

## **REQUEST FOR PROPOSAL – HVAC Control Replacements**

Howell Public Schools will receive firm prime contractor bids for the labor materials, equipment, and all other services to complete the following project: HVAC Control Replacements for Three Fires Elementary located at 4125 Crooked Lake Rd., Howell, MI 48843.

The bid documents consist of plans and specifications prepared by Kingscott Associates. Documents may be requested from Matt Cox (cox@howellschools.com) on or after Wednesday, April 17<sup>th</sup>, 2024.

**Pre-Bid Meeting:** A Pre-Bid meeting will be held at Three Fires Elementary, 4125 Crooked Lake Rd., Howell, MI 48843, on **Monday, April 29<sup>th</sup>, 2024 at 2:00 PM**. Please meet at the loading dock off the North parking lot, which is on the North side of Three Fires Elementary School; walk-through will commence shortly after 2:00 pm.

Each Proposal must be submitted in duplicate on the forms furnished by the Construction Manager, and must be completed in full. An opaque, sealed envelope bearing your proposal must identify your company, the project name: **"HVAC Control Replacements"** and be addressed and delivered to:

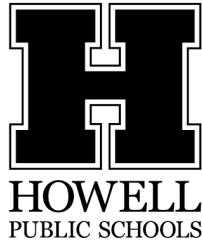
Attn: Ben Engelter  
Howell Public Schools  
411 E Highlander Way, Suite C  
Howell, MI 48843

Bids must be delivered no later than **12:00 noon (EST), Thursday, May 2<sup>nd</sup>, 2024** to the locations indicated above. The Board of Education will not accept bids submitted after the date and time specified for bid submission. All late bid proposals will be returned to the bidder unopened.

Bids can be hand delivered to the Howell Public Schools Central Office, 411 E Highlander Way, Howell, MI 48843, located at the Howell High School Freshman Campus. The Central Office door is labeled C1. Howell Public Schools will not consider or accept a bid received after the date and time specified for bid submission. Should Howell Public Schools be closed for any reason, bids will be due the next business day Howell Public Schools is open. The time bids are due will remain the same time specified herein.

A bid bond executed by a U.S. Treasury listed surety company acceptable to the owner, or a cashier's check in the amount of at least 5% of the sum of the proposal payable to Howell Public Schools shall be submitted with each proposal in excess of \$29,572.00. All proposals shall be firm for a period of sixty (60) days.

Bids must be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any member of the board or the superintendent. Additionally, bids shall be accompanied by a sworn and notarized statement for the Iran Economic Sanctions Act



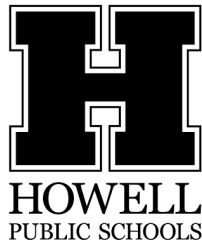
Affidavit of Compliance and Equal Opportunity Statement. Bids not accompanied by these documents will not be accepted.

Bids will be publicly opened and read aloud at a public meeting held at the Howell Public Schools Admin Building starting at 1:00 PM (EST) on Thursday, May 2<sup>nd</sup>, 2024.

Successful bidders whose proposals are \$50,000 or more will be required to furnish a Satisfactory Performance and Payment Bond in the amount of 100% of their bid. The cost of the Bond shall be included in each proposal.

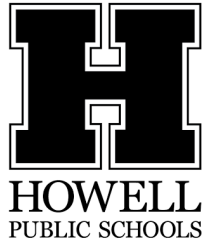
The Board of Education reserves the right to reject any and/or all bids in whole or in part and to waive any informality therein. The Board of Education reserves the right to accept that bid which in its opinion is in the best interest of the Owner, or to award the contract to an alternate bidder other than the bidder(s) submitting the best financial Bid (low bidder) in its sole and absolute discretion.

Howell Public Schools accepts all bids but reserves the right to select Michigan Based Businesses over out of state companies. Under 1984 PA 431, MCL 18.1268, our board has elected to enforce the PA as defined.



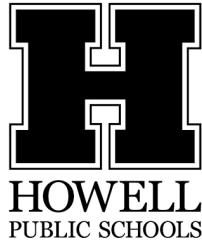
## **GENERAL CONDITIONS**

- A. It shall be the bidder's responsibility to read this entire document, review all enclosures and attachments, and comply with all requirements within.
- B. For the purpose of assuring the School District of the quality of workmanship, materials, equipment, and service, the School Board will retain the right to qualify or disqualify bidders on the basis of available information covering their service and the suitability of the equipment/material bid for the project.
- C. Howell Public Schools reserves the right to accept or reject any or all bids; and to make awards as it considers its best interest, whether low bid or not, this excludes omitting the required affidavits. Howell Public Schools may award this bid in part or whole.
- D. All bid proposals must be mailed or hand-delivered a sealed envelope/package. Telephonic, E-mail, online, or fax bids will not be accepted.
- E. All questions regarding the specifics of the bid proposal should be emailed through SIGMA VSS and answers will be responded to through the same means. All questions and answers will be distributed to all bidders who have, or later ask questions about the bid.
- F. All proposals submitted shall remain firm for a period of ninety (90) days after date of receiving bids.
- G. The successful bidder shall, within a reasonable time after receipt of written notice, make good any defects in material or workmanship that may develop, especially during the warranty period.
- H. Howell Public Schools shall not be responsible for any cost or expense incurred by the bidder during the preparation of the bid.
- I. The owner is a federally constituted government body and as such is not subject to Michigan State or Federal excise taxes.
- J. Bidder shall follow all applicable state codes and regulations. All codes and regulations set forth by the state pertaining to the specified equipment included in the scope of work take precedence over the specifications supplied by Howell Public Schools.
- K. Contractor must meet District's background check requirements for all employees required to be onsite.
- L. The laws of the State of Michigan shall govern the rights, obligations and remedies of the Parties under this bid and any agreement reached through this process.
- M. All information included in a bid proposal response is subject to the "Freedom of Information Act" and may be disclosed in its entirety after the formal date bids are due.



### **ACCEPTABLE EQUAL**

Any name of a model, manufacturer or brand in this RFP shall not be considered as exclusive of other brands. If listed, the brands and models specified in the RFP are preferred. The District expects all supplies and materials bids by a Vendor to meet or exceed the Specifications set forth in this RFP. Further, it is the District's intent that this RFP permit competition. Accordingly, the use of any patent, propriety name or manufacturer's name is for demonstrative purposes only and is not intended to curtail competition. Whenever any supplies and materials requested in this RFP are specified by patent, proprietary name or by the name of the manufacturer, unless stated differently, such specification shall be considered as if followed by the words "or comparable equivalent" whether or not such words appear. **The District in its sole and absolute discretion, shall have the right to determine if the proposed equivalent products/brands submitted by the Vendor meet the Specification contained in this RFP and possess equivalent and/or better qualities.** Any and all deviations from Specifications must be noted on the Proposal Form.



**BIDDERS RESPONSIBILITIES**

Pre-Bid meeting at 2:00 PM on Monday, April 29th, 2024  
Bids will be due by 12:00 pm on Thursday, May 2, 2024  
Bids will be opened at 1:00 pm on Thursday, May 2, 2024

**Contractor shall be responsible for:**

Project Management, Logistics, Procuring Equipment, Shipping & Delivery Costs, Cleaning and Installation, Documentation requested, and copies of the Manufacturer’s Warranty Information. Contractor shall provide a minimum of 1-year warranty on all workmanship and materials with in this bid.

**The bid proposals shall include the following documentation:**

- Proposal Form
- Iran Economic Sanctions Affidavit
- Familial Affidavit
- Product Specification Sheets and Manufacturer’s Warranty Information for proposed equipment

Additional documentation found necessary will be posted to SIGMA VSS as an addenda(s).

**SPECIFICATIONS**

**FOR**

**HVAC CONTROL REPLACEMENTS  
Three Fires Elementary**

**HOWELL PUBLIC SCHOOLS  
HOWELL, MICHIGAN**

DECEMBER 19, 2023

A/E PROJECT NO. 2600-40

OWNER

HOWELL PUBLIC SCHOOLS  
411 N. HIGHLANDER WAY  
HOWELL, MICHIGAN 48843  
(517) 548-6200

**SECTION 230913**  
**INSTRUMENTATION AND CONTROL DEVICES FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Control panels.
- B. Control Valves:
  - 1. Globe pattern.
  - 2. Butterfly pattern.
  - 3. Electronic operators.
- C. Dampers.
- D. Damper Operators:
  - 1. Electric operators.
- E. Input/Output Sensors:
  - 1. Temperature sensors.
  - 2. Static pressure (air pressure) sensors.
  - 3. Equipment operation (current) sensors.
  - 4. Damper position indicators.
  - 5. Carbon dioxide sensors.
- F. Thermostats:
  - 1. Electric room thermostats.
  - 2. Room thermostat accessories.
  - 3. Outdoor reset thermostats.
  - 4. Airstream thermostats.
  - 5. Electric low limit duct thermostats.

6. Electric high limit duct thermostats.

G. Transmitters:

1. Building static pressure transmitters.
2. Pressure transmitters.
3. Air pressure transmitters.
4. Water pressure transmitters (liquid differential pressure transmitters).
5. Temperature transmitters.

H. Control valves.

I. Automatic dampers.

J. Damper operators.

K. Miscellaneous accessories.

## 1.02 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2012.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.
- C. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats 2013.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2014.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2015.

## 1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

## 1.04 SUBMITTALS

- A. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- B. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and



pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

- C. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
- D. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
  - 1. Revise shop drawings to reflect actual installation and operating sequences.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

#### **1.05 QUALITY ASSURANCE**

- A. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

#### **1.06 WARRANTY**

- A. Correct defective Work within a two year period after Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 EQUIPMENT - GENERAL**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

#### **2.02 CONTROL VALVES**

- A. Manufacturers:
  - 1. Belimo: [www.belimo.com](http://www.belimo.com).
- B. Globe Pattern:
  - 1. Manufacturers:
    - a. Belimo: [www.belimo.com](http://www.belimo.com).

2. Up to 2 inches (50 mm): Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
3. Over 2 inches (50 mm): Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
4. Hydronic Systems:
  - a. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).
  - b. Size for 3 psig (20 kPa) maximum pressure drop at design flow rate.
  - c. two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.

C. Butterfly Pattern:

1. Iron body, bronze disc, resilient replaceable seat for service to 180 degrees F (82 degrees C) wafer or lug ends, extended neck.
2. Hydronic Systems:
  - a. Rate for service pressure of 125 psig at 250 degrees F (860 kPa at 121 degrees C).
  - b. Size for 1 psig (7 kPa) maximum pressure drop at design flow rate.

D. Electronic Operators:

1. Manufacturers:
  - a. Belimo.
2. Fully modulating capability.
3. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
4. Select operator for full shut off at maximum pump differential pressure.

## 2.03 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gage, 0.1046 inch (2.66 mm).

- C. Blades: Galvanized steel, maximum blade size 8 inches (200 mm) wide, 48 inches (1200 mm) long, minimum 22 gage, 0.0299 inch (0.76 mm), attached to minimum 1/2 inch (13 mm) shafts with set screws.
- D. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.
- E. Maximum Pressure Differential: 6 inches wg (1.5 kPa).

#### **2.04 DAMPER OPERATORS**

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
  - 1. Manufacturers:
    - a. Belimo: [www.belimo.com](http://www.belimo.com).
- B. Electric Operators:
  - 1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

#### **2.05 INPUT/OUTPUT SENSORS**

- A. Temperature Sensors:
  - 1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
  - 2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F (26 degrees C).
  - 3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
  - 4. Temperature Sensing Device: Compatible with project DDC controllers.
  - 5. Performance Characteristics:
    - a. RTD:
      - 1) Room Sensor Accuracy: Plus/minus 0.50 degrees F (0.28 degrees C) minimum.
      - 2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F (0.28 degrees C) minimum.

- 3) Chilled Water Accuracy: Plus/minus 0.50 degrees F (0.28 degrees C) minimum.
- b. Thermistor:
- 1) Accuracy (All): Plus/minus 0.36 degrees F (0.20 degrees C) minimum.
  - 2) Range: Minus 25 degrees F (Minus 13 degrees C) through 122 degrees F (50 degrees C) minimum.
  - 3) Heat Dissipation Constant: 2.7 mW per degree C.
- c. Temperature Transmitter:
- 1) Accuracy: 0.10 degree F (0.06 degrees C) minimum or plus/minus 0.20 percent of span.
  - 2) Output: 4 to 20 mA.
- d. Sensing Range:
- 1) Provide limited range sensors if required to sense the range expected for a respective point.
  - 2) Use RTD type sensors for extended ranges beyond minus 30 degrees F (minus 34.4 degrees) to 230 degrees F (114.4 degrees C).
  - 3) Use temperature transmitters in conjunction with RTD's when RTD's are incompatible with DDC controller direct temperature input.
- e. Wire Resistance:
- 1) Use appropriate wire size to limit temperature offset due to wire resistance to 1.0 degree F (0.56 degrees C) or use temperature transmitter when offset is greater than 1.0 degree F (0.56 degrees C) due to wire resistance.
  - 2) Compensate for wire resistance in software input definition when feature is available in the DDC controller.
- f. Room Sensors in corridors: Locking cover.
- g. Room Temperature Sensors with Integral Digital Display:
- 1) Construct for surface or wall box.
  - 2) Provide a four button keypad with the following capabilities:

- (a) Indication of space and outdoor temperatures.
  - (b) Setpoint adjustment to accommodate room setpoint.
  - (c) Display and control fan operation status.
  - (d) Manual occupancy override and indication of occupancy status.
- h. Insertion Elements:
- 1) Use in ducts not affected by temperature stratification or smaller than 11 sq inches (1 sq m).
  - 2) Provide dry type, insertion elements for liquids, installed in immersion wells, with minimum insertion length of 2.5 inches (60 mm).
- B. Static Pressure (Air Pressure) Sensors:
- 1. Unidirectional with ranges not exceeding 150 percent of maximum expected input.
  - 2. Temperature compensate with typical thermal error or 0.06 percent of full scale in temperature range of 40 to 100 degrees F (5 to 40 degrees C).
  - 3. Accuracy: One percent of full scale with repeatability 0.3 percent.
  - 4. Output: 0 to 5 vdc with power at 12 to 28 vdc.
- C. Damper Position Indicators: Potentiometer mounted in enclosure with adjustable crank arm assembly connected to damper to transmit 0 to 100 percent damper travel.
- D. Carbon Dioxide Sensors, Duct and Wall:
- 1. General: Provide non-dispersive infrared (NDIR), diffusion sampling CO<sub>2</sub> sensors with integral transducers and linear output.
    - a. Communication Protocol: BACnet.
  - 2. Calibration Characteristics:
    - a. Automatically compensating algorithm for sensor drift due to sensor degradation.
    - b. Maximum Drift: 2 percent.
  - 3. Construction:

- a. Provide duct mounted sensors with duct probe designed to protect sensing element from dust accumulation and mechanical damage.
- b. Housing: High impact plastic.

## 2.06 THERMOSTATS

### A. Electric Room Thermostats:

1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
2. Service: Cooling and heating.
3. Covers: Locking with set point adjustment, with thermometer.

### B. Room Thermostat Accessories:

1. Thermostat Covers: Brushed aluminum.
2. Insulating Bases: For thermostats located on exterior walls.

### C. Outdoor Reset Thermostats:

1. Remote bulb or bimetal rod and tube type, proportioning action with adjustable throttling range, adjustable setpoint.
2. Scale range: Minus 10 to 70 degrees F (2 to 35 degrees C).

### D. Airstream Thermostats:

1. Remote bulb or bimetallic rod and tube type, proportional action with adjustable setpoint in middle of range and adjustable throttling range.
2. Averaging service remote bulb element: 7.5 feet (2.3 m).

### E. Electric Low Limit Duct Thermostats:

1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or below setpoint,
2. Bulb length: Minimum 20 feet (6 m).
3. Provide one thermostat for every 20 sq ft (1.86 sq m) of coil surface.

### F. Electric High Limit Duct Thermostats:

1. Snap acting, single pole, single throw, manual reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or above setpoint,
2. Bulb length: Minimum 20 feet (6 m).

## 2.07 TRANSMITTERS

### A. Air Pressure Transmitters:

1. General: Provide dry media differential pressure transducers to monitor duct and room pressure.
  - a. Media Compatibility: Dry air.
  - b. Input Power: Class 2; 12 to 30 VDC; 2-wire: 20 mA max.
  - c. Output: Field selectable, 2-wire, loop-powered 4 to 20 mA (DC only, clipped and capped).
  - d. Accuracy: Plus/minus 1 percent f.s. (full scale) of selected range (combined linearity & hysteresis).

### B. Water Pressure Transmitters (Liquid Differential Pressure Transmitters):

1. General: Provide wet media differential pressure transducers with 6 ft (1.83 m) armored cable, to allow remote pressure sensing capability using existing plumbing runs.
  - a. Input Power: Class 2; 15 to 30 VDC, 24VAC nominal, 50/60 Hz.
  - b. Output: 3-wire transmitter; user-selectable, 4 to 20 mA (0 to 5V/0 to 10V).
  - c. Sensor:
    - 1) Accuracy at 77 degrees F (25 degrees C) for less than or equal 20 ft (6.1 m):

### C. Temperature Transmitters:

1. One pipe, directly proportional output signal to measured variable, linearity within plus or minus 1/2 percent of range for 200 degrees F (93 degrees C) span and plus or minus 1 percent for 50 degrees F (10 degrees C) span, with 50 degrees F (10 degrees C). temperature range, compensated bulb, averaging capillary, or rod and tube operation on 20 psig (138 kPa) input pressure and 3 to 15 psig (20 to 100 kPa) output.

## 2.08 LEVEL INSTRUMENTS

### A. Submersible Level Transmitters (Liquids Other Than Potable Water):

1. Provide for aluminum tanks, chemical storage tanks, oil tanks, wastewater, sludge pits, clarifiers, digesters, lime slurry, sumps, reservoirs, and \_\_\_\_\_.
2. Function: Measurement of the height of liquid above the position in the tank referenced to atmospheric pressure.
3. Material: Piezoresistive sensing element, encased in a 316 stainless steel housing.
4. Large diameter 316 stainless steel diaphragm seal, non-clogging and damage resistant to floating solids.
5. Equip with a minimum 270 lb (122.5 kg) tensile strength, shielded and vented cable.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.
- G. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide separable sockets for liquids and flanges for air bulb elements.
- C. Provide guards on thermostats in public areas and where indicated.
- D. Provide valves with position indicators and with pilot positioners where sequenced with other controls.



- E. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- F. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- G. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
- H. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

### **3.03 MAINTENANCE**

- A. Provide a separate maintenance contract for specified maintenance service.
- B. Provide service and maintenance of control system for one year from Date of Substantial Completion.
- C. Provide complete service of controls systems, including call backs, and submit written report of each service call.
- D. In addition to normal service calls, make minimum of 4 complete normal inspections of approximately two to four hours duration to inspect, calibrate, and adjust controls.

### **END OF SECTION**

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**SECTION 230923**  
**DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. System description.
- B. Operator interface.
- C. Controllers.
- D. Power supplies and line filtering.
- E. System software.
- F. Controller software.
- G. HVAC control programs.
- H. Chiller control programs.

**1.02 RELATED REQUIREMENTS**

- A. Section 230913 - Instrumentation and Control Devices for HVAC.

**1.03 REFERENCE STANDARDS**

- A. ANSI/CEA 709.1.D - Control Network Protocol Specification 2014.
- B. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks 2020, with Errata (2023).
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

**1.05 SUBMITTALS**

- A. Product Data: Provide data for each system component and software module.

B. Shop Drawings:

1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
2. List connected data points, including connected control unit and input device.
3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
4. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
5. Indicate description and sequence of operation of operating, user, and application software.

C. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.

1. Revise shop drawings to reflect actual installation and operating sequences.
2. Include submittals data in final "Record Documents" form.

D. Operation and Maintenance Data:

1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

## 1.06 QUALITY ASSURANCE

- A. Perform work in accordance with NFPA 70.
- B. Designer Qualifications: Perform design of system using manufacturer's software under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

Kingscott Associates, Inc.  
Architects/Engineers  
Kalamazoo, Michigan.

Three Fires Elementary HVAC Controls Replacement  
Howell Public Schools  
Controls Upgrade  
Howell, Michigan

## **1.07 WARRANTY**

- A. Provide five year manufacturer's warranty for field programmable micro-processor based units.

## **1.08 PROTECTION OF SOFTWARE RIGHTS**

- A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:
  - 1. Limiting use of software to equipment provided under these specifications.
  - 2. Limiting copying.
  - 3. Preserving confidentiality.
  - 4. Prohibiting transfer to a third party.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Tridium
- B. American AutoMatrix
- C. \_\_\_\_\_.

### **2.02 DESIGN/INSTALLATION CONTRACTOR**

- A. Bass Controls, Sterling Heights, Michigan, 586-731-0793
- B. Operator Workstation
  - 1. Application Software: Update to newest version.
  - 2. Dynamic Color Graphics: Provide dynamic, 3-D graphic for all equipment and systems with replaced controls.

### **2.03 SYSTEM DESCRIPTION**

- A. Complete packaged DDC system based on BACnet International protocol for all new equipment provided. All new equipment shall connect to the existing Building Automation System at the respective facility.
- B. Automatic temperature control field monitoring and control system using field programmable micro-processor based units.

- C. Base system on distributed system of fully intelligent, stand-alone controllers, operating in a multi-tasking, multi-user environment on token passing network, with central and remote hardware, software, and interconnecting wire and conduit.
- D. Include computer software and hardware, operator input/output devices, control units, local area networks (LAN), sensors, control devices, actuators.
- E. Controls for variable air volume terminals, radiation, reheat coils, unit heaters, fan coils, and the like when directly connected to the control units. Individual terminal unit control is specified in Section 230913.
- F. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.
- G. Include installation and calibration, supervision, adjustments, and fine tuning necessary for complete and fully operational system.

## **2.04 OPERATOR INTERFACE**

- A. BACnet protocol to comply with ASHRAE Std 135.

## **2.05 CONTROLLERS**

### **A. BUILDING CONTROLLERS**

#### **1. General:**

- a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
- b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
- c. Share data between networked controllers.
- d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
- e. Utilize real-time clock for scheduling.
- f. Continuously check processor status and memory circuits for abnormal operation.

- g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
      - h. Communication with other network devices to be based on assigned protocol.
- 2. Communication:
  - a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
  - b. Perform routing when connected to a network of custom application and application specific controllers.
  - c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
- 3. Anticipated Environmental Ambient Conditions:
  - a. Outdoors and/or in Wet Ambient Conditions:
    - 1) Mount within waterproof enclosures.
    - 2) Rated for operation at 40 to 150 degrees F (4 to 65 degrees C).
  - b. Conditioned Space:
    - 1) Mount within dustproof enclosures.
    - 2) Rated for operation at 32 to 120 degrees F (0 to 50 degrees C).
- 4. Provisions for Serviceability:
  - a. Diagnostic LEDs for power, communication, and processor.
  - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
- 5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
- 6. Power and Noise Immunity:
  - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
  - b. Perform orderly shutdown below 80 percent of nominal voltage.

- c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet (1 m).

## B. CUSTOM APPLICATION CONTROLLERS

### 1. General:

- a. Provide sufficient memory to support controller's operating system, database, and programming requirements.
- b. Share data between networked, microprocessor based controllers.
- c. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
- d. Utilize real-time clock for scheduling.
- e. Continuously check processor status and memory circuits for abnormal operation.
- f. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
- g. Communication with other network devices to be based on assigned protocol.

### 2. Communication:

- a. Controller to reside on a BACnet network using Internet Protocol (BACnet IP).
- b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.

### 3. Anticipated Environmental Ambient Conditions:

- a. Outdoors and/or in Wet Ambient Conditions:
  - 1) Mount within waterproof enclosures.
  - 2) Rated for operation at 40 to 150 degrees F (4 to 65 degrees C).
- b. Conditioned Space:
  - 1) Mount within dustproof enclosures.
  - 2) Rated for operation at 32 to 120 degrees F (0 to 50 degrees C).

### 4. Provisions for Serviceability:



- a. Diagnostic LED's for power, communication, and processor.
  - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
6. Power and Noise Immunity:
- a. Maintain operation at 90 to 110 percent of nominal voltage rating.
  - b. Perform orderly shutdown below 80 percent of nominal voltage.
  - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet (1 m).

#### C. INPUT/OUTPUT INTERFACE

1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:
  - a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
  - b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:
  - a. Allow monitoring of On/Off signals from remote devices.
  - b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
  - c. Sense dry contact closure with power provided only by the controller.
4. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
  - a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).

- b. Compatible with and field configurable to commonly available sensing devices.
- 6. Binary Outputs:
  - a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
  - b. Outputs provided with three position (On/Off/Auto) override switches.
  - c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
- 7. Analog Outputs:
  - a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
  - b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
  - c. Drift to not exceed 0.4 percent of range per year.
- 8. Tri State Outputs:
  - a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
  - b. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
- 9. System Object Capacity:
  - a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
  - b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

## **2.06 POWER SUPPLIES AND LINE FILTERING**

### **A. Power Supplies:**

- 1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
- 2. Limit connected loads to 80 percent of rated capacity.

3. Match DC power supply to current output and voltage requirements.
4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
7. Operational Ambient Conditions: 32 to 120 degrees F (0 to 50 degrees C).
8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD 810 for shock and vibration.
9. Line voltage units UL recognized and CSA approved.

B. Power Line Filtering:

1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
2. Minimum surge protection attributes:
  - a. Dielectric strength of 1000 volts minimum.
  - b. Response time of 10 nanoseconds or less.
  - c. Transverse mode noise attenuation of 65 dB or greater.
  - d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

## 2.07 SYSTEM SOFTWARE

A. Operating System:

1. Concurrent, multi-tasking capability.
  - a. Common Software Applications Supported: Microsoft Excel.
2. System Graphics:
  - a. Allow up to 10 graphic screens, simultaneously displayed for comparison and monitoring of system status.
  - b. Animation displayed by shifting image files based on object status.
  - c. Provide method for operator with password to perform the following:

- 1) Move between, change size, and change location of graphic displays.
- 2) Modify on-line.
- 3) Add, delete, or change dynamic objects consisting of:
  - (a) Analog and binary values.
  - (b) Dynamic text.
  - (c) Static text.
  - (d) Animation files.
3. Custom Graphics Generation Package:
  - a. HTML graphics to support web browser compatible formats.
  - b. Capture or convert graphics from AutoCAD.
4. Standard HVAC Graphics Library:
  - a. HVAC Equipment:
    - 1) Boilers.
    - 2) Air Handlers.
    - 3) Terminal HVAC Units.
    - 4) Fan Coil Units.
    - 5) Unit Ventilators.
    - 6) Condensers.
  - b. Ancillary Equipment:
    - 1) Fans.
    - 2) Pumps.
    - 3) Coils.
    - 4) Valves.
    - 5) Piping.

6) Dampers.

7) Ductwork.

B. Workstation System Applications:

1. Automatic System Database Save and Restore Functions:
  - a. Current database copy of each Building Controller is automatically stored on hard disk.
  - b. Automatic update occurs upon change in any system panel.
  - c. In the event of database loss in any system panel, the first workstation to detect the loss automatically restores the database for that panel unless disabled by the operator.
2. Manual System Database Save and Restore Functions by Operator with Password Clearance:
  - a. Save database from any system panel.
  - b. Clear a panel database.
  - c. Initiate a download of a specified database to any system panel.
3. Software provided allows system configuration and future changes or additions by operators under proper password protection.
4. On-line Help:
  - a. Context-sensitive system assists operator in operation and editing.
  - b. Available for all applications.
  - c. Relevant screen data provided for particular screen display.
  - d. Additional help available via hypertext.
5. Security:
  - a. Operator log-on requires user name and password to view, edit, add, or delete data.
  - b. System security selectable for each operator.
  - c. System supervisor sets passwords and security levels for all other operators.
  - d. Operator passwords to restrict functions accessible to viewing and/or changing system applications, editor, and object.

- e. Automatic, operator log-off results from keyboard or mouse inactivity during user-adjustable, time period.
  - f. All system security data stored in encrypted format.
6. System Diagnostics:
- a. Operations Automatically Monitored:
    - 1) Workstations.
    - 2) Printers.
    - 3) Modems.
    - 4) Network connections.
    - 5) Building management panels.
    - 6) Controllers.
  - b. Device failure is annunciated to the operator.
7. Alarm Processing:
- a. All system objects are configurable to "alarm in" and "alarm out" of normal state.
  - b. Configurable Objects:
    - 1) Alarm limits.
    - 2) Alarm limit differentials.
    - 3) States.
    - 4) Reactions for each object.
8. Alarm Messages:
- a. Descriptor: English language.
  - b. Recognizable Features:
    - 1) Source.
    - 2) Location.

- 3) Nature.
9. Configurable Alarm Reactions by Workstation and Time of Day:
    - a. Logging.
    - b. Printing.
    - c. Starting programs.
    - d. Displaying messages.
    - e. Dialing out to remote locations.
    - f. Paging.
    - g. Providing audible annunciation.
    - h. Displaying specific system graphics.
  10. Custom Trend Logs:
    - a. Definable for any data object in the system including interval, start time, and stop time.
    - b. Trend Data:
      - 1) Sampled and stored on the building controller panel.
      - 2) Archivable on hard disk.
      - 3) Retrievable for use in reports, spreadsheets and standard database programs.
      - 4) Archival on LAN accessible storage media including hard disk, tape, Raid array drive, and virtual cloud environment.
      - 5) Protected and encrypted format to prevent manipulation, or editing of historical data and event logs.
  11. Alarm and Event Log:
    - a. View all system alarms and change of states from any system location.
    - b. Events listed chronologically.
    - c. Operator with proper security acknowledges and clears alarms.
    - d. Alarms not cleared by operator are archived to the workstation hard disk.

12. Object, Property Status and Control:

- a. Provide a method to view, edit if applicable, the status of any object and property in the system.
- b. Status Available by the Following Methods:
  - 1) Menu.
  - 2) Graphics.
  - 3) Custom Programs.

13. Reports and Logs:

- a. Reporting Package:
  - 1) Allows operator to select, modify, or create reports.
  - 2) Definable as to data content, format, interval, and date.
  - 3) Archivable to hard disk.
- b. Real-time logs available by type or status such as alarm, lockout, normal, etc.
- c. Stored on hard disk and readily accessible by standard software applications, including spreadsheets and word processing.
- d. Set to be printed on operator command or specific time(s).

14. Reports:

- a. Standard:
  - 1) Objects with current values.
  - 2) Current alarms not locked out.
  - 3) Disabled and overridden objects, points and SNVTs.
  - 4) Objects in manual or automatic alarm lockout.
  - 5) Objects in alarm lockout currently in alarm.
  - 6) Logs:
    - (a) Alarm History.



- (b) System messages.
  - (c) System events.
  - (d) Trends.
- b. Custom:
- 1) Daily.
  - 2) Weekly.
  - 3) Monthly.
  - 4) Annual.
  - 5) Time and date stamped.
  - 6) Title.
  - 7) Facility name.
- c. Tenant Override:
- 1) Monthly report showing total, requested, after-hours HVAC and lighting services on a daily basis for each tenant.
  - 2) Annual report showing override usage on a monthly basis.
- d. Electrical, Fuel, and Weather:
- 1) Electrical Meter(s):
    - (a) Monthly showing daily electrical consumption and peak electrical demand with time and date stamp for each meter.
    - (b) Annual summary showing monthly electrical consumption and peak demand with time and date stamp for each meter.
  - 2) Fuel Meter(s):
    - (a) Monthly showing daily natural gas consumption for each meter.
    - (b) Annual summary showing monthly consumption for each meter.
  - 3) Weather:

- (a) Monthly showing minimum, maximum, average outdoor air temperature and heating/cooling degree-days for the month.
- e. Daily Operating Condition of Chiller(s) Based on ASHRAE Std 147:
  - 1) Chilled water inlet and outlet temperature.
  - 2) Chilled water flow.
  - 3) Chilled water inlet and outlet pressure.
  - 4) Evaporator refrigerant pressure and temperature.
  - 5) Condenser refrigerant pressure and temperature.
  - 6) Condenser refrigerant pressure and liquid temperature.
  - 7) Refrigerant levels.
  - 8) Oil pressure and temperature.
  - 9) Oil level.
  - 10) Compressor refrigerant discharge temperature.
  - 11) Refrigerant suction temperature.
  - 12) Addition of refrigerant.
  - 13) Addition of oil.
  - 14) Motor amperes per phase.
  - 15) Motor volts per phase.
  - 16) Ambient temperature (dry-bulb and wet-bulb).
  - 17) Date and time logged.

C. Workstation Applications Editors:

- 1. Provide editing software for each system application at PC workstation.
- 2. Downloaded application is executed at controller panel.
- 3. Full screen editor for each application allows operator to view and change:

- a. Configuration.
  - b. Name.
  - c. Control parameters.
  - d. Set-points.
4. Scheduling:
- a. Monthly calendar indicates schedules, holidays, and exceptions.
  - b. Allows several related objects to be scheduled and copied to other objects or dates.
  - c. Start and stop times adjustable from master schedule.
5. Custom Application Programming:
- a. Create, modify, debug, edit, compile, and download custom application programming during operation and without disruption of all other system applications.
  - b. Programming Features:
    - 1) English oriented language, based on BASIC, FORTRAN, C, or PASCAL syntax allowing for free form programming.
    - 2) Alternative language graphically based using appropriate function blocks suitable for all required functions and amenable to customizing or compounding.
    - 3) Insert, add, modify, and delete custom programming code that incorporates word processing features such as cut/paste and find/replace.
    - 4) Allows the development of independently, executing, program modules designed to enable and disable other modules.
    - 5) Debugging/simulation capability that displays intermediate values and/or results including syntax/execution error messages.
    - 6) Support for conditional statements (IF/THEN/ELSE/ELSE-F) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.
    - 7) Support for floating-point arithmetic utilizing plus, minus, divide, times, square root operators; including absolute value; minimum/maximum value from a list of values for mathematical functions.

- 8) Language consisting of resettable, predefined, variables representing time of day, day of the week, month of the year, date; and elapsed time in seconds, minutes, hours, and days where the variable values can be used in IF/THEN comparisons, calculations, programming statement logic, etc.
- 9) Language having predefined variables representing status and results of the system software enables, disables, and changes the set points of the controller software.

## 2.08 HVAC CONTROL PROGRAMS

### A. General:

1. Support Inch-pounds and SI (metric) units of measurement.

### B. Optimal Run Time:

1. Control start-up and shutdown times of HVAC equipment for both heating and cooling.
2. Base on occupancy schedules, outside air temperature, seasonal requirements, and interior room mass temperature.
3. Start-up systems by using outside air temperature, room mass temperatures, and adaptive model prediction for how long building takes to warm up or cool down under different conditions.
4. Use outside air temperature to determine early shut down with ventilation override.
5. Analyze multiple building mass sensors to determine seasonal mode and worse case condition for each day.

### C. Supply Air Reset:

1. Monitor heating and cooling loads in building spaces, terminal reheat systems, both hot deck and cold deck temperatures on dual duct and multizone systems, single zone unit discharge temperatures.
2. Adjust discharge temperatures to most energy efficient levels satisfying measured load by:
  - a. Raising cooling temperatures to highest possible value.
  - b. Reducing heating temperatures to lowest possible level.

### D. Enthalpy Switchover:

1. Calculate outside and return air enthalpy using measured temperature and relative humidity; determine energy expended and control outside and return air dampers.

## **2.09 CHILLER CONTROL PROGRAMS**

- A. Condenser Water Reset: Automatically reset controlled condenser water temperature using measured outside wet bulb temperature and load being handled.
- B. Chilled Water Reset: Automatically reset controlled chilled water temperature satisfying cooling coil requiring greatest cooling.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.

### **3.02 INSTALLATION**

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 230993.
- C. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

### **3.03 MANUFACTURER'S FIELD SERVICES**

- A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.
- B. Provide basic operator training for several owner-designated persons on data display, alarm and status descriptors, requesting data, execution of commands and request of logs. Include a minimum of 16 hours dedicated instructor time. Provide training on-site by a manufacturer authorized representative. .

### **3.04 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstrate complete and operating system to Owner.

### **3.05 MAINTENANCE**

- A. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.
- B. Provide two complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.

Kingscott Associates, Inc.  
Architects/Engineers  
Kalamazoo, Michigan.

Three Fires Elementary HVAC Controls Replacement  
Howell Public Schools  
Controls Upgrade  
Howell, Michigan

- C. Provide complete service of systems, including call backs. Make minimum of four complete normal inspections of approximately two to four hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

**END OF SECTION**

**SECTION 264300**  
**SURGE PROTECTIVE DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surge protective devices for service entrance locations.

**1.02 RELATED REQUIREMENTS**

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 262416 - Panelboards.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- C. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.
- D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Include information on status indicators and recommended maintenance procedures and intervals.

- F. Project Record Documents: Record actual connections and locations of surge protective devices.

## **1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

## **1.06 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

## **1.07 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Manufacturer's Warranty: Provide minimum five year warranty covering repair or replacement of surge protective devices showing evidence of failure due to defective materials or workmanship.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Factory-installed, Internally Mounted Surge Protective Devices:
  - 1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.
- B. Source Limitations: Furnish surge protective devices produced by a single manufacturer and obtained from a single supplier.

### **2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS**

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
  - 1. Wye Systems: L-N, L-G, N-G, L-L.
  - 2. Delta Systems: L-G, L-L.
  - 3. Single Split Phase Systems: L-N, L-G, N-G, L-L.



4. High Leg Delta Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
  1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.
- F. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
  1. Indoor clean, dry locations: Type 1.
  2. Outdoor locations: Type 3R.
- G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
  1. Panelboards: See Section 262416.

## **2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS**

- A. Unless otherwise indicated, provide factory-installed, internally mounted SPDs.
- B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.
- D. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
- E. UL 1449 Nominal Discharge Current (I-n): 20 kA.
- F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
- G. Diagnostics:
  1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
  2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.
  3. Surge Counter: Provide surge event counter with manual reset button, surge count retention upon power loss, and six digit LCD display that indicates quantity of surge events.

- H. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the service voltage and configuration marked on the SPD are consistent with the service voltage and configuration at the location to be installed.
- C. Verify system grounding and bonding is in accordance with Section 260526, including bonding of neutral and ground for service entrance and separately derived systems where applicable. Do not energize SPD until deficiencies have been corrected.
- D. Verify that conditions are satisfactory for installation prior to starting work.

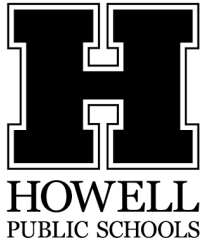
#### **3.02 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Unless indicated otherwise, connect service entrance surge protective device on load side of service disconnect main overcurrent device.
- D. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.
- E. Disconnect SPD prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPD connected.

#### **3.03 CLEANING**

- A. Repair scratched or marred exterior surfaces to match original factory finish.

### **END OF SECTION**



**PROPOSAL FORM**

We have examined your specifications, fully understood and accepted all their terms and conditions and submit the following prices and information:

**Pricing:**

Item	Base Bid
HVAC Controls Replacement	

I hereby confirm that the requested specifications will be fully met with the following exceptions, if any:

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**Bidder:**

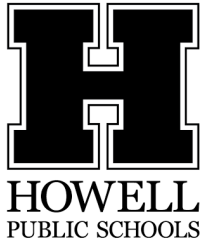
Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_



**FAMILIAL RELATIONSHIP DISCLOSURE STATEMENT**

*Important: This disclosure statement must be included with your bid - required by state law (P.A. 232 of 2004)*

As required by Public Act 232 of 2004, all bids shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the bidder and any member of the School Board or the Superintendent of Howell Public Schools.

The undersigned, the owner or authorized officer of \_\_\_\_\_ (the Bidder), pursuant to the familial disclosure requirement provided in the attached invitation to bid, hereby represent and warrant, except as provided below, that no familial relationships exist between the owner(s) or any employee of the company and any member of the School Board or the Superintendent of Howell Public Schools. If such a relationship exists, please explain:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Bidder:**

By: \_\_\_\_\_

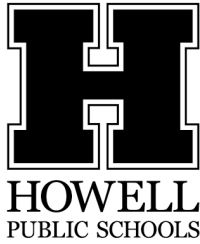
Title: \_\_\_\_\_

Date: \_\_\_\_\_

STATE OF MICHIGAN        )  
  )ss.  
COUNTY OF \_\_\_\_\_)

This instrument was acknowledged before me on the \_\_\_\_ day of \_\_\_\_\_, 2024, by \_\_\_\_\_.

\_\_\_\_\_, Notary Public  
\_\_\_\_\_, County, Michigan  
My Commission Expires: \_\_\_\_\_  
Acting in the County of: \_\_\_\_\_



**AFFIDAVIT OF COMPLIANCE – IRAN ECONOMIC SANCTIONS ACT**

Michigan Public Act No. 517 of 2012

The undersigned, the owner or authorized officer of \_\_\_\_\_ (the "Bidder"), pursuant to the compliance certification requirement provided in the Howell Public Schools request for proposal for **HVAC Control Replacements**, hereby certifies, represents and warrants that the Bidder (including its officers, directors and employees) is not an "Iran Linked Business" within the meaning of the Iran Economic Sanctions Act, Michigan Public Act No. 517 of 2012 (the "Act"), and that in the event Bidder is awarded a Contract as a result of the aforementioned Invitation To Bid, the Bidder will not become an "Iran Linked Business" at any time during the course of performing under the Contract.

The Bidder further acknowledges that any person who is found to have submitted a false certification is responsible for a civil penalty of not more than \$250,000.00 or 2 times the amount of the Contract or proposed Contract for which the false certification was made, whichever is greater, the cost of the School District's investigation, and reasonable attorney fees, in addition to the fine. Moreover, any person who submitted a false certification shall be ineligible to bid on an Invitation To Bid for three (3) years from the date it is determined that the person has submitted the false certification.

**Bidder:**

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

STATE OF MICHIGAN        )  
  )ss.  
COUNTY OF \_\_\_\_\_)

This instrument was acknowledged before me on the \_\_\_\_ day of \_\_\_\_\_, 2024, by  
\_\_\_\_\_.

\_\_\_\_\_, Notary Public  
\_\_\_\_\_ County, Michigan  
My Commission Expires: \_\_\_\_\_  
Acting in the County of: \_\_\_\_\_