



Troy Schools District

BP#3C 2024 Smith Middle School – Early Electrical Equipment Package – Addendum #1 November 22, 2023

Content Included in this Addendum:

Cover Page (1 Page)
Barton Malow Write Up (1 Page)
TMP Architecture, Inc. Addendum #1 (13 Pages)

TOTAL PAGES: 15 Pages



November 22, 2023

Troy School District
BP #3C – Smith Middle School – Early Electrical Equipment Package

Addendum #1 Bidder Clarifications

A. General Clarifications

- Bid due date extended to November 29th, 2023, at 2:00PM.

B. Clarifications and Additions to Work Scopes

- Electrical scope of work added 26 1200 Medium Voltage Transformers into work scopes.

C. RFI Responses

Q: Please provide a spec for the transformer.

A: Spec will be included in this addendum.



Addendum

Date November 22, 2023
Project Name Smith Middle School Pre-Purchase Package
TMP Project No(s). 22102
Bid Package No. 03C
Addendum No. One (1)

The Bidding Documents are modified, supplemented, or augmented as follows and the Addendum is hereby made a part of the proposed Contract Documents.

The following Drawing(s) and Attachment(s) are issued with this Addendum:

Attachment(s): 00 0110, 26 1200

Item No.	Specification Changes
SC-1	Refer to Section No. 00 0110 – TABLE OF CONTENTS (reissued): A. Revise electrical sections as indicated.
SC-2	Refer to Section No. 26 1200 – MEDIUM VOLTAGE TRANSFORMERS (new): A. Added specification section, complete.

END OF ADDENDUM NO. 1 - BID PACKAGE NO. 03C

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00 8200	Availability of Electronic Files	PP
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SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 - GENERAL REQUIREMENTS

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01 3000	Administrative Requirements	PP
01 3000.01	TMP Submittal and Sample Transmittal Form	PP
01 4000	Quality Requirements	PP
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FACILITY CONSTRUCTION SUBGROUP

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Not Used

DIVISION 03 - CONCRETE

Not Used

DIVISION 04 - MASONRY

Not Used

DIVISION 05 - METALS

Not Used

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

Not Used

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

Not Used

DIVISION 08 - OPENINGS

Not Used

DIVISION 09 - FINISHES

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DIVISION 10 - SPECIALTIES

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DIVISION 11 - EQUIPMENT

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DIVISION 21 – FIRE SUPPRESSION

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DIVISION 22 - PLUMBING

Not Used

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING (HVAC)

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DIVISION 25 – INTEGRATED AUTOMATION

Not Used

DIVISION 26 – ELECTRICAL

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26 1200	Medium Voltage Transformers	ADD1
26 1329	Medium Voltage Switchgear (Deleted)	PP, ADD1
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Not Used

END OF SECTION

SECTION 26 1200 - MEDIUM VOLTAGE TRANSFORMERSADD1****

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PART 1 GENERAL

1.01 PRE-PURCHASE

- A. Specification includes product, installation, and field quality control testing requirements. Installation requirements included for reference only.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.03 SUMMARY

- A. This Section includes the pre-purchase of the following types of transformers with medium-voltage primaries:
 - 1. Pad-mounted, liquid-filled transformers.

1.04 DEFINITIONS

- A. NETA ATS: Acceptance Testing Specification.

1.05 SUBMITTALS

- A. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, utility or manufacturer's anchorage and base recommendations, installed devices and features, location of each field connection, and performance for each type and size of transformer indicated.
- B. Manufacturer Seismic Qualification Certification: Submit certification that transformer assembly and components will withstand seismic forces defined in Division 26 Section "Electrical Supports and Seismic Restraints." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Source quality-control test reports.
- D. Follow-up service reports.
- E. Operation and Maintenance Data: For transformer and accessories to include in emergency, operation, and maintenance manuals.
- 1.06 **QUALITY ASSURANCE**
- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of transformers and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - C. Comply with IEEE C2.
 - D. Comply with ANSI C57.12.10, ANSI C57.12.28, IEEE C57.12.70, and IEEE C57.12.80.
 - E. Comply with NFPA 70.
- 1.07 **DELIVERY, STORAGE, AND HANDLING**
- A. Store transformers protected from weather and so condensation will not form on or in units. Provide temporary heating according to manufacturer's written instructions.
- 1.08 **PROJECT CONDITIONS**
- A. Service Conditions: IEEE C37.121, usual service conditions except for the following:
 1. Altitudes above 3300 feet.
 2. Exposure to explosive environments.
 3. Exposure to seismic shock or to abnormal vibration, shock, or tilting.
 4. Exposure to excessively high or low temperatures.
- 1.09 **COORDINATION**
- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork shall meet load requirements. Requirements for concrete bases for electrical equipment are specified in Division 26 "Hangers and Supports for Electrical Systems."
 - B. Coordinate installation of louvers, doors, spill retention areas, and sumps. Coordinate installation so no piping or conduits are installed in space allocated for medium-voltage transformers except those directly associated with transformers.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. [Cooper Industries; Cooper Power Systems Division.](#)
 2. [Square D; Schneider Electric.](#)

2.02 PAD-MOUNTED, LIQUID-FILLED TRANSFORMERS

- A. Description: ANSI/IEEE C57.12.00, pad-mounted, 2-winding transformers. Stainless-steel tank base.
- B. Insulating Liquid: Less flammable, edible-seed-oil based, and UL listed 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.
- C. Insulation Temperature Rise: 65 deg C when operated at rated kVA output in a 40 deg C ambient temperature. Transformer shall be rated to operate at rated kilovolt ampere in an average ambient temperature of 30 deg C over 24 hours with a maximum ambient temperature of 40 deg C without loss of service life expectancy.
- D. KVA and Voltage Ratings: As indicated on drawings.
- E. Basic Impulse Level: Comply with U.L. 1062.
- F. Cooling System: Class KNAN, self cooled.
- G. Full-Capacity Voltage Taps: Four 2.5 percent taps, 2 above and 2 below rated high voltage; with externally operable tap changer for de-energized use and with position indicator and padlock hasp.
- H. High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts, complying with IEEE 386 and including the following:
1. Bushing-Well Inserts: One for each high-voltage bushing well.
 2. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.
- I. Transformer cabinet construction and paint finish shall conform to ANSI C57.12.28. and ANSI Standard Draft 6 dated October 18, 1989, color shall be outdoor green.
- J. The transformer enclosure shall have no exposed screws, bolts, or other fastening devices which are externally removable. There shall be no openings through which foreign objects such as sticks, rods, or wires might contact live parts. There shall be means for padlocking the compartment doors with a single padlock having a maximum 1/2" diameter shackle (provide padlock and 2 sets of keys). In addition to each door handle, a recessed pentahead bolt shall be provided. The high voltage compartment door shall have a fastening device which is accessible only through the low voltage compartment. The enclosure shall comply with utility standards of withstanding pull test of 150 pounds, prying of 75 foot pounds and axial force of 50 pounds. The tank shall be welded/sealed type construction, tamper resistant.
- K. Sound level may not exceed sound levels listed in NEMA TR 1.
- L. Impedance: 5.75 percent.
- M. Accessories:
1. Drain Valve: 1 inch, with sampling device.
 2. Dial-type thermometer.

3. Liquid-level gage.
4. Pressure-vacuum gage.
5. Pressure Relief Device: Self-sealing with an indicator.

2.03 IDENTIFICATION DEVICES

- A. Provide porcelain enamel "DANGER HIGH VOLTAGE" warning signs on the outside and inside of each door.
- B. Provide porcelain enamel identification nameplates on the outside of each door, indicating the distribution transformer name.
- C. Warning Signs/Nameplates: mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Electrical Identification."

2.04 SOURCE QUALITY CONTROL

- A. Factory Tests: Perform design and routine tests according to standards specified for components. Conduct transformer tests according to IEEE C57.12.90.
- B. Factory Tests: Perform the following factory-certified tests on each transformer:
 1. Resistance measurements of all windings on rated-voltage connection and on tap extreme connections.
 2. Ratios on rated-voltage connection and on tap extreme connections.
 3. Polarity and phase relation on rated-voltage connection.
 4. No-load loss at rated voltage on rated-voltage connection.
 5. Excitation current at rated voltage on rated-voltage connection.
 6. Impedance and load loss at rated current on rated-voltage connection and on tap extreme connections.
 7. Applied potential.
 8. Induced potential.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for medium-voltage transformers.
- B. Examine roughing-in of conduits and grounding systems to verify the following:
 1. Wiring entries comply with layout requirements.
 2. Entries are within conduit-entry tolerances specified by manufacturer and no feeders will have to cross section barriers to reach load or line lugs.
- C. Examine walls, floors, and concrete bases for suitable mounting conditions where transformers will be installed.
- D. Verify that ground connections are in place and that requirements in Division 26 Section "Grounding and Bonding" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install transformers and anchor to concrete bases according to utility or manufacturer's written instructions, seismic codes at Project, and requirements in Division 26 Section "Hangers and Supports for Electrical Systems."
- B. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

3.03 IDENTIFICATION

- A. Identify field-installed wiring and components.

3.04 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding."
- B. Connect wiring according to Division 26 Section "Conductors and Cables."

3.05 FIELD QUALITY CONTROL

- A. Testing: Perform the following field quality control tests in accordance with Division 26 section "Electrical Testing"
- B. Visual and Mechanical Inspection
 - 1. Compare equipment nameplate information with single line diagram.
 - 2. Inspect for physical damage, cracked insulators, leaks, tightness of connections, and general mechanical and electrical conditions.
 - 3. Verify proper auxiliary device operation.
 - 4. Verify proper liquid level in all tanks and bushings.
 - 5. Perform specific inspections and mechanical tests as recommended by manufacturer.
 - 6. Verify proper equipment grounding.
 - 7. Verify removal of any shipping bracing after final placement.
- C. Electrical Tests
 - 1. Perform insulation resistance tests, winding-to-winding and windings-to-ground, utilizing a meg-ohmmeter with test voltage output as shown in accordance with N.E.T.A. Acceptance Testing Specifications, Table 10.5. Test duration shall be for 10 minutes with resistance values tabulated at 30 seconds, 1 minute, and 10 minutes. Calculate Polarization index.
 - 2. Perform a turns ratio test between windings at all tap positions. The final tap setting is to be set at the secondary system rated voltage at full load or as directed by the Architect/Engineer.
 - 3. Insulating liquid shall be sampled in accordance with ASTM D-923. Sample shall be laboratory tested for:
 - a. Dielectric breakdown voltage: ASTM D-877 or ASTM D-1816
 - b. Acid neutralization number: ASTM D-974
 - c. Interfacial tension: ASTM D-971 or ASTM D-2285
 - d. Color: ASTM D-1500
 - e. Visual Condition: ASTM D-1524
 - f. Perform dissolved gas analysis (DGA) in accordance with ANSI/IEEE C57.104 or ASTM D-3612 for transformers 500 kVA and larger.

- g. PPM water: ASTM D-1533.
 4. Perform insulation power factor tests or dissipation factor tests on all windings and bushings. Overall dielectric-loss and power factor (C_H , C_L , C_{HL}) shall be determined. Test voltages should be limited to the line to ground voltage rating of the transformer winding.
 5. Perform tests and adjustments on tap-changer, fan and pump controls, and alarm function.
 6. Verify proper core grounding if accessible.
 7. Perform percent oxygen test on the nitrogen gas blanket for 3000 kVA or larger.
- D. Test Values
1. Perform insulation resistance tests in accordance with N.E.T.A. Acceptance Testing Specifications, Table 10.5. Results to be temperature corrected in accordance with Table 10.14.
 2. The polarization index should be used for future reference.
 3. Turns ratio test results shall not deviate more than one half percent (0.5%) from either the adjacent coils or the calculated ratio.
 4. Maximum power factor of liquid filled transformers corrected to 20°C shall be in accordance with N.E.T.A. Acceptance Testing Specifications, Table 10.3.
 5. Bushing power factors and capacitances that vary from nameplate values by more than ten percent (10%) should be investigated.
 6. Dielectric fluid should comply with N.E.T.A. Acceptance Testing Specifications, Table 10.4.
- E. Remove and replace malfunctioning units and retest as specified above.
- F. Test Reports: Prepare written reports to record the following:
1. Test procedures used.
 2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective actions taken to achieve compliance with requirements.

3.06 FOLLOW-UP SERVICE

- A. Voltage Monitoring and Adjusting: Perform the following voltage monitoring after Substantial Completion but not more than six months after Final Acceptance:
1. During a period of normal load cycles as evaluated by Owner, perform seven days of three-phase voltage recording at secondary terminals of each transformer. Use voltmeters with calibration traceable to National Institute of Science and Technology standards and with a chart speed of not less than 1 inch per hour. Voltage unbalance greater than 1 percent between phases, or deviation of any phase voltage from nominal value by more than plus or minus 5 percent during test period, is unacceptable.
 2. Corrective Actions: If test results are unacceptable, perform the following corrective actions, as appropriate:
 - a. Adjust transformer taps.
 - b. Prepare written request for voltage adjustment by electric utility.

3. Retests: After corrective actions have been performed, repeat monitoring until satisfactory results are obtained.
4. Report: Prepare written report covering monitoring and corrective actions performed.

END OF SECTION

