Request for Proposal

New 13.2kV Metalclad Switchgear Equipment
West End Substation Project – The Navy Yard

For

Philadelphia Authority for Industrial Development
(PAID)

Issued by:
Philadelphia Industrial Development Corporation
(PIDC)

Dated
March 18, 2016

Proposals due 2:00 PM EDT, April 29, 2016

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* Indicates Bidder action required.
SECTION 01010 - SUMMARY OF WORK

Description of Request:

The Philadelphia Industrial Development Corporation (PIDC) is issuing this Request for Proposal regarding a pre-purchase package containing a 13.2kV metal clad switchgear lineup, 125 VDC stationary battery control power system and a system control network. The equipment included in the pre-purchase specifications will accept two (2) new PECO service lines to increase capacity and deliver power safely to the tenants of the Philadelphia Navy Yard. This contract will not include the means to install the equipment, but does include onsite support such as acceptance testing and training once the switchgear, battery control power system and system control network are installed within the West End Substation. Additionally, the system control network includes specialty equipment and services which are to be done by a 3rd party hired by the manufacturer. Due to the nature of West End Substation construction schedule, the pre-purchase equipment is to be built, programmed, tested, accepted and stored until the manufacturer/distributor is notified to ship the equipment. The successful manufacturer/distributor shall enter into an Agreement with the Philadelphia Authority for Industrial Development (PAID) to provide equipment conforming to the Specifications.

Location:

The Navy Yard, in Philadelphia, PA

Scope of Work:

Design, furnish, store, deliver, commission and warranty a 13.2kV switchgear lineup, battery control power system and system control network. The switchgear shall function locally or be controlled remotely by the system control network under normal or total power outage conditions.

Equipment and services:

- 13.2kV Indoor Metalclad main-tie-main switchgear lineup
  - With paralleling capabilities and provisions for future distributed generation.
- 125 VDC battery control power system with capacity to operate the switchgear upon failure of PECO’s service.
- Control Network including GE/Alstom Grid Solutions equipment
  - GE/Alstom Grid Solutions shall be contracted to program and test the control network to conform to the Specifications and drawing requirements.
- Hardwired Mimic Board for remote operations
- Short Circuit, Coordination, and Arc Flash Hazard Study
- Equipment site testing
- Acceptance Testing
- Commissioning
- Operator Training

**Proposal Evaluation and Selection**

- The award will be made to the responsive and responsible switchgear manufacturer whose Proposal is determined by the PIDC to be the most advantageous to The Philadelphia Navy Yard. The consideration, which shall only include proposals that substantially meet the specifications, will involve the following evaluation criteria:
  - Proposal Price
  - Conformance with specification requirements and qualifications
  - Guaranteed Delivery Time
  - Documentation in the proposal confirming Minimum Bidder Qualifications listed below
  - All information listed under the Proposal Requirements and Submission Information has been provided

- **Incomplete submittals may be rejected in their entirety.**

**Switchgear Manufacturers:**

- **Basis of Design Manufacturer:**
  - PEECO (Philadelphia Electrical Equipment Company)
    Stephen R. Chambers
    14 Mount Pleasant Road
    Aston, PA 19014
    (484) 840-0860; schambers@peecoenergy.com

- **Other Acceptable Manufacturers, subject to approval:**
  - Square D by Schneider Electric
    Bruce Bubeck
    2002 Sproul Road, Suite 202
    Broomall, PA 19008
    (610) 355-5706; bruce.bubeck@schneider-electric.com

  - Eaton
    Jason Schriner
    7 Chelsea Parkway, Suite 700
    Boothwyn, PA 19061
SUMMARY OF WORK

(610) 497-6129; jasonschriner@eaton.com

- Dennis Balickie
  General Electric
  535 Route 38 East, Suite 240
  Cherry Hill, NJ 08002
  (484) 431-8582; dennis.balickie@ge.com

Proposal Requirements and Submission Information

- Two copies, letter sized hardcopy document in soft report cover
- Do not include physical tabs and dividers, empty pages, marketing material
- One electronic copy (PDF) emailed, before deadline
- Memory stick or CD by registered mail or personal delivery, due by bid deadline.
- Marketing collateral or manufacturer cut-sheets may be provided but separate from proposal and ONLY as PDF documents.

Send to:
Rudy Terry
Director, Smart Grid Operations
PIDC
4747 South Broad Street
Building 101, Suite 120
Philadelphia, PA 19112
rterry@PIDCphila.com, P 215.218.2846

- All inquiries concerning this Request for Proposal should be directed to Rudy Terry at the email address provided above.
- All inquirers concerning the GE/Alstom portion of this Request for Proposal should be directed to Nardi Massimo via email: Massimo.nardi@alstom.com, or phone: 603-326-6628.

Manufacturer Data & Qualifications

- Provide name, address, and phone number of manufacturer, along with narrative description of qualifications of manufacturer, years manufacturer’s firm has been incorporated, corporate history, industry position and longevity in the medium voltage switchgear and controls market, and corporate financial strength covering the past three (3) years.
- Manufacturer shall have an office within 100 miles of Philadelphia; provide evidence of this claim.
- The manufacturer shall be ISO 9001 certified.
- The switchgear shall be U.L. listed and labeled.
- Provide proposed financial terms and conditions.
o Include list of five (5) references for projects completed within the past three (3) year. The references shall consist of previous projects detailing the design, testing, start-up and commissioning of switchgear, its control network, and control power system. Additionally, provide contacts for each installation which includes name, title and phone number. References in the Delaware Valley are preferred.

o Design, production and delivery milestone schedule
   - Guaranteed delivery time shall be listed in total weeks rather than a range of weeks and shall include 21 days for review and return of reviewed drawings.
   - Describe storage facility for switchgear in event the project site is not prepared to receive at time of factory shipment. A storage period of six (6) months may be required. Include rate if additional time is required up to one (1) year.

o Supporting Documentation
   - Bill of materials, drawings showing approximate shipping split and final dimensions, layout, weights, recommended anchoring points, conduit entry locations, elevations, and single line.

o The Proposal Pricing Table shall be completely filled in and submitted. The table can be found in the Appendix of the RFP as defined in the table of contents. Failure to submit a completed form may be reason to reject the proposal.

o Deviations and Exceptions: Manufacturer shall submit in writing deviations from the Specification or exceptions to the Specifications, whether they be more or less than specified herein, and the reasons for these deviations and/or exceptions. This sheet shall be signed by the manufacturer. Additionally, the manufacturer shall annotate a copy of the Specifications, annotated with the words “Comply”, “Exception Taken”, or “Deviation” in the right hand margin of every paragraph. Failure to submit annotated specification even if there are no exceptions or deviations take, may be reason to reject proposal.
   - If no deviations are listed, it will be inferred that manufacture fully complies with all project requirements.

o Disclosure of Data: The proposals will not be open for public inspection. Trade secrets or other proprietary data contained in the proposal document shall remain confidential if requested by the manufacturer and agreed upon by the PIDC.
RFP Key Dates

- Issue RFP: March 18, 2016
- Pre-Bid (Optional): March 28, 2016
- Notice of Intent to Respond Due: March 30, 2016
- Questions Due: April 6, 2016
- PIDC Responses to Questions: April 15, 2016
- Proposals Due 2:00 PM EDT: April 29, 2016
- Short List Notification & Request for Clarification: May 6, 2016
- Final Revised Submissions-short List Only: May 16, 2016

PIDC

The Philadelphia Industrial Development Corporation, PIDC, is Philadelphia's economic development corporation. Founded in 1958 as a non-profit joint venture between the City of Philadelphia and the Greater Philadelphia Chamber of Commerce, PIDC conducts real estate and financing transactions that attract investment, tax paying businesses and jobs to the City of Philadelphia. PIDC is responsible for managing the day-to-day affairs of the PAID.

PAID

PAID is a public authority incorporated by the City of Philadelphia in December 1967, pursuant to the Economic Development Financing (EDF) Law. PAID currently owns and is responsible for the economic redevelopment of the former Philadelphia Naval Shipyard and Naval Station, now collectively known as The Navy Yard. This responsibility includes operation and maintenance of the electric distribution system serving The Navy Yard business owners and tenants. PAID will be the contracting entity for any award resulting from this RFP.

The Navy Yard

PAID acquired The Navy Yard in March, 2000, from the United States Navy as part of the formal base closure process. The acquisition included an area of approximately 1,200 acres, in excess of 1,000 buildings and utility systems that exclusively served all of the campus and building requirements for electric, steam and water distribution. Since 2000, The Navy Yard has become a dynamic and very successful urban development project. In 2004, a real estate master plan that has guided the development and begun to fulfill the vision of creating a unique, sustainable and centrally-located business campus in the Philadelphia region. That plan was updated in 2013 to expand upon the most successful parts of the development.
Today, The Navy Yard is home to more than 145 diverse companies with 11,500 employees. The renovated historic and new high-performance buildings created in The Navy Yard since 2000, serve a wide variety of businesses in the office, industrial, manufacturing, and research and development sectors, currently occupying 6.5 million square feet.

**The Navy Yard Electric Grid**

Owned by PAID and managed by PIDC, The Navy Yard Electric Utility, TNYEU, is a private distribution grid serving all power needs within The Navy Yard. By issuance of a declaratory order, The Pennsylvania Public Utility Commission officially classified the TNYEU unregulated. To operate the grid in a professional and safe manner, PIDC hired a third-party utility management firm. Currently the daily operational, maintenance, repair needs and customer billing are outsourced to DTE Energy Service (locally, DTE Philadelphia, LLC). PIDC manages The Navy Yard electric utility as a self-funding non-profit business entity.

PECO (LDC/EDC) delivers >98% of TNYEU electric supply to the two primary PAID owned substations within The Navy Yard. PIDC currently purchases all electric power contracts from external third party providers through the PJM market. Power is delivered by PECO and 13.2 kV and then distributed to building substations (93 and 664) within The Navy Yard at 13.2 kV. Substation 602 is intertied to Substation 93.

**Disclaimers**

This RFP does not commit PIDC or PAID to award a contract. PAID may terminate this process at any time until a contract is executed by both PAID and the selected proposer. PAID may negotiate with one or more parties. This RFP and the process it describes are proprietary to PAID are for the sole and exclusive benefit of PAID. No other party, including any Proposing Firm, is granted any rights hereunder. Any response, including written documents and verbal communication, by any Proposing Firm shall become the property of PAID. This RFP does not constitute a commitment, implied or otherwise, that PAID, PIDC or The Navy Yard will take procurement action in this matter.

**Response Preparation and Miscellaneous Expenses**

The Navy Yard will not reimburse vendors for any expenses incurred in connection with developing and/or submitting a proposal in response to this RFP, including the costs of preparing the response and/or providing any additional information. All material that is submitted in response to this RFP will become the sole property of The Navy Yard. The Navy Yard expressly reserves the right to utilize any and all ideas submitted in the
proposals received unless covered by legal patent or proprietary rights, which must be carefully noted in the proposal submitted in response to the RFP.

**Philadelphia Antidiscrimination Policy**

Under the authority of Executive Order No. 03-12, the City of Philadelphia has established an antidiscrimination policy ("Policy") relating to the participation of Minority (MBE), Woman (WBE) and Disabled (DSBE) Owned Business Enterprises in City contracts. Executive Order 03-12 is administered by the City’s Office of Economic Opportunity ("OEO").

The purpose of this Policy is to provide equal opportunity for all businesses and to assure that City funds are not used, directly or indirectly, to promote, reinforce or perpetuate discriminatory practices. The City is committed to fostering an environment in which all businesses are free to participate in business opportunities without the impediments of discrimination and participate in all City contracts on an equitable basis. In accordance with the contracting requirements of the City, the City’s antidiscrimination policy is applicable to this Notice of Contracting Opportunity (NOCO), or RFP.

For this RFP, the City has not established ranges for the participation of MBEs, WBEs and/or DSBEs (collectively, “M/W/DSBEs”), but applicant is highly encouraged to exercise its Best and Good Faith Efforts to include M/W/DSBEs in its proposal. “Best and Good Faith Efforts” are those efforts, the scope, intensity and appropriateness of which are designed and performed to achieve meaningful participation of M/W/DSBEs in the work described by the RFP. Applicant’s desire to self-perform all of the work does not excuse applicant from its exercise of Best and Good Faith Efforts. Solicitations and any commitments with M/W/DSBEs shall be designated on the Solicitation For Participation and Commitment Form. The submission of this form and any supporting documentation is an element of responsiveness to the NOCO and failure to submit the required information will result in rejection of your proposal.

PIDC is a public-private non-profit, economic development business, located in Philadelphia. The PIDC board of directors is comprised of officials who work for the City of Philadelphia (The City), and for the Greater Philadelphia Chamber of Commerce. In principal, PIDC adheres to the antidiscrimination policy of The City. PIDC will expect the successful vendor to employ and demonstrate good faith and best efforts toward including commercially useful participation of M/W/DSBE businesses in their response to this RFP.

**City of Philadelphia Certificate of Non-Indebtedness**

The Proposing Firm must submit completed Certificate of Non-Indebtedness (see Appendix) with the response to this RFP.
SECTION 16015 – SHORT-CIRCUIT, COORDINATION AND ARC FLASH HAZARD STUDY

PART 1 - GENERAL

1.1 SCOPE

A. The switchgear manufacturer shall furnish a short-circuit, protective device coordination and arc-flash hazard study (known as the Study).

B. The arc flash hazard analysis shall be based on the latest version of NFPA 70E - Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D and utilize IEEE 1584 methodology.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

   1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems
   2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems
   3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis
   5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems

B. American National Standards Institute (ANSI):

   1. ANSI C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
   2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures
   3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis
   5. ANSI C37.5 – Methods for Determining the RMS Value of a Sinusoidal Current Wave and Normal-Frequency Recovery Voltage, and for Simplified Calculation of Fault Currents

C. The National Fire Protection Association (NFPA)

   1. NFPA 70 - National Electrical Code, latest edition
   2. NFPA 70E – Standard for Electrical Safety in the Workplace
1.3 SUBMITTALS FOR REVIEW/APPROVAL

A. The Study shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from the engineer may be obtained for preliminary submittal of sufficient study data to ensure that the selection of devices and characteristics will be satisfactory.

B. Copies of relay logic set points and diagrams.

1.4 SUBMITTAL FOR CONSTRUCTION

A. The results of the Study shall be summarized in a final report. Five (5) bound copies of the complete final report shall be submitted. All TCCs shall be in color. A copy of the report on CD in PDF format shall be included.

B. The report shall include the following sections:

1. One-line diagram showing protective device ampere ratings and associated designations, cable size & lengths, transformer kVA & voltage ratings, generator kVA ratings, and switchgear designations
2. Descriptions, purpose, basis and scope of the study
3. Tabulations of the worst-case calculated short circuit duties as a percentage of the applied device rating; the short circuit duties shall be upward-adjusted for X/R ratios that are above the device design ratings
4. Protective device time versus current coordination curves with associated one line diagram identifying the plotted devices, tabulations of ANSI protective relay functions and unit settings
5. Fault study input data, case descriptions, and current calculations including a definition of terms and guide for interpretation of the computer printout
6. Arc Flash analysis and labels
7. Comments and recommendations for system improvements, where needed
8. Executive Summary including source of information, setting calculations for all relay functions on contract drawings, and assumptions made
9. Copies of SEL programs including RDB files
10. SKM files

1.5 QUALIFICATIONS

A. The Study shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer. Engineer shall be skilled in performing and interpreting the power system studies and in the use of SKM. The Registered Professional Electrical Engineer qualifications shall be submitted for owner approval.
PART 2 - PRODUCT

2.1 STUDIES

A. SKM shall be used to conduct studies where applicable.

B. Study shall be sealed by the Registered Professional Electrical Engineer.

C. All data or field information will be coordinated with owner.

D. The Study shall begin with the utility company's feeder protective devices and include all electrical protective devices in the switchgear portion of this project ending with the primary side of the first downstream fuse.

E. For all feeder breakers the overcurrent protection shall be based on site distribution conductor size and rating data provided by others.

F. Synchronizing relay settings with bus voltage configuration permissives (dead bus and live bus, dead bus and live line).

G. All functions indicated on contract drawings.

H. Provide detailed CT burden calculations per circuit breaker.

2.2 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION

A. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standards 141, latest edition.

B. Transformer design impedances and standard X/R ratios shall be used when test values are not available.

C. Provide the following:
   1. Calculation methods and assumptions
   2. Selected base per unit quantities
   3. One-line diagram of the system being evaluated with available fault at each bus, and interrupting rating of devices noted
   4. Source impedance data, including electric utility system and motor fault contribution characteristics
   5. Typical calculations
   6. Tabulations of calculated quantities
   7. Results, conclusions, and recommendations

D. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

E. Protective Device Evaluation:
   1. Evaluate equipment and protective devices and compare to short circuit ratings. Identify remedies for any issues.
2.3 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves shall be graphically displayed on log-log scale paper.

B. Include on each curve sheet a complete title and one-line diagram with legend identifying the specific portion of the system covered.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which device is exposed.

D. Identify device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Study engineer shall coordinate with The Navy Yard’s supplying utility, PECO, for utility substation relay settings, requirements and system grounding characteristics.

F. Plot the following characteristics on the curve sheets, where applicable:

1. Electric utility’s protective device
2. Medium voltage equipment relays
3. Transformer full-load current, magnetizing inrush current, and ANSI transformer withstand parameters
4. Conductor damage curves
5. Ground fault protective devices

G. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.4 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2004, Annex D.

B. When appropriate, the short circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Alternative methods shall be presented in the proposal.

C. Safe working distances shall be specified for calculated fault locations based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm2.

D. The Arc Flash Hazard analysis shall include calculations for maximum and minimum contributions of fault current magnitude. The minimum calculation shall assume that the utility contribution is at a minimum and shall assume a minimum motor load. Conversely, the maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.

E. Arc Flash label shall be submitted for approval.
F. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 section B.1.2.

2.5 REPORT SECTIONS

A. Input Data:

1. Utility three-phase and line-to-ground available contribution with associated X/R ratios
2. Cable type, construction, size, conductors per phase, length, impedance and conduit type
3. Transformer primary & secondary voltages, winding configurations, kVA rating, impedance, and X/R ratio
4. Reactor inductance and continuous ampere rating

B. Short-Circuit Data:

1. Source fault impedance and generator contributions
2. X to R ratios
3. Asymmetry factors
4. Short circuit kVA
5. Symmetrical and asymmetrical fault currents

2.6 Recommended Protective Device Settings:

1. Protective Relays:
   a. Current transformer ratios and burden
   b. Current settings
   c. Time settings
   d. Instantaneous setting
   e. Specialty non-overcurrent device settings
   f. Breaker failure setting
   g. Relay failure output
   h. Recommendations on improved relaying systems, if applicable
   i. Arc flash detection settings

B. Incident energy and flash protection boundary calculations.

1. Arcing fault magnitude
2. Device clearing time
3. Duration of arc
4. Arc flash boundary
5. Working distance
6. Incident energy
7. Hazard Risk Category
8. Recommendations for arc flash energy reduction
PART 3 - EXECUTION

3.1 ARC FLASH WARNING LABELS

A. A 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester shall be provided for each work location analyzed.

B. The label shall have an orange header with the wording, “WARNING, ARC FLASH HAZARD”, and shall include the following information:

1. Location designation
2. Nominal voltage
3. Flash protection boundary
4. Hazard risk category
5. Incident energy
6. Working distance
7. Engineering report number, revision number and issue date

C. Labels shall be machine printed, with no field markings

D. Arc flash labels shall be provided for each switchgear breaker section based on recommended overcurrent device settings.

3.2 FIELD ADJUSTMENT

A. Refer to Section 16955 for implementations of settings.

B. Power engineer shall provide all relay files updated during field testing.

END OF SECTION 16015
SECTION 16346 - MEDIUM-VOLTAGE, METAL-CLAD SWITCHGEAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes indoor metal-clad switchgear, batteries, battery chargers, HMI’s, mimic board, accessories, acceptance testing, field-testing, and field support

B. Manufacturer shall furnish equipment as specified herein and as shown on the contract drawings.

1.3 DEFINITIONS

A. BIL: Basic Impulse Insulation Level.
B. CN: Control Network
C. CPS: 125VDC Control Power System
D. DAP: Digital Automation Platform by GE/Alstom Grid Solutions
E. HMI: Human Machine Interface
F. Manufacturer: Provides and integrates all equipment.
G. NOC: Network Operation Center
H. UPS: Uninterruptable power supply.
I. VLA: Wet-cell, Vented, Lead-acid.

1.4 SUBMITTALS

A. Product Data: For each type of product.
   1. Manufacturer product data sheets and descriptive bulletins.
   2. Rated capacities, operating characteristics, and furnished specialties and accessories.
   3. Time-current characteristic curves for overcurrent protective devices.
B. Shop Drawings: For each medium-voltage, metal-clad switchgear.
1. Tabulation of installed devices with features and ratings.
2. Master Drawing Index.
3. Dimensioned plans and elevations, showing dimensions, shipping sections, and weights of each assembled section. Elevations shall show major components, features, and mimic bus diagram.
4. Plan views and cross sections of equipment base showing clearances, manufacturer's recommended work space, and locations of penetrations for grounding and conduits. Show location of anchor bolts and leveling channels.
5. Details of equipment assemblies and storage cabinet. Indicate dimensions, weights, loads, and required clearances, method of field assembly, and location and size of each field connection.
7. Copy of nameplate.
8. Test results of enclosure corrosion resistant finish.
9. Ratings of the switchgear assembly:
   a. Voltage.
   b. Continuous current.
   c. Short-circuit current.
   d. Lightning impulse full-wave withstand voltage.
10. Utility company's metering provisions with indication of approval by utility company.
11. Wiring Diagrams: for each switchgear assembly include the following:
   a. Power, signal, and control wiring.
   b. Three-line diagrams of current and future secondary circuits showing device terminal numbers and internal diagrams.
   c. Schematic control diagrams.
   d. Diagrams showing connections of component devices and equipment.
   e. Schematic diagrams showing connections to remote devices including connection details to the communications network.
12. Cable terminal sizes.
13. Automatic Transfer Switch:
   a. Show connections between transfer switch, power sources, and load.
14. Station Power Transformer:
   a. Outline dimensions, connection and support points, weight, specified ratings and materials.
   b. Standard model design tests and options.
15. Submit all required documentation per the PECO bluebook. PECO shall have ample time to review and comment on design. Manufacturer must comply and address PECO’s comments. All correspondence with PECO shall be copied to PIDC and engineer.

C. Protective relays and relay settings.
1. Part number configuration.
D. CPS (125VDC battery system):

1. Sizing calculations.
2. Batteries.
3. Battery chargers with integral DC distribution panel.
4. Battery rack and accessories.
5. Include control power wiring diagrams including all equipment and terminal numbers.
6. DC test cabinet installation and wiring details.

E. CN (Control Network):

1. HMI.
2. DAP server logic including control and monitoring logic for full main-tie-main operation, HMI, Mimic board controls and interface with NOC (Network Operation Center).
3. Written sequence of operation, and programming code.
4. Ethernet switches.
5. GPS clock.
6. DAP server.
7. I/O Modules.
8. Other items indicated in contract drawings.
9. Installation details.
10. Wiring diagrams.
11. Include wiring diagrams including all equipment and terminal numbers.

F. Mimic Board

1. Dimensions.
2. Elevation view of front panel with mimic bus and controls.
3. Wiring diagrams.
4. Installation details.
5. Other items indicated in contract drawings.

G. Factory testing plan for the switchgear and CN. This includes protective relaying control and tripping circuits, interlocks, automatic utility line transfer schemes, and DAP Server/HMI control and interface to include the following: The testing plan shall include the following, but is not limited to:

1. Testing Schedule.
2. List of all systems to be demonstrated.
3. Description of tests.
4. Test report containing the following:
   a. Summary of Project.
   b. Description of equipment tested.
   c. Description of tests.
   d. Test results.
   e. Conclusions and recommendations.
   f. Appendix, including appropriate test forms.
   g. List of test equipment used and calibration date.
   h. Conditions for future access to secured computer database of all test data.
1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings:

1. Indoor Installations:
   a. Outline of the switchgear weight, conduit entries, and grounding equipment locations.
   b. Recommended battery rack anchorage equipment for concrete floor and installation details.
   c. Battery charger details for on grade or wall mounted installations.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For switchgear, switchgear components, CPS, and CN include operation and maintenance manuals. Include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device.
3. As-shipped drawings.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Spare Fuses: Six of each type and rating of fuse and fusible device used. Include spares for the following:
   a. Potential transformer fuses.
   b. Control power fuses.
   c. House power transformer fuses.

2. Spare Indicating Lights: Six of each type installed.
3. Touchup Paint: Three half-pint containers of paint matching enclosure's exterior finish.
4. Primary Switch Contact Lubricant: One container.

1.8 WARRANTY

A. The cost and details, including inspection, maintenance, testing, diagnostic, and recordkeeping requirements, of a warranty against defects in materials and workmanship for a period of 18 months, FOB factory. An additional one (1) year shall be added to the warranty if manufacturer’s field service organization performs startup and testing.

B. Should the switchgear or any part fail within the warranty period, removals, transportation and reinstallation shall be included.
C. Special Warranties:

1. CPS (125VDC battery system): Manufacturer agrees to repair or replace central battery equipment that fails in materials or workmanship within specified switchgear warranty period.

D. Transformers:

1. Control, potential and power dry-type transformers shall be warranted for a period of two (2) years for failure determined to be caused by vacuum circuit breaker induced switching transients.

E. Control Wiring Modifications

1. Any changes to controls shall be made by factory-authorized personnel, and shall not impact the factory warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Storage: Equipment shall be stored at a secure, clean, and dry controlled climate space at the manufacturer’s facility for a minimum of 6 months. Manufacturer shall provide insurance certificate. Duration of storage shall be negotiable up to a year. Switchgear shall not be stored outdoors. Storage location shall be identified in proposal.

B. Shipping: Groups shall be designed to be shipped by truck, rail, or ship. Indoor groups shall be bolted to skids. Accessories shall be packaged and shipped separately. Delivery/shipping responsibilities are defined by “Delivered At Place” per Incoterms 2010.

C. Handling:

1. Switchgear shall be equipped to be handled by crane. Where cranes are not available, switchgear shall be suitable for skidding in place on rollers using jacks to raise and lower the groups.
2. Handle switchgear according to according to manufacturer's recommendations, avoid damage to the enclosure, termination compartments, base, frame, tank, and internal components. Do not subject switchgear to impact, jolting, jarring, or rough handling.
3. Protect switchgear compartments against the entrance of dust, rain, and snow.
4. Transport switchgear upright to avoid internal stresses on equipment mounting assemblies. Do not tilt or tip switchgear.
5. Use spreaders or a lifting beam to obtain a vertical lift and to protect switchgear from straps bearing against the enclosure. Lifting cable pull angles may not be greater than 15 degrees from vertical.
6. Do not damage structure when handling switchgear. Any damage done during handling and storage shall be remedied by manufacturer.
7. Handle CPS according to manufacturer’s recommendation. Any damage done during handling and storage shall be remedied by manufacturer.
8. Handle mimic board according to manufacturer’s recommendation. Any damage done during handling and storage shall be remedied by manufacture.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers: See Summary of Work, Section 01010

B. The specific manufacturers and equipment above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Manufacturer shall contract the services of GE/Alstom to provide integration, programming, start-up and customer acceptance testing of the DAP, including server, communication equipment, mimic board, and HMIs.

2.2 SYSTEM DESCRIPTION AND RATINGS

A. Manufactured Unit: Indoor, metal-clad switchgear, designed for 13.2 kV, 3-phase, 3-wire grounded system.

B. Switchgear shall be suitable for operation under service conditions specified as usual service conditions in IEEE C37.20.2.

C. The switchgear ratings shall comply with IEEE C37.04, and shall be the preferred ratings of IEEE C37.06 circuit breakers.

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

E. The utility main breaker sections, utility meter sections, tie breaker sections, and associated main-tie-main circuit breaker control and protective relaying shall be constructed, wired, and tested to the latest edition of the PECO Bluebook standards.

1. Manufacturer shall be responsible for ensuring design is in full compliance with PECO’s requirements.

2.3 SWITCHGEAR CONSTRUCTION

A. The switchgear assembly shall consist of individual vertical sections housing various combinations of circuit breakers and auxiliaries, bolted to form a rigid metal-clad switchgear assembly. Metal side sheets shall provide grounded barriers between adjacent structures and solid removable metal barriers shall isolate the major primary sections of each circuit. Hinged rear doors, complete with provisions for padlocking, shall be provided.

B. The stationary primary contacts shall be silver-plated and recessed within insulating tubes. A durable shutter shall automatically cover the stationary primary disconnecting contacts when the breaker is in the disconnected position or out of the cell. Provide rails to allow withdrawal of each circuit breaker for inspection and maintenance without the use of a separate lifting device.

C. Switchgear Enclosure
1. Indoor Enclosure: Steel, drip proof enclosure for utility incoming and metering sections, otherwise provide NEMA type 1.
2. The finish shall consist of a coat of gray (ANSI-61), thermosetting, polyester powder paint applied electrostatically to pre-cleaned and phosphatized steel and aluminum for internal and external parts. The coating shall have corrosion resistance of 600 hours to 5% salt spray. The coating shall contain anti-fungal additives.
3. The switchgear described in these specifications shall be arranged as shown on contract drawings.
4. Infra-red scanning windows shall be installed in each vertical section at the rear of the equipment in upper and lower cubicle areas where power cable terminations are made. Windows shall be located to provide maximum viewing of conductor connections.

D. Bus: Tin-plated copper with fluidized bed epoxy flame-retardant and track-resistant insulation with provisions for future extension.

1. Bus Ratings:
   a. Nominal Voltage: 13.2 kV
   b. Maximum Voltage: 15 kV
   c. BIL: 95 kV
   d. Frequency: 60 Hz
   e. Continuous Amperes: Refer to contract drawings

2. Ground Bus: Sized to carry the rated short-time withstand current, extended full length of the switchgear assembly, and connected to the metal enclosures of each vertical section. Drill 2 holes on either end of the ground bus to accept NEMA 2 post ground lug.
3. The bus supports between units shall be flame-retardant, track-resistant glass polyester. The switchgear shall be constructed so that all buses, bus supports and connections shall withstand stresses that would be produced by currents equal to the momentary ratings of the circuit breakers. Main bus shall be rated as shown on drawings and as noted within this specification. All bus joints shall be plated, bolted and insulated with easily installed boots. The bus shall be braced to withstand fault currents equal to the close and latch rating of the breakers. The temperature rise of the bus and connections shall be in accordance with ANSI standards and documented by design tests.
4. Grounding ball-studs shall be installed on bus at all medium voltage cable terminations. Grounding ball-studs at utility line terminations shall be per PECO standards.
5. Incoming line cable termination provisions shall be furnished for a minimum (2) 350 kCMIL copper conductors per phase.

E. Circuit Breakers and Associated Components

1. Circuit Breaker Ratings:
   a. Rated Maximum Design Voltage: 15 kV.
   b. BIL: 95 kV.
   c. Rated Continuous Current: 1200A.
   d. Rated Short-Circuit Current and Short-Time Current: 25 kA rms.
   e. Close and Latch Rating: 130 kA peak.

2. Rated Interrupting Time: 5 cycles (83ms). Each circuit breaker shall contain three vacuum interrupters separately mounted in a self-contained, self-aligning pole unit, which can be removed easily. The vacuum interrupter pole unit shall be mounted on glass polyester supports. A contact
wear gap indicator for each vacuum interrupter, which requires no tools to indicate available contact life, shall be easily visible when the breaker is removed from its compartment. The current transfer from the vacuum interrupter moving stem to the breaker main conductor shall be a non-sliding design. The breaker front panel shall be removable when the breaker is withdrawn for ease of inspection and maintenance.

3. The circuit breakers shall be drawout type, capable of being withdrawn on rails. The breakers shall be operated by a motor-charged stored energy spring mechanism, charged normally by a universal electric motor and in an emergency by a manual handle. The primary disconnecting contacts shall be silver-plated copper.

4. The secondary contacts shall be silver-plated and shall automatically engage in the breaker operating position, which can be manually engaged in the breaker test position.

5. Interlocks shall be provided to prevent closing of a breaker between operating and test positions, to trip breakers upon insertion or removal from housing and to discharge stored energy mechanisms upon insertion or removal from the housing. The breaker shall be secured positively in the housing between and including the operating and test positions.

6. The breakers shall be electrically operated by CPS. Close, trip and charge functions shall be 125 VDC.

7. Auxiliary Switches:
   a. All breakers shall be provided with a minimum eighteen (18) MOC switches (18 “a” and 18 “b”).
   b. All breakers shall be provided with a minimum of six (6) TOC position switches (6 “a” and 6 “b”).
   c. A minimum of 6 “a” and 6 “b” contacts shall be spares on all breakers.

8. Breakers of equal rating shall be interchangeable.

F. Wire each shipping split’s power connections to a terminal block. Provide terminal block within one of the upper cubicles to land the CPS supply.

G. Auxiliary Vertical Sections, Compartments, and Systems:

1. Utility metering compartment that complies with PECO requirements.

   a. Provide separate barriered-off utility metering compartment or structure complete with hinged sealable door. Bus work shall include provisions for mounting utility company current transformers and potential transformers as required by the utility company. Provide service entrance label and provide necessary applicable service entrance features per NEC, PECO and local code requirements.
   b. Number of revenue metering current transformers and voltage transformers shall be determined by PECO.
   c. Voltage transformer fuses shall be drawer mounted with locking device per PECO requirements.

2. All breaker cubicles shall have hardware and features to accept a motorized through-door racking in/out device.

3. A work light with toggle switch shall be installed in each switchgear section containing circuit breakers or control components. Provide one (1) common circuit for all work lights and wire to terminal block for field connection by others. Terminal block shall be installed in the upper cubicle of vertical section 1. A ground fault interrupter type work receptacle shall be installed per shipping split on a lower cubicle door. Provide one (1) common circuit for all work receptacles and wire to terminal block for field connection by others. Terminal block shall be in the upper cubicle of vertical section 1.
4. Install PECO signage per PECO Blue Book.
   a. Other control equipment indicated in this specification and contract drawings.

5. A.C. Control Power Automatic Transfer Switch (Device 83):
   a. Switch shall be 2-pole and rated for a minimum of 240VAC. Source and load neutrals shall be bonded together at switch.
   b. Position contacts shall be provided for remote monitoring by the DAP server. HMIs shall display automatic transfer switch position.
   c. Sources shall be electrically interlocked to prevent closing both sources on the load at the same time.
   d. Switchgear door mounted and indicators:
      a) White light with nameplate engraved "Control Power On Bus 1"
      b) White light with nameplate engraved "Control Power On Bus 2"

6. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.

7. Station Power Transformer:
   a. The basic impulse levels shall match that of the switchgear.
   b. The coils shall be wound with copper conductors.
   c. All insulating materials are to be in accordance with IEEE Standard C57.12.01 for 220° C UL insulation system.
   d. Primary fuses shall be in a draw-out assembly, easily accessible and in same section as transformer.
   e. Refer to contract drawings for transformer rating and secondary breaker setting.
   f. Provide within one vertical section or less.
   g. Line- and Load- side devices and connections for station power transformer shall be selected so as to accomplish the following:
      1) Complete selectivity between primary fuses and secondary circuit breaker, favoring operation of the circuit breaker first; the fuses shall only be needed in the case of an internal fault in the transformer
      2) Proper sizing of the conductors between the bus, fusing, transformer and secondary circuit breaker
      3) Adjustability of trip settings for secondary circuit breaker to allow future coordination with remote panel main breaker
   h. Wire load side of breaker leads to easily accessible terminal block for customer connection in field.

8. Control Power Transformer (CPT):
   a. Primary fuses shall be easily accessible and in a draw-out assembly.
   b. Refer to contract drawings for ratings.
   c. Secondary CPT shall have circuit breaker and be connected to Device 83 automatic transfer switch.
   d. Provide fused distribution blocks for secondary connected loads.
e. Control power transformers shall be mounted in drawout drawers. Rails shall be provided as applicable for each drawer to permit easy inspection, testing and fuse replacement

9. Space Heaters:

a. Each vertical section of switchgear shall be provided with space heaters. Tubular type heaters operated at half voltage for long life shall be supplied. 500-volt or 250-volt rated heaters shall be used at 240 or 120-volt, respectively. Power for space heaters shall be supplied from a remote panelboard. Terminal blocks shall be provided in each shipping split. Heaters shall be controlled by an adjustable thermometer triggering the heaters on based on user selected setting between 35°F and 60°F.

H. Surge Arrestors

1. Comply with PECO Blue Book requirements.
2. Comply with IEEE C62.11, 15KV Station class; metal-oxide-varistor type, connected in each phase of incoming circuit and ahead of disconnecting device the main breakers.
3. Comply with IEEE C62.11, 15KV Distribution class; metal-oxide-varistor type, connected in each phase of incoming circuit and ahead of disconnecting device the feeder breakers.
4. Surge arresters shall be directly connected to the switchgear ground bus.
5. Devices shall be installed in the termination compartment.
6. Surge arresters with disconnectors or external gaps are not acceptable for installation within switchgear.

I. Accessory Set: Tools and miscellaneous items required for interrupter switchgear test, inspection, maintenance, and operation.

1. One maintenance tool for manually charging the breaker closing spring and manually opening the shutter.
2. One levering crank for moving the breaker between test and connected positions.
3. One test jumper for electrically operating the breaker while out of its compartment.
4. One breaker lifting yoke used for attachment to breaker for lifting breaker on or off compartment rails.
5. One set of rail extensions and rail clamps, when applicable.
6. One portable lifting device for lifting the breaker on or off the rails.
7. One ramp for rolling breaker mounted in lower compartment directly onto the floor.
8. One test cabinet for testing electrically operated breakers outside housing.
9. One “dockable” transport dolly for moving breaker about outside its compartment.
10. One electrical levering device.
11. One remote motorized racking device.

2.4 INSTRUMENT AND CONTROL WIRING

A. Instruments and Control

1. The utility main breaker sections, utility meter sections, tie breaker sections, and associated main-tie-main control and protection shall be in accordance with PECO Blue Book standard.
2. Instrument and control wiring within the switchgear sections shall be of #14 flame-retardant, type SIS, extra-flexible, tinned copper, rated 600 volts and approved for switchgear use, unless noted otherwise.
a. All wire terminations associated with current transformers shall be #12 and made with insulated ring type lugs.

3. Refer to contract drawings for all connections required for equipment exterior to switchgear.

4. All wire terminations made at terminal blocks, meters, relays, voltage transformers and other similar devices shall be made with insulated ring type lugs.

5. Each internal interconnecting wire shall be identified by means of a heat embossed vinyl sleeve markers at each end. Labeling tape wire markers are not acceptable. Wire numbers shall match the Manufacturer's interconnection, schematic and wiring drawings.

B. Terminal Blocks

1. Terminal blocks shall be supplied and clearly marked for wiring to be installed by others in the field, including wiring between shipping sections.

   a. Terminal blocks shall have high-insulating barriers and be equipped with screw-type terminals, for accommodating ring type lug wire terminations.

   b. A minimum of ten percent spare terminal block connections shall be available when the switchgear is accepted by owner, unless otherwise noted.

   c. All current transformers shall be connected to shorting type terminal blocks located on the breaker control cubicle side wall.

2. All unused contacts shall be wired to accessible terminal blocks on side wall in the breaker control space and labeled.

C. Control Network Wiring

1. All Category 6 cable and associated jacks, terminations, and patch cables shall be shielded type cables. Manufacturer shall properly terminate and ground (to ground bus) all cable shields to ensure continuity throughout the entire length of the channel in accordance with all equipment and cable manufacturers’ requirements. Achieve a clear transmission, free from signal interruptions or any degradation in signal.

2. STP: Shielded Twisted Pair

   a. Cable: 100-ohm, covered with a gray thermoplastic jacket and overall metallic shield.

      1) Comply with ICEA S-90-661 for mechanical properties.

      2) Comply with TIA/EIA-568-C.1 for performance specifications.

      3) Comply with TIA/EIA-568-C.2, Category 6.

      4) Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

         a) Type requirements in subparagraphs below are minimum requirements and may be revised to suit Project. Retain options if "permitted substitutions," as defined in NFPA 70, are appropriate for this Project.

         b) Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG.

         c) Communications, Plenum Rated: Type CMP or MPP, complying with NFPA 262.
Philadelphia Industrial Development Corporation
West End Substation 13.2kV Metal Clad Switchgear Pre-Purchase March 18, 2016

MEDIUM-VOLTAGE, METAL-CLAD SWITCHGEAR
AND ASSOCIATED EQUIPMENT

- d) Communications, Riser Rated: Type CMR; or MPP, CMP, or MPR, complying with UL 1666.
- e) Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG.
- f) Multipurpose: Type MP or MPG; or MPP or MPR.
- g) Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
- h) Multipurpose, Riser Rated: Type MPR or MPP, complying with UL 1666.

b. Hardware

1) General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
2) Patch Cords: Factory-made, 4-pair cables in 36-inch (900-mm) lengths; terminated with 8-position modular plug at each end.
   a) Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
   b) Patch cords shall have color-coded boots for circuit identification.

3. Coaxial Cable

a. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 50-ohm nominal impedance with a return loss of 19 dB minimum from 7 to 2000 MHz.

b. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
   1) CATV Cable: Type CATV, or CATVR.
   2) CATV Plenum Rated: Type CATVP, complying with NFPA 262.
   3) CATV Riser Rated: Type CATVR, complying with UL 1666.
   4) CATV Limited Rating: Type CATVX.

c. Hardware

1) Coaxial-Cable Connectors: Type N, 50 ohms.

D. Color code secondary service, feeder, CPT, and branch circuit conductors with factory applied color using the following color coding:

<table>
<thead>
<tr>
<th>240/120 Volts</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>A</td>
</tr>
<tr>
<td>Red</td>
<td>B</td>
</tr>
<tr>
<td>Blue</td>
<td>C</td>
</tr>
<tr>
<td>White</td>
<td>Neutral</td>
</tr>
<tr>
<td>Green</td>
<td>Ground</td>
</tr>
</tbody>
</table>
E. Color code for current transformer circuits with factory applied color using the following color coding:

<table>
<thead>
<tr>
<th>Color</th>
<th>Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black/White Tracer</td>
<td>A</td>
</tr>
<tr>
<td>Red/White Tracer</td>
<td>B</td>
</tr>
<tr>
<td>Blue/White Tracer</td>
<td>C</td>
</tr>
<tr>
<td>Gray</td>
<td>Return</td>
</tr>
</tbody>
</table>

2.5 INSTRUMENTS AND CONTROL SWITCHES

A. ANSI number 86 lockout relay device shall be a separate device from protective relay function.

1. Manufacture shall use ElectroSwitch series 24 LOR with LED lighted target nameplate.


1. Potential Transformers: Secondary voltage rating of 120 V and NEMA C 12.11 accuracy class of 0.3 with burdens of W, X, and Y.

   a. Voltage and control power transformers of the quantity and ratings indicated on drawings shall be supplied. Voltage transformers shall be mounted in drawout drawers contained in an enclosed auxiliary compartment. Drawers shall have hardware to permit padlocking in both open and closed positions. Shutters shall isolate primary bus stabs when drawers are withdrawn.

2. Current Transformers:

   a. Protective relay current transformers shall be multi-ratio, 5 amp secondaries. Thermal and mechanical ratings of the current transformers shall be coordinated with the circuit breakers. Accuracy rating shall be equal to or higher than relaying accuracy class C150. Rating shall be confirmed by a CT burden calculation. The location for the current transformers on the bus side and line side of the circuit breaker units shall be front accessible to permit adding or changing current transformers without removing high-voltage insulation connections. Coordinate location of CTs with contract drawings. All current transformer tap leads shall be wired to accessible shorting blocks.

C. Basic Metering

1. Square D ION6200.

   a. Mount display panel on face of switchgear door allowing for maximum visibility.
   
   b. Meters shall be powered by the CPS (125 VDC).

D. Control Switches:

1. Control switches shall be provided for each circuit breaker on cubicle door and Mimic panel. Control switches shall have black pistol-grip handles, black target escutcheons engraved "trip/close", and orange target indicator flags. Switchgear mounted control switch escutcheons shall be equipped with lighted name plate. Green, amber, and red LEDs shall be wired to indicate "breaker open", "spring charged" and "breaker closed" respectively. Control switches shall be ElectroSwitch Series 24 and be spring return to vertical. Number of decks may be modified by manufacturer per the control requirements.
a. Front door breaker control switch (CS) connections shall be hardwired to the switchgear’s breaker control scheme and be independent of the protective relay and DAP server.

2. A two-position Automatic/Manual maintained type selector switch shall be located and labeled as indicated on the contract drawings. Control switch shall be ElectroSwitch Series 24 with lighted target nameplate. Green and red LEDs shall be wired to indicate “AUTO” and “MANUAL” respectively. Number of decks may be modified by manufacturer per the control requirements. Switch shall be hardwired into associated breakers.

3. A two-position Normal/Parallel maintained type selector switch shall be located and labeled as indicated on the contract drawings. Control switch shall be ElectroSwitch Series 24 with lighted target nameplate. Green and red LEDs shall be wired to indicate “NORMAL” and “PARALLEL” respectively. Number of decks may be modified by manufacturer per the control requirements. Switch shall be hardwired into associated breakers.

4. A two-position NOC Enabled/Disabled maintained type selector switch shall be located and labeled as indicated on the contract drawings. Control switch shall be ElectroSwitch Series 24. Number of decks may be modified by manufacturer per the control requirements. Switch logic shall be stored within the DAP server.

5. A three-position Utility Line Loss Test maintained type selector switch shall be located and labeled as indicated on the contract drawings. Control switch shall be ElectroSwitch Series 24. Escutcheons shall be equipped with lighted nameplate. Number of decks may be modified by manufacturer per the control requirements. Switch logic shall be stored within the DAP server.

6. A four-position Pre-Select Trip maintained type selector switch shall be located and labeled as indicated on the contract drawings. Control switch shall be ElectroSwitch Series 24 or 31. Number of decks may be modified by manufacturer per the control requirements. Switch logic shall be stored within the DAP server.

E. Terminal blocks shall be provided in switchgear and Mimic board for interconnection of hardwired devices, including control switches, mode switches and indicating lights.

2.6 PROTECTIVE RELAYS

A. Basis-of-Design Product: SEL; by Schweitzer Engineering Laboratory.

1. Other manufactures will be considered, but equipment must be submitted for review for owner’s approval.

B. The specific manufacturers and equipment above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

C. Relays shall be multifunction, solid-state microprocessor-based relay systems, complying with IEEE C37.90.

D. All devices shall communicate using either DNP3 or IEC61850.

E. Manufacturer to modify relay part number configuration based on wiring and data transfer requirements.
F. Protective relaying trip functions shall be hardwired and independent of the DAP Server.

G. Relays shall be equipped to transmit meter, target and configuration data as well as receive close and trip signals from CN.

H. Relays shall be powered by the 125 VDC CPS.

I. Each utility main breaker shall have a primary and back-up microprocessor-based multifunction protective relays per PECO redundancy requirements.

J. All current and voltage transformer circuits shall have test switches mounted and wired on the door front. In addition, utility main breakers (U-1 and U-2) and feeder breakers shall have trip and close contacts wired through test switches.

K. Test switches shall be ABB FT-14 type.

L. For Tie breaker, include synch check bus configuration modes (Dead Bus and Live Bus, Dead Bus and Live Line).

M. Refer to section 2.9 for required communication protocol.

N. Relays and DAP shall have a synchronized clock based on the RT-430 gps clock.

O. Multifunction Digital Meter and Monitor functionality shall be integrated into the protective relays: Microprocessor-based unit suitable for three-wire systems.

1. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
2. Selectable digital display with the following features:

   a. Phase Currents, Each Phase: Plus or minus 1 percent.
   b. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
   c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
   d. Three-Phase Real Power: Plus or minus 2 percent.
   e. Three-Phase Reactive Power: Plus or minus 2 percent.
   f. Power Factor: Plus or minus 2 percent.
   g. Frequency: Plus or minus 0.5 percent.
   h. Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
   i. Accumulated energy, in megawatt hours, plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.

P. Overcurrent and Ground-Fault Protective Relays (IEEE C37.2 device functions 51/50 and 51G/50G):

1. No signal, control, switch, or program shall inhibit the overcurrent relay function from tripping a breaker.
2. Field-Selectable Relay Settings: Required by the overcurrent protective device coordination study and arc-flash study.
3. Primary Current-Transformer Ratings: Programmable from 5 to 5000 A.
4. Phase and Ground Protection: Field-selectable curves from IEEE moderately inverse, very inverse, or extremely inverse.
5. Phase Instantaneous Overcurrent Trip Pickup Point: Field selectable as "none" or from 0.5 to 25 times current-transformer primary rating. Include discriminator circuit with "on" and "off" switch so that when phase instantaneous overcurrent has been programmed to "none," the discriminator circuit protects against currents exceeding 11 times current-transformer primary rating when the breaker is being closed and shall be deactivated after approximately eight cycles.
6. Alphanumeric display to show the following parameters with metering accuracy not to exceed 2 percent of full scale:

   a. Individual phase currents.
   b. Ground current.
   c. Cause of trip.
   d. Magnitude and phase of current-causing trip.
   e. Phase or ground indication.
   f. Peak current demand for each phase and ground since last reset.
   g. Current-transformer primary rating.
   h. Programmed phase and ground set points.

Q. Relay shall send relay failure signal to DAP server to be displayed on the HMIs and NOC.
R. Provide arc-flash detection within the switchgear.

1. Use the SEL arc-flash protection functionality within the protective relays.
3. All cubicles shall be monitored for arc-flash by a SEL relay.
4. Provide fast hybrid outputs enabling fast acting trip to the circuit breakers under the event of an arc.

2.7 CONTROL POWER SYSTEM (CPS) – 125VDC Battery System

A. Refer to contract drawings for configuration of CPS.

B. Dedicated 125 VDC battery system to supply continuous DC power under normal conditions and 12 hours of backup under loss of utility conditions.

C. Provide a DC distribution panel integral with each battery charger. Each branch circuit breaker shall support one shipping split.

D. Battery:

1. Basis-of-Design Product: (Subject to compliance with requirements) C&D technologies.
   a. Other manufactures will be considered and must be submitted for review for owner’s approval.

2. The specific manufacturers and equipment above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.
3. Manufacturer shall size battery based on project requirements and IEEE standard to be 100% end of life. Calculate the battery capacity based on the lowest ambient temperature and the load profile. Include a safety margin of 15% for reserve capacity.

4. Provide flooded lead acid batteries. Battery voltage shall be 125 VDC nominal.

5. Rack: Two-step rack with alkali resistant finish, electrical connections between battery cells, and between rows of cells; include two flexible connectors with bolted-type terminals for output leads. Ground metallic racks with #4/0 copper conductor. Batteries shall be secured to rack to prevent overturning.

6. Provide liquid tight spill-control barrier system:
   a. Welded 4” tall acid tight barrier using 5/16” thick HDPE pan combination to have minimum dimension of rack length+2” and rack width+2”.
   b. 12”x12” Flame retardant acid absorbing/neutralizing pillows.

7. Accessories:
   a. Set of cell numerals.
   b. Acid-resistant gloves.
   c. Protective apron and overshoes.
   d. Portable rinsing station using neutralizing agent for skin and eyes.
   e. Provide safety signs on all doors connecting to switchgear room.
   f. Provide portable eyewash station.

8. Cycle battery before shipment to guarantee rated capacity on installation. Arrange to operate ungrounded.

9. Each battery cell shall have electrolyte minimum and maximum level indicators.


E. Battery Charger

1. Basis-of-Design Product: (Subject to compliance with requirements) Valley Forge Power Systems Inc.
   a. Other manufacturers will be considered and must be submitted for review for owner’s approval.

2. The specific manufacturers and equipment above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

3. Provide one (1) 240VAC, single phase, silicon controlled rectifier battery charger capable of recharging any stationery, secondary battery type. The charger is designed to operate automatically, and shall be a constant voltage device equipped to provide automatic current limiting. The battery charger shall be all solid state, employing integrated circuitry for maximum performance.

4. Basic Design Features
   a. MTBF of 30,000 hours minimum (20 year life expectancy).
   b. Modular construction: control circuits and alarm assemblies shall be printed circuit boards that are modularized with plug and socket connections.
   c. Adjustments for all charger output settings, float and equalize voltages, current limit and alarm thresholds shall be via potentiometers. Float and equalize potentiometers shall be located on the front panel and shall employ lock nuts to mechanically maintain the settings once achieved.
d. Internal Components shall be accessed through a hinged door in the front.
e. Enclosure shall be ventilated NEMA 2, and are to be equipped with knockouts for cable and conduit entry.
f. Alarm and power connections shall be made via internal terminal blocks that are easy to access.
g. Charger shall be capable of supplying the following demand simultaneously:

1) Recharging a fully discharged battery in 12 hours.
2) Supervisory panel and control panel.
3) Steady loads (indicating lamps, relays, etc.)

5. Environmental Criteria

a. Charger shall be capable of continuous operation in an ambient temperature of between 0°C-40°C without derating. Charger shall be installed in a convection cooled, ventilated, NEMA Type 12, enclosure with a drip proof shield. The housing is to have a hinged front door with all equipment accessible from the front.

6. Protection and Tolerances

a. Charger shall maintain 1/2 of one percent voltage regulation from no load to full load for line voltage variation of 10 percent, and frequency variation of 3 Hz from 60 Hz.
b. Charger shall maintain a nominal float voltage of 1.4 vpc, and a nominal equalizing voltage of 1.5 vpc.
c. AC circuit breaker (2-pole for single phase, 3-pole for 3 phase, shall be UL-listed or recognized type).
d. VDC fuse (fast acting type rated for appropriate VDC service).
e. Provide both AC and DC transient protection. Charger shall be able to recharge a fully discharged battery without tripping AC protective devices. AC circuit breaker shall not trip under any DC load condition, including short circuit on output terminals.
f. Charger shall have AC input and DC output circuit breaker protection.
g. Charger shall not discharge the batteries when AC power fails.

7. Features and Accessories

a. Charger shall have battery eliminator feature allowing for batteries to be disconnected without interrupting the output of the CPS.
b. Provide integrated D.C. distribution panel and circuit breakers for each charger to support switchgear under this project’s scope. Charger and DC distribution panel shall be packaged as one unit.
c. Digital DC meter for VDC, ADC, timer hours and alarm settings with minimum 1% accuracy.
d. Summary relay contact for AC Failure, DC Failure, High VDC, Low VDC, positive and negative ground fault.
e. On off control switch with AC pilot light.
f. I/O power terminal block.

F. Monitoring and Communication: Charger shall communicate, using DNP3, monitored statuses and alarms of the charger to the HMIs via the DAP server.
2.8 HUMAN MACHINE INTERFACE (HMI)

A. Basis-of-Design Product: (Subject to compliance with requirements), provide Advantech’s IPPC-6192A-S - 19” SXGA TFT LCD Core™2 Quad/Duo Industrial Panel PC; by Advantech.

B. Other manufactures will be considered, but equipment and proposed integrator, if applicable, must be submitted for review for owner’s approval.

C. HMI shall be U.L. listed.

D. The specific manufacturers and equipment above does not imply acceptance of their products that do not meet the specified ratings, features and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety.

E. Furnish two (2) HMI’s. One touchscreen, HMI 1, shall be mounted onto a cubicle door and a loose unit, HMI 2, to be mounted remotely in a console by others. Provide easily accessible connection for remote HMI 2, connection to be made by others.

1. HMI 1 (Switchgear):
   a. Provide HMI mounted on outward facing plane of switchgear.
   b. This device shall be read only and contain all information listed in the “HMI'SCREEN LISTING”.

2. HMI 2 (Remote location):
   a. Provide loose HMI for future installation at a remote location.
   b. The switchgear shall be fully controlled and configured from this interface. All screens listed in “HMI'SCREEN LISTING” shall be contained on this device and be able to be manipulated from this device.

F. HMI 1 and HMI 2 shall be powered by the CPS.

1. Provide DC to AC Inverters rated for zero to 40 degree C environment.
2. UPS back-up is not permitted.

G. Graphic screens shall be programmed by GE/Alstom and coordinated with owner. The screens shall provide alarms, status, and control of the DAP and all switchgear circuit breakers. Refer to section I for further clarification.

H. Hardware

1. HMI shall be of modular design have the following features:
   a. Enclosure rated NEMA type 12.
   b. Impact-resistant protective window over display.
   c. Field-replaceable flat panel backlight.

2. HMI shall support a USB keyboard for alphanumeric entry functions. Operator control actions through the touchscreen shall support the following features:
a. Positive, two-step control or critical control operations and immediate one-touch control for non-critical operations such as page change or mode change.
b. Field-replaceable touch screen.

I. Communications

1. HMIs shall offer the following communications choices:
   a. Built-in drivers for both Fiber and Ethernet communications protocols.
   b. Simultaneous communication to multiple elements of the DAP.
   c. Optional High-speed interfaces through either PCMCIA or PCI bus.
   d. Network down/uploading of configurations, drivers and runtime firmware.
   e. Dual serial ports.
   f. 10/100Base-T Ethernet communications.
   g. Built-in OPC Server connectivity.

J. Software and Configuration

1. Provide Windows operating system to support HMI application.

2. HMIs shall offer the following tools for creating and changing screen content:
   a. Common look and feel of NOC.
   b. Single configuration software for all products.
   c. Fill-in-the-blank configuration.
   d. Automatic conversion of existing configurations.
   e. Context-sensitive help screens.
   f. Pre-configured templates:
      1) Indicator.
      2) Button.
      3) Readout.
      4) Bar.
      5) Display.
      6) Clock.
      7) Multiline Text.
      8) LED Indicator.
      9) Touch Areas.
      10) Images – support for BMP, JPEG, WMF and EMF formats.
      11) Images – support for Ethernet based Cognex and DVT vision system images.
   g. Document Viewer Window for display of PDF, JPEG, TXT, and HTML file types.
   h. Media Player support for MPG and MPEG file types.
   i. Alarm and Event window.
   j. Full library of Boolean logic and math operators.
   k. Direct addressing of DAP data and OPC tags.
   l. Ethernet transfers.
   m. All documentation in HTML Help format.

3. The HMIs shall provide the following graphical capabilities:
a. Bitmap graphics (.bmp, jpg, .wmf and .emf formats).
b. Object-based pixel graphics.
c. Dynamic object-based graphics.
d. Blinking colors for up to 16 different blink states and up to 3 different blink rates.
e. Nondestructive updates.

4. Password entry screen that shall contain a numeric keypad for password entry.

1) Four levels of passwords shall be provided for HMI 2.

a) Read only
b) Operate
c) Configure
d) One level for future use.

2) HMI 1 shall not be password protected.

K. HMI Screens:

1. The switchgear control interface shall provide the following screens. The screens shall provide all of the information, metering, control, announcements, settings and indications listed below:

a. Match aesthetics and functionality of NOC.
b. Main menu screen with a complete listing of major screens/depictions.
c. System overview screen with a dynamic graphic display of the electrical one line and circuit breaker close/open position, and 86 trip status.
d. System control screen.
e. Feeder metering depiction.
f. System settings screen.
g. Breaker settings screen.
h. Time delay settings screen.
i. Capacity for future generator sets’ control, monitoring, and settings screen.
j. Capacity for future individual generator set’s control, monitoring, and settings screen.
k. Capacity for future engine monitoring screens for each generator set that shall contain a graphical representation of engine gauges and data.
l. Buses 1 and 2 Transfer Control.
m. Subsystems monitoring screen

1) CPS health and metering.
2) CN health.
3) Relay health.
4) Security system status.
5) Fire alarm status.

n. Annunciator screens as follows:

1) System annunciation screen that shall contain status, lamp test and alarm points.
2) Capability for future generator set annunciator screen for each generator set that shall contain status, lamp test, pre-alarms and shutdown faults.
3) Alarm summary screen that shall contain a time/date stamped system alarm summary.

2.9 CONTROL NETWORK ARCHITECTURE, EQUIPMENT, AND PROGRAMMING

A. Refer to contract drawings for equipment furnishing, installation, and programming responsibilities.

B. GE/Alstom shall update the NOC to recognize and communicate with the DAP as part of this contract.

1. Submit NOC HMI screen configuration and layout for owner approval.

C. All devices shall communicate using either DNP3 or IEC61850.

D. DAP server, ethernet switches, I/O modules and clock specified below shall be installed within the switchgear and supplied power by the CPS.

1. Mount devices such that their display panels are flush with the outward facing plane of the cubicle door when a display panel is available. Fully opening of the cubicle door shall not be impeded by the connections to the back of the CN equipment.

2. Maintenance or programming of the equipment shall not require a complete shutdown of the switchgear once installed.

E. DAP Server

1. Basis-of-Design Product: (Subject to compliance with requirements), provide GE/Alstom’s DAP Server DAP-AT mirroring the features and accessories currently implemented in The Navy Yard as well as the items addressed in this specification.

2. The DAP server shall be powered by the CPS.

3. The DAP Server shall have two output contacts which fail closed upon DAP Server failure. Additionally, upon DAP server failure, an indicating lamp shall be illuminated on the Buses 1 and 2 Transfer Control panel and on the HMIs.

4. DAP server alarms shall be reset via HMI 2.

5. Automatic and semi-automatic Buses 1 and 2 Transfer Control including logic, timers, permissives and interlocks shall reside in the DAP Server.

6. DAP server logic including control and monitoring logic for full main-tie-main operation, HMIs, Mimic board controls and interface with NOC (Network Operation Center) shall be submitted for review and approval six (6) weeks prior to factory witness test.

7. All mounting equipment, connecting cables, operating manuals, etc. must be included to provide a functioning control system.

8. Provide DAP IO Substation I/O Modules as necessary.

a. All modules shall be enclosed in rugged plastic housings. There shall be no user access to the circuit board components.

b. Minimum of sixteen (16) digital inputs and eight (8) digital outputs shall be reserved for spare.

c. Wire spare inputs and outputs to a terminal block for future customer use.

9. The following conditions shall be programmed as DAP Server outputs for the NOC:
Philadelphia Industrial Development Corporation
West End Substation 13.2kV Metal Clad Switchgear Pre-Purchase March 18, 2016

a. DAP Failure
b. Buses 1 and 2 Transfer Control in Automatic
c. Buses 1 and 2 Transfer Control in Manual
d. Automatic Transfer Disabled by Auto/Manual Switch
e. Automatic Transfer Disabled by Breaker Main Breaker Trip
f. U-1 PECO Passyunk 2040 Loss
g. U-2 PECO Passyunk 2044 Loss
h. Intrusion Alarm.
i. Fire Protection Alarm.
j. Metered values.

F. Ethernet switches shall be GE/Alstom T1000 – IEC61850 Ethernet Switch.

G. Clock shall be GE/Alstom RT430 – GPS Grandmaster Clock.

H. Gridstream radio shall be Landis+Gyr DA IWR Radio, Part Number: 26-1317.

1. Provide 125VDC to 12VDC isolated converter to supply the radio with 12VDC.

I. Relays, DAP server, HMI, clock, and Gridstream radio shall connect as defined within the contract drawings.

1. Multiple ethernet switches may be needed depending on the number of ports offered by a single switch.
2. Provide a minimum of 2 additional ports on each ethernet switch for future expansion.

J. Programming/Testing

1. Manufacture shall contract GE/Alstom Grid Solutions to program DAP Server, ethernet switches, clock, HMI's, and I/O modules.
2. Programmer

a. Programming software shall be supplied with the DAP system and be capable of programming, editing and monitoring of the program.
b. The software package shall be capable of on-line changes and offline programming, on-line monitoring, storage of programs to disk, and output of programs to a printer. Communication shall be through the standard COM ports of the personal computer. No special boards shall be required in the computer for the interface.

3. Programmed logic shall include:

a. All automatic transfer scheme operations described in the “UTILITY LINE LOSS MANUAL/AUTOMATIC SEQUENCE OF OPERATION”.
b. Relay configuring.
c. NOC intercommunication.
d. Monitoring of systems and subsystems as described throughout this specification.

4. GE/Alstom Grid Solutions shall conduct a functional test of the programed equipment at the manufactures factory.

K. Mimic Board:
1. Refer to contract drawings for mimic board details.
2. Enclosure shall be NEMA type 12.
   a. Match cabinet finish and mimic bus with color of switchgear enclosure and switchgear mimic bus.
3. Utilize same model of control switches on the breaker cubicles for mimic board without the “spring charged” label or amber LED indication.
4. Utilize same model of indicating lamp on the breaker cubicles for mimic board.
5. Provide terminal blocks for interconnecting wiring to switchgear.
6. Control switches shall be hardwired to switchgear breaker control logic wiring.

2.10 UTILITY LINE LOSS SEQUENCE OF OPERATION
A. Upon line loss from Normal Configuration, circuit breakers shall open or close as shown below:

<table>
<thead>
<tr>
<th>Bus Configuration</th>
<th>Circuit Breaker Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>U-1</td>
</tr>
<tr>
<td>Loss of U-1</td>
<td>Open</td>
</tr>
<tr>
<td>Loss of U-2</td>
<td>Closed</td>
</tr>
<tr>
<td>Simultaneous Loss of U-1 &amp; U-2</td>
<td>Closed</td>
</tr>
</tbody>
</table>

B. Buses 1 and 2 Transfer Control logic shall be stored and run within the DAP Server. The transfer sequences shall meet PECO Blue Book requirements. If the DAP server fails, switchgear control shall be capable to operate in an “open transition” mode and enable all local breaker control switches on mains, tie and feeder circuit breakers.

C. When in automatic, the breaker may be controlled by the automatic transfer screen. When in manual, the switch shall deactivate the automatic transfer scheme.

D. Protective relay sync check function permissive shall be hardwired in both mains and the tie breaker close circuits and status shall be sent to the DAP server.

E. Required Features For Buses 1 and 2 Automatic Transfer Control:
1. Automatic/Manual control switch:
   a. In “MANUAL” position:
      1) Automatic transfer is blocked
      2) Breakers may be tripped and closed (open transition only) at will from their local control switches, the mimic board, or HMI 2.
   b. In “AUTO” position:
      1) The automatic transfer shall be operative.
      2) If the main-tie-main breakers are paralleled when the Automatic/Manual selector switch is in the AUTO position, tie breaker (T-1) shall trip.
3) Main and tie breakers may be tripped from their control switch, the mimic board, or HMI 2.

4) Tripping breakers U-1, T-1 or U-2 from their control switch, the mimic board, or HMI 2 with the Automatic/Manual selector switch in AUTO will disable the automatic transfer control logic and cause the “AUTO TRANSFER DIABLED BY MAIN OR TIE BREAKER TRIP” indicating light to illuminate on the mimic board as well as raise an alarm on the HMIs.

5) All loss of voltage transfers shall be OPEN transition (break before make).

6) Upon loss of to either service (U-1 or U-2) and with a two (2) second (programmable) time delay, the automatic transfer control logic shall:

   a) Verify loss of voltage to the affected service
   b) Verify acceptable voltage is available on the alternate service
   c) Verify opposite utility breaker and tie lock out relays are reset.
   d) Trip the service breaker on the affected service via the lockout relay and close the tie breaker.

7) Automatic ‘Good Line Seeking’ shall be provided after a transfer to one line (transferring the total load from one available line to another as needed to maintain service until normal operating configuration can be established), After a programmable two (2) second time delay, the main breaker (U-1 or U-2) on the affected line shall trip and the service breaker on the available line shall close provided all lockout relays are reset. Tie breaker T-1 shall remain closed during ‘Good Line Seeking’ operations.

F. A Utility Line Loss Test selector switch shall be provided to simulate loss of voltage on a selected line. Refer to the contract drawings for switch details.

G. Restoration To Normal Split Load Service (Pre-Select Trip function):

1) Control logic shall verify normal 3-phase voltage is available on both services.
2) Control logic shall verify all service lockout relays are reset.
3) Upon return of acceptable voltage to the affected service, a manually initiated automatic closed transfer scheme (make before break) shall be commenced. Restoration to normal service sequence shall have the logic described below:

   a. The manually initiated automatic transfer back to normal service shall be initiated by the Pre-Select Trip switch (see contract drawings) to complete a make before break transfer. The duration of the utility lines being parallel shall be momentary and minimized.

1) Pre-Select Trip logic shall reside in the DAP Server. The transfer sequences is based on and shall meet PECO Blue Book requirements.
2) An example for restoration of service due to a loss of U-1 using the Pre-Select Switch is as follows:

   a) Loss of U-1, U-1 breaker trips.
   b) Automatic or manual transfer closes T-1.
   c) All requirements are met to restore normal service.
   d) Pre-Select “TRIP T-1” using the Pre-Select Trip Switch.
   e) Close U-1 breaker using mimic board or local breaker controls to cause a momentary paralleling of U-1 and U-2.
f) Pre-Select logic trips T-1 automatically to restore normal service.
3) An alarm shall be sent to the HMIs when the preselect is not in the “Off” position.

H. Circuit breaker in Test position shall block DAP, mimic board, and NOC commands.

2.11 LABELS AND SIGNS

A. Mimic Bus And Nameplates:

1. Engraved nameplates and single line mimic bus, mounted on the face of the switchgear and mimic board assemblies, shall be furnished for all main, tie and feeder circuits as indicated on the contract drawings. Nameplates shall be laminated plastic with black characters on white background and secured with screws unless otherwise noted. Characters shall be 1/4-inch high, minimum unless otherwise noted. Furnish master nameplate for each switchgear lineup giving information in accordance with IEEE Std. C37.20.2-2015, Section 7.4.1.

2. Mimic bus shall be red and match the single line diagram and show power flow and equipment.

3. Control components mounted within the assembly, such as DAP equipment, fuse blocks, relays, pushbuttons, switches, etc., shall be suitably marked for identification corresponding to appropriate designations on manufacturer’s wiring diagrams.

4. Custom circuit breaker nameplates with designations shall be provided and coordinated with owner.

5. Provide schedules for the CPS DC distribution panels on or within their cabinets.

2.12 SOURCE QUALITY CONTROL

A. Perform production tests on each circuit breaker housing for this Project, complying with IEEE C37.09.

1. Perform mechanical operation tests to ensure proper functioning of shutters, operating mechanism, mechanical interlocks, and interchangeability of removable elements that are designed to be interchangeable.

2. Conduct an alignment test with master circuit breaker to verify all interfaces.

3. Verify that control wiring is correct by verifying continuity. Perform electrical operation of relays and devices to ensure they function properly and in the intended sequence.

4. Perform the control wiring dielectric test at 1500 V for one minute.

5. Perform the dielectric test on primary and secondary circuits.

B. Perform production tests, on each circuit breaker supplied for this Project, complying with IEEE C37.09.

1. Perform mechanical operation tests to ensure proper functioning of the switch.

2. Conduct an alignment test with master cell to verify all interfaces and interchangeability.

3. Verify the contact gap. Perform terminal-to-terminal resistance test.

4. Verify that control wiring is correct by verifying continuity. Perform electrical operation of relays and devices to ensure they function properly and in the intended sequence. Operate the circuit breakers over the range of minimum to maximum of the control voltage.

5. Perform the control wiring dielectric test at 1500 V for one minute.
6. Set the contact gap.

2.13 EQUIPMENT EVALUATION PREPARATION

A. The manufacturer shall notify the owner prior to commencement of any testing.
B. The manufacturer shall be responsible for implementing all final settings and adjustments on protective devices and electrical equipment in accordance with the specified values from a coordination study.
C. Any system, material or workmanship which is found defective on the basis of electrical tests shall be reported directly to the owner and repaired free of cost.
D. The manufacturer shall maintain a written record of all tests and upon completion of the project, assemble and certify a final test report.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Upon delivery of switchgear, CPS, and CN and prior to unloading:

1. Examine tie rods and chains to verify they are undamaged and tight and that blocking and bracing are tight.
2. Verify that there is no evidence of load shifting in transit and that readings from transportation shock recorders, if equipped, are within manufacturer's recommendations.
3. Examine equipment for external damage, including dents or scratches in doors and sill, and termination provisions.
4. Compare equipment and accessories received with the bill of materials to verify that the shipment is complete. Verify that equipment and accessories conform to the manufacturer's quotation and shop drawings. If the shipment is not complete or does not comply with project requirements, notify the manufacturer in writing immediately.
5. Unload equipment observing packing label warnings and handling instructions.
6. Open compartment doors and inspect components for damage or displaced parts, loose or broken connections, cracked or chipped insulators, bent mounting flanges, dirt or foreign material, and water or moisture.

3.2 FACTORY TESTING

A. A DAP failure test shall be performed with a demonstration that all circuit breakers can still be opened and closed from their control switches.

B. All monitor and control systems including metering, DAP/HMI, automatic utility line transfer schemes, protective relay schemes and interface with Mimic panel shall be tested and verified at the factory prior to the Owner’s factory visit. The switchgear controls shall be fully functional for a comprehensive equipment demonstration.

C. The manufacturer shall provide three (3) certified copies of factory test reports.
D. The manufacturer shall provide a written witness/acceptance test four (4) weeks prior to owner’s factory visit. The acceptance test shall demonstrate all manual and automatic functions of the switchgear including Buses 1 and 2 Automatic Transfer Control and its interface with the mimic board and HMI 2.

E. The Owner’s factory visit and witness/acceptance test:

1. The manufacturer shall notify the Owner two (2) weeks prior to the scheduled factory witness/acceptance test.

2. The manufacturer shall include the cost for up to three (3) the Owner’s representatives for roundtrip air fare from Philadelphia International Airport, airport parking, local transportation, lodging, and meal per diem.

F. If the equipment fails to perform in accordance with plans and specifications during testing and corrections cannot be made in a timely manner, the factory visit and testing will be rescheduled at full expense to the manufacturer.

3.3 STARTUP, AND COMMISSIONING

Comply with Section 16955.

3.4 FIELD SERVICE

A. Comply with Section 16955 as well as the item below.

B. Provide the services of a qualified factory-trained manufacturer’s representative to assist a Contractor in installation and startup of the equipment specified under this specification for a minimum period of fifteen (15) working days. The manufacturer’s representative shall provide technical direction and assistance to the contractor in general assembly of the equipment, connections, adjustments and testing of the assembly and components contained therein.

3.5 TRAINING

A. The Manufacturer shall provide one (1) eight (8) hour training session on all switchgear systems and operations during normal work days and hours for up to six owner’s representatives at a job site location determined by the owner.

B. The Manufacture shall coordinate a time frame with the owner two weeks in advance.

C. The training session shall be conducted by a manufacturer’s qualified representative and a GE/Alstom qualified representative at the Owner’s facilities.

1. The Owner's maintenance personnel shall be trained to adjust, operate, and maintain systems. The course shall be taught on-site at the Philadelphia Navy Yard, and scheduled to accommodate DTE Philadelphia’s employees.
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SECTION 16955 – STARTUP AND COMMISSIONING OF ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.1 SCOPE

A. The Switchgear Manufacturer shall provide the field testing and startup services for the equipment provided under this contract and coordinate with project contractors (under separate contracts) to provide a completely tested and functional system. The system operation shall be demonstrated to the owner prior to acceptance.

B. Equipment damaged during shipment will be repaired by manufacture at no cost to owner.

1.2 APPLICABLE CODES, STANDARDS AND REFERENCES

A. All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.

1. National Electrical Manufacturer’s Association – NEMA
2. American National Standards Institute – ANSI
3. Institute of Electrical and Electronic Engineers – IEEE
7. Insulated Power Cable Engineers Association – IPCEA
8. Association of Edison Illuminating Companies – AEIC
9. Occupational Safety and Health Administration – OSHA
10. State and local codes and ordinances
11. Applicable Independent Testing Associations Specifications

B. All inspections and tests shall utilize the following references:

1. Project design specifications
2. Project design drawings
3. Manufacturer’s instruction manuals applicable to each particular apparatus.

1.3 DEFINITIONS

A. DAP: Distributed Automation Platform
B. HMI: Human Machine Interface, refer to specification 16346 – Medium Voltage, Metal Clad Switchgear for included equipment and functionality
C. CN: Control Network, refer to specification 16346 – Medium Voltage, Metal Clad Switchgear for included equipment and functionality
D. CPS: Control Network, refer to specification 16346 – Medium Voltage, Metal Clad Switchgear for included equipment and functionality
1.4 QUALIFICATIONS OF STARTUP TECHNICIAN

A. The testing plan and procedures shall be reviewed and approved by the owner. The startup technician shall be a full time employee of the manufacturer with at least 10 years of field experience testing electrical apparatus.

B. All employees working on this project shall have had specific factory, and/or field training in accordance with division-wide standards.

C. All test records shall be recorded onto standardized test forms. All data shall be uploaded to a central computer in a data-secured environment; therefore ensuring no changes can be incorporated into the final test records. These records shall be retrievable for a period of not less than five years, based on a mutually agreed periodic maintenance plan, separate from this contract.

D. Should repairs be required, the manufacturer shall maintain dedicated locations that perform remanufacturing and reconditioning of electrical equipment at no cost to owner. All repairs shall be conducted under the direction of a quality control and reconditioning standard pursuant to ISO9001 compliance. A quality certificate, computer database and final test records shall document the progress of each piece of electrical equipment through the repair or reconditioning process. All work shall be performed in accordance with industry standards.

E. Documentation of periodic audits, as specified in item D above, shall also be maintained for the dedicated remanufacturing and reconditioning facility.

F. The manufacturer shall have a calibration program which maintains all applicable test instrumentation within rated accuracy.

G. The accuracy shall be traceable to the National Bureau of Standards in an unbroken chain.

H. Instruments shall be calibrated in accordance with the following frequency schedule:

1. Field instruments – six to twelve months
2. Laboratory instruments – twelve months

I. Dated calibration labels shall be visible on all test equipment.

J. Records must be kept up to date, which show date and results of all instruments calibrated or tested.

K. An up-to-date instrument calibration instruction and procedure will be maintained for each test instrument.

1.5 SUBMITTALS

A. Acceptance Test Plan

1. Testing Schedule
2. List of all systems to be demonstrated
3. Description of test

B. The test report shall include the following:

1. Summary of project
2. Description of equipment tested
3. Description of test
4. Test results
5. Conclusions and recommendations
6. Appendix, including appropriate test forms
7. List of test equipment used and calibration date
8. Conditions for future access to secured computer database of all Test Data.

C. Furnish three copies of the completed report to the project engineer no later than 10 days after completion of testing.

1.6 SAFETY AND PRECAUTIONS

A. Safety practices shall include, but are not limited to, the following requirements:

3. Applicable state and local safety operating procedures.

B. The technician for the project shall be a designated safety representative and shall be present on the project and supervise testing operations and safety requirements.

C. In all cases, work shall not proceed until the safety representative has determined that it is safe to do so.

D. The testing group shall have available sufficient protective barriers and warning signs, where necessary, to conduct specified tests safely.

E. Site safety procedures shall be reviewed and understood by the manufacturer, contractor and field service personnel.

PART 2 - PRODUCTS

2.1 EQUIPMENT EVALUATION PREPARATION

A. The manufacturer shall notify the owner prior to commencement of any testing.

1. Owner reserves the right to witness tests.

B. The manufacturer or designated field service personnel shall be responsible for implementing all final settings and adjustments on protective devices and electrical equipment in accordance with the specified values from coordination study.
C. Any system, material or workmanship which is found defective on the basis of electrical tests shall be reported directly to the owner.

D. The manufacturer shall maintain a written record of all tests and upon completion of the project, assemble and certify a final test report.

PART 3 - EXECUTION

3.1 FIELD TESTING

A. The manufacturer shall provide all material, equipment, labor and technical supervision to perform electrical equipment tests and inspections. The field engineering service division of the equipment manufacturer shall administer all start-up and testing of their equipment in conjunction with the installed contractor.

B. Upon completion of the tests and inspections noted in these specifications, a label shall be attached to all serviced devices. These labels will indicate date serviced and the testing group responsible.

3.2 SWITCHGEAR TESTING

A. Main switchgear examination including breakers, and accessories for:

1. Doors, panels, and sections for alignment, dents, scratches, fit, and missing hardware.
2. Shipped loose and shipped short components.
3. Shipping damage.
4. Loose or obviously damaged components.
5. Proper identification.
6. Physical damage from installation.
7. If the unit was placed in temporary storage, verify and record that proper procedures were observed. Remove temporary heater wiring and shipping braces.

B. Inspection:

1. Shipping splits to insure that all bus connections were properly connected and all control wiring splits have been properly terminated.
2. Inspect all grounding connections for cleanliness and alignment.
3. Insulators for evidence of physical damage or contaminated surfaces.
4. Surge arrester and/or surge suppression size, type, installation and connection to determine if they are in accordance with the drawings.
5. Control power & instrument transformers.
6. Wiring for damaged insulation, broken leads, tightness of connections, proper crimping, and overall general condition.

C. Structure, grounding, cables and bus assembly verification:

1. Correct alignment and cleanliness.
2. The proper grounding of instruments, panels and connections
4. Cable termination tightness.
5. That all cables have been properly installed, routed and supported and are clear of energized parts.
6. That conduits and conduit bushings are correctly installed.
7. Tightness of accessible bolted electrical connections, especially shipping splits and busway connections, by calibrated torque-wrench method in accordance with manufacturers published data.

D. Control & Instrumentation verification:

1. That all VT and CT ratios properly correspond to drawings and that polarity is correct.
2. That shorting screws and bars are removed from CT’s and terminal blocks as required.
3. That primary and secondary fuse ratings or circuit breakers match manufacturer’s drawings.
4. Meter scaling.
5. Polarity.

E. Ductor testing

1. Inspect shipping splits for mechanical connection assuring adequate surface contact.
2. Ground bonding & shipping splits shall be tested with ductor tester (Digital low ohm resistance meter) to insure connection is a low resistance connection. Test from one fixed bus to adjacent fixed bus through the shipping split connector to measure both connection points.
3. Microhm values shall not vary more than 50% from other phase readings and meet the manufactures published data based on bus size, ampacities and material.

F. Control Network And Control Power System Testing

1. Protective relay, control circuits and interlock testing.
2. All control systems including but not limited to DAP, mimic board, Buses 1 and 2 Transfer Control and protective relay schemes shall be tested and verified at the. The switchgear controls shall be fully functional. Owner reserves the right to be present for a comprehensive equipment demonstration.
3. A DAP failure test shall be performed with a demonstration that all circuit breakers can still be opened and closed from their control switches and mimic board.
4. System monitoring testing including alarm inputs, status inputs, metering inputs, and CN.
5. CPS wiring and alarms.
6. Control power automatic transfer scheme testing from HMI 2.

3.3 PROTECTIVE RELAY SETTINGS

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study. Field adjustments to be completed by the manufacturer of the equipment.
B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

C. Notify Owner in writing of any required major equipment modifications.

D. Include synch check bus configuration switches (Dead Bus and Live Bus, Live Line and Dead Bus).

E. Manufacturer shall coordinate with PECO for PECO witness testing.

3.4 RESTORATION OF EQUIPMENT AND REPORTS

A. Before energizing insure all adjustable meters, relays and trip devices are properly set in accordance with the coordination study.

B. Note corrective actions taken, deficiencies, recommendations and any general comments.

C. Finish recording data on test forms, completely filling in the blanks. Enter into electronic database and provide location and access for owner to download.

3.5 OWNER DEMONSTRATION AND ACCEPTANCE TEST

A. The manufacture shall coordinate a time frame with the owner two weeks in advance for demonstration of all switchgear systems and operations at the Owner’s request. The testing organization shall submit a testing schedule and listing of all systems to be demonstrated for approval with the initial testing notice. Owner acceptance testing shall take place during standard work hours, Monday through Friday.

1. If the equipment fails to perform in accordance with plans and specifications during testing and corrections cannot be made in a timely manner, the (factory visit if requested by owner) and testing will be rescheduled at full expense to the manufacturer.

END OF SECTION 16955
SECTION 00623

CONTRACTOR'S CERTIFICATE OF NON-INDEBTEDNESS
TO CITY OF PHILADELPHIA,
THE PHILADELPHIA AUTHORITY FOR INDUSTRIAL DEVELOPMENT &
THE PHILADELPHIA INDUSTRIAL DEVELOPMENT CORPORATION

The individual or firm listed below hereby certifies and represents to the City of Philadelphia, the Philadelphia Authority for Industrial Development (PAID) and its agent, the Philadelphia Industrial Development Corporation (PIDC), that the individual(s) or firm(s) or the firm’s parent company(ies) and subsidiary(ies) are not currently indebted to the City, PAID or PIDC, nor will be indebted to the City, PAID or PIDC, for or on account of any delinquent taxes (including, but not limited to, taxes collected by the City on behalf of the School District of Philadelphia), liens, judgments, fees or other debts for which no written agreement or payment plan satisfactory to the City, PAID, or PIDC has been established. In addition to any other rights or remedies available at law or in equity, individuals(s) or firm(s) acknowledges that any breach of or failure to conform to this certification may, at the option and direction of PAID or PIDC result in disqualification from further consideration of the attached proposal.

____________________________________
Name of Individual or Development Firm

By: ____________________________________
Authorized Signatory

Title: ____________________________________
President or Vice President

____________________________________
Print Name

Attest: ____________________________________
Secretary or Treasurer

____________________________________
Print Name
CITY OF PHILADELPHIA
OFFICE OF ECONOMIC OPPORTUNITY
ANTIDISCRIMINATION POLICY- MINORITY, WOMAN AND DISABLED OWNED BUSINESS ENTERPRISES
FORMS, INSTRUCTIONS AND SPECIAL CONTRACT PROVISIONS (NON-COMPETITIVELY BID CONTRACTS)

Under the authority of Executive Order No. 03-12, the City of Philadelphia has established an antidiscrimination policy ("Policy") relating to the participation of Minority (MBE), Woman (WBE) and Disabled (DSBE) Owned Business Enterprises in City contracts. Executive Order 03-12 is administered by the City's Office of Economic Opportunity ("OEO").

The purpose of this Policy is to provide equal opportunity for all businesses and to assure that City funds are not used, directly or indirectly, to promote, reinforce or perpetuate discriminatory practices. The City is committed to fostering an environment in which all businesses are free to participate in business opportunities without the impediments of discrimination and participate in all City contracts on an equitable basis. In accordance with the contracting requirements of the City, the City’s antidiscrimination policy is applicable to this Notice of Contracting Opportunity (hereinafter, “NOCO”).

For this NOCO, the City has not established ranges for the participation of MBEs, WBEs and/or DSBEs (collectively, “M/W/DSBEs”), but applicant is still required to exercise its Best and Good Faith Efforts to include M/W/DSBEs in its proposal. "Best and Good Faith Efforts" are those efforts, the scope, intensity and appropriateness of which are designed and performed to achieve meaningful participation of M/W/DSBEs in the work described by the NOCO. Applicant’s desire to self-perform all of the work does not excuse applicant from its exercise of Best and Good Faith Efforts. Solicitations and any commitments with M/W/DSBEs shall be designated on the Solicitation For Participation and Commitment Form. The submission of this form and any supporting documentation (more fully discussed below) is an element of responsiveness to the NOCO and failure to submit the required information will result in rejection of your proposal.

Applicant hereby verifies that all forms, information and documentation submitted to OEO are true and correct and is notified that the submission of false information by applicant is subject to the penalties of 18 Pa.C.S. §4904 relating to unsworn falsification to authorities which may include payment of a fine of at least $1,000 and a term of imprisonment of not more than two years. Applicant also acknowledges that under 18 Pa.C.S. §4107.2 (a)(4) it is a felony in the third degree, punishable by a term of imprisonment of not more than seven years in addition to the payment of any fines or restitution, if, under any Contract awarded pursuant to this NOCO, applicant fraudulently obtains public moneys reserved for or allocated or available to minority business enterprises or women's business enterprises.

A. M/W/DSBE PARTICIPATION

1. Only firms that are certified by an approved certifying agency and identified in the OEO Certification Registry by the time of contract award will be counted for participation. An OEO Certification Registry is maintained by the OEO and is available online at www.phila.gov/OEO/directory. Firms owned and

1 The term “Notice of Contracting Opportunity,” shortened to the acronym “NOCO,” refers to the City’s contract solicitation documents and information posted on eContract Philly. Generally, these documents take the form of a Request for Proposals (RFP), Request for Qualifications (RFQ) or Request for Expression of Interest (RFI) and include any other document or information (for example, exhibits, appendices) related to the posting of the new contract opportunity.

2 Approved certifying agencies are identified on the OEO webpage found at www.phila.gov/OEO. Applicant is strongly encouraged to search the Pennsylvania Unified Certification Program (“PaUCP”) Directory which offers a robust listing of DBEs; the PaUCP Directory is found at www.pauclp.com.
controlled by minority persons, women or disabled persons, which are certified as MBE, WBE, DSBE or DBE by an approved certifying agency may apply to the OEO for listing in its OEO Certification Registry.

2. Participation is counted only if the M/W/DSBE performs a commercially useful function (“CUF”). An M/W/DSBE performs a Commercially Useful Function when it performs a distinct element of a City Contract (as required by the services to be performed in accordance with the NOCO) which is worthy of the dollar amount of the M/W/DSBE’s participant agreement and the M/W/DSBE carries out its responsibilities by managing and supervising the services involved and actually self-performing at least twenty percent (20%) of the services of the participant agreement with its own employees. For suppliers, an M/W/DSBE performs a Commercially Useful Function when it is responsible for sourcing the material, negotiating price, determining quality and quantity, ordering the material and paying for it from its own funds. Commercial usefulness will be evaluated and determined by the OEO on a proposal by proposal basis as informed by prevailing industry standards and the M/W/DSBE’s NAIC codes.

3. In order to maximize opportunities for as many businesses as possible, a firm that is certified in two or more categories (e.g. MBE and WBE and DSBE or WBE and DSBE) will only be counted as either an MBE or WBE or DSBE. The firm will not be counted toward more than one category. Applicants will note with their submission which category, MBE or WBE or DSBE, is submitted for counting.

4. An MBE/WBE/DSBE submitting as the prime applicant is required, like all other applicants, to submit a proposal that is responsive to the Policy. In addition, the participation of an M/W/DSBE partner, as part of a joint venture created for this contract, may be counted only to the extent of the M/W/DSBE partner’s ownership interest in the joint venture in accordance with the following criteria:
   • The MBE, WBE or DSBE partner(s) must be identified in the OEO Registry prior to contract award;
   • The M/W/DSBE partner(s) must derive substantial benefit from the arrangement;
   • The M/W/DSBE partner(s) must be substantially involved in all phases of the contract including planning, staffing and daily management;
   • The business arrangement must be customary (i.e., each partner shares in the risk and profits of the joint venture commensurate with their ownership interest, contributes working capital and other resources, etc).

5. M/W/DSBE subcontractors must perform at least twenty percent (20%) of the total amount of work to be performed under the subcontract with their own employees.

6. In listing participation commitments on the Solicitation for Participation and Commitment Form, applicants are required to list a description of the services or supply effort, the dollar amount of the quotation, and percentage of the contract the participation represents. In calculating the percentage amount, applicants may apply the standard mathematical rules in rounding off numbers. The OEO reserves the right to request clarifying information from applicants in the event of an inconsistency or ambiguity in the Solicitation For Participation and Commitment Form.

B. RESPONSIVENESS

1. A proposal responsive to the Policy is one which contains documentary evidence of the applicant’s exercise of Best and Good Faith Efforts. The applicant’s Solicitation For Participation and Commitment Form should include evidence of the M/W/DSBEs that have been solicited and any commitments to use M/W/DSBEs in performance of the contract. This form should be submitted with applicant’s proposal but the City, at its sole discretion, may allow applicants to submit or amend the Solicitation For Participation and Commitment Form at any time prior to award. As an expression of Best and Good Faith Efforts, the Solicitation For Participation and Commitment Form must contain the following information:
   • Documentation of all solicitations (regardless of whether commitments resulted
therefrom) as well as all commitments made on the enclosed document entitled “Solicitation For Participation and Commitment Form”. Applicants should only make actual solicitations of M/W/DSBEs whose services or materials are within the scope of this NOCO. Mass mailing of a general nature to M/W/DSBEs or similar methods will not be deemed solicitation, but rather will be treated as informational notification only. A reasonable period of time should be given to all solicited firms to ensure that they have sufficient time to adequately prepare their quotes/subproposals. The applicant’s listing of a commitment with an M/W/DSBE constitutes a representation that the applicant has made a legally binding commitment to contract with such firm, upon receipt of a contract award from the City (“Contract Commitment”).

• If the applicant has entered into a joint venture with an MBE, WBE and/or DSBE partner, the applicant is also required to submit along with the Solicitation For Participation and Commitment Form, a document entitled “Joint Venture Eligibility Information Form,” available at OEO, for the City’s review and approval of the joint venture arrangement.

2. In evaluating applicant’s Best and Good Faith Efforts, OEO will review the scope, intensity and appropriateness of these efforts to ascertain whether they could reasonably be expected to achieve meaningful M/W/DSBE participation in this contract. Failure to submit the documentary evidence of Best and Good Faith Efforts will result in rejection of the proposal as nonresponsive, although the City, at its sole discretion, may allow applicants to submit or amend their submission at any time prior to award which may result in revision to applicant’s participation commitments. The submission shall contain and discuss, at a minimum, the following:

• Provide reasons for not committing with any MBE/WBE/DSBEs that submitted a quote/subproposal, regardless of whether the quote/subproposal was solicited by applicant.
• Provide any additional evidence pertinent to applicant’s conduct relating to this NOCO including sufficient evidence which demonstrates to the OEO that applicant has not engaged in discriminatory practices in the solicitation of and commitment with contract participants. In describing applicant’s efforts to achieve meaningful M/W/DSBE participation, applicant may submit any corroborating documentation (e.g., copies of advertisements for participation).

The applicant's documentary evidence will be reviewed by the OEO to determine whether applicant exercised Best and Good Faith Efforts. Applicant’s expressed desire to self-perform services with its own employees will not excuse applicant from exercising Best and Good Faith Efforts to include M/W/DSBEs in its proposal. OEO’s review will include consideration of the following:

• Whether the applicant's actions were motivated by considerations of race or gender or disability. The OEO may investigate the applicant's contracting activities and business practices on similar public and private sector contracts. For example, if applicant rejects any M/W/DSBE based on price, applicant must fully document its reasons for the rejection and also demonstrate that applicant subjects non-M/W/DSBEs to the same pricing standards. OEO will investigate whether there was any attempt at good faith negotiation of price.
• Whether M/W/DSBEs were treated as equally as other businesses in the solicitation and commitment process. For example, the OEO will investigate whether M/W/DSBEs are given the same information, access to the plans and requirements of the contract and given adequate amount of time to prepare a quote/subproposal as others who were solicited by applicant. The OEO will also investigate whether M/W/DSBEs were accorded the same level of outreach as non-M/W/DSBEs, for example whether applicant short listed M/W/DSBEs for participation or solicited M/W/DSBEs at any pre-proposal meetings.
• Whether the applicant's contracting decisions were based upon policies which disparately affect M/W/DSBEs. OEO will ascertain whether applicant selected portions of work or material needs consistent with the capacity of available M/W/DSBE subcontractors and suppliers. OEO will consider whether applicant employed policies which facilitate the participation of M/W/DSBEs on City contracts such as segmentation of the contract or prompt payment practices.
3. After review of the applicant’s submission and other information the OEO deems relevant to its evaluation, the OEO will make a written determination that will be forwarded to the awarding City Department.

- If the proposal is determined nonresponsive by the OEO, the applicant will be notified and may file a written appeal with the Executive Director of OEO within forty-eight (48) hours of the date of notification; the decision of the Executive Director shall be final.

C. RESPONSIBILITY

1. Upon award, the completed Solicitation For Participation and Commitment Form and accompanying documents regarding solicitation and commitments with MBEs, WBEs and DSBEs become part of the contract and the successful applicant is required to enter into legally binding agreement(s) ("M/W/DSBE Subcontract(s)") with its M/W/DSBE participants for the services and in the dollar amount(s) and percentage(s) as so committed (the "Contract Commitment(s)"). M/W/DSBE percentage commitments are to be maintained throughout the term of the contract and shall apply to the total contract value (including amendments). Any change in commitment, including but not limited to substitutions for the listed firm(s), changes or reductions in the work and/or listed dollar/percentage amounts, must be pre-approved in writing by the OEO.

2. Unless otherwise specified in the M/W/DSBE Subcontract, the successful applicant shall, within five (5) business days after receipt of a payment from the City for services performed under the contract, deliver to its M/W/DSBE participants, their proportionate share of such payment for services performed (including the supply of materials). In connection with the payment of its M/W/DSBE participants, the successful applicant agrees to fully comply with the City’s payment reporting process which may include the use of electronic payment verification systems.

3. No privity of contract exists between the City and any M/W/DSBE participant identified in any contract resulting from this NOCO. The City does not intend to give or confer upon any such M/W/DSBE participant any legal rights or remedies in connection with the subcontracted services pursuant to Executive Order 03-12 or by reason of any contract resulting from the NOCO except such rights or remedies that the M/W/DSBE subcontractor may seek as a private cause of action under any legally binding contract to which it may be a party.

4. If the OEO determines that the applicant has discriminated against a M/W/DSBE at any time during the term of the contract, the OEO may recommend to the Director of Finance the imposition of sanctions on the applicant including debarment of the applicant from submitting and/or participating in future City contracts for a period of up to three (3) years.

D. ACCESS TO INFORMATION

1. The OEO shall have the right to make site visits to the applicant’s place of business and/or job site and obtain documents and information from any applicant, subcontractor, supplier, manufacturer or contract participant that may be required in order to ascertain applicant’s responsiveness and responsibility.

2. Failure to cooperate with the OEO in its review may result in a recommendation to terminate the contract.
E. RECORDS AND REPORTS

1. The successful applicant shall maintain all books and records relating to its M/W/DSBE commitments (e.g. copies of quotations, subcontracts, joint venture agreement, correspondence, cancelled checks, invoices, telephone logs) for a period of at least three (3) years following acceptance of final payment from the City. These records shall be made available for inspection by the OEO and/or other appropriate City officials. The successful applicant agrees to submit reports and other documentation to the OEO as deemed necessary by the OEO to ascertain the successful applicant’s fulfillment of its M/W/DSBE commitments.

F. REMEDIES

1. The successful applicant’s compliance with the requirements of Executive Order 03-12 is material to the contract. In the event the City determines that the successful applicant has failed to comply with any of the requirements of this Antidiscrimination Policy, including substantial compliance with any Contract Commitment, the City may, in addition to any other rights and remedies it may have under the Contract which includes termination of the Contract, exercise one or more of the following remedies which shall be deemed cumulative and concurrent:

- Debar successful applicant from proposing on and/or participating in any future contracts for a maximum period of three (3) years.

- Withhold from the contract payment(s) or any part thereof until corrective action is taken. If corrective action is not taken to the satisfaction of OEO, the City may, without institution of a lawsuit, deduct money in an amount equal to the M/W/DSBE shortfall which amount shall be collected and considered not as a penalty but as liquidated damages for the successful applicant’s failure to comply with the contract.

The remedies enumerated above are for the sole benefit of the City and City’s failure to enforce any provision or the City’s indulgence of any non-compliance with any provision hereunder, shall not operate as a waiver of any of the City’s rights in connection with any contract resulting from this NOCO nor shall it give rise to actions by any third parties including identified M/W/DSBE participants.
### ANTIDISCRIMINATION POLICY SOLICITATION FOR PARTICIPATION AND COMMITMENT FORM

Minority (MBE), Woman (WBE), Disabled (DSBE) and Disadvantaged (DBE) Business Enterprises

**DEPARTMENT OF COMMERCE**

**OFFICE OF ECONOMIC OPPORTUNITY (OEO)**

<table>
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<tr>
<th>Bid Number or Proposal Title:</th>
<th>West End Substation 13.2kV Metalcalp Switchgear</th>
<th>Name of Bidder/Proposer:</th>
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<td><strong>Bid/RFP Opening Date:</strong></td>
<td>3/18/2016</td>
<td><strong>Bid/RFP Opening Date:</strong></td>
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List below ALL MBE/WBE/DBE/DSBEs that were solicited regardless of whether a commitment resulted therefrom. - Photocopy this form as necessary.

<table>
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<tr>
<th>MBE</th>
<th>WBE</th>
<th>DSBE</th>
<th>M-DBE</th>
<th>W-DBE</th>
<th>Work or Supply Effort to be Performed</th>
<th>Date Solicited</th>
<th>Commitment Made</th>
<th>Give Reason(s)</th>
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<th>Company Name</th>
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<tr>
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<td>NO</td>
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1. If Bidder/Proposer makes solicitation(s) and commitment(s) with a DBE, Bidder/Proposer shall indicate which class type, M-DBE or W-DBE, is submitted for credit.

2. Attach all quotations to this form.

09/2010
WEST END SUBSTATION
13.2kV METAL CLAD SWITCHGEAR
PRE-PURCHASE

CONTRACT DRAWINGS - 03/07/16
# Scoring Rubric

## Proposal Requirements

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<tr>
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<th>Unweighted Available Points</th>
<th>Proposal Requirements</th>
<th>Response</th>
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<td>Support office is within 100 miles of Philadelphia</td>
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<td>Switchgear is U.L. listed and labeled</td>
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<td>Field Support</td>
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<td>GE/Alstom Programming</td>
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<td>GE/Alstom Field Services (start-up and commissioning)</td>
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<td>GE/Alstom Equipment</td>
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<tr>
<td><strong>DEVIATIONS AND EXPECTATIONS (acceptable reason/total number of deviations or exceptions)</strong></td>
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<td>N/A</td>
<td>Annotated copy of the Specifications noting, conformance, deviations, and exceptions</td>
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</table>

* If not provided, bid is subject to rejection

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*Weighted Total Score: [15, 35]*

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[PIDC Logo]

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