



THE CITY OF WINNIPEG

TENDER

TENDER NO. 103-2020

**SUPPLY AND DELIVERY OF ABOVEGROUND RADAR VEHICLE SENSING
DETECTORS**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 SUPPLY AND DELIVERY OF ABOVEGROUND RADAR VEHICLE SENSING DETECTORS

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, April 6, 2020.

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 D5.1.

B3.2 If the Bidder finds errors, discrepancies or omissions in the Tender, 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 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Tender will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B3.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Tender will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B3.5 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. CONFIDENTIALITY

B4.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:

- (a) was known to the Bidder before receipt hereof; or
- (b) becomes publicly known other than through the Bidder; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B4.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Tender to the media or any member of the public without the prior written authorization of the Contract Administrator.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Tender, or clarifying the meaning or intent of any provision therein.

- B5.2 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.
- B5.3 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>
- B5.4 The Bidder is responsible for ensuring that he/she 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.
- B5.5 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.
- B5.6 Notwithstanding B3, enquiries related to an Addendum may be directed to the Contract Administrator indicated in D5.

B6. SUBSTITUTES

- B6.1 The Work is based on the materials, equipment, methods and products specified in the Tender.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least fifteen (15) Business Days prior to the Submission Deadline.
- B6.4 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 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.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her 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.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, to the Bidder who requested approval of the substitute.
- B6.6.1 The Contract Administrator will issue an Addendum, disclosing the approved materials, equipment, methods and products to all potential Bidders. The Bidder requesting and obtaining the approval of a substitute shall be responsible for disseminating information regarding the approval to any person or persons he/she wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her 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 B16.

B6.9 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.

B7. BID SUBMISSION

B7.1 The Bid shall consist of the following components:

- (a) Form A: Bid;
- (b) Form B: Prices.

B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.

B7.3 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.

B7.4 The Bid Submission may be submitted by mail, courier or personal delivery, or by facsimile transmission.

B7.5 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 Tender 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

B7.5.1 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 Tender number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.

B7.6 If the Bid Submission is submitted by facsimile transmission, it shall be submitted to 204-949-1178.

B7.6.1 The Bidder is advised that the City cannot take responsibility for the availability of the facsimile machine at any time or guarantee the successful receipt of a faxed Bid Submission.

B7.7 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.8 Bidders are advised that inclusion of terms and conditions inconsistent with the Tender document, including the General Conditions, will be evaluated in accordance with B16.1(a).

B7.9 Bids submitted by internet electronic mail (e-mail) will not be accepted.

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

B8.2 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/her own name, his/her 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/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 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.

B8.4 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/her 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/her 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.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.

B8.5 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.

B9. PRICES

B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.

B9.1.1 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.

B9.1.2 Prices on Form B: Prices shall not include Environmental Handling Charges (EHC) or fees, which shall be extra where applicable.

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 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.

B10. DISCLOSURE

B10.1 Various Persons provided information or services with respect to this Work. In the City's opinion, this relationship or association does not create a conflict of interest because of this full disclosure. Where applicable, additional material available as a result of contact with these Persons is listed below.

B10.2 The Persons are:

- (a) n/a

B11. CONFLICT OF INTEREST AND GOOD FAITH

B11.1 Bidders, by responding to this Tender, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B11.2 Conflict of Interest means any situation or circumstance where a Bidder or employee of the Bidder proposed for the Work has:

- (a) other commitments;
- (b) relationships;
- (c) financial interests; or
- (d) involvement in ongoing litigation;

that could or would be seen to:

- (i) exercise an improper influence over the objective, unbiased and impartial exercise of the independent judgment of the City with respect to the evaluation of Bids or award of the Contract; or
- (ii) compromise, impair or be incompatible with the effective performance of a Bidder's obligations under the Contract;
- (e) has contractual or other obligations to the City that could or would be seen to have been compromised or impaired as a result of its participation in the Tender process or the Work; or
- (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the Tender process) of strategic and/or material relevance to the Tender process or to the Work that is not available to other bidders and that could or would be seen to give that Bidder an unfair competitive advantage.

B11.3 In connection with its Bid, each entity identified in B11.2 shall:

- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Work;
- (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the Tender process, promptly disclose a detailed description of the Conflict of Interest to the City in a written statement to the Contract Administrator; and
- (c) provide the City with the proposed means to avoid or mitigate, to the greatest extent practicable, any perceived, potential or actual Conflict of Interest and shall submit any additional information to the City that the City considers necessary to properly assess the perceived, potential or actual Conflict of Interest.

B11.4 Without limiting B11.3, the City may, in its sole discretion, waive any and all perceived, potential or actual Conflicts of Interest. The City's waiver may be based upon such terms and conditions as the City, in its sole discretion, requires to satisfy itself that the Conflict of Interest has been appropriately avoided or mitigated, including requiring the Bidder to put into place such policies, procedures, measures and other safeguards as may be required by and be acceptable to the City, in its sole discretion, to avoid or mitigate the impact of such Conflict of Interest.

B11.5 Without limiting B11.3, and in addition to all contractual or other rights or rights at law or in equity or legislation that may be available to the City, the City may, in its sole discretion:

- (a) disqualify a Bidder that fails to disclose a perceived, potential or actual Conflict of Interest of the Bidder or any of its employees proposed for the Work;
- (b) require the removal or replacement of any employees proposed for the Work that has a perceived, actual or potential Conflict of Interest that the City, in its sole discretion, determines cannot be avoided or mitigated;

- (c) disqualify a Bidder or employees proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B11.4 to avoid or mitigate a Conflict of Interest; and
- (d) disqualify a Bidder if the Bidder, or one of its employees proposed for the Work, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.

B11.6 The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B12. QUALIFICATION

B12.1 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.

B12.2 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 <https://winnipeg.ca/finance/findata/matmgt/listing/debar.pdf>

B12.3 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;
- (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba); and
- (d) have successfully installed, operated and provided technical support for Aboveground Radar Vehicle Sensing Detectors (ARVSD) in the past 3 years from submission of Bid.

B12.4 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.

B12.5 The Bidder on the request of the Contract Administrator shall provide representative samples of the goods offered.

B12.5.1 Further to B12.5, the Bidder shall provide, on the request of the Contract Administrator, one (1) sample unit(s) of each item as described in E2.1, for detailed inspection and approval. Failure to supply the sample unit(s) within ten (10) Business Days may result in a failure to demonstrate, that the Contractor is responsible and qualified to perform this Contract.

B12.5.2 The following shall be submitted with the samples:

- (a) Installation manuals;
- (b) Operator/user manuals;

- (c) manufacturer's performance test reports:
- (d) reference contact information for municipalities and/or cities having installed and operating AVRSD within the last 3 years of submission of Bid.

- B12.5.3 Unsolicited samples will be returned at Bidders expense.
- B12.5.4 The Bidder shall be responsible for all freight costs associated with the delivery and return of samples.
- B12.5.5 Should the Bidder not submit a sample that meets the approval of the Contract Administrator, the bid may be determined to be non-responsive.
- B12.6 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.

B13. OPENING OF BIDS AND RELEASE OF INFORMATION

- B13.1 Bids will not be opened publicly.
- B13.2 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>
- B13.3 After award of Contract, the name(s) of the successful Bidder(s), their address(es) 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>
- B13.4 The Bidder is advised that any information contained in any Bid may be released if required by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law or by City policy or procedures (which may include access by members of City Council).
 - B13.4.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Bid Submission identified by the Bidder as such in accordance with and by reference to Part 2, Section 17 or Section 18 or Section 26 of The Freedom of Information and Protection of Privacy Act (Manitoba), as amended.

B14. IRREVOCABLE BID

- B14.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 9 of Form A: Bid.
- B14.2 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 9 of Form A: Bid.

B15. WITHDRAWAL OF BIDS

- B15.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
 - B15.1.1 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.
 - B15.1.2 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.

- B15.1.3 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 B15.1.3(b), declare the Bid withdrawn.
- B15.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B14.2 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.

B16. EVALUATION OF BIDS

- B16.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Tender, or acceptable deviation therefrom (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B12 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B16.2 Further to B16.1(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.
- B16.3 Further to B16.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is qualified.
- B16.4 Further to B16.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B16.5 This Contract will be awarded as a whole.

B17. AWARD OF CONTRACT

- B17.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B17.2 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 qualified, and the Bids are determined to be responsive.
- B17.2.1 Without limiting the generality of B17.2, 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.

- B17.3 Where an award of Contract is made by the City, the award shall be made to the qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B16.
- B17.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.
- B17.4 Notwithstanding C4, the City may issue a purchase order to the successful Bidder in lieu of the execution of a Contract.
- B17.5 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 2019-01-15) 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 Tender 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 deliver Aboveground Radar Vehicle Sensing Detector for the period from date of award until March 31, 2021, with the option of four (4) mutually agreed upon one (1) year extensions.

D2.1.1 The City may negotiate the extension option with the Contractor within ninety (90) Calendar Days prior to the expiry date of the Contract. The City shall incur no liability to the Contractor as a result of such negotiations.

D2.1.2 Changes resulting from such negotiations shall become effective on April 1st of the respective year. Changes to the Contract shall not be implemented by the Contractor without written approval by the Contract Administrator.

D2.2 The Work shall be done on an "as required" basis during the term of the Contract.

D2.2.1 The type and quantity of Work to be performed under this Contract shall be as authorized from time to time by the Contract Administrator and/or Users.

D2.2.2 Notwithstanding C7, the City shall have no obligation under the Contract to purchase any quantity of any item in excess of its actual operational requirements.

D2.3 Notwithstanding D2.1, in the event that operational changes result in substantial changes to the requirements for Work, the City reserves the right to alter the type or quantity of work performed under this Contract, or to terminate the Contract, upon thirty (30) Calendar Days written notice by the Contract Administrator. In such an event, no claim may be made for damages on the ground of loss of anticipated profit on Work.

D3. COOPERATIVE PURCHASE

D3.1 The Contractor is advised that this is a cooperative purchase.

D3.2 The Contract Administrator may, from time to time during the term of the Contract, approve other public sector organizations and utilities, including but not limited to municipalities, universities, schools and hospitals, to be participants in the cooperative purchase.

D3.3 The Contract Administrator will notify the Contractor of a potential participant and provide a list of the delivery locations and estimated quantities.

D3.4 If any location of the potential participant is more than ten (10) kilometres beyond the boundaries of the City of Winnipeg, the Contractor shall, within fifteen (15) Calendar Days of the written notice, notify the Contract Administrator of the amount of any additional delivery charge for the location.

D3.5 If any additional delivery charges are identified by the Contractor, the potential participant may accept or decline to participate in the cooperative purchase.

D3.6 The Contractor shall enter into a contract with each participant under the same terms and conditions as this Contract except:

- (a) supply under the contract shall not commence until the expiry or lawful termination of any other contract(s) binding the participant for the same goods;

- (b) a participant may specify a duration of Contract shorter than the duration of this Contract;
- (c) a participant may specify that only some items under this Contract and/or less than its total requirement for an item are to be supplied under its contract; and
- (d) any additional delivery charge identified and accepted in accordance with clause D3.4 and D3.5 will apply.

D3.7 Each participant will be responsible for the administration of its contract and the fulfilment of its obligations under its contract. The City shall not incur any liability arising from any such contract.

D3.8 No participant shall have the right or authority to effect a change in the Contract, or of any other participant in this Contract.

D4. DEFINITIONS

D4.1 When used in this Tender:

- (a) **“ARVSD”** means Aboveground Radar Vehicle Sensing Detectors;
- (b) **“AWG”** means American Wire Gauge;
- (c) **“CSA”** means Canadian Standards Association;
- (d) **“CFR”** means Code of Federal Regulations;
- (e) **“cUL”** means UL evaluated to CSA;
- (f) **“DC”** means Direct Current;
- (g) **“DIN”** means German Institute of Standardization;
- (h) **“DRC”** means Detector Rack Card;
- (i) **“DRVDD”** means Dual Radar Vehicle Data Detector;
- (j) **“ETA”** means Estimated Time of Arrival;
- (k) **“FCC”** means Federal Communications Commission;
- (l) **“KPH”** means kilometres per hour;
- (m) **“MPH”** means mile per hour;
- (n) **“NEMA”** means National Electrical Manufacturers Association;
- (o) **“PSBS”** means Preassembled Segmented Backplate System;
- (p) **“PSM”** means Power Supply Module;
- (q) **“RTS/CTS”** means Request to Send/Clear to Send;
- (r) **“SECM”** means Sensor to Ethernet Converter Module;
- (s) **“SPM”** means Surge Protection Module;
- (t) **“SSM”** means Surge Suppression Module;
- (u) **“UL”** means Underwriters Laboratory.

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is:

Vic Hucko
Asset Standards & Contracts Specialist
Telephone No.: 204-981-4191
Email Address: vhucko@winnipeg.ca

D6. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

- D6.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.
- D6.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.
- D6.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;
- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
 - (b) the Contract, all deliverables produced or developed; and
 - (c) any statement of fact or opinion regarding any aspect of the Contract.
- D6.4 A Contractor who violates any provision of D6 may be determined to be in breach of Contract.

D7. NOTICES

- D7.1 Notwithstanding C21.3, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer.

D8. RETURNED GOODS

- D8.1 Further to C7 and C11, The Contract Administrator or his/her designate shall inform the Contractor of the item(s) being returned and the reason for the return. The Contractor shall provide the Contract Administrator with Return Material Authorization (RMA) including shipping instructions, within five (5) Calendar Days of the request.
- D8.2 The Contractor shall be responsible for all transportation charges on returned goods and further to C8 the goods will be held at the Contractor's risk pending instruction.
- D8.3 Further to D8.1 the RMA shall include the following information, as a minimum:
- (a) Company name, if different than Contractor, and ship to addresses;
 - (b) Written authorization for the return and for a collect shipment;
 - (c) Preference of carrier / shipping method, a contact person with either a local Winnipeg telephone number or a toll-free telephone number;
 - (d) A contact person, responsible for the returned goods, with a toll-free telephone number.
- D8.4 The Contract Administrator shall provide, as a minimum:
- (a) The City department returning the goods, including an address and contact information for pick up;
 - (b) The City account number; if applicable;
 - (c) The City of Winnipeg's Department and address;
 - (d) Two (2) copies of the written authorization / RMA, one (1) copy on the outside and (1) one within the package;
 - (e) Total number of packages, weight and dimensions.

SUBMISSIONS

D9. AUTHORITY TO CARRY ON BUSINESS

D9.1 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.

SCHEDULE OF WORK

D10. COMMENCEMENT

D10.1 The Contractor shall not commence any Work until he/she is in receipt of a notice of award from the City authorizing the commencement of the Work.

D10.2 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 D9;
 - (ii) evidence of the workers compensation coverage specified in C6.16.
- (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.
- (c) A purchase order has been received from the City of Winnipeg Public Works Stores personnel noting quantity of material required.

D11. DELIVERY

D11.1 Goods shall be delivered on an "as required" basis during the term of the Contract, f.o.b. destination, freight prepaid, to:

Public Works Stores
1277 Pacific Avenue
Winnipeg, MB

D11.1.1 Goods shall be delivered within forty-five (45) Business Days of the placing of an order.

D11.2 Initial start-up delivery shall be forty-five (45) Business days from the date of award.

D11.3 After the initial start-up delivery stated in D11.2, Goods shall be delivered in accordance with D11.1.1.

D11.4 The Contractor shall confirm each delivery with the Contract Administrator or his/her designate, at least two (2) Business Days before delivery.

D11.5 Goods shall be delivered between 8:00 a.m. and 2:00 p.m. on Business Days.

D11.6 The Contractor shall off-load goods as directed at the delivery location.

D12. LIQUIDATED DAMAGES

D12.1 If the Contractor fails to achieve delivery of the goods within the time specified in D11. Delivery the Contractor shall pay the City one hundred twenty-five dollars (\$125) per Calendar Day for each and every Calendar Day until the goods have been delivered.

D12.2 The amount specified for liquidated damages in D12.1 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.

D12.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D13. ORDERS

D13.1 The Contractor shall provide a local Winnipeg telephone number or a toll-free telephone number at which orders for delivery may be placed.

D14. RECORDS

D14.1 The Contractor shall keep detailed records of the goods supplied under the Contract.

D14.2 The Contractor shall record, as a minimum, for each item listed on Form B: Prices:

- (a) user name(s) and addresses;
- (b) order date(s);
- (c) delivery date(s); and
- (d) description and quantity of goods supplied.

D14.3 The Contractor shall provide the Contract Administrator with a copy of the records for each quarter year within fifteen (15) Calendar Days of a request of the Contract Administrator.

MEASUREMENT AND PAYMENT

D15. INVOICES

D15.1 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

D15.2 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, MRST, and any applicable environmental handling charges/fees identified and shown as separate amounts; and
- (f) the Contractor's GST registration number.

D15.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D15.4 **Bid Submissions must not be submitted to the above facsimile numbers. Bids must be submitted in accordance with B7.**

D16. PAYMENT

D16.1 Further to C10, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

D16.2 Further to C10, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D17. WARRANTY

D17.1 Warranty is as stated in C11.

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS

- 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 B6.. In every instance where a brand name or design specification is used, the City will also consider approved equals and/or approved alternatives in accordance with B6.

E2. GOODS

- E2.1 The Contractor shall supply and deliver Aboveground Radar Vehicle Sensing Detector (ARVSD) equipment in accordance with the requirements hereinafter specified.
- E2.2 **ITEM NO. 1** – An Aboveground Radar Presence Detector (ARPD) shall be configured and used to detect the presence of individual motor vehicles approaching and waiting in traffic lanes at the stop bar.
- E2.2.1 General
- (a) The ARPD shall detect vehicles by transmitting and receiving low energy electromagnetic radar signals through the air.
 - (b) The ARPD shall provide a non-intrusive means of detecting traffic without roadway modifications or specialized and unique traffic signal poles for mounting.
 - (c) The ARPD shall not be affected by normal weather and environmental conditions such as rain, wind, snow, dust, etc. The ARPD shall not require cleaning and shall maintain performance over a wide range of ambient temperatures.
- E2.2.2 Sensor Outputs
- (a) The ARPD shall:
 - (i) Present real-time presence data in 10 lanes.
 - (ii) Support a minimum of 16 zones.
 - (iii) Support a minimum of 16 channels.
 - (iv) Support user-selectable zone to channel mapping.
 - (v) Use AND logic to trigger channels when all selected zones are active.
 - (vi) Use OR logic to combine multiple zones to a channel output, and shall have channel output extend and delay functionality.
 - (vii) Shall mitigate false calls or interference from wrong way traffic or crossing traffic.
 - (viii) Shall have fail-safe mode capabilities for contact closure outputs if communication is lost.
 - (ix) Shall automatically recover to operating mode when fault conditions corrected.
- E2.2.3 Detectable Area
- (a) Detection Range
 - (i) The ARPD shall be able to detect and report presence of motor vehicles:
 - ◆ In lanes with boundaries as close as 6ft. (1.8m) from the base of the pole on which the ARPD is mounted
 - ◆ In lanes located within the 140ft. (42.7m) arc from the base of the pole on which the ARPD is mounted
 - ◆ Within a 90 degree field of view
 - ◆ In curved lane approaches and areas with islands and medians

E2.2.4 System Hardware and Interface

- (a) Each ARPD shall interface with a pre-assembled segmented back plate system interconnected by field wiring which shall include:
 - (i) AC Line powered energy supply for ARVSDs and interface equipment, providing a DC power supply voltage of 24 Volts DC.
 - (ii) Surge protection on all power supply cables that are terminated on interface board.
 - (iii) Communication connections to interface with the traffic signal controller equipment.
- (b) The ARPD shall utilize two (2) channel contact closure and extension cards that shall provide
 - (i) Functional and electrical compatibility to 2-channel detection cards used in input file racks normally provided in Model 33x series of traffic signal control cabinets
 - (ii) Front panel inter-connectivity to other two channel detector and extension cards using a single interface style cable.

E2.2.5 Maintenance

- (a) The ARPD shall not require cleaning or adjustment to maintain performance.
- (b) The ARPD shall not rely on battery backup to store configuration information, thus eliminating any need for battery replacement.
- (c) Once the ARPD is calibrated, it shall not require recalibration to maintain performance unless the roadway configuration changes.
- (d) The mean time between failures shall be 10 years.

E2.2.6 Physical Properties

- (a) The ARPD shall not exceed 4.2lbs. (1.9kg) in weight.
- (b) The ARPD shall not exceed 13.2in. x 10.6in. x 3.3in. (33.5cm x 26.9cm x 8.4cm) in its physical dimensions.
- (c) All external parts of the ARPD shall be ultraviolet-resistant, corrosion-resistant, and protected from fungus growth and moisture deterioration.

E2.2.7 Enclosure

- (a) The ARPD enclosure shall:
 - (i) Be able to withstand a drop of up to 5ft. (1.5m) without compromising its functional and structural integrity.
 - (ii) Be manufactured using a polycarbonate copolymer formulation (Lexan EXL or equivalent).
 - (iii) Be classified "f1" outdoor weather ability in accordance with UL 746C.
 - (iv) Be classified as watertight according to the NEMA 250 standard.
 - (v) Conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures.
- (b) Test results shall be provided for each of the following type 4X criteria:
 - (i) External icing (clause 5.6).
 - (ii) Hose-down (clause 5.7).
 - (iii) 4X corrosion protection (clause 5.10).
 - (iv) Gasket (clause 5.14).
- (c) Include a connector that provides electrical contacts for all data and power connections
 - (i) The connector shall meet the MIL-C-26482 specification.

E2.2.8 Electrical

- (a) In operation, the ARPD shall:
 - (i) Consume less than 10W.

- (ii) Operate with a DC input supply voltage between 9.8 VDC and 28 VDC.
- (iii) Have onboard (internal) surge protection for power and communications circuits.

E2.2.9 Communication Ports

- (a) The ARPD shall have two communication ports, and both ports shall communicate independently and simultaneously. This design shall allow one port to be used for configuration, verification and traffic monitoring without interrupting communications on the other dedicated data port.
- (b) The ARPD shall support the upload of new firmware into the ARPD's non-volatile memory over either communication port.
- (c) Free firmware upgrades shall be available on-line through the service lifetime of the ARPD module.

E2.2.10 Output Ports

- (a) Contact closure data shall be reliably communicated over homerun cable connections as long as 600 ft. (182.9m) with latency from the time of channel requirement satisfaction to the eventual reporting of the detections on the back edge of the contact closure card in 15ms or less.
- (b) The contact closure output frequency shall be user configurable as short as 10ms, with a default near 130ms for compatibility.

E2.2.11 RF Channels

- (a) The ARPD shall function normally when operating in close proximity to (up to) seven (7) other ARVSD devices.

E2.2.12 Verification

- (a) The ARPD shall have a self-test feature that is used to verify correct hardware functionality.
- (b) The ARPD shall have a diagnostics mode feature to verify correct system functionality.

E2.2.13 Auto-configuration

- (a) The ARPD shall have a method for automatically defining traffic lanes, stop bars and zones without requiring user intervention.
 - (i) This auto-configuration process shall execute on a processor internal to the ARPD and shall not require an external PC or other processor.
- (b) The auto-configuration process shall work under normal intersection operation and may require several cycles to complete.

E2.2.14 Manual Configuration

- (a) The auto-configuration method shall not prohibit the ability of the user to manually adjust the ARPD configuration.
- (b) The ARPD shall support the configuring of lanes, stop bars and detection zones in 1ft. (0.3m) increments.
- (c) The ARPD shall include the ability to do vehicle counting and pulsed channels.

E2.2.15 Software

- (a) The graphical user interface shall operate on Windows Mobile, Windows XP, Windows Vista and Windows 7 in the .NET framework.
- (b) Free software upgrades shall be available on-line through the service lifetime of the ARPD.
- (c) The software shall support the following functionality:
 - (i) Operate over a TCP/IP connection.
 - (ii) Give the operator the ability to save/back up the ARPD configuration to a file or load/restore the ARPD configuration from a file.

- (iii) Allow the backed-up sensor configurations to be viewed and edited.
- (iv) Provide zone and channel actuation display.
- (v) Provide a virtual connection option so that the software can be used without connecting to an actual sensor.
- (vi) Local or remote sensor firmware upgradability.

E2.2.16 Operating Conditions

- (a) The ARPD shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light, including direct light on sensor at dawn and dusk.
- (b) ARPD shall operate properly through rain falling at a rate of up to 1in. (2.5cm) per hour.
- (c) The ARPD shall be capable of continuous operation over an ambient temperature range of -40°F to 165.2°F (-40°C to 74°C) and over a relative humidity range of 5% to 95% (non-condensing).

E2.2.17 Testing

- (a) Each ARPD shall be certified by the Federal Communications Commission (FCC) under CFR 47, part 15, section 15.249 as an intentional radiator.
 - (i) The FCC certification shall be displayed on an external label on each ARPD according to the rules set forth by the FCC.
- (b) The ARPD shall comply with FCC regulations under all specified operating conditions and over the expected life of the ARPD.

E2.2.18 NEMA TS 2-2003 Testing

- (a) The ARPD shall comply with the applicable standards stated in the NEMA TS 2-2003 standard. The manufacturer shall make available third party test results for each of the following tests:
 - (i) Shock pulses of 10g, 11ms half sine wave.
 - (ii) Vibration of 0.5g up to 30Hz.
 - (iii) 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage.
 - (iv) Cold temperature storage at -49°F (-45°C) for 24 hours.
 - (v) High temperature storage at 185°F (85°C) for 24 hours.
 - (vi) Low temp, low DC supply voltage at -29.2°F (-34°C) and 10.8VDC.
 - (vii) Low temp, high DC supply voltage at -29.2°F (-34°C) and 26.5VDC.
 - (viii) High temp, high DC supply voltage at 165.2°F (74°C) and 26.5VDC.
 - (ix) High temp, low DC supply voltage at 165.2°F (74°C) and 10.8VDC.

E2.2.19 Manufacturing

- (a) The ARPD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include the following:
 - (i) Functionality testing of all internal sub-assemblies.
 - (ii) Unit level burn-in testing of 48 hours' duration or greater.
 - (iii) Final unit functionality testing prior to shipment.
- (b) Test results and all associated data for the above testing shall be provided for each purchased ARPD by serial number, upon request.

E2.2.20 Documentation

- (a) ARPD documentation shall include an instructional training guide and a comprehensive user guide as well as an installer quick-reference guide and a user quick-reference guide.
- (b) The ARPD manufacturer shall supply the following documentation and test results upon request:

- (i) FCC CFR 47 certification (frequency compliance).
- (ii) IED 6100-4-5 class 4 test report (surge).
- (iii) NEMA 250 Standard for Type 4X Enclosures (third party test data).

E2.3 **ITEM NO. 2** – An Aboveground Continuous Tracking Advance Detector (ACTAD) shall be configured and used to detect and track motor vehicles moving towards a traffic signalized intersection.

E2.3.1 General

- (a) An ACTAD detects vehicles by transmitting electromagnetic radar signals through the air. The signals bounce off vehicles in their paths and part of the signal is returned to the ACTAD. The returned signals are then processed to determine traffic parameters.
- (b) The ACTAD shall not be affected by normal weather and environmental conditions such as rain, wind, snow, dust, etc. and shall not require cleaning to maintain performance over a wide range of ambient temperatures.
- (c) The ACTAD shall provide a non-intrusive means of detecting traffic and shall be capable of installation at the side of a roadway.

E2.3.2 Measured Quantities and Outputs

- (a) The ACTAD shall:
 - (i) Detect range and speed to the stop bar for vehicles or clusters of vehicles moving in the user-selected direction of travel.
 - (ii) Dynamically track and update the estimated time of arrival (ETA) for each vehicle as it approaches the stop-bar; each newly-measured ETA result will be continually compared against the pre-determined ETA ranges that define the dilemma zone, and a green light extension request will be provided to the controller when one or more vehicles are within that range.
 - (iii) Detect instantaneous roadway efficiency.
 - (iv) Simultaneously detect and report information from up to 25 vehicles on the roadway when they are serially sequenced between the near and far boundaries.
 - (v) Turn on a zone output when the range, speed, ETA, and qualified count or instantaneous roadway efficiency requirements for that zone are satisfied.
 - (vi) Turn on an alert output on when the user defined zone output combinational logical is satisfied.
 - (vii) Turn on a normal channel output when any of the channel's alerts is on and the channel's delay and extend time constraints are satisfied.
 - (viii) The ACTAD shall turn on a latched channel output when the on alert is turned on and the delay time is satisfied. The ACTAD shall turn off a latched channel output when the off alert is turned on or the max timer expires and the extension time is satisfied.
 - (ix) Provide vehicle call and extend data on up to eight channels that can be connected to contact closure modules compliant with 170 and 2070 controllers.
 - (x) Be capable of providing data for each tracked detection over the serial ports.
 - (xi) Have Pulse channel outputs for intersection arrival-time information.

E2.3.3 Detectable Area

- (a) In operation, the ACTAD shall detect and report:
 - (i) Vehicle information on the roadway when the ACTAD mounted within 50ft. (15.2m) of the center of the lanes of interest.
 - (ii) Vehicle information when the ACTAD is mounted at heights up to 40ft. (12.2m) above the road surface.
 - (iii) Information about vehicles on the roadway that are located with the near range boundary of 50ft. (15.2m) from the base of the pole on which the ACTAD is mounted.

- (iv) Information about vehicles on the roadway that are located with the far range boundary of 600ft. (182.3m) from the base of the pole on which the ACTAD is mounted.
- (v) At least 95 percent of large vehicles (high-profile trucks and buses) on the roadway within the line-of-site of the ACTAD shall be detected and reported before they arrive within 400ft. (121.9m) of the sensor.
- (vi) At least 90 percent of all motor vehicles on the roadway within the line-of-site of the ACTAD shall be detected and reported before they arrive within 400ft. (121.9m) of the sensor.

E2.3.4 Performance

- (a) Detection Accuracy
 - (i) The ACTAD shall detect at least 98 percent of large vehicles like truck-trailer combinations and at least 95 percent of all motor vehicles on the roadway within the line-of-sight of the ACTAD sensor where multiple detections of multi-unit vehicles are not considered false detections and merged detections of adjacent lane vehicles are not considered missed detections.
- (b) Range Accuracy
 - (i) The ACTAD shall provide range measurements in which 90% of the measurements are accurate within 10ft. (3m) when detected vehicles are tracked independently.
- (c) Speed Accuracy
 - (i) The ACTAD shall provide per vehicle speed measurements in which 90% of the measurements are accurate within 5mph (8kph) when detected vehicles are tracked independently.
- (d) ETA Accuracy
 - (i) The ACTAD shall provide estimated time-of-arrival (ETA) measurements in which 85% of the measurements are accurate within one second when detected vehicles are tracked independently at a constant speed above 40mph (64kph) and are within 2.5 and 5.5 seconds of the stop bar.

E2.3.5 Maintenance

- (a) The ACTAD shall not:
 - (i) Require cleaning or adjustment to maintain performance.
 - (ii) Rely on battery backup to store configuration information, thus eliminating any need for battery replacement.
 - (iii) Require recalibration to maintain performance unless the roadway configuration changes.
- (b) The mean time between failures of ACTAD devices shall be 10 years, which is estimated based on manufacturing techniques.

E2.3.6 Physical Properties

- (a) The ACTAD shall not exceed
 - (i) 4lbs (1.8kg) in weight.
 - (ii) 14in. x 11in. x 4in. (35.6cm x 27.9cm x 10.2cm) in its physical dimensions.
- (b) All external parts of the ACTAD shall be ultraviolet-resistant, corrosion-resistant and protected from fungus growth and moisture deterioration.

E2.3.7 Enclosure

- (a) The ACTAD shall be:
 - (i) Able to withstand a drop of up to 5ft. (1.5m) to a hard surface without compromising its functional and structural integrity.
 - (ii) Manufactured using a polycarbonate copolymer formulation (Lexan EXL or equivalent).
 - (iii) Classified "f1" outdoor weather ability in accordance with UL 746C.

- (iv) Classified as “watertight” according to the NEMA 250 standard.
- (v) Shall conform to test criteria set forth in the NEMA 250 standard for type 4X enclosures.
- (vi) Test results shall be provided for each of the following type 4X criteria:
 - ◆ External icing (clause 5.6)
 - ◆ Hose-down (clause 5.7)
 - ◆ 4X corrosion protection (clause 5.10)
 - ◆ Gasket (clause 5.14)
- (b) Shall include a connector that provides contacts for all data and power connections
 - (i) The connector shall meet the MIL-C-26482 specification.

E2.3.8 Electrical

- (a) The ACTAD shall:
 - (i) Consume less than 4W of power when operating at 12VDC.
 - (ii) Operate with a DC input between 9VDC and 28VDC.
 - (iii) Have onboard surge protection.

E2.3.9 Communication Ports

- (a) The ARPD shall have two communication ports, and both ports shall communicate independently and simultaneously. The ports shall allow one port to be used for configuration, verification and traffic monitoring without interrupting communications on the other dedicated data port.
- (b) The ACTAD shall support the upload of new firmware into the ACTAD's non-volatile memory over either communication port.
- (c) Free firmware upgrades shall be available on-line through the service lifetime of the ACTAD.
- (d) Contact closure data shall be reliably communicated over homerun cable connections as long as 600ft. (182m) with latency from the time of channel requirement satisfaction to the eventual reporting of the detections on the back edge of the contact closure card in 15ms or less.
- (e) The contact closure output frequency shall be user configurable as short as 10ms, with a default near 130ms for compatibility.

E2.3.10 RF Channels

- (a) The ACTAD shall function normally when operating in close proximity to (up to) seven (7) similar devices.

E2.3.11 Auto Configuration

- (a) The ACTAD shall have a method for automatically configuring the sensitivity of detection in at least 5ft. (1.5m) increments.
- (b) The auto-configuration method shall not prohibit the ability of the user to manually adjust the ACTAD configuration.
- (c) The ACTAD shall support the configuration of up to eight channel outputs with up to four alerts per channel and up to four zones per alert, resulting in 32 configurable alerts and 128 configurable zones.

E2.3.12 Zone Configuration

- (a) The ACTAD shall support:
 - (i) The configuring of zones in 5ft. (1.5m) increments.
 - (ii) Detection zones as long as 550ft. (167.6m).
 - (iii) User configurable high-speed and low-speed detection filters for each zone.
 - (iv) The configuring of speed filters in 1mph (1.6kph) increments.
 - (v) User configurable upper and lower estimated time-of-arrival (ETA) filters for each zone.

- (vi) The configuring of ETA filters in increments of 0.1 seconds.
- (b) The ACTAD shall provide configurable upper and lower count filters that help determine if a required number of qualified detections are present.
- (c) The ACTAD shall support the configuring of qualified count filters in increments of one.

E2.3.13 Software

- (a) The ACTAD shall include graphical user interface software that displays the current traffic pattern using a graphical traffic representation.
- (b) The graphical user interface shall also display all configured alerts and provide visual representation of their actuation.
- (c) The graphical user interface shall provide a means of logging the vehicular track files with an update rate of greater than five times per second.
- (d) The graphical interface shall operate on Windows Mobile, Windows XP, Windows Vista, and Windows 7 in the .NET framework.
- (e) Free software upgrades shall be available on-line through the service lifetime of the ACTAD.
- (f) The software shall support the following functionality:
 - (i) Operate over a TCP/IP connection.
 - (ii) Provide a virtual sensor connection for software usability without a sensor.
 - (iii) Give the operator the ability to save/back up the ACTAD configuration to the a file or load/restore the ACTAD configuration from a file.

E2.3.14 Operation Conditions

- (a) The ACTAD shall maintain accurate performance in all weather conditions, including rain, freezing rain, snow, wind, dust, fog and changes in temperature and light, including direct light on sensor at dawn and dusk.
- (b) ACTAD operation shall continue to operate properly in rain falling at a rate of up to 2in. (5.08cm) per hour.
- (c) The ACTAD shall be capable of continuous operation over an ambient temperature range of -40°F to 165°F (-40°C to 74°C) and over a relative humidity range of 5% to 95% (non-condensing).

E2.3.15 Testing

- (a) Each ACTAD shall be Federal Communications Commission (FCC) certified under CFR 47, part 15, section 15.245 or 15.249 as an intentional radiator.
 - (i) The FCC certification shall be displayed on an external label on each ACTAD according to the rules set forth by the FCC.
- (b) The ACTAD shall comply with FCC regulations under all specified operating conditions and over the expected life of the ACTAD.
- (c) The ACTAD shall comply with the applicable standards stated in the NEMA TS 2-1998 Standard. Third party test results shall be made available for each of the following tests:
 - (i) Shock pulses of 10 g, 11ms half sine wave.
 - (ii) Vibration of 0.5g up to 30Hz.
 - (iii) 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage.
 - (iv) Cold temperature storage at -49°F (-45°C) for 24 hours.
 - (v) High temperature storage at 185°F (85°C) for 24 hours.
 - (vi) Low temp, low DC supply voltage at -29.2°F (-34°C) and 10.8 VDC.
 - (vii) Low temp, high DC supply voltage at -29.2°F (-34°C) and 26.5 VDC.
 - (viii) High temp, high DC supply voltage at 165.2°F (74°C) and 26.5 VDC.
 - (ix) High temp, low DC supply voltage at 165.2°F (74°C) and 10.8 VDC.

E2.3.16 Manufacturing

- (a) The ACTAD shall undergo a rigorous sequence of operational testing to ensure product functionality and reliability. Testing shall include the following:
 - (i) Functionality testing of all internal sub-assemblies.
 - (ii) Unit level burn-in testing of 48 hours' duration or greater.
 - (iii) Final unit functionality testing prior to shipment.
- (b) Test results and all associated data for the above testing shall be provided by the manufacturer for each purchased ACTAD by serial number, upon request.

E2.3.17 Documentation

- (a) ACTAD documentation shall include a comprehensive user guide as well as an installer quick-reference guide and a user quick-reference guide.
- (b) The ACTAD manufacturer shall supply the following documentation and specification test results upon request:
 - (i) Detection accuracy.
 - (ii) Range accuracy.
 - (iii) Earliest range of detection.
 - (iv) Speed accuracy.
 - (v) ETA accuracy.
 - (vi) FCC CFR 47 certification.
 - (vii) NEMA 250 standard for Type 4X Enclosure third-party test data.
 - (viii) NEMA TS 2-1998 standard third-party test data.

E2.4 **ITEM NO. 3** – Sensor Mount shall be a manufactured assembly designed to align and permanently mount Aboveground Radar Vehicle Sensing Devices (ARVSDs) on City of Winnipeg Traffic Signal Poles.

E2.4.1 Mounting

- (a) The mounting assembly shall:
 - (i) Feature a symmetric hole pattern that mates with fixed and rotational ARVSD backplates.
 - (ii) Be slotted for 3/4in. (1.9cm) banding.
 - (iii) Have two contact points with the pole.
 - (iv) Be able to support at least the weight of the AVRSD.
 - (v) Provide at least two axes of rotation to ensure proper installation.

E2.4.2 Construction

- (a) The mounting assembly shall:
 - (i) Be constructed of 0.1875in. (0.48cm) thick or thicker aluminum with 316 stainless steel hardware.
 - (ii) Be powder coated for oxidation resistance.

E2.5 **ITEM NO. 4** – Sensor to Field Wiring Cable and Connector shall be constructed from a shielded cable consist of three twisted pairs of conductors 40ft (12.2m) in length and have one end terminated to connect to a ARVSD device.

E2.5.1 Cable

- (a) The cable shall conform to the following specifications:
 - (i) The Sensor to Field Wiring Cable shall consist of three twisted wire pairs of conductors with an overwrapped shield.
 - (ii) Two twisted 22 AWG wire pairs used for RS-485 communications shall have nominal conductor to conductor capacitance of less than 40 pF/ft at 1kHz.
 - (iii) The same two twisted wire pairs used for RS-485 communications shall have nominal conductor DC resistances of less than 16.7ohms/1000ft. at 20°C.

- (iv) A twisted 20AWG wire pair used for power conductors shall have a minimum nominal conductor DC resistance of less than 11ohms/1000ft. at 20°C.
- (v) The entire cable shall be shielded with an aluminum/polyester shield with a drain wire.
- (vi) The cable jacket shall be made of PVC that is at maximum 0.053in. (1.3mm) thick.
- (vii) The cable shall have a maximum diameter of 0.41in. (1.04cm).
- (viii) The cable shall be RoHS compliant.
- (ix) The cable shall have a UL/cUL type CMG safety approval.
- (x) The cable shall be cable of operating at temperatures up to 221°F (105°C) while dry and 167°F (75°C) while wet.
- (xi) The cable shall have an FT4 flammability rating.
- (xii) The cable shall be UV resistant, as per the UL 720 Hour Sunlight Resistance Test.

E2.5.2 Connector

- (a) The cable end connector plug shall meet the MIL-C- 6482 specification and shall be designed to interface with the appropriate MIL-C-26482 socket connector. The cable end connector backshell shall be an environmentally sealed shell that offers excellent immersion capability.
- (b) All conductors that interface with the connector shall be encased in a single jacket, and the outer diameter of this jacket shall be within the backshell's cable O.D. range to ensure proper sealing.
 - (i) The backshell shall have a strain relief with enough strength to support the cable slack under extreme weather conditions.

E2.6 **ITEM No. 5** - Sensor to Field Wiring Cable and Connector shall be constructed from a shielded cable consist of three twisted pairs of conductors 60ft (18.3m) in length and have one end terminated to connect to a ARVSD device.

E2.6.1 Cable

- (a) The cable shall conform to the following specifications:
 - (i) The Sensor to Field Wiring Cable shall consist of three twisted wire pairs of conductors with an overwrapped shield.
 - (ii) Two twisted 22 AWG wire pairs used for RS-485 communications shall have nominal conductor to conductor capacitance of less than 40 pF/ft at 1kHz.
 - (iii) The same two twisted wire pairs used for RS-485 communications shall have nominal conductor DC resistances of less than 16.7ohms/1000ft. at 20°C.
 - (iv) A twisted 20AWG wire pair used for power conductors shall have a minimum nominal conductor DC resistance of less than 11ohms/1000ft. at 20°C.
 - (v) The entire cable shall be shielded with an aluminum/polyester shield with a drain wire.
 - (vi) The cable jacket shall be made of PVC that is at maximum 0.053in. (1.3mm) thick.
 - (vii) The cable shall have a maximum diameter of 0.41in. (1.04cm).
 - (viii) The cable shall be RoHS compliant.
 - (ix) The cable shall have a UL/cUL type CMG safety approval.
 - (x) The cable shall be cable of operating at temperatures up to 221°F (105°C) while dry and 167°F (75°C) while wet.
 - (xi) The cable shall have an FT4 flammability rating.
 - (xii) The cable shall be UV resistant, as per the UL 720 Hour Sunlight Resistance Test.

E2.6.2 Connector

- (a) The cable end connector plug shall meet the MIL-C- 6482 specification and shall be designed to interface with the appropriate MIL-C-26482 socket connector. The cable end connector backshell shall be an environmentally sealed shell that offers excellent immersion capability.
- (b) All conductors that interface with the connector shall be encased in a single jacket, and the outer diameter of this jacket shall be within the backshell's cable O.D. range to ensure proper sealing.
 - (i) The backshell shall have a strain relief with enough strength to support the cable slack under extreme weather conditions.

E2.7 **ITEM NO. 6** – Detector Rack Card (DRC) shall provide 2-channel of outputs that are compatible with devices that may be inserted into any Input File slot in a Model 33x Controller Cabinet.

E2.7.1 General

- (a) The DRC shall be used to translate data from a radar vehicle sensing device (ARVSD) two output contact closure(s).

E2.7.2 Product Description

- (a) The DRC shall convert communication from the ARVSD to contact closure data, providing 2 channel contact closure outputs on each card.

E2.7.3 Physical

- (a) The two-channel DRC shall not exceed 0.25lbs. (0.11kg) in weight.
- (b) The two-channel DRC shall not exceed 8.3in. x 4. in. x 1.2in. (21.1cm x 11.4cm x 3cm) in its physical dimensions.
- (c) The DRC shall operate over a temperature range of -29°F to 165°F (-34°C to 74°C).
- (d) The DRC shall operate in up to 95% humidity.

E2.7.4 Mounting

- (a) The DRC shall mount in a 332 Cabinet input file rack slot.

E2.7.5 Power

- (a) Each DRC shall receive cabinet DC power through card edge terminals and shall consume 1W of average power during normal operation.

E2.7.6 Connections

- (a) The DRC shall have a 2x22 way (dual-edge) connector for detection and power connections.
- (b) The DRC shall also have sufficient communication ports to facilitate required communications.

E2.7.7 Communication

- (a) The DRC shall have at minimum two independent communication ports which allow it to be configured without interfering with data communication.
- (b) The DRC's connection to the detector rack shall allow it to pass vehicle information to a traffic controller via contact closures.

E2.7.8 Faceplate Configuration Features

- (a) The DRC shall have a mode switch for controlling menu operation.
- (b) The DRC shall have three banks of LEDs"
 - (i) The first bank shall have red LEDs used for detection; these shall indicate the current detection state.
 - (ii) The second bank of LEDs shall aid in viewing and setting menu options.
 - (iii) The third bank shall display menu items for selecting and they shall also have the following status-indicating functions:
 - ◆ One LED shall illuminate to indicate the DRC has power

- ◆ One LED shall illuminate to indicate when the device is transmitting data
 - ◆ One LED shall illuminate to indicate when the device is receiving data
- (c) The DRC faceplate features shall support the configuration of communication port data rates and channel mapping settings.

E2.7.9 Software Configuration Features

- (a) The DRC shall be provided with configuration software that:
- (i) Runs on a Windows desktop or laptop PC (Windows XP and newer).
 - (ii) Configures communication settings.
 - (iii) Configures channel mapping settings.
 - (iv) Can remotely and directly upgrade the DRC firmware to add new features to the DRC.
 - (v) Can save/open a configuration to/from a file, and allow a common configuration to be easily programmed into many devices.
 - (vi) Has a customizable driver that is stored in an XML file that describes the settings for a device as well the graphical user interface for that driver in the configuration software.

E2.7.10 Data Conversion

- (a) The DRC shall output traffic data as contact closures specified by the ARVSD.

E2.7.11 Fail-Safe-Mode

- (a) The DRC shall enter a fail-safe-mode if it loses communications with the ARVSD for more than ten seconds.
- (b) In fail-safe-mode, all channel outputs shall be asserted to a LOW state.
- (c) The DRC shall exit fail-safe-mode when communication with the ARVSD is restored

E2.7.12 Class 4 Compliance

- (a) The DRC shall comply with the EN 61000-4-5 Class 4 lightning surge protection on the DC input.

E2.7.13 Contact Closure Outputs

- (a) The DRC shall dissipate up to a 600W power surge received on any contact closure output terminal.
- (b) The contact closure output terminals on the DRC shall be able to withstand 50V DC continuously. In the conduction (ON) state, the DRC's contact closure outputs shall be less than 8ohms and shall also be able to sink up to 150mA DC. Outputs in a non-conducting (OFF) state shall leak less than 1uA.

E2.7.14 Remote Upgradeability

- (a) The DRC shall have flash memory that can be remotely upgraded to add functionality to the firmware when new features have been developed to improve the performance of the installation.

E2.7.15 Testing

- (a) Before shipping, each DRC shall have passed a manufacturer's test. The DRC shall comply with the applicable standards stated in the NEMA TS2-2003 Standard.
- (b) Test results and other documentation demonstrating performance and capabilities shall be provided as requested.

E2.8 **ITEM NO. 7** - Sensor to Ethernet Converter Module (SECM) shall provide an opportunity to use IP-addressable standard Ethernet to communicate with the ARVSD and any associated electronic controls. If the ARVSD has native IP-addressable Ethernet communication no SECM is required.

E2.8.1 Product Description

- (a) The SECM shall be capable of converting two-wire half-duplex RS-485 communication and RS-232 communication to IP-addressable Ethernet protocol and vice versa. All serial ports shall pass data on one port to all other ports. Any data coming to or from the Ethernet port shall simultaneously be sent to all RS-485 and RS-232 ports.

E2.8.2 Physical

- (a) The SECM shall not exceed 0.2lbs. (0.1kg) in weight.
- (b) The SECM shall not exceed 4.5in. x 4in. x 0.9in. (11.4cm x 10.2cm x 2.3cm) in its physical dimensions.
- (c) The SECM shall operate within a temperature range of -29°F to 165°F (-34°C to 74°C).
- (d) The SECM shall operate in humidity up to 95% RH.

E2.8.3 Mounting

- (a) The SECM shall mount to a DIN rail with hot-swappable power and communication buses via T-Bus interface connector for quick installation and replacement.

E2.8.4 Power

- (a) The SECM shall have a power supply voltage of 10 to 30VDC.
- (b) The SECM shall operate using less than 1W of average power at 24VDC.

E2.8.5 Connections

- (a) The SECM shall include the following connections for power and communications
 - (i) Power.
 - ◆ The SECM shall include a 5-position T-Bus connector, with two contact points reserved for connecting power through the bus
 - (ii) RS-232.
 - ◆ The SECM shall feature a DB-9 connector for RS-232 communications.
 - (iii) RS-485.
 - ◆ The SECM shall feature a pluggable screw terminal for RS-485 communication. The 5-position connector shall have three contact points reserved for connecting RS-485 through the T-Bus connector.
 - (iv) Ethernet.
 - ◆ The SECM shall feature an RJ-45 jack for Ethernet communications.

E2.8.6 Communications

- (a) The SECM shall support the following communication capabilities:
 - (i) Serial Protocol Conversion.
 - ◆ The SECM shall allow communications with any serial device that has a serial connection by converting 2-wire half-duplex RS-485 communication to half-duplex RS-232 communication, and vice versa.
 - (ii) Ethernet.
 - ◆ The SECM shall convert RS-232 and RS-485 protocol to Ethernet, allowing communication with any device connected to the SECM via an Ethernet network.

E2.8.7 Baud Rates

- (a) The SECM shall support baud rates of 1200bps, 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps and 115200bps.

E2.8.8 Configuration Features

- (a) Push-button.

- (i) The front of the SECM shall include a push-button Mode Switch that causes the SECM to autobaud to a SmartSensor or other serial device. It shall also be able to reset the SECM to factory defaults.
- (b) LED's.
 - (i) The front of the SECM shall include a red LED for power and green and yellow LEDs, which shall illuminate when corresponding data is successfully transmitted or received.

E2.8.9 Pocket PC & PC Configuration Software

- (a) The SECM shall be provided with configuration software that:
 - (i) Runs on both a Pocket PC and a Windows desktop or laptop PC (Windows XP and newer).
 - (ii) Configures serial communication port settings including the serial baud rates.
 - (iii) Can remotely and directly upgrade the SECM firmware to add new features to the SECM.
 - (iv) Allows users to save a configuration to a file, and to open existing files and save to a device, allowing a common configuration to be easily programmed into many devices.
 - (v) Has customizable drivers that are stored as XML files that describe the graphical user interface for that driver.
 - (vi) Free software upgrades shall be available on-line throughout the service lifetime of the SECM module.

E2.8.10 Upgradeability

- (a) The SECM shall have flash memory that can be remotely upgraded to add functionality to the firmware when new features have been developed to improve the performance of the installation.
- (b) Free firmware upgrades shall be available on-line through the service lifetime of the SECM module.

E2.8.11 NEMA TS2-1998 Testing

- (a) The SECM shall comply with applicable standards stated in the NEMA TS2-1998 Standard Test results shall be made available for each of the following tests:
 - (i) Shock pulses of 10g, 11ms half sine wave.
 - (ii) Vibration of 0.5 G RMS up to 30Hz.
 - (iii) 300 V positive/negative pulses applied at one pulse per second at minimum and maximum DC supply voltage.
 - (iv) Cold temperature storage at -49°F (-45°C) for 24 hours.
 - (v) High temperature storage at 185°F (85°C) for 24 hours.
 - (vi) Low temp, low DC supply voltage at -29.2°F (-34°C) and 10.8 VDC.
 - (vii) Low temp, high DC supply voltage at -29.2°F (-34°C) and 26.5 VDC.
 - (viii) High temp, high DC supply voltage at 165.2°F (74°C) and 26.5 VDC.
 - (ix) High temp, low DC supply voltage at 165.2°F (74°C) and 10.8 VDC.

E2.8.12 Testing

- (a) Before shipping, each SECM shall have passed a manufacturer's test.
- (b) The SECM shall comply with the applicable standards stated in the NEMA TS2-2003 Standard.
 - (i) Test results and other documentation demonstrating performance and capabilities of the SECM shall be provided on request.

E2.9 **ITEM NO. 8** - Preassembled Segmented Backplate System (PSBS) provides a separate power supply panel and two (2) interface panels supplied with all necessary electrical protection devices, surge suppression module, DC power supply, two (2) system surge protection

modules, other components, terminal blocks and wiring required to support four (4) ARVSDs consisting of various combinations of ARPDs and ACTADs.

E2.9.1 The PSBS shall consist of three (3) preassembled aluminum backplates mountable within a traffic signal controller cabinet. Each PSBS assembly shall be pre-wired to include the following elements and features:

- (a) Backplate #1 dimensions shall be no larger than 18 cm wide x 13 cm high, and no mounted component shall exceed a height of 10 cm above the backplate.
- (b) Backplate #1 shall include one AC Circuit Breaker (ITEM 8), one Surge suppression module (ITEM 9), one DC Power Supply (ITEM 10), two System Surge Protection modules (2x ITEM 11), one T-bus 5-screw terminal block (left end) and three (3) T-bus connectors, all mounted on a single DIN rail mounted to the front face of Backplate #1.
- (c) Backplate #1 shall be supplied pre-wired to all modules and interfaces and shall be complete with 3-conductor plug-in 2.4m (8 ft) power cord and a single (solid) conductor green insulated ground wire 2.0 m long with one end electrically secured to the aluminum backplate and the other end terminated with ring style of ground lug for mounting on 1/2x20 machine bolt, Supplied accessories with Backplate #1 shall also include four (4) 1.5m white RJ-11 patch cables and one (1) 1.5m black RJ-11 patch cable.
- (d) Backplates #2 and #3 shall be no larger than 11 cm wide x 9 cm high.
- (e) Backplate #2 shall contain a single horizontally-mounted DIN-rail supporting all terminal spacers and end blocks and 14 colour-coded insulation displacement terminal blocks, and shall also contain one (1) 3m 15-conductor serial cable for sensor cable termination (needed to interface ARVSD device #1 and ARVSD device #2) with circuits pre-wired to the System Surge Suppressor #1 located on Backplate #1.
- (f) Backplate #3 shall contain a single front-mounted DIN-rail supporting all terminal spacers and end blocks and 14 colour-coded insulation displacement terminal blocks, and shall also contain one (1) 3m 15-conductor serial cable for sensor cable termination (needed to interface ARVSD device #3 and ARVSD device #4) with circuits pre-wired to the System Surge Suppressor #2 located on Backplate #1.
- (g) No feature on Backplate #2 or Backplate #3 shall exceed a mounted height of 10 cm above either backplate.
- (h) Backplates shall accept user-supplied 6mm (1/4") diameter mounting hardware in slots pre-punched along both the long top and bottom edges of the backplates without the requirement field-modify the backplates.

E2.9.2 The items listed and specified below may be ordered as individually replaceable devices and / or modules which are supplied on Backplate #1 of **ITEM 8**:

- (a) **ITEM 9** - Circuit Breaker shall be rated for 250 VAC and 0.5 A with pushbutton-reset feature.
- (b) **ITEM 10** - Surge Suppression Module shall operate over an ambient operating temperature range rated from -29°F to 140°F (-34°C to 60°C), shall provide three-stage electrical surge protection for an overvoltage protection exceeding an applied input voltage of 150 VAC and shall operate properly following a maximum electrical discharge (8/20 uSec) of 10kA.
- (c) **ITEM 11** - AC to DC Power Supply shall operate over an ambient operating temperature range from -29°F to 140°F (-34°C to +60°C) with an input voltage range of 100-240 VAC @ 45-65 Hz, and will supply a regulated pre-set output voltage of 24 Volts DC (user-adjustable from 22.5 to 28.5 VDC) at up to 4 Amperes.
- (d) **ITEM 12** - System Surge Protection which includes DC Power Protection (Maximum working voltage of 28V, complying with applicable standards in IEC 61000-4-5 class 4 standard for DC power lines) and RS-485 Protection (Maximum working voltage of 5V, complying with applicable standards in IEC 61000-4-5 class 4 standard for communication lines) .

E2.10 **ITEM NO. 13** – ACTAD Alignment Tool is a visual sighting instrument used to align the ACTAD sensor to the roadway. The tool shall be manufactured from aluminum stock and designed to be attached to the ACTAD temporarily during the setup.

E3. TESTING

E3.1 All items described within this Specification containing voltage surge suppression circuitry shall meet NEMA TS2-1998 testing requirements and shall provide three-stage electrical protection (Stage 1: high-powered current-handling gas discharge tubes and Stage 2 and 3: fast-responding surge-arresting diodes and series decoupling elements) on all AC Power Input and DC Power Input circuit interfaces.

E3.2 All items described within this Specification containing communication ports surge suppression circuitry shall meet NEMA TS2-1998 testing requirements and shall provide three-stage electrical protection (Stage 1: gas tubes and Stages 2 & 3: resistors and fast-responding surge-arresting diodes) on all Communication Circuit Interfaces.

E4. TRAINING AND TECHNICAL SUPPORT

E4.1 Training and Technical Support.

- (a) The ARVSD manufacturer shall provide both training and technical support services.
- (b) The manufacturer-provided training shall be sufficient to fully train installers and operators in the installation, configuration, and use of the ARVSD to ensure accurate ARVSD performance.
- (c) The manufacturer-provided training shall consist of comprehensive classroom labs and hands-on, in-the-field, installation and configuration training.
- (d) Classroom lab training shall involve presentations outlining and defining the ARVSD, its functions, and the procedures for proper operation. These presentations shall be followed by hands-on labs in which trainees shall practice using the equipment to calibrate and configure a virtual ARVSD. To facilitate the classroom presentation and hands on labs, the manufacturer-provided training shall include the following items:
 - (i) Knowledgeable trainer or trainers thoroughly familiar with the ARVSD and its processes. Trainers shall be factory trained and authorized by the manufacturer.
 - (ii) Presentation materials, including visual aids, printed manuals and other handout materials for each student.
 - (iii) Computer files, including video and raw data, to facilitate the virtual configuration of the ARVSD.
 - (iv) Laptop computers or Windows CE handheld devices with the necessary software, and all necessary cables, connectors, etc.
 - (v) All other equipment necessary to facilitate the virtual configuration of the ARVSD.
- (e) Training shall be such that each trainee will mount and align the ARVSD correctly.
- (f) Training shall be scheduled to insure sufficient time is allocated to cover all aspects, functionality, troubleshooting and installation of the ARVSD.
- (g) Training shall be conducted within forty-five (45) days of award and be conducted on site.
- (h) Manufacturer-provided technical support shall be available via a toll free number, and a certified technical representative shall be remotely available to assist with the physical installation, alignment, and auto-configuration of each supplied ARVSD. Technical support shall be provided thereafter to assist with troubleshooting, maintenance, or replacement of ARVSDs should such services be required. The vendor shall also provide certified technical support via a toll free number.
- (i) The manufacturer shall make available free firmware upgrades and software upgrades for the ARVSD and assembly till the end of the product life of any product line. The upgrades shall be made available on-line through the manufacture's website.

E5. PERFORMANCE RELIABILITY

- E5.1 The responsibility for the design of the complete unit, warranty and performance reliability shall rest upon the Contractor.
- E5.2 The term “*repeat failures*” as used herein is defined to mean that the same component, subassembly, or assembly develops repeated defects, breakdowns and/or malfunctions rendering the unit inoperative, or required repeated shop correction, service and/or extra during the warranty period applicable for said component, subassembly, or assembly. Minor items or ordinary service adjustments are not included, or considered under the scope of “repeated failures”, as well as other factors, such as operational damage due to accidents, misuse or lack of proper maintenance and service attention by not following the manufacturer’s preventative maintenance schedules.
- E5.3 Where the unit develops “repeated failures” in service, the Contractor shall make any necessary engineering changes, repairs, alterations or modifications in order to guarantee reliability of performance.

E6. APPROVED PRODUCTS

- E6.1 Subject to E1.2, the following products are approved or equivalent in accordance with B6 Substitutes;
- (a) **ITEM 1** ARPD – Wavetronix SmartSensor Matrix WX-SS-225 (ref. E2.2).
 - (b) **ITEM 2** ACTAD – Wavetronix SmartSensor Advance WX-SS-200V (ref. E2.3).
 - (c) **ITEM 3** Sensor Mount – Wavetronix WX-SS-611 (ref. E2.4).
 - (d) **ITEM 4** Wiring Cable and Connector – Wavetronix SS-704-040 (ref. E2.5).
 - (e) **ITEM 5** Wiring Cable and Connector – Wavetronix SS-704-060 (ref. E2.6).
 - (f) **ITEM 6** DRC – Wavetronix Click! 112 WX-CLK-112 (ref.E2.7).
 - (g) **ITEM 7** SECM – Wavetronix Click! 301 WX-CLK-301 (ref.E2.8).
 - (h) **ITEM 8** PSBS – Wavetronix WX-SS-B03-0005 (ref.E2.9).
 - (i) **ITEM 9** Circuit Breaker – Wavetronix Click! 210 WX-CLK-210 (ref.E2.9.2(a)).
 - (j) **ITEM 10** Surge Suppression Module – Wavetronix Click! 230 WX-CLK-230 (ref.E2.9.2(b)).
 - (k) **ITEM 11** Power Supply – Wavetronix Click! 204 WX-CLK-204 (ref.E2.9.2(c)).
 - (l) **ITEM 12** System Surge Protection - Wavetronix Click! 222 WX-CLK-222 (ref.E2.9.2(d)).
 - (m) **ITEM 13** ACTAD Alignment Tool - Wavetronix 101-0400 (ref.E2.10).