other	None Detected
35A / 23047441-070 Roof Shingles + Felt, Felt	Black Fibrous Homogeneous	90% Synthetic	10% Other	None Detected
35B / 23047441-071 Roof Shingles + Felt, Shingle	Various Non-Fibrous Homogeneous	5% Glass	95% Other	None Detected
35B / 23047441-071 Roof Shingles + Felt, Felt	Black Fibrous Homogeneous	90% Synthetic	10% Other	None Detected

Analyst:

Approved Signatory:

Analysis Date: 9/5/2023

Date: 9/5/2023

Disclaimer

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NYELAP Disclaimer:

Polarized- light microscopy is not consistently reliable in detecting asbestos in floor covering and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.

Asbestos Accreditations

National Voluntary Laboratory Accreditation Program (NVLAP) Lab Code 200870-0
City of Philadelphia Department of Public Health Air Management Services, Certification#ALL-460
Commonwealth of Pennsylvania Department of Environmental Protection Number 68-05397
California State Environmental Laboratory Accreditation Program Certificate Number 2915
Colorado Department of Public Health and Environment Registration Number AL-23143
Connecticut Department of Public Health Environmental Laboratory Registration Number PH-0105
Massachusetts Department of Labor Standards Asbestos Analytical Services License Number: AA000222
State of Maine Department of Environmental Protection License Number: LB-0075, LA-0084
New York State Department of Health Laboratory ID: 11983
State of Rhode Island Department of Health Certification No.: PCM00126, PLM00126, TEM00126
Texas Department of State Health Services License Number: 300440
Commonwealth of Virginia Department of Professional and Occupational Regulation Number: 3333000323
State of Washington Department of Ecology Laboratory ID: C989
State of West Virginia Bureau for Public Health Analytical Laboratory Number: LT000616
Vermont Department of Health License Number: Asb-Co-An-000006
Louisiana Department of Environmental Quality AI Number 212253, Certificate #05088



1551 Oakbridge Dr. STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos
Chain of Custody
Form 140, Rev 2, 5/18/18

SanAir ID Number

23047441

Company: S+ME		Project #: 23830110		Collect by: Vince Epps	
Address: 822 E. Crescentville Rd.		Project Name: UK - Kelley Hall		Phone #: 513-591-8325	
City, St., Zip: Cinci, OH 45246		Date Collected: 8/25/2023		Fax #: ---	
State of Collection: KY Account#:		P.O. Number: 23830110		Email: vepps@smc-inc.com	

Bulk		Air		Soil	
ABB	PLM EPA 600/R-93/116 <input checked="" type="checkbox"/>	ABA	PCM NIOSH 7400	ABSE	PLM EPA 600/R-93/116 (Qual.)
	Positive Stop <input type="checkbox"/>	ABA-2	OSHA w/ TWA*	Vermiculite & Soil	
ABEPA	PLM EPA 400 Point Count	ABTEM	TEM AHERA	ABSP	PLM CARB 435 (LOD <1%)
ABBIK	PLM EPA 1000 Point Count	ABATN	TEM NIOSH 7402	ABSP1	PLM CARB 435 (LOD 0.25%)
ABBEN	PLM EPA NOB**	ABT2	TEM Level II	ABSP2	PLM CARB 435 (LOD 0.1%)
ABBCH	TEM Chatfield**	Other:		Dust	
ABBTM	TEM EPA NOB**	New York ELAP		ABWA	TEM Wipe ASTM D-6480
ABQ	PLM Qualitative	ABEPA2	NY ELAP 198.1	ABDMV	TEM Microvac ASTM D-5755
		ABENY	NY ELAP 198.6 PLM NOB	Matrix <input type="checkbox"/> Other <input type="checkbox"/>	
		ABBNY	NY ELAP 198.4 TEM NOB		
Water					
ABHE	EPA 100.2				

** Available on 24-hr. to 5-day TAT

Turn Around Times	3 HR (4 HR TEM) <input type="checkbox"/>	6 HR (8HR TEM) <input type="checkbox"/>	12 HR <input type="checkbox"/>	24 HR <input type="checkbox"/>
	2 Days <input type="checkbox"/>	3 Days <input type="checkbox"/>	4 Days <input type="checkbox"/>	<input checked="" type="checkbox"/> 5 Days

Special Instructions	
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Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start - Stop Time*
1 A-B	Yellow caulk glaze	---	8/25/23	---	---
2 A-B	Core base w/ black adh.	---	↓	---	---
3 A-B	Ceiling tile	---	↓	---	---
4 A-G	Plaster	---	↓	---	---
5 A-B	Duct sealant	---	↓	---	---
6 A-B	Dw/JC/Tape	---	↓	---	---
7 A-B	Ceiling tile	---	↓	---	---
8 A-B	Pipe wrap	---	↓	---	---
9 A-B	Floor tile w/ yellow mastic	---	↓	---	---
10 A-B	Terrazzo	---	↓	---	---
11 A-B	Floor tile w/ yellow mastic	---	↓	---	---
12 A-B	Floor tile w/ yellow mastic	---	↓	---	---

Relinquished by	Date	Time	Received by	Date	Time
<i>[Signature]</i>	8/28/23	1:30	RMB	AUG 28 2023	2:00pm
RMB	AUG 29 2023	1:10pm	EA	8/30/23	10:35am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of \$150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Appendix VI – PCB Analytical Laboratory Report



September 06, 2023

Vince Epps
S&ME, Inc.
862 East Crescentville Rd
Cincinnati, OH 45246

RE: Project: 23830109 MI King Library KH
Pace Project No.: 50352688

Dear Vince Epps:

Enclosed are the analytical results for sample(s) received by the laboratory on August 29, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Indianapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Regina K. Bedel".

Regina Bedel
regina.bedel@pacelabs.com
(317)228-3100
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268

Illinois Accreditation #: 200074

Indiana Drinking Water Laboratory #: C-49-06

Kansas/TNI Certification #: E-10177

Kentucky UST Agency Interest #: 80226

Kentucky WW Laboratory ID #: 98019

Michigan Drinking Water Laboratory #9050

Ohio VAP Certified Laboratory #: CL0065

Oklahoma Laboratory #: 9204

Texas Certification #: T104704355

Wisconsin Laboratory #: 999788130

USDA Foreign Soil Permit #: 525-23-13-23119

USDA Compliance Agreement #: IN-SL-22-001

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SAMPLE SUMMARY

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50352688001	KH-22	Solid	08/25/23 11:30	08/29/23 09:30
50352688002	KH-24	Solid	08/25/23 11:35	08/29/23 09:30
50352688003	KH-31	Solid	08/25/23 11:45	08/29/23 09:30
50352688004	KH-32	Solid	08/25/23 11:50	08/29/23 09:30
50352688005	KH-17	Solid	08/25/23 12:30	08/29/23 09:30

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SAMPLE ANALYTE COUNT

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50352688001	KH-22	EPA 8082	AM	8	PASI-I
50352688002	KH-24	EPA 8082	AM	8	PASI-I
50352688003	KH-31	EPA 8082	AM	8	PASI-I
50352688004	KH-32	EPA 8082	AM	8	PASI-I
50352688005	KH-17	EPA 8082	AM	8	PASI-I

PASI-I = Pace Analytical Services - Indianapolis

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**SUMMARY OF DETECTION**

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Lab Sample ID Method	Client Sample ID Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50352688001	KH-22					
EPA 8082	PCB-1260 (Aroclor 1260)	8.2	mg/kg	2.7	09/06/23 10:15	
50352688005	KH-17					
EPA 8082	PCB-1254 (Aroclor 1254)	4.2	mg/kg	1.1	09/01/23 04:08	

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ANALYTICAL RESULTS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Sample: KH-22 Lab ID: 50352688001 Collected: 08/25/23 11:30 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids		Analytical Method: EPA 8082 Preparation Method: EPA 3546 Pace Analytical Services - Indianapolis						
PCB-1016 (Aroclor 1016)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	11097-69-1	
PCB-1260 (Aroclor 1260)	8.2	mg/kg	2.7	2	08/30/23 16:34	09/06/23 10:15	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	97	%.	10-133	2	08/30/23 16:34	09/06/23 10:15	877-09-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Sample: KH-24 Lab ID: 50352688002 Collected: 08/25/23 11:35 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids		Analytical Method: EPA 8082 Preparation Method: EPA 3546 Pace Analytical Services - Indianapolis						
PCB-1016 (Aroclor 1016)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	0.94	1	08/30/23 16:34	09/06/23 10:19	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	51	%.	10-133	1	08/30/23 16:34	09/06/23 10:19	877-09-8	

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ANALYTICAL RESULTS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Sample: KH-31 Lab ID: 50352688003 Collected: 08/25/23 11:45 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids		Analytical Method: EPA 8082 Preparation Method: EPA 3546 Pace Analytical Services - Indianapolis						
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.2	1	08/30/23 16:34	09/06/23 10:24	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	50	%.	10-133	1	08/30/23 16:34	09/06/23 10:24	877-09-8	

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ANALYTICAL RESULTS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Sample: KH-32 **Lab ID:** 50352688004 Collected: 08/25/23 11:50 Received: 08/29/23 09:30 Matrix: Solid**Results reported on a "wet-weight" basis**

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids								
Analytical Method: EPA 8082 Preparation Method: EPA 3546								
Pace Analytical Services - Indianapolis								
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 03:53	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	94	%.	10-133	1	08/30/23 16:34	09/01/23 03:53	877-09-8	

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ANALYTICAL RESULTS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Sample: KH-17 Lab ID: 50352688005 Collected: 08/25/23 12:30 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids								
Analytical Method: EPA 8082 Preparation Method: EPA 3546								
Pace Analytical Services - Indianapolis								
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	12672-29-6	
PCB-1254 (Aroclor 1254)	4.2	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.1	1	08/30/23 16:34	09/01/23 04:08	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	53	%.	10-133	1	08/30/23 16:34	09/01/23 04:08	877-09-8	

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QUALITY CONTROL DATA

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

QC Batch: 750693

Analysis Method: EPA 8082

QC Batch Method: EPA 3546

Analysis Description: 8082 PCB Solids

Laboratory: Pace Analytical Services - Indianapolis

Associated Lab Samples: 50352688001, 50352688002, 50352688003, 50352688004, 50352688005

METHOD BLANK: 3440409

Matrix: Solid

Associated Lab Samples: 50352688001, 50352688002, 50352688003, 50352688004, 50352688005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1221 (Aroclor 1221)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1232 (Aroclor 1232)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1242 (Aroclor 1242)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1248 (Aroclor 1248)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1254 (Aroclor 1254)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1260 (Aroclor 1260)	mg/kg	ND	0.10	08/31/23 11:43	
Tetrachloro-m-xylene (S)	%	89	10-133	08/31/23 11:43	

LABORATORY CONTROL SAMPLE: 3440410

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	mg/kg	0.33	0.35	104	50-120	
PCB-1260 (Aroclor 1260)	mg/kg	0.33	0.33	99	40-122	
Tetrachloro-m-xylene (S)	%			96	10-133	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3440411 3440412

Parameter	Units	50351723012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	mg/kg	ND	1.1	0.97	1.0	1.0	95	105	10-154	1	20	
PCB-1260 (Aroclor 1260)	mg/kg	ND	1.1	0.97	0.99	0.96	92	99	10-165	4	20	
Tetrachloro-m-xylene (S)	%						92	95	10-133			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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METHOD CROSS REFERENCE TABLE

Project: 23830109 MI King Library KH

Pace Project No.: 50352688

Parameter	Matrix	Analytical Method	Preparation Method
8082 PCB Solids	Solid	SW-846 8082A	SW-846 3546

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

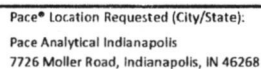
Project: 23830109 MI King Library KH

Pace Project No.: 50352688


Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50352688001	KH-22	EPA 3546	750693	EPA 8082	750828
50352688002	KH-24	EPA 3546	750693	EPA 8082	750828
50352688003	KH-31	EPA 3546	750693	EPA 8082	750828
50352688004	KH-32	EPA 3546	750693	EPA 8082	750828
50352688005	KH-17	EPA 3546	750693	EPA 8082	750828

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Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields



50352688

ENV-FRM-CORQ-0019 v01 082123 ©



SAMPLE CONDITION UPON RECEIPT FORM

Date/Time and Initials of person examining contents: 8/29/23 1046 CRR

1. Courier: ☒ FED EX ☐ UPS ☐ CLIENT ☐ PACE ☐ NOW/JETT ☐ OTHER _____

2. Custody Seal on Cooler/Box Present: ☒ Yes ☐ No

(If yes) Seals Intact: ☒ Yes ☐ No (leave blank if no seals were present)

3. Thermometer: 1 2 3 4 5 6 7 8 A B C D E F G H

4. Cooler Temperature(s): 22.2/20.2

(Initial/Corrected) RECORD TEMPS OF ALL COOLERS RECEIVED (use Comments below to add more)

5. Packing Material: ☐ Bubble Wrap ☒ Bubble Bags
☐ None ☐ Other _____

6. Ice Type: ☐ Wet ☐ Blue ☒ None

7. If temp. is over 6°C or under 0°C, was the PM notified?: ☒ Yes ☐ No

Cooler temp should be above freezing to 6°C

All discrepancies will be written out in the comments section below.

	Yes	No		Yes	No	N/A
USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		<input checked="" type="checkbox"/>	All containers needing acid/base preservation have been pH CHECKED?: Exceptions: VOA, coliform, LLHg, O&G, RAD CHEM, and any container with a septum cap or preserved with HCl.			
Short Hold Time Analysis (48 hours or less)? Analysis:		<input checked="" type="checkbox"/>	Circle: HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form			
Time 5035A TC placed in Freezer or Short Holds To Lab	Time:		Residual Chlorine Check (SVOC 625 Pest/PCB 608)	<u>Present</u>	<u>Absent</u>	<u>N/A</u>
Rush TAT Requested (4 days or less):		<input checked="" type="checkbox"/>	Residual Chlorine Check (Total/Amenable/Free Cyanide)			
Custody Signatures Present?	<input checked="" type="checkbox"/>		Headspace Wisconsin Sulfide?			
Containers Intact?:	<input checked="" type="checkbox"/>		Headspace in VOA Vials (>6mm): See Container Count form for details	<u>Present</u>	<u>Absent</u>	<u>No VOA Vials Sent</u>
Sample Label (IDs/Dates/Times) Match COC?: Except TCs, which only require sample ID	<input checked="" type="checkbox"/>		Trip Blank Present?		<input checked="" type="checkbox"/>	
Extra labels on Terracore Vials? (soils only)			Trip Blank Custody Seals?:			

COMMENTS:

** Place a RED dot on containers that are out of conformance **

COC Line Item	WGFL	WGKU	BG1U	MeOH (only)	DG9H	VG9H	VOA VIAL HS >6mm	VG9U	DG9U	VG9T	AMBER GLASS							PLASTIC								OTHER			Matrix	Nitric	Sulfuric	Sodium Hydroxide	Sodium Hydroxide/ ZnAc					
				SBS							R	AG0U	AG1H	AG1U	AG3U	AG3S	AG3SF	AG3B	BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	CG3H		CG3F	Syringe Kit	Red	Yellow	Green	Black			
				DI																																		
1	1																																	SL	HNO3 <2	H2SO4 <2	NaOH >10	NaOH/Zn Ac >9
2	1																																	SL				
3	1																																	SL				
4	1																																	SL				
5	1																																	SL				
6																																						
7																																						
8																																						
9																																						
10																																						
11																																						
12																																						

Container Codes

Glass			
DG9H	40mL HCl amber voa vial	BG1T	glass
DG9P	40mL TSP amber vial	BG1U	1L unpreserved glass
DG9S	40mL H2SO4 amber vial	CG3U	250mL Unpres Clear Glass
DG9T	40mL Na Thio amber vial	AG0U	100mL unpres amber glass
DG9U	40mL unpreserved amber vial	AG1H	1L HCl amber glass
VG9H	40mL HCl clear vial	AG1S	1L H2SO4 amber glass
VG9T	40mL Na Thio. clear vial	AG1T	1L Na Thiosulfate amber glass
VG9U	40mL unpreserved clear vial	AG1U	1liter unpres amber glass
I	40mL w/hexane wipe vial	AG2N	500mL HNO3 amber glass
WGKU	8oz unpreserved clear jar	AG2S	500mL H2SO4 amber glass
WGFL	4oz clear soil jar	AG2U	500mL unpres amber glass
JGFL	4oz unpreserved amber wide	AG3S	250mL H2SO4 amber glass
CG3H	250mL clear glass HCl	AG3SF	250mL H2SO4 amb glass -field filtered
CG3F	250mL clear glass HCl, Field Filter	AG3U	250mL unpres amber glass
BG1H	1L HCl clear glass	AG3B	250mL NaOH amber glass
BG1S	1L H2SO4 clear glass		

Plastic			
BP1B	1L NaOH plastic	BP4U	125mL unpreserved plastic
BP1N	1L HNO3 plastic	BP4N	125mL HNO3 plastic
BP1S	1L H2SO4 plastic	BP4S	125mL H2SO4 plastic
BP1U	1L unpreserved plastic	Miscellaneous	
BP1Z	1L NaOH, Zn, Ac		
BP2N	500mL HNO3 plastic	Syringe Kit	LL Cr+6 sampling kit
BP2C	500mL NaOH plastic	ZPLC	Ziploc Bag
BP2S	500mL H2SO4 plastic	R	Terracore Kit
BP2U	500mL unpreserved plastic	SP5T	120mL Coliform Sodium Thiosulfate
BP2Z	500mL NaOH, Zn Ac	GN	General Container
BP3B	250mL NaOH plastic	U	Summa Can (air sample)
BP3N	250mL HNO3 plastic	WT	Water
BP3F	250mL HNO3 plastic-field filtered	SL	Solid
BP3U	250mL unpreserved plastic	OL	Oil
BP3S	250mL H2SO4 plastic	NAL	Non-aqueous liquid
BP3Z	250mL NaOH, ZnAc plastic	WP	Wipe
BP3R	250mL Unpres FF SO4/OH buffer		



October 16, 2023

University of Kentucky
Environmental Quality Management
355 Cooper Drive, Suite
Lexington, Kentucky 40508

Attention: Mr. Bob Kjelland, P.G., CHMM

Reference: **Report of Limited Hazardous Materials Assessment**
University of Kentucky – Medical Annex #5
Lexington, Kentucky
S&ME Project No. 23830110

Dear Mr. Bob Kjelland:

S&ME, Inc. (S&ME) is pleased to provide this report detailing the results of our limited hazardous materials survey services at the referenced site. The purpose was to perform a limited assessment for the presence of polychlorinated biphenyls (PCBs) in caulk, asbestos in caulk, and universal wastes prior to the demolition of the Medical Annex on the University of Kentucky campus in Lexington, Kentucky. Our services were performed in general accordance with S&ME *Proposal No. 23-83-0110* dated June 21, 2023, and authorized under the Per Diem Agreement for Civil-Structural-Geotechnical Engineering Services Contract No. A231030 dated July 1, 2022, between the University of Kentucky and S&ME. The following report includes the project background, sampling and analysis procedures, findings, results, and conclusions.

This report is provided for the sole use of Mr. Bob Kjelland and the University of Kentucky. Use of this report by any other parties will be at such party's sole risk and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the assessment and of the specific areas referenced.

S&ME appreciates this opportunity to provide our services to you. Please contact us if you have questions concerning this report or any of our services.

Sincerely,
S&ME, Inc.

A blue ink signature of Vincent J. Epps, written in a cursive style.

Vincent J. Epps, RG
Operations Manager

A blue ink signature of Thomas M. Reed, written in a cursive style.

Thomas M. Reed, PG
Project Manager

Senior Reviewed by: R. Bruce



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Executive Summary

S&ME, Inc. (S&ME) conducted a limited hazardous materials assessment for Medical Annex #5 on the University of Kentucky campus in Lexington, Kentucky. The limited hazardous materials assessments included a supplemental survey of asbestos-containing materials (ACM), regulated materials and universal waste inventories, and polychlorinated biphenyl-containing caulk (PCB) assessment. The purpose of the assessment was to identify hazardous materials that may require removal prior to implementation of proposed demolition activities at Medical Annex #5. A summary of the results of the limited hazardous materials assessment is provided below.

Asbestos-containing Materials

Asbestos was detected greater than one percent in samples of the following materials:

- ◆ Pipe wrap on piping above the ceiling in Room 105;
- ◆ Mudded elbows on piping system above the ceiling in Room 105;
- ◆ Brown and tan floor tile with black mastic in Room 103;
- ◆ Transite panels in Room 300B (attic);
- ◆ Yellow flooring in Room 205;
- ◆ Roofing tar on flat roof (1st layer above roof deck);
- ◆ Plaster throughout the building; and
- ◆ Window putty on the exterior windows of the original part of the building.

Other Regulated Materials and Universal Wastes

- ◆ Polychlorinated biphenyls (PCBs): Approximately 105 fluorescent light ballasts (FLBs) were observed in this building.
- ◆ Chlorofluorocarbons (CFCs): Approximately 14 items that potentially contain CFCs were observed in the building.
- ◆ Universal Wastes: Various quantities of battery-containing equipment, air conditioning units, fluorescent bulbs, and miscellaneous cleaning/household style chemicals were present in the building. Tritium-containing exit signs or pesticides were not observed.

Polychlorinated Biphenyls (PCB)-Containing Caulk

- ◆ The PCB-caulk samples submitted for chemical analysis did not reveal the presence of PCBs above the Toxic Substances Control Act (TSCA) action level of 50 milligrams per kilogram (mg/kg).



1.0 Introduction

The University of Kentucky (UK) retained S&ME, Inc. (S&ME) to conduct a limited hazardous materials assessment of suspect asbestos-containing materials (ACMs), polychlorinated biphenyl (PCB) containing materials, and universal wastes on the UK campus in Lexington, Kentucky. Mr. Vincent Epps of S&ME performed the assessment on August 24, 2023 in general accordance with S&ME Proposal No. 23830110 dated June 21, 2023.

2.0 Purpose and Site Description

2.1 Purpose

The purpose of the assessment was to identify the presence of PCBs, ACMs in building materials, and universal wastes prior to the demolition of the building. The assessment included the interior and exterior portions of the structure. An assessment strategy believed by S&ME to be appropriate for this purpose was presented in our proposal and is described in this report. The report should be interpreted only with regard to the specific location and materials referenced.

2.2 Site Description

The Medical Annex #5 is located at 1096 Veterans Drive and is an approximately 4,000 square-foot classroom and learning center. This building is two stories with a basement and attic. According to the provided information, the building is scheduled for demolition. It is understood that this project is to include the assessment of potential ACMs, PCB-containing caulk, and regulated and universal waste. A site location map is included as **Figure 1** in **Appendix I**.

3.0 Supplemental Asbestos-containing Materials Sampling

3.1 Scope of Services

Demolition and renovation in public and commercial buildings is regulated by the Occupational Safety and Health Administration (OSHA), the United States Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP). The EPA and KDEP require asbestos assessments, conducted by licensed and accredited individuals, prior to implementation of renovation and demolition projects. Code 40 of Federal Regulations Part 61, Subpart M, Final Rule, National Emissions Standards for Hazardous Air Pollutants (NESHAP) and KDEP require asbestos assessments, followed by the proper removal, and disposal of ACM that is affected by demolition. Identification of ACM is also required by the OSHA 1926.1101. The identification of ACMs will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. The EPA, OSHA and KDEP define ACM as materials containing greater than one percent asbestos in a representative sample. However, OSHA also regulates materials containing less than or equal to one percent asbestos.

S&ME performed a visual assessment of the referenced building to determine the homogenous areas (HAs) of suspect ACMs. Based on EPA definitions used in the Asbestos Hazard Emergency Response Act (AHERA), 40 CFR



763, an HA of asbestos-suspect building material has the same color and texture and is thought to be installed within the same timeframe. S&ME assessed the interior and exterior of the building (except for the roof) for suspect ACMs, including thermal system insulation (TSI), surfacing, and miscellaneous materials. S&ME collected representative samples of suspect ACMs from each HA in accordance with the US EPA AHERA protocol and applicable state regulations.

This building was previously inspected by UK personnel. At the request of UK, the previously collected sample data is included in this report and summarized on the ACM Summary Table in **Appendix IV**.

S&ME provided KDEP-licensed, and an EPA-accredited, Asbestos Inspector to conduct the asbestos survey and sample collection of the referenced building. On August 24th 2023, Mr. Vincent Epps conducted the supplemental asbestos survey in the building. A copy of Mr. Epps' asbestos inspector credentials area included in **Appendix II**. Bulk materials collected included, but were not limited to plaster, ceiling tile, drywall and joint compound, floor tile, cove base, pipe/joint insulation, caulk, window glazing, and various mastics and adhesives. During the survey, representative photographs of the interior and exterior finishes of the building were collected. A selection of these photographs with descriptions is included in **Appendix III**.

3.2 Methods

The asbestos survey was performed to comply with the NESHAP regulations (40 CFR 61 (M)) issued by the US EPA as they pertain to requirements for an asbestos inspection prior to demolition projects. KDEP regulations are equivalent to the NESHAP regulations regarding pre-demolition asbestos inspection requirements.

Information regarding the bulk samples of each HA was collected, recorded on a chain-of-custody record, and submitted to the SanAir Technologies in Cincinnati, Ohio for analysis by Polarized Light Microscopy (PLM), coupled with dispersion staining in general accordance with the EPA 600/R-93/116 Method. SanAir Technologies is an accredited laboratory by the National Voluntary Laboratory Accreditation (NVLAP), which is administered by the National Institute of Standards and Technology (NIST). The laboratory analysis reports the specific type of asbestos mineral identified (if any) and the percentage present in each sample.

Wall finishes composed of drywall finished with joint compound observed only at drywall seams and fastener holes were sampled as a composite sample (samples include both the drywall and the joint compound). Current EPA interpretations allow that the components of these drywall systems may be considered as a single HA/material. Accordingly, the presence of greater than one percent asbestos in a composite sample analysis identifies the sample as ACM. If the composite sample analysis (both joint compound and drywall) is reported as "trace" or less than, or equal to one percent asbestos, the sample must be further analyzed using the Point Count Method or be considered to be ACM under US EPA and state regulations.

3.3 Results

Based on the results of the assessment, six building components were identified to contain asbestos at a concentration greater than one percent. **Table 3-1** below contains a summary of the identified materials.



Table 3-1 Identified ACM

Material Description	Material Location	Quantity	Category (F/I/II)	Type	Condition / Potential for Disturbance	Type and Percent Asbestos
Pipe Wrap	Room 105 Above Drop Ceiling	120 LF	F	TSI	Good/High	70% CH
Mudded Elbows	Room 105 Above Drop Ceiling	9 Units	F	TSI	Good/High	50% CH
Brown & Tan Floor Tile with Black Mastic	Room 103 Under Carpet	200 SF	I	Misc.	Good/High	3% CH Tile 2% CH Mastic
Flat Roofing (multiple layers)	Flat Roof – First Layer Above Decking	2,500 SF	I	Misc.	Good/High	10% CH
Transite	Room 300B (Attic) East Wall	140 SF	II	Misc.	Good/High	10% Chrysotile
Yellow Flooring with Tan Mastic*	Room 205 Under Carpet	100 SF	I	Misc.	Good/High	5% CH Tile ND Mastic
Plaster*	Throughout Building	9,361	F	Surf.	Good/High	1.84% CH by TEM
Window Putty*	Exterior Windows Original Structure	14 Units	F	Misc.	Good/High	3% CH

SF = Square feet LF = Linear feet F=Friable I=Category I, Non-Friable II=Category II, Non-Friable CH=Chrysotile Asbestos
Misc. = Miscellaneous TSI = Thermal System Insulation

*Samples collected by others during previous assessment activities.

The quantities of ACM provided in the report are for informational purposes only and should not be used for abatement contractor bidding purposes. Actual field measurements and quantity calculation should be performed by the prospective asbestos abatement contractor for bid purposes. If materials were assumed to contain asbestos and were not sampled, these materials must be treated as asbestos unless sampling indicates the materials are not ACM. Sample locations are depicted on **Figures 2-4 in Appendix III**. The summary of bulk asbestos results is provided in the Summary of Asbestos Sampling tables in **Appendix IV**. The laboratory report and chain-of-custody records are provided in **Appendix V**.



4.0 Other Regulated Materials and Universal Wastes

4.1 Regulated Waste

4.1.1 PCBs

Approximately 105 fluorescent light ballasts (FLBs) were observed to be present in the building. FLBs manufactured before July 1, 1979, may contain PCBs. FLBs manufactured between July 1, 1979, and July 1, 1998, that do not contain PCBs must be labeled “NO PCBs.” If a FLB is *not* labeled “NO PCBs,” it should be assumed to contain PCBs. FLBs manufactured after 1998 are not required to be labeled. If date of manufacture cannot be determined or verified on ballasts with no labeling indicating PCB content, they should be assumed to contain PCBs. S&ME did not observe “NO PCB” labels on the FLBs that were observed. For the purposes of this assessment, S&ME assumes all FLBs present on the building to contain PCBs.

PCB-containing fluid or oil has historically been used in various electrical components outside of FLBs, in switches, dampeners, and most commonly wet transformers either found on power poles or ground mounted on a concrete pad. We observed two pole-mounted transformers around the building. Labels indicating the presence of PCB fluids in the transformers were not observed; therefore, these transformers should be treated as potentially containing PCB fluid.

Along with PCB fluid/oil in electrical components, it has also been stated that PCBs have been found in older style door closers which are noted as being “kettle shaped.” Five of these types of door closers were observed during this assessment.

4.2 Chlorofluorocarbons (CFCs)

Potential CFC-containing equipment may include drinking fountains, window or portable air conditioning units, refrigerators, freezers, and exterior condenser units. A summary of the items and approximate quantities is presented in **Table 4-2** below.

Table 4-2 – CFC Inventory Summary

Drinking Fountains	Refrigerators/Freezers	A/C Units	Exterior Condenser Units
0	1	13	0

4.3 Universal Wastes

The federal universal waste regulations are set forth in Part 273 Title 40 of the Code of Federal Regulations (40 C.F.R. 273). Materials regulated under this rule include batteries or battery-containing equipment (exit signs, smoke detectors, and emergency lights), cleaning/household chemicals, pesticides, mercury-containing equipment (thermostats and switches), and bulbs (lamps). Management and disposal of fluorescent light bulbs



are regulated under the Resource Conservation and Recovery Act (RCRA), the Universal Waste Rule (UWR), and Subtitle C Hazardous Waste regulations. A standard fluorescent bulb contains eight to 14 milligrams of mercury. Fluorescent light bulbs that are not marked with green aluminum end caps are generally considered to be regulated universal waste after their useful life. Fluorescent bulbs with green end caps contain less mercury than standard fluorescent bulbs and are also generally considered to be regulated universal waste after their useful life. A summary of the items and approximate quantities is presented in **Table 4-3** below.

Table 4-3 – Universal Waste Summary

Exit Signs/Emergency Lights	Smoke Detectors	Tritium-containing Exit Signs	Fluorescent Bulbs	Mercury-containing Equipment	Cleaning/Household Chemicals	Pesticides
11	28	0	157	3	8	0

5.0 PCB-Containing Caulk

PCBs are a group of organic chemicals known as chlorinated hydrocarbons. These chemicals were manufactured between 1929 and 1979 and were used in a variety of building materials for their non-flammability, chemical stability, high boiling point, plasticizing, and electrical insulating properties. Specifically, PCBs in caulk may be present in buildings that were constructed or renovated during the 1950s through the 1970s. PCB caulk inspection and sampling methods are not regulated; however, the TSCA has established an action level of 50 mg/kg or 50 parts per million (ppm).

The PCB-containing caulk assessment included the interior and exterior of the building. A visual assessment and sampling strategy was developed and representative samples of each type of caulk identified during the visual assessment were collected. Each sample consisted of an approximately 10-gram (four-inch long) piece of caulk that was collected using a utility knife with a new blade for each sample. A total of three caulk samples were collected as part of this assessment. Each caulk sample was placed in a laboratory-provided two-ounce unpreserved glass jar with a Teflon-lined lid. The samples were shipped overnight to a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory under chain-of-custody.

The samples were analyzed for the presence of PCBs using United States Protection Agency (US EPA) Method 8082A. A copy of the laboratory analytical report is included in **Appendix VI** and a summary of results from the samples collected is provided in **Table 5-1** below. Please note that if multiple PCB compounds were identified in a sample, the total concentration of all identified PCB types in that sample is presented in the table below.



Table 5-1 – PCB Caulk Sampling Summary

Sample No.	Material Description and Location	Color	Result (mg/kg)	Action Level (mg/kg)
ANX-18	Window/Door Caulk (Room 102 Exterior)	White	ND	50
ANX-20	Expansion Joint Caulk (Room 105 Exterior)	Gray	ND	50
ANX-21	Building Addition Window Caulk (Room 107 Exterior)	Gray	ND	50

ND = Not Detected above laboratory detection limits

The PCB-caulk samples submitted for analysis did not reveal the presence of PCBs above the TSCA action level of 50 mg/kg.

6.0 Conclusions and Recommendations

6.1 Asbestos

ACM was identified in areas to be affected by the planned demolition. We recommend removal and disposal of the ACM by a KDEP-licensed and EPA-accredited asbestos abatement contractor, prior to activities that may disturb an ACM. State and federal regulations should be carefully considered in order to verify compliance before any actions are initiated that may disturb an ACM. If additional suspect ACMs not included in this report are discovered and will be disturbed by renovation activities, bulk samples must be collected by a KDEP-licensed and EPA-accredited asbestos inspector and analyzed for asbestos content, prior to disturbance of the suspect material(s).

Asbestos removal requires written notification to KDEP, specific removal procedures, proper transportation, and disposal per state and federal regulations. The identification and proper removal of ACM prior to demolition will aid in the prevention of occupational exposures and/or environmental releases of airborne asbestos. If ACMs are managed in place, OSHA requirements apply to employees that may contact or disturb ACMs, including maintenance and custodial workers.

Removal of Category I Non-friable ACM may not be required by state and federal regulations if the probability is low that it will be rendered friable during demolition. Likewise, removal of Category II Non-friable ACM may not be required if the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition. The demolition procedures must follow NESHAP and KDEP regulations and the debris contaminated with asbestos must be disposed of as regulated asbestos-containing waste.

While there are Category I and II Non-friable flooring and other materials found within the building, it is anticipated that contractors will not be able to remove these materials without rendering them friable, as they are multi-layered and/or attached to wooden or other porous substrates. Therefore, we recommend the removal of



all asbestos-containing Category I and II Non-friable materials as regulated materials, prior to demolition activities and that air monitoring and 3rd-party observation be conducted during removal activities. Additionally, due to the quantities of ACMs to be removed, a project design will need to be prepared and transmission electron microscopy (TEM) clearance will need to be conducted at the end of the abatement process.

Various areas of ACM flooring were covered with carpet. S&ME recommends that all carpeting and other surficial floor coverings be removed during the abatement phase to determine if additional asbestos-containing flooring or mastic exists in these areas prior to other trades performing work. If non-sampled suspect materials are discovered that are similar to the sampled materials in appearance, age, or use, they should be treated the same as the similarly sampled materials.

6.2 Other Regulated Materials and Universal Wastes

It is recommended that the other regulated materials and universal wastes identified in Section 5.0 of this report be removed by qualified waste disposal contractor and properly recycled or disposed prior to renovation activities that may impact them in accordance with the applicable EPA regulations regarding these materials.

6.3 PCB-Containing Caulk

The PCB-caulk samples submitted for analysis did not reveal the presence of PCBs above the TSCA action level of 50 mg/kg and do not require removal before demolition activities.

7.0 Limitations

This report is provided for the sole use Mr. Bob Kjelland and the University of Kentucky. Use of this report by any other parties will be at such party's sole risk, and S&ME disclaims liability for any such use or reliance by third parties. The results presented in this report are indicative of conditions only during the time of the sampling and of the specific areas referenced. Under no circumstances is this report to be used as a bidding document, or as a project design or specification.

S&ME performed the services in accordance with generally accepted practices of reputable environmental consultants undertaking similar studies at the same time and in the same geographical area. S&ME has endeavored to meet this standard of care. No other warranty, expressed or implied, is intended or made with respect to this report or S&ME's services. Users of this report should consider the scope and limitations related to these services when developing opinions as to risks associated with the site.

The findings of the limited hazardous materials survey are based largely on visual observations within the amount of time available. The findings do not warrant that all hazardous materials have been identified; hazardous materials could be present in areas not readily accessible to observation. In addition, the actual locations and quantities of materials determined to contain asbestos will vary from those herein. Apparent homogeneous sampling areas may vary in actual asbestos content due to previous renovations, maintenance, or related operations.



If additional suspect materials are found, our firm should be notified so that our findings can be reviewed for modification or verification.

7.1 Asbestos Survey Limitations

This report is not intended for use as an asbestos abatement specification. It is not within the scope of this project to describe all appropriate precautions, safeguards and regulations relating to asbestos. The possibility exists that suspect materials were undetected in inaccessible or concealed areas such as under carpeting or multiple flooring layers, and inside pipe chases or wall voids or were not observed during the assessment. If additional suspect materials are discovered during the planned renovation activities, bulk samples must be collected by a KDEP-licensed and EPA-accredited asbestos inspector and analyzed for asbestos content.

7.2 Other Regulated Materials and Universal Wastes

S&ME endeavored to identify hazardous materials or potentially hazardous wastes that should be removed prior to renovation or demolition and disposed of in accordance with state and federal regulations. Other hazardous materials or potentially hazardous waste may be present and identified during renovation or demolition. If additional hazardous materials or potentially hazardous wastes are identified, they should be disposed of in accordance with state and federal regulations pertaining to Universal Waste and hazardous waste.

Appendices

Appendix I – Figures



IMAGERY REFERENCE: ©2023 CNES/Airbus, Maxar Technologies, U.S. Geological Survey, ©Google
 COORDINATE REFERENCE SYSTEM: EPSG:3089 - NAD83 / Kentucky Single Zone (ftUS)



PROJECT LOCATION MAP

Medical Annex #5
 1096 Veterans Drive
 Lexington, Kentucky

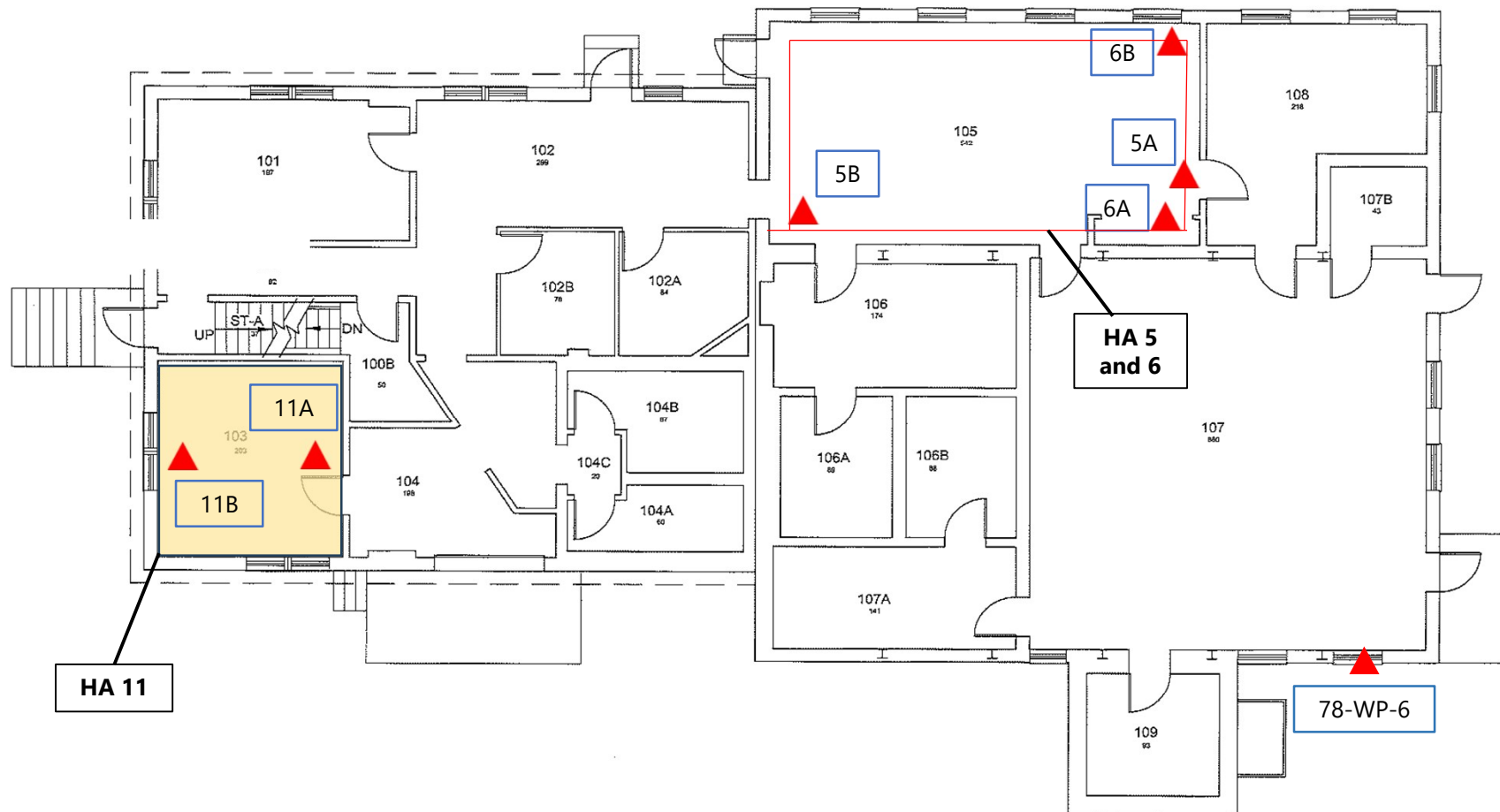
SCALE:
 Not to Scale

DATE:
 10-16-2023

PROJECT NUMBER:
 23830110

FIGURE NO.

1



Legend ▲ Positive Asbestos Sample Location

10A	Sample ID
-----	-----------



POSITIVE SAMPLE LOCATION MAP – FIRST FLOOR

Medical Annex #5
1096 Veterans Drive
Lexington, Kentucky

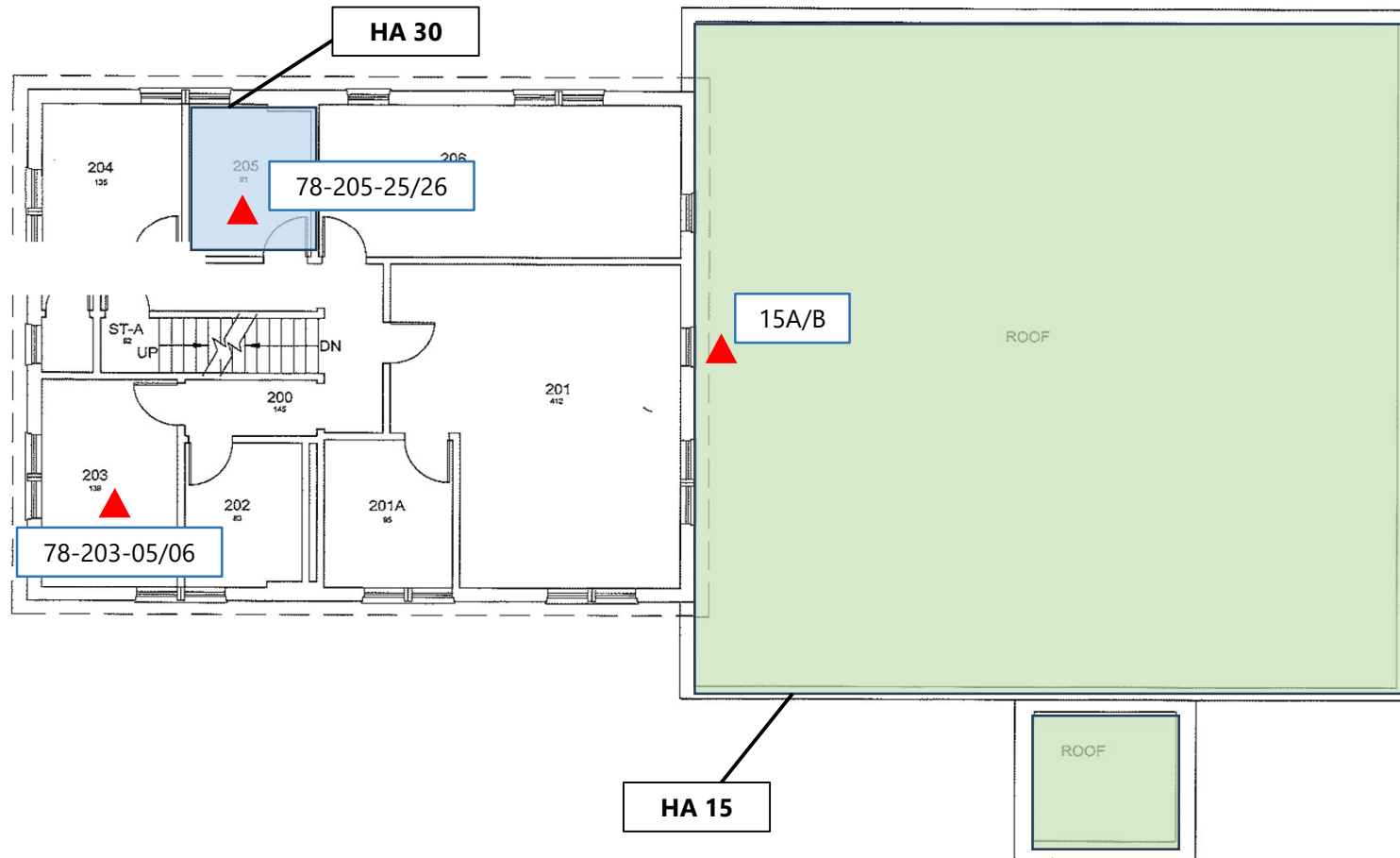
SCALE:
Not to Scale

DATE:
10-16-2023

PROJECT NUMBER:
23830110

FIGURE NO.

2



POSITIVE SAMPLE LOCATION MAP – SECOND FLOOR

Medical Annex #5
1096 Veterans Drive
Lexington, Kentucky

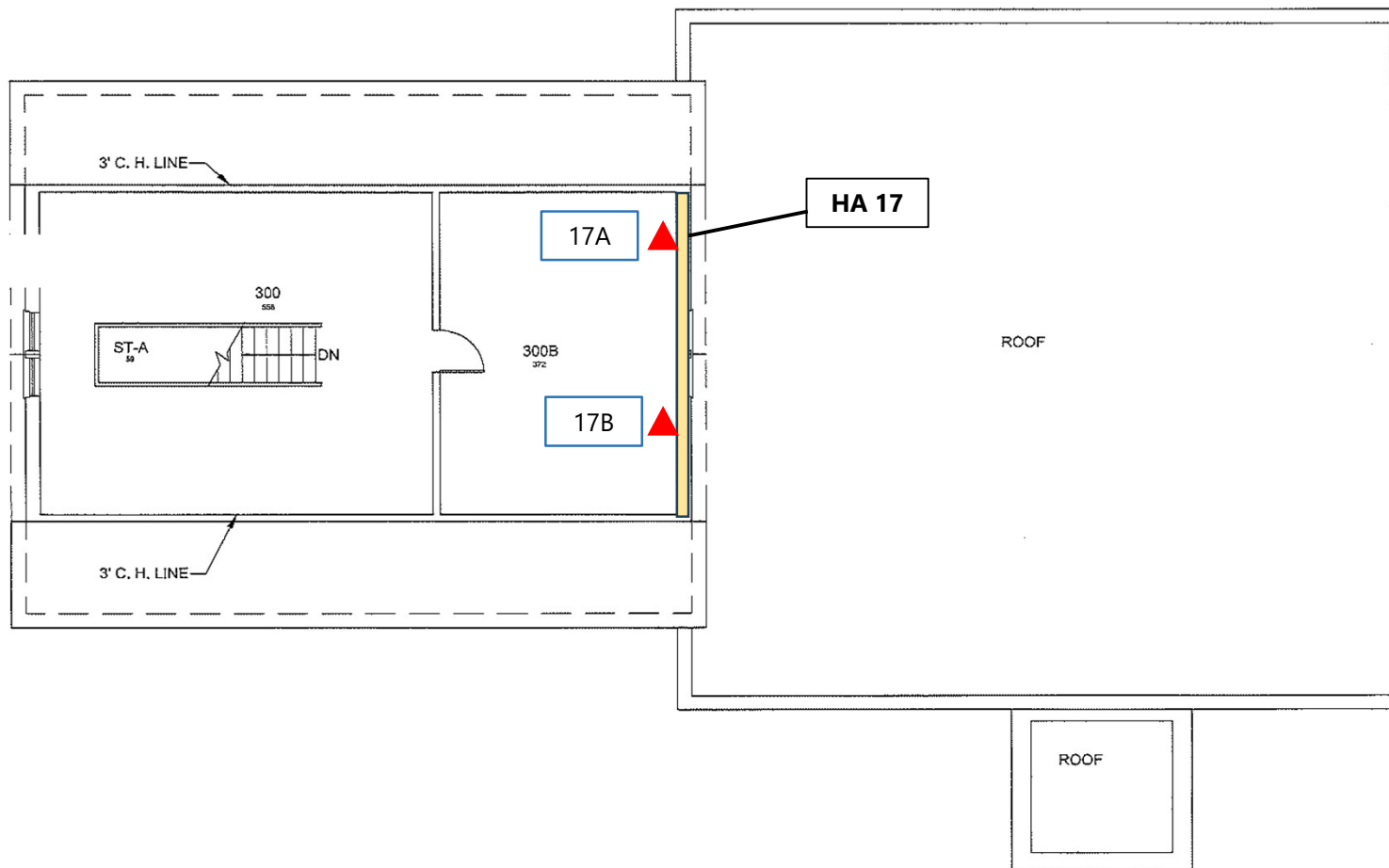
SCALE:
Not to Scale

DATE:
10-16-2023

PROJECT NUMBER:
23830110

FIGURE NO.

3



Legend ▲ Positive Asbestos Sample Location

10A Sample ID



POSITIVE SAMPLE LOCATION MAP – ATTIC

Medical Annex #5
1096 Veterans Drive
Lexington, Kentucky

SCALE:
Not to Scale

DATE:
10-16-2023

PROJECT NUMBER:
23830110

FIGURE NO.

4

Appendix II – Asbestos Inspector Credentials



Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

March 8, 2023

Vincent J Epps
862 E Crescentville Rd
Cincinnati, Ohio 45246

Asbestos Management Planner
AI Number: 155508
License Number: 63211
Expires: December 21, 2023

Dear Vincent J Epps:

This is to acknowledge receipt of your application for accreditation as an asbestos abatement professional. Your application has been approved and the above-referenced card is enclosed.

Initial accreditation fee is \$100.00 per person per discipline, except for abatement worker (\$20.00). Renewal fees for accreditations within one year of the expiration date are one-half of the initial fees. Renewals for accreditations expired over one year require the initial fee. There is a \$10.00 duplication charge to replace a lost card. Please also note that the expiration date on your license is determined by the expiration date on the training certificate submitted with your application.

When submitting application packets, please note the following:

- do not staple any of the application materials;
- make sure to fill out the application completely, including your signature; and
- include current proof of training for the discipline(s) for which you are applying

If you have any questions regarding this matter, please call our office at (502) 782-6717.

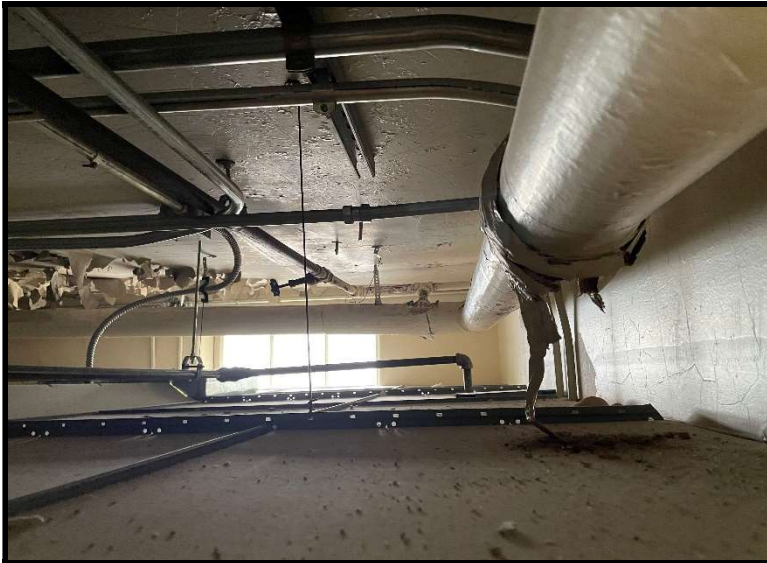
Sincerely,

Emma Moreo

Emma Moreo
Field Support Section
Field Operations Branch



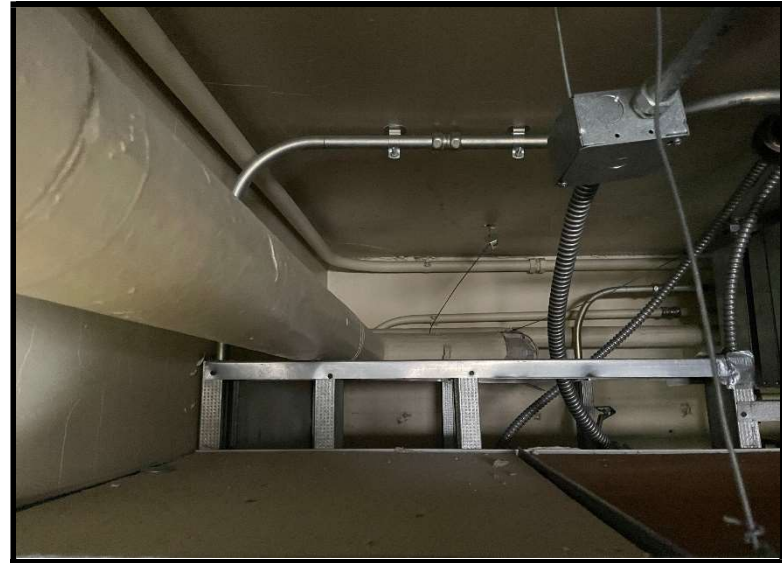
Appendix III – Photographic Log



1

View of Aircell Pipe Wrap and Mudded Elbows (HAs 5 and 6)

Date: 08/24/2023
Photographer: CR



2

View of Aircell Pipe Wrap and Mudded Elbows (HAs 5 and 6)

Date: 08/24/2023
Photographer: CR



3

HA 11 Under Carpet

Date: 08/24/2023
Photographer: CR



4

HA 15 ACM Roof Layer on Roof Deck

Date: 08/24/2023
Photographer: CR



5 HA 17 Transite Wall Panels

Date: 08/24/2023
Photographer: CR



6 HA 30 ACM Floor Tile Under Carpet

Date: 08/24/2023
Photographer: CR



7 General View of First Floor

Date: 08/24/2023
Photographer: CR



8 General View of Second Floor

Date: 08/24/2023
Photographer: CR

Appendix IV – ACM Summary Table

Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
1	Tan Cove Base with Yellow Mastic	Room 101	NQ	NA	Misc.	Good/Low	1A	Bottom of East Wall	ND
							1B	Bottom of West Wall	
2	Brown Floor Tile with Yellow Mastic	Room 101	NQ	NA	Misc.	Good/Low	2A	Near Door	ND
							2B	Near Window	
3	Blue Cove Base with Tan Adhesive	Room 102	NQ	NA	Misc.	Good/Low	3A	Bottom of West Wall	ND
							3B	Bottom of East Wall	
4	Window Glazing	Rooms 105, 108 & 107	NQ	NA	Misc.	Good/Low	4A	Room 105	ND
							4B	Room 108	
5	Pipe Wrap	Room 105 Above Drop Ceiling	120 LF	F	TSI	Good/High	5A	Room 105	70% CH
							5B	Room 105	
6	Mudded Elbows	Room 105 Above Drop Ceiling	9 Units	F	TSI	Good/High	6A	Room 105	50% CH
							6B	Room 105	
7	Wall Cement Coating	Room 107A	NQ	NA	Misc.	Good/Low	7A	Near Exterior Door	ND
							7B	Near Entrance Door	
8	12" x 12" Blue Floor Tile (Solid) with Yellow Mastic	Room 106	NQ	NA	Misc.	Good/Low	8A	Center	ND
							8B	Near Door	

NQ = Not Quantified

ND = Asbestos Not Detected

SF = Square feet

LF = Linear feet

CF = Cubic Feet

CH = Chrysotile

NA = Not Applicable

¹Category:

F=Friable

I=Category I, Non-Friable

II=Category II, Non-Friable

²Type;

Misc. = Miscellaneous

Sur = Surfacing

TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

*Samples collected by others during previous assessments

Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
9	Brown Cove Base with Brown Adhesive	Room 104A	NQ	NA	Misc.	Good/Low	9A	Near Door	ND
							9B	Under Window	
10	Floor Leveling Compound	Room 104	NQ	NA	Sur.	Good/Low	10A	Center	ND
							10B	Near Wall	
11	Brown & Tan Floor Tile with Black Mastic	Room 103 Under Carpet	200 SF	I	Misc.	Good/High	11A	Near Door	3% CH Tile 2% CH Mastic
							11B	Under Window	
12	Black Stair Treads with Clear Adhesive	Stairs to 2 nd Floor	NQ	NA	Misc.	Good/Low	12A	Top Stair	ND
							12B	2 nd From Top Stair	
13	Floor Leveling Compound	Room 201	NQ	NA	Sur.	Good/Low	13A	Near Column	ND
							13B	Near Door	
14	Red Terrazzo Floor	Room 202	NQ	NA	Misc.	Good/Low	14A	Near Door	ND
							14B	Near Door	
15	Flat Roofing (Multiple Layers)	Flat Roof – First Layer Above Decking	2,500 SF	I	Misc.	Good/High	15A	Outside of Room 201	10% CH
							15B	Outside of Room 201	
16	Brown Linoleum	Room 300B (Attic)	NQ	NA	Misc.	Good/Low	16A	Room 300B	ND
							16B	Room 300B	

NQ = Not Quantified

ND = Asbestos Not Detected

SF = Square feet

LF = Linear feet

CF = Cubic Feet

CH = Chrysotile

NA = Not Applicable

¹Category:

F=Friable

I=Category I, Non-Friable

II=Category II, Non-Friable

²Type;

Misc. = Miscellaneous

Sur = Surfacing

TSI = Thermal System Insulation

Quantities are approximate and should not be used for cost estimates or bidding purposes

*Samples collected by others during previous assessments

Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
17	Transite	Room 300B (Attic) East Wall	140 SF	II	Misc.	Good/High	17A	Room 300B	10% Chrysotile
							17B	Room 300B	
18	White Window and Door Caulk	Exterior Windows and Doors	NQ	NA	Misc.	Good/Low	18A	Bottom Right Pane	ND
							18B	Bottom Left Pane	
19	Window Putty	Exterior Windows Addition	NQ	NA	F	Good/Low	19A	Middle of Pane	ND
							19B	Middle of Pane	
20	Gray Expansion Joint Caulk	Exterior Brick Addition	NQ	NA	Misc.	Good/Low	20A	South Side	ND
							20B	South Side	
21	Gray Building Addition Window Caulk	Addition Exterior	NQ	NA	Misc.	Good/Low	21A	East Side	ND
							21B	East Side	
22	Black Foundation Coating	Addition Foundation	NQ	NA	Misc.	Good/Low	22A	East Foundation	ND
							22B	East Foundation	
23*	2' x 2' Drop-In Ceiling Tile	Throughout First Floor	NQ	NA	Misc.	Good/Low	78-102B-8	Room 102B	ND
							78-104-9	Room 104	

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Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
24*	12" x 12" Black Floor Tile with Yellow Mastic	Entrance	NQ	NA	Misc.	Good/Low	78-ET-10	Front Entrance	ND
							78-ET-11	Front Entrance	
25*	12" x 12" Blue Floor Tile with Yellow Mastic	Rooms 102B and 107	NQ	NA	Misc.	Good/Low	78-102B-12	Room 102B	ND
							78-107-13	Room 107	
26*	Drywall and Joint Compound	Throughout Building	NQ	NA	Misc.	Good/Low	78-104-14	Room 104	ND
							78-104A-15	Room 104A	
							78-206-24	Room 206	
27*	12" x 12" Gray Floor Tile with Yellow Mastic	Room 104A	NQ	NA	Misc.	Good/Low	78-104A-16	Room 104A	ND
							78-104A-17	Room 104A	
28*	Foundation Mortar	Basement	NQ	NA	Misc.	Good/Low	78-BST-18	Basement	ND
							78-BST-19	Basement	
							78-BST-20	Basement	
29*	Gray Carpet Glue	Rooms 201 and 206	NQ	NA	Misc.	Good/Low	78-201-21	Room 201	ND
							78-206-22	Room 206	
							78-206-23	Room 206	

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Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
30*	Yellow Flooring with Tan Mastic	Room 205 Under Carpet	100 SF	I	Misc.	Good/High	78-205-25	Room 205	5% CH Tile Mastic ND
							78-205-26	Room 205	
31*	Yellow Carpet Glue	Room 201	NQ	NA	Misc.	Good/Low	78-201-27	Room 201	ND
							78-201-28	Room 201	
32*	Black Felt Paper	Room 203	NQ	NA	Misc.	Good/Low	78-203-29	Room 203	ND
33*	Blue/Green Shingle	Pitched Roof	NQ	NA	Misc.	Good/Low	78-RF-30	Pitched Roof	ND
							78-RF-31	Pitched Roof	
							78-RF-32	Pitched Roof	
34*	Cork Insulation	Freezer Walls Rooms 106A, 106B, Basement	NQ	NA	TSI	Good/Low	78-106A-33	Room 106A	ND
							78-106B-34	Room 106B	
							78-BST-35	Basement	
35*	Cork Insulation	Freezer Ceiling Room 106B	NQ	NA	TSI	Good/Low	78-106B-36	Room 106B	ND
							78-106B-37	Room 106B	

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Summary of Asbestos Sampling

Project Name: UK Medical Annex	Project Number: 23830110
Location: Lexington, KY	Sampling Date(s): 8/24/2023

HOMOGENEOUS AREA

SAMPLE DATA

HA Area	Material Description	Material Location	Quantity	¹ Cat (F/I/II)	² Type	Condition / Potential for Disturbance	Sample Number	Sample Location	Type and Percent Asbestos
36*	Black Cork Insulation Coating	Rooms 106A, 106B, Basement	NQ	NA	TSI	Good/Low	78-106B-38	Room 106B	ND
							78-106A-39	Room 106A	
							78-BST-33	Basement	
							78-BST-34	Basement	
37*	Plaster	Throughout Building Walls and Ceilings	9,361 SF	F	Surf.	Good/High	78-203-04	Room 203	1.84% CH by TEM
							78-203-05	Room 203	1.49% CH by TEM
38*	12" x 12" Blue Tile with Yellow Mastic	Room 102	NQ	NA	Misc.	Good/Low	78-102-02	Room 102	ND
39*	2' x 2' Drop In Ceiling Tiles	Throughout	NQ	NA	Misc.	Good/Low	78-102-03	Room 102	ND
40*	Window Putty	Exterior Windows Original Building	14 Units	F	Misc.	Good/High	78-WP-6	Exterior Window	3% CH
41"	Window Putty	Exterior Windows Addition	NQ	NA	Misc.	Good/Low	78-WP-7	Exterior Window	ND

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²Type;

Misc. = Miscellaneous

Sur = Surfacing

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Quantities are approximate and should not be used for cost estimates or bidding purposes

*Samples collected by others during previous assessments

Appendix V – Asbestos Analytical Laboratory Reports



The Identification Specialists

Analysis Report
prepared for
S&ME, Inc.

Report Date: 9/5/2023

Project Name: UK-Annex #5

Project #: 23830110

SanAir ID#: 23047447



NVLAP LAB CODE 200870-0

10501 Trade Court | North Chesterfield, Virginia 23236
888.895.1177 | 804.897.1177 | fax: 804.897.0070 | IAQ@SanAir.com | SanAir.com



SanAir ID Number

23047447

FINAL REPORT

9/5/2023 5:27:52 PM

Name: S&ME, Inc.

Address: 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226

Project Number: 23830110

P.O. Number: 23830110

Project Name: UK-Annex #5

Collected Date: 8/24/2023

Received Date: 8/28/2023 2:00:00 PM

Dear Jamie Bailey,

We at SanAir would like to thank you for the work you recently submitted. The 44 sample(s) were received on Monday, August 28, 2023 via Drop Box. The final report(s) is enclosed for the following sample(s): 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, 5A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15A, 15B, 16A, 16B, 17A, 17B, 18A, 18B, 19A, 19B, 20A, 20B, 21A, 21B, 22A, 22B.

These results only pertain to this job and should not be used in the interpretation of any other job. This report is only complete in its entirety. Refer to the listing below of the pages included in a complete final report.

Sincerely,

A handwritten signature in black ink that reads "Sandra Sobrino".

Sandra Sobrino
Asbestos & Materials Laboratory Manager
SanAir Technologies Laboratory

Final Report Includes:

- Cover Letter
- Analysis Pages
- Disclaimers and Additional Information

Sample conditions:

- 44 samples in Good condition.



SanAir ID Number

23047447

FINAL REPORT

9/5/2023 5:27:52 PM

Name: S&ME, Inc.**Address:** 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226**Project Number:** 23830110**P.O. Number:** 23830110**Project Name:** UK-Annex #5**Collected Date:** 8/24/2023**Received Date:** 8/28/2023 2:00:00 PM

Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
1A / 23047447-001 Cove Base w/ Adh., Cove Baes	Tan Non-Fibrous Homogeneous		100% Other	None Detected
1A / 23047447-001 Cove Base w/ Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
1B / 23047447-002 Cove Base w/ Adh., Cove Baes	Tan Non-Fibrous Homogeneous		100% Other	None Detected
1B / 23047447-002 Cove Base w/ Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
2A / 23047447-003 Floor Tile w/ Mastic, Floor Tile	Brown Non-Fibrous Homogeneous	10% Cellulose	90% Other	None Detected
2A / 23047447-003 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
2B / 23047447-004 Floor Tile w/ Mastic, Floor Tile	Brown Non-Fibrous Homogeneous	10% Cellulose	90% Other	None Detected
2B / 23047447-004 Floor Tile w/ Mastic, Mastic	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
3A / 23047447-005 Cove Base w/ Adh., Cove Base	Blue Non-Fibrous Homogeneous		100% Other	None Detected
3A / 23047447-005 Cove Base w/ Adh., Adhesive	Tan Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

Date: 9/5/2023



SanAir ID Number

23047447

FINAL REPORT

9/5/2023 5:27:52 PM

Name: S&ME, Inc.**Address:** 6190 Enterprise Court

Dublin, OH 43016

Phone: 6147932226**Project Number:** 23830110**P.O. Number:** 23830110**Project Name:** UK-Annex #5**Collected Date:** 8/24/2023**Received Date:** 8/28/2023 2:00:00 PM

Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
3B / 23047447-006 Cove Base w/ Adh., Cove Base	Blue Non-Fibrous Homogeneous		100% Other	None Detected
3B / 23047447-006 Cove Base w/ Adh., Adhesive	Tan Non-Fibrous Homogeneous		100% Other	None Detected
4A / 23047447-007 Window Glazing	Grey Non-Fibrous Homogeneous		100% Other	None Detected
4B / 23047447-008 Window Glazing	Grey Non-Fibrous Homogeneous		100% Other	None Detected
5A / 23047447-009 Pipe Wrap	Off-White Fibrous Heterogeneous		30% Other	70% Chrysotile
5B / 23047447-010 Pipe Wrap	Off-White Fibrous Heterogeneous		30% Other	70% Chrysotile
6A / 23047447-011 Elbow Mud	Off-White Fibrous Heterogeneous		50% Other	50% Chrysotile
6B / 23047447-012 Elbow Mud	Off-White Fibrous Heterogeneous		50% Other	50% Chrysotile
7A / 23047447-013 Wall Cement	Grey Non-Fibrous Homogeneous		100% Other	None Detected
7B / 23047447-014 Wall Cement	Grey Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

Date: 9/5/2023



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Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
8A / 23047447-015 Floor Tile + Adh., Floor Tile	Blue Non-Fibrous Homogeneous		100% Other	None Detected
8A / 23047447-015 Floor Tile + Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
8B / 23047447-016 Floor Tile + Adh., Floor Tile	Blue Non-Fibrous Homogeneous		100% Other	None Detected
8B / 23047447-016 Floor Tile + Adh., Adhesive	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
9A / 23047447-017 Cove Base w/ Adh., Cove Base	Brown Non-Fibrous Homogeneous		100% Other	None Detected
9A / 23047447-017 Cove Base w/ Adh., Adhesive	Brown Non-Fibrous Homogeneous		100% Other	None Detected
9B / 23047447-018 Cove Base w/ Adh., Cove Base	Brown Non-Fibrous Homogeneous		100% Other	None Detected
9B / 23047447-018 Cove Base w/ Adh., Adhesive	Brown Non-Fibrous Homogeneous		100% Other	None Detected
10A / 23047447-019 Floor Level Compound	White Non-Fibrous Homogeneous		100% Other	None Detected
10B / 23047447-020 Floor Level Compound	White Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

Date: 9/5/2023



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Collected Date: 8/24/2023

Received Date: 8/28/2023 2:00:00 PM

Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
11A / 23047447-021 Floor Tile w/ Mastic, Floor Tile	Tan Non-Fibrous Homogeneous		97% Other	3% Chrysotile
11A / 23047447-021 Floor Tile w/ Mastic, Mastic	Black Non-Fibrous Homogeneous		98% Other	2% Chrysotile
11B / 23047447-022 Floor Tile w/ Mastic, Floor Tile	Tan Non-Fibrous Homogeneous		97% Other	3% Chrysotile
11B / 23047447-022 Floor Tile w/ Mastic, Mastic	Black Non-Fibrous Homogeneous		98% Other	2% Chrysotile
12A / 23047447-023 Floor Tile w/ Clear Adh., Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected
12A / 23047447-023 Floor Tile w/ Clear Adh., Adhesive	White Non-Fibrous Homogeneous		100% Other	None Detected
12B / 23047447-024 Floor Tile w/ Clear Adh., Floor Tile	Black Non-Fibrous Homogeneous		100% Other	None Detected
12B / 23047447-024 Floor Tile w/ Clear Adh., Mastic	Grey Non-Fibrous Homogeneous		100% Other	None Detected
13A / 23047447-025 Floor Level Cmpd	Grey Non-Fibrous Heterogeneous	2% Cellulose	98% Other	None Detected
13B / 23047447-026 Floor Level Cmpd	Grey Non-Fibrous Heterogeneous	2% Cellulose	98% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

Date: 9/5/2023



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Project Name: UK-Annex #5
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Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
14A / 23047447-027 Terazzo	Various Non-Fibrous Heterogeneous		100% Other	None Detected
14B / 23047447-028 Terazzo	Various Non-Fibrous Heterogeneous		100% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Membrane	Various Non-Fibrous Heterogeneous		100% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Insulation	Yellow Non-Fibrous Homogeneous		100% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Insulation	Brown Fibrous Heterogeneous	95% Cellulose	5% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Carpet	Black Non-Fibrous Heterogeneous	70% Synthetic	30% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Roofing	Black Non-Fibrous Heterogeneous	20% Cellulose	80% Other	None Detected
15A / 23047447-029 Flat Roof Layers, Roofing	Black Non-Fibrous Heterogeneous	20% Glass	70% Other	10% Chrysotile
15B / 23047447-030 Flat Roof Layers, Membrane	Various Non-Fibrous Heterogeneous		100% Other	None Detected
15B / 23047447-030 Flat Roof Layers, Insulation	Yellow Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: *J. Mayes*

Approved Signatory: *Jonathan Wilson*

Analysis Date: 9/5/2023

Date: 9/5/2023



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Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
15B / 23047447-030 Flat Roof Layers, Insulation	Brown Fibrous Heterogeneous	95% Cellulose	5% Other	None Detected
15B / 23047447-030 Flat Roof Layers, Carpet	Black Non-Fibrous Heterogeneous	70% Synthetic	30% Other	None Detected
15B / 23047447-030 Flat Roof Layers, Roofing	Black Non-Fibrous Heterogeneous	20% Cellulose	80% Other	None Detected
15B / 23047447-030 Flat Roof Layers, Roofing	Black Non-Fibrous Heterogeneous	20% Glass	70% Other	10% Chrysotile
16A / 23047447-031 Linoleum	Brown Non-Fibrous Heterogeneous	20% Cellulose	80% Other	None Detected
16B / 23047447-032 Linoleum	Brown Non-Fibrous Heterogeneous	20% Cellulose	80% Other	None Detected
17A / 23047447-033 Transite Panel	Grey Non-Fibrous Heterogeneous		90% Other	10% Chrysotile
17B / 23047447-034 Transite Panel	Grey Non-Fibrous Heterogeneous		90% Other	10% Chrysotile
18A / 23047447-035 Caulk	Grey Non-Fibrous Homogeneous		100% Other	None Detected
18B / 23047447-036 Caulk	Grey Non-Fibrous Homogeneous		100% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

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Analyst: Mayes, Jean

Asbestos Bulk PLM EPA 600/R-93/116

SanAir ID / Description	Stereoscopic	Components		Asbestos Fibers
	Appearance	% Fibrous	% Non-fibrous	
19A / 23047447-037 Window Glazing	White Non-Fibrous Homogeneous		100% Other	None Detected
19B / 23047447-038 Window Glazing	White Non-Fibrous Homogeneous		100% Other	None Detected
20A / 23047447-039 Expansion Joint Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
20B / 23047447-040 Expansion Joint Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
21A / 23047447-041 Caulk, Caulk	Grey Non-Fibrous Homogeneous		100% Other	None Detected
21A / 23047447-041 Caulk, Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
21B / 23047447-042 Caulk, Caulk	Grey Non-Fibrous Homogeneous		100% Other	None Detected
21B / 23047447-042 Caulk, Caulk	White Non-Fibrous Homogeneous		100% Other	None Detected
22A / 23047447-043 Foundation Coating	Black Non-Fibrous Heterogeneous	1% Cellulose	99% Other	None Detected
22B / 23047447-044 Foundation Coating	Black Non-Fibrous Heterogeneous	1% Cellulose	99% Other	None Detected

Analyst: 

Analysis Date: 9/5/2023

Approved Signatory: 

Date: 9/5/2023

Disclaimer

This report is the sole property of the client named on the SanAir Technologies Laboratory chain-of-custody (COC). Results in the report are confidential information intended only for the use by the customer listed on the COC. Neither results nor reports will be discussed with or released to any third party without our client's written permission. The final report shall not be reproduced except in full without written approval of the laboratory to assure that parts of the report are not taken out of context. This report and any information contained within shall not be edited, altered, or modified in any way by any persons or agencies receiving, viewing, distributing, or otherwise possessing a copy of this final report. The laboratory reserves the right to perform amendments to any finalized report, of which shall supersede and make obsolete any previous editions. Such changes, modifications, additions, or deletions shall be effective immediately upon notice thereof, which may be given by means including but not limited to posting on the SanAir client portal website, electronic or conventional mail, or by any other means. The information provided in this report applies only to the samples submitted and is relevant only for the date, time, and location of sampling. The accuracy of the results is dependent upon the client's sampling procedure and information provided to the laboratory by the client on the COC. SanAir assumes no responsibility for the sampling procedure and will provide evaluation reports based solely on the sample(s) in the condition in which they arrived at the laboratory and information provided by the client on the COC, such as: project number, project name, collection dates, po number, special instructions, samples collected by, sample numbers, sample identifications, sample type, selected analysis type, flow rate, total volume or area, and start stop times that may affect the validity of the results in this report. Samples were received in good condition unless otherwise noted on the report. SanAir assumes no responsibility or liability for the manner in which the results are used or interpreted. This report does not constitute nor shall not be used by the client to claim product, process, system, or person certification, approval, or endorsement by NVLAP, NIST, NELAC, AIHA LAP, LLC or any other U.S. governmental agencies and may not be accredited by every local, state, and federal regulatory agencies. Samples are held for a period of 60 days. Fibers smaller than 5 microns cannot be seen with this method due to scope limitations. For NY state samples, method EPA 600/M4-82-020 is performed.

NYELAP Disclaimer:

Polarized- light microscopy is not consistently reliable in detecting asbestos in floor covering and similar non-friable organically bound materials. Quantitative transmission electron microscopy is currently the only method that can be used to determine if this material can be considered or treated as non-asbestos containing.

Asbestos Accreditations

National Voluntary Laboratory Accreditation Program (NVLAP) Lab Code 200870-0
City of Philadelphia Department of Public Health Air Management Services, Certification#ALL-460
Commonwealth of Pennsylvania Department of Environmental Protection Number 68-05397
California State Environmental Laboratory Accreditation Program Certificate Number 2915
Colorado Department of Public Health and Environment Registration Number AL-23143
Connecticut Department of Public Health Environmental Laboratory Registration Number PH-0105
Massachusetts Department of Labor Standards Asbestos Analytical Services License Number: AA000222
State of Maine Department of Environmental Protection License Number: LB-0075, LA-0084
New York State Department of Health Laboratory ID: 11983
State of Rhode Island Department of Health Certification No.: PCM00126, PLM00126, TEM00126
Texas Department of State Health Services License Number: 300440
Commonwealth of Virginia Department of Professional and Occupational Regulation Number: 3333000323
State of Washington Department of Ecology Laboratory ID: C989
State of West Virginia Bureau for Public Health Analytical Laboratory Number: LT000616
Vermont Department of Health License Number: Asb-Co-An-000006
Louisiana Department of Environmental Quality AI Number 212253, Certificate #05088



1551 Oakbridge Dr. STE B
Powhatan, VA 23139
804.897.1177 / 888.895.1177
Fax 804.897.0070
sanair.com

Asbestos
Chain of Custody
Form 140, Rev 2, 5/18/18

SanAir ID Number

23047447

Company: S+ME		Project #: 23830110		Collect by: Vince Epps	
Address: 862 G. Crescentville Rd.		Project Name: UK - Annex #5		Phone #: 513-591-8375	
City, St., Zip: Cinci, OH 45246		Date Collected: 8/24/2023		Fax #: —	
State of Collection: KY Account#:		P.O. Number: 23830110		Email: vepps@smcinc.com	

Bulk		Air		Soil	
ABB	PLM EPA 600/R-93/116 <input checked="" type="checkbox"/>	ABA	PCM NIOSH 7400 <input type="checkbox"/>	ABSE	PLM EPA 600/R-93/116 (Qual.) <input type="checkbox"/>
	Positive Stop <input type="checkbox"/>	ABA-2	OSHA w/ TWA* <input type="checkbox"/>	Vermiculite & Soil	
ABEPA	PLM EPA 400 Point Count <input type="checkbox"/>	ABTEM	TEM AHERA <input type="checkbox"/>	ABSP	PLM CARB 435 (LOD <1%) <input type="checkbox"/>
ABB1K	PLM EPA 1000 Point Count <input type="checkbox"/>	ABATN	TEM NIOSH 7402 <input type="checkbox"/>	ABSP1	PLM CARB 435 (LOD 0.25%) <input type="checkbox"/>
ABBEN	PLM EPA NOB** <input type="checkbox"/>	ABT2	TEM Level II <input type="checkbox"/>	ABSP2	PLM CARB 435 (LOD 0.1%) <input type="checkbox"/>
ABBCH	TEM Chatfield** <input type="checkbox"/>	Other:	<input type="checkbox"/>	Dust	
ABBTM	TEM EPA NOB** <input type="checkbox"/>	New York ELAP		ABWA	TEM Wipe ASTM D-6480 <input type="checkbox"/>
ABQ	PLM Qualitative <input type="checkbox"/>	ABEPA2	NY ELAP 198.1 <input type="checkbox"/>	ABDMV	TEM Microvac ASTM D-5755 <input type="checkbox"/>
		ABENY	NY ELAP 198.6 PLM NOB <input type="checkbox"/>	Matrix <input type="checkbox"/> Other <input type="checkbox"/>	
		ABBNY	NY ELAP 198.4 TEM NOB <input type="checkbox"/>		

** Available on 24-hr. to 5-day TAT

Water	
ABHE	EPA 100.2 <input type="checkbox"/>

Turn Around Times	3 HR (4 HR TEM) <input type="checkbox"/>	6 HR (8HR TEM) <input type="checkbox"/>	12 HR <input type="checkbox"/>	24 HR <input type="checkbox"/>
	2 Days <input type="checkbox"/>	3 Days <input type="checkbox"/>	4 Days <input type="checkbox"/>	<input checked="" type="checkbox"/> 5 Days

Special Instructions

Sample #	Sample Identification/Location	Volume or Area	Sample Date	Flow Rate*	Start - Stop Time*
1 A-B	Tan cove base w/ yellow adh.	—	8/24/23	—	—
2 A-B	Brown floor tile w/ yellow mastic	—	↓	—	—
3 A-B	Blue cove base w/ tan adh.	—	↓	—	—
4 A-B	window glazing	—	↓	—	—
5 A-B	Pipe wrap	—	↓	—	—
6 A-B	Elbow mud	—	↓	—	—
7 A-B	wall cement	—	↓	—	—
8 A-B	Blue floor tile + yellow adh.	—	↓	—	—
9 A-B	Brown cove base w/ brown	—	↓	—	—
10 A-B	Floor level comp.	—	↓	—	—
11 A-B	Brown + tan floor tile w/ black mastic	—	↓	—	—
12 A-B	Black floor tile w/ clear adh.	—	↓	—	—

Relinquished by	Date	Time	Received by	Date	Time
<i>[Signature]</i>	8/28/23	1:30	<i>[Signature]</i>	AUG 28 2023	@ 2:00pm
<i>[Signature]</i>	AUG 29 2023	1:10pm	EA	8/30/23	10:35am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of \$150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

[illegible]

Special Instructions

Relinquished by	Date	Time	Received by	Date	Time
<i>[Signature]</i>	8/28/23	1330	<i>[Signature]</i>	AUG 28 2023	2:00pm
<i>[Signature]</i>	AUG 29 2023	11:00am	EA	8/30/23	10:35am

If no technician is provided, then the primary contact for your account will be selected. Unless scheduled, the turnaround time for all samples received after 3 pm EST will be logged in the next business day. Weekend or holiday work must be scheduled ahead of time and is charged at 150% of the 3hr TAT or a minimum charge of \$150. A courier charge will be applied for same day and one-day turnaround times for offsite work. SanAir covers Standard Overnight FedEx shipping. Shipments billed to SanAir with a faster shipping rate will result in additional charges.

Page 2 of 2

Vincent J Epps

From: Taylor, Tommy W. <twtayl0@email.uky.edu>
Sent: Monday, June 5, 2023 10:08 AM
To: Smith, Andrea L.
Subject: Medical Center Annex #5 Survey Report & Database Info
Attachments: 20230605095419391.pdf

Andrea,

The flat roof on the back of the building has not been tested due to it having foam for a roof. I have been told that when foam was added it was installed over the flat roof on the building.

Historical Data shows window putty, black mastic and plaster to all contain asbestos.

Total quantities I came up with for plaster is 8565 sq. ft. on wood lath.

Total quantities I came up with were plaster is on masonry is 796 sq. ft. in basement.

Linoleum I tested that was positive is 108 sq. ft.

Floor tile is 168 sq. ft.

I did not get quantities for the window putty.

Sector	BldgNo	BldgName	RoomNo	SampleNo	SampleDate	Description	Results	Condition
	AbatedDate	Identity						
MC	0078	Medical Center Annex #5 22013	203	04	10/4/14	ceiling plaster	1.84% chry TEM	
MC	0078	Medical Center Annex #5 22014	203	05	10/4/14	ceiling plaster	1.49% chry TEM	
CA	0078	Medical Center Annex #5 NAD mastic 6% chry 12398	102	01		"12"x12" fl. tile beige w/ bk. mastic tile		
CA	0078	Medical Center Annex #5 both NAD 19811	102	02	1/24/08	12x12 blue fl. tile w/ yellow mastic		
CA	0078	Medical Center Annex #5 19812	102	03	1/24/08	2x2 lay-in ceiling tile	NAD	
MC	0078	Medical Center Annex #5 22835	WP	6	10/31/17	window putty	3% chry	
MC	0078	Medical Center Annex #5 22836	WP	7	10/31/17	window putty	NAD	

Appendix VI – PCB Analytical Laboratory Report



September 01, 2023

Vince Epps
S&ME, Inc.
862 East Crescentville Rd
Cincinnati, OH 45246

RE: Project: 23830110 MI King Library Anx
Pace Project No.: 50352686

Dear Vince Epps:

Enclosed are the analytical results for sample(s) received by the laboratory on August 29, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Indianapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink that reads "Regina K. Bedel".

Regina Bedel
regina.bedel@pacelabs.com
(317)228-3100
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Pace Analytical Services Indianapolis

7726 Moller Road, Indianapolis, IN 46268

Illinois Accreditation #: 200074

Indiana Drinking Water Laboratory #: C-49-06

Kansas/TNI Certification #: E-10177

Kentucky UST Agency Interest #: 80226

Kentucky WW Laboratory ID #: 98019

Michigan Drinking Water Laboratory #9050

Ohio VAP Certified Laboratory #: CL0065

Oklahoma Laboratory #: 9204

Texas Certification #: T104704355

Wisconsin Laboratory #: 999788130

USDA Foreign Soil Permit #: 525-23-13-23119

USDA Compliance Agreement #: IN-SL-22-001

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SAMPLE SUMMARY

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50352686001	Anx-18	Solid	08/24/23 15:55	08/29/23 09:30
50352686002	Anx-20	Solid	08/24/23 16:00	08/29/23 09:30
50352686003	Anx-21	Solid	08/24/23 16:05	08/29/23 09:30

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SAMPLE ANALYTE COUNT

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50352686001	Anx-18	EPA 8082	AM	8	PASI-I
50352686002	Anx-20	EPA 8082	AM	8	PASI-I
50352686003	Anx-21	EPA 8082	AM	8	PASI-I

PASI-I = Pace Analytical Services - Indianapolis

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ANALYTICAL RESULTS

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Sample: Anx-18 Lab ID: 50352686001 Collected: 08/24/23 15:55 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids								
Analytical Method: EPA 8082 Preparation Method: EPA 3546								
Pace Analytical Services - Indianapolis								
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:23	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	85	%.	10-133	1	08/30/23 16:34	09/01/23 02:23	877-09-8	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Sample: Anx-20 Lab ID: 50352686002 Collected: 08/24/23 16:00 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids								
Analytical Method: EPA 8082 Preparation Method: EPA 3546								
Pace Analytical Services - Indianapolis								
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.5	1	08/30/23 16:34	09/01/23 02:38	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	76	%.	10-133	1	08/30/23 16:34	09/01/23 02:38	877-09-8	

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ANALYTICAL RESULTS

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Sample: Anx-21 Lab ID: 50352686003 Collected: 08/24/23 16:05 Received: 08/29/23 09:30 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 PCB Solids								
Analytical Method: EPA 8082 Preparation Method: EPA 3546								
Pace Analytical Services - Indianapolis								
PCB-1016 (Aroclor 1016)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	mg/kg	1.0	1	08/30/23 16:34	09/01/23 02:53	11096-82-5	
Surrogates								
Tetrachloro-m-xylene (S)	84	%.	10-133	1	08/30/23 16:34	09/01/23 02:53	877-09-8	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

QC Batch: 750693

Analysis Method: EPA 8082

QC Batch Method: EPA 3546

Analysis Description: 8082 PCB Solids

Laboratory:

Pace Analytical Services - Indianapolis

Associated Lab Samples: 50352686001, 50352686002, 50352686003

METHOD BLANK: 3440409

Matrix: Solid

Associated Lab Samples: 50352686001, 50352686002, 50352686003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1221 (Aroclor 1221)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1232 (Aroclor 1232)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1242 (Aroclor 1242)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1248 (Aroclor 1248)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1254 (Aroclor 1254)	mg/kg	ND	0.10	08/31/23 11:43	
PCB-1260 (Aroclor 1260)	mg/kg	ND	0.10	08/31/23 11:43	
Tetrachloro-m-xylene (S)	%	89	10-133	08/31/23 11:43	

LABORATORY CONTROL SAMPLE: 3440410

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	mg/kg	0.33	0.35	104	50-120	
PCB-1260 (Aroclor 1260)	mg/kg	0.33	0.33	99	40-122	
Tetrachloro-m-xylene (S)	%			96	10-133	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3440411 3440412

Parameter	Units	50351723012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	mg/kg	ND	1.1	0.97	1.0	1.0	95	105	10-154	1	20	
PCB-1260 (Aroclor 1260)	mg/kg	ND	1.1	0.97	0.99	0.96	92	99	10-165	4	20	
Tetrachloro-m-xylene (S)	%						92	95	10-133			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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METHOD CROSS REFERENCE TABLE

Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Parameter	Matrix	Analytical Method	Preparation Method
8082 PCB Solids	Solid	SW-846 8082A	SW-846 3546

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

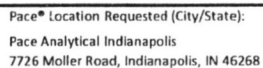
Project: 23830110 MI King Library Anx

Pace Project No.: 50352686

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50352686001	Anx-18	EPA 3546	750693	EPA 8082	750828
50352686002	Anx-20	EPA 3546	750693	EPA 8082	750828
50352686003	Anx-21	EPA 3546	750693	EPA 8082	750828

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Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

50352686

Contact/Report To:	Epps, Vince
Phone #:	513-771-8471
E-Mail:	vepps@smeinc.com
Cc E-Mail:	

Invoice To:	
Invoice E-Mail:	

Purchase Order # (if applicable):
Quote #:

County / State origin of sample(s):	Kentucky
-------------------------------------	----------

Data Deliverables:

<input type="checkbox"/> Level II	<input type="checkbox"/> Level III	<input type="checkbox"/> Level IV
<input type="checkbox"/> EQUIS		
<input type="checkbox"/> Other _____		

Regulatory Program (DW, RCRA, etc.) as applicable:

Rush (Pre-approval required):

DW PWSID # or WW Permit # as applicable:

Date Results Requested:

Field Filtered (if applicable): ☐ Yes ☐ No

Analysis:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Waste Water (WW), Product (P), Soil/Solid (SS), Oil (OI), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Other (OT), Surface Water (SW), Sediment (SED), Sludge (SL), Caulk

[illegible]

Customer Remarks / Special Conditions / Possible Hazards:

Collected By: Vince Epps
Printed Name:
Signature: [Signature]

Additional Instructions from Pace®:

# Coolers:	Thermometer ID:	Correction Factor (°C):	Obs. Temp. (°C)	Corrected Temp. (°C)
2	H	0.0	20.2	20.2

Relinquished by/Company: (Signature)

Date/Time: 8/28/23 1300

Received by/Company: (Signature)

Date/Time: 21/24/23 1300

Tracking Number:

Relinquished by/Company (Signature)

Date/Time: 02/29/23 0930

Received by/Company: (Signature)

Date/Time: 8/28/23 0930

Delivered by: ☐ In-Person ☐ Courier

Relinquished by/Company: (Signature)

Date/Time:

Received by/Company: (Signature)

Date/Time:

[~~Ed~~EdY [] UPS

Relinquished by/Company: (Signature)

Date/Time:

Received by/Company: (Signature)

Date/Time:

Page: of

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace® Terms and Conditions found at <https://www.pacelabs.com/resource-library/resource/pace-terms-and-conditions/>

ENV-FRM-CORQ-0019 v01 082123 ©



SAMPLE CONDITION UPON RECEIPT FORM

Date/Time and Initials of person examining contents: 8/29/23 1046 CRR

1. Courier: ☒ FED EX ☐ UPS ☐ CLIENT ☐ PACE ☐ NOW/JETT ☐ OTHER _____

2. Custody Seal on Cooler/Box Present: ☒ Yes ☐ No

(If yes) Seals Intact: ☒ Yes ☐ No (leave blank if no seals were present)

3. Thermometer: 1 2 3 4 5 6 7 8 A B C D E F G H (H)

4. Cooler Temperature(s): 20.2/20.2 [] [] []

(Initial/Corrected) RECORD TEMPS OF ALL COOLERS RECEIVED (use Comments below to add more)

5. Packing Material: ☒ Bubble Wrap ☒ Bubble Bags

☐ None ☐ Other _____

6. Ice Type: ☐ Wet ☐ Blue ☒ None

7. If temp. is over 6°C or under 0°C, was the PM notified? ☒ Yes ☐ No

Cooler temp should be above freezing to 6°C

All discrepancies will be written out in the comments section below.

	Yes	No		Yes	No	N/A
USDA Regulated Soils? (HI, ID, NY, WA, OR, CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		/	All containers needing acid/base preservation have been pH CHECKED?: Exceptions: VOA, coliform, LLHg, O&G, RAD CHEM, and any container with a septum cap or preserved with HCl.			
Short Hold Time Analysis (48 hours or less)? Analysis:		/	Circle: HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9) Any non-conformance to pH recommendations will be noted on the container count form			/
Time 5035A TC placed in Freezer or Short Holds To Lab	Time:		Residual Chlorine Check (SVOC 625 Pest/PCB 608)	Present	Absent	N/A
Rush TAT Requested (4 days or less):		/	Residual Chlorine Check (Total/Amenable/Free Cyanide)			/
Custody Signatures Present?	/		Headspace Wisconsin Sulfide?			/
Containers Intact?:	/		Headspace in VOA Vials (>6mm): See Container Count form for details	Present	Absent	No VOA Vials Sent
Sample Label (IDs/Dates/Times) Match COC?: Except TCs, which only require sample ID		/	Trip Blank Present?		/	
Extra labels on Terracore Vials? (soils only)			Trip Blank Custody Seals?:			/

COMMENTS: Time (11005) on Sample ID Anx-20 is different from (11000) COC / Time (11000) on Sample ID Anx-21 is different from COC (11005) (8/29/23 CRR)

Sample Container Count

** Place a RED dot on containers that are out of conformance **

COC Line Item	WG FU	WG KU	BG 1U	MeOH (only)	DG 9H	VG 9H	VOA VIAL HS >6mm	VG 9U	DG 9U	VG 9T	AMBER GLASS							PLASTIC							OTHER				Matrix	Nitric Red	Sulfuric Yellow	Sodium Hydroxide Green	Sodium Hydroxide/ ZnAc Black					
				SBS							R	AG 0U	AG 1H	AG 1U	AG 3U	AG 3S	AG 3SF	AG 3B	BP 1U	BP 1N	BP 2U	BP 3U	BP 3N	BP 3F	BP 3S	BP 3B	BP 3Z	CG 3H						CG 3F	Syringe Kit			
				DI																																		
1	1																														SL							
2	1																																SL					
3	1																																	SL				
4																																						
5																																						
6																																						
7																																						
8																																						
9																																						
10																																						
11																																						
12																																						

Container Codes

Glass			
DG9H	40mL HCl amber voa vial	BG1T	glass
DG9P	40mL TSP amber vial	BG1U	1L unpreserved glass
DG9S	40mL H2SO4 amber vial	CG3U	250mL Unpres Clear Glass
DG9T	40mL Na Thio amber vial	AG0U	100mL unpres amber glass
DG9U	40mL unpreserved amber vial	AG1H	1L HCl amber glass
VG9H	40mL HCl clear vial	AG1S	1L H2SO4 amber glass
VG9T	40mL Na Thio. clear vial	AG1T	1L Na Thiosulfate amber glass
VG9U	40mL unpreserved clear vial	AG1U	1liter unpres amber glass
I	40mL w/hexane wipe vial	AG2N	500mL HNO3 amber glass
WGKU	8oz unpreserved clear jar	AG2S	500mL H2SO4 amber glass
WGUFU	4oz clear soil jar	AG2U	500mL unpres amber glass
JGFU	4oz unpreserved amber wide	AG3S	250mL H2SO4 amber glass
CG3H	250mL clear glass HCl	AG3SF	250mL H2SO4 amb glass -field filtered
CG3F	250mL clear glass HCl, Field Filter	AG3U	250mL unpres amber glass
BG1H	1L HCl clear glass	AG3B	250mL NaOH amber glass
BG1S	1L H2SO4 clear glass		

Plastic			
BP1B	1L NaOH plastic	BP4U	125mL unpreserved plastic
BP1N	1L HNO3 plastic	BP4N	125mL HNO3 plastic
BP1S	1L H2SO4 plastic	BP4S	125mL H2SO4 plastic
BP1U	1L unpreserved plastic	Miscellaneous	
BP1Z	1L NaOH, Zn, Ac		
BP2N	500mL HNO3 plastic	Syringe Kit	LL Cr+6 sampling kit
BP2C	500mL NaOH plastic	ZPLC	Ziploc Bag
BP2S	500mL H2SO4 plastic	R	Terracore Kit
BP2U	500mL unpreserved plastic	SP5T	120mL Coliform Sodium Thiosulfate
BP2Z	500mL NaOH, Zn Ac	GN	General Container
BP3B	250mL NaOH plastic	U	Summa Can (air sample)
BP3N	250mL HNO3 plastic	WT	Water
BP3F	250mL HNO3 plastic-field filtered	SL	Solid
BP3U	250mL unpreserved plastic	OL	Oil
BP3S	250mL H2SO4 plastic	NAL	Non-aqueous liquid
BP3Z	250mL NaOH, ZnAc plastic	WP	Wipe
BP3R	250mL Unpres FF SO4/OH buffer		

DOCUMENT 00 3132 - GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 GEOTECHNICAL DATA

- A. This Document, with its referenced attachments, is part of the Procurement and Contracting Requirements for the Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, Owner, Architect, Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report accepts full responsibility for its use.
- C. A Geotechnical Investigation Report for Project, prepared by S&ME, Inc., dated August 26, 2022, is available for viewing as appended to this Project Manual.
 - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 2. Any party using information described in the geotechnical report will make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.
- D. Related Requirements:
 - 1. Document 003119 "Existing Condition Information" for information about existing conditions that is made available to Bidders.
 - 2. Document 003126 "Existing Hazardous Material Information" for hazardous materials reports that are made available to Bidders.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF DOCUMENT 00 3132



Report of Geotechnical Exploration
UK Health Education Building
Lexington, Kentucky
S&ME Project No. 22830088

PREPARED FOR:

JRA Architects

3225 Summit Square Place

Suite #200

Lexington, Kentucky 40509

PREPARED BY:

S&ME, Inc.

2020 Liberty Road, Suite 105

Lexington, Kentucky 40505

August 26, 2022



August 26, 2022

JRA Architects
3225 Summit Square Place
Suite #200
Lexington, Kentucky 40509

Attention: Mr. Rob Deal, AIA, LEED AP, KCID, NCARB

Reference: **Report of Geotechnical Exploration**
University of Kentucky – Health Education Building
Lexington, Kentucky
S&ME Project No. 22830088

Dear Mr. Deal:

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the new Health Education Building project on the University of Kentucky campus in Lexington, Kentucky. We performed our work in accordance with S&ME Proposal No. 22830088 dated May 4, 2022 as authorized by you. The purpose of this exploration was to obtain subsurface data at the site and provide geotechnical recommendations for design and construction of the new Health Education Building.

This report explains our understanding of the project, documents our findings, and presents our conclusion and engineering recommendations.

Sincerely,

S&ME, Inc.

A handwritten signature in blue ink, appearing to read 'A. Fiehler'.

Andrew M. Fiehler, PE
Sr. Project Engineer
Licensed Kentucky 23977

A handwritten signature in blue ink, appearing to read 'John C. Lessley'.

John C. Lessley
Vice President/Technical Principal



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- Appendix II – Boring and Sounding Summary / Test Boring Records
- Appendix III – Laboratory Testing Results
- Appendix IV – ACI 302.1R-96 “GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION”

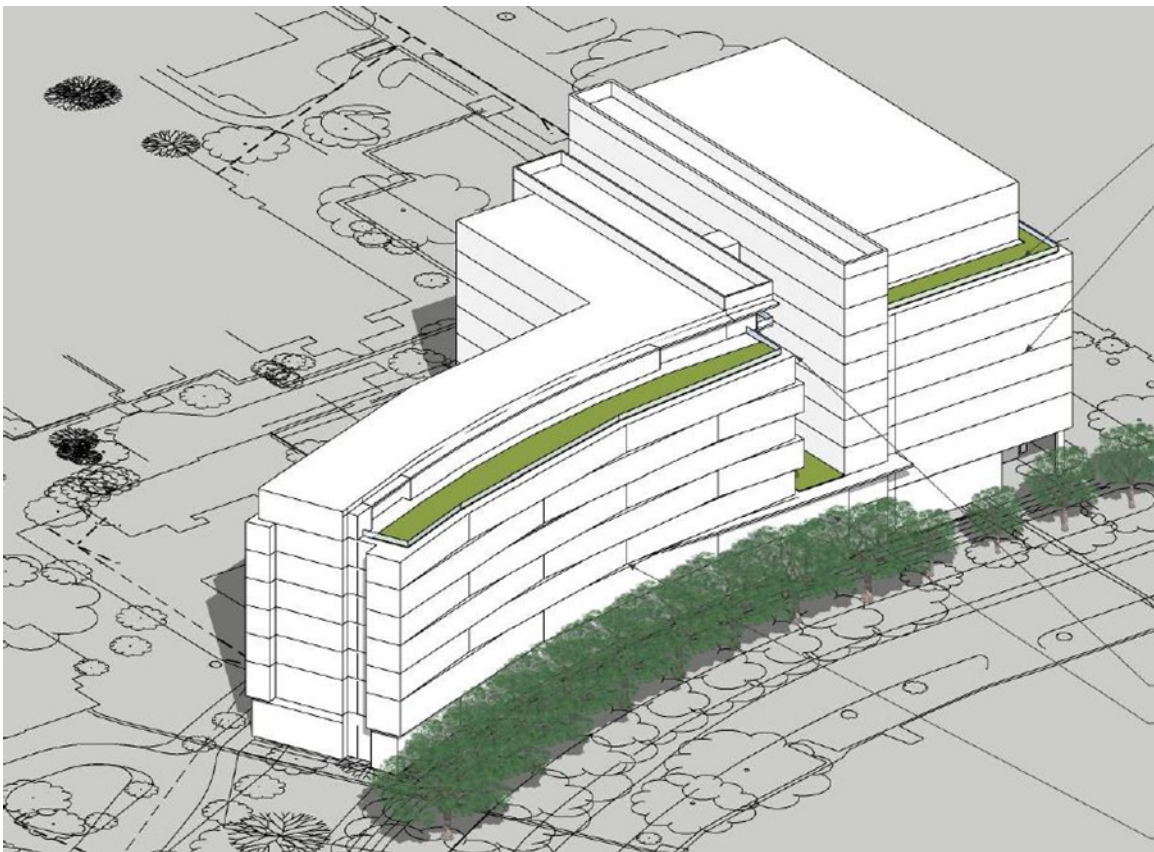
1.0 Introduction

S&ME, Inc. (S&ME) has completed our geotechnical exploration for the new Health Education Building (HEB) on the University of Kentucky campus in Lexington, Kentucky. We performed our work in accordance with S&ME Proposal No. 22830088 dated May 4, 2022 as authorized by you. The purpose of this exploration was to obtain subsurface data at the site and provide geotechnical recommendations for design and construction of the new education building.

This report explains our understanding of the project, documents our findings, and presents our conclusion and engineering recommendations.

2.0 Site and Project Description

The new HEB project design is still being refined; however, the structure will likely be a 5- to 7-story structure above grade with a basement level. The limits of the basement are also being refined. We understand that the basement will be under a portion of the building footprint rather than the entire building footprint. Below is a schematic image of the anticipated building layout.





The total building square footage will be around 450,000 square feet. Mr. Brian McMillan, PE with Brown and Kubican Structural Engineers indicated that typical column loads will range from about 1,100 to 1,400 kips with maximum column loads of near 2,000 kips.

Site development and grading plans are still being developed. We understand that the Finished Floor Elevation (FFE) will be 1002.0 feet for the main floor and 986.0 for the basement floor elevation. The provided topographic survey shows about 8 to 10 feet of relief across the site. We anticipate that site grading will consist of cuts/fills of less than 5 feet to match the adjacent grades around the new building which is currently developed. Proposed modifications to Veteran's Drive are planned as part of the HEB development.

The HEB site is currently occupied by several buildings, parking lots, and lawn areas and includes numerous existing utilities, as indicated on the provided Topographic Survey drawings prepared by Endris Engineering, Inc, dated March 29, 2022.

3.0 Geology

A review of the United States Geologic Survey (USGS) geologic map of the Lexington West Quadrangle (1967) indicates this project site is underlain by the Tanglewood Member of the Lexington Limestone Formation comprised of Ordovician aged deposits. The Tanglewood Member consists of irregularly bedded limestone and shale. Limestone comprises approximately 50 percent of the member and is described as light-gray to medium-gray, medium to coarse grained, in smooth to irregular-surfaced beds, medium to thick bedded, fossiliferous. Our recovered rock core classifications agreed with the geologic mapping of the region.

The Lexington Limestone series is prone to Karst features such as differential weathering, solution enlarged soil filled joints and sinkholes. The most common presentations of Karst development in the project area are an erratic top of rock profile due to differential weathering of the limestone and soil filled, solution enlarged joints in the bedrock. Subsurface water that may affect this project is water that infiltrates down through the soil from rainfall and collecting in solution widened joints and fractures and along the soil/rock interface. Alignments of solution enlarged fractures, sinkholes, caverns and depressions commonly indicate fracture zones followed by subsurface water courses.

The Kentucky Geological Survey (KGS) identifies this portion of Lexington as having a "moderate" potential for Karst activity. The Geologic Quadrangle mapping shows several closed depressions within one mile of the property; however, they are mapped in the underlying formations and at lower elevations than the project site. The local region has been heavily developed which may have hidden such surface indications of Karst.

From our experience on campus, we have encountered Karst features that are predominantly along a narrow valley extending from the recently constructed Woodland Glen dorms, beneath the WT Young Library, beneath the southern end of the Chemistry-Physics building, and on passed the Gatton College of Business. Several other projects where we have performed explorations on either side of this narrow valley have not exhibited signs of Karst development.

We did observe some variation in the bedrock surface (auger refusal) in our borings with these elevations ranging from 974.3 feet to 991.0 feet. Rock coring was performed of the refusal materials from four of the borings (B-8, B-11, B-15, and B-19). Recoveries of the coring ranged from 96 percent to 100 percent. Rock Quality Designations

(RQD) of the recovered cores ranged from 36 percent to 90 percent. Other than one 4 inch tall void in the upper foot of the rock core in boring B-15, we did not observe obvious signs of the development of Karst features. Thin voids in the weathered zone of the Tanglewood are not uncommon.

4.0 EXPLORATION METHODS

The procedures used by S&ME for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. Appendix II contains brief descriptions of the procedures used in this exploration.

4.1 Field Exploration

A total of 23 soil test borings were drilled for this project near locations requested by the structural engineer. The final locations were selected to avoid existing utilities or other obstructions. Prior to beginning drilling, S&ME staked the boring locations and measured the ground surface elevation at each boring location using survey grade GPS equipment. The measured locations are noted on the Boring Location Plan (Figure 2) included in Appendix I.

Mr. Deron Zierer, GIT from our office was on-site during drilling to observe pertinent surface and site features indicative of the site geology, record and log the recovered soil and rock core samples, and to direct the drilling operations.

The borings were drilled by a track-mounted Diedrich D-50 drill rig using a combination of 6-7/8 inch O.D. hollow stem augers and 4-1/4 inch O.D. solid flight augers. Soil samples were obtained using a split-barrel sampler driven by an automatic hammer system in general accordance with ASTM D1586. We also obtained relatively undisturbed (Shelby) tube samples of the soil using direct push methods. A bulk sample of auger cuttings from boring B-19 was obtained for laboratory testing to assess the moisture-density relationship.

The borings were advanced to auger refusal. As requested, 20 feet of rock coring was performed in four borings in general accordance with ASTM D2113. The recovered cores were placed in rock core sample boxes and delivered to our laboratory where the geologist and engineer logged the rock cores.

The stratification lines shown on the boring records represent the approximate boundaries between soil and rock types. The transitions may be more gradual than shown. A general description of our field procedures, a test boring record legend and Test Boring Records are provided in Appendix II of this report. Also included in Appendix II is a summary of the weathered bedrock and auger refusal depths and elevations for the borings.

4.2 Laboratory Testing

Following sample retrieval, the recovered soil samples were placed in sealed plastic storage bags. The recovered samples were returned to our laboratory where applicable laboratory tests were performed. These tests are used to assess the engineering properties of the soil. The soil samples were visually classified by an engineer according to the Unified Soil Classification System (ASTM D2487). S&ME conducted natural moisture content determinations and Atterberg limits tests on selected samples to aid in classification. We performed unconfined compressive strength testing of representative undisturbed soil and rock core samples.



We also performed moisture-density relationship testing (standard Proctor) and a California Bearing Ratio (CBR) test of the bulk samples of auger cuttings from boring B-19. A summary of laboratory test results is included in Appendix III.

5.0 SUBSURFACE CONDITIONS

As mentioned above, we drilled a total of 23 soil test borings at the project site. Ten of our borings were advanced through existing asphalt pavements and encountered 4 to 6 inches of asphalt overlying 6 to 9 inches of gravel base. The 13 borings advanced in lawn areas encountered between 1 and 5 inches of topsoil.

Ten of the borings encountered previously placed fill material beneath the surficial horizon. The fill typically classified as stiff to very stiff lean clay with varying amounts of limestone gravel and debris (most commonly brick fragments). The fill depths varied from 1 to 6 feet with an average depth of about 3 feet. Most of this material was likely placed as backfill around buried conduits without engineering control of compaction or moisture content.

Beneath the surficial materials or fill we encountered residuum consisting of low plasticity (lean) clay (CL) and low plasticity silt (ML) overlying high plasticity (fat) clay (CH) and high plasticity (elastic) silt (MH). These soils form part of the weathered profile of the Ordovician age Lexington Limestone Formation, well consolidated fine-grained sediments indicated on local geologic maps. These soils extended to refusal to the soil auger at depths of 10 to over 25 feet. Considering a basement finished floor elevation at 986 feet, most of these soils will be excavated and removed from the site, but these soils would form the majority of the side slopes of excavations made to construct basement areas. They may also form the immediate bearing surface for footings supporting light duty structures outside of basement areas. These soils will also form the immediate subgrade for pavements or floor slabs outside of basement areas.

Recovered samples were predominantly red-brown in color. Most samples manipulated by hand contained only slightly discernable free moisture. Moisture contents ranged from 14 to 38 percent oven-dried in the laboratory. Minus No. 40 sieve sizes exhibited liquid limit values of 44 to 61 percent and plastic limit values ranging from 23 to 34 percent. Plasticity Index values thus ranged from 18 to 31 percent. Liquidity Index values determined by comparison of plasticity indices to in-place moisture content varied from 0.18 to -0.48.

Standard penetration resistance N-values ranged from 5 to over 20 blows per foot. Laboratory unconfined compressive strength testing of representative undisturbed samples of the cohesive soils ranged from 1400 psf to 6150 psf. Values obtained are consistent with generally firm to very stiff soil consistency. The table below summarizes the natural moisture content, Liquid Limit, and Plasticity Indices of selected representative soil samples.

Table 5.1 - Soil Classification Summary

Soil Type	Natural Moisture Content	Liquid Limit	Plastic Limit	Plasticity Index
Lean Clay (CL)	22 to 26	44 to 46	23 to 26	18 to 24
Silt (ML)	23 to 30	46 to 48	28 to 30	17 to 20
Fat Clay (CH)	22 to 39	51 to 58	24 to 29	27 to 29
Elastic Silt (MH)	29 to 32	51 to 66	29 to 34	22 to 31



Beneath the residual soils borings penetrated weathered bedrock, generally less than one foot thick, before encountering auger refusal. We note that refusal of our drilling tools in this layer may have resulted from the presence of gravel beds, lenses or seams of cemented or hard soils, boulders or ledges of weathered or partially weathered rock, or continuous, relatively hard competent rock. Diamond core procedures would be necessary to assess the character and apparent strength of materials below refusal.

Beneath the weathered bedrock we encountered limestone with interbedded shale which extended to termination of coring. Depth to refusal encountered in the soil test borings suggest substantial variations may occur in the top of rock over very short horizontal distances, typical of limestone strata where Karst solutioning is considered mature. Refusal elevations in the borings ranged from 3.8 feet in boring B-3 to 25.4 feet in boring B-6 with an average refusal depth of about 12 feet. Greater variations may occur between borings in areas not explored.

These materials resisted penetration by soil augers and were sampled by diamond rock core methods at four locations. The recovered rock from this zone was subdivided into multiple runs ranging from 4 to 5 feet in length as determined by the length of the core barrel. Since visually the recovered core appeared fairly uniform, we did not attempt to separate the recovered core into separate runs based on observed changes in formation or material type of the recovered rock.

Rock core samples obtained examined in the laboratory consisted of moderately hard thinly laminated limestone with calcareous shale. Rock continuity within the core runs was gauged to be fairly continuous to continuous based on an average recovery of 65 to 100 percent. Rock quality as assessed using the Rock Quality Designation (RQD) value ranged from good to excellent based on RQD values of 58 to 90 percent. Weathering of the rock mass was judged to be slight in most runs. Joints were stained and the rock fabric discolored up to one inch from joint surfaces. Weathering of the rock mass was judged to be moderate in the first run of Boring B-11. There was significant discoloration and staining of the rock fabric throughout the run as well as numerous clay partings for the first two feet of the run.

Selected recovered samples of intact rock core representative of each run were cut to length and the ends machined flat. Specimens were compressed in a loading frame and axial load continuously applied until peak load and failure were obtained. Samples were soaked prior to testing. Four representative rock core samples were subjected to unconfined compressive strength testing which indicated strengths ranging from 8,812 psi to 13,098 psi with an average strength of about 11,200 psi.

Our borings were dry upon completion of soil augering. Water level measurements after coring are most likely from water used in the coring process. Seasonal and periodic variations in precipitation can affect the observed water level conditions. Perched water is often encountered near the soil/bedrock transition and should not be considered the static groundwater table which is encountered at much greater depths in central Kentucky.

Detailed Boring Logs compiled by the geotechnical engineer based on laboratory classification and visual-manual manipulation of the recovered samples are included in Appendix II. The Test Boring Summary included in Appendix II includes the boring coordinates, ground surface elevation, and the measured depths and elevations of auger refusal.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General Discussion

Our evaluation and the following discussions and recommendations are based upon a finished first floor elevation (FFE) of 1002 feet and a basement FFE elevation of 986 feet. We anticipate that bedrock supported foundations consisting of a combination of spread footings and drilled shafts will likely be used.

The following sections highlight areas of concern with development of the site and construction of the proposed facilities.

6.1.1 *Existing Fill / Disturbed Ground*

There are two existing buildings that will have to be demolished and numerous utilities relocated prior to beginning construction of the new facility. In our experience, redevelopment of a project site can be challenging. The new construction will encounter existing fill from previous development or ground disturbed by the demolition activities. Since the foundations will be mostly supported by bedrock, the risk of unacceptable structural settlements is expected to be low; however, since compression below rock bearing foundations will be negligible, settlements occurring below soil-supported footings and adjacent rock bearing foundations will be mostly differential.

Outside of proposed basement areas the first floor slab subgrade will bear near the existing surface. We recommend that existing fill or disturbed ground be excavated and replaced with acceptable structural fill to support the first floor slab subgrade. With proper site preparation, we expect that the risk to the floor slab from the existing fill or disturbed ground to be relatively low. Additional discussion on site preparation is included in the following sections of the report.

Depending on the final location of the basement, we anticipate that a significant portion of the existing fill will likely be excavated thus greatly reducing the potential impact of the existing fill.

6.1.2 *High Plasticity Clay*

The soils encountered during our exploration are typical of soils throughout Central Kentucky. The lower clay horizon at this site is a high plasticity clay based on laboratory Atterberg limits testing. Atterberg limits tests of representative Fat Clay and Elastic Silt samples obtained during this exploration indicate Liquid Limits up to 68 percent with Plasticity Indices up to 31 percent. Soils with plasticity indices greater than 30 percent have a tendency to shrink or swell with changes in moisture content. We anticipate the high plasticity soils will potentially impact the project if they are excavated from the basement area and used as structural fill. Once the grading plans are finalized, the potential impact of the high plasticity soils should be evaluated further.

Lightly-loaded structural elements such as slabs-on-grade, sidewalks, pavement areas, and non-load bearing walls are susceptible to damage from shrinking and swelling soils, particularly in areas that have been cut to grade where these soils, if present, would be at very shallow depth. Where these soils are incorporated into structural fills, swell potential can likely be reduced if the soil moisture content is kept near or above the plastic limit. In these cases soil swell is not as likely to occur. Moisture control during placement of these soils is crucial to the performance of the soil fill. Placing the higher plasticity soils deeper within the fill areas and then capping the fat



clay with lean clay or crushed stone may be more economical than wasting the high plasticity/swell-susceptible clay and importing structural soil fill. The swell potential of fat clays is of particular concern, since water may cause the fat clays to swell. Lime treatment of high plasticity clays has been shown to greatly reduce the swell potential. If construction takes place during wet periods of the year, wasting of wet soils may be required since high plasticity clays dry slowly.

6.1.3 Karst Features

As discussed in the Geology section above, the site is located in an area of moderate Karst potential. In Karst prone areas, the most common presentation of Karst development is often manifested as an erratic top of rock profile similar to the profile of auger refusal depths in the borings at this site. Other manifestations include soil filled solution enlarged joints in the bedrock, and variable weathering of the bedrock (i.e. – clay seams). From our experience on campus, such features are more common in the upper weathered zone of the bedrock. Extending foundation excavations beyond observed imperfections in the bedrock is usually the more cost effective remediation approach.

Full time observation of the foundation excavation and construction is recommended to help identify such features so they can be addressed in a timely fashion. Additional evaluation of the bedrock conditions beneath the foundations is also recommended. Discussion of methods for further evaluation of the bedrock are included Section 6.4.3. There are numerous mitigation methods that can be employed to remediate identified features. As features are encountered during construction, an engineer should evaluate the conditions and provide recommendations for the appropriate methods. Additional discussion of these methods is included in the Foundation section below.

6.2 Initial Site Preparation

A detailed site development and grading plan has not yet been finalized. Initial site preparation will require demolition of Kelley Hall and the Medical Center Annex No. 5 as well as existing asphalt driveways and parking lots. Numerous underground and overhead utilities will also have to be relocated. We understand that the majority of the trees lining University Avenue will remain; however, we anticipate that some trees within the construction footprint will have to be removed.

Based on a FFE of 1002 feet and the measured surface elevations at our borings, we expect less than 5 feet of fill will be required across the majority of the building footprint outside of basement areas. Up to 12 to 15 feet will be required at the southern end of the building footprint to achieve the required subgrade elevation. The limits of the basement have not yet been defined. Depending on the existing ground surface elevation, the limits of the basement, and the final exterior grades, cut I depths in basement areas could range from 5 to 15 feet below present exterior grade.

Prior to beginning cut and fill operations, the vegetation, topsoil, tree stumps, and other debris should be removed from the proposed construction areas. We recommend that entire rootball from any trees be removed. During demolition of the existing buildings and relocation of the utilities, the entire structure should be removed. This includes floor slabs, foundations, utilities, etc. Outside of the new basement footprint, the resulting holes from rootballs and removed foundations and other underground structures should be backfilled with compacted structural fill to reach subgrade elevation.

It is important an S&ME representative observes site stripping to assess that adequate (but not excessive) material has been stripped. Previously unexplored or unknown conditions could become evident during these operations. S&ME must judge whether the recommendations in this report should be modified in view of the conditions encountered. Once the initial site stripping is complete, S&ME should be retained to visit the site and assess the exposed grade before fill is placed. Observed soft areas should be remediated at the S&ME engineer's discretion before moving on to subsequent tasks.

Once the initial site demolition and stripping has occurred, we recommend a proofroll of the at-grade areas and areas to receive structural fill. Proofrolling consists of observing a loaded dump truck or scraper traffic over the planned fill area. Areas observed to exhibit excessive rutting and/or deflection should be remediated at the engineer's direction. Areas where planned construction bears at or near the existing site grades may require stabilizing prior to beginning construction. Either undercutting and backfilling with structural fill or aerating/drying and re-compaction of the soil will likely be required.

To control distress associated with swelling clay the upper three feet of the floor slab subgrade should have a Plasticity Index (PI) of 30 percent or less. The upper horizon of soil across the site classified as Lean Clay with a PI of less than 30 percent. Where fat clay is present within three (3) feet of the building pad subgrade elevation, we recommend undercutting and replacing with lean clay. Fat clay can be used as structural fill in deeper fill areas within the building footprint and below the top one foot of asphalt pavement subgrade. It can also be used within one foot of the subgrade elevation beneath sidewalks that lead to entrances where they are more than 20 feet from the building. If suspect soils are observed during site grading, additional Atterberg Limits testing should be performed.

Bedrock Removal

Based on the encountered refusal elevations and the proposed finished basement floor elevation of 986 feet, bedrock excavation of up to 9 feet may be necessary. It would be reasonable to anticipate that rock excavation will require hard rock removal methods such as trenching or hoe ramming. Blasting of bedrock is not typically permitted on campus. To assist the contractor in determining the appropriate rock removal method, selection of bits or teeth, and the ease or difficulty of rock excavation, S&ME performed unconfined compressive strength tests on selected samples of the recovered limestone cores. Please reference the laboratory test reports in Appendix III of this report for a summary of the determined unconfined compressive strengths. S&ME offers the following considerations for trenching and blasting:

Trenching:

A combination of heavy-duty rock trenching equipment and hoe-ramming may be used to perform the required mass rock excavation or utility installation for this project. If the contractor chooses to perform mass rock removal by trenching, the following items should be considered:

- ◆ Trenching will not require a comprehensive pre-blast survey to be conducted on all structures that have the potential to be impacted by blasting operations.
- ◆ Trenching will reduce the ground vibrations compared to blasting
- ◆ Trenching will offer more control over rock excavation but typically takes longer to perform.
- ◆ Trenching will not require the stoppage of traffic along Polo Club Boulevard or the Interstate while being performed.
- ◆ Dust control measures will need to be implemented during trenching operations.

Bedrock Evaluation

Once the mass excavation has been performed in the basement footprint, we recommend that exposed bedrock be evaluated by an S&ME engineer to assess the presence of solution features, and provide remediation recommendations, if required. Once the exposed bedrock is observed by an S&ME engineer, construction can continue in accordance with the recommendations presented later in this report.

6.3 Structural Fill Placement

6.3.1 Soil Fill

Structural fill is defined as inorganic natural soil with a maximum particle size of 3 inches and maximum dry density of at least 100 pounds per cubic foot (pcf) when tested by the standard Proctor method (ASTM D698) and a plasticity index (PI) of less than 30 percent. While the lean clay (CL) satisfies the criteria for structural soil fill, the majority of the fat clay (CH) at the site does not meet the plasticity requirements; however, it can be used in deeper fills.

We performed a standard Proctor test on a composite sample of auger cuttings from borings B-19 and 22. The table below summarizes the standard Proctor test results.

Sample ID/Location	Maximum Dry Density (pcf)	Optimum Moisture Content	Liquid Limit / Plasticity Index
B-18/22	104.3	20.5	44 / 22

It is imperative that, during construction, additional standard Proctor testing and Atterberg limits testing of fill soils should be performed by S&ME for compliance with the project specifications before they are used as fill material. If soils are imported to the site, we recommend the soils be tested for conformance with the project specifications before being transported to the site. Please realize laboratory conformance testing usually takes three to four business days to complete; therefore, the Contractor should plan accordingly.

Structural fill placement should occur in relatively thin (6 to 8-inch) layers and be compacted to at least 98 percent of the standard Proctor maximum dry density beneath the foundation and 95 percent of the standard Proctor maximum dry density in pavement areas. For fills greater than 10 feet in height, we recommend at least 100 percent of the standard Proctor maximum dry density. The moisture content of the fill should be maintained within 2 percent of the soil's optimum moisture content even though compaction may be achieved at moisture contents outside the specified range.

The upper three feet of structural fill beneath building pads, the last 20 feet of sidewalks connecting to building entrances, and concrete pavements should consist of lean clay soils with a plasticity index less than 30 percent, KYDOT Dense Graded Aggregate (DGA) or quarry screenings. Do not use fat clay with a PI of greater than 30 percent as fill within three feet of subgrade beneath the building, sidewalks connecting to entrances, and concrete pavements, as the expansive properties of the fat clay may result in unwanted swell and distress to lightly loaded structural elements such as sidewalks, pavements, etc. Excavated fat clay should be used in greenspace or non-structural areas that are not planned for future development or in deep fill areas.



In-place density testing must be performed on structural fill as a check that the recommended compaction criteria have been achieved. This allows our project engineer to evaluate the quality of the fill construction and assess that the design criteria is being achieved in the field. We further recommend these tests be performed on a full-time basis by S&ME. The testing frequency for density tests performed on a full-time basis can be determined by our personnel based on the area to be tested, the grading equipment used, and construction schedule. Tests should be performed at vertical intervals of 8-inches or less (the recommended lift thickness) as the fill is being placed.

6.4 Foundation Recommendations

S&ME recommends the foundations for the health education building extend through the soil and weathered bedrock to bear on intact bedrock. Depending on bearing elevation and location within the structure, foundations may consist either of shallow rock bearing footings or drilled shafts extending into rock. We recommend use of an allowable bearing pressure to **70 ksf** (kips per square foot) to size foundations bearing on intact, relatively unweathered limestone bedrock similar to recovered materials in the four rock core borings. For drilled shafts or shallow foundations bearing on intact bedrock, we anticipate both total and differential settlements of approximately 1/4 of an inch or less, not including elastic compression of the foundations.

For foundations resisting uplift forces and relying on resistance of the concrete to bedrock bond to do so, they should be socketed into bedrock using an allowable net uplift design value of 4,000 psf for the concrete to bedrock bond zone. The weathered bedrock zone should be ignored when measuring the rock socket for uplift resistance.

Project conceptual plans suggest a partial basement only, with foundations in the remaining portions of the building bearing close to existing grade. In addition, boring data suggest numerous slots or fissures in soils extend below the proposed basement floor elevation. We expect a combination of end bearing drilled shafts and spread footings bearing on bedrock will be used. The following sections include more detailed recommendations for each of the anticipated foundation types.

6.4.1 Drilled Shaft Design and Construction Considerations

For drilled shafts we recommend a minimum rock socket of 12-inches into intact bedrock. Additionally, a 25 percent increase in the allowable axial unit end bearing pressure may be used for short term (transient) load increases. At that magnitude of transient increase, deflections will be within the elastic response zone of the rock and will not result in permanent deflection. S&ME recommends that increases in design values for short term loadings due to wind and seismic loads be in accordance with the Kentucky Building Code or other applicable Code. For uplift resistance, an allowable unit side resistance for the unweathered limestone of 125 psi can be used (assuming 4,000 psi concrete for the drilled shafts).

The following construction considerations are recommended for end bearing drilled shaft construction:

End Bearing

- ◆ Clean the foundation bearing area so it is nearly level or suitably benched and is free of ponded water or loose material.
- ◆ Provide a minimum drilled shaft diameter of 30 inches to reasonably enter the drilled shaft excavation for cleaning, bottom preparation, and inspection.



- ◆ Make provisions for groundwater removal from the drilled shaft excavation after rainfall events. Subsurface water often occurs along the soil/rock interface for several days after rain. If water is flowing into the drilled shaft at less than 20 gallons per minute, pumps may be used to maintain less than 2 inches of water in the drilled shaft during cleaning and inspection. After approval of the bearing surface, the pumps should be pulled and concreting commenced immediately. If more than 20 gallons per minute are flowing into the drilled shaft, the water level should be allowed to stabilize before attempting to place the concrete. For this condition, concrete placement should be accomplished using a tremie pipe or concrete pumping equipment.
- ◆ Specify a concrete slump of 7 to 9 inches for the drilled shaft construction. This slump is recommended to fill irregularities along the sides and bottom of the drilled shaft, displace water as it is placed, and permit placement of reinforcing cages into the fluid concrete.
- ◆ Retain S&ME personnel to observe foundation excavations after the bottom of the hole is leveled, cleaned of any mud or extraneous material, and de-watered.
- ◆ Install temporary (if no voids greater than 6 inches are encountered) or permanent (if voids greater than 6 inches are encountered) protective steel casing or Sonotube to prevent side wall collapse, prevent excessive mud and water intrusion, and to allow workers to clean and inspect the drilled shaft.
- ◆ Where temporary casing is required, the protective steel casing may be extracted as the concrete is placed provided a sufficient head of concrete is maintained inside the steel casing to prevent soil or water intrusion into the newly placed concrete.
- ◆ Direct the concrete placement into the drilled shaft through a centering chute or tremie to reduce side flow or segregation.

Side Resistance

- ◆ For side resistance design, we will require cleaning of the socket "face" prior to concrete placement. Cleaning will require hand cleaning or washing if a mud smear forms on the face of the rock. The geotechnical engineer should approve the rock socket surface prior to concrete placement.
- ◆ Provide a minimum drilled shaft diameter of 30 inches to reasonably enter the drilled shaft excavation for cleaning, rock socket face preparation, and inspection.
- ◆ Make provisions for groundwater removal from the drilled shaft excavation after rainfall events. Subsurface water often occurs along the soil/rock interface for several days after rain. If water is flowing into the drilled shaft at less than 20 gallons per minute, pumps may be used to maintain less than 2 inches of water in the drilled shaft during cleaning and inspection. After approval of the bearing surface, the pumps should be pulled and concreting commenced immediately. If more than 20 gallons per minute are flowing into the drilled shaft, the water level should be allowed to stabilize before attempting to place the concrete. For this condition, concrete placement should be accomplished using a tremie pipe or concrete pumping equipment.
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- ◆ Retain S&ME personnel to observe foundation excavations after the bottom of the hole is leveled, cleaned of mud or extraneous material, and de-watered.
- ◆ Install temporary (if no voids greater than 6 inches are encountered) or permanent (if voids greater than 6 inches are encountered) protective steel casing or Sonotube to prevent side wall collapse, prevent excessive mud and water intrusion, and to allow workers to clean and inspect the drilled shaft.



- ◆ Where temporary casing is required, the protective steel casing may be extracted as the concrete is placed provided a sufficient head of concrete is maintained inside the steel casing to prevent soil or water intrusion into the newly placed concrete.
- ◆ Direct the concrete placement into the drilled shaft through a centering chute or tremie to reduce side flow or segregation.

6.4.2 Drilled Shaft Rock Excavations

Our experience indicates general drilled shaft construction and delineation of "rock" in the excavation is greatly facilitated if adequate drilling equipment is used. We recommend the use of a drill capable of producing at least 500,000 inch-pounds of torque and 35,000 pounds of downward force. Additionally, we recommend that rock be defined as material which cannot be penetrated by a heavy-duty earth auger with hardened teeth at a rate in excess of 3 inches per minute.

Note that the unconfined compressive strengths for the tested rock cores are relatively high for limestone in Central Kentucky. The drilled shaft contractor should review the attached laboratory results when preparing/bidding the project.

6.4.3 Drilled Shaft Quality Control Requirements

We recommend that the drilled shaft construction be observed by an S&ME geotechnical engineer or an S&ME, ICC Certified Special Inspector experienced in drilled shaft construction. The observation should address the following items:

- ◆ Top location within tolerances
- ◆ Correct plan dimensions
- ◆ Plumbness within tolerances
- ◆ Materials excavated agree with borings
- ◆ Statement of bottom cleanliness
- ◆ Construction procedure

Drilled shafts with diameters of 30-inches or greater are large enough to allow a down-hole inspection of the bearing conditions. S&ME will assess the rock condition during construction using 2-inch diameter probe holes to evaluate the actual condition at each shaft location. Specifications are typically written to require the contractor to perform at least one probe hole per shaft at his expense and provide access to the base of the shaft for the engineer to examine the bearing materials.

We recommend drilling the probe holes at least 5-feet into the rock-bearing material for all drilled shafts. These probe holes are usually drilled with a pneumatic percussion drill by the Contractor. S&ME will check the probe hole using a hooked-end steel feeler rod to assess the rock continuity and to check for the presence of mud seams or voids. If this check indicates a discontinuity or void in the rock, our Engineer will compute the expected settlement for that shaft using elastic theory. If the calculated settlement exceeds the allowable, our Engineer will require that the drilled shaft be excavated deeper. Additional probe holes may be required by the S&ME Geotechnical Engineer to check foundations supported on marginal material.



6.4.4 *Bedrock Evaluation Alternatives*

There are several alternatives to physically sending a person into the drilled shaft excavation to drill a test hole and another to inspect the test hole. These include either coring of the bedrock or using geophysical methods to evaluate the bedrock at individual drilled shaft locations.

There are numerous benefits to either coring the bedrock at each drilled shaft location or using geophysical testing methods including:

- ◆ Setting the final bearing elevation/depth and shaft lengths prior to finalization of bids resulting in fewer unknowns during bidding or change orders during construction.
- ◆ Fewer delays and/or change orders during construction resulting from having to extend drilled shaft excavations that encounter unsuitable conditions that were not observed during the geotechnical exploration.
- ◆ The reinforcing cages can be constructed off-site since the shaft length is known. We anticipate that the project site will likely be congested. Eliminating an area for constructing rebar cages will help reduce such congestion.
- ◆ Eliminating the need to send workers into the excavation to drill a test hole or inspect the test hole. This is an improvement in jobsite safety as well as efficiency during drilled shaft excavation.

One option for bedrock evaluation is to use conventional rock coring methods to sample the bedrock at each drilled shaft location. This approach has been performed on numerous projects and provides a physical sample of the bedrock that can be measured and analyzed. The engineer can then provide a recommended bearing elevation for the drilled shafts.

Another option for bedrock evaluation is to use optical and acoustic televiwers to observe probe holes drilled into the bedrock. The probe holes need to be at least 3-inches in diameter but can be drilled with air-track equipment (similar to drills used for blasting) which are typically faster and less expensive than a conventional rock core drill. After installing PVC casing in the soil overburden, the televiwers are lowered into the borehole. Optical televiwers utilize recordings from a high resolution CMOS digital image sensor combined with a fisheye lens to provide a continuous digital image. Acoustic televiwers use ultrasound pulses from a rotating sensor to record the amplitude and travel time of the signals reflected at the interface between fluids and the borehole wall. The combination of these televiwers provide direct measurements of the bedrock in-situ including height and depth of voids or seams as well as strike, dip, and aperture of planar features.

Both coring and drilling of the probe holes and use of the geophysical testing can be performed before the drilled shaft contractor mobilizes. Scheduling of either the coring or geophysical televiwers must be included in the project scheduling. The existing buildings will have to be demolished prior to mobilizing the core or probe hole drill. Typically, the building construction starts immediately after demolition. Some amount of time must be allowed after demolition for the drill crew(s) to complete the coring and for analysis of the rock cores to set the bearing elevations. The greater number of drilled shafts that are planned, the greater the amount of time will be required.

Note that either the core holes or probe holes should be drilled nearer the perimeter of the drilled shaft footprint than the center. If the core or probe hole is not dead center of the drilled shaft location, the lead teeth of the drilled shaft rig augers can follow the core/probe hole and drag the shaft off-center or out of plumb.



Even if either of these methods are used, a qualified technician should observe the shaft construction and the six bullet points noted above.

6.4.5 Spread Footing Design and Construction Considerations

We anticipate that foundations in the basement portion of the building will consist of spread footings bearing on bedrock. Where bedrock is near the foundation bearing elevation, over-excavating through the soil and weathered bedrock and backfilling to re-establish the foundation bearing elevation with lean concrete is an acceptable alternative provided the bedrock surface has been observed before backfilling. Foundations should be excavated through overlying materials to bear entirely on acceptable bedrock. We recommend a minimum 28-day compressive strength of 4,000 psi concrete be used for backfilling beneath foundations.

For resistance to lateral or sliding forces of foundations bearing on the limestone bedrock, we recommend a friction factor of 0.7 be used for design. Socketing or keying spread footings into bedrock can also be used to resist lateral forces.

To evaluate the bedrock beneath the spread footings, we recommend that 2-inch diameter probe holes be drilled to assess the continuity of the underlying bedrock. We recommend at least one probe hole be drilled every 25 feet along continuous footings. Additionally, at least one probe hole may be requested for each column footing. Two or more probe holes may be required, at the discretion of the engineer, when the footing sizes exceed 25 square feet. We recommend that the project budget contain a unit price contingency for additional probe hole drilling if additional probe holes are required based on encountered subsurface conditions.

The probe holes should be drilled to a depth of 5 feet into the bedrock-bearing material for all spread footing foundations. These probe holes are usually drilled with a pneumatic percussion drill. The engineering technician should check the probe hole using a hooked-end steel feeler rod to assess the bedrock continuity. If this check indicates a discontinuous or compressible seam in the bedrock, the foundation should be excavated deeper. Additional probe holes may be required by the Geotechnical Engineer to check foundations supported on marginal material.

Since the foundations will bear on bedrock, the frost depth requirement will not apply. We recommend all foundations have a minimum footing width of 24 inches to allow for hand cleaning of footing subgrades disturbed by the excavation process and the placement of reinforcing steel. The reinforcing steel should be clean and dry prior to concrete placement.

6.4.6 Seismic Site Classification

The current seismic design procedures outlined in the NEHRP (National Earthquake Hazard Reduction Program) guidelines mandate structural design loads to be based on the seismic coefficients of the site. Based on the results of our exploration and the geology of the area, we recommend **a site seismic classification of "C"** for this project site. This classification is further defined in the Kentucky Building Code.

6.5 Below Grade Walls

Basement walls will be required to resist the lateral earth pressures of the soil and backfill within the Rankine zone. Please note that the following information is only for the design of basement walls and should not be used for the design of any other retaining structures.

The lateral earth pressure coefficients listed below assume the excavation between the wall and the face of the limestone will be backfilled with compacted KYDOT No. 57 crushed stone of sufficient width that a Rankine failure surface could develop within the crushed stone backfill. The Rankine failure surface is defined by a 1H:1V slope projected from the rear base of the wall where it meets the foundation to the proposed finished grade. In areas where the face of the limestone falls within the Rankine failure surface, the lateral earth pressure coefficients will be conservative. The No. 57 crushed stone will also be conducive to draining water from around the basement walls. A geo-synthetic filter fabric should be placed between the crushed stone and the retained soil to help prevent migration of soil into the stone.

Where pavements are near the building, the wall design should also factor in the lateral load imparted by the traffic loads. This is often modeled as a traffic surcharge strip load of 250 psf over the driving lane.

We recommend that the below grade wall design include drainage such as a prefabricated drain board or two feet wide zone of KYDOT No. 57 crushed stone immediately behind the wall. Some areas of basement walls could employ single-form construction where the wall is backed by bedrock. Where single-form construction is used, a prefabricated drainage board should be installed and connected to the foundation drain system.

The remainder of the material behind the wall will consist of undisturbed residual soil and structural soil fill. As such, the lateral earth pressures exerted on the wall will predominantly be influenced by soil. We recommend that the KYDOT No. 57 crushed stone include a sock covered, perforated drainage pipe that will allow water to be channeled away from the wall and discharged into a storm sewer or drained to daylight away from the building. The following chart indicates the recommended values associated with stone and clay backfill for the various lateral earth pressure coefficients for horizontal backfill surface. We recommend that the At-Rest coefficient be used for below grade walls that are not free to rotate.

S&ME recommends the At-Rest coefficient be used for the basement wall design. As requested, the following table provides the Active, At-Rest, and Passive pressure coefficients

Backfill Material	Φ'	Unit Weight	Active (K_a)	At-Rest (K_o)	Passive (K_p)
KYDOT No. 57 Stone	40°	105 pcf	0.22	0.35	4.6
Soil Backfill	24°	120 pcf	0.42	0.59	2.3

Depending on the limits of the basement and other site constraints, shoring of the basement excavations may be required. Once the building design and site development plans have been completed, additional evaluation of the excavation plan and requirements for shoring should be evaluated. We understand that there is a major underground utility route containing steam lines and several other utilities that would be costly to relocate. We also understand that the trees lining University Avenue are to remain. Care must be taken when designing tie-backs (if used) to prevent damaging both utilities and the root systems of the trees.

6.6 Floor Slab Recommendations

The planned building will have a first floor FFE of 1002 feet and a basement FFE of 986 feet. Based on the observed surface elevations and planned site development, the first floor slab will be supported by a combination of residual clay and newly placed and compacted fill. We anticipate that a portion of the first floor slab will also



bear on the backfill behind the basement walls. In our experience, floor slabs supported on basement wall backfill have a tendency to settle and crack near the cut/fill transition. Constructing the portion of the slab adjacent to the basement wall to be structurally supported by the basement wall is one method to help reduce the potential for floor cracking. Constructing the first floor slab to be entirely structurally supported is also an option; however, doing so is expensive. Compacting the basement wall backfill to 100% of the standard Proctor maximum dry density can help reduce the potential for settlement. This approach is often difficult to achieve in the field during construction.

We recommend the upper three feet of the building pad subgrade consist of low plasticity fill with a plasticity index (PI) of less than 30 percent, Dense Graded Aggregate (DGA), or quarry screenings.

Where bedrock excavation is required to achieve the planned basement floor elevations, we recommend over-excavating the bedrock to allow for a minimum of 2-feet of crushed stone beneath the floor slab. We also recommend consideration be given to removing the soil from beneath the basement floor slab where bedrock excavation is not required. The intent of the over-excavation is to soften the transition where the slab will bear on bedrock to bearing on soil. The crushed stone will also aid in draining water from beneath the floor slab.

We recommend that control joints be placed in the slab around columns and along footing supported walls to reduce cracking due to minor differential settlements. We recommend that ACI 302.1R-96 "GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION" be followed for design and placement of concrete floor slabs, see attached form in Appendix V to this report.

Between completion of grading and slab construction, floor slab subgrades are often disturbed by weather, footing and utility line installation, and other construction activities. For this reason, the subgrade should be evaluated by an S&ME engineer immediately prior to constructing the slab.

6.7 Pavement Recommendations

New pavement areas are anticipated around the health education building; however, the site development plans have not yet been finalized thus we do not know the extent or planned usage of the pavement areas.

In order for the pavement to perform satisfactorily, the subgrade soils must have sufficient strength and be stable enough to avoid deterioration from construction traffic and support the paving equipment. In addition, the completed pavement section must resist freeze/thaw cycles and wheel loads from traffic. Generally, construction traffic loading is more severe than the traffic after construction.

Typical asphalt pavement is designed for a lifespan of 20 years. While the northwest parking lot will likely have a life of about 5 years, the south parking lot pavement will have a life of approximately 10 years if the current development phasing is followed. Placing a slightly thinner pavement section in these areas could provide for savings in the initial construction as well as during demolition of the parking lot for the future construction. However, the owner must be willing to assume some risk of premature failure in the form of cracking and/or bird baths in the pavement surface.

Minimizing infiltration of water into the subgrade and rapid removal of subsurface water are essential for the successful long-term performance of the pavement. Both the subgrade and the pavement surface should have a minimum slope of one-quarter inch per foot to promote surface drainage. Edges of the pavement should provide

a means of water outlet by extending the aggregate base course through to side ditches. Side ditches should be at least 2 feet below the pavement surface.

The pavement materials should conform and be placed and compacted in accordance with the applicable sections of the Kentucky Transportation Cabinet (KTC) Standard Specifications for Road and Bridge Construction, latest edition. We used the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures (1993) as a basis for our flexible pavement thickness analysis. The total pavement thickness requirement is a function of the CBR. We performed CBR testing on three samples from the site which are summarized below.

Sample ID/Location	Maximum Dry Density (psf)	Optimum Moisture Content	CBR at 95% MDD
B-19/22	104.3	20.5	8.8

While the laboratory testing indicated a CBR value 8.8 percent, we recommend a CBR of 4 percent for pavement design calculations, based on our experience with similar soils in the vicinity of the project site.

The following parking lot pavement design recommendations are based on the assumptions of a 20-year service life, a CBR value of 3 percent, 15,000 ESAL's for light duty pavement (light duty parking lot) and 30,000 ESAL's for heavy duty pavement (drive lanes and drop off lanes). If actual or anticipated traffic volumes exceed the estimated ESAL value used for this design, S&ME must re-evaluate the pavement thickness recommendations. The total pavement thickness requirement is obtained from the AASHTO nomograph in terms of a structural number (SN), a weighted sum of the pavement layer thicknesses accounting for their structural and drainage properties.

S&ME recommends that the pavement section (base stone and asphalt) be placed after the majority of the new building construction has been completed. S&ME recommends that both binder and surface mix asphalt be placed sequentially before traffic is allowed on the new pavement. S&ME recommends that the light duty pavement section be used for automobile parking only.

The following pavement thickness design thickness recommendations will likely NOT provide a sufficient pavement for haul roads or construction traffic. Expect that at least isolated repairs will be required to roadways following major phases of construction. If construction sequencing requires that new pavement areas be constructed prior to substantial completion of the building, do not allow construction traffic on the finished pavement.

S&ME recommends the following flexible asphalt pavement sections for this project:

Table 6-1 – Flexible Pavement Bearing on Soil

Material	Light Duty	Heavy Duty	KY Transportation Cabinet Specification
Asphalt Surface Course	1-½ Inches	1-½ Inches	Section 400
Asphalt Binder Course	3 Inches	4 Inches	Section 400
Crushed Stone Base	5 Inches	6 Inches	Section 303



Our pavement recommendations are based on the assumption that S&ME is retained to monitor installation of the asphalt and base, check the installed thickness of the aggregate materials, and perform in-place density tests. Asphalt placement should be monitored full-time to observe placement and compaction procedures. Asphalt samples should be collected periodically and tested for asphalt cement content, aggregate gradation, and density.

Impervious Concrete Pavement Alternative – We recommend that in areas where heavy, concentrated loads (i.e., dumpster area, entrances, loading docks, etc.) are expected, a rigid (concrete) pavement section be used. For dumpster areas, we recommend that rigid pavement be extended beyond the dumpster pad for the entire length of the garbage truck loading area. The pavement subgrade should be stabilized in accordance with the recommendations for the asphalt paved areas, and the related recommendations in this report. We recommend that the concrete pavement be supported by at least a 6-inch layer of compacted DGA. The DGA should be compacted to a minimum of 95 percent of the standard Proctor maximum dry density. We recommend a minimum concrete section of 6 inches for this site. The concrete should be air-entrained and have a 28-day compressive strength of 4,500 psi. Joint spacing should be at a maximum spacing of 15 feet each way.

7.0 FOLLOW-UP SERVICES

Our services should not end with the submission of this geotechnical report. S&ME should be kept involved throughout the design and construction process to maintain continuity and to assess whether our recommendations are properly interpreted and implemented. To achieve this, we should be retained to review project plans and specifications with the designers to see that our recommendations are fully incorporated. We also should be retained to observe and test the site preparation, foundation excavation, and building construction. If we are not allowed the opportunity to continue our involvement on this project, we cannot be held responsible for the recommendations in this report.

Our familiarity with the site and with the foundation recommendations will make us a valuable part of your construction quality assurance team. In addition, a qualified engineering technician should observe and test all structural concrete and steel. Only experienced, qualified persons trained in geotechnical engineering and familiar with foundation construction should be allowed to evaluate and test foundation excavations. Normally, full-time observations and testing of the site work and foundation installation is appropriate.

8.0 LIMITATIONS OF REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other representation or warranty either express or implied, is made.

We relied on project information given to us to develop our conclusions and recommendations. If project information described in this report is not accurate, or if it changes during project development, we should be notified of the changes so that we can modify our recommendations based on this additional information if necessary.

Our conclusions and recommendations are based on limited data from a field exploration program. Subsurface conditions can vary widely between explored areas. Some variations may not become evident until construction. If conditions are encountered which appear different than those described in our report, we should be notified. This report should not be construed to represent subsurface conditions for the entire site.



Unless specifically noted otherwise, our field exploration program did not include an assessment of regulatory compliance, environmental conditions or pollutants or presence of any biological materials (mold, fungi, bacteria). If there is a concern about these items, other studies should be performed. S&ME can provide a proposal and perform these services if requested.

S&ME should be retained to review the final plans and specifications to confirm that earthwork, foundation, and other recommendations are properly interpreted and implemented. The recommendations in this report are contingent on S&ME's review of final plans and specifications followed by our observation and monitoring of earthwork and foundation construction activities.

For more information on the use and limitations of this report, please read the Geoprofessional Business Association (GBA) document that follows this page.



Important Information About Your Geotechnical Engineering Report

Variations in subsurface conditions can be a principal cause of construction delays, cost overruns and claims. The following information is provided to assist you in understanding and managing the risk of these variations.

Geotechnical Findings Are Professional Opinions

Geotechnical engineers cannot specify material properties as other design engineers do. Geotechnical material properties have a far broader range on a given site than any manufactured construction material, and some geotechnical material properties may change over time because of exposure to air and water, or human activity.

Site exploration identifies subsurface conditions at the time of exploration and only at the points where subsurface tests are performed or samples obtained. Geotechnical engineers review field and laboratory data and then apply their judgment to render professional opinions about site subsurface conditions. Their recommendations rely upon these professional opinions. Variations in the vertical and lateral extent of subsurface materials may be encountered during construction that significantly impact construction schedules, methods and material volumes. While higher levels of subsurface exploration can mitigate the risk of encountering unanticipated subsurface conditions, no level of subsurface exploration can eliminate this risk.

Geotechnical Findings Are Professional Opinions

Professional geotechnical engineering judgment is required to develop a geotechnical exploration scope to obtain information necessary to support design and construction. A number of unique project factors are considered in developing the scope of geotechnical services, such as the exploration objective; the location, type, size and weight of the proposed structure; proposed site grades and improvements; the construction schedule and sequence; and the site geology.

Geotechnical engineers apply their experience with construction methods, subsurface conditions and exploration methods to develop the exploration scope. The scope of each exploration is unique based on available project and site information. Incomplete project information or constraints on the scope of exploration increases the risk of variations in subsurface conditions not being identified and addressed in the geotechnical report.

Services Are Performed for Specific Projects

Because the scope of each geotechnical exploration is unique, each geotechnical report is unique. Subsurface conditions are explored and recommendations are made for a specific project.

Subsurface information and recommendations may not be adequate for other uses. Changes in a proposed structure location, foundation loads, grades, schedule, etc. may require additional geotechnical exploration, analyses, and consultation. The geotechnical engineer should be consulted to determine if additional services are required in response to changes in proposed construction, location, loads, grades, schedule, etc.

Geo-Environmental Issues

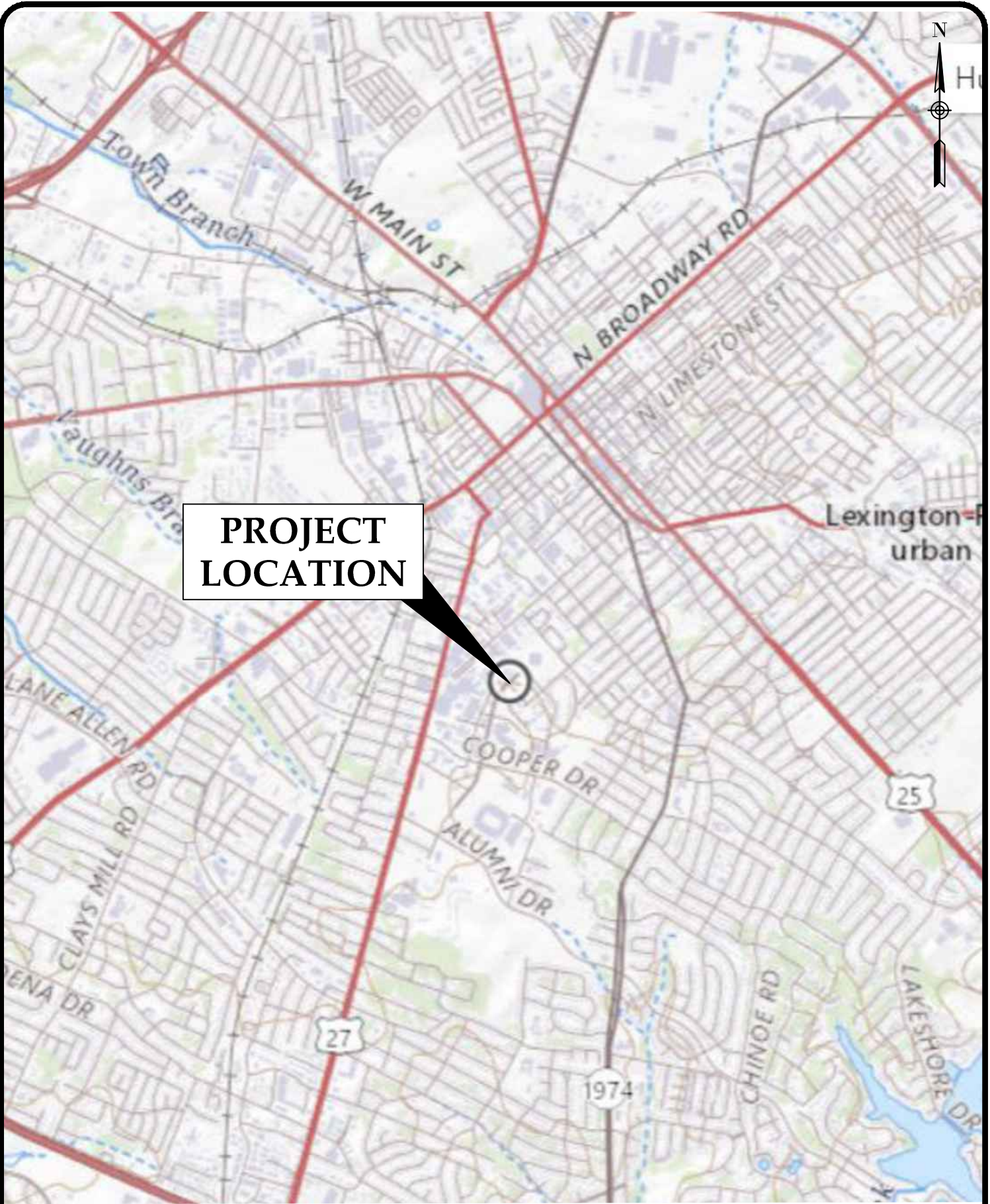
The equipment, techniques, and personnel used to perform a geo-environmental study differ significantly from those used for a geotechnical exploration. Indications of environmental contamination may be encountered incidental to performance of a geotechnical exploration but go unrecognized. Determination of the presence, type or extent of environmental contamination is beyond the scope of a geotechnical exploration.

Geotechnical Recommendations Are Not Final

Recommendations are developed based on the geotechnical engineer's understanding of the proposed construction and professional opinion of site subsurface conditions. Observations and tests must be performed during construction to confirm subsurface conditions exposed by construction excavations are consistent with those assumed in development of recommendations. It is advisable to retain the geotechnical engineer that performed the exploration and developed the geotechnical recommendations to conduct tests and observations during construction. This may reduce the risk that variations in subsurface conditions will not be addressed as recommended in the geotechnical report.



Appendix I – Site Location Plan / Boring Location Plans



VICINITY MAP

UK Health Education Building
Huguelet Drive
Lexington, Kentucky

SCALE:

NTS

DATE:

08/15/2022

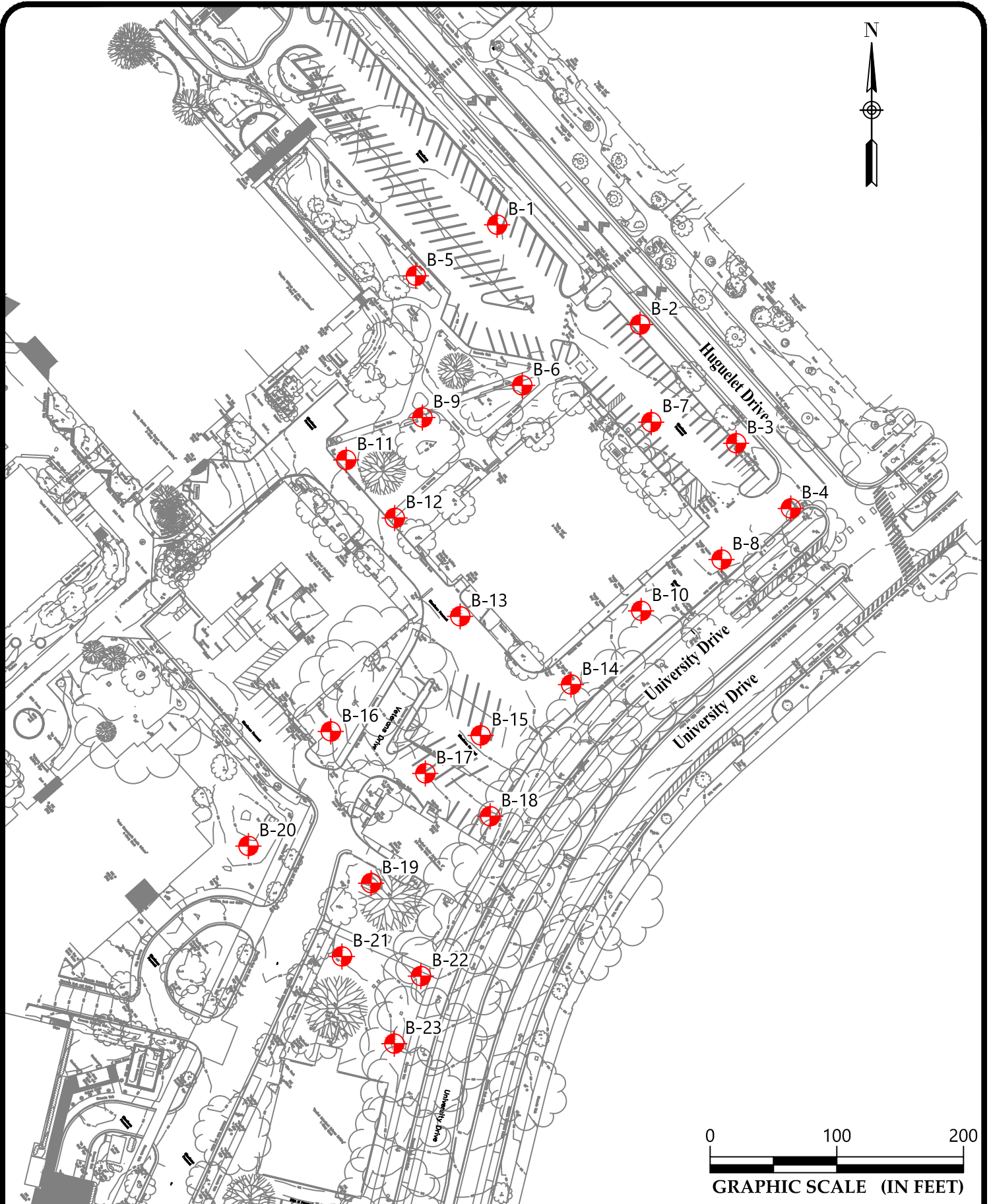
PROJECT NUMBER

22830088

FIGURE NO.

1

Drawing Path: T:\GEO\Projects\2022\22830088_JRA_UK Health Education Building_Lexington, KY\4 GEO\CAD\22830088_FIG 1&2.dwg



BORING LOCATION PLAN

UK Health Education Building
Huguelet Drive
Lexington, Kentucky

SCALE:	FIGURE NO.
1" = 100'	2
DATE:	
08/15/2022	
PROJECT NUMBER	
22830088	



Appendix II – Boring Summary / Test Boring Logs

TEST BORING LOG LEGEND

FINE AND COARSE GRAINED SOIL INFORMATION

COARSE GRAINED SOILS (SANDS AND GRAVELS)

<u>N</u>	<u>Relative Density</u>
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
Over 50	Very Dense

FINE GRAINED SOILS (CLAYS AND SILTS)

<u>N</u>	<u>Consistency</u>
0-2	Very Soft
3-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
Over 30	Hard

PARTICLE SIZE

Boulders	Greater than 300 mm (12")
Cobbles	75 mm—300 mm (3-12")
Gravel	4.75 mm—75 mm (3/16-3")
Coarse Sand	2 mm—4.74 mm
Medium Sand	.425 mm—2 mm
Fine Sand	0.075 mm—0.425 mm
Silts and Clays	Less than 0.075 mm

The STANDARD PENETRATION TEST as defined by ASTM D 1586 is a method to obtain a disturbed soil sample for examination and testing and to obtain relative density and consistency information. A standard 1.4-inch I.D. / 2.0-inch O.D. split barrel sampler is driven three 6-inch increments with a 140 lb. hammer falling 30 inches. The hammer can either be of a trip, free-fall design, or actuated by a rope and cathead. The blow counts required to drive the sampler the final two 6-inch increments are added together and designated the N-value defined in the above tables.

ROCK PROPERTIES




RQD

<u>Percent RQD</u>	<u>Quality</u>
0-25	Very Poor
25-50	Poor
50-75	Fair
75-90	Good
90-100	Excellent

ROCK HARDNESS

Very Hard	Rock can be broken by heavy hammer blows.
Hard	Rock cannot be broken by thumb pressure, but can be broken by moderate hammer blows.
Moderately Hard	Small pieces can be broken off along sharp edges by considerable thumb pressure; can be broken with light hammer blows.
Soft	Rock is coherent but breaks very easily with thumb pressure at sharp edges and crumbles with firm hand pressure.
Very Soft	Rock disintegrates or easily compresses when touched; can be hard to very hard soil.

KEY

	Undisturbed Sample
	Standard Penetration Test Sample
	Rock Core Sample

<u>Core Diameter (I.D.)</u>	<u>Inches</u>
BQ	1-7/16
NQ	1-7/8
HQ	2-1/2

$$RQD = \frac{\text{Sum of 4" and Longer Rock Pieces Recovered}}{\text{Length of Core Run}} \times 100$$

(Rock Quality Designation)

$$REC = \frac{\text{Length of Rock Core Recovered}}{\text{Length of Core Run}} \times 100$$

(Recovery)

SOIL PROPERTY SYMBOLS

N	Standard Penetration, BPF
NMC	Natural Moisture Content, %
LL	Liquid Limit, %
PL	Plastic Limit, %
PI	Plasticity Index, %
PPV	Pocket Penetrometer Value, TSF
Qu	Unconfined Compressive Strength, TSF
Yd	Dry Unit Weight, PCF
F	Fines Content



UK Health Education Building
Boring Summary
S&ME Project No. 22830088

	Northing	Easting	Surface Elevation	Refusal Depth	Refusal Elevation
B-1	193861.6743	1567011.871	1000.1	14.4	985.7
B-2	193783.4788	1567124.618	998.8	16.4	982.4
B-3	193695.9776	1567201.733	999.5	11.3	988.2
B-4	193637.9824	1567243.507	1000.3	10.8	989.5
B-5	193820.7441	1566947.643	1000.2	19.5	980.7
B-6	193735.065	1567031.548	999.7	25.4	974.3
B-7	193704.3662	1567133.486	999.6	16.3	983.3
B-8	193596.9889	1567188.93	1001.3	11.3	990.0
B-9	193706.9747	1566952.751	999.7	14.4	985.3
B-10	193556.4525	1567125.356	1001.1	14.8	986.3
B-11	193674.2976	1566892.642	998.5	8.0	990.5
B-12	193626.5699	1566934.066	999.4	9.1	990.3
B-13	193552.6088	1566982.577	999.5	10.3	989.2
B-14	193497.7672	1567070.163	1000.5	12.3	988.2
B-15	193459.0565	1566998.861	999.2	8.2	991.0
B-16	193461.7486	1566880.551	993.9	8.5	985.4
B-17	193424.4767	1566955.111	995.8	7.5	988.3
B-18	193393.3092	1567006.345	996.9	10.3	986.6
B-19	193344.1547	1566912.242	993.6	13.4	980.2
B-20	193370.5143	1566815.494	991.4	14.2	977.2
B-21	193285.6899	1566889.289	993.1	3.8	989.3
B-22	193266.0441	1566951.717	998.3	17.2	981.1
B-23	193215.3807	1566930.654	993.5	8.2	985.3

Northing/Easting coordinates are in KY North Zone

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B- 1 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/20/2022		ELEVATION: 1000.1 ft		NOTES:			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 14.4 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193861.4		EASTING: 1567011.9	
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 7 in							
1.1				SPT-1 (10 in)	LEAN CLAY (CL), firm to stiff, red brown, slightly moist	6-3-5 N = 8	●					
5				SPT-2 (10 in)		4-3-6 N = 9	●				996	
5.9				SPT-3 (10 in)	FAT CLAY (CH), some degraded Chert, stiff to very stiff, moist	3-4-6 N = 10	●					
10				SPT-4 (11 in)		5-8-10 N = 18	●				991	
14.1				SPT-5	Weathered Limestone	50/4"					986	
14.4	Auger refusal at 14.4 feet				Borehole terminated at 14.4 feet	N = 50/4"						
15												
20											981	
25											976	
30											971	
35											966	

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B- 2 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/20/2022		ELEVATION: 998.8 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 16.9 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193782.6 EASTING: 1567124.6	
SAMPLING METHOD: UD, SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION	
							△ % Fines	○ NMC	□ PL-LL			
0												
0.3		Fill		SPT-1 (10 in)	TOPSOIL, 4 in	5-8-8 N = 16						
	SPT-2 (8 in)			LEAN CLAY (CL), little limestone fragments, very stiff, dark gray	4-14-10 N = 24							
3.1					LEAN CLAY (CL), trace limestone fragments, stiff, slightly moist							
5	Soil UCS= 5.288 KSF				UD-1 REC-100%							
					SPT-3 (12 in)		5-4-5 N = 9					
9.1		Residuum		SPT-4 (12 in)	FAT CLAY (CH), trace clayey silt, soft to stiff, red brown, moist	4-6-6 N = 12					989	
15					SPT-5 (12 in)		2-1-2 N = 3					984
16.6	Auger refusal at 16.9 feet											
16.9					Weathered Limestone Borehole terminated at 16.9 feet							
20											979	
25											974	
30											969	
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B- 3 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/20/2022		ELEVATION: 999.5 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 11.3 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193695.4 EASTING: 1567201.7	
SAMPLING METHOD: UD, SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							△ % Fines	○ NMC	□ PL-LL			
0												
0.1		Fill		SPT-1 (10 in)	TOPSOIL, 1 in	8-13-14 N = 27						
				SPT-2 (10 in)	LEAN CLAY (CL), some limestone fragments, very stiff, dark gray, slightly moist	2-12-10 N = 22						
3.2					LEAN CLAY (CL), little limestone fragments, little degraded Chert, stiff, red brown	4-5-5 N = 10						995
5		Residuum		SPT-3 (12 in)								
6.0				SPT-4 (10 in)	SILT (ML), little degraded Chert, little limestone fragments, stiff, red brown, moist	3-5-6 N = 11						
10	Soil UCS=1.897			UD-1 REC-75%								990
11.1	Auger refusal at 11.3 feet				Weathered Limestone							
11.3					Borehole terminated at 11.3 feet							
15												985
20												980
25												975
30												970
35												965

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088			BORING LOG: B- 4 <i>Sheet 1 of 1</i>		
DATE DRILLED: 06/21/2022		ELEVATION: 1000.3 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 10.8 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193637.4 EASTING: 1567243.5	
SAMPLING METHOD: SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							Δ % Fines	○ NMC	□ PL-LL			
							20	40	60	80		
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 6 in							
1.0				SPT-1 (12 in)	LEAN CLAY (CL), firm to stiff, red brown, slightly moist	3-4-5 N = 9	●					
5				SPT-2 (12 in)		2-3-4 N = 7	●					
8.0				SPT-3 (12 in)	FAT CLAY (CH), stiff, red brown, moist	5-6-8 N = 14	●					
10				SPT-4 (12 in)		3-7-6 N = 13	●					
10.6	Auger refusal at 10.8 feet				Weathered Limestone							
10.8					Borehole terminated at 10.8 feet							
15												
20												
25												
30												
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B- 5 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/20/2022		ELEVATION: 1000.2 ft		NOTES: NORTHING: 193821.0 EASTING: 1566947.6			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 19.5 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0		0.3		SPT-1 (11 in)	TOPSOIL, 4 in	7-5-4 N = 9	●					
				SPT-2 (10 in)	FAT CLAY (CH), firm to stiff, red brown, slightly moist	6-4-5 N = 9	●					
5				SPT-3 (10 in)		3-3-5 N = 8	●	○	—			996
				SPT-4		4-5-5 N = 10	●	○				
8.2				SPT-5 (11 in)	ELASTIC SILT WITH SAND (MH), degraded Chert, limestone fragments, stiff to very stiff, red brown, slightly moist	5-6-7 N = 13	●	○	—			991
10												
15				SPT-6 (11 in)		16-15-5 N = 20	●	○				986
19.1	Auger refusal at 19.5 feet	19.1		SPT-7	Weathered Limestone	50/3"		○				981
19.5		19.5			Borehole terminated at 19.5 feet	N = 50/3"						
20												
25												976
30												971
35												966

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B- 6 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/20/2022		ELEVATION: 999.7 ft		NOTES: NORTHING: 193734.6 EASTING: 1567031.6			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 25.4 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			
SAMPLING METHOD: SS							

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							△ % Fines ○ NMC ┌─┐ PL-LL	20	40	60	80	
0		Residuum		SPT-1 (11 in)	TOPSOIL, 2 in SILT (ML), little, stiff, red brown, slightly moist	6-6-7 N = 13	●					995
1	0.2			SPT-2 (11 in)		6-5-7 N = 12	●					
2				SPT-3 (12 in)		5-5-5 N = 10	●	○	┌─┐			
3				SPT-4 (12 in)		3-4-5 N = 9	●	○				
4				SPT-5 (12 in)		6-7-8 N = 15	●	○	┌─┐			
5					ELASTIC SILT (MH), little degraded Chert, stiff, red brown, slightly moist							
6												
7												
8				SPT-6 (12 in)		6-7-9 N = 16	●	○	┌─┐			985
9				SPT-7 (12 in)		5-5-7 N = 12	●	○				980
10				SPT-8 (10 in)		3-3-50/5" N = 50/5"						975
11					Weathered Limestone Borehole terminated at 25.4 feet							
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25	Auger refusal at 25.4 feet	25.3 25.4										970

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD	☒			
END OF DRILLING	☒	06/20/2022		not encountered
AFTER DRILLING	☒			
AFTER DRILLING	☒			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B- 7 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/20/2022		ELEVATION: 999.6 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 16.3 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193705.6 EASTING: 1567133.5	
SAMPLING METHOD: SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0					ASPHALT, 4 in							
0.3					GRAVEL BASE 9 in							
1.1				SPT-1 (10 in)	LEAN CLAY (CL), firm, brown and red, mottled, slightly moist	2-3-3 N = 6	●					
5				SPT-2 (12 in)		3-3-4 N = 7	●				995	
8.2				SPT-3 (12 in)		2-3-4 N = 7	●					
10				SPT-4 (12 in)	FAT CLAY (CH), stiff, red brown, moist	5-6-7 N = 13	●				990	
15				SPT-5 (12 in)		2-2-7 N = 9	●				985	
16.1	Auger refusal at 16.3 feet				Weathered Limestone							
16.3					Borehole terminated at 16.3 feet							
20											980	
25											975	
30											970	
35											965	

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD	06/20/2022		
END OF DRILLING	06/20/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B- 8 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/20/2022		ELEVATION: 1001.3 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 31.3 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA, NQ		LOGGED BY: Deron Zierer		NORTHING: 193597.1 EASTING: 1567188.9	
SAMPLING METHOD: SS, CORE, UD			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 6 in	2-4-4						
1.0				SPT-1 (12 in)	LEAN CLAY (CL), some ferrous nodules, firm, dark red brown, slightly moist	N = 8	●					
5				SPT-2 (12 in)		N = 7	●	○				997
5.5	Soil UCS= 5.301 KSF	Residuum		UD-1 REC-100%	ELASTIC SILT WITH SAND (MH), some ferrous nodules, few degraded Chert, firm, dark red brown, slightly moist			○		I		
10				SPT-3 (10 in)		N = 5	●	○				992
11.0	Auger refusal at 11.3 feet				Weathered Limestone							
11.3	Rock UCS= 11,251 psi			R-1 REC-98% RQD-70%	LIMESTONE AND SHALE, dark gray to pale gray, very thinly laminated, freshly weathered							987
15					LIMESTONE, pale gray, very thinly laminated, Some shale partings							
20				R-2 REC-100% RQD-60%	LIMESTONE, light gray, very thinly laminated, Heavily Jointed, 50- 85							982
20.9		Rock			LIMESTONE, pale gray, very thinly laminated <i>Lost Water</i>							
25				R-3 REC-100% RQD-86%								977
30				R-4 REC-100% RQD-62%								972
31.3					Borehole terminated at 31.3 feet							967
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/20/2022	28.2	
AFTER DRILLING			
AFTER DRILLING			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B- 9 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022		ELEVATION: 999.7 ft		NOTES: NORTHING: 193709.2 EASTING: 1566952.8			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 14.4 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS, UD				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION	
							△ % Fines	○ NMC	┌ PL-LL			
0				SPT-1 (10 in)	TOPSOIL, 2 in LEAN CLAY (CL), firm to stiff, brown, slightly moist	7-8-7 N = 15	●					
5				SPT-2 (10 in)		4-6-7 N = 13	●					
10	Soil UCS= 1.444			SPT-3 (10 in)	FAT CLAY (CH), stiff, red brown, moist	4-4-4 N = 8	●	○	┌			995
15				SPT-4 (10 in)		4-5-7 N = 12	●	○				
20				UD-1 REC-100%		3-6-5 N = 11	●	○	┌	└		990
25	Auger refusal at 14.4 feet	14.1 14.4		SPT-5 (10 in)								
30				SPT-6 (2 in)	Weathered Limestone Borehole terminated at 14.4 feet	50/5" N = 50/5"	○					985
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-10 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/21/2022		ELEVATION: 1001.1 ft		NOTES: NORTHING: 193556.6 EASTING: 1567125.4			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 14.8 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION
							Δ % Fines	○ NMC	□ PL-LL		
0					ASPHALT, 6 in						
0.5					GRAVEL BASE, 6 in						
1.0				SPT-1 (10 in)	LEAN CLAY (CL), soft, red brown, slightly moist	1-2-2 N = 4	●				
3.1				SPT-2 (12 in)	LEAN CLAY (CL), stiff, red brown, slightly moist	4-5-6 N = 11	●				997
5				SPT-3 (12 in)		4-5-8 N = 13	●				
8.0				SPT-4 (12 in)	FAT CLAY (CH), stiff, red brown, moist	4-6-6 N = 12	●				992
10											
14.2		Rock		SPT-5 (6 in)	Weathered Limestone	7-50/4" N = 50/4"					987
14.8	Auger refusal at 14.8 feet				Borehole terminated at 14.8 feet						
15											
20											982
25											977
30											972
35											967

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-11 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022			ELEVATION: 998.5 ft			NOTES:	
DRILL RIG: D-50			DATUM: NAVD88				
DRILLER: Damain Caudill			BORING DEPTH: 28.0 ft				
HAMMER TYPE: Automatic hammer			CLOSURE: Auger Cuttings				
DRILLING METHOD: 3-1/4" HSA, NQ			LOGGED BY: Deron Zierer			NORTHING: 193675.8 EASTING: 1566892.6	
SAMPLING METHOD: CORE, SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION
							Δ % Fines	○ NMC	□ PL-LL		
0							20	40	60	80	
0.2		Fill		SPT-1 (10 in)	TOPSOIL, 2 in	5-10-8 N = 18					
2.0				SPT-2 (10 in)	LEAN CLAY WITH GRAVEL (CL), limestone fragments, stiff to very stiff, dark brown	4-5-7 N = 12					
		Residuum		SPT-3 (12 in)	LEAN CLAY (CL), stiff, red brown, slightly moist	5-5-5 N = 10					994
5				SPT-4 (12 in)		6-5-8 N = 13					
7.9	Auger refusal at 8.0 feet				Weathered Limestone						
8.0					LIMESTONE, light gray and dark gray, moderately weathered, Clay partings throughout						989
9.6				R-1 REC-100% RQD-36%	LIMESTONE AND CALCAREOUS SHALE, light gray and dark gray, very thinly laminated, slightly weathered						
12.1				R-2 REC-100% RQD-62%	LIMESTONE, light gray to dark gray, very thinly laminated						984
15	Rock UCS= 11,561 psi			R-3 REC-100% RQD-54%							979
20				R-4 REC-96% RQD-74%	LIMESTONE, light gray to gray, Heavily Jointed 90-70						974
24.5											
28.0					Borehole terminated at 28.0 feet						969
30											
35											964

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022	24.0	
AFTER DRILLING			
AFTER DRILLING			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-12 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/21/2022		ELEVATION: 999.4 ft		NOTES: NORTHING: 193626.1 EASTING: 1566934.1			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 9.1 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0		0.1		SPT-1 (10 in)	TOPSOIL, 1 in	6-13-6						
				SPT-2 (6 in)	LEAN CLAY (CL), firm to very stiff, dark gray, slightly moist	N = 19						
		3.0			LEAN CLAY WITH SAND (CL), degraded Chert, firm, red brown, slightly moist	3-3-4 N = 7						
5				SPT-3 (10 in)		2-3-4 N = 7					995	
				SPT-4 (10 in)		3-2-3 N = 5						
10	Auger refusal at 9.1 feet	8.9 9.1		SPT-5 (1 in)	Weathered Limestone Borehole terminated at 9.1 feet	50/1" N = 50/1"					990	
15											985	
20											980	
25											975	
30											970	
35											965	

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD	06/21/2022		not encountered
END OF DRILLING			
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-13 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/21/2022		ELEVATION: 999.5 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 10.4 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193552.2 EASTING: 1566982.6	
SAMPLING METHOD: SS, UD			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							Δ % Fines	○ NMC	┌ PL-LL			
0					ASPHALT, 6 in							
1.0				SPT-1 (10 in)	GRAVEL BASE, 6 in	1-2-3 N = 5						
3.1					LEAN CLAY (CL), firm to stiff, red brown, slightly moist							
5	Soil UCS= 3.140			UD-1 REC-100%	FAT CLAY (CH), little limestone fragments, stiff, red brown, moist	5-5-6 N = 11						995
10				SPT-2 (12 in)								
10.0				SPT-3 (6 in)		5-7-50/4" N = 50/4"						990
10.4	Auger refusal at 10.4 feet				Weathered Limestone Borehole terminated at 10.4 feet							
15												985
20												980
25												975
30												970
35												965

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-14 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/21/2022		ELEVATION: 1000.5 ft		NOTES: NORTHING: 193498.4 EASTING: 1567070.2	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 12.3 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer			
SAMPLING METHOD: SS, UD			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							Δ % Fines	○ NMC	▬ PL-LL	20	40	
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 6 in							
1.0				SPT-1 (12 in)	LEAN CLAY (CL), little ferrous nodules, firm to stiff	3-3-4 N = 7	●					
5				SPT-2 (10 in)		3-7-6 N = 13	●					996
6.0				UD-1 REC-100%	FAT CLAY (CH), stiff, red brown, moist, iron oxide staining							
10				SPT-3 (12 in)		4-6-8 N = 14	●					991
12.0	Auger refusal at 12.3 feet				Weathered Limestone							
12.3					Borehole terminated at 12.3 feet							
15												986
20												981
25												976
30												971
35												966

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-15 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/21/2022		ELEVATION: 999.2 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 28.2 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA, NQ		LOGGED BY: Deron Zierer		NORTHING: 193458.3 EASTING: 1566998.9	
SAMPLING METHOD: CORE, SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 7 in							
1.1		Residuum		SPT-1 (12 in)	LEAN CLAY (CL), firm to stiff, red brown, moist	1-2-3 N = 5	●					
				SPT-2 (12 in)		4-6-5 N = 11	●	○				
				SPT-3 (12 in)		3-4-5 N = 9	●	○				
8.0	Auger refusal at 8.2 feet				Weathered Limestone							
8.2	Rock UCS= 13,098 psi				LIMESTONE, pale gray to dark gray, very thinly laminated, slightly weathered							990
				R-1 REC-96% RQD-40%	4 in void							
13.7					LIMESTONE, pale gray to light gray, very thinly laminated, Some calcareous shale partings							985
				R-2 REC-100% RQD-68%								
18.0					LIMESTONE, pale gray and dark gray, very thinly laminated							980
				R-3 REC-100% RQD-65%								
28.2					Borehole terminated at 28.2 feet							970
				R-4 REC-100% RQD-66%								
35												965

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			

Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-16 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022		ELEVATION: 993.9 ft		NOTES: Offset 5 ft S, shaded no grass NORTHING: 193461.4 EASTING: 1566880.6			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 8.5 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS, UD				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0		Residuum		SPT-1 (12 in)	TOPSOIL, 1 in	7-10-9						
	SPT-2 (10 in)			LEAN CLAY (CL), stiff to very stiff, brown, slightly moist	N = 19							
					5-6-5							
					N = 11							
5				UD-1								
				REC-100%								
				SPT-3 (12 in)		6-5-7						
						N = 12						
10	Auger refusal at 8.5 feet				Weathered Limestone Borehole terminated at 8.5 feet							
15												
20												
25												
30												
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-17 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/21/2022		ELEVATION: 995.8 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 7.5 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193425.7 EASTING: 1566955.1	
SAMPLING METHOD: SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							Δ % Fines	○ NMC	□ PL-LL			
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 6 in							
1.0		Fill			LEAN CLAY (CL), brick fragments, firm, dark brown to dark gray	2-2-3 N = 5	●					
2.0				SPT-1 (12 in)	LEAN CLAY (CL), firm, red brown, slightly moist							
5		Residuum		SPT-2 (10 in)		3-4-5 N = 9	●					991
				SPT-3								
7.3	Auger refusal at 7.5 feet				Weathered Limestone	2-50/5" N = 50/5"					●	
7.5					Borehole terminated at 7.5 feet							
10												986
15												981
20												976
25												971
30												966
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-18 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/21/2022		ELEVATION: 996.9 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 10.3 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer		NORTHING: 193394.4 EASTING: 1567006.4	
SAMPLING METHOD: UD, SS			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							Δ % Fines	○ NMC	⊢ PL-LL	20	40	
0					ASPHALT, 6 in							
0.5					GRAVEL BASE, 6 in	3-3-4						
1.0				SPT-1 (12 in)	ELASTIC SILT (MH), firm to stiff, red brown, slightly moist	N = 7	●					
5				SPT-2 (10 in)		N = 13	●	○				992
	Soil UCS= 6.160 KSF			UD-1 REC-100%				○		⊢		
10				SPT-3 (12 in)		4-6-7	●	○				987
10.0	Auger refusal at 10.3 feet	10.0			Weathered Limestone							
10.3		10.3			Borehole terminated at 10.3 feet							
15												982
20												977
25												972
30												967
35												

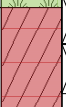
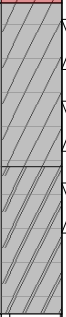
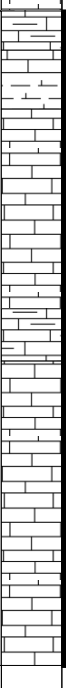
GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/21/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			








Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT:		UK Health Education Building Lexington, KY S&ME Project No. 22830088		BORING LOG: B-19 <i>Sheet 1 of 1</i>	
DATE DRILLED: 06/22/2022		ELEVATION: 993.6 ft		NOTES:	
DRILL RIG: D-50		DATUM: NAVD88			
DRILLER: Damain Caudill		BORING DEPTH: 33.4 ft			
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings			
DRILLING METHOD: 3-1/4" HSA, NQ		LOGGED BY: Deron Zierer		NORTHING: 193341.6 EASTING: 1566912.2	
SAMPLING METHOD: CORE, SS, AU			PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet		

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION	
							Δ % Fines	○ NMC	□ PL-LL			
0												
0.4		Fill		SPT-1 (10 in)	TOPSOIL, 5 in	5-11-9 N = 20						
				SPT-2 (10 in)	LEAN CLAY WITH GRAVEL (CL), few construction debris, very stiff	5-7-9 N = 16						
3.5		Residuum		SPT-3 (11 in)	LEAN CLAY (CL), firm to stiff, brown, slightly moist	4-3-3 N = 6					989	
				SPT-4 (11 in)		4-5-6 N = 11						
8.5				SPT-5 (12 in)	FAT CLAY (CH), stiff, red brown, slightly moist	12-5-7 N = 12						984
13.0	Auger refusal at 13.4 feet Rock UCS= 8,812 psi				Weathered Limestone							
13.4		Rock			LIMESTONE, gray to light gray, very thinly laminated, slightly weathered, Clay partings throughout						979	
14.6												
16.4				R-1 REC-100% RQD-72%	LIMESTONE AND CALCAREOUS SHALE, light gray to dark gray, very thinly laminated							
20					LIMESTONE, light gray to pale gray, very thinly laminated						974	
22.5												
				R-2 REC-100% RQD-58%	LIMESTONE, pale gray to light gray, very thinly laminated, slightly weathered, Fractured, clay partings throughout						969	
24.1												
				R-3 REC-100% RQD-82%	LIMESTONE, light gray to pale gray, very thinly laminated						964	
30												
				R-4 REC-100% RQD-90%								
33.4					Borehole terminated at 33.4 feet						959	
35												

GROUNDWATER		DATE	DEPTH (FT)	REMARKS
ATD				
END OF DRILLING		06/22/2022	23.0	
AFTER DRILLING				
AFTER DRILLING				



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-20 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/20/2022		ELEVATION: 991.4 ft		NOTES: NORTHING: 193371.0 EASTING: 1566815.5			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 14.7 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION
							Δ % Fines	○ NMC	▬ PL-LL		
0				SPT-1 (7 in)	TOPSOIL, 1 in	6-13-9 N = 22					
				SPT-2 (8 in)	LEAN CLAY WITH GRAVEL (CL), little construction debris, firm to very stiff, dark brown and dark gray	4-7-6 N = 13					
5				SPT-3 (8 in)		3-3-3 N = 6					987
				SPT-4 (12 in)	LEAN CLAY (CL), stiff, red brown, slightly moist	4-4-6 N = 10					
10				SPT-5 (12 in)	FAT CLAY (CH), little limestone fragments, stiff, red brown, moist	5-6-7 N = 13					982
14.1				SPT-6	Weathered Limestone	50/1"					977
14.7	Auger refusal at 14.7 feet				Borehole terminated at 14.7 feet	N = 50/1"					
15											
20											972
25											967
30											962
35											957

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-21 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022		ELEVATION: 993.1 ft		NOTES: NORTHING: 193283.8 EASTING: 1566889.3			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 3.8 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION
							20	40	60	80	
0		0.1	Fill	SPT-1 (10 in)	TOPSOIL, 1 in	10-11-12 N = 23					
1.0		1.0	Residuum	SPT-2 (10 in)	SANDY LEAN CLAY WITH GRAVEL (CL), light brown	11-11-13 N = 24					
3.6	Auger refusal at 3.8 feet	3.6	***		LEAN CLAY (CL), very stiff, light brown, slightly moist						989
5		3.8			Weathered Limestone						
					Borehole terminated at 3.8 feet						
10											984
15											979
20											974
25											969
30											964
35											959

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-22 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022		ELEVATION: 998.3 ft		NOTES: NORTHING: 193268.3 EASTING: 1566951.7			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 17.3 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA					ELEVATION
							20	40	60	80		
0				SPT-1 (9 in)	TOPSOIL, 3 in	10-11-11 N = 22						
				SPT-2 (8 in)	LEAN CLAY (CL), few construction debris, very stiff, dark brown, slightly moist	10-11-9 N = 20						
5				SPT-3 (7 in)		9-11-9 N = 20					994	
				SPT-4 (12 in)	LEAN CLAY (CL), stiff, red brown, slightly moist	6-5-6 N = 11						
10				SPT-5 (12 in)	FAT CLAY (CH), little ferrous nodules, stiff, red brown, slightly moist	3-6-7 N = 13					989	
15				SPT-6 (12 in)		6-7-8 N = 15					984	
17.0	Auger refusal at 17.3 feet				Weathered Limestone						979	
17.3					Borehole terminated at 17.3 feet							
20												
25												
30												
35												

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal

PROJECT: UK Health Education Building Lexington, KY S&ME Project No. 22830088				BORING LOG: B-23 <i>Sheet 1 of 1</i>			
DATE DRILLED: 06/22/2022		ELEVATION: 993.5 ft		NOTES: NORTHING: 193214.9 EASTING: 1566930.6			
DRILL RIG: D-50		DATUM: NAVD88					
DRILLER: Damain Caudill		BORING DEPTH: 8.2 ft					
HAMMER TYPE: Automatic hammer		CLOSURE: Auger Cuttings					
DRILLING METHOD: 3-1/4" HSA		LOGGED BY: Deron Zierer					
SAMPLING METHOD: SS				PROJECT COORDINATE SYSTEM - NAD 1983 StatePlane Kentucky North FIPS 1601 Feet			

DEPTH (feet)	NOTES	Origin/Identifier	GRAPHIC	SAMPLE NO. (RECOVERY)	MATERIAL DESCRIPTION	BLOW COUNT DATA (SPT N-value)	STANDARD PENETRATION TEST DATA				ELEVATION		
							△ % Fines	○ NMC	□ PL-LL				
0							20	40	60	80			
0.3		Fill		SPT-1 (10 in)	TOPSOIL, 4 in	7-10-11 N = 21							
				SPT-2 (11 in)	SANDY LEAN CLAY WITH GRAVEL (CL), little limestone fragments, stiff to very stiff	5-8-7 N = 15							
3.2				Residuum			LEAN CLAY (CL), few ferrous nodules, very stiff, red brown, slightly moist	6-9-11 N = 20					989
5						SPT-3 (11 in)							
		SPT-4 (10 in)											
8.0	Auger refusal at 8.2 feet				Weathered Limestone								
8.2					Borehole terminated at 8.2 feet						984		
10													
15											979		
20											974		
25											969		
30											964		
35											959		

GROUNDWATER	DATE	DEPTH (FT)	REMARKS
ATD			
END OF DRILLING	06/22/2022		not encountered
AFTER DRILLING			
AFTER DRILLING			



Vertical Accuracy: Land Survey, Horizontal Accuracy: Land Survey

GROUNDWATER DEPTHS ARE NOT EXACT AND MAY VARY SUBSTANTIALLY FROM THOSE INDICATED. ATD = AT TIME OF DRILLING
 LL=Liquid Limit, PL = Plastic Limit, NMC = Natural Moisture Content, PPV = Pocket Penetrometer (tsf), PTV = Pocket Torvane (tsf),
 AR = Auger Refusal



FIELD TESTING PROCEDURES

Field Operations: The general field procedures employed by S&ME, Inc. are summarized in ASTM D 420 which is entitled "Investigating and Sampling Soils and Rocks for Engineering Purposes." This recommended practice lists recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the subsurface conditions. These techniques are:

- a. Continuous 2-1/2 or 3-1/4 inch I.D. hollow stem augers;
- b. Wash borings using roller cone or drag bits (mud or water);
- c. Continuous flight augers (ASTM D 1425).

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

The subsurface conditions encountered during drilling are reported on a field test boring record by a field engineer who is on site to direct the drilling operations and log the recovered samples. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soils in general accordance with the procedures outlined in ASTM D 2488 and prepares the final boring records that are the basis for all evaluations and recommendations.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designating the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report. The detailed data collection methods used during this study are discussed on the following pages.

Soil Test Borings: Soil test borings were made at the site at locations shown on the attached Boring Plan. Soil sampling and penetration testing were performed in accordance with ASTM D 1586.

The borings were made by mechanically twisting a 5-5/8" outer diameter auger into the soil. At regular intervals, the drilling tools were removed and samples obtained with a standard 1.4 inch I.D., 2 inch O.D., split tube sampler. The sampler was first seated 6 inches to penetrate any loose cuttings, then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated the "penetration resistance".

Representative portions of the samples, thus obtained, were placed in glass jars and transported to the laboratory. In the laboratory, the samples were examined to verify the driller's field classifications. Test Boring Records are attached which graphically show the soil descriptions and penetration resistances.

Soil Auger Soundings: Soil auger soundings were made at the site at the locations shown on the attached Boring Location Plan. The soundings were performed by mechanically twisting a steel auger into the soil. However, unlike the soil test borings, a smaller diameter solid stem auger was used and no split-spoon samples were obtained. The driller provided a general description of the soil encountered by observing the soils brought to the surface by the twisting auger. The auger was advanced until refusal materials were encountered and the refusal depth was noted by the driller. The auger is then withdrawn and the depths to water or caved materials are then measured and recorded by the driller.

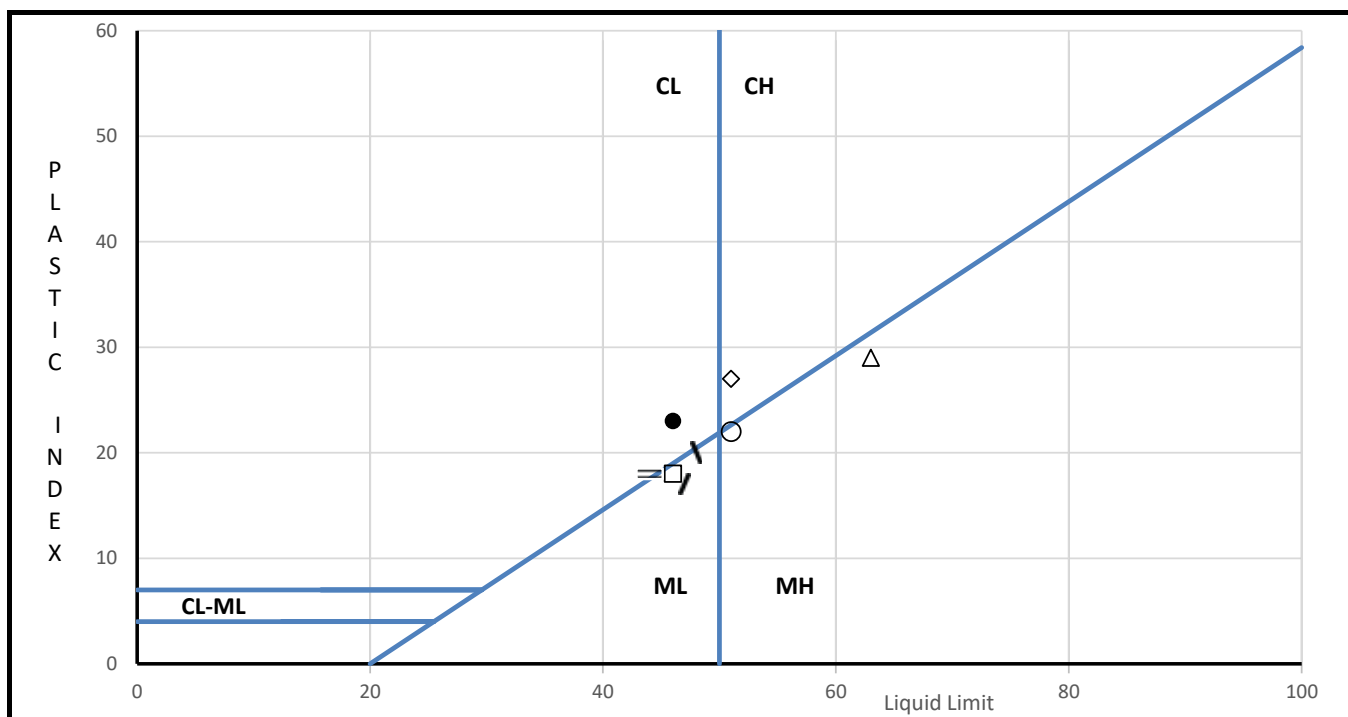
Soil auger soundings provide a rapid, economical method of obtaining the approximate bedrock depth, groundwater depth, and general soil conditions at locations where detailed soil testing and sampling is not required.

Water Level Readings: Water table readings are normally taken in conjunction with borings and are recorded on the "Test Boring Records". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of the hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.


The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The time of boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using an electrical probe to detect the water level surface. Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.



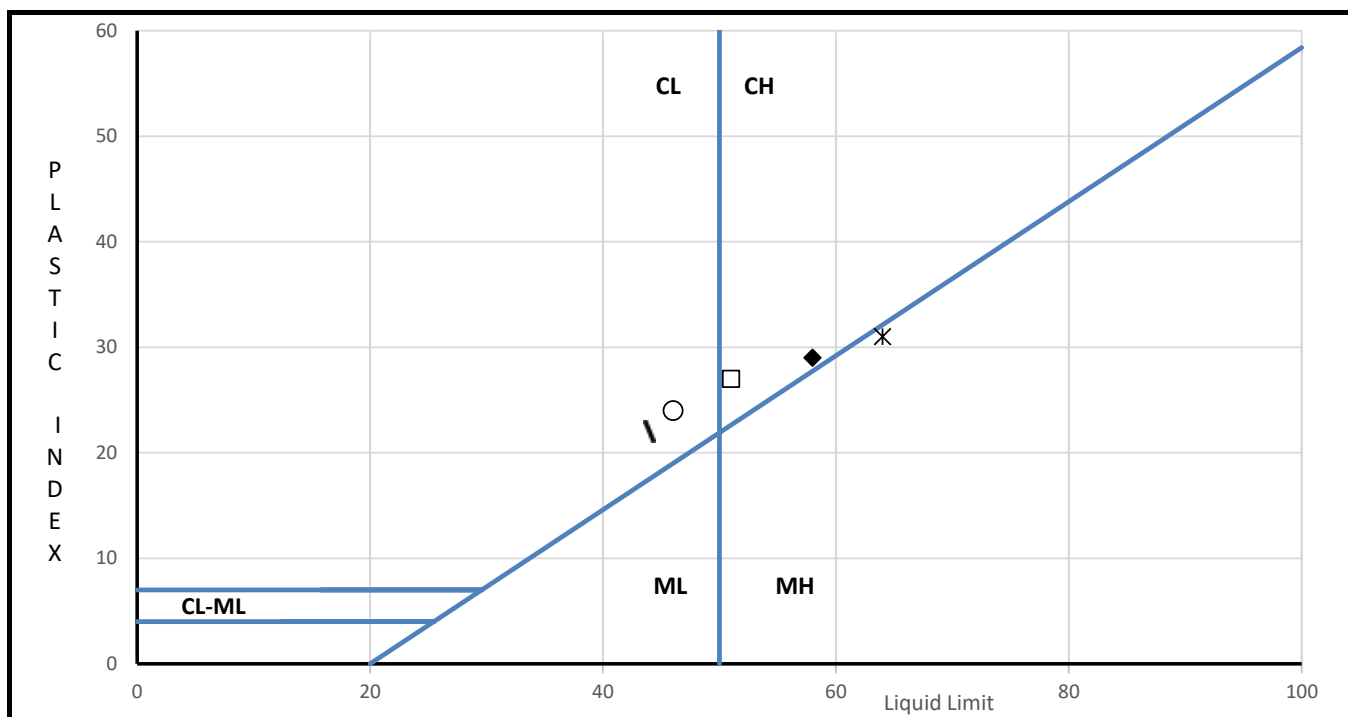
Appendix III – Laboratory Testing Results




Specimen Identification				MC	LL	PL	PI	Fines	Classification (symbol is based on minus 40 material only when no grain size information is present.)	
ID	No.	Top Depth							Symbol	Name
B- 2	SPT-3	6		36.8						
B- 2	SPT-4	9		33.3						
B- 2	SPT-5	14		32.6						
●	B- 2	UD-1	4	21.7	46	23	23		CL	
	B- 3	SPT-2	1.5	10.1						
	B- 3	SPT-3	4	24.6						
□	B- 3	UD-1	8	29.6	46	28	18		ML	
◇	B- 5	SPT-3	4	25.8	51	24	27		CH	
△	B- 5	SPT-5	9	39.1	63	34	29		MH	
	B- 5	SPT-6	14	34.4						
	B- 5	SPT-7	19	26.5						
\	B- 6	SPT-3	4	23.3	48	28	20		ML	
/	B- 6	SPT-5	9	25.7	47	30	17		ML	
○	B- 6	SPT-6	14	27.2	51	29	22		MH	
	B- 6	SPT-7	19	31.9						
	B- 8	SPT-2	4	27.2						
	B- 8	SPT-3	9	30.6						
	B- 8	UD-1	6	31.6	66	35	31		MH	
=	B- 9	SPT-3	4	24.0	44	26	18		CL	
	B- 9	SPT-5	10	38.7						

INDEX TEST RESULTS			
Project Name		UK Health Education Building	
Project Number		22830088	
Approved by		Date	
		7/19/2022 16:40	





Specimen Identification				MC	LL	PL	PI	Fines	Classification (symbol is based on minus 40 material only when no grain size information is present.)	
ID	No.	Top Depth							Symbol	Name
B-9	SPT-6	14		19.5						
◆	B-9	UD-1	8	35.1	58	29	29		CH	
B-12	SPT-3	4		26.5						
B-12	SPT-5	9		29.1						
B-13	SPT-2	6		29.6						
B-13	SPT-3	9		28.7						
□	B-13	UD-1	4	22.2	51	24	27		CH	
B-15	SPT-2	4		30.5						
B-18	SPT-2	4		28.7						
B-18	SPT-3	8		24.6						
*	B-18	UD-1	6	29.6	64	33	31		MH	
\	B-19	ite Bulk B-	5	16.2	44	22	22		CL	
B-20	SPT-3	4		24.4						
○	B-20	SPT-4	6.5	24.5	46	22	24		CL	
B-20	SPT-5	9		25.6						
B-20	SPT-6	14		13.6						
B-22	SPT-5	9		23.6						
B-22	SPT-6	14		29.5						

INDEX TEST RESULTS			
Project Name		UK Health Education Building	
Project Number		22830088	
Approved by		Date	
		7/19/2022 16:40	

UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

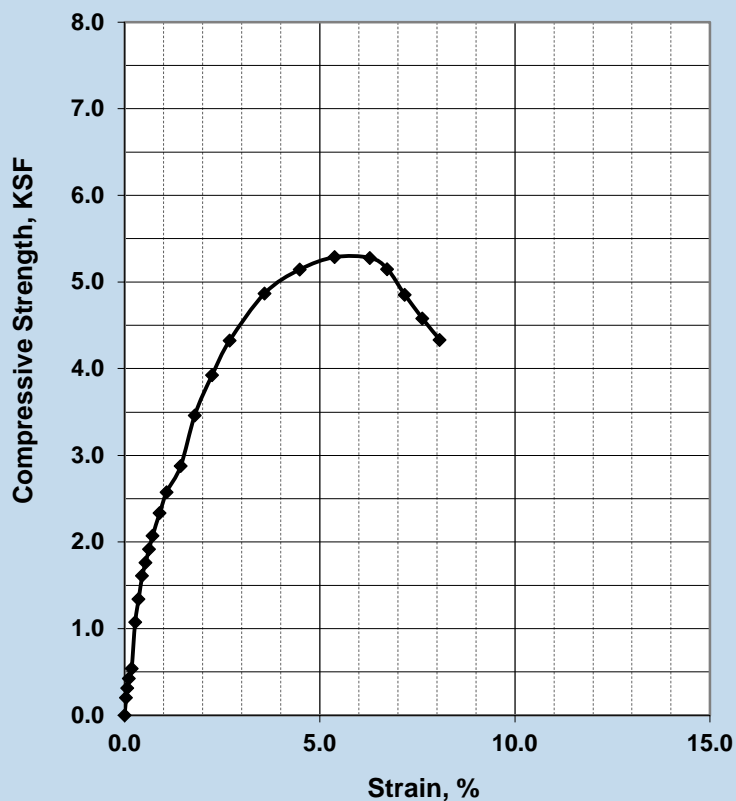


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-2	Depth (ft.):	4.5 - 5.0
Sample Description:	LEAN CLAY (CL), brown		

Unconfined Compressive Strength



Failed Specimen

Type of Sample: IntactSource of Moisture Sample: 3/4 SpecimenLiquid Limit: 46Plasticity Index: 23Height to Diameter Ratio: 1.9Rate of Strain (%/min.): 1.1Strain at Failure: 5.4%Initial Dry Unit Weight: 100.7 pcf Initial Water Content: 21.7%Unconfined Compressive Strength, q_u : **5.288** KSFUndrained Shear Strength, s_u : **2.644** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

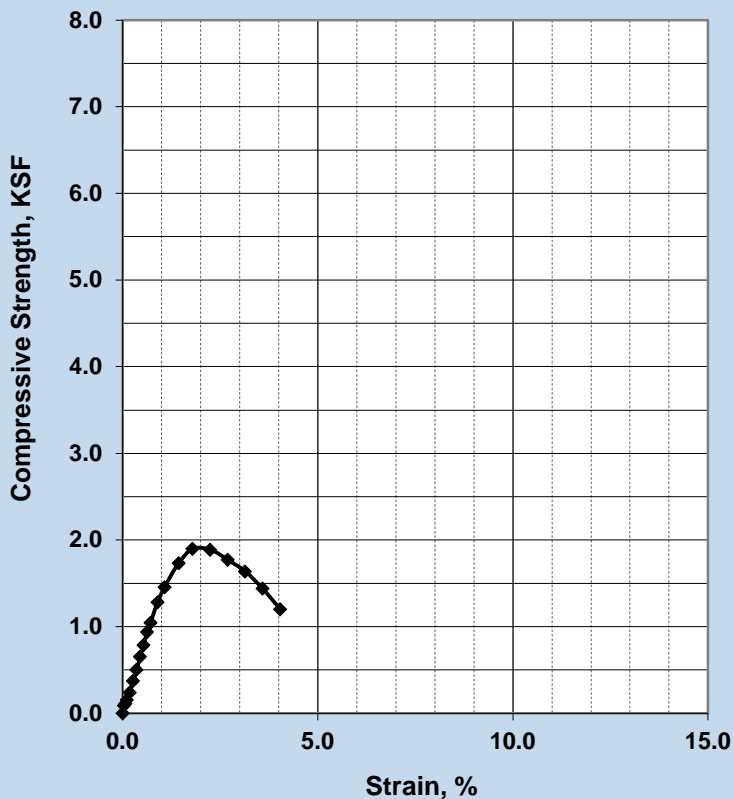


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-3	Depth (ft.):	8.3 - 8.8
Sample Description:	SILT (ML), brown		

Unconfined Compressive Strength



Failed Specimen

Type of Sample: IntactSource of Moisture Sample: 3/4 SpecimenLiquid Limit: 46Plasticity Index: 18Height to Diameter Ratio: 1.9Rate of Strain (%/min.): 1.1Strain at Failure: 1.8%Initial Dry Unit Weight: 87.6 pcf Initial Water Content: 29.6%Unconfined Compressive Strength, q_u : **1.897** KSFUndrained Shear Strength, s_u : **0.949** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

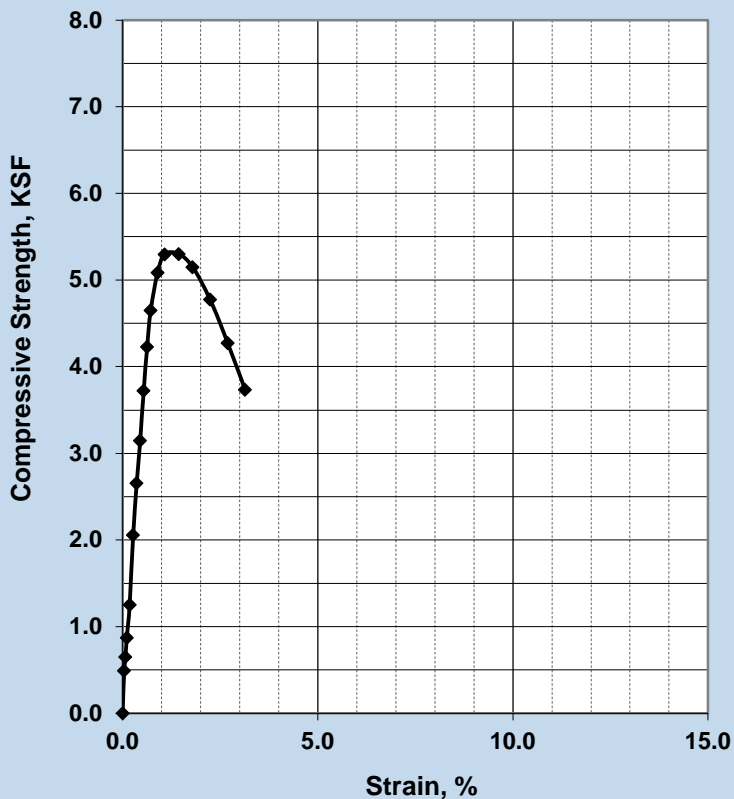


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-8	Depth (ft.):	6.5 - 7.0
Sample Description:	ELASTIC SILT (MH), yellow brown		

Unconfined Compressive Strength



Failed Specimen

Type of Sample: IntactSource of Moisture Sample: 3/4 SpecimenLiquid Limit: 66Plasticity Index: 31Height to Diameter Ratio: 2.0Rate of Strain (%/min.): 1.1Strain at Failure: 1.4%Initial Dry Unit Weight: 90.4 pcf Initial Water Content: 31.6%Unconfined Compressive Strength, q_u : **5.301** KSFUndrained Shear Strength, s_u : **2.651** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

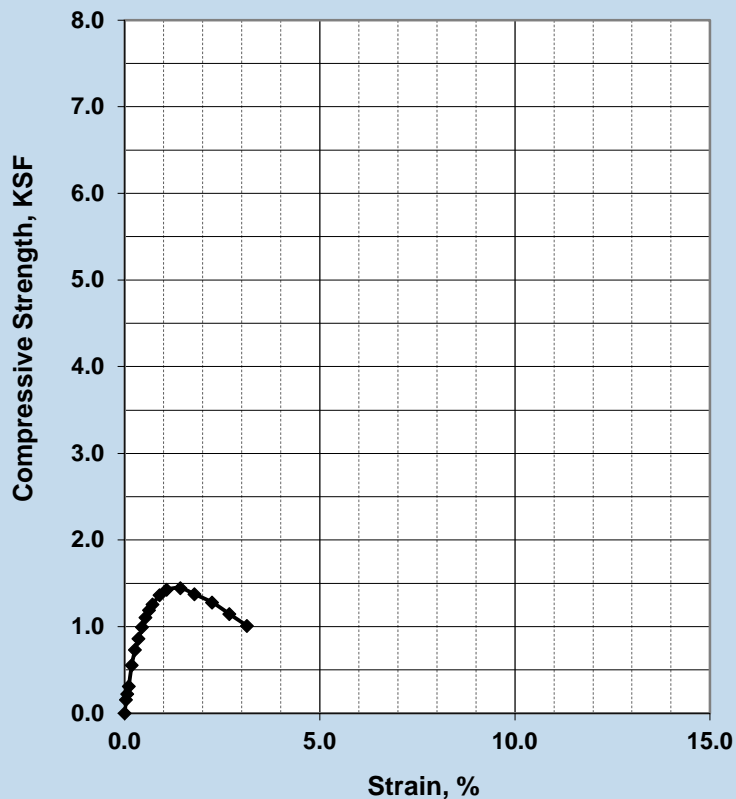


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-9	Depth (ft.):	8.3 - 8.8
Sample Description:	FAT CLAY (CH), yellow brown		

Unconfined Compressive Strength



Failed Specimen



Type of Sample: Intact
 Source of Moisture Sample: 3/4 Specimen

Liquid Limit: 58Plasticity Index: 29Height to Diameter Ratio: 1.9Rate of Strain (%/min.): 1.1Strain at Failure: 1.4%Initial Dry Unit Weight: 84.3 pcf Initial Water Content: 35.1%Unconfined Compressive Strength, q_u : **1.444** KSFUndrained Shear Strength, s_u : **0.722** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

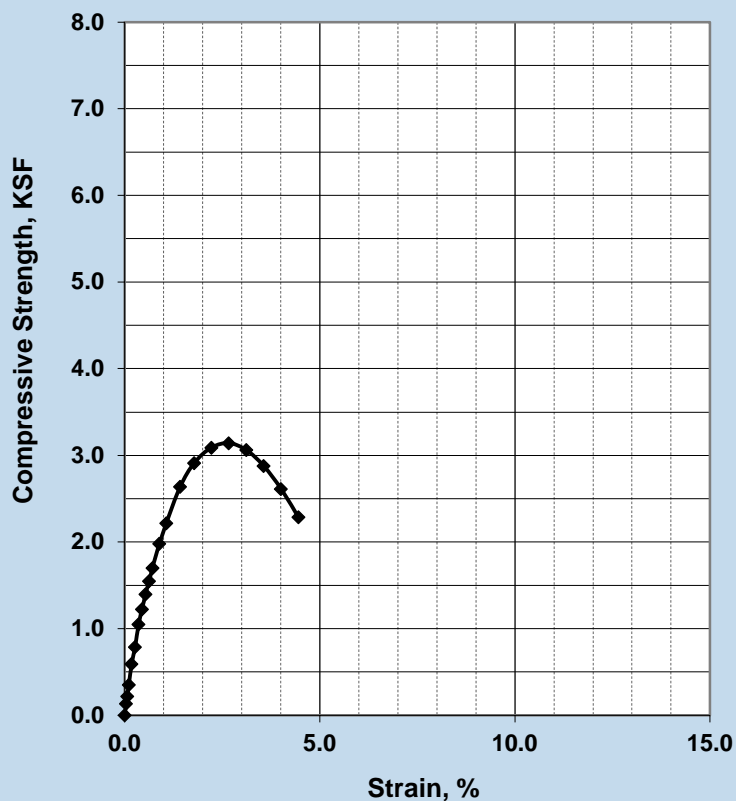


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-13	Depth (ft.):	4.3 - 4.8
Sample Description:	FAT CLAY (CH), brown		

Unconfined Compressive Strength



Failed Specimen

Type of Sample: IntactSource of Moisture Sample: 3/4 SpecimenLiquid Limit: 51Plasticity Index: 27Height to Diameter Ratio: 1.9Rate of Strain (%/min.): 1.1Strain at Failure: 2.7%Initial Dry Unit Weight: 99.0 pcf Initial Water Content: 22.2%Unconfined Compressive Strength, q_u : **3.140** KSFUndrained Shear Strength, s_u : **1.570** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS

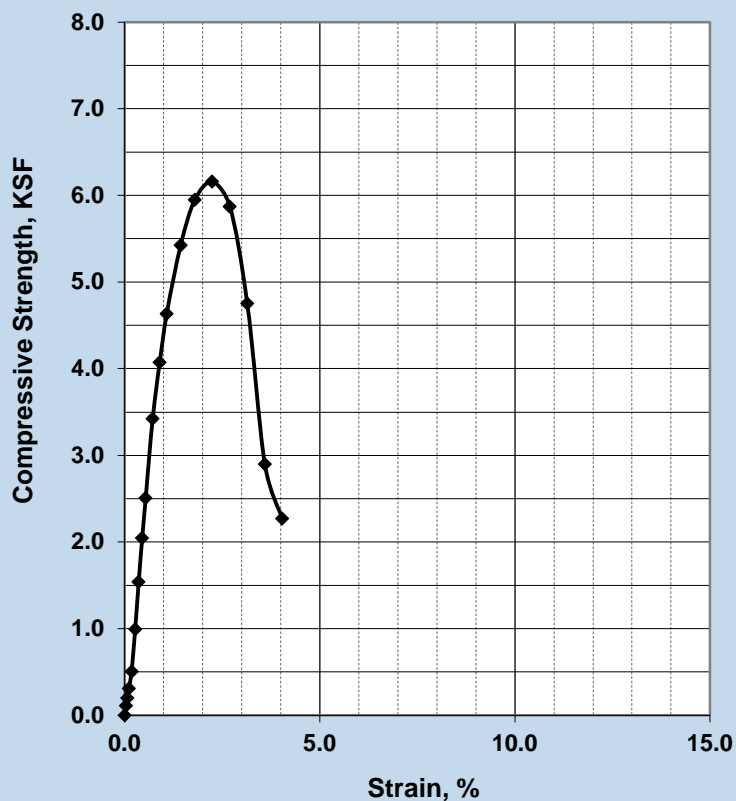


ASTM D2166

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	7/19/2022
Project Name:	UK Health Education Building	Test Date(s):	7/12/2022
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	UD	Sample Date:	6/28/2022
Location:	B-18	Depth (ft.):	6.3 - 6.8
Sample Description:	ELASTIC SILT (MH), brown		

Unconfined Compressive Strength



Failed Specimen

Type of Sample: IntactSource of Moisture Sample: 3/4 SpecimenLiquid Limit: 64Plasticity Index: 31Height to Diameter Ratio: 1.9Rate of Strain (%/min.): 1.1Strain at Failure: 2.2%Initial Dry Unit Weight: 88.2 pcf Initial Water Content: 29.6%Unconfined Compressive Strength, q_u : **6.160** KSFUndrained Shear Strength, s_u : **3.080** KSF

References / Comments / Deviations:

Jacob Folsom

Technical Responsibility

Signature

Lab Services Manager

Position

7/19/2022

Date

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MOISTURE - DENSITY REPORT



Quality Assurance

ASTM D 698 Method A

S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	22830088	Report Date:	07/19/22	
Project Name:	UK Health Education Building	Test Date(s):	07/13/22	
Client Name:	JRA Architects			
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY			
	Sample No.:	P-1	Sample Date:	06/28/22
Location:	B-19/22	Depth (ft.):	N/A	
Sample Description:	LEAN CLAY (CL), brown			

Maximum Dry Density 104.3 PCF. Optimum Moisture Content 20.5%

ASTM D 698 - - Method A



Moisture-Density Curve Displayed: Fine Fraction ☒ Corrected for Oversize Fraction (ASTM D 4718) ☐
Sieve Size used to separate the Oversize Fraction: #4 Sieve ☒ 3/8 inch Sieve ☐ 3/4 inch Sieve ☐
Mechanical Rammer ☒ Manual Rammer ☐ Moist Preparation ☐ Dry Preparation ☒

References / Comments / Deviations: NA = Not Applicable; ND = Not Determined. *Specific gravity of soil assumed.
Percent retained on separating sieve estimated from Proctor sample separation operations.

Jacob Folsom
Technical Responsibility

Jacob Folsom
Signature

Lab Services Manager
Position

7/19/2022
Date

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CBR (CALIFORNIA BEARING RATIO) OF LABORATORY COMPACTED SOIL



ASTM D 1883

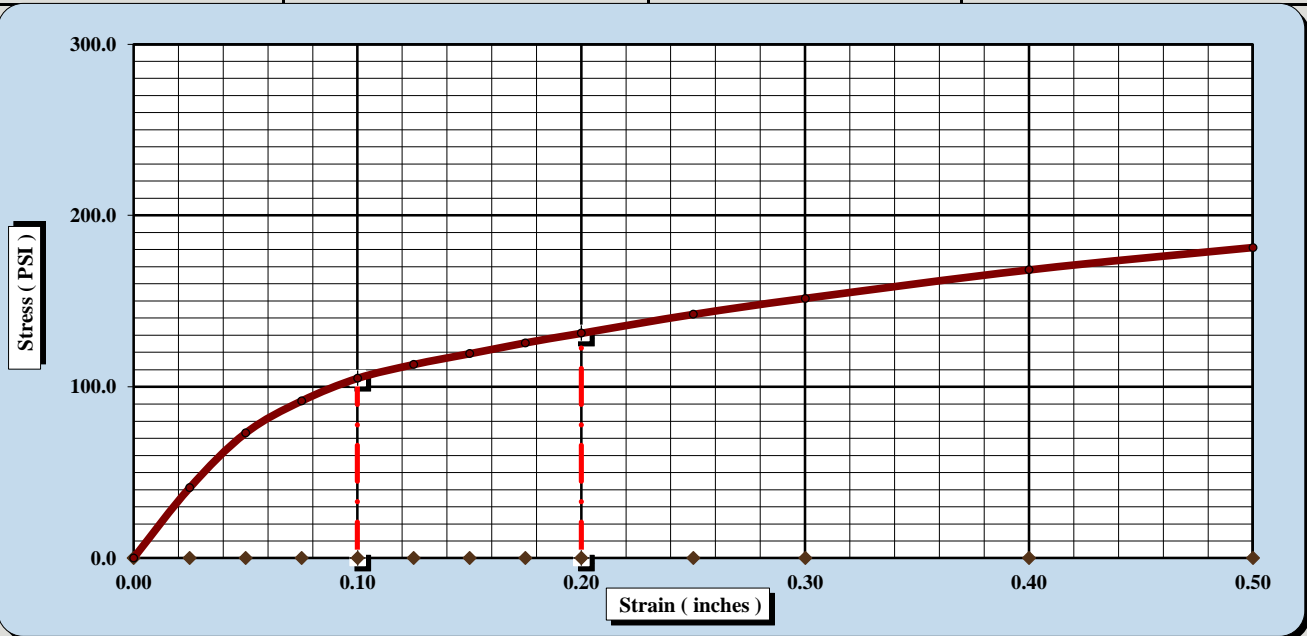
S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project #:	22830088	Report Date:	07/19/22
Project Name:	UK Health Education Building	Test Date(s)	07/14/22
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY		
Type:	Bulk	Sample #:	P-1
		Sample Date:	06/28/22
Location:	B-19/22	Depth (ft.):	N/A

Sample Description: LEAN CLAY (CL), brown

ASTM D 698	Method A	Maximum Dry Density:	104.3	PCF	Optimum Moisture Content:	20.5%
Compaction Test performed on grading complying with CBR spec.					% Retained on the 3/4" sieve:	0.0%

Uncorrected CBR Values		Corrected CBR Values	
CBR at 0.1 in.	10.5	CBR at 0.1 in.	10.5
CBR at 0.2 in.	8.8	CBR at 0.2 in.	8.8



CBR Sample Preparation:

The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	102.0
Initial Dry Density (PCF)	101.7	Moisture Content (top 1" after soaking)	23.1%
Moisture Content of the Compacted Specimen	21.9%	Percent Swell	0.2%
Percent Compaction	97.5%		

Soak Time:	96	Surcharge Weight:	10.0	Surcharge Wt. per sq. Ft.:	50.8
Liquid Limit:	44	Plastic Index:	22		

Notes/Deviations/References:

Jacob Folsom

Technical Responsibility

Jacob Folsom

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

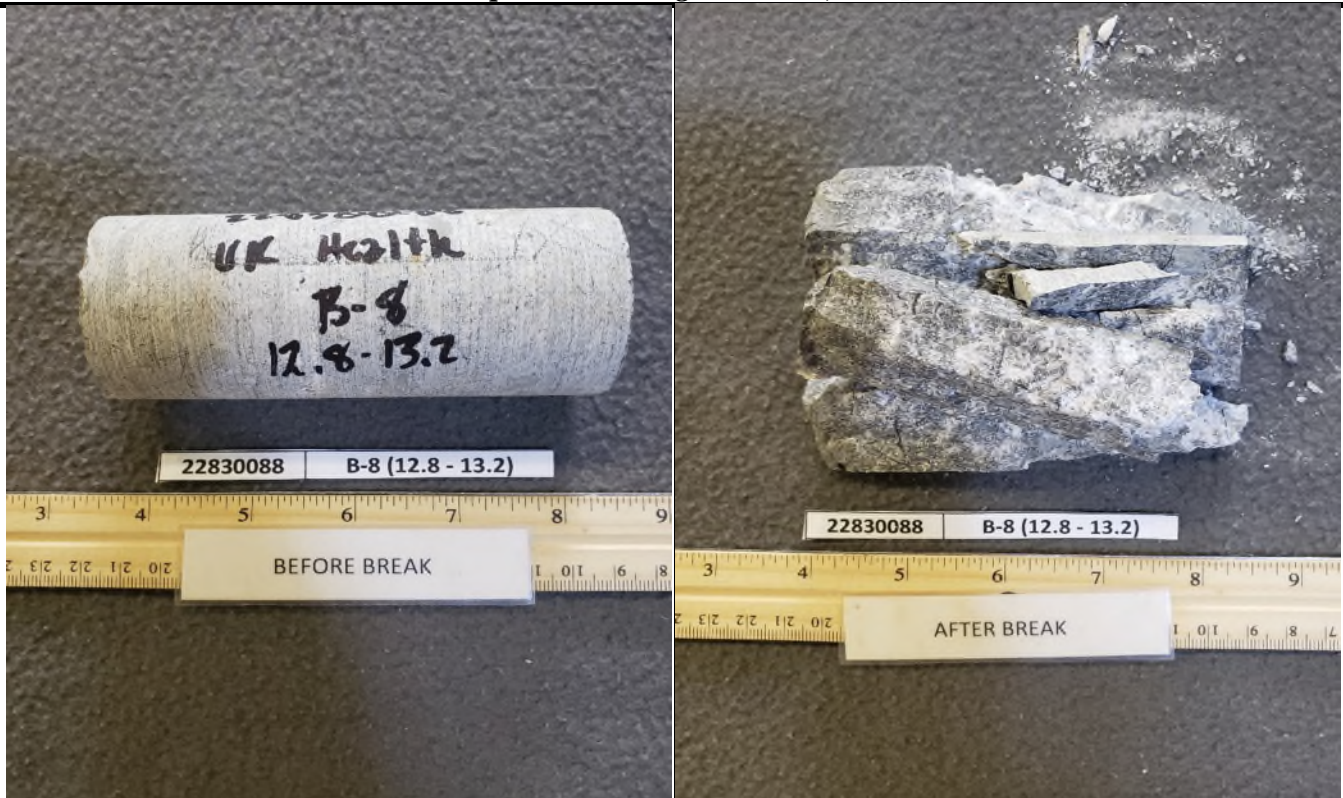


S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505			
Project No.:	22830088	Report Date:	07/19/22
Project Name:	UK Health Education Building	Test Date(s):	07/18/22
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY	Received Date:	06/28/22
Location:	B-8	Depth/Elev., ft:	12.8 - 13.2
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content **0.1 %** **Dry Unit Weight** **166.9 pcf**
Compressive Strength **11,251 psi**



Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom
Technical Responsibility

Jacob Folsom
Signature

Lab Services Manager
Position

7/19/2022
Date

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UNIAXIAL COMPRESSIVE STRENGTH**OF ROCK**

ASTM D 7012 Method C

**S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505**Project Name: **UK Health Education Building**Location: **B-8**Depth, feet: **12.8 - 13.2****Summary of Specimen Tolerances**

Length/diameter target: **MET**

Side straightness target: **MET**

Parallelism target: **MET**

Perpendicularity target: **MET**

Planeness target: **MET**

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio

Length, inches: **4.40** Diameter, inches: **1.860**

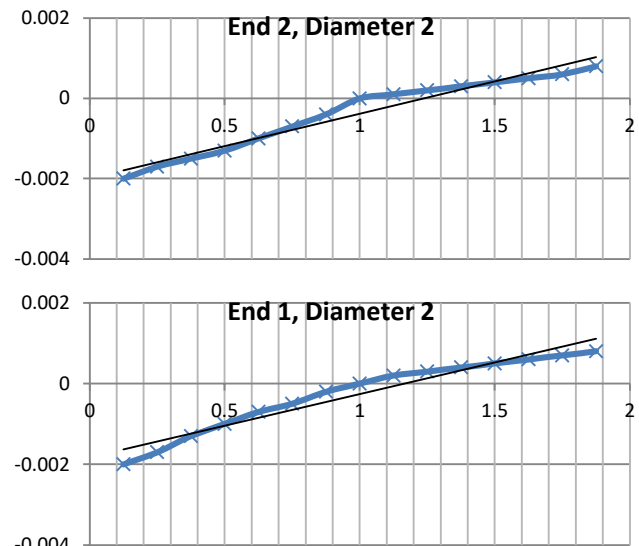
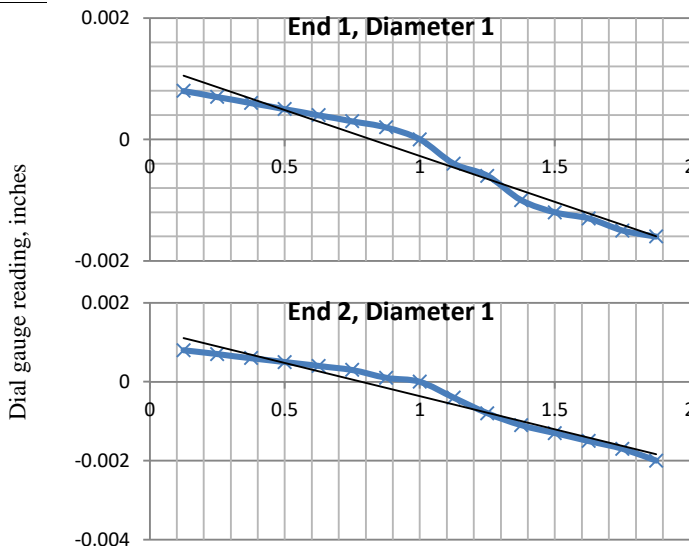
Ratio: **2.36** length to 1 diameter

Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1

Side Straightness

Maximum gap between side of core and reference plate, inches: **< .02**

Target tolerance: Maximum gap less than .02 inches

Planeness**Distance along diameter, inches**Maximum point-line deviation, inches: **< .001**

Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.

ParallelismSlope difference, Diameter 1, degrees: **0.01**Slope difference, Diameter 2, degrees: **0.00**

Target Tolerance: Difference between slopes on each end less than 0.25°

PerpendicularitySlope of End 1, Diameter 1, degrees: **-0.09**Slope of End 2, Diameter 1, degrees: **-0.10**Slope of End 1, Diameter 2, degrees: **0.09**Slope of End 2, Diameter 2, degrees: **0.09**

Target Tolerance: Each diameter perpendicular to the long axis to within 0.25°

Test InformationStrain rate, in/min: **0.015****OR**

Stress rate, lbs/sec:

Time to failure, min: **3.7**Temperature: **room temperature**

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C

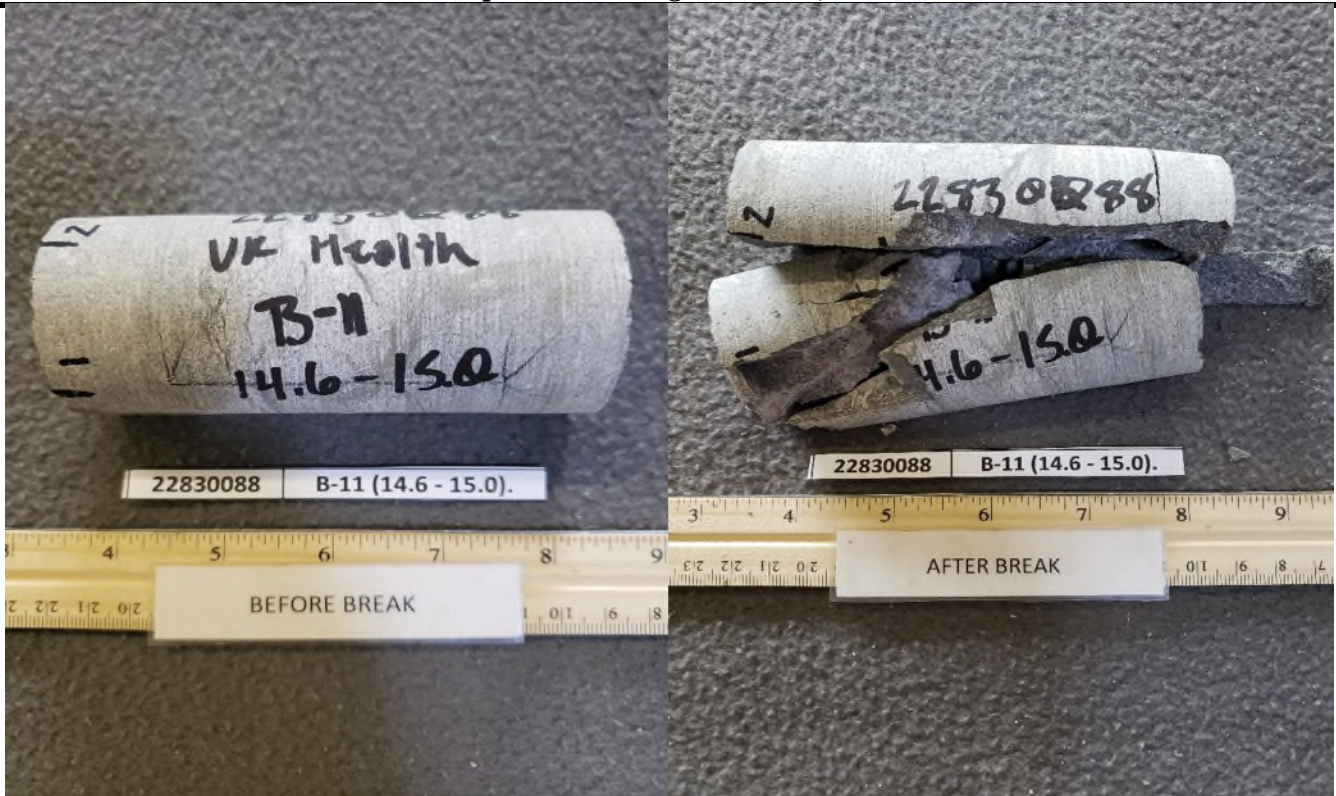


S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505			
Project No.:	22830088	Report Date:	07/19/22
Project Name:	UK Health Education Building	Test Date(s):	07/18/22
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY	Received Date:	06/28/22
Location:	B-11	Depth/Elev., ft:	14.6 - 15.0
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content **0.2 %** **Dry Unit Weight** **164.7 pcf**
Compressive Strength **11,561 psi**



Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom
Technical Responsibility

Jacob Folsom
Signature

Lab Services Manager
Position

7/19/2022
Date

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C



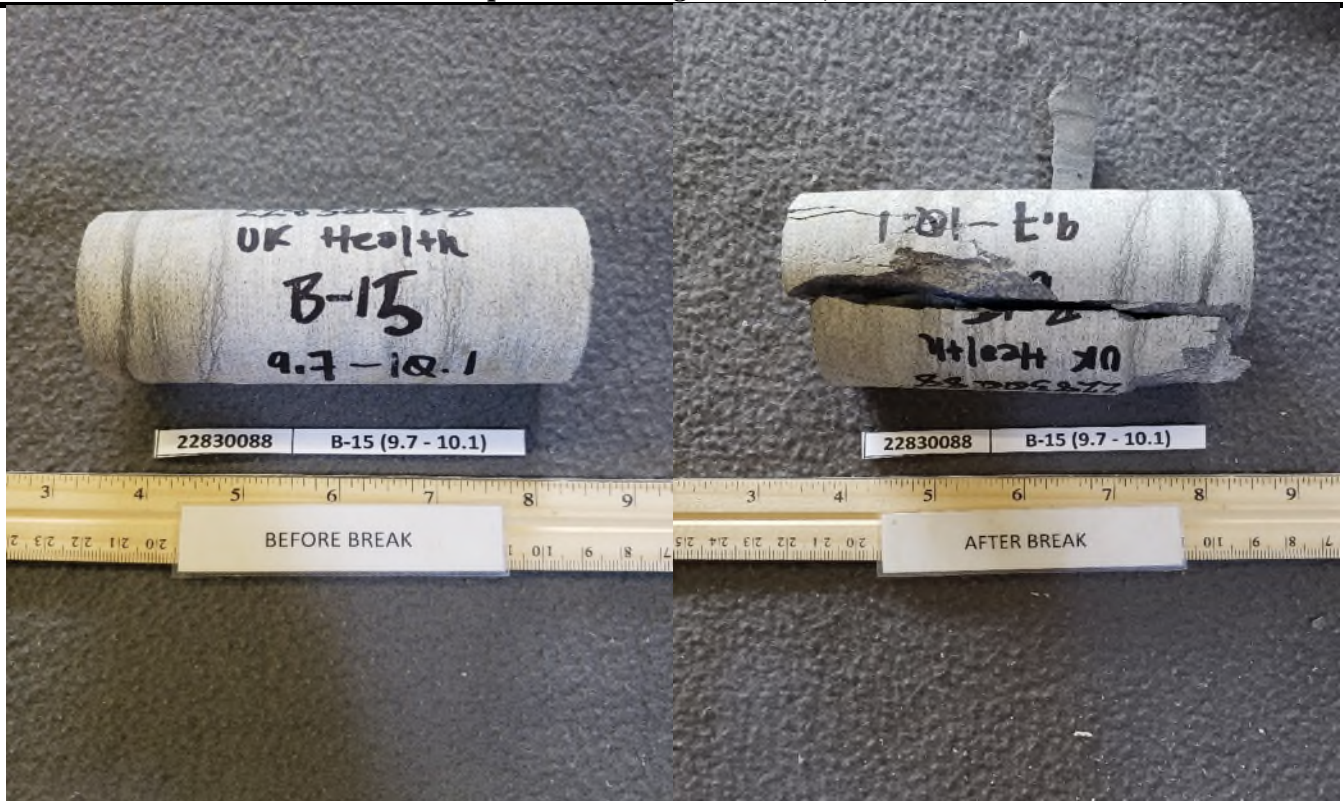
S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	07/19/22
Project Name:	UK Health Education Building	Test Date(s):	07/18/22
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY	Received Date:	06/28/22
Location:	B-15	Depth/Elev., ft:	9.7 - 10.1
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content **0.1 %** **Dry Unit Weight** **165.8 pcf**
Compressive Strength **13,098 psi**



Strain rate: 0.015 in/min.

Notes / Deviations / References:

J Folsom

Technical Responsibility

Jacob Folsom

Signature

Lab Services Manager

Position

7/19/2022

Date

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UNIAXIAL COMPRESSIVE STRENGTH**OF ROCK**

ASTM D 7012 Method C

**S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505**Project Name: **UK Health Education Building**Location: **B-15**Depth, feet: **9.7 - 10.1****Summary of Specimen Tolerances**

Length/diameter target: **MET**

Side straightness target: **MET**

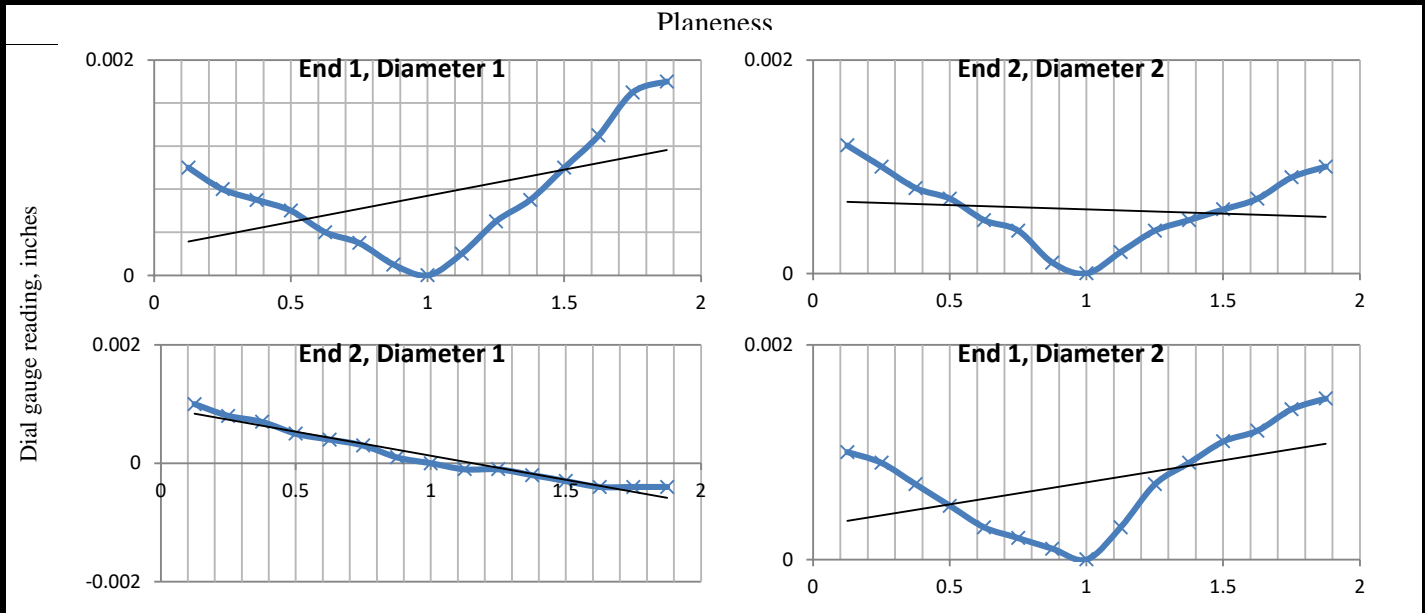
Parallelism target: **MET**

Perpendicularity target: **MET**

Planeness target: **MET**

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter Ratio		Side Straightness	
Length, inches:	4.42	Diameter, inches:	1.860
Ratio:	2.38	Maximum gap between side of core and reference plate, inches:	< .02
Target tolerance: L:D ratio between 2 to 1 and 2.5 to 1		Target tolerance: Maximum gap less than .02 inches	



Distance along diameter, inches		Parallelism	
Maximum point-line deviation, inches:	< .001	Slope difference, Diameter 1, degrees:	0.07
Target Tolerance: No individually measured point should deviate from the best fit line by more than .001 inches.		Slope difference, Diameter 2, degrees:	0.03
Perpendicularity Slope of End 1, Diameter 1, degrees: 0.03 Slope of End 2, Diameter 1, degrees: -0.05 Slope of End 1, Diameter 2, degrees: 0.02 Slope of End 2, Diameter 2, degrees: 0.00 Target Tolerance: Each diameter perpendicular to the long axis to within 0.25°		Test Information Strain rate, in/min: 0.015 OR Stress rate, lbs/sec: Time to failure, min: 3 Temperature: room temperature	

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UNIAXIAL COMPRESSIVE STRENGTH OF ROCK

ASTM D 7012 Method C


S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505

Project No.:	22830088	Report Date:	07/19/22
Project Name:	UK Health Education Building	Test Date(s):	07/18/22
Client Name:	JRA Architects		
Client Address:	3225 Summit Square Place, Suite 200, Lexington, KY	Received Date:	06/28/22
Location:	B-19	Depth/Elev., ft:	14.0 - 14.4
Sample Description:	Gray Limestone		

Angle of load relative to lithology: Approximately perpendicular

Test Results

Moisture Content 0.2 % Dry Unit Weight 162.5 pcf
Compressive Strength 8,812 psi



Strain rate: 0.015 in/min.

Notes / Deviations / References:

J. Folsom
Technical Responsibility

Jacob Folsom
Signature

Lab Services Manager
Position

7/19/2022
Date

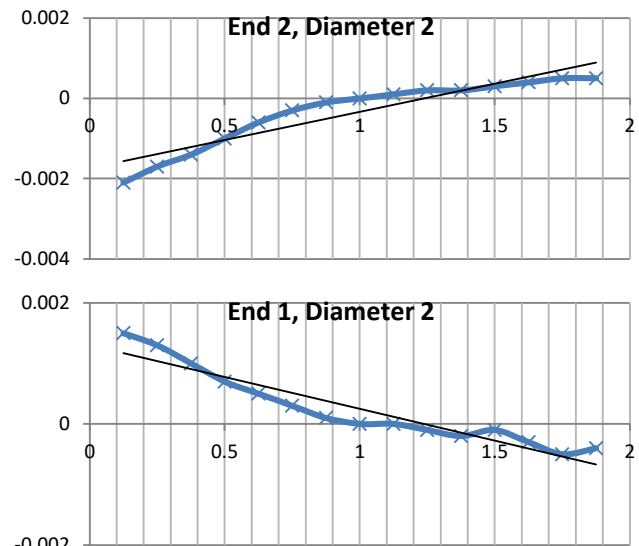
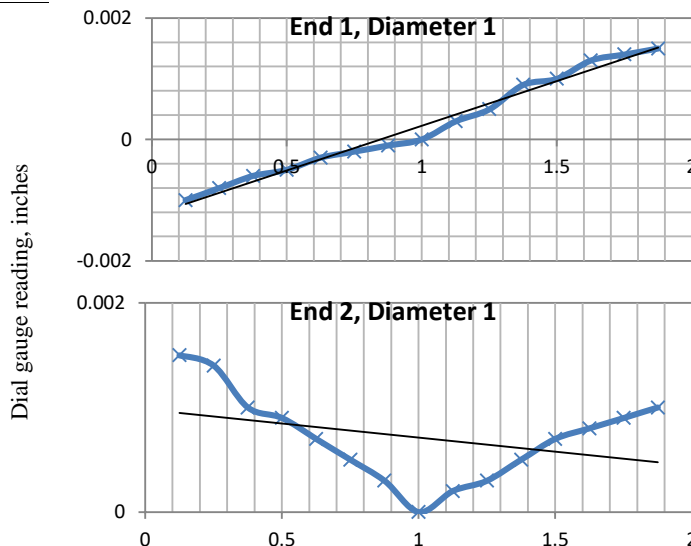
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UNIAXIAL COMPRESSIVE STRENGTH**OF ROCK**

ASTM D 7012 Method C

**S&ME, Inc. - Lexington: 2020 Liberty Road, Suite 105, Lexington, KY 40505**Project Name: **UK Health Education Building**Location: **B-19**Depth, feet: **14.0 - 14.4****Summary of Specimen Tolerances**Length/diameter target: **MET**Perpendicularity target: **MET**Side straightness target: **MET**Planeness target: **MET**Parallelism target: **MET**

*ASTM D4543-08 Standard Practice for Preparing Rock Core as Cylindrical Test Specimens and Verifying Conformance to Dimensional and Shape Tolerance, Section 1.2 - "Rock is a complex engineering material that can vary greatly as a function of lithology, stress history, weathering, moisture content, chemistry, and other natural geologic processes. As such, it is not always possible to obtain or prepare rock core specimens that satisfy the desirable tolerances given in this practice. Most commonly, this situation presents itself with weaker, more porous, and poorly cemented rock types and rock types containing significant or weak (or both) structural features. For these and other rock types which are difficult to prepare, all reasonable efforts shall be made to prepare a specimen in accordance with this practice and for the intended test procedure. However, when it has been determined by trial that this is not possible, the rock specimen will be prepared to the closest tolerance practicable and be considered the best effort and report it as such. If allowable or necessary for the intended test, capping the ends of the specimen as discussed in ASTM D7012 is permitted."

Length to Diameter RatioLength, inches: **4.36** Diameter, inches: **1.865**Ratio: **2.34** length to 1 diameterTarget tolerance: *L:D ratio between 2 to 1 and 2.5 to 1***Side Straightness**Maximum gap between side of core and reference plate, inches: **< .02**Target tolerance: *Maximum gap less than .02 inches***Planeness****Distance along diameter, inches**Maximum point-line deviation, inches: **< .001**Target Tolerance: *No individually measured point should deviate from the best fit line by more than .001 inches.***Perpendicularity**Slope of End 1, Diameter 1, degrees: **0.08**Slope of End 2, Diameter 1, degrees: **-0.02**Slope of End 1, Diameter 2, degrees: **-0.06**Slope of End 2, Diameter 2, degrees: **0.08**Target Tolerance: *Each diameter perpendicular to the long axis to within 0.25°***Parallelism**Slope difference, Diameter 1, degrees: **0.10**Slope difference, Diameter 2, degrees: **0.14**Target Tolerance: *Difference between slopes on each end less than 0.25°***Test Information**Strain rate, in/min: **0.015****OR**

Stress rate, lbs/sec:

Time to failure, min: **2.62**Temperature: **room temperature***This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.*



LABORATORY TESTING PROCEDURES

Soil Classification: Soil classifications provide a general guide to the engineering properties of various soil types and enable the engineer to apply past experience to current problems. In our investigations, samples obtained during drilling operations are examined in our laboratory and visually classified by an engineer. The soils are classified according to consistency (based on number of blows from standard penetration tests), color and texture. These classification descriptions are included on our "Test Boring Records."

The classification system discussed above is primarily qualitative and for detailed soil classification two laboratory tests are necessary: grain size tests and plasticity tests. Using these test results the soil can be classified according to the AASHTO or Unified Classification Systems (ASTM D 2487). Each of these classification systems and the in-place physical soil properties provides an index for estimating the soil's behavior. The soil classification and physical properties obtained are presented in this report.

Compaction Tests: Compaction tests are run on representative soil samples to determine the dry density obtained by a uniform compactive effort at varying moisture contents. The results of the test are used to determine the moisture content and unit weight desired in the field for similar soils. Proper field compaction is necessary to decrease future settlements, increase the shear strength of the soil and decrease the permeability of the soil.

The two most commonly used compaction tests are the Standard Proctor test and the Modified Proctor test. They are performed in accordance with ASTM D 698 and D 1557, respectively. Generally, the Standard Proctor compaction test is run on samples from building or parking areas where small compaction equipment is anticipated. The Modified compaction test is generally performed for heavy structures, highways, and other areas where large compaction equipment is expected. In both tests a representative soil sample is placed in a mold and compacted with a compaction hammer. Both tests have three alternate methods.

Test	Method	Hammer Wt./Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/Layer
Standard D 698	A	5.5 lb./12"	4"	No. 4 sieve	3	25
	B	5.5 lb./12"	4"	3/8" sieve	3	25
	C	5.5 lb./12"	6"	3/4" sieve	3	56

Test	Method	Hammer Wt./Fall	Mold Diam.	Run on Material Finer Than	No. of Layers	No. of Blows/Layer
Standard D 1557	A	10 lb./18"	4"	No. 4 sieve	5	25
	B	10 lb./18"	4"	3/8" sieve	5	25
	C	10 lb./18"	6"	3/4" sieve	5	56

The moisture content and unit weight of each compacted sample is determined. Usually 4 to 5 such tests are run at different moisture contents. Test results are presented in the form of a dry unit weight versus moisture content curve. The compaction method used and any deviations from the recommended procedures are noted in this report.

Atterberg Limits: Portions of the samples are taken for Atterberg Limits testing to determine the plasticity characteristics of the soil. The plasticity index (PI) is the range of moisture content over which the soil deforms as a plastic material. It is bracketed by the liquid limit (LL) and the plastic limit (PL). The liquid limit is the moisture content at which the soil becomes sufficiently "wet" to flow as a heavy viscous fluid. The plastic limit is the lowest moisture content at which the soil is sufficiently plastic to be manually rolled into tiny threads. The liquid limit and plastic limit are determined in accordance with ASTM D 4318.

Moisture Content: The Moisture Content is determined according to ASTM D 2216.



Appendix IV – ACI 302.1R-96 “GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION”

ADDENDUM
GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
(302.1R-96)
Vapor Retarder Location

The report of ACI Committee 302, “Guide for Concrete Floor and Slab Construction (ACI 302.1R-96)” states in section 4.1.5 that “if a vapor barrier or retarder is required due to local conditions, these products should be placed under a minimum of 4 in. (100 mm) of trimable, compactible, granular fill (not sand).” ACI Committee 302 on Construction of Concrete Floors, and Committee 360 on Design of Slabs on Ground have found examples where this approach may have contributed to floor covering problems.

Based on the review of the details of problem installations, it became clear that the fill course above the vapor retarder can take on water from rain, wet-curing, wet-grinding or cutting, and cleaning. Unable to drain, the wet or saturated fill provides an additional source of water that contributes to moisture-vapor emission rates from the slab well in excess of the 3 to 5 lb/1000 ft²/24 h (1.46 to 2.44 kg/100 m²/24 h) recommendation of the floor covering manufacturers.

As a result of these experiences, and the difficulty in adequately protecting the fill course from water during the construction process, caution is advised on the use of the granular fill layer when moisture-sensitive finishes are to be applied to the slab surface.

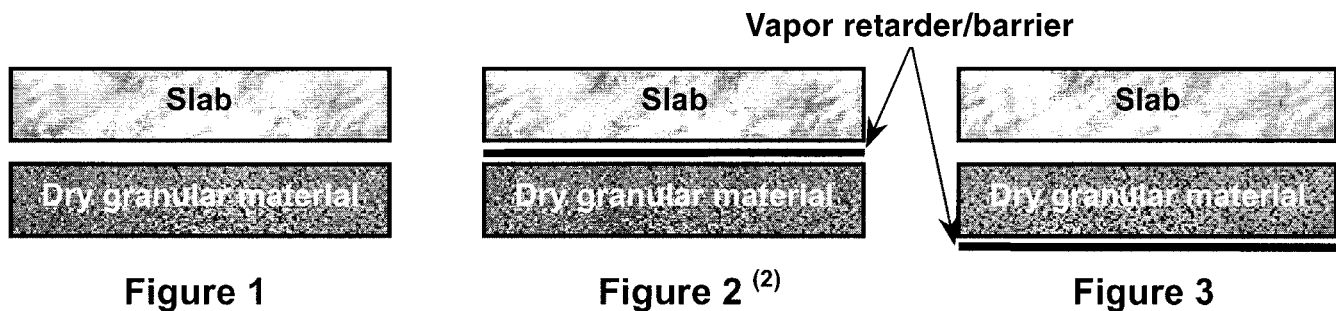
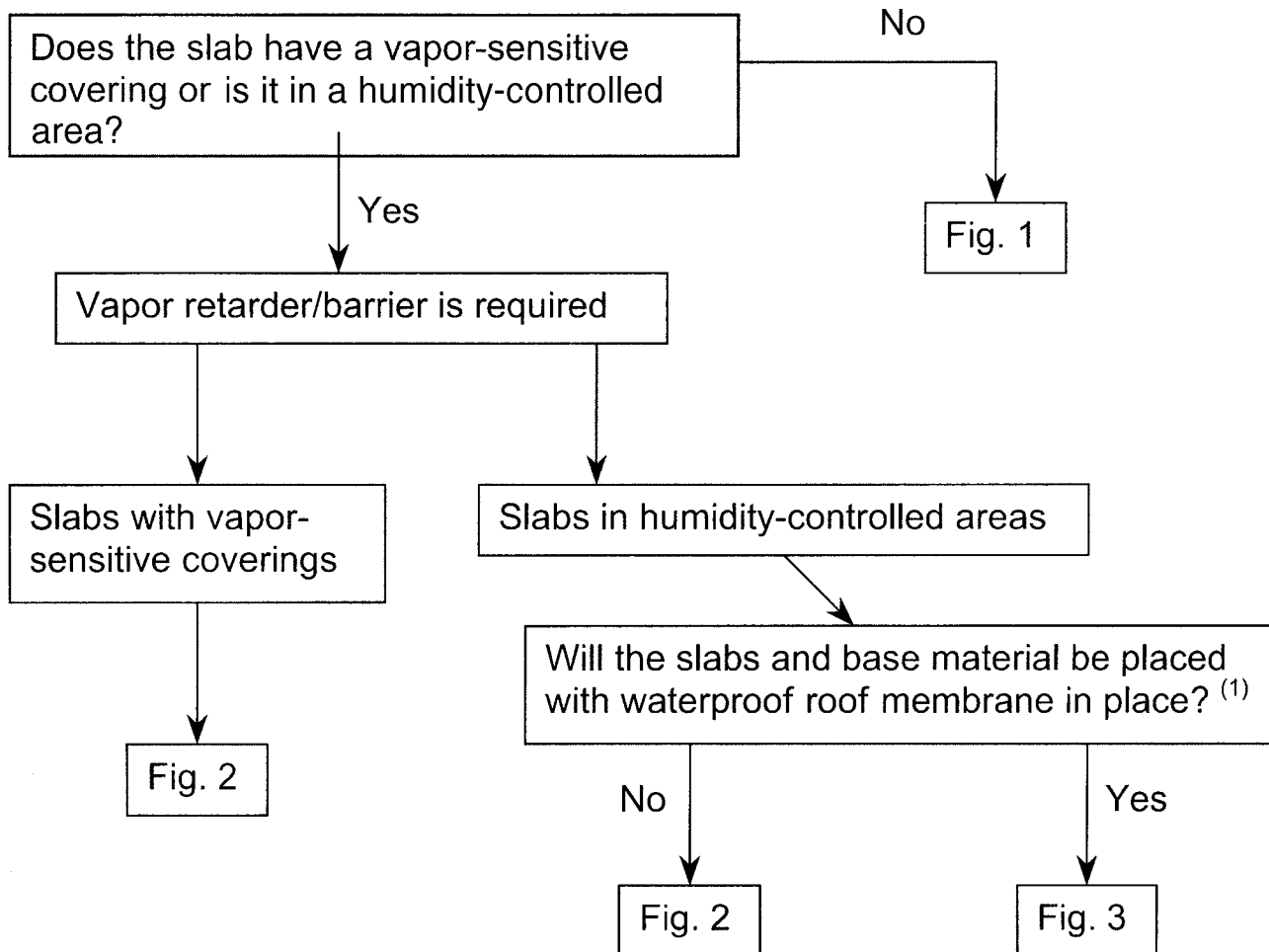
The committees believe that when the use of a vapor retarder or barrier is required, the decision whether to locate the retarder or barrier in direct contact with the slab or beneath a layer of granular fill should be made on a case-by-case basis.

Each proposed installation should be independently evaluated by considering the moisture sensitivity of subsequent floor finishes, anticipated project conditions and the potential effects of slab curling and cracking.

The following chart can be used to assist in deciding where to place the vapor retarder. The anticipated benefits and risks associated with the specified location of the vapor retarder should be reviewed with all appropriate parties before construction.

ADDENDUM
GUIDE FOR CONCRETE FLOOR AND SLAB CONSTRUCTION
(302.1R-96)

Flow Chart for Location of Vapor Retarder/Barrier



(1) If granular material is subject to future moisture infiltration, use Fig. 2

(2) If Fig. 2 is used, reduced joint spacing, a concrete with low shrinkage potential, or other measures to minimize slab curling will likely be required.



JRA Architects
3225 Summit Square Place
Suite #200
Lexington, Kentucky 40509

October 13, 2023

Attention: Mr. Rob Deal, AIA, LEED AP, KCID, NCARB

Reference: **Addendum to Report of Geotechnical Exploration**
University of Kentucky – Health Education Building
Lexington, Kentucky
S&ME Project No. 22830088

Dear Mr. Deal:

S&ME, Inc. (S&ME) completed our geotechnical exploration for the new UK Health Education Building project with our findings and recommendations outlined in a report dated August 18, 2022. At that time, the project was still in the scoping/development phase. On October 8, 2023, Mr. Brian McMillan, PE with Brown and Kubican Structural Engineers emailed updated structural and architectural floor plan drawings.

The current plans include a full depth basement beneath the entire footprint of the building. Bedrock supported spread footing foundations are currently planned which will require areas of bedrock removal to achieve the planned elevations as well as areas of soil over-excavation to expose intact bedrock. In our August 2022 report we recommended an allowable bearing pressure of 70 ksf for foundations bearing on intact bedrock. Where over-excavation is required to expose intact bedrock, we recommend backfilling to the plan bearing elevation with lean concrete with a 28-day compressive strength of at least 4,000 psi. Since the structure foundations will be supported by shallow foundations bearing directly on bedrock, a site seismic classification of "B" can be used for the structural design.

Note that if blasting of the bedrock is performed for the basement excavation, over-shot material should be excavated from beneath both the building footprint and backfilled with lean concrete to the plan grades. Given the relatively shallow bedrock excavation depths, over-shooting of the bedrock should be expected.

Based on our understanding of the project, the recommendations outlined in our August 2022 report are applicable. If additional design elements are altered or if we can be of further assistance, please call.

Sincerely,

S&ME, Inc.

Andrew M. Fiehler, PE
Sr. Project Engineer
Licensed Kentucky 23,977

John C. Lessley, PE
Technical Principal Engineer

SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. Related Requirements:
 - 1. Section 024116 "Structure Demolition" for photographic documentation before building demolition operations commence.
 - 2. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.2 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect and Construction Manager.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.
 - g. Unique sequential identifier keyed to accompanying key plan.

1.3 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.4 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than

3200 by 2400 pixels, and with vibration-reduction technology. Use flash in low light levels or backlit conditions.

- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time from camera.
- D. File Names: Name media files with date and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- D. Periodic Construction Photographs: Take 20 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.

PART 2 - PRODUCTS (Not Used)
PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3233

SECTION 017419 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Demolition of structures is carried in BP-01 requirements.
- C. Related Requirements:
 - 1. Reference Turner Front End for requirements for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
 - 2. Definitions included in the "LEED Version 4 Building Design and Construction Reference Guide (LEED v4 BD+C) Construction and Demolition Waste Management and Diversion, Option 1 Path 2 and online amendments apply to this Section.

1.03 DEFINITIONS

- 1. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- 2. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- 3. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- 4. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- 5. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during construction remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.05 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 (seven) days of date established for the Notice to Proceed.

1.06 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.
 4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Qualification Data: For waste management coordinator.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, or individual employed and assigned by General Contractor, with a record of successful waste management coordination of projects with similar requirements. Superintendent may serve as Waste Management Coordinator.
- B. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference(s): Conduct conference(s) at Project site. Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.

3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.08 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between construction waste material streams. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan. Coordinate the unit of measurement with other Bid Packs for one standard metric.
- B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.01 RECYCLING RECEIVERS AND PROCESSORS

- A. Subject to compliance with requirements, available recycling receivers and processors include, but are not limited to, the following:
 1. Rumpke
 2. Central Kentucky Landfill
 3. Republic

2.02 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of seventy-five – ninety-five percent (75-95%) by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:
 1. Demolition Waste: covered in BP-01
 2. Construction Waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.

- d. Wood trim.
- e. Metals.
- f. Roofing.
- g. Insulation.
- h. Carpet and pad.
- i. Gypsum board.
- j. Piping.
- k. Electrical conduit.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - i. Paper.
 - ii. Cardboard.
 - iii. Boxes.
 - iv. Plastic sheet and film.
 - v. Polystyrene packaging.
 - vi. Wood crates.
 - vii. Wood pallets.
 - viii. Plastic pails.
- m. Construction Office Waste: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following construction office waste materials:
 - i. Paper.
 - ii. Aluminum cans.
 - iii. Glass containers.
 - iv. Cardboard

PART 2 - EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply local requirements for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.

- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.
 - 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.03 RECYCLING CONSTRUCTION WASTE

- B. General: The following articles define acceptable recycling procedures. The contractor has the option to utilize all or none of the following procedures; however, the Contractor is required to meet the requirement for diverted content defined in Article 2.02, A – PERFORMANCE REQUIREMENTS
- C. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- D. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
- E. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
- F. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- G. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location. Evaluate fit for attic stock or manufacturer's take-back programs.
- H. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals. Evaluate fit for attic stock or manufacturer's take-back programs.
- I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
 - 2. Evaluate fit for attic stock or manufacturer's take-back programs.
- J. Carpet Tile: Remove debris, trash, and adhesive.
 - 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.

- 2. Evaluate fit for attic stock or manufacturer's take-back programs.
 - K. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
 - L. Conduit: Reduce conduit to straight lengths and store by material and size.
 - M. Packaging:
 - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - 2. Polystyrene Packaging: Separate and bag materials.
 - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
 - E. Wood Materials:
 - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean sawdust as organic mulch.
 - F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
 - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Section 329300 "Plants" for use of clean ground gypsum board as inorganic soil amendment.
 - G. Paint: Seal containers and store by type.
- 3.04 DISPOSAL OF WASTE
- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - B. Burning: Do not burn waste materials.
 - C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 017419

SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section describes general requirements and procedures to comply with the Project's Sustainable Design Requirements. The Design Professional has selected materials and utilized integrated design processes that achieve the LEEDv4 BD+C NC Silver certification target. Contractor is responsible to maintain and support these objectives in developing means and methods for performing work and in proposing product substitutions or changes to specified processes. By submitting a change or substitution of materials or processes, contractor must demonstrate its diligence in performing the level of investigation and comparison required to prove product as equal.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.03 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction: New Construction" (LEEDv4 BD+C: NC) Silver Certification target based on USGBC's LEEDv4 BD+C: NC.
 - 1. Other LEED prerequisites and credits needed to obtain LEED certification depend on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - 4. Specific requirements for LEED materials are included in greater detail in other Sections.
- B. To achieve the project's LEED v4 BD+C Silver certification target, the project will borrow credits from the following LEED rating systems as indicted on LEED Project Checklist.
 - 1. LEEDv 4.1 BD+C: NC, April 2021 Addendum Release
- C. Related Sections:
 - 1. Reference Turner Front End for
 - a. General submittal requirements.
 - b. Temporary construction facilities, protection, and controls.
 - 2. Section 017419 - "Construction Waste Management and Disposal".
 - 3. Section 018116 - "Low Emitting Materials"
 - 4. Section 018119 - "Construction Indoor Air Quality (IAQ) Management
 - 5. Divisions 01 through 49 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.04 DEFINITIONS

- A. LEED: USGBC's "LEED Version 4 for Building Design and Construction."
 - 1. Definitions that are a part of "LEED Version 4 and Version 4.1 for Building Design and Construction" (LEEDv4, v4.1 BD+C) apply to this Section.
- B. Bio-Based Materials: Materials that meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials shall be tested using ASTM D 6866 and be legally harvested, as defined by the exporting and receiving country.
- C. CDPH Standard Method v1.2: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.2–2017, for the emissions testing and requirements of products and materials.
- D. Chain-of-Custody (COC): A procedure that tracks a product from the point of harvest or extraction to its end use, including all successive stage of processing, transformation, manufacturing, a distribution.
- E. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001. Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- F. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- G. Environmental Product Declaration (EPD): An independently verified report based on life-cycle assessment studies that have been conducted according to a set of common rules for each product category and peer-reviewed.
 - 1. Product-Specific Declaration: A product with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044 that has at least a cradle to gate scope.
 - 2. Industry-Wide (Generic) EPD: Provide products with third-party certification (Type III), including external verification, in which the manufacturer is explicitly recognized as a participant by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
 - 3. Product-Specific Type III EPD: A product with a third-party certification, including external verification, in which the manufacturer is explicated recognized by the program operator. EPD must conform to ISO 14025, 14040, 14044, and EN 15804 or ISO 21930 and have at least a cradle to gate scope.
- H. Extended Producer Responsibility (EPR): Measures undertaken by the maker of a product to accept its own and sometimes other manufacturers' products as postconsumer waste at the end of the products' useful life.
- I. GBCI: Green Business Certification Institute: Administers LEED, performing third-party technical reviews and verification of LEED-registered projects.
- J. Health Product Declaration Open Standard (HPD): A standard format for reporting product content and associated health information for building products and materials.
- K. Indoor Air Quality (IAQ) Management Plan: Plan developed by the Contractor to provide a healthy indoor environment for workers and building occupants during construction. Plan must meet or exceed the recommendations of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) "IAQ Guidelines for Occupied Buildings Under Construction."

- L. Leadership Extraction Practices: Products that meet at least one of the responsible extraction criteria, which include: extended producer responsibility; bio-based materials; FSC wood products; materials reuse; recycled content; and other USGBC approved programs.
- M. Material Cost: The dollar value of materials being provided to the site, after Contractor mark-ups, including transportation costs, taxes, fees, and shop labor, but excluding field equipment and field labor costs.
- N. Materials Reuse: Reuse includes salvaged, refurbished, or reused products.
- O. Passive (As Related to MEP): Not part of the active portions of the Mechanical, Electrical, and Plumbing systems, for example piping, pipe insulation, ducts, duct insulation, conduit, plumbing fixtures, faucets, showerheads, and lamp housings.
- P. Recycled Content: Recycled content is the sum of postconsumer recycled content plus one-half the preconsumer recycled content, based on cost.
 - 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.
- Q. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site. If only a fraction of a product or material is extracted/ harvested/ recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- R. Volatile Organic Compounds (VOC) Emissions Test: Refer to CDPH Standard Method v1.2 definition.

1.05 LEED CONFERENCE

- A. LEED Conference: Schedule and conduct a conference at a time convenient to Owner and Architect within 7 days of Notice of Award. Advise Architect, Owner's Commissioning Provider, and Owner's Project Manager of scheduled meeting dates.
 - 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Provider, Owner's Project Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: LEED goals for the project, Contractor's action plans, and discussion of targeted LEED Prerequisites and Credits.
 - 3. Minutes: Record and distribute minutes to attendees and other entities with responsibilities for obtaining LEED Credits.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Work of this project includes completed building and application for LEED certification. Work is not complete until Owner has accepted USGBC's final review of LEED certification.
 - 1. Provide documentation required by LEED and GBCI reviewer.
 - 2. Document correspondence with USGBC as informational submittal.
- B. Provide materials and procedures necessary to obtain LEED prerequisites and credits required in this Section. Other Sections may specify requirements that contribute to LEED prerequisites and credits. Refer to other sections for additional materials and procedures necessary to obtain LEED prerequisites and credits.
- C. Respond to questions and requests for additional information from Architect, Owner, and the USGBC regarding LEED credits until the USGBC has made its determination on the project's LEED certification application.
- D. LEED Online Submittals: Upload LEED documentation submittal data directly to USGBC project "LEED Online" website. Complete online forms at least monthly and as necessary to document LEED credits for submittals required in this Section.

1.07 ACTION SUBMITTALS

- A. General: Submit additional sustainable design submittals required by other Specification Sections.
- B. Sustainable design submittals are in addition to other submittals.
 - 1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated LEED requirements instead of separate sustainable design submittal. Mark additional copy "Sustainable design submittal."
- C. Sustainable Design Documentation Submittals in compliance with LEED Requirements
 - 1. Construction Activity Pollution Prevention
 - a. Erosion and Sedimentation Plan (prepared by Civil Engineer).
 - b. Maintenance of measures.
 - c. Construction Documentation: Timestamped photographs monthly and after major weather events showing prevention measures are maintained and effective.
 - 2. Documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials for products sourced within 100 miles from project site.
 - 3. Environmental Product Declarations
 - 4. Documentation for products for Embodied Carbon/LCA Optimization
 - 5. Sustainability reports for products for responsible sourcing of raw materials. Include the following:
 - a. Product data and certification letter from product manufacturers, indicating participation in an extended producer responsibility program and statement of costs.
 - b. Product data and certification for bio-based materials. Include statement of costs.
 - c. Product data and chain-of-custody certificates for products containing certified wood. Include statement of costs with Vendor COC number on invoice.
 - d. Receipts for salvaged and refurbished materials used for Project, indicating sources and costs.

- e. Product data and certification letter from product manufacturers, indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement of costs.
- 6. Material ingredient reports for material ingredient reporting.
- 7. Documentation for products for material ingredient optimization.
- 8. Documentation complying with Section 017419 "Construction Waste Management and Disposal."
- 9. Product data for adhesives and sealants used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
- 10. Product data for paints and coatings used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
- 11. Laboratory test reports for flooring, indicating compliance with requirements for low-emitting materials.
- 12. Laboratory test reports for products containing composite wood or agrifiber products or wood glues, indicating compliance with requirements for low-emitting materials.
- 13. Laboratory test reports for wall panels indicating compliance with requirements for low-emitting materials.
- 14. Laboratory test reports for ceilings indicating compliance with requirements for low-emitting materials.
- 15. Laboratory test reports for insulation indicating compliance with requirements for low-emitting materials.
- 16. Construction Indoor-Air-Quality (IAQ) Management:
 - a. Construction IAQ management plan.
 - b. Product data for temporary filtration media.
 - c. Product data for filtration media used during occupancy.
 - d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 - e. Construction Documentation: Filtration media log with record of MERV and frequency of filter changes during construction and prior to Owner occupancy.

1.08 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For LEED coordinator.
- B. Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items which are not included in the calculations for credit compliance:
 - 1. Wood construction materials.
 - 2. Furniture.
 - 3. Passive plumbing materials.
 - 4. Passive mechanical (HVAC) materials.
 - 5. Passive electrical materials.
 - 6. Earthwork and exterior improvements, hard costs.
- C. Sustainable Design Action Plans: Provide preliminary submittals within fourteen (14) days of date established for commencement of the Work, indicating how the following requirements will be met:
 - 1. List of proposed products with Environmental Product Declarations.
 - 2. List of proposed products complying with requirements for Embodied Carbon/LCA Optimization.
 - 3. List of proposed products complying with requirements for Responsible Sourcing of Raw Materials reporting.
 - 4. List of proposed products complying with requirements for Material Ingredient Reporting.

5. List of proposed products complying with requirements for Material Ingredient Optimization.
 6. Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
 7. Construction IAQ management plan.
- D. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.

1.09 QUALITY ASSURANCE

- A. LEED Coordinator: Engage an experienced LEED-accredited professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, the Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated. Contractor to determine a combination of credit options best suited for achieving credits required.
1. Exclusions: Special equipment, such as elevators, escalators, process equipment, and fire suppression systems, is excluded from the credit calculations. Also excluded are products purchased for temporary use on the project, like formwork for concrete.
 2. Any discrepancies between product and LEED requirements are to be promptly communicated to the Owner and AE Team.

2.02 BUILDING DISCLOSURE AND OPTIMIZATION

- A. LEEDv4.1 BD+C: NC: MR Building Product Disclosure and Optimization – Environmental Product Declarations.
1. Achieve Exemplary Performance for Option 1. Environmental Product Declaration (EPD): **Provide at least 40 permanently installed products (sourced from at least 5 different manufacturers)** which have Environmental Product Declarations that comply with LEED requirements.
 - a. Life-Cycle assessment
 - b. Product-Specific Type III EPD
 - c. Industry-Wide Type III EPD
 2. Achieve Option 2. Embodied Carbon/LCA Optimization. Provide products that have a compliant embodied carbon optimization report or action plan separate from the LCA or EPD. **Use at least 5 permanently installed products sourced from at least three different manufacturers.**
 - a. Embodied Carbon / LCA Action Plan
 - b. Reductions in Embodied Carbon, Comparative Analysis
 - c. Regional Materials: Products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site.
- B. LEEDv4.1 BD+C: NC: MR Building Product Disclosure and Optimization – Sourcing of Raw Materials.
1. Provide permanently installed products that comply with at least one of the responsible sourcing and extraction criteria for at least 30%, by cost, of the total value of permanently installed building products in the project (sourced from at least five different manufacturers)
 - a. Extended producer responsibility program.

- b. Bio-based materials:
 - c. Certified Wood: Forest Stewardship Council or USGBC approved equivalent.
 - d. Materials Reuse
 - e. Recycled content.
 - f. Regional Materials: Products sourced (extracted, manufactured, purchased) within 100 miles (160 km) of the project site.
 - 2. Do not include furniture, plumbing, mechanical and electrical components, and specialty items, such as elevators and equipment, in the calculation.
- C. LEEDv4.1 BD+C: NC: MR Building Product Disclosure and Optimization – Material Ingredients
- 1. Achieve Option 1. Material Ingredient Reporting. **Provide at least 20 different permanently installed products (from at least five different manufacturers)** that use any of the following programs to demonstrate the chemical inventory of the product to at least 0.1% (1000 ppm), which meet one of the following disclosure criteria:
 - a. Cradle to Cradle Certification or Material Health Certificate, Bronze
 - b. Declare Product Labels, Red List Free, LBC Red List Free, or Declared
 - c. Global Green Tab, issued after January 1, 2020
 - d. Health Product Declaration.
 - e. Living Product Challenge
 - f. Manufacturer Inventory
 - g. Product Lens Certification
 - 2. Achieve Option 2: Material Ingredient Optimization. Provide products that have a compliant material ingredient optimization report or action plan. **Use at least 5 permanently installed products sourced from at least three different manufacturers** which meet one of the following disclosure criteria.
 - a. Material Ingredient Screen and Optimization Action Plan.
 - b. Advanced Inventory & Assessment. Inventory to at least 0.01% by weight (100 ppm) and no GreenScreen LT-1 hazards or GHS Category 1 hazards are present or Inventory to at least 0.01% by weight (100ppm) and at least 75% by weight of product is assessed using GreenScreen. The remaining 25% by weight of product has been inventoried and the GreenScreen assessment is publicly available.
 - i. Cradle to Cradle Certified or Material Health Certificate, Bronze, Third-party verified
 - ii. Declare Product Labels, Red List Free, LBC Red List Free, Third-party verified
 - iii. Health Product Declaration, Third-party verified
 - iv. Living Product Challenge, Red List Free, LBC Red List Free, Third-party verified
 - v. Manufacturer Inventory, Third-party verified
 - c. Material Ingredient Optimization. Inventory to at least 0.01% by weight (100 ppm) and at least 95% by weight of product is assessed using GreenScreen. No BM-1 hazards are present. The remaining 5% not assessed has been inventoried and screened using GreenScreen List Translator and no GreenScreen LT-1 hazards are present.
 - i. Cradle to Cradle Certified or Material Health Certificate, Silver, Third-party verified
 - ii. Health Product Declaration, Third-party verified
 - iii. Living Product Challenge, Imperative 09: Transparent Material Health
 - iv. Manufacturer Inventory, Third-party verified
- 2.03 LEEDv4.1 BD+C: NC: EQ Low-Emitting Materials
- A. Achieve 3, three Points **[4 product categories]**. Product Categories are as follow:
- 1. Paints and Coatings: For field applications that are inside the weatherproofing system, at least 75% of all paints and coatings, by volume or surface area, meet the VOC emissions evaluation

AND 100% meet the VOC content evaluation. To meet the 100% requirement for VOC content evaluation, a VOC budget may be used.

2. Adhesives and Sealants: For field applications that are inside the weatherproofing system. At least 75% of all adhesives and sealants, by volume or surface area, meet the VOC emissions evaluation AND 100% meet the VOC content evaluation. To meet the 100% requirement for VOC content evaluation, a VOC budget may be used.
3. Flooring: At least 90% of all flooring, by cost or surface area, meets the VOC emissions evaluation OR inherently nonemitting sources criteria, OR salvaged and reused materials criteria.
4. Wall Panels: At least 75% of all wall panels, by cost or surface area, meet the VOC emissions evaluation, OR inherently nonemitting sources criteria, OR salvaged and reused materials criteria.
5. Ceilings: At least 90% of all ceilings, by cost or surface area, meet the VOC emissions evaluation, OR inherently nonemitting sources criteria, OR salvaged and reused materials criteria.
6. Insulation: At least 75% of all insulation, by cost or surface area, meets the VOC emissions evaluation.
7. Composite Wood: At least 75% of all composite wood, by cost or surface area, meets the Formaldehyde emissions evaluation OR salvaged and reused materials criteria.

2.04 LEEDv4 NC: WE INDOOR WATER USE REDUCTION

- A. WEp2, Indoor Water Use Reduction, Appliances: Provide ENERGY STAR or performance equivalent appliances.
- B. WEp2/WEc2, Indoor Water Use Reduction, Plumbing Fixtures: Do not exceed water flow requirements indicated in Division 22 – PLUMBING and related fixture schedules. Flow rates to be provided as required to meet LEED Objectives indicated by LEED scorecard included in specifications by reference.
- C. Provide fixtures and fittings with WaterSense labeling for any fixture type that is eligible for the WaterSense Label.

PART 3 - EXECUTION

3.01 NONSMOKING BUILDING

- A. Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

3.02 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 017419 "Construction Waste Management and Disposal."

3.03 LOW EMITTING MATERIALS

- A. Comply with Section 018116 – "Low Emitting Materials"

3.04 CONSTRUCTION IAQ MANAGEMENT

- A. Comply with Section 018119 – “Construction Indoor Air Quality (IAQ) Management”
- B. Comply with all applicable recommended control measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007, ANSI/SMACNA 008–2008, Chapter 3.
 - 1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in **Section 015000 "Temporary Facilities and Controls,"** install MERV 8 filter media at each return-air inlet for the air-handling system used during construction.
 - 2. Replace air filters immediately prior to occupancy.
 - 3. Protect absorptive materials stored on-site and installed from moisture damage.

END OF SECTION 018113

SECTION 01 8116 – LOW EMITTING MATERIALS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for volatile organic compound (VOC) limits and emissions criteria for adhesives sealants, paints, coatings, flooring, ceilings, wall panels, insulation and composite wood used for the Project.
- B. Related Sections:
 - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
 - 2. Section 01 8113: "Sustainable Design and LEED Requirements"
 - 3. Section 01 8119: "Construction Indoor Air Quality [IAQ] Management"
 - 4. Divisions 01 through 49 Sections for LEED requirements specific to the work of each of these Sections. Requirements may or may not include reference to LEED.

1.02 REFERENCE STANDARDS

- A. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory.
- B. In the event of conflict of referenced standards and this specification or within the standards themselves, the more stringent standard or requirement shall govern.
 - 1. Rule 1113, February 5, 2016 - "Architectural Coatings": South Coast Air Quality Management District (SCAQMD), State of California <http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/r1113.pdf>
 - 2. California Air Resources Board (CARB) 2007 – "Suggested Control Measure (SCM) for Architectural Coatings" [2007 Suggested Control Measure for Architectural Coatings \(ca.gov\)](http://www.carb.ca.gov/2007_Suggested_Control_Measure_for_Architectural_Coatings)
 - 3. Green Seal Paint Standard GS-11, Green Seal, Inc., Washington, DC. https://greenseal.org/wp-content/uploads/2018/10/GS-11_Ed3-2_Paints_Coatings_Stains_and_Sealers.pdf
 - 4. Green Seal Commercial Adhesive Standard GS-36, Green Seal, Inc., Washington, DC [Adhesives for Commercial Use \(greenseal.org\)](http://www.greenseal.org/Adhesives_for_Commercial_Use)
 - 5. Rule 1168, October 6, 2017 - "Adhesive and Sealant Applications", South Coast Air Quality Management District (SCAQMD), State of California <http://www.aqmd.gov/docs/default-source/rule-book/reg-xi/rule-1168.pdf>
 - 6. CDPHV1.2 -2017 Standard Method for The Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers
 - 7. GreenGuard Environmental Institute: Standard Method for Measuring and Evaluating Chemical Emissions from Building Materials, Finishes and Furnishings, Using Dynamic Environmental Chambers
 - 8. Ultra-low-emitting formaldehyde (ULEF), EPA Toxic Substances Control Act, Formaldehyde Emission Standards for Composite Wood Products (TSCA, Title VI) (EPA TSCA Title VI) or California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM)
 - 9. No added formaldehyde resins (NAF), EPA TSCA Title VI or CARB ATCM
 - 10. PS 1-09, Performance Standard for Structural Plywood
 - 11. PS 2-10, Performance Standard for Wood Base Structural-Use Panels, Exposure 1 or Exterior

- a. ASTM D 5456 Standard Specification for Evaluation of Structural Composite Lumber Products
- b. ANSI A190.1 Product Standard for Structural Glued Laminated Timber
- c. ASTM D 5055 Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists
- d. ANSI PRG 320 Standard for Performance-Rated Cross-Laminated Timber
- e. PS 20-15 American Softwood Lumber Standard

1.03 SUBMITTALS

- A. Manufacturer's technical information for all interior applied adhesives, sealants, paints, coatings, floors, floor covers and other interior products VOC content evaluation in grams/Liter (g/L) and general emissions evaluation.
 1. For wet applied products applied inside the weatherproofing membrane:
 - a. Provide product data indicating compliance with VOC content requirements.
 2. For all products including wet-applied, inside weatherproofing membrane, Provide General Emissions Evaluation documentation for each product.
 - a. CDPH Standard Method v1.2 (2017)
 - b. Third-party Certifications/Programs that use CDPH Standard Method v1.2 (2017)
<https://www.usgbc.org/resources/cdph-list-certifications-use-cdph-standard-method-v12>

PART 2 - PRODUCTS

2.01 GENERAL – LOW-EMITTING MATERIALS

- A. VOC Content Requirements: All products wet-applied onsite, inside the weatherproofing membrane must demonstrate compliance with VOC Content Evaluation.
- B. General Emissions Requirements: Adhesives, sealants, paints, coatings, flooring, ceilings, insulation and composite wood products inside the weatherproofing membrane must demonstrate they have been tested and determined compliant in accordance with California Department of Public Health, (CDHP), Standard Method v1.2-2017, using the applicable exposure scenario.
 1. Manufacturer's documentation demonstrating compliance must state the range of total VOCs (tVOC) after 14 days measured as specified in the CDPH Standard Method v1.2 as follows:
 - a. 0.5 mg/m3 or less,
 - b. between 0.5 and 5.0 mg/m3 or,
 - c. 0.5 mg/m3 or more.
- C. Additional Low-Emitting Requirements:
 1. If the applicable regulation requires subtraction of exempt compounds, any content of intentionally added exempt compounds larger than 1% weight by mass (total exempt compounds) must be disclosed.
 2. If a product cannot reasonably be tested as specified above, testing of VOC content must comply with ASTM D2369-10; ISO 11890, part 1; ASTM D6886-03; or ISO 11890-2.

2.02 PAINTS AND COATINGS PRODUCT CATEGORY

- A. The paints and coatings product category includes all interior paints and coatings wet-applied on site. Exclude foamed-in place and sprayed insulation (include in Insulation category).
- B. Methylene chloride and perchloroethylene shall not be intentionally added in paints or coatings.
- C. Comply with General Emissions Evaluation: Paints and Coatings must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
- D. VOC Limits

1. INTERIOR ARCHITECTURAL PAINTS

- a. The volatile organic compound (VOC) content of all field-applied architectural paints, used on the interior walls and ceilings of this Project shall not exceed the limits defined in the Green Seal standard GS-11, Paints, Edition 3.2, October 26, 2015. Product specific requirements are as follows:

i. Paints

1]	Flat	50
2]	Non-Flat	100
3]	Non-Flat High Gloss Coatings	150

ii. Coatings:

1]	Concrete/Masonry Sealers	100
2]	Fire resistive Coatings	350
3]	Floor coatings	100
4]	Fire-Proofing Coatings	150
5]	Low-Solids Coatings	120
6]	Primers, Sealers, and Undercoaters	100
7]	Roof Coatings	50
8]	Rust Preventative Coatings	250
9]	Wood Coatings	275

2. INTERIOR COATINGS

- a. The volatile organic compound (VOC) content of all field-applied coating used on the interior of this Project shall not exceed the limits defined in Rule 1113 - "Architectural Coatings" of the South Coast Air Quality Management District (SCAQMD), of the State of California, Amended February 5, 2016.
- b. The VOC limits defined by SCAQMD are measured in grams per liter (g/L), less water and less exempt compounds.
- c. General: For specified building construction related applications, the allowable VOC content is as follows:

i. Coatings

1]	Building Envelope Coatings	50
2]	Clear Wood Finish:	
	a] Varnish	275
	b] Sanding Sealers	275
	c] Lacquer	275
3]	Concrete-Curing Compounds	100
4]	Dry Fog Coatings	50
5]	Floor Coatings	50
6]	Low-solids Coatings	120*
7]	Magnesite Cement Coatings	450
8]	Primers, Sealers and Undercoaters	100

9]	Shellac	
a]	Clear	730
b]	Pigmented	550
10]	Stains	100
11]	Waterproofing Sealers	100
12]	Waterproofing Concrete/Masonry Sealers	100
13]	Wood Preservatives	350
14]	Low Solids Coatings	120

*Note: VOC levels for Low-Solids coatings are measured in grams of VOC per liter of material, including water.

2.03 ADHESIVES AND SEALANTS PRODUCT CATEGORY

- A. The adhesives and sealants product category includes all interior adhesives and sealants wet-applied on site.
- B. Methylene chloride and perchloroethylene shall not be intentionally added in adhesives or sealants.
- C. Do not use adhesives that contain urea formaldehyde.
- D. Comply with General Emissions Evaluation: Adhesives and Sealants must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2-2017, using the applicable exposure scenario.
- E. VOC Limits

1. INTERIOR ADHESIVES

- a. The volatile organic compound (VOC) content of all field-applied adhesives, adhesive bonding primers, and adhesive primers used on the interior of this Project shall not exceed the limits de-fined in Rule 1168 - "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California, with a rule amendment date of October 6, 2017.
- b. The VOC limits defined by SCAQMD are measured in grams per liter (g/L), less water and less exempt compounds.
- c. General: For specified building construction related applications, the allowable VOC content is as follows:
 - i. Architectural Applications:

1]	Building Envelope Membrane Adhesive	250
2]	Indoor carpet adhesive	50
3]	Carpet Pad Adhesive	50
4]	Wood Flooring Adhesive	100
5]	Rubber Floor Adhesive	60
6]	Subfloor adhesive	50
7]	Ceramic Tile Adhesive	65
8]	VCT and asphalt tile adhesive	50
9]	Drywall and panel adhesive	50
10]	Cove base adhesive	50
11]	Multipurpose construction adhesive	70
12]	Structural glazing adhesive	100

- ii. Specialty Applications:
 - 1] PVC welding 510
 - 2] CPVC welding 490
 - 3] ABS welding 325
 - 4] Adhesive primer for plastic 550
 - 5] Contact Adhesive 80
 - 6] Special Purpose Contact Adhesive 250
 - 7] Adhesive Primer for Traffic Marking Tape 150
 - 8] Structural Wood Member Adhesive 140
 - 9] Top and trim adhesive 250
 - iii. Substrate Specific Applications:
 - 1] Metal to metal 30
 - 2] Plastic foams 50
 - 3] Porous material (except wood) 50
 - 4] Wood 30
 - 5] Fiberglass 80
 - 6] Reinforced Plastic Composite 250
2. INTERIOR AEROSOL ADHESIVES
- a. The volatile organic compound (VOC) content of all field-applied aerosol adhesives, used on the interior of this Project shall not exceed the limits defined in the Green Seal standard GS-36, Commercial Adhesives, Edition 2.1, July 12, 2013. Product specific requirements are as follows:
 - i. Aerosol Adhesives
 - 1] General purpose mist spray 65% VOCs by weight
 - 2] General purpose web spray 55% VOCs by weight
 - 3] Special purpose aerosol adhesives 70% VOCs by weight
3. INTERIOR SEALANTS
- a. The volatile organic compound (VOC) content of all field-applied adhesives, adhesive bonding primers, and adhesive primers used on the interior of this Project shall not exceed the limits de-fined in Rule 1168 - "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California.
 - b. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.
 - c. General: For specified building construction related applications, the allowable VOC content is as follows:
 - i. Sealants:
 - 1] Clear, Paintable, and Immediately 250
 - 2] Water-Resistant Sealant 250
 - 3] Foam insulation and sealant 65
 - 4] Grout Sealant 150
 - 5] Non-Staining Plumbing Putty 100
 - 6] Potable Water Sealant 450
 - 7] Single Ply Roof Membrane Sealants 300
 - 8] Other Roof Sealants 250
 - 9] All other Architectural Sealants 420
 - 10] All other Sealants
 - ii. Sealant Primer:
 - 1] Architectural - Nonporous 250
 - 2] Architectural- Porous 775
 - 3] Modified Bituminous Sealant Primer 500
 - 4] Other Sealant Primer 750

2.04 FLOORING PRODUCT CATEGORY

- A. The flooring product category includes all types of hard and soft surface flooring (carpet, ceramic, vinyl, rubber, engineered, solid wood, laminates), raised flooring, wall base, underlayments, and other floor coverings.
 - 1. Exclude subflooring (include subflooring in the composite wood category, if applicable. Exclude wet-applied products applied on the floor (include in paints and coatings category).
- B. Comply with General Emissions Evaluation criteria:
 - 1. CDPH Standard Method v1.2 (2017)
 - 2. USGBC approved Third-party Certifications/Programs that use CDPH Standard Method v1.2 (2017)
- C. Carpet and Carpet Cushion
 - 1. Comply with testing and product requirements of CRI's "Green Label Plus" testing program.
 - a. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.

2.05 WALL PANELS PRODUCT CATEGORY

- A. The wall panels product category includes all finish wall treatments (wall coverings, wall paneling, wall tile), surface wall structures such as gypsum or plaster, cubicle/curtain/partition walls, trim, interior and exterior doors, wall frames, interior and exterior windows, and window treatments.
 - 1. Exclude cabinetry (include built-in cabinetry in the composite wood category and free-standing cabinetry in the furniture category), and vertical structural elements (include structural elements such as structural panels or structural composite wood in the composite wood category, if applicable).
- B. Comply with General Emissions Evaluation criteria:
 - 1. CDPH Standard Method v1.2 (2017)
 - 2. USGBC approved Third-party Certifications/Programs that use CDPH Standard Method v1.2 (2017)

2.06 CEILINGS PRODUCT CATEGORY

- A. The ceilings product category includes all ceiling panels, ceiling tile, surface ceiling structures such as gypsum or plaster, suspended systems (including canopies and clouds), and glazed skylights.
 - 1. Exclude overhead structural elements (include structural elements in the composite wood category, if applicable).
- B. Comply with General Emissions Evaluation criteria:
 - 1. CDPH Standard Method v1.2 (2017)
 - 2. USGBC approved Third-party Certifications/Programs that use CDPH Standard Method v1.2 (2017)

2.07 INSULATION PRODUCT CATEGORY

- A. The insulation product category includes all thermal and acoustic boards, batts, rolls, blankets, sound attenuation fire blankets, foamed-in place, loose-fill, blown, and sprayed insulation.
 - 1. Exclude insulation for HVAC ducts and plumbing piping from the credit. Insulation for HVAC ducts may be included at the project team's discretion.
- B. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.

- C. Comply with General Emissions Evaluation criteria:
 - 1. CDPH Standard Method v1.2 (2017)
 - 2. USGBC approved Third-party Certifications/Programs that use CDPH Standard Method v1.2 (2017)

2.08 COMPOSITE WOOD PRODUCT CATEGORY

- A. The composite wood product category includes all particleboard, medium density fiberboard (both medium density and thin), hardwood plywood with veneer, composite or combination core, and wood structural panels or structural wood products.
 - 1. Exclude products covered in the flooring, ceiling, or wall panels categories from this category.
- B. Formaldehyde Emissions Evaluation
 - 1. Comply with one of the following:
 - a. Certified as ultra-low-emitting formaldehyde (ULEF) product under EPA Toxic Substances Control Act, Formaldehyde Emission Standards for Composite Wood Products (TSCA, Title VI) (EPA TSCA Title VI) or California Air Resources Board (CARB) Airborne Toxic Control Measure (ATCM)
 - b. Certified as no added formaldehyde resins (NAF) product under EPA TSCA Title VI or CARB ATCM
 - c. Wood structural panel manufactured according to PS 1-09 or PS 2-10 (or one of the standards considered by CARB to be equivalent to PS 1 or PS 2) and labeled bond classification Exposure 1 or Exterior
 - d. Structural wood product manufactured according to ASTM D 5456 (for structural composite lumber), ANSI A190.1 (for glued laminated timber), ASTM D 5055 (for I-joists), ANSI PRG 320 (for cross-laminated timber), or PS 20-15 (for finger-jointed lumber).

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 8116

SECTION 018119 - CONSTRUCTION INDOOR AIR QUALITY [IAQ] MANAGEMENT

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.02 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials and equipment necessary to complete the work of this Section, including but not limited to the following:
 - 1. LEED EQp1, Environmental Tobacco Smoke Control: Prevent exposure of building systems to environmental tobacco smoke during construction.
 - 2. LEED EQc3, Construction Indoor Air Quality Management Plan: Requirements for minimum indoor air quality (IAQ) performance standards during the construction period.
 - 3. LEED EQc4, Indoor Air Quality Assessment: Requirements for assessment of minimum indoor air quality (IAQ) performance standards through either building flush-out or air testing before occupancy
- B. Sustainable Design Intent: Comply with project requirements intended to achieve certification, measured and documented according to the LEED Green Building Rating System, of the US Green Building Council. Refer to Section 018113 - SUSTAINABLE DESIGN REQUIREMENTS, for certification level and certification requirements.
- C. Related Work: The following items are not included in this Section and are specified under the designated Sections:
 - 1. Reference Turner Front End for
 - a. General submittal requirements.
 - b. Temporary construction facilities, protection, and controls.
 - 2. Section 017419 - "Construction Waste Management and Disposal" for demolition and construction waste management.
 - 3. Section 018113 - "Sustainable Design and LEED Requirements"
 - 4. Section 018116 - "Low Emitting Materials"
 - 5. Division 23 - HVAC for coordination with HVAC requirements.
 - 6. Divisions 02 through 49 Specification Sections for specific requirements relating to indoor air quality.

1.03 PERFORMANCE REQUIREMENTS

- A. LEED EQp1, Environmental Tobacco Smoke Control: At a minimum, take the following measures:
 - 1. Comply with Owner's Non-Smoking Campus Policy.
 - 2. Do not allow smoking in enclosed portions of the project site, on the rooftop, or in construction trailers. This prohibition includes electronic cigarettes.

- B. LEED EQc3, Construction Indoor Air Quality Management Plan: During construction, comply with the following requirements:
1. Coordinate with Owner's current IAQ management plans and procedures.
 2. Meet or exceed the minimum requirements of the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, Second Edition, November 2007, Chapter 3.
 3. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 shall be used at each return air grille, as determined by ASHRAE 52.2-2007. Replace filtration media immediately prior to occupancy, according to Division 23 - HVAC.

1.04 SUBMITTALS

- A. LEED EQc3, Construction Indoor Air Quality Management Plan: Within seven (7) days after receipt of commencement of the Work, the Contractor shall submit Construction IAQ Management Plan.
1. Construction IAQ Management Plan: Include, but do not limit to, the following:
 - a. HVAC Protection.
 - b. Source Control.
 - c. Pathway Interruption.
 - d. Housekeeping.
 - e. Scheduling.
 2. Product Data: Submit for each type of filtration media used during construction and installed immediately prior to occupancy, with MERV values clearly identified.

PART 2 - PRODUCTS

2.01 FILTRATION MEDIA

- A. Filtration Media: Comply with ASHRAE 52.2-2007, with errata and provide MERV 8 as required.

PART 3 - EXECUTION

3.01 CONSTRUCTION IAQ MANAGEMENT PLAN IMPLEMENTATION

- A. IAQ Manager: The Contractor shall designate an on-site person responsible for instructing workers and overseeing and documenting results of the Construction IAQ Management Plan for the Project.
1. Distribution: The Contractor shall distribute copies of the Construction IAQ Management Plan to the Job Site Foreman, each subcontractor, the Owner, and the Architect.
 2. Instruction: The Contractor shall provide on-site instruction of appropriate procedures and methods to be used by all parties at the appropriate stages of the Project.
- B. Preconditioning: Allow products, which have odors and significant VOC emissions, to off-gas in a dry, well-ventilated space for sufficient period to dissipate odors and emissions prior to delivery to Project.
1. Remove containers and packaging from materials prior to conditioning to maximize off-gassing of VOCs.
 2. Condition products in ventilated warehouse or other building.
- C. Ventilation: Ventilate interior spaces directly to the exterior to minimize accumulation of odors and VOC emissions during construction.

- D. Coordinate Construction IAQ Management Plan with construction cleaning as indicated in Section 015000 – “Temporary Facilities and Controls” and with final cleaning as indicated in Section 017700 – “Contract Closeout”.

3.02 INDOOR AIR QUALITY (IAQ) ASSESSMENT

A. LEED EQC4, INDOOR AIR QUALITY ASSESSMENT: Option 1, Flush-Out:

1. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
 - a. Operating Requirements: Refer to Division 23 - HVAC.
2. If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside-air rate, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cu. ft./sq. ft. of outside air has been delivered to the space.
 - a. Operating Requirements: Refer to Division 23 - HVAC.

B. As an option, the Contractor may suggest for the following compliance path for LEED EQc4, Indoor Air Quality Assessment: Option 2, Indoor Air Quality Testing. Contractor will engage testing agency to perform the following:

1. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "LEED Reference Guide for Building Design and Construction."
2. Demonstrate that contaminants do not exceed the concentrations listed below:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Ozone: 0.075 ppm.
 - d. Total Volatile Organic Compounds (TVOCs): 500 micrograms/cu. m.
 - e. Carbon Monoxide (CO): 9 ppm and no greater than 2 ppm above outdoor levels.
 - f. Target Volatile Organic Compounds: California Department of Public Health (CDPH) Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, v. 1.1–2010, Table 4-1.
3. For each sampling point where the concentration exceeds the limit, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met.
4. Air-sample testing shall be conducted as follows:
 - a. All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside-air flow rate for the occupied mode throughout the duration of the air testing.
 - b. Building shall have all interior finishes installed, including, but not limited to, millwork, doors, paint, car-pet, and acoustic tiles. Nonfixed furnishings, such as workstations and partitions, are encouraged, but not required, to be in place for the testing.
 - c. Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 5000 sq. ft.
 - d. For large open spaces, one sampling point per 50,000 sq. ft. may be used.

- e. Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

END OF SECTION 018119

SECTION 20 0130 - GENERAL PROVISIONS – RISER PACKAGE MECHANICAL

1. GENERAL

- A. The Advertisement for Bids, Instructions to Bidders, Bidding Requirements, General, Special and Supplementary Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub-Contractor's work. All manufacturers, suppliers, fabricators, contractors, etc. submitting proposals to any part if for work, services, materials or equipment to be used on or applied to this project are hereby directed to familiarize themselves with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.
- B. Each Proposer shall also be governed by any unit prices and Addenda insofar as they may affect his part of the work or services.
- C. The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s) indicated or specified in the Contract Documents.
- D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.
- E. It is not the intent of this section of the specifications to make any Contractor, other than the Construction Manager, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the Construction Manager to the Architect (if applicable), then to the Engineer. Also, this section of the specifications shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be optional.
- F. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.
- G. In general, and to the extent possible, all work shall be accomplished without interruption of existing facilities operations. The Contractor shall advise the Owners at least two weeks prior to the interruption of any services or utilities. The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.
- H. Definitions and Abbreviations
 - (1) Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of

mechanical work (Controls, Plumbing, HVAC, Sprinkler, Gas Systems, etc.) or, the General Contractor.

- (2) Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc. In this case: CMTA, Inc., Consulting Engineers.
- (3) Architect - The Architect of Record for the project.
- (4) Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.
- (5) Provide - Furnish and install complete, tested and ready for operation.
- (6) Install - Receive and place in satisfactory operation.
- (7) Indicated - Listed in the Specifications, shown on the Drawings or Addenda thereto.
- (8) Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.
- (9) Contract Documents - All documents pertinent to the quality and quantity of work to be performed on this project. Includes, but not limited to: Plans, Specifications, Instructions to Bidders, General and Special Conditions, Addenda, Alternates, Lists of Materials, Lists of Sub-Contractors, Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Schedules of Value, Periodical Payment Requests, Construction Contract with Owners, etc.
- (10) Proposer - Any person, agency or entity submitting a proposal to any person, agency or entity for any part of the work required under this contract.
- (11) OSHA - Office of Safety and Health Administration.
- (12) KBC - Kentucky Building Code.
- (13) The Project - All of the work required under this Contract.
- (14) NEC - National Electrical Code.
- (15) NFPA - National Fire Protection Association.
- (16) ASME - American Society of Mechanical Engineers.
- (17) AGA - American Gas Association.
- (18) SMACNA - Sheet Metal and Air Conditioning Contractors National Association.
- (19) ANSI - American National Standards Institute.
- (20) ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
- (21) NEMA - National Electrical Manufacturers Association.
- (22) UL - Underwriters Laboratories.

(23)ADA - Americans with Disabilities Act.

(24)IMC - International Mechanical Code.

(25)IECC - International Energy Conservation Code.

(26)IFGC - International Fuel Gas Code.

I. Required Notices:

- (1) Ten days prior to the submission of a proposal, each proposer shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system.

- J. All work shall conform to University of Kentucky official design standards. A complete copy of the design standards is located at the following location:
<https://www.uky.edu/cpmd/design-standards/divisions-20---29---facility-services-subgroup>
All contractors shall familiarize themselves with this standard and bid the project accordingly. If a conflict arises between the specifications and the facility standard, the proposer shall notify the engineer of the conflict prior to his bid.

2. INTENT

- A. It is the intention of the Contract Documents to call for finished work, tested and ready for operation.
- B. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

3. DRAWINGS AND SPECIFICATIONS

- A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.
- B. The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification not less than twelve days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final.
- C. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

- D. Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.
- E. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.
- F. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.
- G. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to ensure no conflict with other work.
- H. Each Proposer shall review all drawings including Architectural, Mechanical, Electrical, Fire Protection, Landscaping, Structural, Surveys, etc., to ensure that the work he intends to provide does not encroach a conflict with or affect the work of others in any way. Where such effect does occur, it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict or effect prior to the submission of his proposal. Each Proposer shall in particular ensure that there is adequate space to install his equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without expense to others and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to ensure adequate spaces.
- I. Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.
- J. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.
- K. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.
- L. Special Note: Always check ceiling heights indicated on Architectural Drawings and Schedules and ensure that they may be maintained after all mechanical and electrical equipment is installed. Do not install equipment in the affected area until the conflict is resolved.

4. EXAMINATION OF SITE AND CONDITIONS

- A. Each Proposer shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. Each Proposer shall also fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and

services, availability of utilities, etc. His proposal shall cover all expenses or disbursements in connection with such matters and conditions. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

5. EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

- A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, electrical services, etc., from that indicated. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall remunerate them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.
- B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided the provisions of Paragraph (A) immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of twelve days prior to bids.
- C. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineers.
- D. Each Proposer shall furnish along with his proposal a list of specified equipment and materials which he is to provide. Where several makes are mentioned in the specifications and the Contractor fails to state which he proposes to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not ensure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings is satisfactorily comparable to the items specified and/or indicated.

6. SUPERVISION OF WORK

- A. The Contractor shall personally supervise the work for which he is responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for him.

7. CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.

- A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, taps, tap fees, extensions, water and/or sewer system development charge, etc. in connection with his work. He shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments and/or the appropriate municipality or utility company having jurisdiction, whether indicated or specified or not. He shall hire an independent Registered Engineer to witness installations and provide necessary certifications where required by utility companies, municipal agencies or others that have review authority. He shall also obtain all required certificates of inspection for his work and deliver same to the Engineers before request for

acceptance and final payment for the work. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall also be versed in all Codes, Rules and Regulations pertinent to his part of the work prior to submission of a proposal.

- B. The Contractor shall include in his work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.
- C. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.
- D. All materials and equipment so indicated and all equipment and materials for the electrical portion of the mechanical systems shall bear the approval label of, or shall be listed by the Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable. Where required by the Code and/or the Authority Having Jurisdiction, provide the services of a field labeling agency to provide a UL label for the entire system in the field under evaluation.
- E. All plumbing work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Department of Health. Plumbing work shall not commence until such plans are in the hands of the Contractor.
- F. All Heating, Ventilation and Air Conditioning work shall be accomplished in accordance with the Kentucky Building Code (KBC) and amendments thereto, the latest standards recognized by the American Society of Heating, Refrigerating and Air Conditioning and the National Fire Protection Association. Contractor shall secure a permit from the Division of HVAC. Final inspection certificate shall be provided by Contractor and a copy included in Operation and Maintenance Manuals.
- G. All pressure vessel installations shall comply with the State, and/or Federal Code applicable. A Certificate of Final Boiler Inspection shall be required. This applies to all steam heat exchangers, flash tanks as well as building installed autoclaves and sterilizers where the Mechanical contractor is responsible for making final utility connections.
- H. The Contractor shall furnish three (3) copies of all Final Inspection Certificates obtained to the Engineer when work is complete. Final payment for work will be contingent upon compliance with this requirement.
- I. Where minimum code requirements are exceeded in the Design, the Design shall govern.
- J. The Contractor shall ensure that his work is accomplished in accord with the OSHA Standards and that he conducts his work and the work of his personnel in accord with same.
- K. The installation of all fuel storage tanks and associated piping, whether interior or exterior, shall be inspected by the State Fire Marshal, Hazardous Materials Section, before backfill. Submit certificate of this inspection to the Engineers.
- L. Work in elevators, elevator shafts and elevator equipment rooms shall comply with the Elevator Code enforced by the Commonwealth of Kentucky.

- M. All work relating to the handicapped shall be in accord with regulations currently enforced by the Department of Housing, Buildings and Construction, Commonwealth of Kentucky and the American Disabilities Act.
- N. All work in conjunction with a natural gas installation shall, in addition to all other Codes, Rules, Regulations, Standards, etc., comply with the requirements of the local gas supplier and/or standards and recommendations of the American Gas Association.
- O. All work in relation to domestic water systems shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company and the adopted edition of the 10 States Standards.
- P. All work in relation to the installation of sanitary or storm sewers shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the local agency governing such installations and the adopted edition of the 10 States Standards.
- Q. All work relating to the handicapped shall be in accord with regulations currently enforced by the Department of Housing, Buildings, and Construction, Commonwealth of Kentucky and the American Disabilities Act.
- R. The Contractor shall provide the services of a qualified third party independent inspector to perform all required special inspections required by KBC, as follows:
 - (1) Smoke Control System as required by KBC 909.3.
 - (2) Mechanical and Electrical Component Seismic Bracing per KBC 1705.

8. EQUIPMENT AND PIPING SUPPORT

- A. Each piece of equipment, apparatus, piping, or conduit suspended from the structure or mounted above the floor level shall be provided with suitable structural support, pipe stand, platform or carrier in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and piping. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc., as indicated or required by the Structural Engineer. This, in some instances, will require the Contractor to add an angle to a joist to transfer the load to a panel point. If in doubt, contact the Structural Engineer.

9. DUCT AND PIPE MOUNTING HEIGHTS

- A. All exposed or concealed ductwork, piping, etc., shall be held as high as possible unless otherwise noted and coordinated with all other trades. Exposed piping and ductwork shall, insofar as possible, run perpendicular or parallel to the building structure.

10. COST BREAKDOWNS (SCHEDULE OF VALUES)

- A. Within thirty days after acceptance of the Contract, the Contractor shall furnish to the Engineer, one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made in a format approved by the Engineer. Payments will not be made until satisfactory cost breakdowns are submitted.

11. CORRECTION PERIOD

- A. All equipment, apparatus, materials, and workmanship shall be the best of its respective kind. The Contractor shall replace all parts at his own expense, which are proven defective as described in the General Conditions. The effective date of completion of the work shall be the date of the Architect's or Engineer's Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall not invalidate the guarantee except that the Owner shall be liable for any damage to equipment during this period, due to negligence of his operator or other employees. Refer to other sections for any special or extra warranty requirements.
- B. It is further clarified that all required and specified warranties shall begin on the date of Substantial Completion, not at the time of equipment start-up.
- C. All compressors shall have five-year warranty.

12. COMPUTER-BASED SYSTEM SOFTWARE

- A. For all equipment, controls, hardware, computer-based systems, programmable logic controllers, and other materials provided as a part of the work, software that is installed shall be certified in writing to the Engineer and Owner by the manufacturer and/or writer to be free of programming errors that might affect the functionality of the intended use.

13. CHANGES IN MECHANICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

14. CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

15. SURVEY, MEASUREMENTS AND GRADE

- A. The Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.
- B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.
- C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the contract documents, he shall promptly notify the Engineer and shall not proceed with this work until he has received instructions from the Engineer on the disposition of the work.

16. TEMPORARY USE OF EQUIPMENT

- A. The permanent heating and plumbing equipment, when installed, may be used for temporary

services, with the consent of the Engineers. Should the permanent systems be used for this purpose the Contractors shall make all temporary connections required at their expense. They shall also make any replacement required due to damage wear and tear, etc., leaving the same in "as new" condition.

- B. Permission to use the permanent equipment does not relieve the Contractors from the responsibility for any damages to the building construction and/or equipment which might result because of its use.
- C. A pre-start-up conference shall be held with the Architect, Owner, General Contractor and the Mechanical Contractor. Equipment shall not be started until after this meeting.
- D. During all phases of construction:
 - (1) Air Handling Units:
 - a. At a minimum, four complete sets of filter media are required for each unit. In each unit, install two sets of filter media during construction (more shall be required if construction activities dictate more frequent changes). In each unit, install one set of filter media at substantial completion. Leave one set of filter media in boxes in appropriate mechanical room as a spare set for the Owner. All other filters shall be used by the Contractor during construction. Dispose of all construction filter media.

17. TEMPORARY SERVICES

- A. The Contractor shall arrange any temporary water, electrical and other services which he may require to accomplish his work. Refer also to General and Special Conditions.

18. RECORD DRAWINGS

- A. The Contractor shall ensure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite or electronic versions of the mark-ups shall be maintained onsite and available for review. The Engineer shall review the record documents from time to time to ensure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings set aside at the job site especially for this purpose. Deliver these record drawings electronically in PDF format along with the hand marked field set to the Engineer if available. Electronic bid drawings will be furnished to the Contractor for his use.

19. MATERIALS AND WORKMANSHIP

- A. All equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. Each Proposer shall determine that the materials and/or equipment he proposes to furnish can be brought into the building(s) and installed within the space available. In certain cases, it may be necessary to remove and replace walls, floors and/or ceilings and this work shall be the responsibility of the Contractor. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement of filters, etc. Extra compensation will not be

allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s). Ensure, through coordination, that no other Contractor seals off access to space required for equipment, materials, etc.

- B. Materials and equipment, where applicable, shall bear Underwriters' Laboratories label where such a standard has been established.
- C. Use extreme care in the selection of equipment and its installation to ensure that noise and vibration are kept at a minimum. The Engineer's determination shall be final and corrections to such discrepancies shall be made at the cost of the Contractor.
- D. Each length of pipe, fitting, trap, fixture and device used in the plumbing or drainage systems shall be stamped or indelibly marked with the weight or quality thereof and with the manufacturer's mark or name.
- E. All equipment shall bear the manufacturer's name and address. All electrically operated equipment shall bear a data plate indicating required horsepower, voltage, phase and ampacity.

20. COOPERATION AND COORDINATION WITH OTHER TRADES

- A. The Contractor shall give full cooperation to all other trades and shall furnish in writing with copies to the Engineer, any information necessary to permit the work of other trades to be installed satisfactorily and with the least possible interference or delay.
- B. The Contractor shall participate in a BIM Coordination process as specified by the Construction Manager. This

21. QUALIFICATIONS OF WORKMEN

- A. All mechanical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen, as evidenced by their workmanship, shall be summarily relieved of their responsibilities in areas of incompetency. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workman shall refrain from work in areas not satisfactory to him. Requests for relief of a workman shall be made through the normal channels of Architect, Contractor, etc.
- B. All plumbing work shall be accomplished by Journeymen Plumbers under the direct supervision of a Master Plumber as defined and clarified under Kentucky State Plumbing Law Regulations and Code. Proof and Certification may be requested by the Engineer.
- C. All sheet metal, insulation and pipe fitting work shall be installed by workmen normally engaged or employed in these respective trades, except where only small amounts of such work are required and are within the competency of workmen directly employed by the Contractor involved.
- D. All electrical work shall be installed only by competent workmen under direct supervision of a fully qualified Electrician.

22. CONDUCT OF WORKMEN

- A. The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

23. PROTECTION OF MATERIALS AND EQUIPMENT

- A. The Contractor shall be entirely responsible for all material and equipment furnished by him in connection with his work and special care shall be taken to properly protect all parts thereof from physical, sun, and weather damage during the construction period. Such protection shall be by a means acceptable to the manufacturer and Engineer. All rough-in soil, waste, vent and storm piping, ductwork, etc., shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged, stolen or vandalized while stored on site, either before or after installation, shall be repaired or replaced by the Contractor at his own expense.

24. SCAFFOLDING, RIGGING AND HOISTING

- A. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery onto the premises of any equipment and apparatus furnished. All such temporary appurtenances shall be set up in strict accord with OSHA Standards and Requirements. Remove same from premises when no longer required.

25. BROKEN LINES AND PROTECTION AGAINST FREEZING

- A. No conduits, piping, troughs, etc. carrying water or any other fluid subject to freezing shall be installed in any part of the building where danger of freezing may exist without adequate protection being given by the Contractor whether or not insulation is specified or indicated on the particular piping. All damages resulting from broken and/or leaking lines shall be replaced or repaired at the Contractor's own expense. If in doubt, contact the Engineer. Do not install piping across or near openings to the outside whether they are carrying static or moving fluids or not. Special Note: Insulation on piping does not necessarily ensure that freezing will not occur.

26. CLEANING

- A. The Contractor shall, at all times, keep the area of his work presentable to the public and clean of rubbish and debris caused by his operations; and at the completion of the work, shall remove all rubbish, debris, all of his tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use. If the Contractor does not attend to such cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor. The Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.
- B. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of piping, equipment, fixtures and all other associated or adjacent fabrication.

27. CONCRETE WORK

- A. The Contractor shall be finally responsible for the provisions of all concrete work required for the installation of any of his systems or equipment. He may, at his option, arrange with the others to

provide the work. This option, however, will not relieve the Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Mechanical work shall be 3000 psi minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication AC1-318. Heavy equipment shall not be set on pads for at least seven (7) days after pour. Insert 6-inch steel dowel rods into floors to anchor pads.

- B. All mechanical equipment (tanks, heaters, chillers, boilers, pumps, air handling units, etc.) shall be set on a minimum of 4" tall concrete pads. Pads shall be taller where required for condensate traps. All concrete pads shall be complete with all pipe sleeves, anchor bolts, reinforcing steel, concrete, etc. as required. Pads larger than 18" in width shall be reinforced with ½" round bars on 6" centers both ways. Bars shall be approximately 3" above the bottom of the pad. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms, all surfaces shall be rubbed to a smooth surface. Chamfer all square edges one-half inch.
- C. In general, concrete pads for equipment shall extend four (4) inches beyond the equipment's base dimensions. Where necessary, extend pads 30 inches beyond base or overall dimensions to allow walking and servicing space.
- D. Exterior concrete pads shall be four (4) inches minimum above grade and four (4) inches below grade on a tamped four (4) inch dense grade rock base unless otherwise indicated or specified. Surfaces of all foundations and bases shall have a smooth finish with one-half (1/2) inch chamfer on exposed edges.
- E. All exterior below grade concrete structures (utility vaults, grease traps, manholes, etc.) shall be provided with exterior waterproofing. Waterproofing shall be hot-fluid applied rubberized-asphalt waterproofing membrane with elastomeric sheets at edges, corners, and terminations of membrane for continuous watertight construction. Apply in layers and reinforce as required to provide uniform seamless membrane minimum 4mm thickness. Also, seal penetrations into and out of the structure watertight. Provide Link-Seal modular seal or equal.

28. NOISE, VIBRATION OR OSCILLATION

- A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor at his expense.
- B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports whether indicated or not suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc. by means of flexible connectors, vibration absorbers, or other approved means. Unitary equipment, such as small room heating units, small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor or ceiling as required and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation. Flush and surface mounted equipment such as diffusers, grilles, etc., shall be gasketed and affixed tightly to their mounting surface.
- C. The Contractor shall provide supports for all equipment furnished by him. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through

supporting members by means of bolts or equally effective means. If strength of supporting structural members is questionable, contact Engineers.

29. ACCESSIBILITY

- A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of his work. He shall cooperate with all others whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.
- B. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as valves, filters, fan belts, motors, prime shafts, etc.
- C. The Contractor shall provide access panels for each concealed valve, control damper or other device requiring service as shown on engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work.

30. RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, SURFACES, ETC.

- A. The Contractor shall at his expense restore to their original conditions all paving, curbing, surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item and shall be to the satisfaction of the Architect and/or Engineer.

31. MAINTENANCE OF EXISTING UTILITIES AND LINES

- A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that comes within the contract construction site, shall be subject to continuous uninterrupted service with no other exception than the Owner of the utilities permission to interrupt same temporarily.
- B. Utilities and lines, where known, are indicated on the drawings. Locations and sizes are approximate. Prior to any excavation being performed, the Contractor shall ascertain that no utilities or lines are endangered by new excavation. Exercise extreme caution in all excavation work.
- C. If utilities or lines occur in the earth within the construction site, the Contractor shall probe and locate the lines prior to machine excavation or blasting in the respective area. Electromagnetic utility locators and acoustic pipe locators shall be utilized to determine where metallic and non-metallic piping is buried prior to any excavation.
- D. Cutting into existing utilities and services where required shall be done in coordination with and only at times designated by the Owner of the utility.
- E. The Contractor shall repair to the satisfaction of the Engineer, any surfaces or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.
- F. Machine excavation shall not be permitted with ten feet of electrical lines or lines carrying combustible and/or explosive materials. Hand excavate only.

- G. Protect all new or existing lines from damage by traffic, etc. during construction. Repairs or replacement of such damage shall be at the sole expense of the party responsible.

32. SMOKE AND FIRE PROOFING

- A. The Contractor shall fire and smoke stop all openings made in fire or smoke rated walls, chases, ceilings and floors in accord with the KBC. Patch all openings around ductwork and piping with appropriate type material to stop smoke at smoke walls and provide commensurate fire rating at fire walls, floors, ceilings, roofs, etc. Back boxes in rated walls shall be a minimum distance apart as allowed by code to maintain the rating. If closer provide rated box or fireproofing in code approved manner.

33. MOTORS

- A. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C50, conforming to this and all applicable standards for insulation resistance and dielectric strength.
- B. Each motor shall be provided by the equipment supplier, installer or manufacturer with conduit terminal box, and N.E.C. required disconnecting means as specified or required. Three-phase motors shall be provided with external thermal overload protection in their starter units. Single-phase motors shall be provided with thermal overload protection, integral to their windings or external, in control unit. All motors shall be installed with NEMA-rated starters as specified and shall be connected per the National Electrical Code.
- C. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower. Motors producing excessive noise or vibration shall be replaced by the responsible contractor. See Division 26 of Specifications for further requirements related to installation of motors.

34. CUTTING AND PATCHING

- A. The Contractor shall provide his own cutting and patching necessary to install his work. Patching shall match adjacent surfaces and shall be to the satisfaction of the Architect and Engineer.
- B. No structural members shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by him.
- C. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

35. CURBS, PLATES, ESCUTCHEONS & AIR TIGHT PENETRATIONS

- A. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4-inch-high by 3-inch-wide concrete curb.

- B. Escutcheon plates shall be provided for all pipes and conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.
- C. Seal all duct, pipe, conduit, etc., penetrations through walls and floors air tight. If wall or floor assembly is rated then use similarly rated sealing method.

36. WEATHERPROOFING

- A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings permanently watertight.

37. OPERATING INSTRUCTIONS, MAINTENANCE MANUALS AND PARTS LISTS

- A. Upon completion of all work tests, the Contractor shall instruct the Owner or his representative(s) fully in the operations, adjustment and maintenance of all equipment furnished. The time and a list of representatives required to be present will be as directed by the Engineer. Turn over all special wrenches, keys, etc., to the owner at this time.
- B. The Contractor shall furnish three (3) complete bound sets for delivery to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract prior to substantial completion. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs alone will not be acceptable for operating and maintenance instructions.
- C. The Contractor, in the instructions, shall include a preventive maintenance schedule for the principal items of equipment furnished under this contract and a detailed, parts list and the name and address of the nearest source of supply.
- D. Per University standards, provide as part of the IOM, an equipment schedule list on 8.5x11 inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the specification section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.
- E. Per University standards, provide as part of IOM, a detailed valve schedule list. Refer to valve identification specification for details.
- F. The Contractor shall frame under Lexan in the main mechanical room all temperature control diagrams and all piping diagrams.
- G. Per University standards, IOM information shall include a complete copy of the reviewed TAB report.

38. PAINTING

- A. In general, all finish painting shall be accomplished under the Painting Section of the specifications by the Contractor; however, unless otherwise specified under other sections of these specifications, the following items shall be painted:
 - (1) All exposed piping, valve bodies and fittings (bare and insulated), including hangers, platforms, etc.

- (2) All mechanical equipment not factory finished. Aluminum and stainless-steel equipment, motors, identification plates, tags, etc. shall not be painted. All rust and foreign matter shall be thoroughly removed from surfaces prior to painting. All baked enamel factory finish of equipment which may have been scratched or chipped shall be touched up with the proper paint as recommended and supplied by the manufacturer.
- (3) All ductwork exposed in finished areas (bare and insulated), all grilles, diffusers, etc. not factory finished. Paint the inside surfaces of all interior duct surfaces visible from any register, grille or diffuser opening on all jobs; surfaces shall receive one (1) prime coat of Rustoleum 1225 red "galvinoleum" or other approved equivalent primer and rust inhibitor and one (1) coat of Rustoleum 1579 jet black "Speedy Dry" enamel or approved equivalent applied in accordance with the manufacturer's recommendations.
- (4) All insulated piping, ductwork and equipment shall be properly prepared for painting by the Contractor where mechanical items are to be painted. In the case of externally insulated duct and pipe, the Contractor shall provide 6 oz. canvas jacket with fire retardant lagging. The jacket shall be allowed to dry properly before applying paint to avoid shrinking after painting and exposing unpainted surfaces. The Contractor, at his option, may provide double wall ductwork in lieu of externally insulated ductwork with canvas jacket and lagging.

39. ELECTRICAL CONNECTIONS

- A. The Contractor shall furnish and install all (1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring thru starters, and shall furnish and install all required starters not factory mounted on equipment.
- B. The Contractor shall, regardless of voltage, furnish and install all temperature control wiring and all associated interlock wiring, all equipment control wiring and conduit for the equipment that the Contractor furnishes. He may, at his option, employ at his own expense, the Electrical Contractor to accomplish this work.
- C. After all circuits are energized and completed, the Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of the Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.
- D. The Contractor shall furnish motor starters of the type and size required by the manufacturer for all equipment provided by him, where such starters are necessary. Starters shall have overloads for each phase.

40. FINAL CONNECTIONS TO EQUIPMENT

- A. The Contractor shall finally connect to mechanical services, any terminal equipment, appliances, etc., provided under this and other divisions of the work. Such connections shall be made in strict accord with current codes, safety regulations and the equipment manufacturer's recommendations. If in doubt, contact the Engineers prior to installation.

41. REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT

- A. The NEC has specific required clearances above, in front, and around electrical gear, panels etc. The Contractor shall not install any piping, ductwork, etc., in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated at no additional cost.

42. INDEMNIFICATION

- A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

43. HAZARDOUS MATERIALS

- A. The Contractor is hereby advised that it is possible that asbestos and/or other hazardous materials are or were present in this building(s). Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, ensure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall ensure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.
- B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.
- C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.
- D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

44. ABOVE-CEILING AND FINAL PUNCH LISTS

- A. The Contractor shall review each area and prepare a punch list for each of the subcontractors, as applicable, for at least two stages of the project:
 - (1) For review of above-ceiling work that will be concealed by tile or other materials well before substantial completion.
 - (2) For review of all other work as the project nears substantial completion.
- B. When all work from the Contractor's punch list is complete at each of these stages and prior to completing ceiling installations (or at the final punch list stage), the Contractor shall request that the Engineer develop a punch list. This request is to be made in writing seven days prior to the proposed

date. After all corrections have been made from the Engineer's punch list, the Contractor shall review and initial off on each item. This signed-off punch list shall be submitted to the Engineer. The Engineer shall return to the site once to review each punch list and all work prior to the ceilings being installed and at the final punch list review.



Phone: 859 253-0892 Fax: 859 231-8357

The following is CMTA's guide for Division 20-25 required information relative to the Schedule of Values. Please utilize all items that pertain to this project and add any specialized system as required. A thorough and detailed schedule of values will allow for fair and equitable Pay Application approval and minimize any discrepancies as to the status of the job.

<u>DIVISION 20-25 – MECHANICAL</u> Field Representative: _____ Project Engineer: _____			
Description of Work	Scheduled Value	Labor	Material
Shop Drawings			
Mobilization/Permits			
Hot Water Piping			
BIM Modeling			
Chilled Water Piping			
Mechanical Shop Drawings			
Air Handling Units			
HVAC Sheet Metal			
Insulation			
Factory Start-Up Reports			
Owner Training			
Record Drawings			
O & M Manuals			
Punchlist/Closeout			

END OF SECTION 20 0130

SECTION 23 0230- HVAC EQUIPMENT - AIR HANDLING UNITS

1. GENERAL

- A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.
- B. The Contractor shall provide in complete working order the following heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.
- C. Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer's Checklist.
- D. Factory startup is required for the Air Handling Units. The successful bidder for the Air Handling Units shall coordinate with a Mechanical Contractor determined in a future bid package to ensure proposer installation and coordinate field required testing.
- E. All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90 and/or International Energy Conservation Code 2012, whichever is more stringent.
- F. Installation of all heating, ventilating and air conditioning systems shall be performed by a master HVAC contractor licensed in the state the work will be performed.
- G. Note to Suppliers and Manufacturers Representative furnishing proposals for equipment for the project:
 - (1) Review the Controls Section of these Specifications (if applicable) to determine controls to be furnished by the equipment manufacturer, if any. The Contractor shall provide all controls with equipment unless specifically listed otherwise.
 - (2) Review the section of these specifications entitle: SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS, TOOLS, ETC., and provide all documents called for therein.
 - (3) Ensure that the equipment which you propose to furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.
 - (4) Determine from the Bid Documents the date of completion of this project and ensure that equipment delivery schedules can be met so as to allow this completion date to be met.
 - (5) Where manufacturers' temperature controls are specified, they shall be in full compliance with International Mechanical Code Section 606 including automatic smoke shut down provisions.
 - (6) Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including fan coil units etc. Submit factory start-up reports to the Engineer.

- (7) Provide training to the Owner by a factory representative for each type of equipment. Training shall be a minimum of eight (8) hours on site and the Engineer shall be notified one (1) week in advance of the training. Training shall only occur when the systems are complete and 100% functional. All training shall be video taped.
- (8) Review the Section on Motor Starters and Electrical Requirements for Mechanical Equipment.
- (9) All condensate producing equipment shall be provided with a condensate trap as recommended by the equipment manufacturer and a condensate overflow switch.
- (10) Provide a complete air tight enclosure with opening door that seals air tight for all filters on air moving equipment.
- (11) All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.

2. EQUIPMENT

A. AIR HANDLING UNITS (SEMI-CUSTOM – ALL UNITS EXCEPT AHU-NP4)

SECTION INCLUDES

- (1) Indoor Air Handling Units.

REFERENCES

- (2) AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- (3) AMCA 99 - Standards Handbook.
- (4) AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
- (5) AMCA 300 - Test Code for Sound Rating Air Moving Devices.
- (6) AMCA 500 - Test Methods for Louver, Dampers, and Shutters.
- (7) AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- (8) AHRI 430 - Central-Station Air-Handling Units.
- (9) AHRI 435 - Application of Central-Station Air-Handling Units.
- (10) ASTM B117 - Standard Practice for Operating Salt Spray Apparatus.
- (11) NEMA MG1 - Motors and Generators.
- (12) NFPA 70 - National Electrical Code.
- (13) SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
- (14) UL 723 - Test for Surface Burning Characteristics of Building Materials.
- (15) UL 900 - Test Performance of Air Filter Units.
- (16) UL 1995 - Standard for Heating and Cooling Equipment.
- (17) UL 94 - Test for Flammability of Plastic Materials for Parts in Devices and Appliances.
- (18) IBC 2000, 2003 - International Building Code.
- (19) NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.
- (20) NFPA 5000 - Building Construction and Safety Code.
- (21) ASHRAE 90.1 Energy Code.
- (22) AHRI Standard 1060 - Rating Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment.
- (23) GSA 2003 Facilities Standard - 5.9 HVAC Systems and Components.

SUBMITTALS

- (24) Shop Drawings: Indicate assembly, unit dimensions, weight loading, required clearances, construction details, field connection details, and electrical characteristics and connection requirements. Computer generated fan curves for each air handling unit shall be submitted with specific design operating point noted. A computer generated psychometric chart shall be submitted for each cooling coil with design points and final operating point clearly noted. Sound data for discharge, radiated and return positions shall be submitted by octave band for each unit. Calculations for required baserail heights to satisfy condensate trapping requirements of cooling coil shall be included.
- (25) Product Data:
 - a. Provide literature that indicates dimensions, weights, capacities, ratings, fan performance, finishes of materials, electrical characteristics, and connection requirements.
 - b. Provide data of filter media, filter performance data, filter assembly, and filter frames.
 - c. Provide manufacturer's installation instructions.

2. QUALIFICATIONS

- (1) Manufacturer: Company specializing in manufacturing Air Handler products specified in this section must show a minimum five years documented experience and complete catalog data on total product.

3. SAFETY AGENCY LISTED & CERTIFICATION

- (1) Air Handling units shall be cETLus safety listed to conform with UL Standard 1995 and CAN/CSA Standard C22.2 No. 236. Units shall be accepted for use in New York City by the Department of Building, MEA 342-99-E.
- (2) Air handler furnished with double width, double inlet (DWDI) fans and/or plenum fans where applicable, shall be certified in accordance with the central station air handling units certification program, which is based on AHRI Standard 430. (NOTE: Above does not apply to fan array)
- (3) Air handling unit water heating & cooling coils shall be certified in accordance with the forced circulation air cooling and air heating coils certification program, which is based on AHRI Standard 410.

DELIVERY, STORAGE, AND HANDLING

- (4) Deliver, store, protect and handle products to site.
- (5) Accept products on site on factory-furnished shipping skids. Inspect for damage.
- (6) Store in clean dry place and protect from construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

4. PRODUCTS

A. ACCEPTABLE MANUFACTURERS

- (1) The following manufacturers are approved for use. No substitutions will be permitted.
 - a. Daikin Applied 'Vision' Air Handler shall be the basis of design.
 - b. JCI
 - c. Trane

B. GENERAL DESCRIPTION

- (1) Configuration: Fabricate as detailed on drawings.
- (2) Performance: Conform to AHRI 430. See schedules on prints. (NOTE: above does not apply to fan array)
- (3) Acoustics: Sound power levels (dB) for the unit shall not exceed the specified levels shown on the unit schedule. The manufacturer shall provide the necessary sound treatment to meet these levels if required.

C. UNIT CONSTRUCTION

- (1) Fabricate unit with heavy gauge channel posts and panels secured with mechanical fasteners. All panels, access doors, and ship sections shall be sealed with permanently applied bulb-type gasket. Shipped loose gasketing is not allowed.
- (2) Panels and access doors shall be constructed as a 2-inch nominal thick; thermal broke double wall assembly, injected with foam insulation with an R-value of not less than R-13.
 - a. The inner liner shall be constructed of G90 galvanized steel.
 - b. The outer panel shall be constructed of G90 galvanized steel.
 - c. The floor plate shall be furnished with 0.044 inch thick aluminum tread plate in sections as indicated on project schedule.
 - d. Unit will be furnished with solid inner liners.
 - e. A sound baffle shall be secured to the inner liner of selected fan, plenum, access, and manual sections. It shall be constructed of G60 galvanized perforated steel filled with fiberglass insulation.
- (3) Panel deflection shall not exceed L/240 ratio at 125% of design static pressure, maximum 5 inches of positive or 6 inches of negative static pressure. Deflection shall be measured at the panel midpoint.
- (4) The casing leakage rate shall not exceed 1% of supply air volume at design static pressure up to a maximum of +8" w.c. in positive pressure sections and -8" w.c. (1.99 kPa) in negative pressure sections.
- (5) The casing leakage rate shall not exceed 0.50 cfm per square foot of casing surface area at design static pressure up to a maximum of +5" w.c. in positive pressure sections and -6" w.c. in negative pressure sections (.0025 m3/s per square meter of cabinet area at 1.24 kPa static pressure)
- (6) Module to module field assembly shall be accomplished with an overlapping, full perimeter internal splice joint that is sealed with bulb type gasketing on both mating modules to minimize on-site labor and meet indoor air quality standards.
- (7) Access doors shall be flush mounted to cabinetry, with minimum of two six inch long stainless steel piano-type hinges, latch and full size handle assembly. Access doors shall swing outward for unit sections under negative pressure. Access doors on positive pressure sections, shall have a secondary latch to relieve pressure and prevent injury upon access.
- (8) A 6-inch minimum formed G60 galvanized steel base rail shall be provided by the unit manufacturer for structural rigidity and condensate trapping. Refer to the Drawings for AHU's which may call for a deeper base rail. If a manufacturer requires a deeper base rail to allow for proper condensate trap above a floor slab, then the additional height base rail shall be provided. The base rail shall be constructed with 12-gauge nominal for unit sizes 003 - 035 and 10-gauge nominal for unit sizes 040 - 090. The following calculation shall determine the required height of the baserail to allow for adequate drainage. Use the

largest pressure to determine base rail height. $[(\text{Negative})(\text{Positive}) \text{ static pressure (in)}] (2) + 4" = \text{required baserail height.}$

- (9) A window inspection port shall be provided on unit section(s) as indicated on unit schedule and drawings.
- (10) Construct drain pans from stainless steel with cross break and double sloping pitch to drain connection. Provide drain pans under cooling coil section. Drain connection centerline shall be a minimum of 3" above the base rail to aid in proper condensate trapping. Drain connections that protrude from the base rail are not acceptable. There must be a full 2" thickness of insulation under drain pan.
- (11) The Units shall be field tested for air leakage. The manufacturer's representative shall review the installation prior to testing.

D. FAN ASSEMBLIES

- (1) Acceptable fan array assembly shall consist of single width, single inlet, class II, direct-drive type plenum fans dynamically balanced as an assembly, as shown in schedule. Refer to the plans for the number of fans per AHU. Maximum fan RPM shall be below first critical fan speed. All fan assemblies shall be dynamically balanced by the manufacturer on all three planes.
 - a. Walk in access section placed downstream for motor access.
 - b. Unit shall come equipped with an isolation damper upstream of each fan in the array. Damper shall be equipped with an adjustable, weighted counter balance to minimize static pressure loss.
 - c. Fan array section shall come with sound absorbing panels installed around each fan.
- (2) Fan array shall have fans individually isolated with spring isolators.
- (3) Fan and motor shall be mounted internally on a steel base. Factory mount motor on slide base that can be slid out the side of the unit if removal is required. Provide access to motor, drive, and bearings through hinged access door. Fan and motor assembly shall be mounted on 2" deflection spring vibration type isolators inside cabinetry.

E. BEARINGS, SHAFTS, AND DRIVES

- (1) Bearings: Basic load rating computed in accordance with AFBMA - ANSI Standards. The bearings shall be designed for service with an L-50 life of 200,000 hours and shall be a heavy duty pillow block, self-aligning, grease-lubricated ball or spherical roller bearing type.
- (2) Shafts shall be solid, hot rolled steel, ground and polished, keyed to shaft, and protectively coated with lubricating oil. Hollow shafts are not acceptable.
- (3) V-Belt drives shall be cast iron or steel sheaves, dynamically balanced, bored to fit shafts and keyed. Fixed sheaves, matched belts, and drive rated based on motor horsepower. Minimum of 2 belts shall be provided on all fans with 10 HP motors and above. Standard drive service factor minimum shall be 1.1 S.F. for 1/4 HP – 7.5 HP, 1.3 S.F. for 10 HP and larger, calculated based on fan brake horsepower.

F. ELECTRICAL

- (1) Fan motors shall be manufacturer provided and installed, Open Drip Proof, premium efficiency (meets or exceeds EAct requirements), 1750 RPM, single speed, 460V / 60HZ / 3P. Complete electrical characteristics for each fan motor shall be as shown in schedule.

- (2) The air handler(s) shall be ETL and ETL-Canada listed by Intertek Testing Services, Inc. Units shall conform to bi-national standard ANSI/UL Standard 1995/CSA Standard C22.2 No. 236.
- (3) Wiring Termination: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclosed terminal lugs in terminal box sized to NFPA 70.
- (4) Manufacturer shall provide ASHRAE 90.1 Energy Efficiency equation details for individual equipment to assist Building Engineer for calculating system compliance.
- (5) Air handler manufacturer shall provide and mount conduit and wiring from each fan motor terminated at an external junction box.

G. COOLING AND HEATING COILS

- (1) Certification: Acceptable water cooling, water heating, steam, and refrigerant coils shall be certified in accordance with AHRI Standard 410 and bear the AHRI label. Coils exceeding the scope of the manufacturer's certification and/or the range of AHRI's standard rating conditions will be considered provided the manufacturer is a current member of the AHRI Forced Circulation Air-Cooling and Air-Heating Coils certification programs and that the coils have been rated in accordance with AHRI Standard 410. Manufacturer must be ISO 9002 certified.
- (2) Water cooling coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
 - a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0095 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 5/8 inch OD seamless copper, 0.035 inch nominal tube wall thickness, expanded into fins, brazed at joints.
 - d. Coil connections shall be carbon steel, NPT threaded connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to ensure complete drainage and prevent freeze-up.
 - e. Coil casing shall be a formed channel frame of stainless steel.

- (3) Water heating coil shall be provided. Provide access to coil(s) for service and cleaning. Enclose coil headers and return bends fully within unit casing. Unit shall be provided with coil connections that extend a minimum of 5" beyond unit casing for ease of installation. Drain and vent connections shall be provided exterior to unit casing. Coil connections must be factory sealed with grommets on interior and exterior panel liners to minimize air leakage and condensation inside panel assembly. If not factory packaged, Contractor must supply all coil connection grommets and sleeves. Coils shall be removable through side and/or top panels of unit without the need to remove and disassemble the entire section from the unit.
- a. Headers shall consist of seamless copper tubing to assure compatibility with primary surface. Headers to have intruded tube holes to provide maximum brazing surface for tube to header joint, strength, and inherent flexibility. Header diameter should vary with fluid flow requirements.
 - b. Fins shall have a minimum thickness of 0.0095 inch aluminum plate construction. Fins shall have full drawn collars to provide a continuous surface cover over the entire tube for maximum heat transfer. Tubes shall be mechanically expanded into the fins to provide a continuous primary to secondary compression bond over the entire finned length for maximum heat transfer rates. Bare copper tubes shall not be visible between fins.
 - c. Coil tubes shall be 1/2 inch OD seamless copper, inch nominal tube wall thickness, expanded into fins, brazed at joints.
 - d. Coil connections shall be carbon steel, connection. Connection size to be determined by manufacturer based upon the most efficient coil circuiting. Vent and drain fittings shall be furnished on the connections, exterior to the air handler. Vent connections provided at the highest point to assure proper venting. Drain connections shall be provided at the lowest point to ensure complete drainage and prevent freeze-up.
 - e. Coil casing shall be a formed channel frame of galvanized steel.

H. FILTERS

- (1) Furnish combination filter section with 2-inch flat pre-filter and 4-inch final filter. Provide side loading and removal of filters.
- (2) Filter media shall be UL 900 listed, Class I or Class II.
- (3) Filter Magnehelic gauge(s) shall be furnished and mounted by equipment manufacturer.

I. ADDITIONAL SECTIONS

- (1) Plenum section shall be provided and properly sized for inlet and/or discharge air flow (between 600 and 1500 feet per minute). The plenum shall provide single or multiple openings as shown on drawings and project schedule.
- (2) Access section shall be provided for access between components.
- (3) Blender / air mixer section to provide proper air mixing and distribution of the outside and return airstreams. Provide proper spacing provided in the direction of airflow as recommended by the blender manufacturer.
- (4) Blender / air mixer section to provide proper air mixing and distribution of the outside and return airstreams. Provide proper spacing provided in the direction of airflow as recommended by the blender manufacturer.

- (5) Mixing box section shall be provided with top outside air opening and end return air opening with or without parallel low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.
- (6) Economizer section shall be provided with top outside air opening and end return air opening and top exhaust air opening with or without parallel low leak airfoil damper blades. Dampers shall be hollow core galvanized steel airfoil blades, fully gasketed and have continuous vinyl seals between damper blades in a galvanized steel frame. Dampers shall have stainless steel jamb seals along end of dampers. Linkage and ABS plastic end caps shall be provided when return and outside air dampers sized for full airflow. Return and outside air dampers of different sizes or very large dampers and exhaust dampers must be driven separately. Damper Leakage: Leakage rate shall be less than two tenths of one percent leakage at 2 inches static pressure differential. Leakage rate tested in accordance with AMCA Standard 500.

5. EXECUTION

A. INSTALLATION

- (1) Install in accordance with manufacturer's Installation & Maintenance instructions.

B. ENVIRONMENTAL REQUIREMENTS

- (1) Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

C. EXTRA MATERIALS

- (1) Provide two sets of filters for the Construction period and two extra set(s) filters for each unit as shown on project schedule to be left for the Owner after Substantial Completion.

B. AIR HANDLING UNIT- (CUSTOM UNIT)- AHU-NP4 LAB AHU

PART 1 - GENERAL

1.01 SECTION INCLUDES

Design, performance criteria, controls, and installation requirements for Custom Air Handling Units.

1.02 REFERENCES

- A. AMCA Standard 99: Standards Handbook
- B. AMCA /ANSI Standard 204: Balance Quality and Vibration Levels for Fans
- C. AMCA Standard 210: Laboratory Methods of Testing Fans for Ratings

- D. AMCA Standard 300: Reverberant Room Method for Sound Testing of Fans
- E. AMCA Standard 500: Test Methods for Louvers, Dampers and Shutters
- F. AHRI Standard 410: Forced-Circulation Air-Cooling and Air-Heating Coil
- G. ASHRAE Standard 52: Gravimetric and Dust Spot Procedures for Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter
- H. ASHRAE/ANSI Standard 111: Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning and Refrigeration Systems
- I. UL Standard 1995: Heating and Cooling Equipment
- J. ASTM A-525: Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.03 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Division 1.
- B. Submittals shall include the following:
 - 1. Dimensioned plan and elevation view drawings, including motor starter and control cabinets, required clearances, and location of all field connections.
 - 2. Summary of all auxiliary utility requirements such as: electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
 - 3. Ladder type schematic drawing of the power and ancillary utility field hookup requirements, indicating all items that are furnished.
 - 4. Manufacturer's performance of each unit. Selection shall indicate, as a minimum, the following:
 - a. Input data used for selection.
 - b. Model number of the unit.
 - c. Net capacity.
 - d. Rated load amp draw.
 - e. Noise levels produced by equipment.
 - f. Fan curves.
 - g. Approximate unit shipping weight.

1.04 OPERATION AND MAINTENANCE DATA

- A. Include data on design, inspection and procedures related to preventative maintenance. Operation and Maintenance manuals shall be submitted at the time of unit shipment.

1.05 QUALIFICATIONS

- A. Manufacturer shall be a company specializing in the design and manufacture of commercial / industrial custom HVAC equipment. Manufacturer shall have been in production of custom HVAC equipment for a minimum of 5 years.
- B. Each unit shall bear an ETL or UL label under UL Standard 1995 indicating the complete unit is listed as an assembly. ETL or UL listing of individual components, or control panels only, is not acceptable.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under the supervision of the owner.

1.07 SEQUENCING AND SCHEDULING

- A. Coordinate work performed under this section with work performed under the separate installation contract.

1.08 WARRANTY

- A. The complete unit shall be covered by a parts warranty issued by the manufacturer covering the first year of operation starting at Substantial Completion of the project projected to be June 2027. This warranty period shall start upon receipt of start-up forms for the unit or eighteen months after the date of shipment, whichever occurs first.
- B. The installing contractor shall provide labor warranty during the unit's first year of operation.

PART TWO: PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Provide custom indoor air handling units as manufactured by Temtrol or Governair as the basis-of-design. Equipment manufactured by Climatecraft or Air-Flow shall be considered provided the construction specifications capacities and performance criteria are met.

2.02 GENERAL

- A. Furnish and install where shown on the plans, mechanical frame style air handling units with construction features as specified below. The units shall be provided and installed in strict accordance with the specifications. All units shall be complete with all components and accessories as specified. Any exceptions must be clearly defined. The contractor shall be responsible for any additional expenses that may occur due to any exception made.

2.03 Factory Testing and Quality Control

- A. Standard Factory Tests: The fans shall be factory run tested to ensure structural integrity and proper RPM. All electrical circuits shall be tested to ensure correct operation before shipment of unit. Units shall pass quality control and be thoroughly cleaned prior to shipment.
- B. Field Leak Testing: The unit shall be leak tested in the field. The Manufacturer's representative shall inspect the installed unit prior to testing and review all testing results.

2.04 UNIT CONSTRUCTION DESCRIPTION

- A. General: Provide factory-fabricated air handling units with capacity as indicated on the schedule. Units shall have overall dimensions as indicated and fit into the space available with adequate clearance for service as determined by the Engineer. Units shall be completely assembled. Multiple sectioned units shall be shipped as a single factory assembled piece (except where shipping limitations prevent) de-mounted into modular sections in the field by the contractor. Units shall be furnished with sufficient gasket and bolts for reassembly in the field by the contractor. Unit manufacturer shall provide certified ratings conforming to the latest edition of AMCA 210, 310, 500 and AHRI 410. All electrical components and assemblies shall comply with NEMA standards. Unit internal insulation must have a flame spread rating not over 25 and smoke developed rating no higher than 50 complying with NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems." Units shall comply with NFPA 70, "National Electrical Code," as applicable for installation and electrical connections of ancillary electrical components of air handling units. Tags and decals to aid in service or indicate caution areas shall be provided. Electrical wiring diagrams shall be attached to the control panel access doors. Operation and maintenance manuals shall be furnished with each unit. Units shall be UL or ETL listed.

- B. Rigging Provision – Multiple Piece Units: Units shipped in multiple sections shall be engineered for field assembly. The base frame shall have integral lifting lugs. The lifting lugs shall be fabricated from structural steel with an appropriate rigging hole. Lifting lugs shall be located at the corner of each section (and along the sides if required) and sized to allow rigging and handling of the unit. All gasket and necessary assembly hardware shall ship loose with unit. Junction boxes with a factory supplied numbered terminal strip shall be supplied at each shipping split for reconnection of control wiring.
- C. Unit Base - Floor: Unit perimeter base rail shall be fabricated using heavy gauge steel. C-Channel cross supports shall be welded to perimeter base steel and located on maximum 24" centers to provide support for internal components. Base rails shall include lifting lugs at the corner of the unit or each section if de-mounted. Internal walk-on floor shall be .188" aluminum tread plate. The outer sub-floor of the unit shall be made from .04" aluminum. The floor cavity shall be spray foam insulated with floor seams gasketed for thermal break and sealed for airtight / watertight construction. Where access is provided to the unit interior, floor openings shall be covered with walk on phenolic coated steel safety grating. Single wall floors with glued and pinned insulation and no sub floor are not acceptable. Base frame shall be attached to the unit at the factory.
- D. Unit Casing – The construction of the air handling unit shall consist of a (1" x 2") roll formed steel frame with formed 16 gauge galvanized exterior casing panels. The exterior casing panels shall be attached to the gasketed (1 x 2) steel frame with corrosion resistant fasteners. All casing panels shall be completely removable from the unit exterior without affecting the unit's structural integrity. (Units without framed type of construction shall be considered, provided the exterior casing panels are made from 16 gauge galvanized steel, maximum panel center lines are less than 20 inches and deflection is less than L/200 @ 8" positive pressure). The air handling unit casing shall be of the "no-through-metal" design. The casing shall incorporate insulating thermal breaks as required so that, when fully assembled, there's no path of continuous unbroken metal to metal conduction from inner to outer surfaces. All panel seams shall be caulked and sealed for an airtight unit.

The exterior panel finish shall be: Corrosion resistant Galvanized (No paint)

- E. Double Wall Liner - Each unit shall have double wall construction with 16 gauge solid galvanized liner in the entire unit and stainless steel in the humidifier and cooling coil section. The double wall interior panel shall be removable from the outside of the unit without affecting the structural integrity of the unit.
- F. Insulation - Entire unit to be insulated with a full 3" (R24) thick closed cell foam insulation. Foam shall be ecomate 0-, 0-, (Non VOC) UL 94HF1 rated. All insulation edges shall be encapsulated within the panel. All field penetrations must be completely sealed by installing contractor.
Note: Non UL 94HF1 rated foam is not allowed.
- G. Access Doors - The unit shall be equipped with a solid double wall insulated, hinged access doors as shown on the plans. The doorframe shall be extruded aluminum, foam filled with a built in thermal break barrier and full perimeter gasket. The door hinge assembly shall be powder coated steel. There shall be a minimum of two heavy duty handles per door. Provide ETL, UL 1995, and CAL-OSHA approved tool operated safety latch on all fan section access doors.

Note: If manufacturer cannot provide thermal break door design it must be noted as an exception on the bid.

- a. Access doors (in the fan section) (all sections) shall be provided with a 10 x 10 dual thermal pane safety glass window.

2.05 UNIT COMPONENT DESCRIPTION

A. FANWALL

The multiple fan array systems shall include multiple, direct driven, arrangement 4 plenum fans constructed per AMCA requirements for the duty specified class III as required. Class I fans are not acceptable. Fans shall be rated in accordance with and certified by AMCA for performance. All fans shall be selected to deliver the specified airflow quantity at the specified operating Total Static Pressure and specified fan/motor speed. The fan array shall be selected to operate at a system Total Static Pressure that does not exceed 90% of the specified fan's peak static pressure producing capability at the specified fan/motor speed. Each fan/motor cube or cell shall include a minimum 10 gauge, G 90 Galvanized steel intake wall and an 10 gauge G90 Galvanized steel motor support plate rail and structure. All motors shall be standard foot mounted type TEAO selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. Motors shall meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be as manufactured by Baldor or Toshiba for use in multiple fan arrays that operate at varying synchronous speeds as driven by an approved VFD. Motor HP shall not exceed the scheduled HP as indicated in the AHU equipment schedule(s). Steel cased motors and/or ODP motors are not acceptable. All motors shall include permanently sealed (L10-200,000 hr) bearings and shaft grounding to protect the motor bearings from electrical discharge machining due to stray shaft currents. Motors provided with hybrid ceramic bearings, when specified, do not require shaft grounding devices. Each fan/motor assembly shall be dynamically balanced to meet AMCA standard 204-96, exceeding category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .022" per second peak, filter in (.55mm per second peak, filter in). Fan and motor assemblies submitted for approval incorporating larger than 22" wheel size and 215 T frames size motors shall be balanced in three orthogonal planes to demonstrate compliance with the G.55 requirement with a maximum rotational imbalance of .022" per second peak filter in (.55 mm per second peak, filter in). Copies of the certified balancing reports shall be provided with the unit O&M manuals at the time of shipment. Submittals that do not include a statement of compliance with this requirement will be returned to the contractor without review.

The multiple fan array AHU unit shall provide the specified acoustical performance as scheduled for the unit supply discharge opening(s), RA opening(s), and the OSA and Exhaust air opening(s). Listed or alternate manufacturers, other than the basis of design, providing multiple fan arrays that incorporate fans which are not manufactured by the AHU manufacturer, must provide modeled acoustical performance of the AHU unit for pre-bid approval by the engineer 10 working days before the project bid date. Submitted sound and performance data for preapproval showing only single fan performance for multiple fan arrays will be returned without review. Approved alternate or listed manufacturers that do not manufacture their own fans for the specific purpose of use in multiple fan arrays, shall provide a letter guaranteeing submitted AHU performance for flow, pressure, and acoustics at the perimeter boundary of the unit signed by an officer of the OEM fan manufacturer being submitted on. The letter from the OEM fan manufacturer must clearly state that the submitted air handling unit perimeter boundary performance in the submitted AHU configuration is guaranteed, and that any deficiencies in performance from that as scheduled will be corrected at no cost to the owner. Submittals for listed and alternate manufacturers that do not contain the letter of guarantee as described above will be returned to the contractor disapproved and must be resubmitted for approval. Any corrective acoustical treatment, added airway tunnel lengths, increased electrical service, and any structural modifications necessary to meet specified and scheduled performance shall be provided at no additional cost to the owner to meet the specified performance criteria. All proposed

corrective actions, when required, must be submitted for approval and shall include a guarantee of performance, as listed above, at no additional cost to the owner.

The fan array shall consist of multiple fan and motor "cubes" or "cells", spaced in the air way tunnel cross section to provide a uniform air flow and velocity profile across the entire air way tunnel cross section and components contained therein. In order to assure uniform velocity profile in the AHU cross section, the fan cube dimensions must be variable, such that each fan rests in an identically sized cube or cell, and in a spacing that must be such that the submitted array dimensions fill a minimum of 90% of the cross sectional area of the AHU air way tunnel. There shall be no blank off plates or "spacers" between adjacent fan columns or rows to position the fans across the air way tunnel. The array shall produce a uniform air flow profile and velocity profile within the airway tunnel of the air handling unit to equal the specified cooling coil and/or filter bank face velocity by $\pm 10\%$ when measured at a point 36" from the intake side of the fan array intake plenum wall, and at a distance of 72" from the discharge side of the fan array intake plenum wall. Submittals for units providing less than the scheduled quantity of fans and/or spacing of the fans for multiple fan arrays shall submit CFD modeling of the air flow profile for pre-bid approval that indicates uniform velocity and flow across all internal components without increasing the length of the AHU unit or changing the aspect ratio of the unit casing as designed.

Each individual cube or cell in the multiple fan arrays shall be provided with an integral back flow prevention device that prohibits recirculation of air in the event a fan or multiple fans become disabled. The system effects for the back flow prevention device(s) shall be included in the criteria for TSP determination for fan selection purposes, and shall be indicated as a separate line item SP loss in the submittals. Submitted AHU performance that does not indicate allowance for system effects for the back flow prevention device(s) and the system effect for the fan and motor enclosure in which each fan is mounted, will be returned to the contractor disapproved and will need to be resubmitted with all of the requested information included for approval. Back Draft Damper performance data that is per AMCA ducted inlet and discharge arrangements will not be accepted. Damper data must be for the specific purpose of preventing back flow in any disabled fan cube and that is mounted directly at the inlet of each fan. Motorized dampers for this purpose are not acceptable. Submitted fan performance data which only reflect published performance for individual fans in AMCA arrangement "A" free inlet and discharge will not be accepted. AHU Manufacturers that do not manufacture the fans being submitted on must provide certified performance data for fans as installed in the AHU unit with Back Draft damper effects included. At the sole discretion of the engineer, such performance testing may be witnessed by the engineer and/or the owner's representative.

Each fan motor shall be individually wired to a control panel.

Each fan & motor assembly shall be removable through a 24" wide, free area, access door located on the discharge side of the fan wall array without removing the fan wheel from the motor. All fan/motor access doors shall open against pressure.

Motors

Motors shall be standard foot mounted type, TEFC or TEOA motors selected at the specified operating voltage, RPM, and efficiency as specified or as scheduled elsewhere. The motor shall incorporate hybrid ceramic bearings on both bearings to prevent electrical arcing across bearing races and balls. Fiber type grounding devices are not permitted.

Provide NEMA Premium Efficiency induction motors that meet the requirements of NEMA MG-1 Part 30 and 31, section 4.4.2. Motors shall be available in $\frac{1}{2}$ HP increments as nameplate HP ratings from 1 HP through 15 HP. Motors shall be manufactured by Toshiba or Baldor.

Provide FANWALL Ultra-Premium Efficient Motors IE5+ that meet IE5 efficiency levels.

Compare to NEMA Premium induction motors, these FANWALL Ultra-Premium Efficient

Motors shall have tested data that shows a 5HP motor having 4.5% improved efficiency at nominal nameplate speed and load and over 20% improved efficiency at 40% turndown speed along a fan curve.

category BV-5, to meet or exceed an equivalent Grade G.55, producing a maximum rotational imbalance of .022" per second peak, filter in (.55mm per second peak, filter in).

MOTOR CIRCUIT PROTECTION:

All motors in the FANWALL Array shall be provided with individual Motor Protection for thermal overload protection. All motor circuit protectors can be located in starting device enclosure or, if required by design, in a separate enclosure. Motor circuit protector enclosure must be located and mounted at a minimal distance from motors in the FANWALL Array. Provide remote indication by means of aux contacts wired in series.

Pilot Lights:

Multiple (one per fan) cover mounted pilot lights for local monitoring

B. Heat Transfer Coils – Water Coil

- i. All coil assemblies shall be leak tested under water at 315 PSIG and PERFORMANCE is to be CERTIFIED under ARI Standard 410. Coils exceeding the range of ARI standard rating conditions shall be noted.
- ii. COOLING COIL FOR THIS AHU ONLY SHALL BE A COONEY COIL. Cooling coils shall be mounted on stainless steel support rack to permit coils to slide out individually from the unit. Provide intermediate drain pans on all stacked cooling coils. The intermediate pan shall drain to the main drain pan through a copper downspout. Water coils shall be constructed of seamless copper tubing mechanically expanded into fin collars. All fins shall be continuous within the coil casing to eliminate carryover inherent with a split fin design. Fins are die formed Plate type.
- iii. Headers are to be seamless copper with die formed tube holes.
- iv. Connections shall be male pipe thread (MPT) Schedule 40 Red Brass with 1/8" vent and drain provided for complete coil drainage. All coil connections shall be extended to the exterior of the unit casing by the manufacturer. Coils shall be suitable for 250 PSIG working pressure. Intermediate tube supports shall be supplied on coils over 44 IN fin length with an additional support every 42" multiple thereafter. Grooved pipe connections are acceptable.
- v. Water coils shall have the following construction:
Standard 5/8 IN:
 - vi. 5/8 IN o.d. x 0.035" wall copper tube with .028 return bends.
 - vii. .010 IN aluminum fins
 - viii. 16 gauge galvanized steel casing

- C. Condensate / Drain Pans - IAQ style drain pans shall be provided under all cooling coils as shown on the drawings. The drain pan shall be fabricated from 16 gauge 304 stainless steel. All pans are to be triple pitched for complete drainage with no standing water in the unit. They shall be insulated minimum 3-inch "Double Bottom" construction with welded corners. Provide stainless steel, 1-1/4" MPT drain connection extended to the exterior of the unit base rail. Units in excess of 200 inches shall have drain connections on both sides, or two connections on the same side. All drain connections shall be piped and trapped separately for proper drainage.
- D. Filters - Provide filters of the type indicated on the schedule. Factory fabricated filter sections shall be of the same construction and finish as the unit. Face loaded pre and final filters shall have Type 8 frames as manufactured by AAF, FARR or equal. Side service filter sections shall include hinged access doors on both sides of the unit. Internal blank-offs shall be provided by the air unit manufacturer as required to prevent air bypass around the filters. The filters shall be as manufactured by Farr, Purolator, AAF or equal. Filters shall be in compliance with ANSI/UL 900 – Test Performance of Air Filters.
- a. Filter Gauge: Each Filter bank shall be furnished with: (Magnehelic / Photohelic) filter gauge with a 4 3/4" OD white static pressure dial with black figures and zero pointer adjustment. / Dwyer Series 2000 Air filter gauge Dwyer Mark 25 Inclined manometer (DWYER 250 AF).
 - b. *Optional:* Flat Racks - Filter racks shall be completely factory assembled and designed for industrial applications. Filter racks shall be fabricated from no less than 16 gauge galvanized steel. Filter racks shall be applied in low efficiency filter applications and will be either upstream or side accessible. Side accessible filter racks shall have an oversized access door on the exterior of the air handler, centered on the filter rack for easy filter removal. Upstream access filter racks shall have one central access cover per row of filters centered in the unit for easy access. Filter racks over 72" in length shall require an angle center reinforcement support. Filter racks shall be designed for a maximum of 500 fpm, or meet or exceed the area specified in the mechanical schedule.
 - c. *Optional:* High Efficiency Rigid Filters - Filters shall be 12" deep high performance, pleated, totally rigid and totally disposable MERV 13 type. Each filter shall consist of high density glass fiber media, media support grid, contour stabilizers and enclosing frame. Filter media shall be laminated to a non-woven synthetic backing to form a lofted filter blanket. The filter media shall have an average efficiency of 85%. The media support shall be a metal grid with an effective open area of not less than 96%. The metal grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull-away. The metal grid shall be formed in such a manner that it effects a tapered radial pleat design. The grid shall be designed to support the media both vertically and horizontally. Filters shall be listed Class II under UL Standard 900. Filters shall be tested per ASHRAE Standard 52.1-76. Contour stabilizers shall be permanently installed on both entering air and exit air sides of the filter media pack to ensure that the tapered radial pleat configuration is maintained throughout the life of the filter. The filter shall be capable of withstanding a 10" wg pressure drop without noticeable distortion of the media pack. The enclosing frame shall be constructed of galvanized steel. It shall be constructed and assembled in such a manner that a rigid and durable enclosure for the filter pack is affected. The periphery of the filter pack shall be continuously bonded to the inside of the enclosing frame, thus eliminating the possibility of air bypass. The enclosing frame shall be equipped with protective diagonal support members on both the entering air and air exit sides of the filters.
- E. Dampers – Provide Class 1 rated, ultra low leak dampers (less than 3 cfm/sq ft. @ 1" w.g.) as indicated on the unit drawings. Low leakage dampers shall have extruded aluminum airfoil blades. Flat or formed metal blades are not acceptable. The damper blade shall incorporate santoprene

rubber edge seals and zinc plated or stainless steel tubular steel shaft for a non-slip operation. Shaft bearings shall be spherical – non corrosive nylon to eliminate friction and any metal to metal contact. Damper jamb seals shall be UV rated, nylon glass reinforced or stainless steel spring arcs designed for a minimum air leakage and smooth operation. Damper linkage shall be concealed within a 16 gauge galvanized steel frame. (Operator furnished and installed by future bid package).

- F. Humidifier – Dispersion tubes will be field installed for an adiabatic humidification system. Manufacturer's representative shall review humidifier submittal drawings and approve the installation and mounting methods.

2.06 ELECTRICAL POWER AND CONTROLS

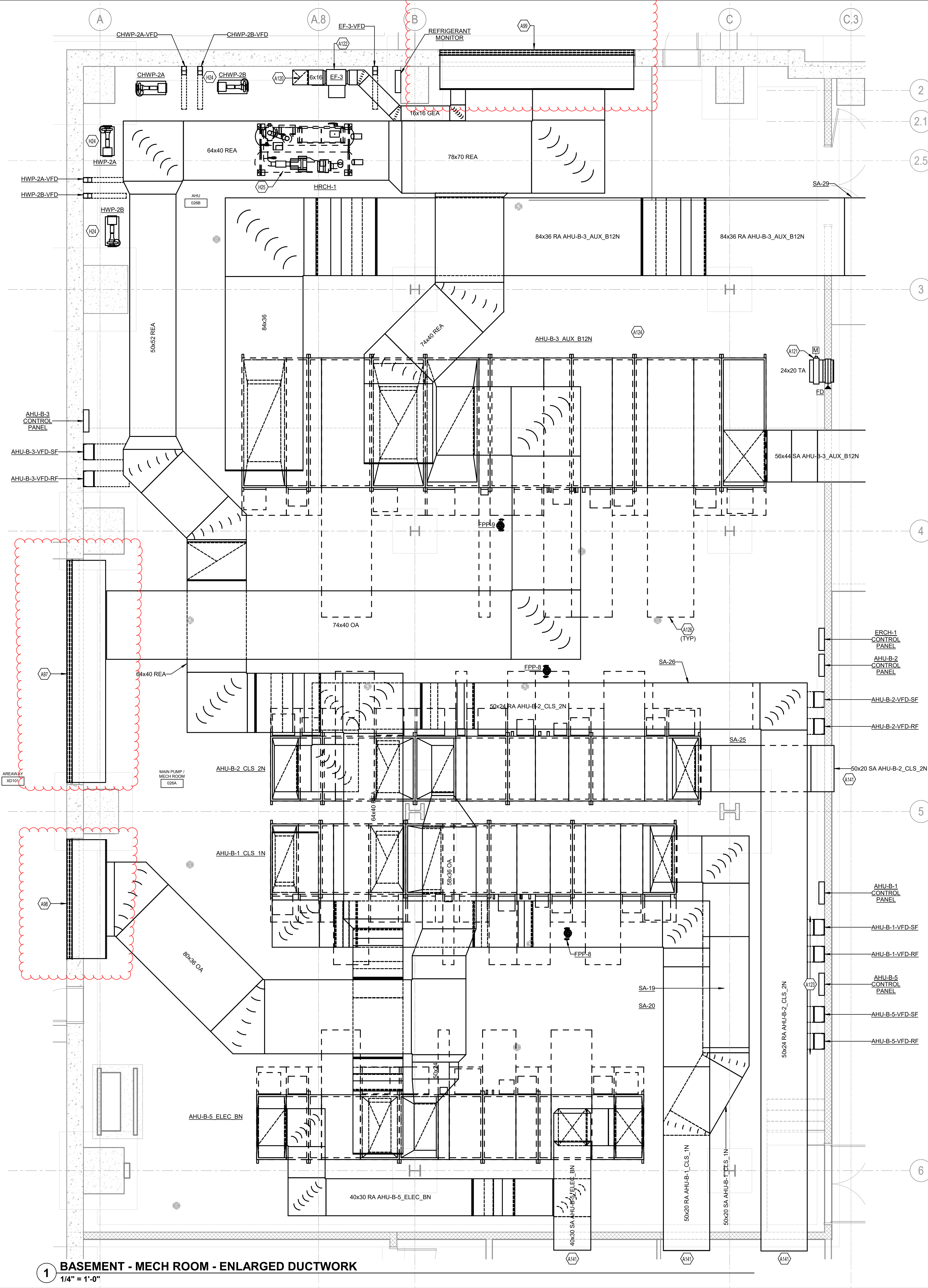
- A. All electrical and automatic control devices not previously called out or listed below are to be furnished and installed in the field by OTHERS. VFD's will be provided and installed in a future bid package.
- B. All wiring shall be (75°C) Insulated copper wires.
- C. The unit shall feature a mounted permanent nameplate displaying at a minimum the manufacturer, serial number, model number and current and amps voltage. The unit must have an ETL or UL Listing and bear the appropriate mark.
- D. Conduit shall consist of a combination of EMT or flexible metal conduit as required. Liquidtight flexible metal conduit may be used outside the air tunnel for wet locations.
- E. The fan motor shall be wired to a junction box mounted Motor Control Panel on unit exterior.
- F. Unit Convenience Features
 - 1. Each section (specified sections) shall be equipped with a vapor- proof LED service light with guard.
 - 2. Lights shall be controlled by one light switch mounted adjacent to the supply air fan access door.
 - 3. Furnish a 120 volt GFI duplex convenience outlet on the exterior of the unit..
 - 4. All lights, switches and outlets shall be wired to a fused or non-fused disconnect for a separate 120 volt external source.

6. FACTORY START-UP REPORT

- A. Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including pumps, VFD's, boilers, chillers, cooling towers, heat pumps, rooftop units, etc. Submit factory start-up reports to the Engineer. The Mechanical Contractor and the Controls Contractor shall have a representative on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action taken shall be submitted to Engineer.
- B. At a minimum, the report submitted to the Engineer shall include the following data:
 - (1) Blower Coil and Fan Coil Units
 - a. Fan bearings lubrication

- b. Fan not vibrating
- c. Fan motor volts / amps
- d. Fan belt tension, if applicable
- e. Sheave alignment, if applicable
- f. Coils clean
- g. Filters clean
- h. Fan rotation direction

END OF SECTION 23 0230



GENERAL HVAC DESIGN NOTES

- A. DUCTWORK SHALL STOP AT FIRE DAMPER AND BE CAPPED FOR FUTURE CONNECTION.
B. HYDRONIC PIPING SHALL CONTINUE 6" PAST ISOLATION VALVE AND CAPPED FOR FUTURE CONNECTION.
C. AHUS SHALL BE OWNER PURCHASED AND CONTRACTOR INSTALLED.
D. ALL EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE PAD UNLESS NOTED OTHERWISE.

TAGGED NOTES

- A97 20" x 14" x 6" D OUTSIDE AIR LOUVER W/ 3'-0" OUTSIDE AIR PLENUM. SLOPE TOWARDS LOUVER.
A98 10'-0" x 14" x 6" D OUTSIDE AIR LOUVER W/ 3'-0" OUTSIDE AIR PLENUM. SLOPE TOWARDS LOUVER.
A99 21" x 11" x 6" D RELIEF AIR LOUVER W/ 3'-0" RELIEF AIR PLENUM. SLOPE TOWARDS LOUVER.
A120 REFER TO LOW EXHAUST DETAIL ON SHEET M-801.
A121 24x20 TRANSFER AIR DUCT WITH MOTORIZED DAMPER AND 1-1/2 HOUR FIRE DAMPER AT MECHANICAL ROOM WALL. MOTORIZED DAMPER SHALL OPEN WHEN REFRIGERANT MONITOR IS IN ALARM.
A122 EF-3 SHALL OPERATE UPON DETECTION OF REFRIGERANT BY THE REFRIGERANT MONITOR.
A123 NO PIPING OR DUCTWORK SHALL PASS OVER ELECTRICAL EQUIPMENT, INCLUDING VFD'S.
A124 AIR HANDLING UNITS SHALL BE INSTALLED ON A 6" CONCRETE CURB.
A126 DASHED LINES INDICATE ACCESS AND MAINTENANCE CLEARANCES. THESE AREAS SHALL BE KEPT CLEAR OF INTERFERENCES AND OBSTRUCTIONS.
A141 STUB DUCTWORK THROUGH WALL AND CAP FOR FUTURE CONNECTION.
H24 BASE MOUNTED PUMPS LOCATED BENEATH THE AUDITORIUM SHALL BE INSTALLED ON AN INERTIA BASE.
H25 INSTALL HEAT RECOVERY CHILLER HRCH-1 ON A 6" CONCRETE HOUSEKEEPING PAD.



301 East Vine Street
Lexington, Kentucky 40507
859.252.6781



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BP-04F

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EDUCATION BUILDING
UNIVERSITY OF KENTUCKY
1149 UNIVERSITY DRIVE, LEXINGTON, KENTUCKY



MECHANICAL

PROJECT 202170/XKSM21

DATE 08.09.2024

REVISIONS

No.	Description	Date

JRA ARCHITECTS HAS RETAINED AN ELECTRONIC VERSION OF THESE DRAWINGS. THE CLIENT AGREES NOT TO REUSE THESE DRAWINGS - IN ELECTRONIC OR ANY OTHER FORMAT - IN WHOLE OR IN PART FOR ANY PROJECT OTHER THAN FOR THE PROJECT. THE CLIENT AGREES NOT TO TRANSMIT THESE ELECTRONIC DRAWINGS TO OTHERS WITHOUT THE PRIOR WRITTEN CONSENT OF THE ARCHITECT. THE CLIENT FURTHER AGREES TO WAIVE ALL CLAIMS AGAINST THE ARCHITECT RESULTING IN ANY WAY FROM ANY UNAUTHORIZED CHANGES TO OR RELIANCE OF THE ELECTRONIC FILES FOR ANY OTHER PROJECT BY ANYONE OTHER THAN THE ARCHITECT.

MECHANICAL
ENLARGED
PLANS

M-206E

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1
ENLARGED AIR DISTRIBUTION PLAN - SOUTH PENTHOUSE - NORTH HALF
1/4" = 1'-0"

2
ENLARGED HYDONICS PLAN - SOUTH PENTHOUSE - NORTH HALF
1/4" = 1'-0"

GENERAL HVAC DESIGN NOTES

- A. DUCTWORK SHALL STOP AT FIRE DAMPER AND BE CAPPED FOR FUTURE CONNECTION.
B. HYDRONIC PIPING SHALL CONTINUE 6" PAST ISOLATION VALVE AND CAPPED FOR FUTURE CONNECTION.
C. AHUS SHALL BE OWNER PURCHASED AND CONTRACTOR INSTALLED.
D. ALL EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE PAD UNLESS NOTED OTHERWISE.

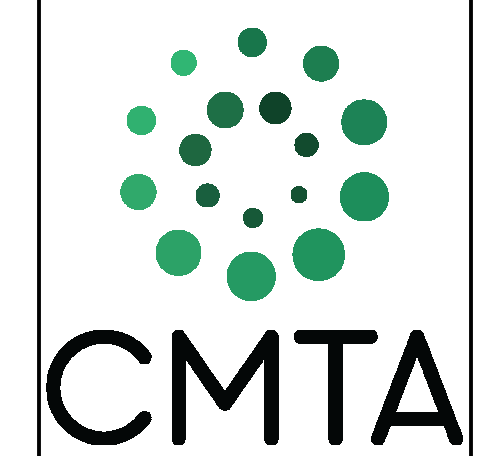
TAGGED NOTES

- A13 PROVIDE DUCT SMOKE DETECTOR FOR COMBINATION SMOKE FIRE DAMPER. MECHANICAL CONTRACTOR SHALL INSTALL SMOKE DETECTOR AT THIS LOCATION. SMOKE DETECTOR SHALL BE PROVIDED BY FIRE ALARM CONTRACTOR. TYPICAL OF EACH FIRE SMOKE DAMPER.
A105 12L x 14H x 6"D EQUIPMENT REMOVAL LOUVER, INSIDE FACE OF LOUVER SHALL HAVE 2" POLY ISO BOARD SEALED WEATHER TIGHT.
A106 12L x 16H x 6"D OUTSIDE AIR LOUVER W/ 3'-0" DEEP PLENUM.
A107 8L x 16H x 6"D RELIEF AIR LOUVER W/ 3'-0" DEEP PLENUM.
H33 SPILL CONDENSATE TO CONDENSATE RECEPTOR. REFER TO PLUMBING PLANS FOR EXACT LOCATION OF DRAIN.
H39 NO PIPING OR DUCTWORK SHALL PASS OVER ELECTRICAL GEAR.



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MECHANICAL

PROJECT 202170/XKSM21

DATE 08.09.2024

REVISIONS		
No.	Description	Date

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M-209E

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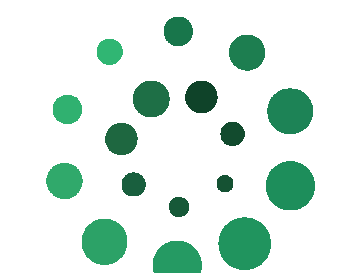
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M-210E

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GENERAL HVAC DESIGN NOTES

- DUCTWORK SHALL STOP AT FIRE DAMPER AND BE CAPPED FOR FUTURE CONNECTION.
- HYDRONIC PIPING SHALL CONTINUE 6" PAST ISOLATION VALVE AND CAPPED FOR FUTURE CONNECTION.
- AHUS SHALL BE OWNER PURCHASED AND CONTRACTOR INSTALLED.
- ALL EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE PAD UNLESS NOTED OTHERWISE.

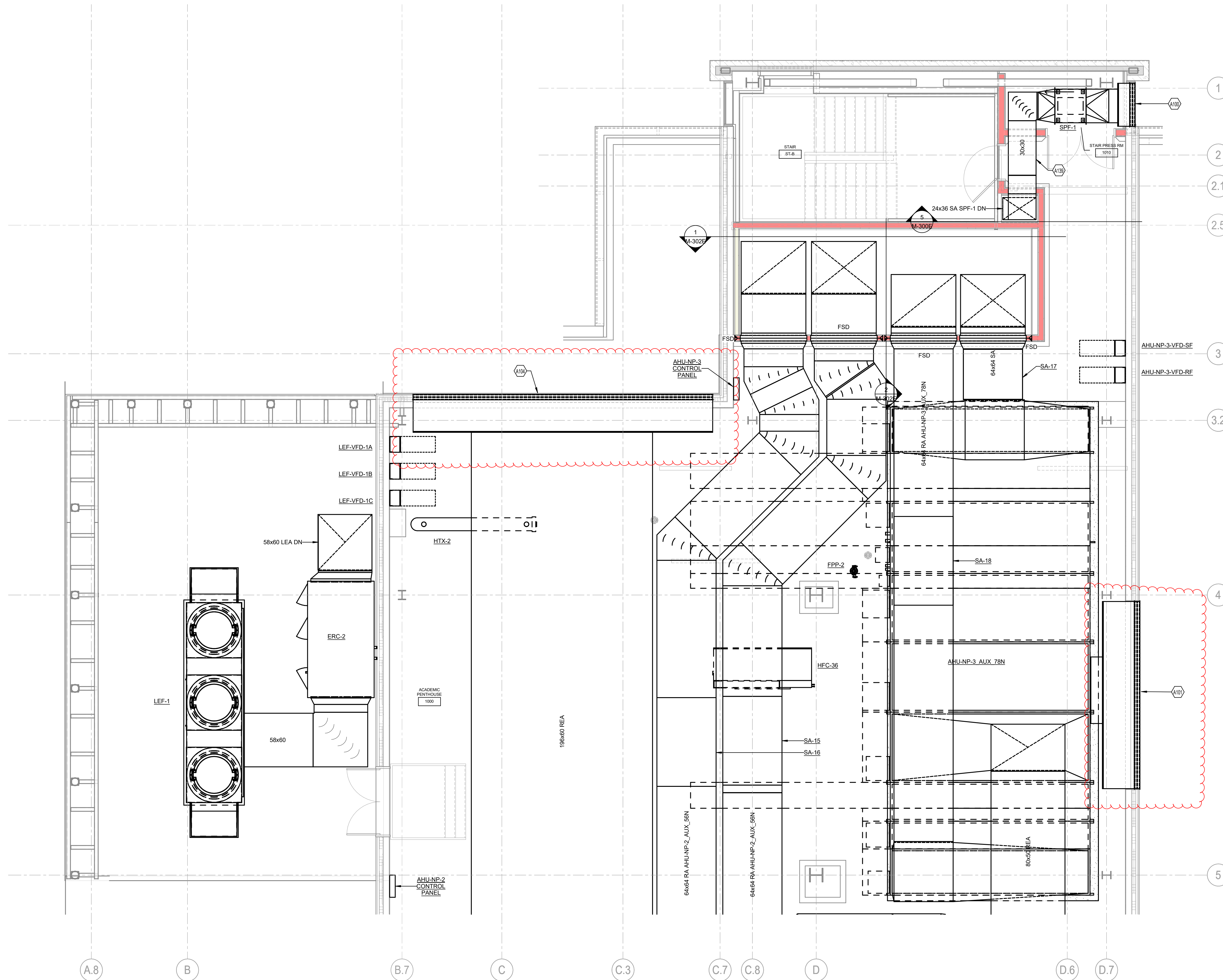
TAGGED NOTES

- A13 PROVIDE DUCT SMOKE DETECTOR FOR COMBINATION SMOKE FIRE DAMPER. MECHANICAL CONTRACTOR SHALL INSTALL SMOKE DETECTOR AT THIS LOCATION. SMOKE DETECTOR SHALL BE PROVIDED BY FIRE ALARM CONTRACTOR. TYPICAL OF EACH FIRE SMOKE DAMPER.
- A105 12L x 14H x 6"D EQUIPMENT REMOVAL LOUVER, INSIDE FACE OF LOUVER SHALL HAVE 2" POLY ISO BOARD SEALED WEATHER TIGHT.
- A108 34L x 16H x 6"D OUTSIDE AIR LOUVER W/ 3'-0" DEEP PLENUM.
- A109 21L x 16H x 6"D RELIEF AIR LOUVER W/ 3'-0" DEEP PLENUM.
- A139 INSTALL STAIRWELL PRESSURIZATION FAN BACKDRAFT DAMPER IN DUCTWORK AT THIS LOCATION.
- H17 MOUNT AND INSTALL VFD ON UNISTRUT POSTED UP FROM PENTHOUSE FLOOR.
- H18 MOUNT AND INSTALL CONTROL PANEL ON UNISTRUT POSTED UP FROM PENTHOUSE FLOOR.
- H33 SPILL CONDENSATE TO CONDENSATE RECEPTOR. REFER TO PLUMBING PLANS FOR EXACT LOCATION OF DRAIN.
- H39 NO PIPING OR DUCTWORK SHALL PASS OVER ELECTRICAL GEAR.

ENLARGED AIR DISTRIBUTION PLAN - SOUTH PENTHOUSE - SOUTH HALF
1/4" = 1'-0"

ENLARGED HYDONICS PLAN - SOUTH PENTHOUSE - SOUTH HALF
1/4" = 1'-0"

8/5/2024 11:01:23 AM



1 ENLARGED DUCTWORK - NORTH PENTHOUSE - NORTH HALF
1/4" = 1'-0"

GENERAL HVAC DESIGN NOTES

- DUCTWORK SHALL STOP AT FIRE DAMPER AND BE CAPPED FOR FUTURE CONNECTION.
- HYDRONIC PIPING SHALL CONTINUE 6" PAST ISOLATION VALVE AND CAPPED FOR FUTURE CONNECTION.
- AHUS SHALL BE OWNER PURCHASED AND CONTRACTOR INSTALLED.
- ALL EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE PAD UNLESS NOTED OTHERWISE.

TAGGED NOTES

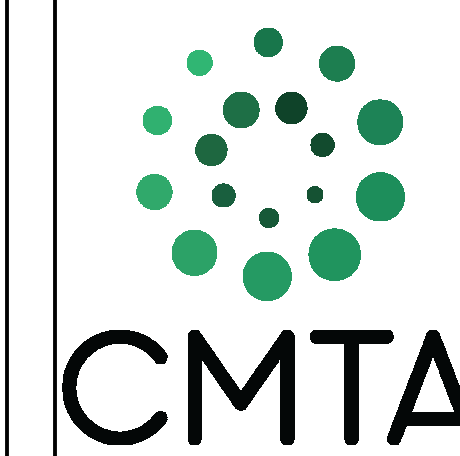
- | | |
|------|---|
| A100 | 4L x 14H x 6"D STAIR PRESSURIZATION LOUVER W/ 1'-0" DEEP PLENUM. |
| A101 | 17L x 15H x 6"D OUTSIDE AIR LOUVER W/ 3'-0" DEEP PLENUM. |
| A104 | 27L x 14'-6"H x 6"D RELIEF AIR LOUVER W/ 3'-0" DEEP PLENUM. |
| A139 | INSTALL STAIRWELL PRESSURIZATION FAN BACKDRAFT DAMPER IN DUCTWORK AT THIS LOCATION. |



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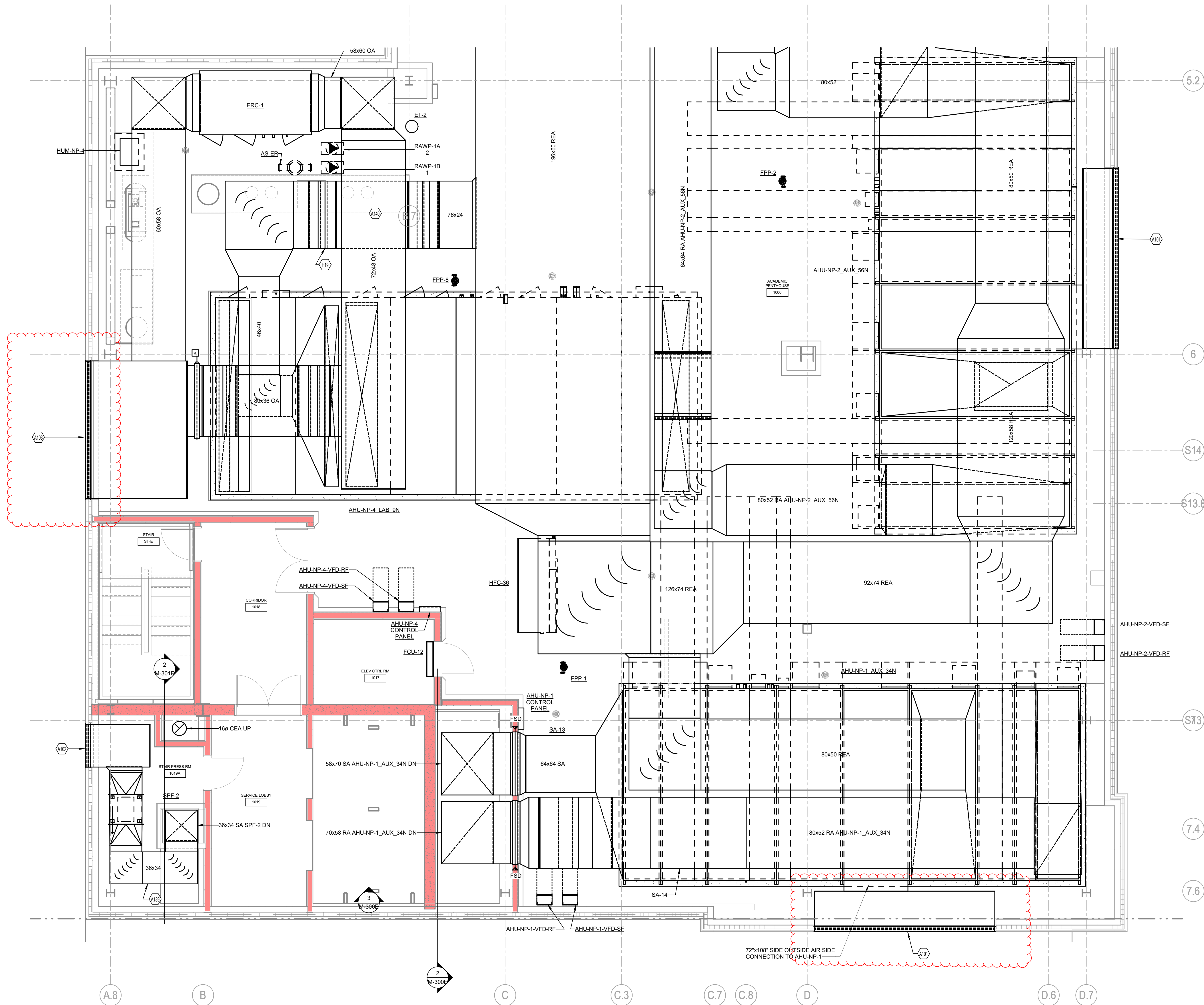
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**MECHANICAL
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PLANS**

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1 ENLARGED DUCTWORK - NORTH PENTHOUSE - SOUTH HALF
1/4" = 1'-0"

GENERAL HVAC DESIGN NOTES

- A. DUCTWORK SHALL STOP AT FIRE DAMPER AND BE CAPPED FOR FUTURE CONNECTION.
B. HYDRONIC PIPING SHALL CONTINUE 6" PAST ISOLATION VALVE AND CAPPED FOR FUTURE CONNECTION.
C. AHUS SHALL BE OWNER PURCHASED AND CONTRACTOR INSTALLED.
D. ALL EQUIPMENT SHALL BE INSTALLED ON A 4" CONCRETE PAD UNLESS NOTED OTHERWISE.

TAGGED NOTES

- A101 17L x 15H x 6"D OUTSIDE AIR LOUVER W/ 3'-0" DEEP PLENUM.
A102 4L x 14H x 6"D STAIR PRESSURIZATION LOUVER W/ 5'-0" DEEP PLENUM.
A103 13L x 13'-6"H x 6"D OUTSIDE AIR LOUVER W/ 3'-0" DEEP PLENUM.
A139 INSTALL STAIRWELL PRESSURIZATION FAN BACKDRAFT DAMPER IN DUCTWORK AT THIS LOCATION.
A140 CONTRACTOR TO COORDINATE DUCTWORK AND MECHANICAL PIPING WITH ELECTRICAL AND PLUMBING DISCIPLINES PRIOR TO ROUGH-IN.
H19 PROVIDE HUMIDIFIER PIPING BETWEEN CONTROLLER AND AHU-NP-4 LAB 9N AS REQUIRED BY MANUFACTURER. ROUTE UP HIGH TO ALLOW ACCESS PAST PIPING.



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