NOTICE TO BIDDERS
ADDENDUM #1
BOROUGH OF MADISON, MORRIS COUNTY, NEW JERSEY
PURCHASE OF PREVENTIVE MAINTENANCE, TESTING AND INSPECTION SERVICES FOR JAMES PARK AND KINGS ROAD ELECTRICAL SUBSTATION DISTRIBUTION EQUIPMENT 2015-2017
ITB-LS-14-1202-1000
BID OPENING DATE – TUESDAY, DECEMBER 2, 2014, 10:00 AM

NOTICE IS HEREBY GIVEN that sealed bids for PURCHASE OF PREVENTIVE MAINTENANCE, TESTING AND INSPECTION SERVICES FOR JAMES PARK AND KINGS ROAD ELECTRICAL SUBSTATION DISTRIBUTION EQUIPMENT 2015-2017 for the Borough of Madison, County of Morris, State of New Jersey will include an acknowledgement of ADDENDUM #1. The ACKNOWLEDGEMENT OF RECEIPT OF CHANGES TO BID DOCUMENTS form included in the bid specifications on page 34 must be completed.

(1) Addendum #1 consists of the replacement of bid document pages 42 through 51 – Maintenance Testing and Inspection section. The information contained in the bid document has not changed however the format in which the information is presented is revised to clarify the specifications.

(2) Question: Does the contractor need to be NETA certified or can the work be subcontracted out?
   Answer: The contractor needs to be NETA certified, the work cannot be subcontracted out.

The Addendum shall become part of the original specifications and is to be attached thereto.

Addendum will be available at the Borough Clerk’s office, 50 Kings Road, Madison, NJ from 8:00 AM to 4:30 PM, Monday through Friday and online at www.MorrisCountyBidSystem.com for no charge. All vendors who obtained the bid specifications either at the Borough Clerk’s office or online at www.MorrisCountyBidSystem.com have been provided the Addendum.

Raymond M. Codey
Borough Administrator
MAINTENANCE TESTING AND INSPECTION

PART 1  GENERAL

1.01  SUMMARY

A. This Section specifies the maintenance testing and inspection procedures required for the medium voltage equipment shown on the Contract Drawings.

1.02  REFERENCES

The following is a listing of the publications referenced in this Section the latest edition of each shall be utilized for the work:

National Electrical Manufacturers Association (NEMA)
National Electrical Testing Association (NETA)
American National Standards Institute (ANSI)
American Society of Testing and Materials (ASTM)

ASTM D 924 - Standard Test Method for Dissipation Factor (or Power Factor) and Relative Permittivity (Dielectric Constant) of Electrical Insulating Liquids
ASTM D 974 - Standard Test Method for Acid and Base Number by Color-Indicator Titration.
ASTM D 1298 - Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
ASTM D 1533 - Standard Test Method for Water in Insulating Liquids by Coulometric Karl Fischer Titration
ASTM D 1816 - Standard Test Method for Dielectric Breakdown Voltage
1.03 QUALITY ASSURANCE

A. The Testing Company shall secure the services of qualified personnel to perform inspection and testing. The required qualifications include, but are not limited to a minimum of Ten (10) years' experience in testing Utility Type Substations. Experience with industrial or commercial type substations will not be acceptable.

B. Submit resumes of personnel assigned to perform the contract tasks. The Borough reserves the right to reject personnel that the Borough deems their experience does not represent competence in testing 34.5KV and 15KV type apparatus. Only testing personnel authorized by the Borough may perform the contract tasks. On site lead technician shall be OSHA 30 certified.

C. The Vendor shall be available for (24) twenty-four hour assistance to the Borough. Upon receiving a telephone request from the Borough, the Vendor shall respond within (30) thirty minutes with personnel and test equipment to the Borough’s designated substation site to render diagnostic assistance and repair apparatus as requested by the Borough.

D. All equipment used in testing Borough apparatus shall be the current industry standard and shall be of the highest integrity. All equipment utilized in handling mineral oil (transformers, OCB’s, etc.) shall be of the highest integrity and tested for leaks prior to handling the liquid.

E. In case of accidental spillage, notify the Borough immediately. All costs involved in cleanup shall be the responsibility of the vendor.
1.04 SUBMITTALS

A. All test results and values shall be recorded on forms approved by the Borough (refer to NETA standard forms).

B. All report forms shall identify apparatus by model number and the Borough’s identification number. **All reports shall bear the supervisor’s signature and tester’s name.**

PART 2 PRODUCTS

2.01 TESTING FIRMS

A. Provide a testing firm with NETA Certification and a minimum of 10 years testing experience for utility type substations. Industrial or commercial testing experience is not acceptable.

B. In order to minimize equipment ‘down time’ and customer service disruption, all entities performing work shall comply with the requirements listed in this specification. The Vendor shall provide **24 hour manned ‘Hotline’ capability** and **30 minute response time** with equipment and personnel upon receiving a Borough request for assistance.

C. Doble Engineering Company Laboratory shall perform insulating liquid testing for all liquid filled equipment listed Section 3.02.

PART 3 EXECUTION (TESTS)

3.01 GENERAL

A. The tests outlined in 3.02 shall be performed on medium voltage equipment as shown on the Contract Drawings and as approved or directed by the Borough.

B. All test values shall be as specified by manufacturer and NETA.

C. All switching and grounding of buss and transformer shall be performed by Borough Personnel. The Vendor shall ascertain for himself that equipment to be tested is de-energized and grounded prior to commencing tests, final responsibility (personal grounds) for safety to all personnel shall rest with the Vendor.

D. Borough Personnel shall remove & replace covers on all apparatus (buss duct, switchgear and fixed circuit breakers), except tap changer compartments. **Vendor will open & close all tap-changer compartments.** Check insulation and Glastic support brackets for evidence of tracking. Report all defects to Borough for corrective action.
3.02 ELECTRICAL TESTS

A. General

1. Prior to the testing of any medium voltage equipment, all tests outlined in 3.01 A to D above, and those outlined below in accordance with NETA MTS, shall be performed by the Vendor and approved by the Borough.

2. No voltage other than megger output shall be applied to control voltage transformers during the performance of any tests, so that no high voltage can be induced on the primary of these transformers or into the high voltage system.

3. Record all test values, settings, and calibrations of each individual test and a description of the test procedures. The Vendor shall record all test data for each test required in this Section on approved test forms.

4. Inspect installation locations and report any unfavorable environmental conditions that must be corrected.

5. Check equipment for level and security to foundations.

6. **Check all apparatus grounding provisions and record the number and size of ground bus and straps for all apparatus.**

7. Borough personnel will switch circuits prior to Vendor performing tests.

8. General inspect exterior and interior of apparatus.

9. Clean magnets and all relay mechanisms.

10. Clean and tighten all contacts, jewels, bearings, gears, armatures and switch plungers.

11. Record all “As Found” settings and results from tests. Utilize standard NETA testing forms.

12. Zero adjust time dial, adjust control spring, etc. and return time dial to original position.

13. Electrically test all targets for proper pickup and seal-in.

14. Electrically calibrate the relay and record “As Left” settings.

15. Check all control switches and contacts, auxiliary relays, associated wires, frayed insulation and proper operation.

16. Visually inspect all apparatus for corrosion damage. Report all findings to Borough for corrective repairs.

17. Prior to restoring all apparatus back into service, visually inspect gasket material on all doors and covers, report all unsuitable conditions to Borough for corrective action.

18. **Vendor shall install personnel grounds on equipment or circuits being tested and advise the Borough of their locations. Provide check off sheet for all personnel grounds installed. Vendor MUST provide a signed sheet confirming the removal of all of their grounds.**

19. Paragraph 3.02.1 delineates the task and schedule the tests which are to be performed during the three (3) year maintenance cycle.
B. Medium Voltage Switchgear (12.47 KV and 34.5 KV)

1. Check all meters at mid-scale. Verify multipliers.
2. Inspect doors, handles, locking bars, etc. for proper operation and alignment.
3. Check door interlocks for proper operation.
4. Inspect poheads, support insulators and bus for deterioration, broken, cracked, chipped, missing parts, etc.
5. Perform ultra-sonic test on outdoor buss for insulation tracking to ground.
6. Check resistors, grid assemblies and space heaters.
7. Check and inspect all wiring, insulating tapes, insulating fittings, bushings, etc. for signs of wear, cracking, discoloration and fatigue.
8. Remove breaker from cell and inspect for damage, defects, arc damage and insulation deterioration.
9. Check bushings, porcelain and finger clusters discoloration, poorly mated contacts, etc.
10. Check contacts for proper alignment and pressure.
11. Inspect all current-carrying parts for signs of overheating, discoloration, pitting and wear.
12. Check and inspect all operating mechanisms for cracks, friction, wear, hardened lubricants, etc.
13. Check all auxiliary switches and internal wiring for proper operation.
14. Check manual and electrical close, latch and trip operation to include, closing coil, trip coil, chock absorbers, bumpers, position indicators, key lockouts, etc.
15. Check space heaters for operation and connections.
16. Power factor test (Doble tests only acceptable) switchgear and external buss duct in accordance with applicable standards or manufacture’s recommendations. Record values and report all unacceptable results as defined in Doble’s Test Data Reference Guide to the Borough for corrective action.

C. Oil Circuit Breakers (JP1 and JP2 at Kings Road Substation)

1. Insulating liquid shall be sampled in accordance with ASTM D-923. Sample shall be laboratory tested for:
   d. Interfacial Tension: ASTM D-971.
   e. Color: ASTM D-1500.
   g. PPM Water: ASTM D-1533.
2. Circuit breaker mechanical components shall be inspected and verified to conform to manufacturer’s tolerances.
3. Perform relay tests, contact resistance test breaker trip and close performance and bushing power factor test (Doble testing).
4. Perform time travel motion analysis and provide curves.

D. Vacuum Circuit Breakers (VB-1 and VB-2, Kings Road Substation)

1. Inspect circuit breaker mechanical components for conformance to manufacturers tolerances.
2. Perform relay tests, contact resistance test, breaker trip and close performance and power factor test (Doble testing).
3. Perform timing test, and perform vacuum integrity check of each vacuum bottle.

E. Medium Voltage Circuit Breakers

1. Measure contact resistance.
2. Perform minimum pick-up voltage tests on trip and close coils.
3. Measure insulation resistance with a 2500 volt mega-meter. With contacts open, test between line and load side of each phase. With contacts closed, test each pole to pole and each pole to ground.
4. Perform an over potential test on each pole with breaker in the closed position. Test each pole to ground with all other poles grounded.
5. With breaker in the test position, make the following test:
   a. Trip and close breaker with the control switch.
   b. Trip each breaker by operating manually each of its protective relays.
   c. Test anti-pump circuit.
6. All circuit breakers shall be operated through at least three (3) open-close cycles in both the rack-in and test positions by manual operation and by control circuits from each control point. Check all indicator lights, annunciators, alarms and targets for correct operation and indication. Check breaker mechanism for correct alignment, freedom of binding and good contact.
7. All protective relays shall be tripped (both manually and electrically) to determine whether the proper breaker has functioned as intended and all devices (including alarms) have also operated correctly.
8. Clean, calibrate and test all protective relays. All relay settings shall be in accordance with the values furnished by the Borough.
9. All test results shall be in accordance with the requirement of all applicable test standards.
10. All circuit breakers shall be given operational tests. This shall include mechanical operation, as well as operation by control circuits, relays and tripping devices. Operating voltage at closing and tripping coils shall be checked to determine that voltage is of proper value.
11. The Vendor shall adjust and set all over current trip devices, shunt trip devices and alarm devices in accordance with values furnished by the Borough.

12. Check alignment of all circuit breaker enclosure shutters. Millwright all circuit breaker guide ways for proper alignment. **Lubricate all moving mechanisms as required, with manufacturers recommended lubricant.**

13. Visually check all medium voltage cables and stress cone attachments to each circuit breaker.

14. Visually check all bus to circuit breaker pressure connections. Report all defects to the Borough so that repairs can be accomplished in a timely manner.

15. Perform vacuum integrity check on each vacuum interrupter bottle.

**F. Medium Voltage Liquid Filled Transformers**

1. Perform the following visual inspections:
   a. Inspect installation locations and report any unfavorable environmental conditions that must be corrected.
   b. Check operation of control compartment doors.
   c. **Check the equipment grounds and record the number and size of ground bus and straps.**
   d. Visually inspect bushings and clamp.
   e. Check for oil leaks and broken mounting brackets.
   f. Check liquid level gauge for accuracy.
   g. Check temperature gauge for accuracy.
   h. Check pressure relief, temperature relays, and meter for functional operation and correct wiring.
   i. Verify fans operation.

2. Perform insulation resistance tests (30 sec., 60 sec., 10 minutes) winding to winding, winding to ground, and bushing power factor and capacitance utilizing Doble type M2H 10KV portable test set. All test values found to be deficient as detailed in ‘Doble’s Bushing Field Test guide or Test Data Reference Guide shall be reported to the Borough for corrective action.

3. Perform over potential test in accordance with the applicable ANSI and NEMA standards.

4. Perform excitation test of the following LTC positions: (16) lower, (15) lower, (1) lower, neutral, (1) raise, (15) raise, (16) raise.

5. Perform winding resistance of DETC (De-energized Tap Changing) position and all (33) LTC positions.

6. Inspect turn ratio on DETC position and all (33) LTC as defined in no. (9) below.

7. Perform SFRA testing (Sweep Frequency Response Analysis) per Doble Engineering’s approved testing methods.

8. Perform leakage reactance testing on windings.
9. Insulating liquid shall be sampled in accordance with ASTM D-923. Sample shall be laboratory tested for:
   d. Interfacial Tension: ASTM D-971.
   e. Color: ASTM D-1500.
   g. PPM Water: ASTM D-1533.
   i. Oxidation Inhibitor: ASTM D-2268. Report deficient results
      (less than .03% by weight) to Borough for corrective action.
   j. PCB testing shall be done on existing insulation oil to determine
      the PCB concentration.
      - Verify on site that the testing equipment used to test for
        PCBs is PCB free prior to testing of existing insulating oil.
      - All oil disposal methods shall be compliant with 40 CFR
        Part 761.
   k. Operate LTC through all positions manually to assure smooth
      operation. Operate with control switch, testing operation of
      limit switches, dynamic braking, position indicator, counters,
      and automatic features.
   l. Open compartment covers, visually check the contacts of the
      arc tap switches or tap selecting switch and arcing switch as
      required for “pitting” or other signs of arc or other damage.
   m. Visually inspect barriers and interconnecting cables between
      main tank and tap changer compartment for corona “tracking”,
      cracking or other sign of damage.
   n. Test and record contact resistance.
   o. Check for proper wiping action of contacts, contact pressure
      and adjustment.
   p. Observe correct tap position and operation via motor and hand-
      crank. Verify positions with a transformer ratio tester.
   q. Clean contacts and inside of compartment as required.
   r. Advise Borough of any major parts requiring replacement
      and/or repair.
   s. Drain existing oil and refill with clean moisture-free
      transformer oil by pumping through an appropriate filter press.
      Check for correct tank levels and/or pressures.
   t. Operate mechanism automatically.
   u. Test LTC oil per 9a to 9j above.
   v. After integrity and component tests have been successfully
      completed, the equipment shall be subjected to operational
      testing.
w. Restore Nitrogen blanket to manufacturer’s recommended pressure value and measure percent of oxygen.

G. Thermographic Testing (Infra-red)

In addition to the tests outlined above, the following equipment, as a minimum, shall be thermographically inspected utilizing a Hughes Aircraft Infrared detector equipment with video monitoring which can be digitally stored, or approved equal. Provide test results in hard copy format, which show abnormal conditions. Forward report to the Borough.

Tests shall be conducted prior to testing and maintenance and after all tests are completed.

1. 12.47 cable terminations and 34.5KV cable terminations.
2. 12.47KV Switchgear bus and 34.5 KV Switchgear bus.
3. 34.5KV/12.47KV Transformers.
4. 12.47KV Bus Duct.
5. 34.5KV Switchgear bus (James Park substation only).
6. 34.5KV exposed bus structure and switches at Kings Road Substation.
7. JP1 and JP2 oil circuit breakers and VB-1 and VB-2 vacuum circuit breakers (Kings Road Substation).
8. The inspection shall be made with all apparatus operating and with all equipment covers removed as directed by the Borough. Inspection reports complete with color photographs of the infrared scan and control photographs indicating the ambient temperature and any hot spots of each item inspected shall be submitted to the Borough.

**Notify the Borough if any equipment, connections or apparatus is indicated to be operating improperly.** All notifications shall include a cost opinion to repair the deficiency.

H. Record of Tests

1. Types of Records
2. Maintain complete and accurate records of all tests. These records shall include the following:
   a. Equipment or circuit identification, description and location.
   b. Complete nameplate data, including serial number.
   c. Readings and measurements taken, including temperature and humidity.
   d. Description of test, including date and tester’s signature.
   e. Description of test equipment used, including serial numbers.
   f. Test results (written description as required).
   g. Other observable data applicable to equipment tests.
   h. Description of any necessary corrective actions.
i. Certification of satisfactory completion of testing and maintenance in accordance with applicable items in this Section.

I. Schedule of testing and inspection for three year cycle.

First Year:

Selective testing and inspection as required by the following Specification Paragraphs:

3.02.A.1 to 19  (note: 3.02 A.10 to 15 are part of the general instructions, relays are only tested in year two)

3.02.D.1 to 3
3.02.C.1a to h shall be performed twice this year. 3.02.F. 9 a to j and u shall be performed twice this year

3.02.G.1 to 8

Second Year:

All testing and inspection required by the following Specification Paragraphs:

3.02.A.1 to 19  E 3.02 1 to 15
3.02.B.1 to 16  3.02. F 1 to 9 completely and 9a to j and u performed a second time this year
3.02.C.1 to 4 completely 3.02.G.1 to 8

Third Year:

All testing and inspections required by the following Specifications Paragraphs:

3.02.A.1 to 19  (note: 3.02 A.10 to 15 are part of the general instructions, relays are only tested in year two)

3.02.D.1 to 3
3.02.C.1a to h shall be performed twice this year 3.02.F. 9a to j and u shall be performed twice this year.

3.02.G.1 to 8

The testing period for each year shall commence in April 1 and be completed by June 31; however, Infrared Scanning shall be performed during the months of July & August.

At the completion of each year's testing period a report shall
be submitted for review by the Borough and the Engineer.

Once the contract is awarded, payments shall be equal for each of the (3) years. Therefore, if costs for each year of service is different, the calculated payments shall be arranged in (3) equal payments.

J. EXCEPTIONS AND ALTERNATE EQUIPMENT

List any alternative equipment and any exceptions to the specifications for the PURCHASE OF PREVENTIVE MAINTENANCE, TESTING AND INSPECTION SERVICES FOR JAMES PARK AND KINGS ROAD ELECTRICAL SUBSTATION DISTRIBUTION EQUIPMENT, 2015-2016-2017.

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9. __________________________________________________________________________

10. __________________________________________________________________________

11. __________________________________________________________________________

12. __________________________________________________________________________

END OF SECTION