

Request for Quotation

Buffalo Urban Development Corporation

Request for Quotation for:

Northland Corridor Redevelopment Project Phase 3

EDA Award Number: 01-79-15280

RFQ Issued: March 4, 2024

Questions Due: 4:00 P.M. on March 25, 2024

Submissions Due: 1:00 P.M. on April 1, 2024



**Empire State
Development**



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1.0 Introduction

Buffalo Urban Development Corporation (BUDC) is the City of Buffalo's not-for-profit local development corporation, reclaiming distressed land and buildings for future development. Mayor Byron W. Brown is the Chairman of the Board which oversees BUDC. As a local development corporation, BUDC seeks to create an environment conducive to private investment, provide oversight and visioning for projects of regional significance, serve as a liaison among various public and private stakeholders, serve as a conduit for public funding of significant projects, and serve as a real estate holding company for certain public-sector projects.

The mission of BUDC is to support the urban economic development efforts of the region through the acquisition, remediation, and management of distressed properties, and to engage in related real estate development activities for the purpose of attracting and/or retaining new and existing businesses to the City as part of the region. The mission of BUDC also includes supporting the revitalization of downtown Buffalo by serving as the lead management entity for Buffalo Building Reuse Project (BBRP) initiatives, working in collaboration with the City of Buffalo, including the coordination of financial assistance for downtown adaptive re-use projects, public right-of-way improvements, and the Ralph C. Wilson Jr. Centennial Park project.

2.0 Project Overview

BUDC is soliciting quotations from equipment manufacturers for equipment that will be used for substation upgrades located at 644 Northland Avenue, Buffalo, NY. The customer-owned substation will be upgraded as part of Phase 3 of the Northland Corridor Redevelopment Project to accommodate additional electric capacity at the site as the campus expands.

The intent and purpose of this request for quotations is to solicit responses for the selection of a vendor to provide switchgears and three medium voltage liquid-filled transformer at the customer-owned substation located at 644 Northland Avenue Buffalo, NY. The equipment and accessories shall be in accordance with the provided technical specifications in Exhibit A.

Questions Regarding the RFQ

Any questions regarding this RFQ should be made in writing to Angelo Rhodes II at arhodes@buffalourbandevelopment.com no later than March 25, 2024 at 4:00 PM EST. No requests for oral interpretations via telephone will be accepted.

BUDC RESERVES THE RIGHT TO REJECT ANY OR ALL QUOTATIONS, AND THE RIGHT TO WAIVE ANY INFORMALITIES THEREIN.

3.0 Northland Corridor Background & Project Area

In September 2014, Governor Andrew M. Cuomo and Mayor Byron W. Brown announced plans for the acquisition and redevelopment of fifty (50) acres of vacant and underutilized land, as well as over 700,000 SF of industrial buildings along the City's Northland Beltline Corridor. As part of the Buffalo Billion Initiative, the mission was to create a state-of-the-art hub campus for workforce training and advanced manufacturing, to spur new economic opportunity and job creation within the City of Buffalo.

As lead developer and owner/manager, the Buffalo Urban Development Corporation (BUDC) is overseeing the transformation. In working with Empire State Development (ESD) and the New York Power Authority (NYPA), a redevelopment strategy has been formulated that focuses on advanced manufacturing, technology, clean energy, and green initiatives.

Since the launch of the project in August 2017, Phases 1 and 2 have been completed. Phase 1 was anchored by the NWTC at 683 Northland Avenue (Northland Central) and included the transformation of 120,000 SF of space to include administrative areas, classrooms, industrial shops, and labs to train and turn out highly skilled members of the local community. The remaining 115,000 SF was transformed into additional office and manufacturing space for select tenants including BMW, Insyte Consulting, SmartCharge, ReTech Systems, Garwood Medical, and Rodriguez Construction Group. Phase 1 also included the demolition of the Houdaille main plant, as well as the renovation of the 'A' building at 612 Northland Avenue to temporarily house the Albright-Knox art gallery. Phase 2 of the project featured improvements to the surrounding streetscape. Work included the enhancement of traffic flow, as well as the installation of new signage, pavement markings, traffic signals, and safety cameras. The pedestrian environment was also improved with the adaption of new granite curbs, curb extensions, wider sidewalks, ADA-compliant sidewalk ramps, and audible pedestrian signals. In addition, new trees were planted, lighting was added, and a public space was created. Located at 577 Northland Avenue, this public space is complete with green infrastructure, including stormwater planters, bioswales, and landscaping.

Phase 3 of this project will further advance the Western New York Regional Economic Development Council's vision to create an advanced manufacturing hub along the Northland Corridor on Buffalo's East Side. Funding sources include an EDA award under the Build Back Better Regional Challenge (Project Number 01-79-15280).

Project Location

The figure below is a map of the City of Buffalo with the Northland Corridor noted. The substation is located at 644 Northland Avenue, Buffalo, NY. The site is on the East Side of Buffalo and within the Northland Avenue Neighborhood. This community is approximately 1.5 square miles in total and includes a mix of residential streets, industrial facilities, and limited retail. This walkable neighborhood also features the Erie County Medical Center Campus and Mt. Olive Baptist Church to the north, as well as several public schools. Other surrounding neighborhoods include Kensington to the north, Hamlin Park to the West, and Martin Luther King, Jr. Park to the South.

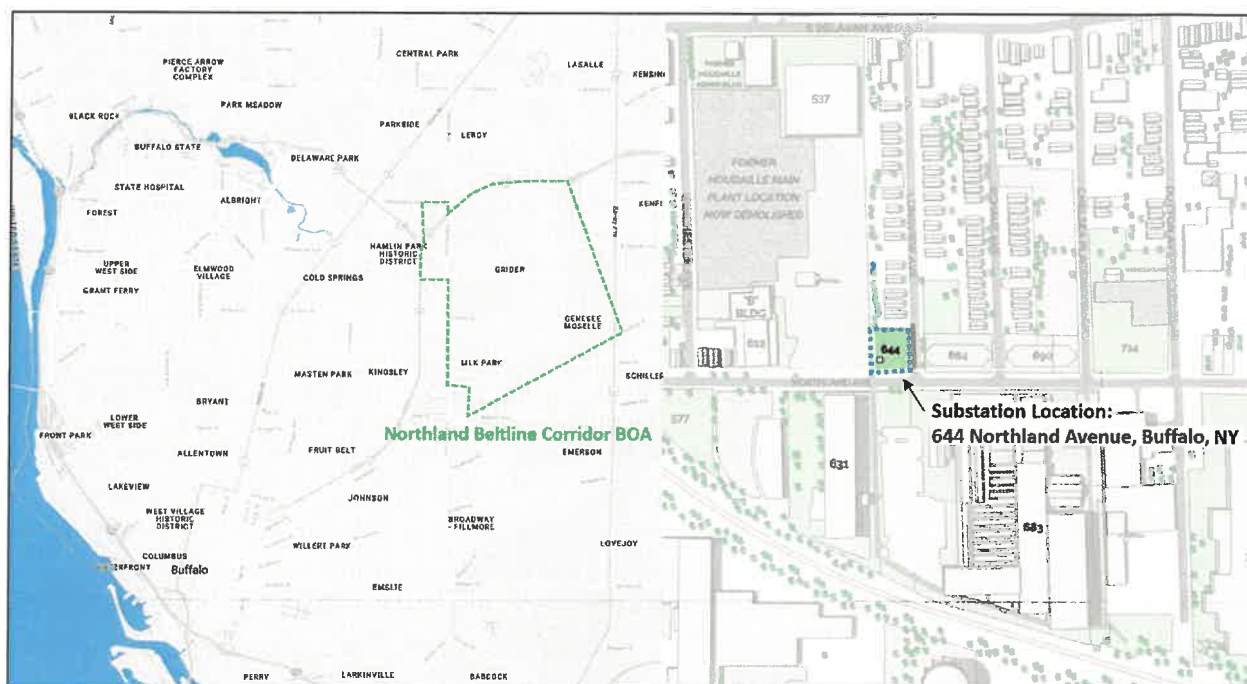


Figure 1: Project Location

4.0 Scope of Work

For the quotation submittal, the following outlines the required equipment. Please refer to Exhibit A for detailed equipment specifications. The scope for this quotation includes procurement and delivery of the equipment to the project site.

- 5kV switchgear
- 23kV switchgear
- Medium voltage liquid-filled transformers

5.0 Compliance with Funding Sources

Funding for the purchase of the equipment for which quotes are being sought pursuant to this RFQ are being provided to BUDC through a grant made available from the United States Department of Commerce Economic Development Administration (EDA) and from a grant made available through the New York Urban Development Corporation d/b/a Empire State Development (ESD). This project will be partially funded with federal funds from the EDA, it is therefore subject to the Federal laws and regulations associated with that program.

U.S. Department of Commerce EDA Standard Terms and Conditions for Construction Projects, as well as the U.S. Department of Commerce Financial Assistance Standard Terms and Conditions can be viewed at <https://eda.gov/arpa/build-back-better/>.

BUY AMERICAN POLICY: Consistent with Executive Order 13858, “Strengthening Buy-American Preferences for Infrastructure Projects” and Executive Order 14005, “Ensuring the Future Is Made in All of America by All of America’s Workers,” contractors must comply with Buy American Act with funding provided under EDA award conditions.

The selected vendor must have an active SAM registration.

6.0 Quote Format/ Requirements

Submissions must include the following information in a brief and concise format. While there is no page limit for quotations, they should be concise. BUDC reserves the right to request additional information during the review of quotations and to reject any and all submissions.

Cover Letter

The cover letter should include the official name of the firm submitting the quotation, mailing address, e-mail address, telephone number, and primary contact name. The letter must be signed by an official authorized to bind the proposer contractually and contain a statement that the quotation is firm for ninety (90) days. An unsigned letter, or one signed by an individual not authorized to bind the proposer, may be disqualified.

Proposed Equipment Data

The proposed equipment's specifications should include all required metrics outlined in Exhibit A. Recommended alternatives should also be included with justification and technical performance data, as required.

Minority and Women Business Enterprise Business Interest

In accordance with Governor Hochul's Executive Order No. 8 establishing a policy to promote equal opportunity in contracting for all persons, without discrimination for minority group members and women and business enterprises owned by them, and to eradicate the barriers that have impaired access by minority and women-owned business enterprise to State contracting opportunities, BUDC and ESD seek to encourage meaningful partnerships with and participation from NYS-certified Minority and Women-Owned Business Enterprise (M/WBE) at all project levels. For purposes of this solicitation, ESD hereby establishes an overall goal of 30% for Minority and Women-Owned Business Enterprises ("MWBE") participation for third-party vendors and services utilized for this contract. The vendor must document good faith efforts to provide meaningful participation by M/WBE's subcontractors or suppliers in the performance of the contract and agrees that BUDC may withhold payment pending receipt of the required M/WBE documentation. M/WBEs companies are encouraged to respond.

Please also include in your quotation:

1. Special tools necessary for installation, testing, and maintenance.
2. Necessary drawings, instructions, and test reports in the English language.
3. In addition to other submittal requirements, final drawings shall be submitted as AutoCAD format files.
4. Maintenance equipment and spare parts.
5. Start-up and training.
6. Proposed payment terms.

Pricing Data

The pricing quotation shall include the proposed cost for the manufacturing, furnishing, delivery, and testing of the specified equipment, including all applicable taxes (BUDC is a tax-exempt corporation) and shipping

costs in a single lump sum in Exhibit B. No part of the fee for other services will be based on a cost-plus-a-percentage-of-cost or a cost using multiplier.

Attachments

Please complete and include all forms under Exhibit B as an Addendum to your quotation.

7.0 Submission Instructions

Seven copies of the quotation must be submitted in hard copy and one (1) electronically via email, no later than 1:00 PM EST on April 1, 2024 to:

Angelo Rhodes II Project Manager
Buffalo Urban Development Corporation
95 Perry Street, Suite 404
Buffalo, New York 14203
Email: arhodes@buffalourbandevelopment.com

8.0 Selection Process

A detailed evaluation of quotations will be conducted by BUDC. To select the most advantageous vendor related to the scope of work contained in the RFQ, comparative judgments of technical factors, in addition to price, will be necessary. Evaluation will be based on the following criteria, not necessarily in the order provided or with equal weight given to each criterion.

1. Responsiveness to the provisions and requirements of this RFQ: 10%
2. Ability to meet required specifications or intent as proposed in recommended alternative: 10%
3. The availability of adequate personnel to provide the requested services safely and efficiently: 10%
4. The thoroughness of the quotation and clarity of the services to be provided: 10%
5. Quality of performance of previous contracts or services as demonstrated through references and/or previous clients: 20%
6. Fee quotation: 25%
7. Lead time: 15%

Based on the received quotations, BUDC will select the responsible firm whose proposal is most advantageous to BUDC, with price and other factors considered.

9.0 General Requirements

According to State Finance Law §§139-j and 139-k, this Request for Quotation imposes certain restrictions on communications between respondents and BUDC during the procurement process. Respondents are prohibited from making contacts (whether oral, written, or electronic) with any BUDC personnel or BUDC Board member other than the designated BUDC staff member (unless the contact is otherwise permitted under State Finance Law §139-j(3)(a)). In addition, respondents are hereby notified that any contact with any BUDC personnel, BUDC Board member, or the designated BUDC staff member which a reasonable person would infer is intended to influence the award of the contract under this Request for Quotation is prohibited.

These prohibitions apply from the respondent's earliest notice of BUDC's intent to solicit quotations through the final award and approval of the procurement contract ("Restricted Period"). For this Request for Quotation, the designated BUDC staff member is Angelo Rhodes II arhodes@buffalourbandevelopment.com.

Respondent's Affirmation of Understanding of and Agreement Pursuant to State Finance Law §139-j(3) and §139-j(6)(b)

BUDC is required to obtain written affirmations from all respondents as to the respondent's understanding of, and agreement to comply with BUDC's procedures relating to permissible contacts (described in paragraph 1 above). The affirmation must be provided to BUDC when the respondent submits its qualification statement. The form of affirmation to be completed and submitted by the respondent is included herein as Exhibit A - Attachment 1 – Affirmation of Understanding Agreement.

Respondent's Certification of Compliance with State Finance Law §139-k(5)

State Finance Law §139-k(5) requires respondents to provide written certification that all information provided to BUDC with respect to State Finance Law §139-k is complete, true and accurate. The certification must be provided to BUDC when the respondent submits its qualification statement. The form of certification to be completed and submitted by the respondent is included herein as Exhibit A – Attachment 2 – Offeror/Bidder Certification.

Respondent Disclosure of Prior Non-Responsibility Determinations

State Finance Law §139-k(2) obligates BUDC to obtain specific information regarding prior non- responsibility determinations with respect to State Finance Law §139-j. In accordance with State Finance Law §139-k, each respondent must disclose whether there has been a finding of non-responsibility made within the previous four (4) years by any Governmental Entity due to: (a) a violation of State Finance Law §139-j or (b) the intentional provision of false or incomplete information to a Governmental Entity. State Finance Law §139-j sets forth detailed requirements about the restrictions on contacts during the procurement process. A violation of State Finance Law §139-j includes, but is not limited to, an impermissible contact during the Restricted Period (for example, contacting a person or entity other than the designated contact person, when such contact does not fall within one of the exemptions).

As part of its responsibility determination, State Finance Law §139-k(3) mandates consideration of whether a respondent fails to timely disclose accurate or complete information regarding the above non- responsibility determination. In accordance with the law, no procurement contract shall be awarded to any respondent that fails to timely disclose accurate or complete information under this section, unless a finding is made that the award of the procurement contract to the respondent is necessary to protect public property or public health and safety, and that the respondent is the only source capable of supplying the required article of procurement within the necessary timeframe. Exhibit A – Attachment 3 – Offeror Disclosure of Prior Non-Responsibility must be completed by the respondent and submitted to BUDC at the time of respondent's submission of its qualification statement.

New York State Finance Law §139-k (5) provides that every procurement contract award subject to the provisions of State Finance Law §§139-k and 139-j shall contain a provision authorizing termination of the contract in the event that the certification provided by the respondent that is awarded the contract is found

to be intentionally false or intentionally incomplete. Such provision shall be included in the contract that is awarded (if one is awarded) pursuant to this Request for Quotation.

Required Federal Contract Provisions

BUDC is required to comply with all required federal contract provisions. The submission of a response to this solicitation indicates compliance with and is hereby incorporated by reference and included in the contract, Appendix II to 2 CFR Part 200 – Contract Provisions for Non-Federal Entity Contracts Under Federal Awards.

ATTACHMENT A

Affirmation of Understanding & Agreement pursuant to State Finance Law §139-j (3) and §139-j (6) (b)

I affirm that I understand and agree to comply with the procedures of the BUDC relative to permissible contacts as required by State Finance Law §139-j (3) and §139-j (6) (b).

By: _____ Date: _____

Name: _____ Title: _____

Contractor Name: _____

Contractor Address: _____

ATTACHMENT B

Offerer/Bidder Certification:

I certify that all information provided to the BUDC with respect to State Finance Law §139-k is complete, true and accurate.

By: _____ Date: _____

Name: _____ Title: _____

Contractor Name: _____

Contractor Address: _____

ATTACHMENT C

Offerer Disclosure of Prior Non-Responsibility Determinations

Name of Individual or Entity Seeking to Enter into the Procurement Contract:

Address:

Name and Title of Person Submitting this Form:

_____ Date: _____

1. Has any Governmental Entity made a finding of non-responsibility regarding the individual or entity seeking to enter into the Procurement Contract in the previous four years? (Please circle):

No

Yes

If yes, please answer the next questions:

2. Was the basis for the finding of non-responsibility due to a violation of State Finance Law §139-j (Please circle):

No

Yes

3. Was the basis for the finding of non-responsibility due to the intentional provision of false or incomplete information to a Governmental Entity? (Please circle):

No

Yes

4. If you answered yes to any of the above questions, please provide details regarding the finding of non-responsibility below.

Governmental Entity:

Date of Finding of Non-responsibility:

Basis of Finding of Non-Responsibility:

(Add additional pages as necessary)

5. Has any Governmental Entity or other governmental agency terminated or withheld a Procurement Contract with the above-named individual or entity due to the intentional provision of false or incomplete information? (Please circle):

No

Yes

6. If yes, please provide details below.

Governmental Entity:

Date of Termination or Withholding of Contract:

Basis of Termination or Withholding:

(Add additional pages as necessary)

Offerer certifies that all information provided to the BUDC with respect to State Finance Law §139-k is complete, true and accurate.

By: _____ Date: _____ Signature

Name: _____ Title: _____

Exhibit A: Equipment Specifications

Please refer to the attached specifications for equipment requirements.

Exhibit B: Pricing

Please complete the following table with quoted pricing for the specified equipment. Make note of anticipated lead times and any provisions or exceptions as required.

Item	Quantity	Lump Sum Cost	Estimated Lead Time (weeks)
5kV Switchgear			
23kV Switchgear			
Medium-Voltage Liquid-Filled Transformer			

CERTIFICATION REGARDING LOBBYING LOWER TIER COVERED TRANSACTIONS

Applicants should review the instructions for certification included in the regulations before completing this form. Signature on this form provides for compliance with certification requirements under 15 CFR Part 28, "New Restrictions on Lobbying."

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 15 CFR Part 28, for persons entering into a grant, cooperative agreement or contract over \$100,000 or a loan or loan guarantee over \$150,000 as defined at 15 CFR Part 28, Sections 28.105 and 28.110, the applicant certifies that to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure occurring on or before October 23, 1996, and of not less than \$11,000 and not more than \$110,000 for each such failure occurring after October 23, 1996.

As the duly authorized representative of the applicant, I hereby certify that the applicant will comply with the above applicable certification.

NAME OF APPLICANT

AWARD NUMBER AND/OR PROJECT NAME

PRINTED NAME AND TITLE OF AUTHORIZED REPRESENTATIVE

SIGNATURE

DATE

Specification Northland 5kV Gear
December 1st
Revision 0
Issued for Vendor Quotation

1. General

- A. The metal-clad switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA SG-4 and SG-5, IEEE, and but not limited to ANSI 37.20.2.
- B. Switchgear and enclosure to follow standards outlined in National Grid ESB 752.
- C. Provided Drawing E-701 shows intended configuration for 23kv rated gear including rating and protective relay configurations.

2. 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. Two rear covers shall be furnished for each vertical section for circuit isolation and ease of handling.
- B. **Buses and Connections:** The main bus shall be copper and have fluidized bed epoxy flame retardant and track-resistant insulation. The bus supports between units shall be flame-retardant, track-resistant, glass polyester for 5kV class. 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. A copper ground bus shall extend the entire length of the switchgear.
- C. **Circuit Breaker Compartment:** The circuit breaker compartment shall be equipped to house the removable breaker element. The mechanism for levering the breaker shall be cell mounted and include all of the necessary interlocks to render the breaker mechanism mechanically trip free during the levering procedure. A contact shall ground the breaker between and at the operating and test positions.

The stationary primary contacts shall be silver-plated and recessed within insulating tubes. A steel 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.

- D. **Circuit Breaker:** The circuit breakers shall be horizontal 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.

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 for 5kV class. 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.

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.

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.

Each circuit breaker shall have the following ratings:

Maximum Voltage	5kV
BIL Rated	95kV
Continuous Current	1200 Amperes
Short Circuit Current At Rated Maximum kV	25kA
Closing and Latching Capability	65kA
Two Second Rating	25kA
Rated Interrupting Time	Five cycles

- E. **Instrument Transformers:** Ring type current transformers shall be furnished. The thermal and mechanical ratings of the current transformers shall be coordinated with the circuit breakers. Their accuracy rating shall be equal or higher than ANSI standard requirements. The standard location for the current transformers on the bus side and line side of the breaker units shall be front accessible to permit adding or changing current transformers without removing high voltage insulation connections. Shorting terminal blocks shall be furnished on the secondary of all the current transformers.

Voltage and control power transformers of the quantity and rating indicated in the detail specification shall be supplied. Voltage transformers shall be mounted in drawout drawers contained in an enclosed auxiliary compartment. Control power transformers up to 5kV, 5kVA, single phase shall be mounted in drawout drawers. Control power transformers above 5kV shall be fixed mounted with primary fuses in drawout drawers. Rails shall be provided for each drawer to permit easy inspection, testing and fuse replacement. Shutters shall isolate primary bus stabs when drawers are withdrawn.

A mechanical interlock shall be provided to require the secondary breaker to be open before the CPT drawer or CPT primary fuse drawer can be withdrawn.

- F. **Relays:** The switchgear manufacturer shall furnish and install, in the metal-clad switchgear, the quantity, type and rating of protection relays as described hereafter in this specification. and the attached one-line. Approved manufacturer is Schweitzer Engineering laboratories.

- G. **Wire and Cable Terminations:** The switchgear manufacturer shall provide suitable terminal blocks for secondary wire terminations and a minimum of 10% spare terminal connections shall be provided. One control circuit cutout device shall be provided in each circuit breaker housing. Switchgear secondary wire shall be #14 AWG, type SIS rated 600 volt, 90 degrees C, furnished with wire markers at each termination, printed with non-adhesive labels indicating destination used in internal wiring diagrams. Wires shall terminate on terminal blocks with ring tongue terminals. Terminal blocks are to be provided with marker strips numbered in agreement with detailed connection diagrams.

H. **Construction Type:** The switchgear described in these specifications shall be:

- a. Outdoor weatherproof, sheltered-aisle, (common aisle) construction for outdoor service. Each shipping group shall be mounted upon an integral base frame with a weatherproof enclosure assembly in the field into a complete metal enclosed switchgear assembly. The enclosure shall be extended on the breaker drawout side to form an operating and/or maintenance aisle large enough to permit interchange of circuit breakers. A weatherproof door with an inside quick release latch mechanism shall be located at each end of the inside even when locked on the outside. Interior lights, light switches and duplex ground fault receptacles shall be furnished in the aisle.
 - b. Each vertical section of outdoor switchgear shall be provided with space heaters. Tubular type heaters operated at half voltage for long life shall be supplied. 250 volt rated heaters shall be used at 120 volts.
 - c. Heaters shall be wired to provide temporary heating during storage.
- I. **Finish:** The finish shall consist of a coat of ANSI-61, Light gray paint applied by electro-deposition process to pre-cleaned and phosphatized steel for internal and external parts. The coating shall have corrosion resistance of 300 hours to 5% salt spray. Prior to shipment, the complete assemblies, indoor as well as outdoor, shall be given 1.5 to 2.0 mil thick exterior finish spray coat of air drying high-gloss gray enamel.
- J. **Accessories:** The switchgear manufacturer shall furnish accessories for test, inspection, maintenance and operation, including:
- 1 - Maintenance tool for manually charging the breaker closing spring and manually opening the shutter
 - 1 - Electrical Racking motor and accessories, for all breakers
 - 1 - Test jumper for electrically operating the breaker while out of its compartment
 - 1 - Set of rail extensions and rail clamps
 - 1 - "Dockable" transport dolly for moving breaker about outside its compartment

3. Detailed Construction Specifications

- A. **System:** The switchgear described in this specification shall be designed for operation on a 5kV, three phase, 3 wire, solidly grounded, 60 hertz system.
- B. **Bus:** 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. A set of 1200 ampere insulated copper main bus shall be provided and have provisions for future extension.
- C. **Breaker Operation:** The breakers shall be electrically operated by the following control voltages: 125 volt DC CLOSE and 125 volt DC TRIP.
- D. **Control Voltage Source:** The control voltage shall be derived from a control power transformer mounted in the switchgear.
- E. **Mimic Bus:** The metal clad switchgear shall be provided with mimic bus on the front of the gear showing the bus arrangement.

4. Bills of Material

A. **Main Circuit Breaker Section:** The metal-clad switchgear section for control of a main circuit breaker shall include the following: (one shown one (1) required).

- 1 - Drawout power circuit breaker rated 1200 amperes
- 6 - Current transformers, 1200/5A multi-ratio, accuracy class C400
- 1 – MOC Auxiliary switch with (8) N.O. and (8) N.C. Contacts
- 1 – TOC Auxiliary switch with (5) N.O. and (5) N.C. Contacts
- 3 – Voltage transformers connected line to ground 8kV to 120 volts with primary and secondary fuses, housed in a drawout drawer.
- 1 - Set of Red and Green LED indicating Lamps for Breaker Position, GE type ET-16
- 1 – Multi-function Overcurrent Relay Schweitzer type SEL-751 with auxiliary trip and close pushbuttons, button guards, configurable labels, DNP 3.0 level slave, 5A Phase and neutral CT inputs, standard I/O, 125VDC power supply and input voltage, and mirrored bits communications. One 52/a, 52/b, and a TOC contact shall be wired into this relay.
- 1 - Control Power Transformer fixed mounted, single phase, rated 37.5 kVA,

8kV – 120/240 volts, with drawout primary fuse drawer and molded case circuit breaker for the secondary side. Control power transformer shall be removable through the rear panel of the vertical section.

- 1 – Lockout relay, Electrosch type LOR, Cat. No. 7810D
- 1 – Breaker Control Switch with Pistol Grip, Electrosch Cat. No. 2457D
- 1 – Test switch ABB type FT-1, Style No. C139A528G01
- 1 – Test switch ABB type FT-1, Style No. C129A501G01
- 1 – White Indicating light, LED type
- 1 – Set of (3) Surge arrestors rated 12.7kV MCOV

B. Tie Breaker Section: The metal-clad switchgear section for control of a tie breaker shall include the following:

- 1 - Drawout power circuit breaker rated 1200 amperes
- 6 - Current transformers, 1200/5A Multi-ratio, accuracy class C400
- 1 – TOC Auxiliary Switch with (5) N.O. and (5) N.C. contacts
- 1 – MOC Auxiliary switch with (8) N.O. and (8) N.C. Contacts
- 1 - Multi-function Overcurrent Relay Schweitzer type SEL-751A with auxiliary trip and close pushbuttons, button guards, configurable labels, DNP 3.0 level slave, 5A Phase and neutral CT inputs, standard I/O, 125VDC power supply and input voltage, and mirrored bits communications. One 52/a, 52/b, and a TOC contact shall be wired into this relay.
- 1 – Set of Red and Green LED indicating lamps for breaker position, GE type ET-16
- 1 - Circuit breaker control switch Electrosch Cat. No. 2457D
- 1 – Set of (3) Surge arrestors rated 12.7kV MCOV

C. Feeder Circuit Breaker Section(s): Each metal-clad switchgear section for control of a feeder circuit breaker shall include the following: (Note 1 shown – 3 required)

- 1 - Drawout power circuit breaker rated 1200 amperes
- 1 – TOC Auxiliary Switch with (5) N.O. and (5) N.C. contacts

- 1 – MOC Auxiliary switch with (8) N.O. and (8) N.C. Contacts
- 6 - Current transformers, 1200/5A Multi-ratio, accuracy class C400
- 1 - Set of Red and Green LED indicating lamps for Breaker Position, GE type ET-16
- 1 – Multi-function Overcurrent Relay Schweitzer type SEL-751 with auxiliary trip and close pushbuttons, button guards, configurable labels, DNP 3.0 level
- 2 slave, 5A Phase and neutral CT inputs, standard I/O, 125VDC power supply and input voltage, and mirrored bits communications. One 52/a, 52/b, and a TOC contact shall be wired into this relay.
- 1 – Test Switch ABB type FT-1, Style No. C129A528G01
- 1 – Test Switch ABB type FT-1, Style No. C129A501G01
- 1 - Circuit breaker control switch Electroschalt Cat. No. 2457D
- 1 – Set of (3) Surge arresters rated 12.7 kV MCOV

D. Work Space and enclosure requirements:

1. Provide a work space 9'-6" at one end of the line up for customer furnished relaying cabinets and utility metering and SCADA cabinets.
2. Provide a work space 7' wide at the other end of the line up for AC and DC Panels, station battery, battery charger, battery disconnect, AC DPDT switch, and eye wash station. This work space shall have a ¼" x 2" bare copper ground bar run around it's perimeter at 12" above the floor. This bar shall be connected by the vendor to the switchgear ground bus and shall be the grounding location for all equipment grounds in this area.
3. The complete enclosure shall be designed for pier support. All support shall be on the enclosure centerline side of the cable entry areas to eliminate interferences between support piers and conduit runs.
4. Enclosure shall be structurally designed to withstand a 120 MPH wind load, the roof shall be capable of supporting 40 lbs. Per square foot.
5. Walls roof, and floor shall have a minimum insulation value of R19.
6. Roof shall have a slope to shed water.

7. HVAC unit shall be wall mounted and shall operate to maintain the building temperature at approximately 78 degree F temperature when in cooling mode and 65 degree F when in heating mode. All Heating calculations shall assume that the switchgear is loaded at 1000A and all cooling calculations shall assume the switchgear is fully loaded at 1200 A.
8. Interior LED lights shall provide 100-foot candles at the 3-foot level from the floor.
9. Metal clad switchgear enclosure shall be mounted on a skid base that is undercoated to prevent corrosion.

10. Interior of the enclosure shall be provided with "rate of rise heat detectors, a thermometer independent of the HVAC pack control and smoke detectors. These devices shall all provide dry contacts and shall be wired to the marshalling panel provided by others.
11. Emergency fan ventilation activated by an independent thermostat to cool the building during an HVAC failure. This fan will also be operated automatically on an hourly basis to prevent accumulation of hydrogen gas from the battery system. A dry contact shall be furnished from this thermostat and wired to a location to be furnished later.
12. Provide (1) – 10 lb. Type A:B:C fire extinguisher mounted adjacent to each door for a total of (2) extinguishers.
13. Provide (1) Pure flow 1000 Eyewash station with Eyesaline Cartridge (Seton Catalog No. 50822 and 50823) Mounted in the battery area.
14. Provide (2) control conduit areas. These areas are to be 12" by 24" with removable bolted plates suitable for field drilling.
15. A cable tray system shall be provided. It shall be of the aluminum ladder-type construction. The rail height shall be 5" and 24" wide. It shall be supported for 100lbs/ft. loading. A barrier shall be installed in the middle of the tray for separation of power and control circuits. The systems shall be designed so that it runs above all cabinets, switchgear sections and AC and DC panels. Switchgear vendors may use the system for interior wiring with the exception of the supplies to the DPDT switch, the supplies to the AC and DC panels, and the source and load connections to the battery disconnect. The cable tray systems shall be extend to within 3" of the floor at the cable entry areas. If the cable tray is not suitable as a ground conductor than a continuous 4/0 AWG copper lead shall be run with the tray. Provisions shall be made for connecting the cable tray or ground lead to the substation ground grid via a PSD supplied 4/0 AWG copper ground conductor located in each of the control conduit entry areas. (9) bonding clamps shall be provided for connecting a 4/0 AWG ground lead from the control cabinets to the cable tray ground.
16. The vendor shall furnish one (1) 240V, 200A, DPDT switch (GE Cat. No. TC35324, or equal). The vendor shall supply all wiring and conduit between this switch and the secondary main circuit breakers in the switchgear as well as the connection between the switch and the AC panel board described in paragraph 17.

17. The vendor shall supply one (1) 175A, 240VAC, single phase, 3 wire, (42) circuit panel board. The panel board shall be in a 20" wide cabinet and the main circuit breaker shall be at the bottom. The main and branch circuit breakers shall be bolt on type. The panel board shall be a GE type AQ (or equal) and the main branch circuit breakers shall be rated for 22 kAIC. The vendor shall furnish all necessary branch circuit breakers to wire all building auxiliary AC circuits as well as all switchgear AC circuits. In addition the following spare GE type THHQB circuit breakers shall be installed: (2) – 30A, 2 pole, (8) 30A Single pole, and (8) 20A Single pole.
18. The vendor shall supply one 225A, 125VDC 2 wire 40 circuit panel board. The panel board shall be in a 20" wide cabinet and main lugs only shall be at the bottom. The main and branch circuit breakers shall be bolted on type. The panel board shall be GE type AE (or equal) and the main and branch circuit breakers shall be rated for 10 kAIC. The vendor shall furnish all necessary branch circuit breakers to wire the switchgear DC circuits. In addition, (7) spare GE type TEY (or equal) two pole 30A circuit breakers shall be installed.
19. The vendor shall supply one 200A, 125VDC DPDT fused safety switch with 200A type RK-1 fuses, GE Catalog No. TH3224. The vendor shall provide the conduit and wiring between the load side terminals of this switch and the main lugs of the DC panel board in paragraph 17 (above).
20. The vendor shall furnish one spare set of CPT and VT fuses.
21. The vendor shall mount and wire the AC and CD connections for the PSD supplied battery charger.
22. The vendor shall supply a completely wired emergency lighting system consisting of illuminated exit signing with battery packs and remote lighting heads to provide interior and egress lighting during an AC power failure per NERA requirements.
23. The vendor shall provide (2) 3" conduit risers from the top control cable access areas in each switchgear vertical section to the cable tray above. Wiring for different circuit breakers shall not occupy the same riser. These conduits may not be used for the CPT secondary connection to the DPDT switch. The vendor shall supply separate conduit runs from each CPT secondary breaker to the DPDT switch.
24. All wiring and installation work performed by the vendor shall be in accordance with 2005 Edition of the National Electrical Code.
25. Floor penetrations for cable/conduit entry from the outside shall be fully framed in and permit no access to the adjacent under floor space. This framed

space shall be free for any obstructions and all sharp edges shall be ground smooth. A removable steel base plate, suitable for field drilling shall be bolted in place to seal the base plate opening. This plate will be field cut/drilled to seal the conduit entry

26. The vendor shall install and anchor the base of the Beta supplied battery rack.
27. One (1) external copper faced or stainless steel ground pads drilled and tapped for ½" UNC bolts and NEMA 2 hole spacing shall be provided at each corner of the building.
28. The vendor shall furnish and install a LED wall pack type light fixture on the exterior above each of the personnel door. The fixture shall include an individual photocell control.

MEDIUM VOLTAGE METAL-CLAD SWITCHGEAR
Specification Northland 23kV Gear
December 1st
Revision 0
Issued for Vendor Quotation

1. General

- A. The metal-clad switchgear and all components shall be designed, manufactured and tested in accordance with the latest applicable standards of NEMA SG-4 and SG-5, IEEE, and but not limited to ANSI 37.20.2.
- B. Switchgear and enclosure to follow standards outlined in National Grid ESB 752.
- C. Provided Drawing E-701 shows intended configuration for 23kv rated gear including rating and protective relay configurations.

2. 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. Two rear covers shall be furnished for each vertical section for circuit isolation and ease of handling.
- B. **Buses and Connections:** The main bus shall be copper and have fluidized bed epoxy flame retardant and track-resistant insulation. The bus supports between units shall be flame-retardant, track-resistant, glass polyester for 25.8kV class. 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.
- C. **Circuit Breaker Compartment:** The circuit breaker compartment shall be equipped to house the removable breaker element. The mechanism for levering the breaker shall be cell mounted and include all of the necessary interlocks to render the breaker mechanism mechanically trip free during the levering procedure. A contact shall ground the breaker between and at the operating and test positions. The stationary primary contacts shall be silver-plated and recessed within insulating tubes. A steel 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.

- D. Circuit Breaker:** The circuit breakers shall be horizontal 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.

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 for 5kV class. 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.

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.

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.

Each circuit breaker shall have the following ratings:

Maximum Voltage	25.8kV
BIL Rated	150kV
Continuous Current	600 Amperes
Short Circuit Current At Rated Maximum kV	25kA
Closing and Latching Capability	65kA
Two Second Rating	25kA
Rated Interrupting Time	Five cycles

- E. **Instrument Transformers:** Ring type current transformers shall be furnished. The thermal and mechanical ratings of the current transformers shall be coordinated with the circuit breakers. Their accuracy rating shall be equal or higher than ANSI standard requirements. The standard location for the current transformers on the bus side and line side of the breaker units shall be front accessible to permit adding or changing current transformers without removing high voltage insulation connections. Shorting terminal blocks shall be furnished on the secondary of all the current transformers.

Voltage and control power transformers of the quantity and rating indicated in the detail specification shall be supplied. Voltage transformers shall be mounted in drawout drawers contained in an enclosed auxiliary compartment. Control power transformers up to 23kV, 5kVA, single phase shall be mounted in drawout drawers. Control power transformers above 5kV shall be fixed mounted with primary fuses in drawout drawers. Rails shall be provided for each drawer to permit easy inspection, testing and fuse replacement. Shutters shall isolate primary bus stabs when drawers are withdrawn.

A mechanical interlock shall be provided to require the secondary breaker to be open before the CPT drawer or CPT primary fuse drawer can be withdrawn.

- F. **Disconnect Switch:** The switches shall be load interrupter in enclosure in series with the 23kv breaker at both the line and load side. IEEE C37.20.3, C37.20.4, Type standards to be followed. Viewing window shall be located on the front and able to show switch position. Mechanical interlock to be included to prevent the door from opening when the switch is closed. Padlocking or tagging the switch in the open or closed position and a switch position indicator on the front cover. Front vertical section covers shall full-length hinges along with cover having a flanged door with latching hardware. Ground bus to be sized to carry a minimum of the short time withstand current and connected to the metal enclosures of each vertical section. Accepted manufacturers are GE, ABB, POWERCON.
- G. **Metering Compartment for National Grid:** The compartment shall be in compliance with National Grid ESB 752.
- H. **Relays:** The switchgear manufacturer shall furnish and install, in the metal-clad switchgear, the quantity, type and rating of protection relays as described hereafter in this specification and the attached one-line. Approved manufacturer is Schweitzer Engineering laboratories.
- I. **Wire and Cable Terminations:** The switchgear manufacturer shall provide suitable terminal blocks for secondary wire terminations and a minimum of 10% spare terminal connections shall be provided. One control circuit cutout device shall be provided in each circuit breaker housing. Switchgear secondary wire shall be

#14 AWG, type SIS rated 600 volt, 90 degrees C, furnished with wire markers at each termination, printed with non-adhesive labels indicating destination used in internal wiring diagrams. Wires shall terminate on terminal blocks with ring tongue terminals. Terminal blocks are to be provided with marker strips numbered in agreement with detailed connection diagrams.

J. **Construction Type:** The switchgear described in these specifications shall be:

- a. Outdoor weatherproof, sheltered-aisle, (common aisle) construction for outdoor service. Each shipping group shall be mounted upon an integral base frame with a weatherproof enclosure assembly in the field into a complete metal enclosed switchgear assembly. The enclosure shall be extended on the breaker drawout side to form an operating and/or maintenance aisle large enough to permit interchange of circuit breakers. A weatherproof door with an inside quick release latch mechanism shall be located at each end of the inside even when locked on the outside. Interior lights, light switches and duplex ground fault receptacles shall be furnished in the aisle.
- b. Each vertical section of outdoor switchgear shall be provided with space heaters. Tubular type heaters operated at half voltage for long life shall be supplied. 250 volt rated heaters shall be used at 120 volts.
- c. Heaters shall be wired to provide temporary heating during storage.

K. **Finish:** The finish shall consist of a coat of ANSI-61, Light gray paint applied by electro-deposition process to pre-cleaned and phosphatized steel for internal and external parts. The coating shall have corrosion resistance of 300 hours to 5% salt spray. Prior to shipment, the complete assemblies, indoor as well as outdoor, shall be given 1.5 to 2.0 mil thick exterior finish spray coat of air drying high-gloss gray enamel.

L. **Accessories:** The switchgear manufacturer shall furnish accessories for test, inspection, maintenance and operation, including:

- 1 - Maintenance tool for manually charging the breaker closing spring and manually opening the shutter
- 1 - Electrical Racking motor and accessories, for all breakers
- 1 - Test jumper for electrically operating the breaker while out of its compartment
- 1 - Set of rail extensions and rail clamps
- 1 - "Dockable" transport dolly for moving breaker about outside its compartment

3. Detailed Construction Specifications

- A. **System:** The switchgear described in this specification shall be designed for operation on a 23kV, three phase, 3 wire, solidly grounded, 60 hertz system.
- B. **Bus:** 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. Each 23kv breaker and its (2) Disconnects shall be isolated from the others.
- C. **Breaker Operation:** The breakers shall be electrically operated by the following control voltages: 125 volt DC CLOSE and 125 volt DC TRIP.
- D. **Control Voltage Source:** The control voltage shall be derived from a control power transformer mounted in the switchgear.
- E. **Mimic Bus:** The metal clad switchgear shall be provided with mimic bus on the front of the gear showing the bus arrangement.

4. Bills of Material

- A. **Utility Incoming Circuit Breaker Section:** The metal-clad switchgear section for control of a main circuit breaker shall include the following: (one shown one (3) required).

- 1 - Drawout power circuit breaker rated 600 amperes
- 6 - Current transformers, 400/5A multi-ratio, accuracy class C400
- 1 – MOC Auxiliary switch with (8) N.O. and (8) N.C. Contacts
- 1 – TOC Auxiliary switch with (5) N.O. and (5) N.C. Contacts
- 2 – Voltage transformers connected in wye grounded/broken 23kV to 120 volts with primary and secondary fuses, housed in a drawout drawer.
- 1 - Set of Red and Green LED indicating Lamps for Breaker Position, GE type ET-16
- 2 – Multi-function Overcurrent Relay Schweitzer type SEL-751 with auxiliary trip and close pushbuttons, button guards, configurable labels, DNP 3.0 level 2 slave, 5A Phase and neutral CT inputs, standard I/O, 125VDC power supply and input voltage, and mirrored bits communications. One 52/a, 52/b, and a TOC contact shall be wired into this relay.

- 1 - Control Power Transformer fixed mounted, single phase, rated 37.5 kVA, 23kV – 120/240 volts, with drawout primary fuse drawer and molded case circuit breaker for the secondary side. Control power transformer shall be removable through the rear panel of the vertical section.
- 1 – Lockout relay, Electroschalt type LOR, Cat. No. 7810D
- 1 – Breaker Control Switch with Pistol Grip, Electroschalt Cat. No. 2457D
- 3 – Test switch ABB type FT-1, Style No. C139A528G01
- 3 – Test switch ABB type FT-1, Style No. C129A501G01
- 1 – White Indicating light, LED type
- 1 – Set of (3) Surge arrestors rated 19.2kV MCOV

B. Group Operated Disconnect Switch : The metal-clad switchgear section for the disconnect switch on line and load side of the breaker (1 shown 6 needed).

- 1 – Manually Operated Group operated Load Break Switch.

C. National Grid Metering Compartments. Each 23kv incoming feed will have a compartment for National Grid metering after the line side of the 23kv breaker (need 3).

D. Work Space and enclosure requirements:

1. Provide a work space 9'-6" at one end of the line up for customer furnished relaying cabinets and utility metering and SCADA cabinets.
2. Provide a work space 7' wide at the other end of the line up for AC and DC Panels, station battery, battery charger, battery disconnect, AC DPDT switch, and eye wash station. This work space shall have a ¼" x 2" bare copper ground bar run around it's perimeter at 12" above the floor. This bar shall be connected by the vendor to the switchgear ground bus and shall be the grounding location for all equipment grounds in this area.
3. The complete enclosure shall be designed for pier support. All support shall be on the enclosure centerline side of the cable entry areas to eliminate interferences between support piers and conduit runs.
4. Enclosure shall be structurally designed to withstand a 120 MPH wind load, the roof shall be capable of supporting 40 lbs. Per square foot.
5. Walls roof, and floor shall have a minimum insulation value of R19.
6. Roof shall have a slope to shed water.
7. HVAC unit shall be wall mounted and shall operate to maintain the building temperature at approximately 78 degree F temperature when in cooling mode and 65 degree F when in heating mode. All Heating calculations shall assume that the switchgear is loaded at 500A and all cooling calculations shall assume the switchgear is fully loaded at 600 A.
8. Interior fluorescent lights shall provide 100-foot candles at the 3-foot level from the floor.
9. Metal clad switchgear enclosure shall be mounted on a skid base that is undercoated to prevent corrosion.

10. Interior of the enclosure shall be provided with “rate of rise heat detectors, a thermometer independent of the HVAC pack control and smoke detectors. These devices shall all provide dry contacts and shall be wired to the marshalling panel provided by others.
11. Emergency fan ventilation activated by an independent thermostat to cool the building during an HVAC failure. This fan will also be operated automatically on an hourly basis to prevent accumulation of hydrogen gas from the battery system. A dry contact shall be furnished from this thermostat and wired to a location to be furnished later.
12. Provide (1) – 10 lb. Type A:B:C fire extinguisher mounted adjacent to each door for a total of (2) extinguishers.
13. Provide (1) Pure flow 1000 Eyewash station with Eyesaline Cartridge (Seton Catalog No. 50822 and 50823) Mounted in the battery area.
14. Provide (2) control conduit areas. These areas are to be 12” by 24” with removable bolted plates suitable for field drilling.
15. A cable tray system shall be provided. It shall be of the aluminum ladder-type construction. The rail height shall be 5” and 24” wide. It shall be supported for 100lbs/ft. loading. A barrier shall be installed in the middle of the tray for separation of power and control circuits. The systems shall be designed so that it runs above all cabinets, switchgear sections and AC and DC panels. Switchgear vendors may use the system for interior wiring with the exception of the supplies to the DPDT switch, the supplies to the AC and DC panels, and the source and load connections to the battery disconnect. The cable tray systems shall be extend to within 3” of the floor at the cable entry areas. If the cable tray is not suitable as a ground conductor than a continuous 4/0 AWG copper lead shall be run with the tray. Provisions shall be made for connecting the cable tray or ground lead to the substation ground grid via a PSD supplied 4/0 AWG copper ground conductor located in each of the control conduit entry areas. (9) bonding clamps shall be provided for connecting a 4/0 AWG ground lead from the control cabinets to the cable tray ground.
16. The vendor shall furnish one (1) 240V, 200A, DPDT switch (GE Cat. No. TC35324, or equal). The vendor shall supply all wiring and conduit between this switch and the secondary main circuit breakers in the switchgear as well as the connection between the switch and the AC panel board described in paragraph 17.

17. The vendor shall supply one (1) 175A, 240VAC, single phase, 3 wire, (42) circuit panel board. The panel board shall be in a 20" wide cabinet and the main circuit breaker shall be at the bottom. The main and branch circuit breakers shall be bolt on type. The panel board shall be a GE type AQ (or equal) and the main branch circuit breakers shall be rated for 22 kAIC. The vendor shall furnish all necessary branch circuit breakers to wire all building auxiliary AC circuits as well as all switchgear AC circuits. In addition the following spare GE type THHQB circuit breakers shall be installed: (2) – 30A, 2 pole, (8) 30A Single pole, and (8) 20A Single pole.
18. The vendor shall supply one 225A, 125VDC 2 wire 40 circuit panel board. The panel board shall be in a 20" wide cabinet and main lugs only shall be at the bottom. The main and branch circuit breakers shall be bolted on type. The panel board shall be GE type AE (or equal) and the main and branch circuit breakers shall be rated for 10 kAIC. The vendor shall furnish all necessary branch circuit breakers to wire the switchgear DC circuits. In addition, (7) spare GE type TEY (or equal) two pole 30A circuit breakers shall be installed.
19. The vendor shall supply one 200A, 125VDC DPDT fused safety switch with 200A type RK-1 fuses, GE Catalog No. TH3224. The vendor shall provide the conduit and wiring between the load side terminals of this switch and the main lugs of the DC panel board in paragraph 17 (above).
20. The vendor shall furnish one spare set of CPT and VT fuses.
21. The vendor shall mount and wire the AC and CD connections for the PSD supplied battery charger.
22. The vendor shall supply a completely wired emergency lighting system consisting of illuminated exit signing with battery packs and remote lighting heads to provide interior and egress lighting during an AC power failure per NERA requirements.
23. The vendor shall provide (2) 3" conduit risers from the top control cable access areas in each switchgear vertical section to the cable tray above. Wiring for different circuit breakers shall not occupy the same riser. These conduits may not be used for the CPT secondary connection to the DPDT switch. The vendor shall supply separate conduit runs from each CPT secondary breaker to the DPDT switch.
24. All wiring and installation work performed by the vendor shall be in accordance with 2023 Edition of the National Electrical Code.
25. Floor penetrations for cable/conduit entry from the outside shall be fully framed in and permit no access to the adjacent under floor space. This framed

space shall be free for any obstructions and all sharp edges shall be ground smooth. A removable steel base plate, suitable for field drilling shall be bolted in place to seal the base plate opening. This plate will be field cut/drilled to seal the conduit entry

26. The vendor shall install and anchor the base of the Beta supplied battery rack.
27. One (1) external copper faced or stainless steel ground pads drilled and tapped for ½" UNC bolts and NEMA 2 hole spacing shall be provided at each corner of the building.
28. Key interlocking in the 23kV circuit breaker will prevent the disconnect switches from opening while the breaker is closed.
29. The vendor shall furnish and install a LED wall pack type light fixture on the exterior above each of the personnel door. The fixture shall include an individual photocell control.

Specification Northland Medium Voltage Liquid-Filled Transformers
December 1st
Revision 0
Issued for Vendor Quotation

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes liquid-filled substation transformers.
- B. Transformer needs to meet the criteria set forth in National Grid ESB 752.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE C57.12.00 - Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.
 - 2. IEEE C57.12.10 - Standard Requirements for Liquid-immersed Power Transformers.
 - 3. IEEE C57.12.90 - Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers and IEEE Guide for Short Circuit Testing of Distribution and Power Transformers.
 - 4. IEEE C57.13 - Standard Requirements for Instrument Transformers.
 - 5. IEEE C57.106 - Guide for Acceptance and Maintenance of Insulating Oil in Equipment.
 - 6. IEEE C57.131 - Standard Requirements for TAP Chargers.
 - 7. IEEE C57.148 - Standard for Control Cabinets for Power Transformers.
 - 8. IEEE C57.19.00 - Standard and General Requirements and Test Procedure for Power Apparatus Bushings.
 - 9. IEEE C57.19.01 - Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.3 SUBMITTALS

- A. Shop Drawings: Indicate electrical characteristics and connection requirements, outline dimensions, connection and support points, weight, specified ratings and materials.
- B. Product Data: Submit electrical characteristics and connection requirements, standard model design tests, and options.
- C. Test Reports: Indicate procedures and results for specified factory and field testing and inspection. Including design test reports and routine test reports.

- D. Manufacturer's Field Reports: Indicate activities on site, adverse findings, and recommendations.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Include copy of manufacturer's certified drawings.
- B. Operation and Maintenance Data: Submit maintenance procedures for sampling and maintaining fluid.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Testing Agency: Company specializing in testing products specified in this section with minimum three years documented experience.

1.6 FIELD MEASUREMENTS

- A. Verify field measurements, orientation, and locations of all components prior to fabrication.

1.7 MAINTENANCE MATERIALS

- A. Furnish two of each special tools required to operate and maintain transformer.

1.8 EXTRA MATERIALS

- A. Furnish two of each size and type fuse (if applicable).

PART 2 - PRODUCTS

2.1 LIQUID-FILLED TRANSFORMERS

- A. Manufacturers:
 - 1. ABB
 - 2. General Electric.
 - 3. Niagara Transformer Corp
 - 4. Virginia Transformer Corp.
- B. Product Description: Three phase, self-cooled/forced-air cooled transformer unit.
- C. Cooling and Temperature Rise; IEEE C57.12.00; Class KNAN/KNAF 55/65 degrees C, self-cooled/forced-air cooled.
- D. Insulating Liquid: Product shall be non-toxic, fire resistant, biological-based natural ester dielectric fluid. Coolant shall be 100-percent derived from edible seed oils and performance-enhancing additives shall be food grade. Coolant shall be FM- approved, UL-classified, Envirotemp FR3 fluid.
- E. SERVICE CONDITIONS
 - 1. Meet requirements for usual service conditions described in IEEE C57.12.00 and IEEE C57.12.12.
 - 2. Maximum/Minimum Ambient Temperature: 99/0 degrees F.
 - 3. Altitude: ±600 feet.
 - 4. Transformer Loading Requirements: motors.
- F. RATINGS
 - 1. Capacity: 2500/3125/3500kVA KNAN/KNN,KNAFF, 55/65 degrees C.
 - 2. Primary Voltage: 22,900 volts, delta connected.
 - 3. Primary DETC Taps: 2.5% and 5.0% above, and 2.5% and 5.0% below rated voltage.
 - 4. Secondary Voltage: 4,160 volts, wye connected.
 - 5. Secondary OLTC: (16) 0.625% steps above and (16) 0.625% steps below rated voltage.
 - 6. Impedance: 7.1 percent.
 - 7. Basic Impulse Level: 150 kV.
- G. ACCESSORIES
 - 1. Accessories: IEEE C57.12.00, ANSI C57.12.10, standard accessories and magnetic liquid level indicator, dial type thermometer, pressure/vacuum gauge, liquid level switches, pressure/vacuum switch, and temperature switch. Similar or equal to Qualitrol for these devices where applicable.
 - 2. Tap Changer: De-energized tap changer (DETC) on primary and on-load tap changer (OLTC) on secondary.
 - 3. Primary Terminations: Porcelain bushing with spade lugs.
 - 4. Secondary Terminations: Porcelain bushing with spade lugs.

5. Inert Air System: Nitrogen tank with enclosed, lockable, cabinet to maintain transformer tank pressure between 0.5 and 5 psi.
6. Neutral Grounding Resistor: 24-ohm, 100 amp, 10 second.
7. Other Accessories: Primary and secondary lightning arrestors, pressure relief device, sudden pressure relay, primary air termination cabinet, secondary air termination cabinet, (2) sets of 1200:5 MR C400 primary bushing current transformers, (2) sets of 1200:5 MR C400 secondary bushing current transformers, and (1) 200:5 SR C20 secondary neutral grounding resistor current transformer conforming to IEEE C57.13. Remaining accessories are shown in section J.
8. Clean surfaces before applying paint.
9. Apply corrosion-resisting primer to surfaces.
10. Finish Color: Manufacturer's standard gray finish.

2.2 On-Load Tap Changer (OLTC)

- A. Manufacturers:
 1. ABB
 2. General Electric
 3. Reinhausen
 4. Waukesha (SPX)
- B. Product Description: Compartment type, three phase, reactor switching with vacuum interrupters, welded to transformer to raise/lower (R/L) secondary voltage.
- C. Regulating Voltage: 4.16kV, WYE (Transformer Secondary)
- D. Insulating Liquid: Degassed mineral oil conforming to IEEE C57.106.
- E. Service Conditions: See Transformer specifications.
- F. Ratings:
 1. Rated through power: 2500/3125/3500kVA KNA/KNAF, 55/65 degrees C.
 2. Maximum rated through current: 1,000 amps.
 3. Rated step voltage: 26V
 4. Maximum rated step voltage: 30V
 5. Rated frequency: 60Hz
 6. Rated insulation level: 75kV BIL
- G. Number of positions/steps: 33 positions / 32 steps (16L...N...16R)
- H. Tank:
 1. Backplate: Welded to transformer with internal gasket
 2. Front door: Single door, bolted and hinged at left side.

- I. Valves and fittings:
 - 1. Drain valve: Globe type, flange / 2" / threaded
 - 2. Vacuum connection: Nipple 2"
 - 3. Liquid fill connection: Nipple 1"

- J. Accessories:
 - 1. Liquid level indicator with auxiliary contacts
 - 2. Dial type thermometer with auxiliary contacts
 - 3. Pressure/vacuum gauge with auxiliary contacts
 - 4. Pressure relief device with auxiliary contacts
 - 5. Sudden pressure relay with two (2) sets of auxiliary contacts
 - 6. Motor/Drive unit with local control panel.
 - a. NEMA 4X enclosure
 - b. Local/Remote selector switch with auxiliary contacts
 - c. Manual/Auto selector switch with auxiliary contacts
 - d. Local control operator switches and indicators
 - e. 120VAC heater
 - f. 240/208VAC, single phase, supply and motor voltage
 - g. Manual hand crank.
 - h. Operation counter.
 - i. 86X for vacuum bottle interrupt failure with auxiliary alarm contacts
 - j. One (1) Form C contact for incomplete tap change
 - k. Input signals for use with dry contacts for remote raise/lower commands
 - l. One (1) 4-20mA analog output for remote position indication
 - 7. Desiccant or breather.

2.3 On-Load Tap Changer Controller

- A. Manufacturers:
 - 1. Beckwith is the only approved controller for this application.

- B. Product Description: Provide equipment to implement the transformer paralleling using the Circulating Current Method and without any hardware change be able to implement Delta Var paralleling if needed in the future due to a change to a separate source configuration. Include a tap changer control capable of separating and not using the in-phase current (real component) entering the circulating current input of the control. All currents used for paralleling and load shall be at 0.2A full scale.
 - 1. In the Circulating Current Paralleling Mode (Common Sources) be able to:
 - a. Minimize circulating current between devices.
 - b. Tap position knowledge not required by the control for operation
 - c. Properly adjust LDC in Parallel and Independent Modes
 - d. Be able to tolerate small differences in size and impedance of paralleled transformers.
 - 2. In the Delta Var Paralleling Mode (Not Common Sources) be able to:
 - a. Proportion Var current between paralleled devices.

- b. Adjust LDC in Parallel and Independent Modes.
- c. Ability to parallel dissimilar transformers (MVA and/or impedance differences).
- d. Allow transformers to be driven from separate sources.
- e. Eliminate paralleling bias error from in phase currents from mismatches.
- f. Tap position knowledge is not required by the control for operation.

2.4 SOURCE QUALITY CONTROL (AND TESTS)

- A. Provide transformer factory tests conforming to IEEE C57.12.90, IEEE C57.12.91, IEEE C57.19.00, IEEE C57.131, and ASTM 1533. Include routine tests as defined in IEEE C57.12.00, IEEE C57.131, and the following other tests:
 - 1. Winding resistance.
 - 2. Voltage ratio and phase displacement.
 - 3. Impedance voltage and load loss.
 - 4. No load loss and current.
 - 5. Dielectric tests.
 - 6. Audible sound level.
 - 7. Zero-phase-sequence impedance voltage.
 - 8. Temperature rise (type test).
 - 9. Dissipation factor.
 - 10. SFRA
- B. Test insulating liquid samples in accordance with IEEE C57.106.
- C. Make available manufacturing facility and similar equipment for inspection by Owner and/or Engineer prior to submittal approvals and fabrication. (Costs for travel, lodging, meals, etc. shall be paid under the Miscellaneous Contingency Allowance).
- D. Make completed transformer available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least fourteen days before inspection is allowed. (Costs for travel, lodging, meals, etc. shall be paid under the Miscellaneous Contingency Allowance).

OF SECTION

