ADDENDUM

OWNER	**BALL STATE UNIVERSITY**
PROJECT	PRUIS HALL AIR HANDLING UNIT REPLACEMENT A/E Project 5-6027
PURPOSE	**ADDENDUM 001** THIS ADDENDUM SHALL FORM PART OF THE BIDDING DOCUMENTS. CHANGES, ADDITIONS, CLARIFICATIONS OR DELETIONS HEREIN SUPERSEDE THE DRAWINGS AND SPECIFICATIONS. BIDDERS SHALL INCLUDE ON THE PROPOSAL FORM ACKNOWLEDGEMENT OF THE RECEIPT OF THIS ADDENDUM.
ATTACHMENTS	**Pre-bid Meeting Agenda, Pre-bid Meeting Sign-in** **Reissued Sheets: G0.00, E1.01** **Reissued Specifications: 00 21 13, 00 43 00, 01 23 00, 23 73 23**
ARCHITECT-ENGINEER	**GMB** www.gmb.com 616.796.0200

ADDENDUM

GENERAL INFORMATION

ITEM NO. 1 PRE-BID MEETING AGENDA (**NEW**)

Agenda from February 28 pre-bid meeting is provided for reference.

ITEM NO. 2 PRE-BID MEETING SIGN-IN (**NEW**)

Sign-in sheet from February 28 pre-bid meeting is provided for reference.

SPECIFICATION CLARIFICATIONS / REVISIONS

ITEM NO. 3 SECTION 00 21 13 NOTICE TO BIDDERS (**REISSUED**)

Revise bid date to 2:00 P.M. EST, Friday, March 10, 2023.

ITEM NO. 4 SECTION 00 43 00 BID FORM SUPPLEMENTS **(REISSUED)**

A. Replace "2. Project Completion" with "2. Project Schedule." Bidder to indicate proposed schedule for the Work.

B. Alternate No. 4 has been added, for bidder to indicate cost impact (if any) for meeting the Owner's preferred schedule.

ITEM NO. 5 SECTION 01 23 00 ALTERNATES **(REISSUED)**

A. Revise base bid for Alternate No. 3 to include Contractor's responsibilities for participating with third-party commissioning services retained directly by Owner.

B. Alternate No. 4 added, for Contractor to follow Owner's preferred schedule for on-site work.

ITEM NO. 6 SECTION 23 73 23 CUSTOM AIR HANDLING UNIT (**REISSUED**)

A. Refer to Paragraphs 2.4 A. and 2.18 F for revisions.

B. Paragraph 3.2 FIELD LEAKAGE AND DEFLECTION TEST was added.

SHEET CLARIFICATIONS / REVISIONS

ITEM NO. 7 SHEET G0.00 – COVER SHEET (**REISSUED**)

Under the list of Alternates, add "4. PREFERRED SCHEDULE"

ITEM NO. 8 SHEET E1.01 – MECHANICAL ROOM ELECTRICAL PLAN (**REISSUED)**

Update Electrical Keynotes.

Pre-Bid Conference

AGENDA

Pruis Hall Air Handling Unit Replacement
Ball State University
BSU Project No. 2023-006.01 PH
February 28, 2023

I. Project Team

A. Owner's Representative(s):

Stephanie Dodds,	Facilities Planning & Mgmt.,	765-285-5639,	email: stephanie.dodds@bsu.edu
David Chadburn,	Facilities Planning & Mgmt.,	765-285-5628,	email: david.chadburn@bsu.ed
Ryan Koenker,	Facilities Planning & Mgmt.,	765-285-2821,	email: rrkoenker@bsu.edu
Robert Ramey,	Facilities Planning & Mgmt.,	765-285-2835,	email: reramey2@bsu.edu
June Sanders,	Purchasing,	765-285-1548,	email: jasanders3@bsu.edu
Branden Roberts,	Purchasing,	765-285-1532	email: cbroberts@bsu.edu

A. Consultant's Representative(s):

Andre Maue,	GMB,	317-641-0674,	email: andrem@gmb.com
Oleg Osipchuk,	GMB,	317-641-0674,	email: olego@gmb.com

II. Contract Documents: Project Manual and Drawings.

A. Availability of Contract Documents.
B. Interpretation of Contract Documents.
C. Addenda.
D. Substitutions.

III. Bidding Procedures.

A. Bidding Date: ~~**March 6, 2023** at **2:00 P.M. EST**~~ **revised to March 10, 2023** at **2:00 PM EST**
Location: Purchasing Conference Room
Service & Stores Building
3401 N. Tillotson Avenue
Muncie, Indiana 47306
Bidder questions due by Monday, March 6 at 2:00 PM EST
Submit questions to andrem@gmb.com and olego@gmb.com

B. Bidding Form and Other Documents.
1. Indiana Form 96 (Revised 2013).
   a. Fill out Part II., Section I. Experience Questionnaire
   b. Fill out Part II., Section II. Plan and Equipment Questionnaire.
   c. Attach Part II., Section III. Contractor's Financial Statement.
   d. Fill out Part II., Section IV. Contractors Non – Collusion Affidavit
   e. Fill out Part II., Section V. Oath and Affirmation
2. Bid Form Supplements, Document 00 43 00
   Appendix A.
   (1) Acknowledgment of Receipt of Addenda.
   (2) Project Completion
   (3) MBE/WBE/VBE Participation Plan
   Appendix B. Alternatives,
   Appendix C. Unit Prices, *n/a*
   Appendix D. Principal Subcontractors
3. Representations and Certifications, Document 00 45 00
   Appendix 1. Nondiscrimination Compliance Statement
   Appendix 2. Contractors Certification of Self Performance
   Appendix 3. Contractors Certification of Authorized Employment
   Appendix 4. Contractors Certification of Training Program Compliance
   Appendix 5. Drug Testing Plan
   Appendix 6. Contractors Certification of Pre-Qualification Compliance
   Appendix 7. Bidder's Check List

4. MBE/WBE/Veteran Participation Plan, Document 00 45 39
   MBE / WBE / Veteran Subcontractor Plan
   Documentation of Effort to Meet MBE / WBE / Veteran Participation
   MBE / WBE / Veteran Letter of Intent to Perform

5. Bid Security, Document 00 43 13.

6. Documents that must be submitted by the Awarded Contractor prior to mobilization.
   Section 00 61 00 – Bond Forms: AIA Document A312 - Performance Bond and Payment Bond
   Section 00 73 73 – Escrow Agreement: Owner will provide document after the award of the project.

IV. Scope of Project.

A. Summary of Work.
B. Project Schedule.
C. Access to Project Area.
D. Coordination with Other Projects.
E. Coordination with Owner Occupancy.

V. Questions.

VI. Tour of Project Site.

End of Agenda

Ball State University
Facilities Planning & Management

SIGN-IN SHEET

Prebid for BSU Pruis Hall Air Handler Replacement
Ball State University
BSU Project No. 2023.006.01
Februrary 28, 2023

NAME	REPRESENTING	PHONE NUMBER	EMAIL
Andrei Maue	GMB	317-696-4703	andrem@gmb.com
Oleg Osipchuk	GMB	317-435-5051	oleg@gmb.com
Branden Roberts		765-285-1538	cbroberts@bsu.edu
Ryen Koenker		765-285-2821	rrkoenker@bsu.edu
Scott Davis		317-726-6501	
Shawn DeBruler		260 740-2388	SDebruler@Shrinkegl
Stephanie Dodds			Stephanie.dodds@bsu.edu
David Chadburn		David.chadburn@BSU.edu	

DOCUMENT 00 43 00
BID FORM SUPPLEMENTS (BID)
(ADDENDUM 001)

This form must be submitted with the Bid along with additional copies as requested in the Project Manual.

To: Ball State University Board of Trustees
Ball State University
Muncie, IN 47306

Project: Pruis Hall Air Handling Unit Replacement
BSU Project No. 2023-006.01 PH

Date: March 6, 2023

Submitted by: _____
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation

_____
(full address)

_____

In accordance with Document 00 21 14 - Instructions to Bidders (AIA A701) and Document 00 22 13 - Supplementary Instructions to Bidders (BSU A701), we include the Bid Form Supplements Appendices listed below. The information provided shall be considered an integral part of the Bid Form.

These Appendices are as follows:

Appendix A **Receipt of Addenda/Project Completion**: If applicable, acknowledge receipt of all Addenda and fill in or acknowledge Completion time/Project Schedule .

Appendix B **Alternates**: When used, include the Cost variation to the Bid Price applicable to the Work described in the Contract Documents.

Appendix C **Unit Prices**: When used, include a listing of unit prices specifically requested by the Contract Documents.

Appendix D **Principal Subcontractors**: When used, include the names of all Primary Subcontractors and the portions of the Work they will perform.

Appendix E **Supplementary General Construction Information**: When used, list the requested Supplementary General Construction Information.

Appendix F **Supplementary Mechanical Information**: When used, list the requested Supplementary Mechanical Information.

Appendix G **Supplementary Electrical Information**: When used, list the requested Supplementary Electrical Information.

Appendix H **Supplementary Telecommunication Information**: When used, list the requested Supplementary Telecommunication Information.

SUBMITTAL SCHEDULE OF APPENDICES

a. All bidders shall submit with their Bid the following Appendices:
APPENDIX A – Receipt of Addenda, Project Completion, MBE/WBE/VBE Participation
APPENDIX B – Alternates
APPENDIX C – Unit Prices
APPENDIX D – Principal Subcontractors

BID FORM SUPPLEMENTS SIGNATURE(S)

_____
(Bidder - please print the full name of your Proprietorship, Partnership, or Corporation)

_____
(Authorized signing officer)

_____
(Title of Person Signing)

ACKNOWLEDGEMENT

STATE OF _____
ss: (seal)
COUNTY OF _____

_____ being duly sworn, deposes and says that he/she is

_____ of the above _____ and that the
(Title) *(Name of Organization)*

statements contained in the foregoing Bid Form Supplements are true and correct.

Subscribed and sworn to before me this _____ day of _____ , _____ .

_____
Notary Public

My Commission Expires: _____

County of Residence: _____

APPENDIX A - RECEIPT OF ADDENDA/PROJECT COMPLETION

1. **ADDENDA**

The Bidder acknowledges receipt of the following Addenda:

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

Addendum No. _____ Dated _____

2. **PROJECT SCHEDULE**

If this Bid is accepted, we will:

Commence on-site work on _____

Substantially Complete the Work by _____

3. **MBE/WBE/VBE PARTICIPATION PLAN**

The Bidder has read MBE/WBE/Veteran Business Participation Plan, Document 00 45 39, and understands that failure to include the completed MBE/WBE/VBE Contractor, Subcontractor, Material Supplier Plan (page 3) and Documentation of Effort to Meet MBE/WBE/Veteran Participation (page 4) **WILL** result in rejection of the Bid.

_____
(Initialed by signing officer)

APPENDIX B - ALTERNATES

The following amounts shall be added to or deducted from the Base Bid Sum. Refer to Section 01 23 00 - Alternates: Schedule of Alternates.

Alternate No. 1

Clean return air plenum/tunnel and duct silencers.

(Add) (Deduct) $ _____

Alternate No. 2

Provide full-flow bag filter.

(Add) (Deduct) $ _____

Alternate No. 3

Commissioning.

(Add) (Deduct) $ _____

Alternate No. 4

Preferred schedule.

(Add) (Deduct) $ _____

APPENDIX C - UNIT PRICES

Not used.

APPENDIX D - PRINCIPAL SUBCONTRACTORS

A. The following Work will be performed (or provided) by subcontractors and their performance of the Work will be coordinated by us:
B. The Bidder will make no changes to this list after submission, without a written request by the bidder and approval by the Owner.
C. Provide additional copies of this page as needed for a complete listing.
D. Indicate YES/NO if Subcontractor is required to be pre-qualified (contract value greater than $300,000). If yes, indicate certification expiration date.

WORK SUBJECT	SUBCONTRACTOR	Pre-Qual-ified	Pre-Qualification Certification Expiration Date
Mechanical		No	
Air handling unit (supplier)		No	
Temperature Controls		No	
Return air plenum cleaning		No	
Fire protection		No	
Electrical		No	

END OF SECTION

SECTION 01 23 00

ALTERNATES
(ADDENDUM 001)

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.
2. Unless explicitly permitted, Alternates shall not adjust the Construction Time of Completion. Costs for additional manpower, overtime, or additional work shifts shall be included in the cost of the Alternate.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Clean return air plenum/tunnel and duct silencers.
   1. Base Bid: Remove debris related to the demolition scope and other work of this project. Return air plenum and tunnel shall be restored to pre-project conditions. No additional cleaning required.
   2. Alternate Bid: Clean all surfaces exposed to airstream within return air plenum/tunnel within the extents indicated on drawing M2.01. Surfaces to clean include concrete floor/wall/ceiling, air duct sound attenuators casing and baffles, piping and conduits, miscellaneous supports and other hardware. Provide all necessary equipment and labor to vacuum, damp-wipe and dry surfaces.

B. Alternate No. 2: Provide full-flow bag filter.
   1. Base Bid: Configure new heating hot water piping as shown on drawing M2.02 to accommodate future installation of new full-flow inline bag filter. New configuration includes full line-size piping and shutoff valves so that future equipment can be installed without system draindown. Install spool piece between isolation valves. From spool piece, route (smaller) piping to existing sidestream filter at new location.
   2. Alternate Bid: In lieu of reinstalling existing sidestream filters at new location, provide new full-flow bag filter for heating hot water as shown on drawing M2.02 and as scheduled on sheet M9.01.

C. Alternate No. 3: Commissioning.
   1. Base Bid: Third-party commissioning services to be retained directly by the Owner. Contractor's responsibilities as designated in section 01 91 00 COMMISSIONING to be included in base bid.
   2. Alternate Bid: Contractor shall retain the services of a third-party commissioning professional in accordance with Section 01 91 00 to provide all scope specified therein.

D. Alternate No. 4: Preferred Schedule.
   1. Base Bid: Contractor to indicate proposed schedule for the Work.
   2. Alternate Bid: Commence on-site Work on or after December 18, 2023 and Substantially Complete the Work on or before January 19, 2024.

END OF SECTION

SECTION 23 73 23 - CUSTOM AIR HANDLING UNITS

(ADDENDUM 001)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes

1. Custom air handling units

1.3 REFERENCE STANDARDS

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified or as denoted on the drawings and schedule.

B. Equipment furnished under this specification shall be in accordance with the following industry, association and government codes and standards, as applicable to their design, fabrication, assembly, and testing.

1. AMCA 99 Standards
2. ARI 430 Central Station Air Handling Units
3. NFPA 70 National Code
4. NFPA 90A Standard for the Installation of Air Conditioning and Ventilating System.

C. Fans shall be rated in accordance with AMCA Standard 210 for performance and AMCA Standard 301 for sound and shall bear the AMCA seal. Motor shall meet requirements for NEMA, IEEE, ANSI, and NEC standard. Coils shall be rated in accordance with ARI Standards 410 and bear the ARI seal.

1.4 COORDINATION

A. Coordinate all work with job site superintendent and all applicable trades.

1.5 ACTION SUBMITTALS

A. See Section 01 33 00 – Submittals and Substitutions

1.6 INFORMATIONAL SUBMITTALS

A. Product data shall include dimensions, weights, capacities, certifications, component performance, electrical characteristics, casing construction details, wiring interconnections, gauges and finishes of materials.

B. Provide all technical information relevant to the product being provided, including but not limited to all the information shown in the equipment schedules. It is the responsibility of the supplier to highlight any variances that his equipment has with the requirements of this specification whether or not preapproval has been obtained. Provide the information in the same measurement units as indicated elsewhere in this specification.

C. Provide fan curves with specified operating points clearly plotted.

D. Provide coil selection worksheets, clearly showing proper consideration for altitude, air density. Indicate coil tube fin and casing construction.

E. Provide filter information, including initial APD, final APD, dust spot efficiency, final dust holding capacity, filter media description, filter frame details, and filter removal details.

F. Submit sound power levels for both air handling unit inlet, outlet and radiated at rated capacity.

G. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearing indicating factory-installed and field-installed wiring.

1.7 CLOSEOUT SUBMITTALS

A. Submit manufacturer's recommended installation instructions.

B. Submit operation and maintenance data under the provisions of Section 01 78 23.

C. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists, and wiring diagrams.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site on a factory-installed base rail or shipping skid. Ship units over the road with 10 mil poly shrink-wrap.

B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

C. Provide one complete set of spare pre-filters.

D. Field Conditions

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.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

A. Haakon (Base of Design)

B. Air Enterprise

C. Ventrol

2.2 GENERAL

A. Provide air handling units in configuration indicated on drawings. Units shall include all specified components provided from the factory. Field fabrication of units will be required. Equipment shall be delivered to site with all required components for assembly shipped complete with the delivery from the factory.

B. Units shall be designed to be supported by a concrete housekeeping pad.

C. Units shall be shipped to the site in sections, as required for rigging through the Mechanical Room double door. Unit may be a "kit" design that will ship palletized for field assembly or may be preassembled with "shipping splits" so that each module will fit through existing door opening. Manufacturer supervision of onsite assembly required.

2.3 PERFORMANCE STANDARDS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters in place, bearings lubricated (if applicable), condensate properly trapped, piping connections verified and leak-tested, belts aligned and tensioned, all shipping braces removed, bearing set screws torqued, and fan has been test run under observation.

B. The manufacturer shall submit a unit assembly plan prior to beginning unit fabrication. The assembly plan shall temporary unit/ventilation requirements; detail each step of the construction process, effects on related trades, required utilities and a timeline for unit completion.

C. The manufacturer shall provide a full time on site construction supervisor during the entire unit assembly process. The supervisor shall manage the unit assembly and provide a lead contact for project meetings, owner/engineer/construction manager relations and answer questions from associated trades.

D. Unit manufacturer shall be responsible for conducting all specified field tests. Manufacturer shall provide testing equipment and instrumentation as needed for testing.

E. Unit manufacturer shall be responsible for conducting all specified field tests. Manufacturer shall provide testing equipment and instrumentation as needed for testing.

2.4 CASING

A. Walls and roofs shall be constructed double-wall, insulated panels, of minimum 16 gauge galvanized steel outer liners. The inner liners shall be minimum 22 gauge solid galvanized steel for all sections except the cooling coil which requires stainless steel liner. Insulation shall be 4" thick 3 lbs density fiberglass or injection foam. Wall and roof seams shall be turned inward to provide a clean flush exterior finish.

B. All permanently joined flanged panel surfaces shall be sealed with an individual strip of 1/8" x 3/8" tape sealer. Wall (and roof) seams shall be turned inward to provide a clean flush exterior finish. All panel seams shall be sealed during assembly to produce an airtight unit.

C. Internal liner shall be suitable for washing with a pressure washer or steam cleaned without risk of wetting the insulation. The liner shall be installed over top of the panel flanges and each liner seam shall be sealed with a lap joint. The wall liner shall be installed over top of the base water dam such that any water run-off from the liner will drip into the water tight base rather into the wall panel. The roof liner shall be installed over top of the roof support so that water cannot enter the roof insulation.

D. All insulation edges shall be joined on 8" centers using zinc plated TEK screws, bolts or metal clinches.

E. All insulation edges shall be protected with metal lagging. Insulation systems using stickpins or adhesives are not acceptable.

F. Stiffeners of angle steel shall be supplied as required to maintain casing deflection criteria of 1/200 at 1.5 times the working pressure.

G. Additional reinforcement shall be provided for roof section above the Preheat Coil and Filter sections for external support of maintenance personnel and equipment. Reinforcement shall include an external checker plate mounted on the exterior casing in this section.

2.5 BASE CONSTRUCTION

A. Units shall be constructed from structural steel C-channel iron around the perimeter of the unit, with intermediate channel and angle iron supports. Units shall have a minimum 6” channel.

B. The floor plate shall be 3/16” thick minimum aluminum checker plate. Floor shall be flat reinforced from below, with all seams continuously welded. Drive screw attachment and caulking are not acceptable. Base shall be provided with lifting lugs, minimum four (4) per shipping section. The base shall be insulated with 3” fiberglass insulation and sheeted with a 22 gauge galvanized steel liner. Floors that “oil can” are not acceptable.

C. Provide a 1.5” perimeter collar around the entire unit, and around each floor opening to ensure the unit is internally watertight. The entire base shall act as an auxiliary drain pan and shall hold up to 1.5” of water.

D. Provide auxiliary 1.25” drains in fan sections downstream of cooling coils, and in mixing sections.

E. Cooling coil drain pans shall be IAQ double-sloped, insulated double walled 304 stainless steel construction, and shall discharge from the side of the drain pan, not the bottom. It is critical that the cooling coil drain pan outlet be located at its highest possible elevation to accommodate drain trap depth.

F. All drain connections on floor mounted air handling units shall terminate at the side of the unit.

G. Maximum base deflection shall be ¼” on a 20 foot unsupported span.

2.6 ACCESS DOORS

A. Access doors shall be manufactured from 16 gauge galvanized steel. The doors shall be double wall construction with 22 gauge solid metal liner on the inside. Corners of the doors shall be continuously welded for rigidity. Two inch 3 lb./cu ft. density insulation shall be sandwiched between the 16 gauge outer layer and the 22 gauge inner layer. Doors must be the same thickness as the unit casing to maximize thermal and acoustical resistance. A 12" round or 10"x10"- hermetically sealed Double Glazed Laminated glass window shall be provided in each door. Hinges shall be continuous piano type stainless steel.

B. Two chrome plated "Ventlok" Model #310 high pressure latches operable from either side of the door shall be provided. Door opening shall be fully gasketed with continuous 1/2" closed cell hollow round black gasket with a metal encapsulated reinforcing backing that mechanically fastens to the door frame. Door frames shall be made from 16 gauge galvanized steel with the outside size of the door flush with unit. Minimum door opening size shall be 18" x 70" (where height permits). Fan compartments must have a door of minimum width to remove the motor.

C. All access doors must swing against the air pressure (i.e. positive pressure plenum doors must swing in)

2.7 NON-SCROLLED FANS-PLENUM TYPE

A. Fans shall be manufactured by Haakon, Twin City, Barry Blower or approved equal. Fans shall be centrifugal airfoil plenum (plug) type, designed without a scroll type housing. Fans shall incorporate a wheel, heavy gauge reinforced steel inlet plate with spun inlet cone, structural steel frame, and shaft and bearings in AMCA Arrangement 3 configuration as an entire assembly.

B. All motor and fan assemblies to be direct-drive.

C. All fan wheels shall have tapered spun wheel cones or shrouds providing stable flow and high rigidity. The wheels shall be non-overloading type.

D. The blades shall be continuously-welded, die-formed Airfoil type, designed for maximum efficiency and quiet operation. Partial welding will not be acceptable on airfoil blades.

E. Impellers shall be statically and dynamically balanced and complete fan assembly shall be test balanced at the operating speed prior to shipment.

F. Shafts to be sized for first critical speed at least 1.43 times the maximum speed for the class. Bearings are to be heavy duty, grease lubricated, anti-friction ball or roller, self-aligning, pillow block type and selected for an L10 200,000 hour life at the maximum class RPM.

G. Plenum fan assembly must have an enclosed safety screen as per OSHA Standards.

H. Fans shall have inlet OSHA approved inlet screens.

I. Supply and Relief Air Fans shall be equipped with Piezometer Rings Fan Inlet Airflow Sensors with displays installed on the unit.

2.8 VIBRATION ISOLATION

A. An integral all welded epoxy coated steel vibration isolation base shall be provided for the fan and motor.

B. Isolators shall be free standing with sound deadening pads and leveling bolts.

C. Spring diameter to compressed operating height ratio shall be 1 to 1.

D. Spring deflection shall be a minimum of 2".

E. Isolators shall have seismic restraints designed to meet IBC 2006 requirements. Manufacturer shall provide seismic calculations upon request.

F. Provide a flexible duct connector between the plenum fan bellmouth inlet and the unit casing.

2.9 MOTORS AND DRIVES

A. Fan motors to be mounted and isolated on the same integral base as the fan.

B. Fan motors shall be heavy duty, Design B, premium efficiency open drip-proof operable at 208 Volts, 60 Hz, 3-phase. Motors shall meet NEMA Premium standard MG 1-2006.

C. Motors used with variable frequency drives shall be provided with motor shaft grounding devices, a minimum insulation class of F, and shall meet NEMA MG1 Part 31.

2.10 HYDRONIC COILS

A. All coils shall meet or exceed all capacities specified on the mechanical schedule for the project. All coil performance shall be certified by the manufacturer in accordance with ARI Standard 410.

B. Construct coils of configuration plate fins and seamless tubes. Aluminum fins shall have collars drawn, belled and firmly bonded to copper tubes by means of mechanical expansion of tubes. Do not use soldering or tinning in bonding process.

C. Construct coil casings of minimum 16 gauge steel with formed end supports and top and bottom channels. Coils in cooling service shall have stainless steel casings and coils in heating-only service shall have galvanized steel casings.

D. Coils shall be fully enclosed within casing and cooling coils shall be on mounted 304 stainless steel angle racks manufactured to allow coils to slide out individually. Heating coils shall be mounted on galvanized angle racks manufactured to allow coils to slide out individually.

E. Removable coil access panels shall be provided to remove coils through casing walls on both the access side and the opposite side. Coils shall be individually removable. Coils shall be individually racked.

F. Drain pans shall be continuously welded 304 stainless steel. Coil section shall have intermediate drain pans which shall be factory-interconnected with 1” drain lines. Drain pans shall be IAQ sloped and fully drainable.

G. Unless indicated otherwise, pipe connections shall be on the same end, extended through the casing for ease of connection, employing a plate over the connection to minimize leakage, and shall be threaded.

H. On staggered coils, pipe connections shall be extended to the exterior of the unit using schedule 40 pipe. The pipe shall be supported with structural stands the pipe clamped to the stands with 1’ thick thermally broken pipe clamps. Insulation of pipe extensions shall be provided by installer on site after installation.

I. Water coils shall be drainable.

J. Water Cooling Coils and Heating Coils.

1. Clearly label supply and return headers on outside of units such that direction of coil water-flow is counter to direction of unit air-flow.
2. Coils shall be proof tested to 300 psig and leak tested to 200 psig air pressure under water.
3. Construct headers of round copper pipe.
4. Construct tubes of 5/8 inch O.D., minimum .035 inch thick copper and construct fins of minimum 0.0095” thick aluminum. Refer to Mechanical Equipment Schedules for sizes and performance.

2.11 PRE-FILTERS

A. Prefilters: Filters shall be MERV 8 pleated, disposable type, Underwriters Laboratories Class 2.

B. Prefilters shall be installed in a prefabricated 16 gauge channel rack. Provide sealed blank-off sections to prevent air bypass.

C. Prefilters shall slide out for side access.

2.12 FINAL FILTERS

A. Final filter media shall be of high density microfine glass fibers that are laminated to a non-woven synthetic backing to forma a lofted filter blanket. The filter media shall have an average efficiency of 90-90% on the ASHRAE Test Standard (52-76) and a MERV 13 rating. It shall have an average arrestance of not less than 99% on that standard. Filters shall be listed by Underwriters' Laboratories as Class 2.

B. Holding Frames: Holding frames shall be factory fabricated of 16 gauge galvanized steel and shall be equipped with gaskets on all 4 sides of the filter and 2 heavy duty positive sealing fasteners. Each fastener shall be capable of withstanding 25 lbs. pressure without deflection and be attached or removed without the use of tools.

C. Final filters shall be lifted out where access is available upstream of the filter, or side slideout when access is not available. Filters to be 4" deep.

2.13 ULTRAVIOLET LIGHTS

A. Acceptable Manufactures:

1. Steril-Aire
2. UV Solar Solutions
3. UVDI

B. Irradiation - Emitters and fixtures are to be installed in sufficient quantity and in such an arrangements so as to provide an equal distribution of UVC energy on the coil and in the drain pan. To maintain energy efficiency, the UVC energy produced shall exhibit the lowest possible reflected and shadowed losses.

C. Intensity - Shall be measured by a Solid State Photodiode UV Sensor. Calibration wavelength is 254nm. Accuracy is to be +10% and be NIST traceable. Operating range shall be 32° F- 150° F. Read by a Display module with a 3.5 digit LCD screen/panel. lrradiance range shall be 0-1999 (x10) µW/cm2 with a resolution of 10 µW/cm.

D. Installation - Emitters and fixtures shall be installed downstream of the cooling coil at right angles to the coil fins, such that UVC energy directly reaches all surfaces of the coil and drain pan.

E. Units shall be high output, HVAC-type, germicidal UVC light sources, factory assembled and tested. Components shall include a housing, reflector, high efficiency electronic power source, Emitter sockets and Emitter tube, all constructed to withstand HVAC environments.

F. High efficiency electronic power sources shall be 115V. They shall be UL listed to comply with UL Standard 1995 and capable of igniting each Emitter at temperatures from 35 - 150° F in airflow velocities of 1000 fpm. They shall be equipped with RF and line noise suppression.

G. Access door to UVC emitters shall be provided with an interlock switch which will cut power to the emitters when the door is opened. The window in this door shall have protective film or be tested for use with UV lights

H. Emitters shall be wired to a power source mounted outside of the air stream.

I. Emitters shall be supported using stainless steel brackets.

J. All wiring in section exposed to UV light shall have protective plastic covering.

2.14 FILTER GAUGES

A. Provide Dwyer 2000 magnehelic gauges across each filter bank.

1. Option1-Provide electronic filter gauges which have a digital display and a DPDT contact to indicate dirty filters. Power the gauges from the lighting circuit.
2. Option2-Provide electronic filter gauges which have a digital display and a 4-20mA or 0-10VDC signal to indicate air pressure drop. Power the gauges from the lighting circuit.

B. Magnehelic gauges shall be accurate to ±2% of full range.

C. Gauges shall be recessed into cabinet casing.

2.15 BELLMOUTH DISCHARGES AND INLETS

A. Supply air discharges and return air/outside air inlets shall have a radiused curve equal to the thickness of the casing, regardless of the air velocities.

2.16 DAMPER (RETURN AIR)

A. Dampers shall be aluminum airfoil type and shall be a minimum of 12 gauge extruded aluminum.

B. Dampers shall opposed blade design capable of withstanding 8" w.g. differential pressure at 2000 feet per minute velocity. Leakage rate shall not exceed 6 cfm per square foot at 4: w.g. differential pressure and 2000 feet per minute velocity.

C. Frames shall be extruded aluminum channels with stainless steel frame seals and flexible synthetic blade end seals.

D. Acceptable dampers: Tamco 1000.

E. Blade linkage hardware shall be installed in frame out of air-stream. All hardware shall be on non-corrosive, reinforced material of cadmium plated steel.

F. Damper seals shall be designed for minimum air leakage by means of overlapping seals.

G. Jack shaft assemblies shall be provided for multiple damper installations.

2.17 DAMPER OPERATORS

A. Damper Actuators to be provided by the TCC for field installation. Ensure operators are mounted in easily accessible sections of the air handling unit.

2.18 ELECTRICAL

A. Electrical connection to fans shall be 208v/3 Phase/60 Hz power connection for each fan. Power wiring and connections of components provided from the factory to be wired and installed in the field.

B. Factory-furnish and provide marine lights in all accessible sections. Lights shall be fully enclosed LED type with metal cover guards. Provide a single light switch with an indicator light on the supply fan section of the unit.

C. Factory-furnish and provide a duplex receptacle on the exterior (access side) of air handling unit.

D. Electrical power for lights and receptacles shall be 120V/1/60.

E. Factory- provided lights and convenience outlets to be wired in the field to a junction box in each shipping split, and to the light switch outside the supply fan section.

F. Factory provided wiring for lighting and receptacles shall be field installed in rigid EMT conduit. Empty run of conduit to be provided by the AHU Manufacturer. Factory provided wiring downstream of the cooling coil, and immediately upstream of the cooling coil shall include rain tight fittings. A separate green bonding wire shall be provided.

G. All materials shall be UL and NEC approved.

2.19 TEST PORTS

A. Provide Duro Dyne IP-4 test ports or equal for unit air stream testing in each plenum section between each component within the AHU. Test ports shall have a tube that extends between the inside and outside of the unit and a screwed cap on the exterior to allow access. The test ports shall have to be flanged on the exterior to allow air seal and shall be flanged on the interior to cover the penetration of the casing.

2.20 DRAINS

A. Provide 1.25” capped floor drain connections on the side of the unit for complete drainability of the base pan for the following sections:
   1. Fresh Air or Mixed Air Plenums
   2. Fan Sections
   3. Sections immediately upstream and downstream of heating and cooling coils

PART 3 - INSTALLATION

3.1 INSTALLATION

A. Any floor penetrations are to be thoroughly sealed to ensure the watertightness and integrity of the entire floor.

B. Install units on a flat surface level within 1/8” and of sufficient strength to support the units.

C. Provide components furnished as per manufacturer’s literature.

D. Provide all water piping so water circuits are serviceable, without having to dismantle excessive lengths of pipe.

E. Provide valves in water piping upstream and downstream of each coil for isolating the coils for maintenance and to balance and trim the system.

F. Provide drain valves and vent cocks to each coil.

G. Provide strainers ahead of all pumps and automatic modulating valves.

H. Provide certified wiring schematics to the electrical division for the equipment and controls.

I. Provide all necessary control wiring as recommended by the manufacturer.

J. Provide condensate traps in accordance with manufacturers recommendations.

3.2 FIELD LEAKAGE AND DEFLECTION TEST

A. The unit shall not leak more than 1% air flow at +/- 10” wg, shall not deflect more than L/200 where “L” is the unsupported span length within completed casing.

B. Test must be submitted to the engineer.

3.3 WARRANTY

A. Units shall have complete parts and labor warranty for a minimum of 12 months from date of acceptance.

END OF SECTION

PRUIS HALL AHU REPLACEMENT

BALL STATE UNIVERSITY

2000 W. UNIVERSITY AVE
MUNCIE, INDIANA

ADDENDUM 001
03.01.2023
GMB PROJECT # 5-6027

MECHANICAL

M0.01 MECHANICAL GENERAL INFORMATION
M1.01 MECHANICAL ROOM HVAC DEMOLITION PLAN
M1.02 MECHANICAL ROOM PIPING DEMOLITION PLAN
M2.01 MECHANICAL ROOM HVAC PLAN
M2.02 MECHANICAL ROOM PIPING PLAN
M6.01 MECHANICAL SECTIONS
M7.01 MECHANICAL DETAILS
M8.01 MECHANICAL & CONTROL DIAGRAMS
M9.01 MECHANICAL SCHEDULES

ELECTRICAL

E0.01 ELECTRICAL SYMBOL LEGENDS & GENERAL NOTES
E1.01 MECHANICAL ROOM ELECTRICAL PLANS

VICINITY MAP

ALTERNATES

ALTERNATE BIDS:

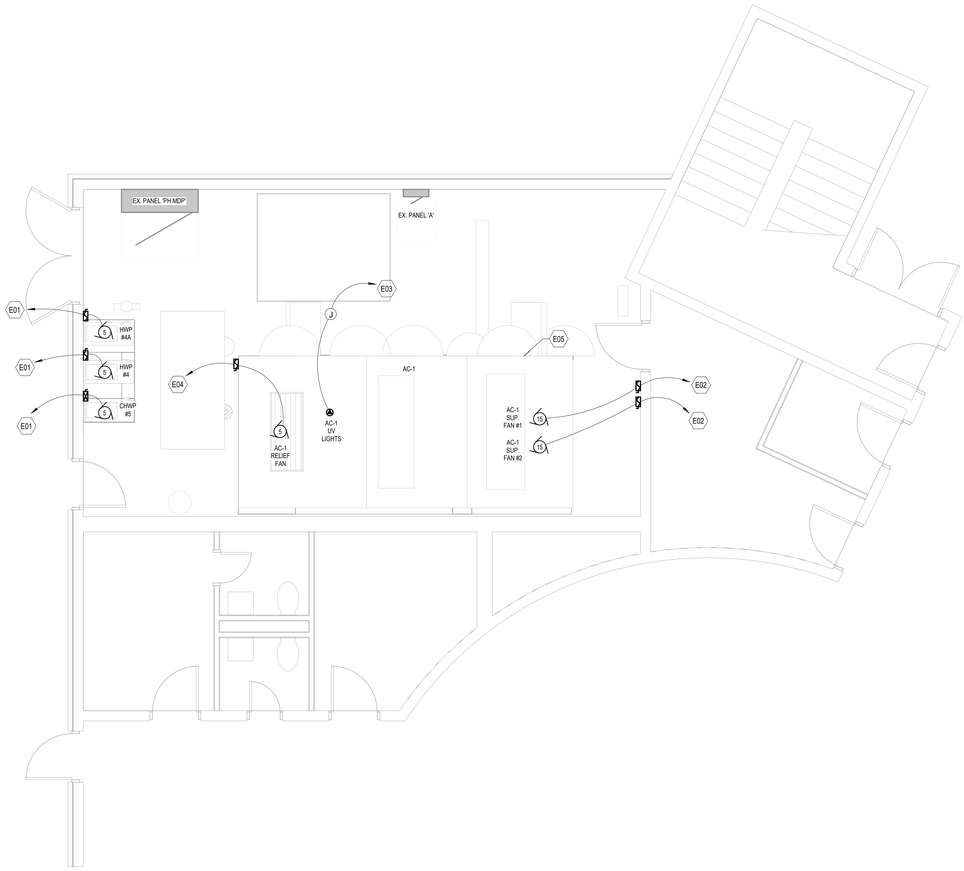
1. PERFORM DUST CLEANING OF RETURN AIR TUNNEL INCLUDING SOUND ATTENUATOR AND ALL PIPINGS.
2. PROVIDE NEW INLINE FULL FLOW BAG FILTER.
3. [illegible]
4. PREFERRED SCHEDULE.

OWNER

BALL STATE UNIVERSITY
2000 W. UNIVERSITY AVE
MUNCIE, IN 47303
P. 765.285.5082
WWW.BSU.EDU

ARCHITECT + ENGINEER

GMB ARCHITECTURE + ENGINEERING
38 W MAIN STREET
CARMEL, IN 46032
P. 317.641.0674
WWW.GMB.COM



2 E1.01 MECHANICAL ROOM POWER PLAN
1/4" = 1'-0"

1 E1.01 MECHANICAL ROOM ELECTRICAL DEMOLITION PLAN
1/4" = 1'-0"

VFD SCHEDULE

EQUIPMENT SERVED	NOMINAL MOTOR HP	VOLTAGE	INTEGRAL DISCONNECT	BYPASS ISOLATION
AC-1 SUPPLY FAN #1	15	208V, 3-PH	YES	NO
AC-1 SUPPLY FAN #2	15	208V, 3-PH	YES	NO
AC-1 RELIEF FAN	5	208V, 3-PH	YES	NO

THE VFD MANUFACTURER IS RESPONSIBLE FOR SIZING THE VFD BASED ON THE ACTUAL EQUIPMENT INSTALLED. REFER TO MECHANICAL EQUIPMENT SCHEDULE AND MANUFACTURER'S SUBMITTAL FOR ACTUAL OPERATING CHARACTERISTICS.

ELECTRICAL DEMOLITION GENERAL NOTES

1. REMOVE ALL ITEMS SHOWN ON DEMO PLAN, UNLESS OTHERWISE NOTED. REMOVE ALL UNUSED CONDUIT, RACEWAYS, WIRE, CABLE, CONTROLS, JUNCTION BOXES, DISCONNECTS, MOUNTS, AND RELATED ELECTRICAL ACCESSORIES COMPLETELY BACK TO SOURCE. REFER TO DEMOLITION SPECIFICATION.
2. MAKE PROVISIONS TO BACKFEED OR RE-CIRCUIT ANY ITEMS THAT ARE EXISTING TO REMAIN WHICH ARE AFFECTED BY THE DEMOLITIONS.
3. THE OWNER RESERVES THE RIGHT TO SALVAGE, WHOLE OR IN PART, ANY EQUIPMENT, SYSTEMS, AND/OR MATERIALS THAT ARE SCHEDULED FOR DEMOLITION PRIOR TO REMOVAL FROM THE BUILDING/SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTION AND GATHERING OF SUCH ITEMS TO A CENTRAL LOCATION AGREED UPON BY THE OWNER AND CONTRACTOR. ALL REMAINING EQUIPMENT AND/OR MATERIALS REMOVED AND NOT REUSED ON THE PROJECT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE BUILDING/SITE.
4. ALL EQUIPMENT AND/OR MATERIALS SLATED FOR REUSE SHALL BE CAREFULLY REMOVED AND STORED TO PREVENT DAMAGE AND REINSTALLED AS WORK PROGRESSES.
5. ALL DEMOLITION SHOWN IS GATHERED FROM FIELD OBSERVATION AND/OR RECORD DRAWINGS. INVESTIGATION OF EXISTING SYSTEMS WILL BE REQUIRED BY THE CONTRACTOR AS PART OF THE BID PRICE, SO THAT THE EXACT EXTENT OF DEMOLITION CAN BE ACCURATELY DETERMINED. THE CONTRACTOR'S BID PRICE SHALL ALSO INCLUDE REMOVAL OF SOME PORTIONS OF SYSTEMS NOT EXPLICITLY SHOWN ON THIS DRAWING, BUT DISCOVERED DURING THE INVESTIGATION PROCESS. WHERE THE EXTENT OF DEMOLITION IS UNCLEAR, THE CONTRACTOR SHALL CONSULT WITH THE ARCHITECT/ENGINEER AND OWNER TO DETERMINE WHICH PORTIONS OF EXISTING SYSTEMS MUST REMAIN ACTIVE AND WHICH PORTIONS MUST BE DEMOLISHED.
6. CONTRACTOR SHALL FIELD VERIFY ACTUAL LOCATION AND SIZES OF EXISTING CONDUIT, WIRING, AND EQUIPMENT.
7. IF ASBESTOS OR PCB MATERIAL IS ENCOUNTERED IT WILL BE REMOVED BY THE OWNER.
8. LAMPS CONTAINING MERCURY (FLUORESCENT, METAL HALIDE, SODIUM VAPOR, MERCURY VAPOR, ETC.) SHALL BE DISPOSED OF IN A PROPER HAZARDOUS WASTE RECYCLING FACILITY.
9. PATCH AND REPAIR ALL FLOOR, WALL AND CEILING OPENINGS DUE TO DEMOLITION WHICH ARE NOT TO BE RE-USED TO MATCH EXISTING CONSTRUCTION.
10. CONTRACTOR SHALL PROTECT ALL WALLS, CEILINGS, FLOORS, LIGHTS, AND OTHER FINISHED SURFACES THAT ARE NOT TO BE REMOVED. IF DAMAGED, CONTRACTOR SHALL REPAIR TO MATCH EXISTING CONDITIONS AT NO ADDITIONAL COST TO THE OWNER.
11. BACKFILLING SHALL PROMPTLY FOLLOW UNDERGROUND DEMOLITION OR REMOVAL WORK AND SHALL CONTINUE AS THE DEMOLITION PROGRESSES.
12. EXISTING CONDUIT SYSTEMS MAY BE REUSED FOR THE INSTALLATION OF NEW CONDUCTORS IF THEY ARE DEEMED TO BE IN GOOD CONDITION AND OF ADEQUATE SIZE FOR CODE-COMPLIANT INSTALLATION OF THE NEW CONDUCTORS. REVISE / REROUTE CONDUIT AS NECESSARY TO PROVIDE FEEDS PER POWER AND/OR LIGHTING PLANS.
13. PROVIDE BLANK COVER OVER ANY ABANDONED AND REMAINING ROUGH-INS OR JUNCTION BOXES TO MATCH EXISTING.

POWER & COMMUNICATION GENERAL NOTES

1. REFER TO ELECTRICAL GENERAL NOTES ON SHEET E0.01.
2. PROVIDE 120VAC POWER FOR ALL SMOKE DAMPERS AND COMBINATION FIRE/SMOKE DAMPERS.
   A. REFER TO MECHANICAL/HVAC DRAWINGS FOR LOCATIONS AND QUANTITIES OF DAMPERS.
   B. TERMINATE W/ BOX-COVER FUSIBLE DISCONNECT SWITCH AT EACH DAMPER.
   C. PROVIDE FIRE ALARM DUCT SMOKE DETECTOR WITHIN 5 FEET OF EACH DAMPER (UNLESS COVERED BY ANOTHER DUCT DETECTOR WITHIN 5 FEET).
   D. PROVIDE FIRE ALARM ADDRESSABLE RELAY(S) FOR INTERLOCKING DAMPER W/ CORRESPONDING HVAC UNIT(S) PER CODE REQUIREMENTS.
3. DESIGNATED CABLING PATHWAYS (CONDUITS, CABLE TRAYS, PENETRATION SLEEVES, ETC.) SHALL BE RESERVED FOR DIV. 27 COMMUNICATIONS CABLING AND DIV. 28 SAFETY/SECURITY CABLING ONLY. OTHER CABLING TYPES, SUCH AS DIV. 23 CONTROLS, DIV. 26 CONTROLS, AND ARCHITECTURAL EQUIPMENT CABLING SHALL BE SUPPORTED AND SLEEVED BY OTHER INDEPENDENT PATHWAYS, HANGERS, AND SUPPORTS.

ELECTRICAL KEYNOTES

D01	DEMOLISH FEEDER TO EXISTING PUMP AND VFD/STARTER BACK TO EX. PANEL 'PH MDP'. FUSED SWITCHES IN 'PH MDP' SHALL REMAIN FOR REUSE. PUMP AND VFD/STARTER SHALL BE SALVAGED AND RETURNED TO OWNER. CONTRACTOR SHALL REUSE.
D02	DEMOLISH FEEDER TO EXISTING PUMP AND VFD BACK TO SOURCE. SALVAGE VFD AND TURN OVER TO OWNER. REPLACE 30A SWITCH IN EX. PANEL 'PH MDP' WITH 100A SWITCH. NEW 100A SWITCH SHALL BE UTILIZED FOR ONE NEW AC-1 SUPPLY FAN.
D03	DEMOLISH FEEDER TO EXISTING AC-1 BACK TO SOURCE. SALVAGE AC-1 VFD AND RETURN TO OWNER. MAINTAIN EXISTING 100A SWITCH IN PANEL 'PH MDP' FOR REUSE. EXISTING 100A SWITCH SHALL BE UTILIZED FOR ONE NEW AC-1 SUPPLY FAN.
D04	DEMOLISH FEEDER FOR EXISTING AC-1 FILTER BACK TO SOURCE. APPROXIMATE LOCATION SHOWN. SWITCH FEEDING CIRCUIT BREAKER/FUSED SWITCH TO OFF POSITION AND UPDATE CIRCUIT DIRECTORY TO READ "SPARE".
D05	DEMOLISH FEEDER FOR EXISTING CONDENSATE PUMP BACK TO SOURCE. SWITCH FUSED SWITCH TO OFF POSITION AND UPDATE CIRCUIT DIRECTORY TO READ "SPARE".
D06	DEMOLISH FEEDER TO EXISTING RELIEF AIR FAN BACK TO EX. PANEL 'A'. REPLACE 3-POLE, 20A CIRCUIT BREAKER IN PANEL WITH 3-POLE 30A CIRCUIT BREAKER.
D07	DEMOLISH EXISTING DUCT-MOUNTED SMOKE DETECTORS AT AC-1. MAINTAIN FIRE ALARM CIRCUIT CONNECTIONS FOR REUSE.
E01	PROVIDE 3-#12, 1-#12(G) IN 3/4" C. TO EX. PANEL 'PH VFD' FOR RELOCATED PUMP. CIRCUIT THROUGH RELOCATED VFD/STARTER. TERMINATE ON EXISTING FUSED SWITCH IN EX. PANEL 'PH VFD'. FINAL CONNECTION TO PUMP SHALL BE IN LIQUID-TIGHT FLEXIBLE METAL CONDUIT. RECORD CIRCUIT INFORMATION ON AS-BUILT DRAWINGS.
E02	PROVIDE 3-#4, 1-#8(G) IN 1 1/4" C. TO EX. PANEL 'PH MDP' FROM AC-1 SUPPLY FAN THROUGH VFD. TERMINATE CIRCUIT ON 100A SWITCH. PROVIDE 70A FUSES IN SWITCH. FINAL CONNECTION TO AC-1 SHALL BE IN LIQUID-TIGHT FLEXIBLE METAL CONDUIT. RECORD CIRCUIT INFORMATION ON AS-BUILT DRAWINGS. FIELD VERIFY EXACT VFD LOCATION. EACH SUPPLY FAN SHALL TERMINATE ON SEPARATE SWITCH.
E03	PROVIDE 2-#4, 1-#8(G) IN 1/2" C. TO JUNCTION BOX FOR CONTROLS AT AC-1. LIGHTS FROM LOWERED, SINGLE-PHASE, 20A CIRCUIT BREAKER IN EX. PANEL 'A' WITH SPARE CAPACITY. COORDINATE JUNCTION BOX LOCATION WITH CONTROLS CONTRACTOR. RECORD CIRCUIT INFORMATION ON AS-BUILT DRAWINGS.
E04	PROVIDE 3-#10, 1-#10(G), IN 3/4" C. TO NEW 3-POLE, 30A CIRCUIT BREAKER IN EX. PANEL 'A' FOR NEW RELIEF FAN #1. CIRCUIT THROUGH VFD. MOUNT VFD ON STRUT. REUSE EXISTING STRUT WHERE POSSIBLE. RECORD CIRCUIT INFORMATION ON AS-BUILT DRAWINGS.
E05	PROVIDE DUCT-TYPE SMOKE DETECTORS ON SUPPLY AND RETURN DUCT FOR AC-1. RECONNECT TO EXISTING FIRE ALARM CIRCUIT. UPDATE FIRE ALARM CONTROL PANEL PROGRAMMING AS REQUIRED.

GMB
616.796.0200
WWW.GMB.COM

PRUIS HALL AHU REPLACEMENT
BALL STATE UNIVERSITY
MUNCIE, INDIANA

ISSUANCES
02.14.2023 BIDS & CONSTRUCTION
03.01.2023 ADDENDUM 001

DRAWN JDM
REVIEWED SMS
PROJECT NO. 5-6027

MECHANICAL ROOM ELECTRICAL PLANS

E1.01

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