

**BID FORM**  
for  
BL237 Wright Quad Renovation  
Owner-purchased Electrical Equipment  
Indiana University  
Bloomington, Indiana  
IU# 20200310

TO: The Trustees of Indiana University  
Bloomington, Indiana

FROM: Bidder's Name \_\_\_\_\_

Address \_\_\_\_\_

City and State \_\_\_\_\_

Phone Number \_\_\_\_\_ Date \_\_\_\_\_

FOR: Owner-purchased Electrical Equipment

BIDS DUE: Noon, September 9, 2022

IU Contact: Phil Cole pcole@iu.edu

ALTERNATIVE EQUIPMENT SELECTIONS

The undersigned Bidder/Vendor, with a complete understanding of the Bidding Documents, hereby proposes to furnish electrical equipment options for owner's final selection based on the following cost and lead time.

Switchgear:

A. Eaton

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

B. ABB/GE

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

C. Siemens

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

D. Schneider/Square D

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

Transformers:

A. ABB/Hitachi

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

B. Eaton Cooper Power Systems

Amount (Written Amount)	Amount (Numerals)	Lead Time (Weeks)	Cost if cancelled at shop drawing approval or before (Numerals)	Hold Bid 90 Days (Numerals)
Dollars	\$		\$	\$

BID APPROVAL

- Bidders are to HOLD the bid price and Lead time for 60 days from the bid date. Provide an alternate price to hold the bid for 90 days

SUBMITTALS:

- Provide one (1) electronic copy of the proposed Electrical Equipment submittals with the bid.

TAX EXEMPTIONS

The undersigned Bidder has informed himself of the tax exempt status of the Owner, as set forth in the Special conditions, and therefore, has not included these taxes in his Lump Sum Base Bid price.

QUESTIONS DURING BIDDING

To be submitted to IU purchasing who will forward. Do not contact IU Engineering or Consultant directly.

SIGNATURES

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Signature

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Printed Name and Title

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Company

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Date

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 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.

1.2 SUMMARY

- A. Section Includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Work under separate contracts.
  - 4. Access to Site.
  - 5. Work restrictions.
  - 6. Specification and Drawing conventions.

1.3 DEFINITIONS

- A. Architect also means Engineer, as applicable to the Project.

1.4 PROJECT INFORMATION

Project Identification:

BL237 Wright Quad Renovation

Owner-purchased Electrical Equipment

Indiana University

Bloomington, Indiana

- A. BL237 Wright Quad Renovation IU# 20200310.
  - 1. Project Location: Indiana University - Bloomington Indiana.
- B. Owner: Indiana University - Board of Trustees. 2901 East Discovery Parkway, Bloomington, Indiana 47408 .
  - 1. Owner's Representative: Pankaj (P.K.) Patel, Indiana University, 2901 East Discovery Parkway, Bloomington Indiana 47408.

- C. Architect: Schmidt Associates, Inc., 415 Massachusetts Avenue, Indianapolis, Indiana 46204-1640, 317-263-6226, 317-263-6224 (fax) www.schmidt-arch.com
  - a. Project Manager: Kevin Shelley, AIA
  - b. Project Engineer Seth Mathis, PE

#### 1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
  - 1. Furnish 3 Switchboards and 2 Transformers as indicated in the Contract Documents.
    - a. Switchboards:  
4NHMSBE  
1NHMSBW  
4NLSBC1
    - b. Transformers:  
T-East  
T-West
- B. Type of Contract:
  - 1. Project will be constructed under a single Contract.
- C. Contract Requirements
  - 1. FOB to Jobsite or within 50 miles of Jobsite if requested by installing contractor Note: location must be approved by Owner.
  - 2. Installing contractor will receive and unload equipment, all delivery details to be coordinated with them. Owner to be notified so they can be present if desired. Installation Contractor contact information will be provided once they have been issued a contract by IU.
  - 3. Bidder/Vendor is to store equipment before installation in an enclosed, dry facility and per any additional requirements of equipment manufacturer.
  - 4. Owner will pay 80% at delivery of equipment, 10% when startup and/or acceptance testing is complete, and final 10% at Project Substantial Completion (Anticipated on July 1, 2025) Note: Vendor to provide warranty until 2 years after Project Substantial Completion.

#### 1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Subsequent Work: Owner will award separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory Work under this Contract.

1. Installing Electrical Contractor will accept delivery, inspect, unload, position and install the electrical equipment provided under this contract

#### 1.7 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform Work or to retain other contractors on portions of Project.
- B. Manufacturer to protect equipment, load, secure and deliver to the project site.
- C. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  1. Coordinate delivery of equipment with the General Contractor and Electrical Contractor.
  2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

#### 1.8 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  2. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard.
  3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 261219 - PAD-MOUNTED, LIQUID-FILLED, MEDIUM-VOLTAGE TRANSFORMERS

### 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 pad-mounted, liquid-filled, medium-voltage distribution transformers, with primary and secondary bushings within or without air-terminal enclosures.

#### 1.3 DEFINITIONS

- A. BIL: Basic Impulse Insulation Level.
- B. Bushing: An insulating structure including a central conductor, or providing a central passage for a conductor, with provision for mounting on a barrier, conducting or otherwise, for the purpose of insulating the conductor from the barrier and conducting current from one side of the barrier to the other.
- C. Bushing Elbow: An insulated device used to connect insulated conductors to separable insulated connectors on dead-front, pad-mounted transformers and to provide a fully insulated connection. This is also called an "elbow connector."
- D. Bushing Insert: That component of a separable insulated connector that is inserted into a bushing well to complete a dead-front, load break or nonload break, separable insulated connector (bushing).
- E. Bushing Well: A component of a separable insulated connector, either permanently welded or clamped to an enclosure wall or barrier, having a cavity that receives a replaceable component (bushing insert) to complete the separable insulated connector (bushing).
- F. Elbow Connector: See "bushing elbow" above.

#### 1.4 ACTION SUBMITTALS

- A. Product Data, Shop Drawings:
  - 1. Product Data: For each type of product.
    - a. Include rated capacities, operating characteristics, and furnished specialties and accessories.



2. Shop Drawings: For pad-mounted, liquid-filled, medium-voltage transformers.
  - a. Include plans and elevations showing major components and features.
    - 1) Include a plan view and cross section of equipment base, showing clearances, required workspace, and locations of penetrations for grounding and conduits.
  - b. Include details of equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - c. Include single-line diagram.
  - d. Include list of materials.
  - e. Include nameplate data.
  - f. Manufacturer's published time-current curves of the transformer high-voltage fuses, with transformer damage curve, inrush curve, and thru fault current indicated.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings:
  1. Utilities site plan, drawn to scale, showing heavy equipment or truck access paths for maintenance and replacement.
- B. Qualification Data: For testing agency.
- C. Product Certificates: For transformers, signed by product manufacturer.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For transformer and accessories to include in emergency, operation, and maintenance manuals.

## 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Member company of NETA or an NRTL.
  1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- B. Comply with IEEE C2.
- C. Comply with IEEE C57.12.00.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Windings Material: Copper.
- B. Surge Arresters: Comply with IEEE C62.11, Distribution Class; metal-oxide-varistor type, fully shielded, separable-elbow type, suitable for plugging into the inserts provided in the high-voltage section of the transformer. Connected in each phase of incoming circuit and ahead of any disconnecting device.
- C. Winding Connections: The connection of windings and terminal markings shall comply with IEEE C57.12.70.
- D. Efficiency: Comply with 10 CFR 431, Subpart K.
- E. Insulation: Transformer kVA rating shall be as follows: The average winding temperature rise above a 40 deg C ambient temperature shall not exceed 65 deg C and 80 deg C hottest-spot temperature rise at rated kVA when tested according to IEEE C57.12.90, using combination of connections and taps that give the highest average winding temperature rise.
- F. Tap Changer: External handle, for de-energized operation.
- G. Tank: Sealed, with welded-on cover. Designed to withstand internal pressure of not less than 7 psi without permanent distortion and 15 psig without rupture. Comply with IEEE C57.12.36.
- H. Enclosure Integrity: Comply with IEEE C57.12.28 for pad-mounted enclosures that contain energized electrical equipment in excess of 600 V that may be exposed to the public.
- I. Mounting: An integral skid mounting frame, suitable to allow skidding or rolling of transformer in any direction, and with provision for anchoring frame to pad.
- J. Insulating Liquids:
  - 1. Less-Flammable Liquids:
    - a. Edible-Seed-Oil-Based Dielectric (Envirotemp FR3): Listed and labeled by an NRTL as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic, having passed the Organisation for Economic Co-operation and Development G.L.203 with zero mortality, and shall be certified by the U.S. Environmental Protection Agency as biodegradable, meeting Environmental Technology Verification requirements.
- K. Sound level shall comply with NEMA TR 1 requirements.
- L. Corrosion Protection:

1. Transformer coating system shall be factory applied, complying with requirements of IEEE C57.12.28, custom color selected by architect..

## 2.3 THREE-PHASE TRANSFORMERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. ABB.
  2. Eaton.
- B. Description:
  1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  2. Comply with IEEE C57.12.26.
- C. Compartment Construction:
  1. Double-Compartment Construction: Individual compartments for high- and low-voltage sections, formed by steel isolating barriers that extend full height and depth of compartments, with hinged, lift-off doors and three-point latching, with a stop in the open position and provision for padlocking.
  2. Drain/Sampling Valve in exterior padlockable enclosure for testing.
- D. Primary Fusing: Designed and rated to provide thermal protection of transformer by sensing overcurrent and high liquid temperature.
  1. 65kV x 95-kV BIL current-limiting fuses, conforming to requirements of IEEE C37.47.
  2. Interrupting Rating: 50,000 rms A symmetrical at system voltage.
  3. Fuse Assembly: Bayonet-type, liquid-immersed, expulsion fuses in series with liquid-immersed, partial-range, current-limiting fuses. Bayonet fuse shall sense both high currents and high oil temperature to provide thermal protection to the transformer. Connect current-limiting fuses ahead of dual-feed load-break switch.
  4. Provide bayonet fuse assembly with an oil retention valve and an external drip shield inside the housing to eliminate or minimize oil spills. Valve shall close when fuse holder is removed and an external drip shield is installed.
  5. Provide a conspicuously displayed warning adjacent to bayonet fuse(s), cautioning against removing or inserting fuses unless transformer has been de-energized and tank pressure has been released.
- E. High-Voltage Section: Dead-front design.
  1. Voltage Rating: 3-Winding, 4160 Delta x 12470 Delta, selectable primary voltage switch with nameplate identification.
  2. To connect primary cable, use separable insulated connectors; coordinated with and complying with requirements of Section 260513 "Medium-Voltage Cables." Bushings shall be one-piece units, with ampere and BIL ratings the same as connectors.
  3. Bushing inserts:

- a. Conform to the requirements of IEEE 386.
  - b. Rated at 600 A, with voltage class matching connectors. Provide a parking stand near each bushing well.
  - c. Provide insulated protective caps for insulating and sealing out moisture from unused bushing inserts.
4. Access to liquid-immersed fuses.
5. Factory Mounted Dead-front surge arresters with 600A dead-break elbows located on primary's second loop feed.
6. Tap-changer operator.
7. Load-Break Switch:
  - a. Nameplate with switch rating below transformer nameplate.
  - b. Dual-feed, liquid-immersed type with voltage class and BIL matching that of separable connectors, with a continuous current rating and load-break rating of 300 amperes, and a make-and-latch rating of 12 kA rms symmetrical.
8. NEMA 2 bolt style ground pad.

F. Low-Voltage Section:

1. Bushings with spade terminals drilled for terminating twice the number of conductors indicated on the Drawings, and the lugs that comply with requirements of Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
  - a. Provide additional supports as required for spade terminals.

G. Capacities and Characteristics:

1. Power Rating (kVA): Refer to Drawings.
2. Voltage Ratings: 480Y/277 V.
3. Taps: Comply with IEEE C57.12.26 requirements.
4. Transformer BIL (kV): 30kV.
5. Impedances:
  - a. 4.00% for units rated 500 kVA.
  - b. 5.75% for units rated 750 kVA and above.
6. Comply with UL listing requirements for combination classification and listing for transformer and less-flammable insulating liquid.

H. Transformer Accessories:

1. Drain and filter connection.
2. Filling and top filter press connections.
3. Pressure-vacuum gauge.
4. Dial-type analog thermometer with alarm contacts.
5. Magnetic liquid level indicator with high and low alarm contacts factory wired out to terminal strip.

6. Automatically resetting pressure-relief device. Device flow shall be as recommended by manufacturer.
7. Dual stainless-steel ground connection pads. One NEMA 2 hole pattern in low-voltage section. One NEMA 2 hole pattern in high-voltage section.
8. Machine-engraved nameplate, made of anodized aluminum or stainless steel.
9. Two position 300A LBOR switch.
10. Dual voltage switch.

## 2.4 SERVICE CONDITIONS

- A. Transformers shall be suitable for operation under service conditions specified as usual service conditions in IEEE C57.12.00, except for the following:
  1. Altitudes above 1000 feet.
  2. Cooling air temperature exceeds limits.

## 2.5 WARNING LABELS AND SIGNS

- A. Comply with requirements for labels and signs specified in Section 260553 "Identification for Electrical Systems."
  1. High-Voltage Warning Label: Provide self-adhesive warning signs on outside of high-voltage compartment door(s). Sign legend shall be "DANGER HIGH VOLTAGE" printed in two lines of nominal 2-inch-high letters. The word "DANGER" shall be in white letters on a red background and the words "HIGH VOLTAGE" shall be in black letters on a white background.
  2. Arc Flash Warning Label: Provide self-adhesive warning signs on outside of high-voltage compartment door(s), warning of potential electrical arc flash hazards and appropriate personal protective equipment required.

## 2.6 SOURCE QUALITY CONTROL

- A. Provide manufacturer's certificate that the transformer design tests comply with IEEE C57.12.90.
  1. Perform the following factory-certified routine tests on each transformer for this Project:
    - a. Resistance.
    - b. Turns ratio, polarity, and phase relation.
    - c. Transformer no-load losses and excitation current at 100 percent of ratings.
    - d. Transformer impedance voltage and load loss.
    - e. Operation of all devices.
    - f. Lightning impulse.
    - g. Low frequency.
    - h. Leak.
    - i. Impedance.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Examine pad-mounted, liquid-filled, medium-voltage transformers upon delivery.

1. Upon delivery of transformers and prior to unloading, inspect equipment for any damage that may have occurred during shipment or storage.
2. Verify that tie rods and chains are undamaged and tight, and that all blocking and bracing is tight. Verify that there is no evidence of load shifting in transit, and that readings from transportation shock recorders, if equipped, are within manufacturer's recommendations.
3. Verify that there is no indication of external damage and no dents or scratches in doors and sill, tank walls, radiators and fins, or termination provisions.
4. Verify that there is no evidence of insulating-liquid leakage on transformer surfaces, at weld seams, on high- or low-voltage bushing parts, and at transformer base.
5. Verify that there is positive pressure or vacuum on tank. Check pressure gauge; it is required to read other than zero.
6. Compare transformers and accessories received with bill of materials to verify that shipment is complete. Verify that transformers and accessories conform with manufacturer's quotation and shop drawings. If shipment is incomplete or does not comply with Project requirements, notify manufacturer in writing immediately.
7. Verify presence of polychlorinated biphenyl content labeling.
8. Unload transformers carefully, observing all packing label warnings and handling instructions.
9. Open termination compartment doors and inspect components for damage or displaced parts, loose or broken connections, cracked or chipped insulators, bent mounting flanges, dirt or foreign material, and water or moisture.

#### B. Handling:

1. Handle transformers carefully, in accordance with manufacturer recommendations, to avoid damage to enclosure, termination compartments, base, frame, tank, and internal components. Do not subject transformers to impact, jolting, jarring, or rough handling.
2. Protect transformer termination compartments against entrance of dust, rain, and snow.
3. Transport transformers upright, to avoid internal stresses on core and coil mounting assembly and to prevent trapping air in windings. Do not tilt or tip transformers.
4. Verify that transformer weights are within rated capacity of handling equipment.
5. Use only manufacturer-recommended points for lifting, jacking, and pulling. Use all lifting lugs when lifting transformers.
6. Use jacks only at corners of tank base plate.
7. Use nylon straps of same length to balance and distribute weight when handling transformers with a crane.
8. Use spreaders or a lifting beam to obtain a vertical lift and to protect transformer from straps bearing against enclosure. Lifting cable pull angles may not be greater than 15 degrees from vertical.
9. Exercise care not to damage tank base structure when handling transformer using skids or rollers. Use skids to distribute stresses over tank base when using rollers under large transformers.

END OF SECTION

## SECTION 262413 - SWITCHBOARDS

### 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. Service and distribution switchboards rated 600 V and less.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.
4. Instrumentation.
5. Control power.
6. Accessory components and features.
7. Identification.

#### 1.3 DEFINITIONS

- A. Inominal: Nominal discharge current.
- B. MCOV: Maximum continuous operating voltage.
- C. Mode(s), also Modes of Protection: The pair of electrical connections where the VPR applies.
- D. MOV: Metal-oxide varistor; an electrical component with a significant non-ohmic current-voltage characteristic.
- E. OCPD: Overcurrent protective device.
- F. SCCR: Short-circuit current rating.
- G. SPD: Surge protective device.
- H. VPR: Voltage protection rating.

#### 1.4 ACTION SUBMITTALS

- A. Product Data with Shop Drawings:



1. Product Data: For each type of switchboard, overcurrent protective device, surge protection suppression device, ground-fault protector, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
  - a. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
  - b. Copy of UL Category Code VZCA certification, as a minimum, listing the tested values for VPRs, Inominal ratings, MCOVs, type designations, OCPD requirements, model numbers, system voltages, and modes of protection.
2. Shop Drawings: For each switchboard and related equipment.
  - a. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
  - b. Detail enclosure types for types other than NEMA 250, Type 1.
  - c. Detail bus configuration, current, and voltage ratings.
  - d. Detail short-circuit current rating of switchboards and overcurrent protective devices.
  - e. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - f. Include schematic and wiring diagrams for power, signal, and control wiring.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field Quality-Control Reports:
  1. Test procedures used.
  2. Test results that comply with requirements.
  3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Comply with NEMA PB 2.

- E. Comply with NFPA 70.
- F. Comply with UL 891.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
- B. Handle and prepare switchboards for installation according to NEMA PB 2.1.

#### 1.8 PROJECT CONDITIONS

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.
- B. Environmental Limitations:
  - 1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
  - 2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:
    - a. Ambient Temperature: Not exceeding 104 deg F.
    - b. Altitude: Not exceeding 6600 feet.
- C. Service Conditions: NEMA PB 2, usual service conditions, as follows:
  - 1. Ambient temperatures within limits specified.
  - 2. Altitude not exceeding 6600 feet.

#### 1.9 WARRANTY

- A. Special Warranty for Surge Protection Devices: Manufacturer's standard form in which manufacturer agrees to repair or replace surge protection devices that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit; Pow-R-Line C Series.
2. ABB; ReliaGear.
3. Siemens Energy & Automation, Inc.; SB Series.
4. Square D; a brand of Schneider Electric; QED-2 Series.

B. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned, same height.

C. Indoor Enclosures: Steel, NEMA 250, Type 1.

D. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

E. Customer Metering Compartment: A separate arc flash resistant customer metering compartment and section with front hinged door, for indicated metering, and current transformers for each meter.

F. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

G. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent conductivity, silver-plated, with copper feeder circuit-breaker line connections.
2. Ground Bus: 1/4-by-2-inch- hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
3. Main Phase Buses and Equipment Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
4. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables.
5. In each switchboard distribution section, provide complete top to bottom vertical bussing, rated at same ampacity as main device or main lugs.
6. Provide proper quantity/size of lugs as required for conductors indicated.

H. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

## 2.2 SURGE PROTECTION DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
2. ABB.
3. Siemens Energy & Automation, Inc.
4. Square D; a brand of Schneider Electric.

B. General SPD Requirements

1. SPD with Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NFPA 70.
3. Comply with UL 1449.
4. MCOV of the SPD shall be at least 125 percent of the nominal system voltage.
5. Comply with UL 1283.

C. Service Entrance Suppressor

1. SPDs: Listed and labeled, complying with UL 1449, Type 1.
  - a. SPDs with the following features and accessories:
    - 1) Integrally mounted, bolt on type.
    - 2) Integral disconnect switch.
    - 3) Internal thermal protection that disconnects the SPD before damaging internal suppressor components.
    - 4) Indicator light display for protection status.
    - 5) Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status.
    - 6) Surge counter.
2. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 250kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
3. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V 208Y/120 V, three-phase, four-wire circuits shall not exceed the following:
  - a. Line to Neutral: 1200 V for 480Y/277 V, 700 V for 208Y/120 V.
  - b. Line to Ground: 1200 V for 480Y/277 V, 1200 V for 208Y/120 V.
  - c. Line to Line: 2000 V for 480Y/277 V, 1000 V for 208Y/120 V.
4. SCCR: Equal or exceed 200 kA.
5. Nominal Rating: 20 kA.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Circuit Breaker Trip Rating 200 amps and below: Thermal-magnetic circuit breakers; Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits.
2. Circuit Breaker Trip Rating 225 amps and above: Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following adjustable settings:
  - a. Instantaneous trip.

- b. Long- and short-time pickup levels.
  - c. Long- and short-time time adjustments.
- 3. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
  - a. Standard frame sizes, trip ratings, and number of poles.
  - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
  - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

## 2.4 INSTRUMENTATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Square D; PowerLogic ION PM5563.
  - 2. Approved equal ION meter labeled under other manufacturer.
- B. Features and Accessories:
  - 1. Minimum 10Base-T and/or 10Base-FX Ethernet option as specified by Engineering Services or CFS.
  - 2. ANSI Accuracy Class 0.3 current transformers. CT range shall be selected appropriately for the load and shall not exceed the load by more than 50%.
  - 3. CT shorting block and/or test switches.
  - 4. Voltage transformers to reduce to 120V.
  - 5. Fuse protection for voltage and power supply inputs.
  - 6. For each meter, provide a data jack in the metering enclosure, connected to the campus Ethernet.
  - 7. Installed in separate enclosure from switchboard.

## 2.5 CONTROL POWER

- A. Control Circuits: 120-V ac, supplied through secondary disconnecting devices from control-power transformer.

## 2.6 IDENTIFICATION

- A. Service Equipment Label: NRTL labeled for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Receive, inspect, handle, and store switchboards according to NEMA PB 2.1.
- B. Examine switchboards once delivered. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work.

### 3.2 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
    - a. Coordinate field service after Switchboards are installed. Switchboards installed under separate contract.

END OF SECTION



PANELBOARD ABBREVIATIONS	
#	NOTES
FTL	FEED THROUGH LUGS
MCB	MAIN CIRCUIT BREAKER
MFS	MAIN FUSED SWITCH
MLO	MAIN LUGS ONLY
SFL	SUB-FEED LUGS
SPD	SURGE PROTECTION DEVICE

CIRCUIT BREAKER OPTIONS ("O" COLUMN / MCB OPTIONS) ABBREVIATIONS	
#	NOTES
C	CONTACTOR CONTROLLED
G	GFCI PROTECTED
P	HANDLE LOCKING DEVICE
S	SHUNT TRIP
X	80% RATED MAIN CIRCUIT BREAKER WITH LSI
Y	100% RATED MAIN CIRCUIT BREAKER WITH LSI
Z	100% RATED MAIN CIRCUIT BREAKER WITH LSI

SWITCHBOARD: 1NHMSBW				SWITCHBOARD SCHEDULE				VOLTS: 480Y/277 V				MAINS RATING: 1000 A			
LOCATION: Space C193				PHASES: 3				MAINS TYPE: MCB				WIRES: 4			
MOUNTING: FLOOR				AIC RATING: 65,000 A				MCB RATING: 1000 A				MCB OPTIONS: Z			
SUPPLY FROM: T-WEST															
O	CKT NO.	CIRCUIT DESCRIPTION	P	FRAME SIZE	TRIP RATING	A	B	C	LOAD	REMARKS					
X	1	5NHE1	3	225 A	225 A	9.84	9.84	9.84	29.52	PANEL					
X	2	7NHG1	3	225 A	225 A	9.84	9.84	9.84	29.52	PANEL					
X	3	T-1NE1	3	400 A	400 A	57.11	50.10	48.68	155.89	TRANSFORMER					
X	4	T-2NF1	3	400 A	400 A	74.44	72.82	69.52	216.78	TRANSFORMER					
X	5	T-3NG1	3	400 A	400 A	123.84	118.27	102.31	344.41	TRANSFORMER					
X	6	1NHF1	3	225 A	100 A	3.05	3.05	3.05	9.15	PANEL					
---	7	SPARE (80% LSI)	3	225 A	225 A	---	---	---	0.00						
---	8	SPARE (80% LSI)	3	225 A	225 A	---	---	---	0.00						
---	9	SPARE (80% LSI)	3	400 A	400 A	---	---	---	0.00						
---	10	SPARE (80% LSI)	3	400 A	400 A	---	---	---	0.00						
---	11	SPARE (80% LSI)	3	400 A	400 A	---	---	---	0.00						
---	12	SPACE	1	---	---	---	---	---	---						
---	13	SPACE	1	---	---	---	---	---	---						
---	14	SPACE	1	---	---	---	---	---	---						
---	15	SPACE	1	---	---	---	---	---	---						
---	16	SPACE	1	---	---	---	---	---	---						
---	17	SPACE	1	---	---	---	---	---	---						
---	18	SPACE	1	---	---	---	---	---	---						
---	19	SPACE	1	---	---	---	---	---	---						
---	20	SPACE	1	---	---	---	---	---	---						
TOTAL LOAD:						278.12 kVA	263.92 kVA	243.23 kVA							
TOTAL AMPS:						1016 A	964 A	878 A							
TOTAL CONNECTED LOAD:						785.27 kVA									
TOTAL CONNECTED AMPS:						1016 A									
TOTAL DEMAND LOAD:						499.62 kVA									
TOTAL DEMAND AMPS:						601 A									
SWITCHBOARD & CIRCUIT BREAKER OPTIONS ("O" COLUMN / MCB OPTIONS ABBREVIATIONS)			LOAD CLASSIFICATION		CONNECTED LOAD (VA)		DEMAND FACTOR		ESTIMATE DEMAND (VA)						
C	CONTACTOR CONTROLLED		Receptacle - General		594520 VA		50.84%		302260 VA						
G	GFCI PROTECTED		Lighting - Interior		32169 VA		125.00%		40211 VA						
P	HANDIC LOCKING DEVICE		Mechanical - Motor		140114 VA		100.00%		140114 VA						
S	SHUNT TRIP		Mechanical - Heating		5728 VA		75.00%		4296 VA						
X	80% RATED MAIN CIRCUIT BREAKER WITH LSI		Power - Continuous		12740 VA		100.00%		12740 VA						
Y	100% RATED MAIN CIRCUIT BREAKER WITH LSI														
Z	100% RATED MAIN CIRCUIT BREAKER WITH LSI														

# **ADDENDUM NO. 1**

## **AUGUST 25, 2022**

PREPARED BY SCHMIDT ASSOCIATES FOR:

**20200310 – BL237 WRIGHT QUAD RENOVATION – EARLY EQUIPMENT PACKAGE  
INDIANA UNIVERSITY**

This Addendum consists of 1 Addendum page and 0 attachment pages totaling 1 page.

Acknowledge receipt of this Addendum by inserting its number on the Bid Form. Failure to do so may subject the Bid to disqualification. This Addendum is part of the Contract Documents.

Bidder is encouraged to verify with reprographer of record all Addenda issued (do not rely exclusively on third party plan room services).

### **PART 1 - CHANGES TO PRIOR ADDENDA (NOT APPLICABLE)**

### **PART 2 - CHANGES TO THE PROJECT MANUAL (NOT APPLICABLE)**

### **PART 3 - CHANGES TO THE DRAWINGS**

Modifications described herein shall be incorporated in the Drawings. All other Work shall remain unchanged.

#### **3.1 E-SERIES DRAWINGS**

##### **A. Drawing Number E-601.1**

1. MODIFY all three Switchboard Schedules
  - a. Meters may be internal or external.
2. MODIFY Details 4A and 5A as follows:
  - a. Change depth for Switchboards 4NHMSBE and 4NLSBC1 from 35" to 36".

**END OF ADDENDUM 1**