



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 778-2011

SUPPLY AND DELIVERY OF DC BATTERY BANK

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 SUPPLY AND DELIVERY OF DC BATTERY BANK

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, October 9, 2011.

B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall promptly notify the Contract Administrator of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.

B3.3 If the Bidder is unsure of the meaning or intent of any provision therein, the Bidder should request clarification as to the meaning or intent prior to the Submission Deadline.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B3.5 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B3.6 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. ADDENDA

B4.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B4.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B4.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>

B4.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B4.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 8 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B5. SUBSTITUTES

- B5.1 The Work is based on the materials, equipment, methods and products specified in the Bid Opportunity.
- B5.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B5.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least seven (7) Business Days prior to the Submission Deadline.
- B5.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the material, equipment, method or product as either an approved equal or alternative;
 - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
 - (c) identify any anticipated cost or time savings that may be associated with the substitute;
 - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract;
 - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract.
- B5.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.
- B5.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.
- B5.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.
- B5.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B5.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B13.
- B5.9 No later claim by the Contractor for an addition to the price(s) because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.
- B5.10 Notwithstanding B5.2 to B5.9, and in accordance with B6.7, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B13.1(a).

B6. BID SUBMISSION

- B6.1 The Bid shall consist of the following components:

- (a) Form A: Bid;
 - (b) Form B: Prices.
- B6.2 Further to B6.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B5.
- B6.3 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely in ink, to constitute a responsive Bid.
- B6.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.
- B6.5 If the Bid Submission is submitted by mail, courier or personal delivery, it shall be enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address, and shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1
- B6.5.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.
- B6.6 Bidders are advised not to include any information/literature except as requested in accordance with B6.1.
- B6.7 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B13.1(a).
- B6.8 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to (204) 949-1178.
- B6.8.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time.
- B6.9 Bids submitted by internet electronic mail (e-mail) will not be accepted.
- B7. BID**
- B7.1 The Bidder shall complete Form A: Bid, making all required entries.
- B7.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;
 - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
 - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
 - (d) if the Bidder is carrying on business under a name other than his own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B7.2.1 If a Bid is submitted jointly by two (2) or more persons, each and all such persons shall identify themselves in accordance with B7.2.
- B7.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

- B7.4 Paragraph 10 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
 - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
 - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers;
 - (d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B7.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B7.4.2 All signatures shall be original.

B7.5 If a Bid is submitted jointly by two (2) or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

B8. PRICES

B8.1 The Bidder shall state the lump sum price in Canadian funds for the Work on Form B: Prices.

B8.1.1 The price on Form B: Prices shall include:

- (a) duty;
- (b) freight and cartage;
- (c) Provincial and Federal taxes [except the Goods and Services Tax (GST) and Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable] and all charges governmental or otherwise paid;
- (d) profit and all compensation which shall be due to the Contractor for the Work and all risks and contingencies connected therewith.

B8.1.2 The price on Form B: Prices shall not include the Manitoba Association for Resource Recovery Corporation (MARRC) Environmental Handling Charge (EHC) which shall be extra where applicable.

B9. QUALIFICATION

B9.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Bidder does not carry on business in Manitoba, in the jurisdiction where the Bidder does carry on business; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

B9.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) be responsible and not be suspended, debarred or in default of any obligations to the City. A list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/debar.stm>

- B9.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
 - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
 - (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba);
- B9.4 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B9.5 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B10. OPENING OF BIDS AND RELEASE OF INFORMATION

- B10.1 Bids will not be opened publicly.
- B10.2 Following the Submission Deadline, the names of the Bidders and their total bid prices (unevaluated, and pending review and verification of conformance with requirements or evaluated prices) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>
- B10.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt>
- B10.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B11. IRREVOCABLE BID

- B11.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.
- B11.2 The acceptance by the City of any Bid shall not release the Bids of the next two (2) lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 9 of Form A: Bid.

B12. WITHDRAWAL OF BIDS

- B12.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B12.1.1 Notwithstanding C21, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.
- B12.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B12.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;

- (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 10 of Form A: Bid; and
- (c) if the notice has been given by any one of the persons specified in B12.1.3(b), declare the Bid withdrawn.

B12.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B11.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B13. EVALUATION OF BIDS

B13.1 Award of the Contract shall be based on the following bid evaluation criteria:

- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
- (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B9 (pass/fail);
- (c) Total Bid Price 100%;
- (d) economic analysis of any approved alternative pursuant to B5;

B13.2 Further to B13.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.

B13.3 Further to B13.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.

B13.4 Further to B13.1(c), the Total Bid Price shall be the lump sum price shown on Form B: Prices.

B14. AWARD OF CONTRACT

B14.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B14.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B14.2.1 Without limiting the generality of B14.2, the City will have no obligation to award a Contract where:

- (a) the prices exceed the available City funds for the Work;
- (b) the prices are materially in excess of the prices received for similar work in the past;
- (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
- (d) only one Bid is received; or
- (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B14.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B13.

B14.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

- B14.4 Notwithstanding C4 and Paragraph 6 of Form A: Bid, the City will issue a Purchase Order to the successful Bidder in lieu of the execution of a Contract.
- B14.5 The Contract Documents, as defined in C1.1 (n) (ii) in their entirety shall be deemed to be incorporated in and to form a part of the Purchase Order notwithstanding that they are not necessarily attached to or accompany said Purchase Order.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for the Supply of Goods* (Revision 2008 05 26) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for the Supply of Goods* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Supply of Goods*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

D1.1 In addition to the *General Conditions for the Supply of Goods*, these Supplemental Conditions are applicable to the Work of the Contract.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of supply and delivery of battery bank.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

- (a) "**DC**" means Direct Current
- (b) "**AC**" means Alternating Current
- (c) "**O&M**" means Operations and Maintenance.
- (d) "**CSA**" means Canadian Standards Association.
- (e) "**CEC**" means Canadian Electrical Code
- (f) "**ANSI**" means American National Standards Institute.
- (g) "**IEC**" means International Electro-technical Commission.
- (h) "**ISO**" means International Organization for Standardization.
- (i) "**IEEE**" means Institute of Electrical and Electronic Engineers.
- (j) "**NEMA**" means National Electrical Manufacturers Association.
- (k) "**EEMAC**" means Electrical and Electronic Manufacturers Association of Canada.
- (l) "**ASTM**" means American Society for Testing and Materials.
- (m) "**UL**" means Underwriters Laboratories
- (n) "**cUL**" means Underwriters Laboratories – Canadian Division
- (o) "**NBC**" means National Building Code
- (p) "**MBC**" means Manitoba Building Code
- (q) "**RTU**" means Remote Terminal Unit
- (r) "**TCP**" means Transmission Control Protocol
- (s) "**Shop Drawings**" means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, which are to be provided by the Contractor to illustrate details of a portion of the Work.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is:

John Amos
Wastewater Treatment Plant Supervisor
2230 Main Street
Winnipeg MB R2V 4T8

Telephone No.: (204) 986-4845

Facsimile No.: (204) 339-2147

D5. NOTICES

D5.1 Notwithstanding C21.3, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:

The City of Winnipeg
Chief Financial Officer

Facsimile No.: (204) 949-1174

SUBMISSIONS

D6. AUTHORITY TO CARRY ON BUSINESS

D6.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D7. MATERIAL SAFETY DATA SHEETS

D7.1 The Contractor shall provide the Contract Administrator with one (1) copy of Material Safety Data Sheets (MSDS's) for each product to be supplied under the Contract at least two (2) Business Days prior to the commencement of Work but in no event later than seven (7) Calendar Days from notification of the award of Contract.

D7.2 Throughout the term of the Contract, the Contractor shall provide the Contract Administrator with revisions or updates of the MSDS's as soon as may be reasonably possible.

SCHEDULE OF WORK

D8. COMMENCEMENT

D8.1 The Contractor shall not commence any Work until he is in receipt of a notice of award from the City authorizing the commencement of the Work.

D8.2 The Contractor shall not commence any Work until:

(a) the Contract Administrator has confirmed receipt and approval of:

- (i) evidence of authority to carry on business specified in D6;
- (ii) evidence of the workers compensation coverage specified in C6.16; and
- (iii) the Material Safety Data Sheets specified in D7.

(b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.

D9. DELIVERY

D9.1 Goods shall be delivered within one hundred twelve (112) Calendar Day(s) of the award of contract, f.o.b. destination, freight prepaid to:

Marc Goovaerts

Water and Waste Department

2230 Main Street

Winnipeg MB R2V 4T8

- D9.2 The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.
- D9.3 Goods shall be delivered between 8:00 a.m. and 3:30 p.m. on Business Days.
- D9.4 Shipping Requirements
- (a) Equipment shall be handled and stored in accordance with the manufacturer's instructions. One (1) copy of these instructions shall be included with the equipment at the time of shipment.
 - (b) The battery charger & battery unit shall be shipped in a weatherproof packaging.

MEASUREMENT AND PAYMENT

D10. INVOICES

- D10.1 Further to C10, the Contractor shall submit an invoice for each order delivered to:
The City of Winnipeg
Corporate Finance - Accounts Payable
4th Floor, Administration Building, 510 Main Street
Winnipeg MB R3B 1B9
Facsimile No.: (204) 949-0864
Email: CityWpgAP@winnipeg.ca
- D10.2 Invoices must clearly indicate, as a minimum:
- (a) the City's purchase order number;
 - (b) date of delivery;
 - (c) delivery address;
 - (d) type and quantity of goods delivered;
 - (e) the amount payable with GST and MRST shown as separate amounts; and
 - (f) the Contractor's GST registration number.
- D10.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.
- D10.4 Bids Submissions must be submitted to the address in B6.5.

D11. PAYMENT

- D11.1 Further to C10, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.
- D11.2 Further to C10, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

WARRANTY

D12. WARRANTY

- D12.1 Further to C11, if a defect or deficiency prevents the full and normal use or operation of the Work or any portion thereof, for purposes of calculating the warranty period, time shall be deemed to cease to elapse for the defective or deficient portion, and for any portion of the Work whose use or operation is prevented by such defect or deficiency, as of the date on which the defect or deficiency is observed or the use or operation is prevented and shall begin to run again when the defect or deficiency has been corrected or the Work may be used or operated to the satisfaction of the Contract Administrator.

- D12.2 Notwithstanding C11, the warranty period shall cover an operating period of twelve (12) months from the date of energization, or eighteen (18) months from the date of delivery to the City, whichever occurs first.
- D12.3 Provide a ten (10) year warranty for the batteries against manufacturing defect.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 The following are applicable to the Work:

Drawing No.	Drawing Name / Title
1-0101G-E0005	Single Line Diagram and Panel Schedule, 125 VDC Battery Bank
1-0101G-E0006	Equipment Layout Plan, Grit Building Main Electrical Room

Filename	Document Code	Document Name/Title
778-2011_Datasheet.pdf	507731-0000-47ED-0001	Electrical Datasheet, Battery Charger and Battery Bank

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B5.

E2. GOODS

E2.1 The Contractor shall supply and deliver the following equipment in accordance with the requirements hereinafter specified.

- (a) One DC Battery Bank and Charger as per E4.
- (b) One DC Panelboard as per E5.
- (c) One Emergency Lighting Test Enclosure as per E6.

E3. GENERAL REQUIREMENTS

E3.1 Shop Drawings

E3.1.1 Description

- (a) This Specification shall revise, amend and supplement the requirements of CW 1100 of the City of Winnipeg's Standard Construction Specifications.
- (b) The Contractor shall submit specified Shop Drawings to the City or designated representative for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be show on all submissions for Engineering review.
- (c) Submittals shall be submitted electronically in .pdf format.
- (d) Provision of Shop Drawings will be considered incidental to the price for supply and delivery of equipment.

E3.1.2 Timeframe

- (a) Submit Shop Drawings within twenty-one (21) Calendar Days from the award of the contract.

E3.1.3 Requirements

- (a) Original drawings are to be prepared by the Contractor, Subcontractor, Supplier, Distributor, or Manufacturer, which illustrate appropriate portion of Work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

E3.1.4 Contractor's Responsibilities

- (a) Review Shop Drawings, product data and samples prior to Shop Drawing submission and stamp and sign drawings indicating conformance to the Contract requirements.
- (b) Verify:
 - (i) Field measurements;
 - (ii) Field construction criteria;
 - (iii) Catalogue numbers and similar data.
- (c) Coordinate each submission with requirements of Work and Contract Documents. Shop Drawings of separate components of a larger system will not be reviewed until all related drawings are available.
- (d) Notify the City or designated representative, in writing at time of Shop Drawing submission, of deviations from requirements of Contract Documents.
- (e) Responsibility for deviations in Shop Drawing submission from requirements of Contract:
 - (i) Documents are not relieved by the City's review of submission, unless the City gives written acceptance of specified deviations.
 - (ii) Responsibility for errors and omissions in submission is not relieved by the City's review of submittals.
- (f) The Contractor shall make any corrections required by the City or designated representative and shall resubmit the Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the City on previous submission.
- (g) After the City's review and return of copies, distribute copies to subtrades as appropriate.

E3.1.5 Submission Requirements

- (a) Accompany submissions with transmittal letter, containing:
 - (i) Date
 - (ii) Project title and Bid Opportunity number
 - (iii) Contractor's name and address
 - (iv) Number of each Shop Drawing, product data and sample submitted
 - (v) Specification Section, Title, Number and Clause
 - (vi) Drawing Number and Detail/Section Number
 - (vii) Other pertinent data
- (b) Submissions shall include:
 - (i) Date and revision dates.
 - (ii) Project title and Bid Opportunity number.
 - (iii) Name of:
 - ◆ Contractor
 - ◆ Subcontractor
 - ◆ Supplier
 - ◆ Manufacturer
 - ◆ Separate detailer when pertinent
 - (iv) Identification of product of material.
 - (v) Relation to adjacent structure or materials.
 - (vi) Field dimensions, clearly identified as such.
 - (vii) Specification section name, number and clause number or drawing number and detail/section number.
 - (viii) Applicable standards, such as CSA or CGSB numbers.

- (ix) Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

E3.1.6 Other Considerations

- (a) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent Shop Drawings and resubmit.

E4. DC BATTERY BANK AND CHARGER

E4.1 Submittals

- (a) Submit Shop Drawings and product data for review by the City or designated representative as per Section E3.1.

E4.2 Technical Data, Drawings and Manuals

E4.2.1 Ensure that drawings, design calculations and welding procedures submitted for review are sealed and signed.

E4.2.2 Ensure Shop Drawings include, but are not necessarily limited to, design data such as size, dimensions, material thickness, materials, spacing and location of attachments, anchor bolt size, location and projection, reinforcement, welding, points of connection, temporary supports and bracing, etc., as applicable.

E4.2.3 Provide detailed installation drawings showing requirements for all field welds and all other necessary details of installation.

E4.2.4 In addition to Installation, Operating and Maintenance Manuals, the Contractor's standard drawing package shall include, at minimum, the following:

- (a) Outline/Bill of Material drawing,
- (b) Base details,
- (c) Wiring drawings,
- (d) Nameplates,
- (e) Battery bank data;
 - (i) Dimensioned drawing showing, individual battery cells, assembly, stacking arrangement and anchoring of Battery rack inside battery enclosure.
 - (ii) Shipping weight.
 - (iii) Individual battery cells, type, size, Ah capacity at 8hr discharge rate, electrolyte, materials for container, cover, separators, retainers, posts and inter-cell connectors.
 - (iv) Cell charge and discharge curves of voltage, current, time and capacity.
 - (v) Maximum short circuit current, internal resistance and battery electrical data.
 - (vi) Maximum charging current recommended for fully discharged condition.
 - (vii) Fully charged voltage per cell.
 - (viii) Fully discharged voltage per cell.
- (f) Battery Charger data
 - (i) Dimensioned sketches and drawings.
 - (ii) Charger user manual.
 - (iii) Installation requirements.
 - (iv) Temperature rise.
 - (v) Ventilation requirements.
 - (vi) Control & wiring schematics.
 - (vii) Maximum short circuit current.

- (viii) Component parts list.
- (ix) User list in Canada.
- (x) Design/Testing approvals certificates.

E4.3 Documents and Manuals

E4.3.1 Each of the O&M Manuals shall include, at a minimum, the following:

- (a) Certified product test reports,
- (b) Certificates of compliance,
- (c) Certified test data,
- (d) CSA certificate of inspection, or Manitoba Department of Labour "Special Inspection" certificate for the complete equipment,
- (e) Handling and installation instructions, including equipment anchorage information and provisions,
- (f) Operating and maintenance instructions,
- (g) Certified "as-manufactured" drawings,
- (h) Complete component list,
- (i) Recommended maintenance practices and procedures,
- (j) Recommended spare parts list,
- (k) Component instruction manuals,
- (l) Standard cut sheets for OEM devices,
- (m) Component manuals for all devices/equipment/relays incorporated into the equipment,
- (n) One hardcopy and one electronic copy on archival electronic media of all relay and metering equipment settings and programming information,
- (o) Site Testing & Commissioning Procedures, and recommendations/ precautions for setting into operation,
- (p) Such additional information, instructions, data, recommendations, and procedures that the switchgear manufacturer considers to be pertinent.

E4.4 General

- (a) This specification defines the technical requirements related to the design, fabrication, factory testing, supply, and delivery to site of a fully enclosed, CSA approved/C-UL listed, AC battery charger and DC battery bank system that is required to be installed at the City of Winnipeg North End Water Pollution Control centre (NEWPCC) facility.
- (b) The equipment shall be designed, fabricated and manufactured to permit indoor installation. The equipment shall be built for top and bottom entry/exit and shall be suitable for stand-alone installation/mounting on a concrete floor.
- (c) The equipment shall be completely fabricated, assembled, factory tested and CSA certified at the Contractor's manufacturing facilities and shipped to site ready for field installation and energization.
- (d) Manufacturer shall specify minimum required clearances for installation and for maintenance.

E4.5 Codes, Standards and Regulations

E4.5.1 Perform the work in accordance with the relevant codes and standards from the regulatory agencies and institutes listed below. The latest issue of an individual code, standard or regulation at the time of contract signing governs.

- (a) CSA
- (b) ANSI

- (c) IEC
- (d) ISO
- (e) IEEE
- (f) NEMA
- (g) EEMAC
- (h) ASTM

E4.5.2 The equipment shall be CSA approved and bear either the CSA or cUL label for installation in Winnipeg, Manitoba, Canada.

E4.5.3 Provide all necessary approvals, inspections and special approval inspections.

E4.5.4 Specific Standards

- (a) In addition to the general standards listed above, the latest editions of the following specific standards shall apply to the extent specified herein:

CSA C22.2 No. 107.2-01	Battery Chargers
ANSI/UL 94-96 (R01)	Tests for flammability of plastic materials (for Battery container, lid and vent).
NEMA PE5-1996	Output Voltage ripple limits
ANSI C57.13	Requirements for Instrument Transformers
CAN3/CSA C13	Instrument Transformers
CSA C22.1_2009	Canadian Electrical Code - Part I
CSA C22.2, No. 31	Switchgear Assemblies
CAN3/CSA Z299.3	Quality Assurance Program – Category 3
ISO 9000 Series	Quality System Standards
EEMAC G8-2	Switchgear Assemblies
CAN/CSA M421-00	Use of Electricity in Mines (R 2007)
NBC/MBC	National Building Code of Canada and applicable Manitoba Building Codes.

- (b) Such amendments and changes to the above standards, as may have been made by the Provincial or Local Authority having Jurisdiction (AHJ) shall also govern.
- (c) Comply with all local codes and regulations applicable in the Province of Manitoba.
- (d) In the event of conflict(s) between the reference codes and standards, drawings, specifications and/or the purchase order, the Contractor shall obtain clarification before proceeding with the work.

E4.6 Language and Measurement System

- (a) Provide equipment nameplates in the English language.
- (b) Comply with the Metric system for all dimensional units of measurements.

E4.7 Operating Environment

- (a) The equipment operates indoors in a non-classified, dry, electrical switchgear room.
- (b) Provide all necessary safeguards and protection for optimal performance of the equipment.
- (c) Design and supply the equipment to provide continuous, long-term service under the ambient and environmental conditions that will prevail on the site as indicated in the associated datasheet.

E4.8 Design Criteria

E4.8.1 Process Description

- (a) The equipment will be installed by others at a wastewater treatment facility and will function as the main 125V DC control and protection power supply for 5kV electrical switchgear.

E4.8.2 Operating Philosophy

- (a) The equipment shall be designed to operate continuously, twenty-four (24) hours per day, three hundred and sixty-five (365) days per year with only scheduled maintenance.
- (b) The Contractor shall provide a list of scheduled maintenance procedures.
- (c) The equipment shall be suitably designed for indoor installation, and for operation under the conditions defined in the data sheet, drawings and as defined below:

E4.8.3 Performance Characteristics

- (a) Refer to the datasheet for performance requirements for the different battery charger/battery system requirements.

E4.8.4 Design Life

- (a) Provide equipment having a minimum design life of twenty five (25) years.

E4.8.5 Preferred Equipment

- (a) Provide equipment in accordance with this specification and equipment datasheets.

E4.8.6 Safety Requirements

- (a) The DC system shall be suitable for electrical switchgear use, and shall meet safety and maintenance requirements specified under CSA Z462-2008, Annexure-O.2 and clause 4.1.8.2.2.
- (b) The equipment shall be designed to provide a maximum degree of safety for personnel both under normal operating and fault conditions.
- (c) The equipment shall be designed so that it is impossible to contact live parts or to perform operations that could lead to arcing faults without the use of tools or brute force.
- (d) The equipment shall include mechanical interlocks where applicable.

E4.8.7 Other

- (a) Lifting Devices
 - (i) Provide adequate lifting points on battery enclosure and on battery charger for safe handling, installation and servicing.
- (b) Noise Levels
 - (i) Restrict noise levels from battery and Charger to not exceed 60 dB (A) at one meter from the source.
- (c) Safety Guards
 - (i) Provide safety guards around all hot equipment and exposed electrically energized equipment parts to protect operating personnel from injury in compliance with OHS requirements.
 - (ii) Provide all necessary safeguards and protection for optimal performance of the equipment.
- (d) Shop Drawings and Product Data
 - (i) Contractor final drawings shall be sealed by a Professional Engineer licensed to practice, and registered with, APEGM.
 - (ii) The City or designated representative will review Contractor drawings and will offer comments to ensure that the product offered complies with the requirements of the City, however the City or designated representative will not seal or approve the Contractor Shop Drawings and submittals.

E4.9 Materials of Construction

- (a) Provide materials of construction for the equipment in accordance with the specification, data sheets and the manufacturer's recommendation for the duty and service conditions specified.
- (b) Ensure no substitution of the materials of construction of the equipment after purchase order has been issued, without prior written authorization from the City or designated representative.
- (c) Fabricate the equipment using only new materials of first grade quality, free from any defects that may impair strength, durability, reliability and appearance.

E4.10 Electrical

E4.10.1 Battery Charger

- (a) The battery charger shall be sized for and shall be compatible with Valve Regulated Lead Acid (VRLA) batteries for electrical switchgear use.
- (b) The battery charger shall automatically maintain the battery bank in a fully charged state while the charger AC mains power is available.
- (c) The battery charger shall maintain a DC float voltage within plus or minus 1% of external setting, from no load to full load, during AC mains voltage variations of $\pm 10\%$ and frequency variations of $\pm 5\%$.
- (d) The DC voltage regulation of the constant voltage battery charger shall be maintained during line, load and temperature variations. Include for temperature monitoring probes to allow for automatic compensation of the DC voltage output of the battery charger.
- (e) The battery charger shall comply with CSA C22.2 No. 107.2-01.
- (f) The AC power input to the battery charger shall be as specified on the datasheet.
- (g) The charger shall be equipped with an AC input circuit breaker of suitable rating. Provide a shunt trip coil equipped AC input circuit breaker with the shunt trip operated by the rectifier (SCR/diode shorting) fail alarm. The AC circuit breaker shall be equipped with a lock & tag facility.
- (h) Alternatively instead of a shunt trip, provide a suitably rated AC input contactor in series with the AC input circuit breaker. The contactor shall close automatically when the AC input circuit breaker is closed and the contactor shall open (trip) only when a high DC voltage trip occurs on battery charger output. The trip signal to the AC input contactor must be latched type and shall be manually reset only. Also provide a maintained contact type emergency stop mushroom pushbutton for the contactor manual trip operation from panel front.
- (i) The battery charger multiple DC outputs shall be as specified on the datasheet and as indicated on the drawing.

E4.10.2 Battery Charger accessories

- (a) Provide mains AC voltmeter with voltage selector switch, accuracy $\pm 2\%$ of full scale, to measure AC input voltage.
- (b) Provide a rectifier output DC voltmeter with control fuses, accuracy $\pm 2\%$ of full scale, to measure rectifier output DC voltage,
- (c) Provide two DC rated output load circuit breakers (2pole, 250V DC) for 125V DC load circuits, as indicated on the datasheet:
 - (i) DC Output #1 - To DC distribution panel board
 - (ii) DC Output #2 - Future Spare
- (d) Provide one DC Battery circuit breaker (2pole, 250V DC) for connecting the 125V DC Battery bank, as indicated on the datasheet. The battery circuit breaker must be equipped with a lock and tag facility and must be in the battery charger section.

- (e) Provide a load DC ammeter, accuracy $\pm 2\%$ of full scale, to measure DC load current.
- (f) Provide auxiliary contact relay output and alarm for AC power failure with time delay to prevent alarm during short power outages.
- (g) Provide low DC battery voltage alarm to indicate battery over discharge.
- (h) Provide high DC output voltage alarm and high DC output voltage automatic shutdown.
- (i) Provide "no-charge" alarm to indicate charger has no DC output.
- (j) Provide DC ground detector relay and alarm (+ve and -ve).
- (k) Provide local indication and annunciation of alarms, including: failure of AC power, low DC voltage, high DC voltage, no rectifier output.
- (l) Provide an equalize timer, automatic reset type with charge time compatible with battery type. Equalize interval shall be settable from 0-28 days.
- (m) All output relays contacts shall be as specified in Section E4.10.8.

E4.10.3 Storage Batteries

- (a) Shall be Valve Regulated Lead Acid battery (VRLA) of Absorbed Glass Mat (AGM) technology or better.
- (b) Plate separators shall be absorbed glass mat.
- (c) Posts shall be bolted type.
- (d) Inter-cell connectors shall be Insulated lead plated copper, bolted to battery posts. Provide bolt holes slightly oversized to facilitate cell replacement. All connectors, bolts and nuts shall be corrosion resistant.
- (e) Submit battery gassing data, to allow for calculating ventilation requirements for the electrical room.
- (f) Cell containers and cover shall be one piece moulded polypropylene or equivalent, to ANSI/UL 94.
- (g) Terminal posts shall be bolted type.
- (h) Design life expectation: 25 years in float service at 25°C.
- (i) The manufacturer shall provide calculated battery capacity data referred to standard conditions (20°C \pm tol 5°C).
- (j) Batteries shall be capable of being recharged in the period specified to 95% full charge after supplying rated load for time specified, with no harmful effects on battery, including leaking or foaming of electrolyte.
- (k) The battery shall be placed in the electrical switchgear room and hence the system must be equipped with charging monitor to prevent overcharging by the battery charger.
- (l) Provide DC circuit breakers able to handle peak loads and duration without tripping.
- (m) Batteries shall be capable of 1000 cycles to 80% depth of discharge.
- (n) Battery shall be rated to deliver specified output over an extreme ambient temperature range of: 10°C to +30°C (indoor).

E4.10.4 Enclosures

- (a) Preferably the system enclosure shall be constructed so that the battery charger is located in the upper compartment and the storage batteries are located in the lower compartment.
- (b) Battery compartment/enclosure shall be NEMA-1 vented to allow dissipation of any off-gassing products and shall fully and totally enclose the batteries such that inadvertent contact with live parts is effectively prevented. Open or non-enclosed batteries and battery racks will **NOT** be accepted.

- (c) Requirements:
 - (i) Sheet steel, minimum 2.5mm thick CSA Type 1 floor-mount enclosure.
 - (ii) NEMA-12 enclosure for battery charger.
 - (iii) Air natural ventilated.
 - (iv) Meters, indicating lamps and controls group mounted on front panel.
 - (v) Provide lifting eyes and base channel for handling either by a crane or a forklift.
 - (vi) Apply finish, ASA 61 gray, in accordance with standard industrial practices.
 - (vii) Maximum temperature rise of any part shall not exceed 55°C over an ambient temperature of 30°C.

E4.10.5 Equipment identification

- (a) Provide equipment identification with lamacoid labels for major components such as enclosure, input circuit breaker, output circuit breakers, mode lights, alarms, meters etc.
- (b) Provide battery charger/ battery hazard warning and caution labels as specified in CSA C22.2 No. 107.2-01.

E4.10.6 Ground Terminal

- (a) Provide suitable ground conductor termination point inside the equipment enclosures for the battery charger and the batteries.

E4.10.7 Surge Arrestors

- (a) Not required.

E4.10.8 Auxiliary Relays

- (a) All auxiliary relays for alarm and trip outputs for customer use shall be CSA approved, with heavy duty form C contacts, rated for operation on 125 volts DC, with visual indication of coil energization.
- (b) Provide Individual form C alarm output contacts (125/250V, AC/DC, 10A) for: AC fail, DC voltage high, DC voltage low, DC ground fault, AC contactor/ Circuit breaker trip etc.

E4.10.9 Battery Test Circuit

- (a) Provide a pushbutton operation Battery Test feature that will transfer automatically the complete DC load onto the Battery Bank alone. Provide and allow for measurements of the battery discharge conditions.
- (b) The battery charger shall kick-in and resume normal operation when the battery voltage reaches end of discharge condition on battery test mode.
- (c) Provide a resettable elapsed time hour-meter to record the battery time duration indicating minimum standby time with the available load.

E4.10.10 Connections and Wiring

- (a) Wiring shall be CSA approved, flame retardant switchboard insulation system (SIS) type, XLPE insulated VW-1, 14 AWG minimum, stranded copper conductors rated 600 volt, 90°C minimum.
- (b) A minimum of 10% spare terminals shall be included (minimum 10 terminal block positions).
- (c) The terminal blocks for external connections shall be located in the low voltage compartment, grouped together and easily accessible, visible and positioned near the external field cable entry points.
- (d) All wiring not terminated on devices shall be terminated on terminal blocks. Not more than two (2) wires shall be connected to any device terminal or at any one terminal side. Interconnecting jumpers between terminal block positions shall be included in the 2 wire per side limitation. General and control wiring shall utilize self retaining

compression type spade connectors where wiring is terminated on hardware (relays, meters, switches, etc).

- (e) Soldered connections are not permitted.

E4.10.11 Communication wiring

- (a) The equipment shall be equipped with one Modbus RTU/TCP over Ethernet RJ45 communication port for communication of system status, alarm & trip status with the City's control system.
- (b) Provide complete communication parameters data, I/O maps and data communication user manual pertaining to the communication protocol, as a part of submittals for review.

E4.11 Interfaces and Coordination

- (a) Equipment will be installed on a concrete floor by the City. Provide all necessary installation instructions and hardware.

E4.12 Surface Treatment

- (a) Metal surfaces shall be cleaned, given rust-inhibiting treatment, primed and painted with a minimum of two coats of finish as per EEMAC G8-2 standard or approved equivalent.
- (b) Exterior surfaces shall be ANSI 61 light gray or approved equivalent.
- (c) Interior finish shall be ANSI white or approved equivalent.

E4.13 Equipment Identification, Marking and Labelling

E4.13.1 Nameplates

- (a) All caution & warning nameplates as required by CSA, CEC and local provincial regulations,
- (b) A main equipment identification nameplate for the battery charger and the battery bank, indicating as a minimum:
 - (i) Manufacturer's shop reference and drawing number, contact details, date/year of manufacturing, Purchase order reference,
 - (ii) Battery charger input AC voltage, phases, DC output voltage and ampere rating; battery bank rated voltage & ampere hour capacity, type of battery model no. manufacturer, contact details etc.
 - (iii) Maximum design temperature rise,
 - (iv) CSA approval, CSA design standard,
 - (v) Enclosure EEMAC/NEMA rating,
 - (vi) Equipment weight.
- (c) Battery Charger identification nameplate: BC-G90
- (d) Device identification nameplates for instruments, meters, relays, fuses, isolators, circuit breakers etc.
- (e) Equipment nameplates indicating auxiliary, control and field wiring sections of the switchgear with minimum lettering height of 6 mm,
- (f) Warning nameplates on the front of control compartments containing multiple sources of power. The warning lamacoid shall have 6 mm high white lettering on a red background,
- (g) Nameplates shall be attached by means of drive pins or self-drilling/tapping screws. Adhesive glue for nameplate fixing is not acceptable.
- (h) Contractor shall submit a detailed listing of proposed equipment nameplates to the City or designated representative for review prior to fabrication and installation.

E4.13.2 Mimic Diagram

- (a) Not required.

E4.14 Field Assembly

- (a) Equipment shall be shipped in weatherproof packaging. A loading dock is available in the electrical room.
- (b) Where equipment must be shipped in sections each section shall be equipped with a full length removable lifting channel which is rated to support the weight of the shipping section.
- (c) Provide instructions for lifting and assembly of the specified equipment at site.

E4.15 Quality Assurance (QA)

(a) General Requirements

- (a) Submit the Factory Inspection and Test Plan for review.

E4.15.1 Shop Inspection and Testing

- (a) Equipment will be subject to inspection at the following stages of manufacture:
 - (i) Prior to shop testing,
 - (ii) Prior to packaging for shipment.
- (b) Test equipment to ensure satisfactory operation prior to shipping.
- (c) Provide Certification of Satisfactory Testing & Performance.
- (d) Test and Inspect all equipment, materials, works in accordance with PO/Contract, scope of work, specifications, all applicable codes, standards, regulations, laws and provide Certified reports and Records.
- (e) Provide the City or designated representative with sufficient access to work, equipment, tools and facilities for witness inspection or witness testing, surveillance or audit, at any time during manufacture and testing.

E4.15.2 Factory Tests

- (a) Test the equipment per applicable standards and provide test data.
- (b) The City or designated representative reserves the right to witness any or all tests.
- (c) Prior to proceeding with the tests, provide in writing, a list of the tests to be performed at least two weeks before the tests are scheduled to begin, and an approximate schedule, with dates anticipated for the tests
- (d) The equipment shall be tested at the Contractor's manufacturing plant prior to shipment and in accordance with the latest applicable standards.
- (e) The tests classified by the standards as optional may be carried out or waived at the City's discretion.
- (f) Contractor's routine tests shall include all tests required by the Standards for manufactured equipment. Routine factory tests shall include but not be limited to the following for all of the equipment supplied:
 - (i) Operational tests on circuit breakers, and control devices; control wiring shall be energized and electrically operated devices shall be electrically operated at normal and minimum control voltage,
 - (ii) Remote control systems if equipped shall be tested to demonstrate proper operation under simulated conditions,
 - (iii) Operation of key, electrical and mechanical interlock systems shall be tested.
 - (iv) Dimension verification,
 - (v) Ratings verification (confirmation of nameplate data),
 - (vi) Physical inspection of equipment.

- (vii) Demonstration of correct operation of all circuit breaker mechanical safety interlocks,
- (viii) The Battery charger shall be factory tested prior to shipping, and all test results shall be properly recorded and included with the operations & maintenance manual.
- (ix) Load Testing by connecting suitable load designed to fully discharge battery to rated end voltage in 8hr. Charge battery to ensure cells fully charged. When voltage reaches steady state, record: ambient temperature, voltage of each cell, voltage of battery. Discharge battery by applying load for 8hr, and record at 85%, 90%, 95% and 100% of rated discharge time: voltage of battery, load current, voltage of each cell, ambient temperature, battery temperature. Chart the battery parameters during discharge phase.
- (x) At completion of discharge test, recharge battery at maximum specified rate, and record at 30 min intervals: battery voltage, charging current. Chart the battery parameters during charging phase.
- (xi) At start and finish of charging cycle record ambient and battery temperatures.
- (xii) Submit copy of test results to the City or designated representative for review, before shipping the equipment.

E4.16 Site Testing and Commissioning Services

- E4.16.1 The equipment will be field tested by the City for its functionality and operation as indicated in this specification.
- E4.16.2 Provide the services of a qualified factory-trained manufacturer's technician to assist the City with installation, certification and startup and site testing of the equipment specified under this section for a period of one (1) Business day. Include in the base bid price.
- E4.16.3 A factory trained service representative is to provide start up and commissioning services. This shall include but not be limited to:
 - (a) Megger, Ground test
 - (b) Verify that all mechanical interlocks are functioning properly
 - (c) Verify Charger basic operation, controls, operating functions, protection relay operation and status monitoring.
- E4.16.4 Provide three (3) copies of the manufacturer's field commissioning report.
- E4.16.5 Following completion of the work, issue a history docket comprised of the quality certificates, inspection and test records, and any other relevant documents related to manufacture and testing for the City's record.

E4.17 Training Services

- (a) Provide the following training services:
 - (i) Battery Charger description, operation, maintenance & troubleshooting training session at City Of Winnipeg site for five (5) people. Training shall consist of theory and practical sessions at site. Discuss proper methods/techniques for routine testing/maintenance.
- (b) Allow for four (4) hours of training included in the base bid price.

E4.18 Spares

- (a) Provide the following spares:
 - (i) DC Circuit Breaker (1)
 - (ii) Relay control board (1)
 - (iii) General Fuses & control fuses – 2 sets of all types/ratings.
 - (iv) Battery temperature monitoring probe (1)
 - (v) Spare inter-cell connectors, nuts and bolts (2)
 - (vi) Spare inter-tier connectors, nuts and bolts (2)
 - (vii) Input filter (1)
 - (viii) Output filter (1)

E5. DC PANELBOARD SPECIFICATIONS

E5.1 Submittals

- (a) Submit Shop Drawings and product data for review by the City or designated representative as per Section E3.1.

E5.2 References

- (a) Canadian Standards Association (CSA International)
 - (i) CSA C22.2 No.29, Panelboards and enclosed Panelboards.
 - (ii) CSA-C22.2 No. 5, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).
- (b) In addition to CSA requirements, manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

E5.3 Panelboard Requirements:

- (a) Panelboard to be rated for 125 VDC service
- (b) Bus and breakers rated for 10 kA (symmetrical) interrupting capacity, or as indicated.
- (c) Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number.
- (d) Panelboard mains, number of circuits, and number and size of branch circuit breakers as indicated.
- (e) Two (2) keys for each panelboard and key panelboards alike.
- (f) Copper bus bars.
- (g) Trim with concealed front bolts and hinges.
- (h) Trim and door finish: baked grey enamel.

E5.4 Breaker Requirements:

- (a) Breakers to be rated for 125 VDC service.
- (b) Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.
- (c) Moulded-case circuit breakers, and Circuit breakers to CSA C22.2 No. 5
- (d) Common-trip breakers: with single handle for multi-pole applications.
- (e) Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
- (f) Circuit breakers to have minimum 10kA symmetrical rms interrupting capacity rating for DC service.

- (g) Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.
- (h) Include on-off locking device.

E5.5 Equipment Identification

E5.5.1 Nameplates:

- (a) Lamicoid: 3 mm thick, white face, black core, mechanically attached with self tapping screws. Text size 5 mm.
- (b) Text to read:
 - (i) Line 1: "PNL-G90"
 - (ii) Line 2: "125 VDC"
 - (iii) Line 3: "SOURCE: BC-G90"

E6. EMERGENCY LIGHTING TEST ENCLOSURE

E6.1 Submittals

- (a) Submit Shop Drawings and product data, and wait for approval, prior to construction of the enclosure as per Section E3.1. Include:
 - (i) Panel Layout.
 - (ii) Bill of Materials.
- (b) Prior to shipment:
 - (i) Submit electronic pictures of enclosure exterior and interior, including door interior. Pictures to be of sufficient resolution to read component labels.
- (c) Do not ship enclosure until approval from the City or designated representative is received.

E6.2 General Requirements

- (a) Enclosure shall be built by a CSA/cUL-approved manufacturer and shall bear the CSA/cUL seal with the manufacturer's file number.
- (b) Enclosure shall be factory assembled and pre-wired where possible. The Enclosure wiring shall be verified at the manufacturer's factory and completely tested before being shipped to the site.
- (c) Supply, install, wire and test all components inside the enclosure according to the specifications herein and the drawings.

E6.3 Products

E6.3.1 Enclosure

- (a) Requirements:
 - (i) Rating: NEMA 12.
 - (ii) Type: Continuous hinge with clamps for closing.
 - (iii) Size: 304mm x 304mm or larger as required to fit components
- (b) Manufacturer:
 - (i) Hoffman or approved equal in accordance with B5.

E6.3.2 Rails (DIN Rails)

- (a) Rails used must be DIN Rail style TS 35mm, slotted.

E6.3.3

Terminals

- (a) TS-35 DIN Rail mounting.
- (b) Voltage rating:
 - (i) 600V for general control circuits.
 - (ii) 600V for power circuits.
- (c) Current Rating:
 - (i) Power Terminals: 20A
 - (ii) Control Terminals 10A
- (d) Manufacturer:
 - (i) Phoenix Contact or approved equal in accordance with B5.
- (e) Terminal blocks shall be designed for the size of the wires to be connected to them.
- (f) Each terminal shall bear an identification number on both sides.
- (g) Supply two (2) spares of each fuse type and rating. Place in a clear plastic bag and attach to the enclosure door interior.
- (h) Drawings and templates supplied may not detail all hardware components such as labels, stoppers, rail lifters, end plates, separators, etc. The supplier must supply and install such components when required.

E6.3.4

Wire duct

- (a) Requirements:
 - (i) Narrow slot wiring duct
 - (ii) Size: one (1") inch wide.
- (b) Manufacturer:
 - (i) Panduit or approved equal in accordance with B5.

E6.3.5

Ground Bus Bar

- (a) Supply a ground bus bar in the enclosure.
- (b) Requirements:
 - (i) Tapped holes with screws.
 - (ii) Bar to have sufficient connection points for all cables entering the control panel, plus twenty-five percent (25%) spare.
 - (iii) Maximum one wire termination per screw.
- (c) Manufacturer:
 - (i) IlSCO or approved equal in accordance with B5.

E6.3.6

Contactors

- (a) Requirements:
 - (i) Type: DPDT
 - (ii) Coil Voltage: 120 VAC
 - (iii) Contact Rating: 20A (125 VDC)
 - (iv) Approvals: CSA
- (b) Manufacturer and Model:
 - (i) Tyco PRD-11AH0-120VAC
 - (ii) or approved equal in accordance with B5.

E6.3.7 Selector Switch

- (a) Switch shall be at least NEMA 12 (or better)-type device.
- (b) Legend plate to read:
 - (i) Position 1: "AUTO"
 - (ii) Position 2: "TEST"
- (c) Manufacturer:
 - (i) Allen-Bradley or approved equal in accordance with B5.

E6.4 Execution

E6.4.1 Component Installation

- (a) Install wire duct on both side of enclosure with components mounted vertically down the middle of the enclosure.
- (b) Selector Switch to be located along the vertical centre line of the enclosure.
- (c) All non-DIN rail mountable devices in the control panel shall be mechanically affixed to the back panel with either tapped or self-tapping screws.
- (d) Mount all control devices so that any component can be replaced without removing the sub-panel.
- (e) Components and/or auxiliary instruments mounted at the rear of the panel shall be readily accessible and their installation shall not be affected by, or interfere with the removal of any panel instrument.
- (f) Supply and install all required fuses.
- (g) Space devices to allow for cooling, replacement, servicing, and wiring access.

E6.4.2 Identification

- (a) Install lamacoid identifier on the enclosure:
 - (i) Text to read: "JBP-G90"
- (b) Install a lamacoid identifier above the selector switch.
 - (i) Text to read: "EMERGENCY LIGHT TEST SWITCH".
- (c) Perform terminal identification using a computerized device. Handwriting is not acceptable. Label terminals as shown on drawings.