



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 717-2008

**SUPPLY AND DELIVERY OF DIESEL GENERATOR
AND TRANSFER SWITCH**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 Supply and Delivery of Diesel Generator and Transfer Switch

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, January 15, 2009

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 D3.1.

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 9 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, 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 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 11 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 and the corporate seal, if the corporation has one, should be affixed;
 - (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.

B7.5 If a Bid is submitted jointly by two 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 Prices 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 Prices 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.

B8.2 The quantities listed on Form B: Prices are to be considered approximately only. The City will use said quantities for the purpose of comparing Bids.

B8.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B8.4 Prices from Non-Resident Bidders are subject to a Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

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 provide, in his Bid:
- (a) Names of all Subcontractors, if any.
- B9.5 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.
- B9.6 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 10 of Form A: Bid.
- B11.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 10 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 11 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 11 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;
 - (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 unit price shown on Form B: Prices.
- B13.5 This Contract will be awarded as a whole.

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 and Delivery of Goods* (Revision 2008 05 26) are applicable to the Work of the Contract.
- C0.2 The *General Conditions for the Supply and Delivery 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
- C0.3 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 and Delivery 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 a diesel generator and transfer switch, including all start-up testing, commissioning, training and coordination with General Contractor.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is SMS Engineering Ltd., represented by:

Mr. Cliff Brown
770 Bradford St
Winnipeg MB R3H 0N3

Telephone No.: (204) 789-2338
Facsimile No.: (204) 772-2153

D4. NOTICES

D4.1 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 address or facsimile number:

The City of Winnipeg
Chief Financial Officer
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

SUBMISSIONS

D5. AUTHORITY TO CARRY ON BUSINESS

D5.1 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.

D6. SECURITY CLEARANCE

D6.1 Each individual proposed to perform Work under the Contract shall be required to obtain a Criminal Record Search Certificate from the police service having jurisdiction at his place of residence.

D6.2 The Criminal Record Search shall include a Vulnerable Sector Search. This can be obtained by completing and providing the following in person to the Winnipeg Police Service Division 30 Clerk at Main Floor, 151 Princess Street:

- (a) Form P-612 Check the following boxes: Vulnerable Sector; and Other by inputting the Bid Opportunity Number in the space provided. This form can be found on the website at: www.winnipeg.ca/police/BPR/forms/Criminal_Record_Check_P612.doc
 - (i) Individuals will need to state in Section 2 of the form, that they may be working in City of Winnipeg pools, libraries and community centres;
 - (ii) Individuals will need to sign and date Section 3 of the form.
 - (b) Two (2) pieces of identification as stated in Bureau of Police Records on the website at: www.winnipeg.ca/police/BPR/id.stm
 - (c) Fee for each individual applying for a Criminal Record Search. Fee schedule can be found on the website at: www.winnipeg.ca/police/BPR/fees.stm
- D6.2.1 The original Criminal Record Search Certificate (Form P-253) will be provided by the Winnipeg Police Service to the individual applicant. The original has a validation sticker from the Winnipeg Police Service in the top right hand corner. The applicant shall:
- (a) Provide the original Criminal Record Search Certificate (Form P-253) to the Contract Administrator.
- D6.3 Prior to the commencement of any Work, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Contractor shall supply the Contract Administrator with a Criminal Record Search Certificate obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform the Work.
- D6.4 Any individual for whom a Criminal Record Search Certificate is not provided, or for whom a Criminal Record Search Certificate indicates any convictions or pending charges related to property offences or crimes against another person, will not be permitted to perform any Work.
- D6.5 Any Criminal Record Search Certificate obtained thereby will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.
- D6.6 Notwithstanding the foregoing, at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated criminal records search. Any individual who fails to provide a satisfactory Criminal Record Search Certificate as a result of a repeated criminal records search will not be permitted to continue to perform any Work.

SCHEDULE OF WORK

D7. COMMENCEMENT

- D7.1 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.
- D7.2 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 D5;
 - (ii) evidence of the workers compensation coverage specified in C6.16;
 - (iii) the security clearances specified in D6.
 - (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.

D8. DELIVERY

- D8.1 Goods shall be delivered within two hundred and eighty (280) Calendar Day(s) of the placing of an order, f.o.b. destination, freight prepaid to:
- 1466 William Ave

Winnipeg MB R3E 1A5

- D8.2 The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.
- D8.3 Goods shall be delivered between 8:30 a.m. and 4:30 p.m. on Business Days.
- D8.4 The Contractor shall off-load goods as directed at the delivery location.

D9. LIQUIDATED DAMAGES

- D9.1 If the Contractor fails to achieve delivery of the goods within the time specified in D8.1 Delivery the Contractor shall pay the City One hundred and fifty dollars (\$150.00) per Calendar Day for each and every Calendar Day until the goods have been delivered.
- D9.2 The amount specified for liquidated damages in D9.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Delivery by the day fixed herein for same.
- D9.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D10. SCHEDULED MAINTENANCE

- D10.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time period required by the Specifications. They shall begin once the equipment has been commissioned and accepted by the City of Winnipeg.

(a) Annually and semi-annually as follows:

D10.1.1 Maintenance Inspection

- (a) Provide semi-annual and annual inspections as described below for the duration of the specified warranty.
- (i) Semi-Annual Inspection
 - (ii) General
 - (aa) Visual Inspection
 - (aaa) Visual inspection of overall condition for foreign objects, loose or broken fittings, guards and components. General inspection for site cleanliness and safety.
 - (iii) Cooling System
 - (aa) Radiator/Heat Exchanger
 - (aaa) Visual inspection for leaks, damage and debris. Louvres operate correctly.
 - (bb) Coolant
 - (aaa) Visually inspect for correct level and condition of coolant (rust, oil, contaminants). Check coolant conditioner concentration and temperature protection. Check filler cap gasket and sealing surfaces.
 - (cc) Hoses and Clamps
 - (aaa) Visual inspection of all hoses for deterioration (i.e. brittle and/or cracked). Check tightness of clamps.
 - (dd) Fan Drive Pulley and Fan
 - (aaa) Check for loose or worn pulleys and lubricate fan drive bearing. Check fan operation and clearance.
 - (ee) Fan Belts

- (aaa) Inspect for wear or deterioration. Check tension and adjust as necessary.
 - (ff) Jacket Water Heater
 - (aaa) Inspect for proper operation.
 - (gg) Water Pump
 - (aaa) Visual and operational inspection for leaks and/or unusual noises.
- (iv) Fuel Systems
 - (aa) Fuel Tank
 - (aaa) Visually inspect fuel tank system for leaks and fuel level.
 - (bb) Water Trap/Separator
 - (aaa) Drain water from fuel tank or water separator.
 - (cc) Fuel Lines and Connections
 - (aaa) Inspect for leaks and tighten connections. Check line brackets.
 - (dd) Governor and Controls
 - (aaa) Check governor oil level, adjust as necessary. Inspect controls and linkage for proper operation.
 - (ee) Fuel Filter-Primary/Secondary
 - (aaa) Inspect for damage, leaks and proper operation. Clean primary filter.
 - (ff) Fuel Pressure
 - (aaa) Operation check of gauge for correct pressure.
- (v) Air Induction and Exhaust System
 - (aa) Air Filter Service Indicator
 - (aaa) Note reading.
 - (bb) Air Filter
 - (aaa) Inspect.
 - (cc) Air Inlet System
 - (aaa) Inspect piping and air filter housing for damage, loose connections and evidence of leaks. Check housing seals and gaskets.
 - (dd) Turbocharger
 - (aaa) Inspect for oil or exhaust leakage. Check for unusual noise and proper operation.
 - (ee) Exhaust Manifold
 - (aaa) Inspect for damage, loose or missing hardware, evidence of exhaust leakage. Inspect for oil slobbering (wet stacking). Load bank recommendation.
 - (ff) Exhaust System
 - (aaa) Inspect silencer and piping for damage, corrosion or leakage. Check rain cap. Check supports for vibration damage and loose connections.
- (vi) Lube Oil System
 - (aa) Oil Level
 - (aaa) Inspect for correct oil level and contamination. Visually inspect unit for leaks.
 - (bb) Oil Pressure
 - (aaa) Operational check of gauge for correct pressure. Operational and visual inspection of prelube pump.
 - (cc) Crankcase Breather

- (aaa) Inspect for proper operation. Check connections and inspect hoses for deterioration. Check for excessive blowby.
 - (dd) Scheduled Oil Sample
 - (aaa) Obtain oil sample for analysis.
 - (vii) Starting System
 - (aa) Batteries
 - (aaa) Inspect for damage and leakage. Clean and tighten all battery cable connections. Check electrolyte level and specific gravity, top up as necessary.
 - (bb) Battery Charger
 - (aaa) Inspect for proper operation (float and equalize), loose terminals and deteriorated wiring.
 - (cc) Starting Motor
 - (aaa) Inspect electrical connections and wiring. For air starters, inspect oil jar and feeder operation. Operational check for abnormal engagement and cranking noises.
 - (dd) Alternator
 - (aaa) Inspect for proper operation, loose connections and mounting hardware. Check belts, pulleys and voltage output.
 - (viii) Engine Monitors and Safety Controls
 - (aa) Safety Controls
 - (aaa) Inspect for proper operation, loose connections and wiring deterioration. Check all safety controls for proper operation.
 - (bb) Remote Annunciators and Alarms
 - (aaa) Inspect and test all panel and safety alarms for proper operation.
 - (ix) Power Generator
 - (aa) Slip Rings and Brushes
 - (aaa) Remove and inspect brushes and clean slip rings.
 - (bb) Space Heaters
 - (aaa) Inspect for proper operation.
 - (x) Control Panel
 - (aa) Start Controls
 - (aaa) Manual/Auto: Operational check for proper operation. Check automatic start.
 - (bb) Voltmeter
 - (aaa) Operational check for correct reading. Check voltage level, voltage gain and voltage drop adjustment.
 - (cc) Ammeter
 - (aaa) Operational check for correct reading if load is available.
 - (dd) Frequency Meter
 - (aaa) Operational check for correct reading. Load and no-load readings if available.
- (b) Annual Inspection
 - (i) Fuel System
 - (aa) Fuel Filters
 - (aaa) Replace filters and inspect for proper sealing and operation.
 - (ii) Lube Oil System
 - (aa) Oil and Filters
 - (aaa) Change oil and filters and inspect all gaskets and seals.

- (bb) Scheduled Oil Sample
 - (aaa) Obtain oils sample for analysis.
- (cc) Crankcase Breather
 - (aaa) Inspect and clean.
- (iii) Air Induction and Exhaust System
 - (aa) Valve Rotators
 - (aaa) Operational inspection to ensure proper valve rotation.
 - (bb) Turbocharger
 - (aaa) Inspect turbocharger for excessive end play of rotating.
- (iv) Engine Monitors and Safety Controls
 - (aa) Gauge Accuracy
 - (aaa) Check oil pressure, water temperature and alternator gauges for accuracy. Replace as necessary.
 - (bb) Sending Unit Switches
 - (aaa) Check water temperature and oil pressure. Replace as necessary.
- (v) Generator
 - (aa) Generator Rear Bearing
 - (aaa) Lubricate.
 - (bb) Vibration Isolators
 - (aaa) Check for proper adjustment and condition.
- (vi) Control Panel
 - (aa) Circuit Breakers
 - (aaa) Inspect for free movement and tight connections.
 - (bb) Automatic Transfer Switch
 - (aaa) Inspect and test for proper operation.
 - (cc) Control Panel
 - (aaa) Vacuum and clean.

D10.2 Determination of performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

MEASUREMENT AND PAYMENT

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.

D12. PAYMENT SCHEDULE

D12.1 Further to C10, payment shall be in accordance with the following payment schedule:

- (a) 5% upon satisfactory review of equipment shop drawings.
- (b) 85% upon delivery of material.
- (c) 10% upon final acceptance of installation.

D12.1 Further to C10, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

WARRANTY

D13. WARRANTY

D13.1 Notwithstanding C11, the warranty period shall begin on the date of successful commissioning and shall expire five (5) years or two thousand, five hundred (2500) operating hours, thereafter unless extended pursuant to C11.3, in which case it shall expire when provided for thereunder.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 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 the diesel generator & transfer switch in accordance with the requirements hereinafter specified.
- E2.2 Item No.1 - Diesel Generator shall be Caterpillar, Onan or Detroit Diesel Allison in accordance the with following specifications.

E2.2.1 References

- (a) American National Standards Institute (ANSI)/American Petroleum Institute (API)
 - (i) ANSI/API 650-1988(A2000), Welded Steel Tanks for Oil Storage Tenth Edition; Addendum 1.
- (b) American National Standards Institute (ANSI)/National Electrical Manufacturers' Association (NEMA)
 - (i) ANSI/NEMA MG1-1998, Motors and Generators.
- (c) Canadian General Standards Board (CGSB)
 - (i) CAN/CGSB-3.6-2000, Regular Sulphur Diesel Fuel.
- (d) International Organization for Standardization (ISO)
 - (i) ISO 3046-1-2002, Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations Of Power, Fuel And Lubricating Oil Consumptions, And Test Methods.
- (e) National Electrical Manufacturers Association (NEMA)
- (f) Underwriters' Laboratories of Canada (ULC)
 - (i) ULC-S601-00, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.
 - (ii) CAN/ULC-S603-92, Standard for Steel Underground Tanks for Flammable and Combustible Liquids.
 - (iii) CAN/ULC - C282.

E2.2.2 System Description

- (a) Generating system consists of:
 - (i) Diesel engine.
 - (ii) Alternator.
 - (iii) Alternator control panel.
 - (iv) Automatic transfer equipment.
 - (v) Battery charger and battery.
 - (vi) Automatic engine room ventilation system.
 - (vii) Fuel supply system.
 - (viii) Exhaust system.
 - (ix) Steel mounting base.
- (b) System designed to operate as emergency standby, rated at 750 kVA.

E2.2.3 Shop Drawings

- (a) Submit Shop Drawings in accordance with E4 - Submittals.
- (b) Include:
 - (i) Engine: make and model, with performance curves.
 - (ii) Alternator: make and model.
 - (iii) Voltage regulator: make, model and type.
 - (iv) Automatic transfer switch: make, model and type.
 - (v) Manual bypass switch' make and model.
 - (vi) Battery: make, type and capacity.
 - (vii) Battery charger: make, type and model.
 - (viii) Alternator control panel; make and type of meters and controls.
 - (ix) Governor type and model.
 - (x) Automatic engine room ventilation system.
 - (xi) Cooling air requirements in m/s.
 - (xii) British standard or DIN rating of engine.
 - (xiii) Flow diagrams for:
 - Diesel fuel.
 - Cooling air.
 - (xiv) Dimensioned Drawing showing complete generating set mounted on steel base, including vibration isolators, exhaust system, drip trays, and total weight.
 - (xv) Continuous full load output of set at 0.8 PF lagging.
 - (xvi) Description of set operation including:
 - (aa) Automatic starting and transfer to load and back to normal power, including time in seconds from start of cranking until unit reaches rated voltage and frequency.
 - (bb) Manual starting.
 - (cc) Automatic shut down and alarm on:
 - (aaa) Overcranking.
 - (bbb) Overspeed.
 - (ccc) High engine temp.
 - (ddd) Low lube oil pressure.
 - (eee) Short circuit.
 - (fff) Alternator overvoltage.
 - (ggg) Lube oil high temperature.
 - (hhh) Over temperature on alternator.
 - (dd) Manual remote emergency stop.

E2.2.4 Closeout Submittals

- (a) The manufacturers shall provide operation and maintenance data for diesel generator for incorporation into manual specified in E6 - Closeout Submittals.
- (b) Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier and:
 - (i) Operation and maintenance instructions for engine, alternator, control panel, automatic transfer switch, manual bypass switch, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.
 - (ii) Technical data:
 - (aa) Illustrated parts lists with parts catalogue numbers.
 - (bb) Schematic diagram of electrical controls.

- (cc) Flow diagrams for:
 - (aaa) Fuel system.
 - (bbb) Lubricating oil.
 - (ccc) Cooling system.
- (dd) Certified copy of factory test results.
- (ee) Maintenance and overhaul instructions and schedules.
- (ff) Precise details for adjustment and setting of time delay relays or sensing controls which require on Site adjustment.

E2.2.5 Diesel Engine

- (a) Diesel engine: to ISO 3046-1.
 - (i) Engine: standard product of current manufacture, from company regularly engaged in production of such equipment.
- (b) Turbo charged and after cooled, synchronous speed 1800 r/min.
- (c) Capacity:
 - (i) Rated continuous power in kW at rated speed, after adjustment for system losses in auxiliary equipment necessary for engine operation; to be calculated as follows: Rated continuous output = Generator kW divided by Generator efficiency at full load.
 - (aa) Under following Site conditions:
 - (aaa) Altitude: 300 m.
 - (bbb) Ambient temperature: 40°C.
 - (ccc) Relative humidity: 60 %.
- (d) Cooling System:
 - (i) Liquid cooled: heavy duty industrial radiator mounted on generating set base with engine driven pusher type fan to direct air through radiator from engine side, with ethylene glycol anti-freeze non-sludging above minus 46 degrees C.
 - (ii) To maintain manufacturer's recommended engine temperature range at 10% continuous overload in ambient temperature of 40 degrees C.
 - (iii) Block heater: thermostatically controlled lube oil or liquid coolant heater connected to line side of automatic transfer switch to allow engine to start in room ambient 0 degrees C.
- (e) Fuel:
 - (i) Type A fuel oil: to CAN/CGSB-3.6.
- (f) Fuel system: solid injection, mechanical fuel transfer pump, fuel filters and air cleaner, fuel rack solenoid energized when engine running.
- (g) Governor:
 - (i) Electronic type:
 - (aa) Steady state speed band of plus or minus 0.5%.
 - (bb) Isochronous speed regulation no load to full load.
 - (cc) Adjustable isochronous to 5% droop.
 - (dd) Transient frequency variation shall not exceed 15% of rated frequency when full load at rated power factor is applied. Recovery to stable operation shall occur within five seconds.
- (h) Lubrication system:
 - (i) Pressure lubricated by engine driven pump.
 - (ii) Lube oil filter: replaceable, full flow type, removable without disconnecting piping.
 - (iii) Lube oil cooler.
 - (iv) Engine sump drain valve.

- (v) Oil level dip-stick.
- (i) Starting system:
 - (i) Positive shift, gear engaging starter 12 or 24V dc.
 - (ii) Cranking limiter to provide 3 cranking periods of 10s duration, each separated by 5 s rest.
 - (iii) Lead acid, 12 or 24V storage battery with sufficient capacity to crank engine for 1min at 0 degrees C without using more than 25% of ampere hour capacity.
 - (iv) Battery charger : constant voltage, solid state, two stage from trickle charge at standby to boost charge after use. Regulation: plus or minus 1% output for plus or minus 10% input variation. Automatic boost for 6h every 30 days. Equipped with dc voltmeter, dc ammeter and on-off switch. Minimum charger capacity: 7 A.
- (j) Vibration isolated engine instrument panel with:
 - (i) Lube oil pressure gauge.
 - (ii) Lube oil temperature gauge.
 - (iii) Lube oil level gauge.
 - (iv) Coolant temperature gauge.
 - (v) Coolant level gauge.
 - (vi) Running time meter: non-tamper type.
- (k) Guards to protect personnel from hot and moving parts. Locate guards so that normal daily maintenance inspections can be undertaken without their removal.
- (l) Drip tray.

E2.2.6

Alternator

- (a) Alternator: to ANSI/NEMA MG1.
- (b) Rating: 3phase, 600 V, 4 wire, 600 kW, 60Hz, at 0.8PF.
- (c) Output at 40 degrees C ambient:
 - (i) 100% full load continuously.
 - (ii) 110% full load for 1h.
 - (iii) 150% full load for 1 min.
- (d) Revolving field, brushless, single bearing.
- (e) Drip proof.
- (f) Amortisseur windings.
- (g) Synchronous type.
- (h) Dynamically balanced rotor permanently aligned to engine by flexible disc coupling.
- (i) Exciter: permanent magnet.
- (j) EEMAC class H insulation on windings.
- (k) Thermistors or Platinum resistance temperature transducers embedded in stator winding and connected to alternator control circuitry.
- (l) Voltage regulator: thyristor controlled rectifiers with phase controlled sensing circuit:
 - (i) Stability: .25% maximum voltage variation at any constant load from no load to full load.
 - (ii) Regulation: 1.5% maximum voltage deviation between no-load steady state and full-load steady state.
 - (iii) Transient: 10% maximum voltage dip on one-step application of 0.8PF full load.
 - (iv) Transient: 12% maximum voltage rise on one-step removal of 0.8PF full load.
 - (v) Transient: 4 s maximum voltage recovery time with application or removal of 0.8PF full load.

- (m) Alternator: capable of sustaining 300% rated current for period not less than 10s permitting selective tripping of down line protective devices when short circuit occurs.

E2.2.7 Control Panel - Remote Type

- (a) Totally enclosed c/w 1000 A L.S.I.G. fixed mounted breaker.
- (b) Instruments:
 - (i) Digital 100% solid state circuitry indicating type 2 % accuracy, rectangular face, flush panel mounting:
 - (aa) Voltmeter: ac, scale 0 to 600 V.
 - (bb) Ammeter: ac, scale 0 to 300 A.
 - (cc) Wattmeter scale 0 to 300 kW.
 - (dd) Frequency meter: scale 55 to 65Hz.
 - (ee) kVAR meter kW.h meter .
 - (ii) Voltmeter selector switch, rotary, panel mounting, round notched handle, four position, labelled "Off-Phase A-Phase B-Phase C".
 - (iii) Ammeter selector switch, rotary, maintained contacts, panel mounting, designed to prevent opening of current circuits, round notched handle, four position labelled "OFF- Phase A-Phase B-Phase C".
 - (iv) Instrument Transformers
 - (aa) Potential-dry type for indoor use:
 - (aaa) Ratio: 600 to 120.
 - (bbb) Rating: 600 V, 60Hz, BIL 95 kV.
 - (bb) Current-dry type for indoor use:
 - (cc) Ratio: 300 to 5.
 - (dd) Rating: 600 V, 60Hz, BIL 95 kV.
 - (ee) Positive action automatic short-circuiting device in secondary terminals.
- (c) Controls:
 - (i) Engine start button.
 - (ii) Selector switch: Off-Auto-Manual - Test full load test no load.
 - (iii) Engine emergency stop button and provision for remote emergency stop button outside of room.
 - (aa) Alternator output breaker:
 - (aaa) Circuit breaker c/w L.S.I.G. adjustable parameters, 1000 Amp.
 - (bb) Voltage control rheostat: mounted on inside of control panel.
 - (cc) Operating lights, panel mounted:
 - (aaa) "Normal power" pilot light.
 - (bbb) "Emergency power" pilot light.
 - (ccc) Green pilot lights for breaker on and red pilot lights for breaker off.
 - (dd) Solid state indicator lights for alarm with 1set manually reset NO/NC (ee) contacts wired to terminal block for remote annunciation on:
 - (aaa) Low fuel level.
 - (bbb) Low battery voltage.
 - (ccc) Ventilation failure.
 - (ddd) Low coolant temperature.
 - (ee) Solid state controller for automatic shutdown and alarms with 1set manually reset NO/NC contacts wired to terminal block for remote annunciation on:
 - (aaa) Engine overcrank.

- (bbb) Engine overspeed.
- (ccc) Engine high temperature.
- (ddd) Engine low lube oil pressure.
- (eee) Short circuit.
- (fff) AC over voltage.
- (ff) Lamp test button.
- (gg) Provision for remote monitoring.
- (hh) Provision for remote shut-down of generator from a push-button located outside of the generator room.

E2.2.8 Automatic Transfer Switch

- (a) See E 2.3.

E2.2.9 Steel Mounting Base

- (a) Complete generating set mounted on structural steel base of sufficient strength and rigidity to protect assembly from stress or strain during transportation, installation and under operating conditions on suitable level surface.
- (b) Assembly fitted with vibration isolators and control console resiliently mounted.
 - (i) Spring type isolators with adjustable side snubbers and adjustable for levelling.
- (c) Sound insulation pads for installation between isolators and concrete base.

E2.2.10 Exhaust System

- (a) Hospital grade horizontally mounted exhaust silencer with condensate drain, plug and flanged couplings.
- (b) Heavy duty flexible exhaust pipe with flanged couplings as required.
- (c) Fittings and accessories as required.
- (d) Expansion joints: stainless steel, corrugated, of suitable length, to absorb both vertical and horizontal expansion.
- (e) Coordinate with future Mechanical sub-trade, provide all fittings, connections, sizes of piping for a complete system as per the engines requirements.

E2.2.11 Equipment Identification

- (a) Provide equipment identification.
- (b) Control panel:
 - (i) Nameplates for controls including alternator breakers and program selector switch.
 - (ii) Nameplates for meters, alarms, indicating lights and minor controls.

E2.2.12 Fabrication

- (a) Shop assemble generating unit including:
 - (i) Base.
 - (ii) Engine and radiator.
 - (iii) Alternator.
 - (iv) Control panel.
 - (v) Battery and charger.
 - (vi) Automatic transfer equipment.

E2.2.13 Finishes

- (a) Apply touch-up as required finishes.
- (b) Alternator control cubicle: paint inside, exterior to match engine and alternator.
- (c) Exhaust and inlet air hoods international orange.

- (d) Other ducts and racks grey.
- (e) Supply 0.25L of grey touch-up enamel.

E2.2.14 Source Quality Control

- (a) Test procedure to be in accordance with CSA - C282, and shall also include the following:
 - (i) Prepare blank forms and check sheet with spaces to record data. At top of first sheet record:
 - (aa) Date.
 - (bb) Generator set serial no.
 - (cc) Engine, make, model, serial no.
 - (dd) Alternator, make, model, serial no.
 - (ee) Voltage regulator, make and model.
 - (ff) Rating of generator set, kW, kV.A, V, A, r/min, Hz.
 - (ii) Mark check sheet and record data on forms in duplicate as test proceeds.
 - (iii) Contract Administrator's signature on completed forms to indicate concurrence in results of test.
- (b) Tests:
 - (i) With 100% rated load, operate set for 4 hours, taking readings at 30 min intervals, and record following:
 - (aa) Time of reading.
 - (bb) Running time.
 - (cc) Ambient temp in degrees C.
 - (dd) Lube oil pressure in kPa.
 - (ee) Lube oil temp in degrees C.
 - (ff) Engine coolant temp in degrees C.
 - (gg) Exhaust stack temp in degrees C.
 - (hh) Alternator voltage: phase 1, 2, 3.
 - (ii) Alternator current: phase 1, 2, 3.
 - (jj) Power in kW.
 - (kk) Frequency in Hz.
 - (ll) Power Factor.
 - (mm) Battery charger current in A.
 - (nn) Battery voltage.
 - (oo) Alternator cooling air outlet temp.
 - (ii) After completion of 4 hour run, demonstrate following shut down devices and alarms:
 - (aa) Overcranking.
 - (bb) Overspeed.
 - (cc) High engine temp.
 - (dd) Low lube oil pressure.
 - (ee) Short circuit.
 - (ff) Alternator overvoltage.
 - (gg) Low battery voltage, or no battery charge.
 - (hh) Manual remote emergency stop.
 - (ii) High alternator temperature.
 - (iii) Next install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:

- (aa) No load to full load to no load.
 - (bb) No load to seventy (70%) percent load to no load.
 - (cc) No load to twenty (20%) percent load to no load.
 - (dd) 20% load to forty (40%) percent load to no load.
 - (ee) 40% load to sixty (60%) percent load to no load.
 - (ff) 60% load to eighty (80%) percent load to no load.
- (c) Demonstrate:
- (i) Automatic starting of set and automatic transfer of load on failure of normal power.
 - (ii) Operation of manual bypass switch.
 - (iii) Automatic shut down of engine on resumption of normal power.
 - (iv) That battery charger reverts to high rate charge after cranking.
- (d) Demonstrate low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.
- (e) Provide testing check sheet as per CAN/ULC C282.
- (f) Incorporate all of the above testing into a single report. Include tests identified in E2.3 - Automatic Transfer Switches.

E2.2.15 Installation

- (a) Generating unit will be installed by an General Contractor under a separate Contract. The following items will be required under the separate Contract.
- (i) Install fuel supply system as indicated.
 - (ii) Install ventilating air duct system as indicated.
 - (iii) Pipe muffler drains to nearest floor drain.
 - (iv) Complete wiring and interconnections as indicated.
 - (v) Start generating set and test to ensure correct performance of components.

E2.2.16 Field Quality Control

- (a) Perform tests as per below.
- (b) Notify Contract Administrator ten (10) Business days in advance of test date.
- (c) Provide fuel for testing and leave full tanks on acceptance.
- (d) Demonstrate:
- (i) Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.
 - (ii) Unit start and shut down on "Manual" control
 - (iii) Unit start and transfer on "Test" control.
 - (iv) Unit start on "Engine start" control.
 - (v) Operation of manual bypass switch.
 - (vi) Operation of automatic alarms and shut down devices.
- (e) Run unit on load for minimum period of two (2) hours to show load carrying ability, stability of voltage and frequency, and satisfactory performance of dampers in ventilating system to provide adequate engine cooling.
- (b) At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.

E2.3 Item No. 2 - Automatic Transfer Switch shall be in accordance with the following specification.

E2.3.1 Section Includes

- (a) Materials and installation for automatic load transfer equipment which can monitor voltage on all phases of normal power supply, initiate cranking of standby generator unit, transfer loads and shut down standby unit.

E2.3.2 References

- (a) Canadian Standards Association (CSA International)
 - (i) CAN3-C13-M83(R1998), Instrument Transformers.
 - (ii) CSA C22.2No.5-02, 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).
 - (iii) CSA C22.2No.178-1978(R2001), Automatic Transfer Switches.
- (b) American National Standards Institute (ANSI)/National Electrical Manufacturers Association (NEMA)
 - (i) ANSI/NEMA ICS 2-2000, Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

E2.3.3 System Description

- (a) Automatic load transfer equipment to:
 - (i) Monitor voltage on phases of normal power supply.
 - (ii) Initiate cranking of standby generator unit on normal power failure or abnormal voltage on any one phase below preset adjustable limits for adjustable period of time.
 - (iii) Transfer load from normal supply to standby unit when standby unit reaches rated frequency and voltage pre-set adjustable limits .
 - (iv) Transfer load from standby unit to normal power supply when normal power restored, confirmed by sensing of voltage on phases above adjustable pre-set limit for adjustable time period .
 - (v) Shut down standby unit after running unloaded to cool down using adjustable time delay relay.

E2.3.4 Shop Drawings

- (a) Submit Shop Drawings in accordance with E4 - Submittals .
- (b) Include:
 - (i) Make, model and type.
 - (ii) Load classification:
 - (aa) Tungsten lamp load: kW.
 - (bb) Ballast lamp load: kW.
 - (cc) Motor load: kW.
 - (dd) Restricted use: resistance and general loads, 0.8pf or higher kW.
 - (iii) Single line diagram showing controls and relays.
 - (iv) Description of equipment operation including:
 - (aa) Automatic starting and transfer to standby unit and back to normal power.
 - (bb) Test control.
 - (cc) Manual control.
 - (dd) Automatic shutdown.

E2.3.5 Closeout Submittals

- (a) Provide operation and maintenance data for automatic load transfer equipment for incorporation into manual specified in E6 - Closeout Submittals.
- (b) Detailed instructions to permit effective operation, maintenance and repair.

- (c) Technical data:
 - (i) Schematic diagram of components, controls and relays.
 - (ii) Illustrated parts lists with parts catalogue numbers.
 - (iii) Certified copy of factory test results.

E2.3.6 Materials

- (a) Instrument transformers: to CAN3-C13.
- (b) Contactors: to ANSI/NEMA ICS2.

E2.3.7 Contactor Type Transfer Equipment

- (a) Contact Type Transfer Equipment: to CSA C22.2No.178.
- (b) Two- 3 phase contactors mounted on common frame, in double throw arrangement, mechanically and electrically interlocked, motor or solenoid operated, open type with CSA enclosure.
- (c) Rated: 600 V, 60Hz, 1000 A. 4 wire, solid neutral.
- (d) Main contacts: silver surfaced, protected by arc disruption means.
- (e) Switch and relay contacts, coils, spring and control elements accessible for inspection and maintenance from front of panel without removal of switch panel or disconnection of drive linkages and power conductors.
- (f) Auxiliary contact: gold or silver plated, to initiate emergency generator start-up on failure of normal power.
- (g) Fault withstand rating: 50 kA symmetrical.
- (h) Lever to operate switch manually when switch is isolated.
- (i) Solid neutral bar, rated: 1000 A.
- (j) Overlapping neutral contacts on contactor type transfer equipment.
- (k) Switchable neutral pole on circuit breaker type equipment.

E2.3.8 Circuit Breaker Type Transfer Equipment

- (a) Circuit Breaker Type Transfer Equipment: to CSA C22.2No.5.
- (b) Rated: 600 V, 60Hz, 1000 A, 4 wire, solid neutral.
 - (i) Fault withstand rating: 50 kA symmetrical.
 - (ii) One normal-three phase molded-case circuit breaker with thermal magnetic non automatic, mounted on common base, designed for double throw action, motor operated, mechanically held and interlocked, wall floor mounted CSA enclosure.
 - (iii) One emergency -three phase moulded-case circuit breaker with thermal magnetic trip, motor operated, and interlocked.
 - (iv) Circuit breakers:
 - (v) Trip free in closed position.
 - (vi) Interrupting rating: 50 kA symmetrical.
 - (vii) Dead front construction with access to relays and controls for inspection and maintenance, and manual operating lever for transfer switch.
 - (viii) Auxiliary contact: to initiate emergency generator start-up on failure of normal power.
 - (ix) Solid neutral bar, rated: 1000 A.
 - (x) Overlapping neutral contacts on Contractor type transfer equipment.
 - (xi) Switchable neutral pole on circuit breaker type equipment.

E2.3.9 Controls

- (a) Selector switch -four position "Test", "Auto", "Manual", "Engine start".

- (i) Test position - Normal power failure simulated. Engine starts and transfer takes place. Return switch to "Auto" to stop engine.
 - (ii) Auto position - Normal operation of transfer switch on failure of normal power; retransfers on return of normal voltage and shuts down engine.
 - (iii) Manual position - Transfer switch may be operated by manual handle but transfer switch will not operate automatically and engine will not start.
 - (iv) Engine start position - Engine starts but unit will not transfer unless normal power supply fails. Switch must be returned to "Auto" to stop engine.
- (b) Control transformers: dry type with 120V secondary to isolate control circuits from:
- (i) Normal power supply.
 - (ii) Emergency power supply.
- (c) Relays: continuous duty, industrial control type, with wiping action contacts rated 10 A minimum:
- (i) Voltage sensing: 3 phase for normal power and on one phase only for emergency, solid state type, adjustable drop out and pick up, close differential, 2V minimum undervoltage and over voltage protection.
 - (ii) Time delay: normal power to standby, adjustable solid state, 20s to 10 min.
 - (iii) Time delay on engine starting to override momentary power outages or dips, adjustable solid state, 0 to 60s.
 - (iv) Time delay on retransfer from standby to normal power, adjustable 20s to 10 min.
 - (v) Time delay for engine cool-off to permit standby set to run unloaded after retransfer to normal power, adjustable solid state, 20s intervals to 10 min.
 - (vi) Time delay during transfer to stop transfer action in neutral position to prevent fast transfer, adjustable, 5s intervals to 180s.
 - (vii) Frequency sensing, to prevent transfer from normal power supply until frequency of standby unit reaches preset adjustable values.
- (d) Solid state electronic in-phase monitor.

E2.3.10

Accessories

- (a) Pilot lights to indicate power availability normal and standby, switch position, green for normal, red for standby, mounted in panel.
- (b) Auxiliary relay to provide 2 N.O. and 2 N.C. contacts for remote alarms.
- (c) Instruments:
 - (i) Digital true rms, indicating type 2% accuracy, flush panel mounting:
 - (aa) Voltmeter: ac, scale 0 to 600 V.
 - (bb) Ammeter: ac, scale 0 to 400 A.
 - (cc) Frequency meter: scale 55 to 65 Hz.
- (d) Voltmeter selector switch: rotary, maintained contacts, panel mounting type, round notched handle, four position, labelled "OFF-Phase A-Phase B-Phase C".
- (e) Potential transformers - dry type for indoor use:
 - (i) Ratio: 600 to 120.
 - (ii) Rating: 600 V, 60Hz, BIL 95 kV.
 - (iii) Accuracy rating: 2%.
- (f) Ammeter selector switch: rotary, maintained contacts, panel mounting type, designed to prevent opening of current circuits, round notched handle, four position labelled "OFF - Phase A - Phase B - Phase C".
- (g) Current transformers - dry type for indoor use:
 - (i) Ratio: 800 to 5.
 - (ii) Rating: 600 V, 60Hz, BIL 95 kV.

- (iii) Accuracy rating: 2%.
- (iv) Positive action automatic short- circuiting device in secondary terminals.

(h) Manual bypass.

E2.3.11 Equipment Identification

- (a) Provide equipment identification.
- (b) Control panel:
 - (i) For selector switch and manual switch: size 4 nameplates.
 - (ii) For meters, indicating lights, minor controls: size 3 nameplates.
 - (iii) Nameplates to include:
 - (aa) Equipment name.
 - (bb) Voltage (current Characteristics).
 - (cc) Where equipment is fed from.

E2.3.12 Source Quality Control

- (a) Complete equipment, including transfer mechanism, controls, relays and accessories factory assembled and tested.
- (b) Tests:
 - (i) Operate equipment both mechanically and electrically to ensure proper performance.
 - (ii) Check selector switch, in modes of operation Test, Auto, Manual, Engine Start and record results.
 - (iii) Check voltage sensing and time delay relay settings.
 - (iv) Check:
 - (aa) Automatic starting and transfer of load on failure of normal power.
 - (bb) Retransfer of load when normal power supply resumed.
 - (cc) Automatic shutdown.
 - (dd) In-phase monitor operation.

E2.3.13 Installation

- (a) The Manufacturer or his qualified technician shall assist the City of Winnipeg's General Contractor and the Contract Administrator with the following:
 - (i) Locate, install and connect transfer equipment.
 - (ii) Check solid state monitors and adjust as required.
 - (iii) Install and connect battery and remote alarms.

E2.3.14 Field Quality Control

- (a) Perform tests as specified.
- (b) Energize transfer equipment from normal power supply.
- (c) Set selector switch in "Test" position to ensure proper standby start, running, transfer, retransfer. Return selector switch to "Auto" position to ensure standby shuts down.
- (d) Set selector switch in "Manual" position and check to ensure proper performance.
- (e) Set selector switch in "Engine start" position and check to ensure proper performance. Return switch to "Auto" to stop engine.
- (f) Set selector switch in "Auto" position and open normal power supply disconnect. Standby should start, come up to rated voltage and frequency, and then load should transfer to standby. Allow to operate for 10 min, then close main power supply disconnect. Load should transfer back to normal power supply and standby should shutdown.

- (g) Repeat, at 1h intervals, 3 times, complete test with selector switch in each position, for each test.

E3. COMMISSIONING

E3.1 The Manufacturer or a qualified factory trained Technical representative shall assist the City of Winnipeg's General Contractor during the process, in accordance with the following requirements.

E3.1.1 Materials, components and installation for electric power generating equipment transfer switch and system start-up.

E3.2 References

E3.2.1 Canadian Standards Association (CSA International)

- (a) CAN/CSA-B139-00(October 2001), Installation Code for Oil-Burning Equipment.

E3.2.2 Underwriters' Laboratories of Canada (ULC - C282)

E3.3 System Start-Up

E3.3.1 Preparation: before starting unit, carry out thorough mechanical and electrical inspection of equipment, and perform following checks and adjustments:

- (a) Disconnect battery cables from batteries to prevent accidental starting.
- (b) Turn engine several revolutions by means of hand-barring devices to ensure parts are free and there are no obstructions to its running.
- (c) Check engine/generator alignment readings to ensure they match readings attained at time of manufacture.
- (d) Check fluid levels and top up as necessary. Pre-lubricate engine and turbochargers as recommended by engine manufacturer. Install drip pan beneath engine.
- (e) Ensure cooling system antifreeze is effective to at least minus 40 degrees C.
- (f) Check belts for correct tension and adjust as necessary.
- (g) Check and grease grease points.
- (h) Check and tighten properly nuts, bolts, etc.
- (i) Ensure safety guards are in place and properly secured. Check linkages for damage and freedom of movement.
- (j) Check fuel supply system for leakage.
- (k) Ensure fuel supply and fuel injection systems are properly primed.
- (l) Check and tighten properly electrical connections.
- (m) Check starting battery electrolyte level specific gravity and for proper installation.
- (n) Check battery charger for proper operation and adjust as necessary.
- (o) Carry out generator winding insulation resistance test. If reading is unacceptable, carry out recognized drying procedure. Do not start unit until satisfactory reading has been achieved.
- (p) Check jacket coolant heater for proper operation.
- (q) Complete additional preparations deemed necessary.

E3.3.2 Performance verification: on completion of start-up preparations, take following action:

- (a) Have at hand, during initial start-up, means for choking off air supply to engine air induction manifold in event of engine run away or other emergency.
- (b) Reconnect starting battery cables to starting battery.

- (c) Start unit only in presence of Contract Administrator and allow to warm up. Stop unit if abnormal conditions are encountered.
- (d) Check for and correct leakage from exhaust system, fuel system, cooling system, and lubricating oil system.
- (e) Adjust vibration isolators.
- (f) Observe and ensure that lubricating oil pressure and coolant temperature are within limits and no harmful vibration or sounds are evident. Ensure voltage is within operating parameters and automatic voltage regulator is operating correctly.
- (g) Ensure manual voltage control is operating correctly.
- (h) Ensure frequency is within operating parameters and electronic governor is operating correctly.
- (i) Check engine air ventilation system for proper operation.
- (j) Check operation of engine-mounted protective sensing devices and adjust as necessary.
- (k) Check phase sequence of normal power supply and ensure emergency power supply are in same sequence.
- (l) Check operation of electronic controller protection, transfer, timing, metering, and annunciator functions and adjust as necessary.
- (m) Check operation and calibration of analog metering and adjust as necessary.
- (n) Apply electrical load, read the metres, and correlate these readings.
- (o) Demonstrate:
 - (i) Unit start, transfer to load, retransfer to normal power, unit shutdown, on "automatic" control.
 - (ii) Unit start, transfer to load, retransfer to normal power, unit shutdown, on "full load test" control. Unit start and shutdown, on "no load test" control.
 - (iii) Unit cranking, start, and shutdown by means of engine-mounted key switch.
 - (iv) Run unit on load for minimum period of 8 hours to show load-carrying capability, stability of voltage and frequency, and satisfactory performance of engine ventilating system to provide adequate cooling.
 - (v) Every 1/2 hour carry out and record readings on Test Chart.
- (p) Perform additional tests as required by Contract Administrator to ensure unit is operating satisfactorily.

E3.4 The City's Instruction

- E3.4.1 Provide instruction to Contract Administrator for Site operation and maintenance staff for proper care, operation, and maintenance of equipment.

E3.5 Commissioning

- E3.5.1 Refer to E2.2.20 - Source Quality Control and E2.3.12 - Source Quality Control.
- E3.5.2 Do Site commissioning of the diesel electric generator unit by qualified diesel electric technician.
- E3.5.3 Provide commissioning report included time delay settings, operational set points and adjustment ranges.
- E3.5.4 Provide load bank and fuel for duration of contractor tests and demonstration to Contract Administrator. Ensure fuel for duration of contractor test and demonstration to Contract Administrator. Ensure fuel tank is refilled upon successful completion of commissioning.

E3.6 Materials

- E3.6.1 The manufacturer or the Technical representative shall provide the following during the installation:
- (a) Insulation for exhaust system.
 - (b) Wiring Material.
 - (c) Antifreeze, ethylene glycol.
 - (d) Automatic Transfer Switch as per E2.3.
 - (e) The General Contractor will provide all wiring and Materials, including necessary steel EMT conduits and fittings for making connections. The power circuit cables will be as noted on Drawing, RW90 (-40 degrees C) cross link polyethylene, conductors.
 - (f) The control circuit cables will not be less than No. 14, RW90, multiple conductors, colour or number coded.
 - (g) Electronic governor control cable shall be minimum size No. 18 stranded copper conductor, shielded complete with drain wire and overall PVC jacket.
 - (h) Battery cable shall be welding cable type, extra flexible, rope stranded copper conductor with neoprene oil-resistant insulation, sized to limit voltage drop to 5% at time of peak load.
- E3.7 Locating And Mounting of Equipment
- E3.7.1 Locate unit as indicated with the City of Winnipeg's General Contractor.
- E3.7.2 Fit and adjust isolators in accordance with manufacturer's installation and adjustment instruction bulletin contained in unit manual.
- E3.7.3 Do not bolt housings to foundation if isolator housing feet are equipped with 6 mm rubber sound pads.
- E3.8 Alignment Check of Equipment
- E3.8.1 Since Engine-generator shaft alignment is adjusted at factory, check to ensure that no change has occurred due to shipment and handling.
- E3.8.2 Where engine and generator housings are close coupled and instruments at hand are not suitable for measuring alignment within confines of housings, just loosen engine and generator hold down bolts and ensure that each foot is carrying proportionate amount of weight and feet are level on base plate.
- E3.9 Batteries And Charger
- E3.9.1 For dry charged batteries, activate in accordance with manufacturer's instructions in the unit manual prior to installation.
- E3.9.2 For wet batteries, inspect individually each battery cell and check electrolyte level. Check charge condition by measuring temperature and specific gravity of electrolyte. Consult manufacturer's instructions for recommended readings. If readings are lower, give batteries freshening charge until reading are reached.
- E3.9.3 Locate batteries as indicated and ensure that batteries are accessible for service. Run and protect cables to starting motor using cables supplied with unit.
- E3.9.4 Install battery charger on wall, adjacent to batteries and make connection to batteries.
- E3.9.5 Clean connections and tighten securely.
- E3.9.6 Install removable plexiglass cover on batteries.
- E3.10 Control And Transfer Panel
- E3.10.1 Locate panels as indicated during construction.
- E3.10.2 Make control and power circuit connections as indicated.

- E3.10.3 Identify cables at both ends.
- E3.10.4 Tag with slip-on wire maker, each wire end with number corresponding to number in panel.
- E3.10.5 Make terminations with self-insulated terminals of flanged fork or ring type.
- E3.11 Additional Works
 - E3.11.1 Complete any additional Work as instructed by Contract Administrator to:
 - (a) Ensure equipment is safe to operate.
 - (b) Provide complete and operating system.
- E3.12 Field Quality Control
 - E3.12.1 Qualified diesel electric technician to: inspect and verify that installation of interruptible power unit is acceptable and complete. Provide inspection report to the Contract Administrator.

E4. SUBMITTALS

- E4.1 Scope
 - E4.1.1 E4 is intended to demonstrate the full scope of required documentation to the diesel generator manufacturer. The generator manufacturer shall provide all the material and labour and documentation for the fully commissioned/tested generator and transfer switch.
- E4.2 Administrative
 - E4.2.1 The Manufacturer or Bidder shall supply the Contract Administrator listed in D4 with the information listed below within twenty (20) Business days.
 - E4.2.2 Present Shop Drawings, product data, samples and mock-ups in SI Metric units.
 - E4.2.3 Where items or information is not produced in SI Metric units converted values are acceptable. Review submittals prior to submission to Contract Administrator. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
 - E4.2.4 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - E4.2.5 Verify field measurements and affected adjacent Work are co-ordinated.
 - E4.2.6 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator review of submittals.
 - E4.2.7 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.
 - E4.2.8 Keep one reviewed copy of each submission on site.
- E4.3 Shop Drawings And Product Data
 - E4.3.1 The term "Shop Drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
 - E4.3.2 Indicate Materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and Specifications.

- E4.3.3 Allow fourteen (14) Business days for Contract Administrator review of each submission.
- E4.3.4 Adjustments made on Shop Drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.
- E4.3.5 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of revisions other than those requested.
- E4.3.6 Accompany submissions with transmittal letter, in duplicate, containing:
- (a) Date.
 - (b) Project title and number.
 - (c) Contractor's name and address.
 - (d) Identification and quantity of each Shop Drawing, product data and sample.
 - (e) Other pertinent data.
- E4.3.7 Submissions include:
- (a) Date and revision dates.
 - (b) Project title and number.
 - (c) Name and address of:
 - (i) Subcontractor.
 - (ii) Supplier.
 - (iii) Manufacturer.
 - (d) Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - (e) Details of appropriate portions of Work as applicable:
 - (i) Fabrication.
 - (ii) Layout, showing dimensions, including identified field dimensions, and clearances.
 - (iii) Setting or erection details.
 - (iv) Capacities.
 - (v) Performance characteristics.
 - (vi) Standards.
 - (vii) Operating weight.
 - (viii) Wiring diagrams.
 - (ix) Single line and schematic diagrams.
 - (x) Relationship to adjacent Work.
- E4.3.8 After Contract Administrator's review, distribute copies.
- E4.3.9 Submit electronic copy of Shop Drawings for each requirement requested in Specification Sections and as Contract Administrator may reasonably request.
- E4.3.10 Submit electronic PDF copies of product data sheets or brochures for requirements requested in Specification Sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.
- E4.3.11 Submit electronic PDF copies of test reports for requirements requested in Specification Sections and as requested by Contract Administrator.
- (a) Report signed by authorized official of testing laboratory that Material, product or system identical to Material, product or system to be provided has been tested in accord with specified requirements.

- (b) Testing must have been within 3 years of date of contract award for project.
- E4.3.12 Submit electronic PDF copies of certificates for requirements requested in Specification Sections and as requested by Contract Administrator.
 - (a) Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or Material attesting that product, system or Material meets Specification requirements.
 - (b) Certificates must be dated after award of project contract complete with project name.
- E4.3.13 Submit electronic PDF copies of manufacturers instructions for requirements requested in Specification Sections and as requested by Contract Administrator.
 - (a) Pre-printed Material describing installation of product, system or Material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- E4.3.14 Submit electronic PDF copies of Manufacturer's Field Reports for requirements requested in Specification Sections and as requested by Contract Administrator.
 - (a) Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- E4.3.15 Submit electronic PDF copies of Operation and Maintenance Data for requirements requested in Specification Sections and as requested by Contract Administrator.
- E4.3.16 Delete information not applicable to project.
- E4.3.17 Supplement standard information to provide details applicable to project.
- E4.3.18 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and resubmission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

E5. DEMONSTRATION AND TRAINING

- E5.1 Description
 - E5.1.1 The Contract Administrator shall call upon the Manufacturers factory trained Technician, near the install completion to demonstrate the operation and maintenance of the equipment to City Personnel.
 - E5.1.2 The City will provide list of personnel to receive instructions, and will co-ordinate their attendance at agreed-upon times. The factory trained Technician shall video tape training and provide six (6) - DVD copies to the City.
- E5.2 Quality Control
 - E5.2.1 When specified in individual Sections require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct The City's personnel, and provide written report that demonstration and instructions have been completed.
- E5.3 Submittals
 - E5.3.1 Submit schedule of time and date for demonstration of equipment two (2) weeks prior to demonstration for Contract Administrator's approval.
 - E5.3.2 Submit reports within one (1) week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
 - E5.3.3 Give time and date of each demonstration, with list of persons present.
- E5.4 Conditions For Demonstrations

- E5.4.1 Equipment has been inspected and put into operation in accordance with E3 Commissioning.
- E5.4.2 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions. E6 - Closeout Submittals.
- E5.5 Preparation
 - E5.5.1 Verify that conditions for demonstration and instructions comply with requirements.
 - E5.5.2 Verify that designated personnel are present.
- E5.6 Demonstration And Instructions
 - E5.6.1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the equipment location.
 - E5.6.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
 - E5.6.3 Review contents of manual in detail to explain aspects of operation and maintenance.
 - E5.6.4 Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instructions.

E6. COMMISSIONING DOCUMENTATION

- E6.1 Submittals
 - E6.1.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
 - E6.1.2 Copy will be returned after final inspection, with Contract Administrator's comments.
 - E6.1.3 Revise content of documents as required prior to final submittal.
 - E6.1.4 Two (2) weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, two (2) final hard copies of operating and maintenance manuals in English, plus four (4) DVD copies.
 - E6.1.5 Ensure spare parts, maintenance Materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
 - E6.1.6 Furnish evidence, if requested, for type, source and quality of products provided.
 - E6.1.7 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
 - E6.1.8 Pay costs of transportation for all defective or replaced materials.
- E6.2 Demonstration And Training
 - E6.2.1 As directed by Contract Administrator the equipment supplier or Technical Representative demonstration and training - carry out demonstrations of complete interruptible power unit for Contract Administrator.
 - E6.2.2 Provide familiarization training of operating and maintenance staff.
 - E6.2.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.
 - E6.2.4 Provide fuel required for performing diesel-generator Site test and top-up after acceptance test completion.

E6.3 Format

- E6.3.1 Organize data as instructional manual.
- E6.3.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- E6.3.3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
- E6.3.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- E6.3.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.
- E6.3.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- E6.3.7 Text: manufacturer's printed data, or typewritten data.
- E6.3.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger Drawings to size of text pages.
- E6.3.9 Provide 1:1 scaled CAD files in drawing format on CD. Autocad V.2008 or newer.

E6.4 Contents - Each Volume

- E6.4.1 Table of Contents: provide title of project;
 - (a) Date of submission; names.
 - (b) Addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.
 - (c) Schedule of products and systems, indexed to content of volume.
- E6.4.2 For each product or system:
 - (a) List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- E6.4.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- E6.4.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- E6.4.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- E6.4.6 Training: refer to E5 - Demonstration and Training.

E6.5 Equipment And Systems

- E6.5.1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with Contract Administrating data and tests, and complete nomenclature and commercial number of replaceable parts.
- E6.5.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- E6.5.3 Include installed colour coded wiring diagrams.
- E6.5.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

- E6.5.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- E6.5.6 Provide servicing and lubrication schedule, and list of lubricants required.
- E6.5.7 Include manufacturer's printed operation and maintenance instructions.
- E6.5.8 Include sequence of operation by controls manufacturer.
- E6.5.9 Provide original manufacturer's parts list, illustrations, assembly Drawings, and diagrams required for maintenance.
- E6.5.10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- E6.5.11 Additional requirements: as specified in individual Specification sections.
- E6.6 Spare Parts
- E6.6.1 Provide spare parts, in quantities specified in individual Specification sections.
- (a) Include:
- (i) 2 fuel filter replacement elements.
 - (ii) 2 lube oil filter replacement elements.
 - (iii) 2 air cleaner filter elements.
 - (iv) 2 sets of fuses for control panel.
 - (v) Special tools for unit servicing.
- E6.6.2 Provide items of same manufacture and quality as items in Work.
- E6.6.3 Deliver to Site; place and store as directed by Contract Administrator.
- E6.6.4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- E6.6.5 Obtain receipt for delivered products and submit prior to final payment.
- E6.7 Maintenance Materials
- E6.7.1 Provide maintenance and extra Materials, in quantities specified in individual Specification sections.
- E6.7.2 Provide items of same manufacture and quality as items in Work.
- E6.7.3 Deliver to Site; place and store.
- E6.7.4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- E6.7.5 Obtain receipt for delivered products and submit prior to final payment.
- E6.8 Special Tools
- E6.8.1 Provide special tools, in quantities specified in individual Specification section.
- E6.8.2 Provide items with tags identifying their associated function and equipment.
- E6.8.3 Deliver to Site; place and store.
- E6.8.4 Receive and catalogue items. Submit inventory listing to Contract Administrator. Include approved listings in Maintenance Manual.
- E6.9 Storage, Handling And Protection
- E6.9.1 Store spare parts, maintenance Materials, and special tools in manner to prevent damage or deterioration.

- E6.9.2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- E6.9.3 Store components subject to damage from weather in weatherproof enclosures.
- E6.9.4 Store paints and freezable Materials in a heated and ventilated room.
- E6.9.5 Remove and replace damaged products at own expense and to satisfaction of Contract Administrator.