



THE CITY OF WINNIPEG

REQUEST FOR PROPOSAL

RFP NO. 862-2019

**PROVISION OF ROAD WEATHER FORECASTING AND SNOW MEASUREMENT
SERVICES**

TABLE OF CONTENTS

PART A - PROPOSAL SUBMISSION

- Form A: Bid/Proposal
- Form B: Prices

PART B - BIDDING PROCEDURES

B1. Contract Title	1
B2. Submission Deadline	1
B3. Enquiries	1
B4. Confidentiality	1
B5. Addenda	2
B6. Substitutes	2
B7. Proposal Submission	3
B8. Proposal	4
B9. Prices	4
B10. Experience of Proponent and Subcontractors (Section C)	5
B11. Experience of Key Personnel Assigned to the Project (Section D)	5
B12. Project Understanding and Methodology (Section E)	5
B13. Technical Understanding (Section F)	6
B14. Disclosure	6
B15. Conflict of Interest and Good Faith	6
B16. Qualification	7
B17. Opening of Proposals and Release of Information	9
B18. Irrevocable Offer	9
B19. Withdrawal of Offers	9
B20. Interviews	9
B21. Negotiations	10
B22. Evaluation of Proposals	10
B23. Award of Contract	11

PART C - GENERAL CONDITIONS

C0. General Conditions	1
------------------------	---

PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions	1
D2. Scope of Services	1
D3. Cooperative Purchase	1
D4. Definitions	2
D5. Contract Administrator	4
D6. Information Management	4
D7. Notices	6

Submissions

D8. Authority to Carry on Business	6
D9. Insurance	7
D10. Subcontractor List	7

Schedule of Work

D11. Commencement	7
D12. Liquidated Damages	7
D13. Orders	8

Measurement and Payment

D14. Invoices	8
D15. Payment	8
D16. Payment Schedule	8

Warranty

D17. Warranty	8
Form J: Subcontractor List	9

PART E - SPECIFICATIONS

General

E1. Applicable Specifications	1
E2. Services	2
E3. Records	2
E4. Weather Notices	2
E5. Weather Forecast	2
E6. RWIS Road Condition, Forecasting and imagery	3
E7. Mobile RWIS Road Condition and imagery	4
E8. Frost control Measurements and Forecast	4
E9. Data Ownership	4
E10. Snow Measurements	4
E11. Snow-to-Liquid Ratios Climatology	10
E12. Database Template	10
E13. Procedures to Melt Snow	11
E14. Observers Notes	12

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 PROVISION OF ROAD WEATHER FORECASTING AND SNOW MEASUREMENT SERVICES

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, September 21, 2020.

B2.2 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 Proponent finds errors, discrepancies or omissions in the Request for Proposal, or is unsure of the meaning or intent of any provision therein, the Proponent 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 Request for Proposal will be provided by the Contract Administrator to all Proponents 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 Request for Proposal will be provided by the Contract Administrator only to the Proponent who made the enquiry.

B3.5 All correspondence or contact by Proponents with the City in respect of this RFP must be directly and only with the Contract Administrator. Failure to restrict correspondence and contact to the Contract Administrator may result in the rejection of the Proponents Proposal Submission.

B3.6 The Proponent 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.

B3.7 Any enquiries concerning submitting through MERX should be addressed to:
MERX Customer Support
Phone: 1-800-964-6379
Email: merx@merx.com

B4. CONFIDENTIALITY

B4.1 Information provided to a Proponent by the City or acquired by a Proponent 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 Proponent before receipt hereof; or
- (b) becomes publicly known other than through the Proponent; or
- (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.

B4.2 The Proponent shall not make any statement of fact or opinion regarding any aspect of the Request for Proposal 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 Request for Proposal, 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 MERX website at www.merx.com.
- B5.4 The Proponent is responsible for ensuring that he/she has received all addenda and is advised to check the MERX website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.5 The Proponent shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid/Proposal. Failure to acknowledge receipt of an addendum may render a Proposal 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 Plant, Materials and methods specified in the Request for Proposal.
- 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 seven (7) Business Days prior to the Submission Deadline.
- B6.4 The Proponent 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 Plant, Material or method 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 proposed work schedule and the dates specified in the Supplemental Conditions for Total Performance;
 - (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 proposed work schedule and the dates specified in the Supplemental Conditions for Total Performance.
- 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 Proponent 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 Proponents. The Proponent 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 Proponent 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 Proponent 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 B22.
- B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. PROPOSAL SUBMISSION

- B7.1 The Proposal shall consist of the following components:
- (a) Form A: Bid/Proposal; and
 - (b) Form B: Prices.
- B7.2 The Proposal should also consist of the following components:
- (a) Experience of Proponent and Subcontractors (Section C) in accordance with B10;
 - (b) Experience of Key Personnel Assigned to the Project (Section D), in accordance with B11;
 - (c) Project Understanding and Methodology (Section E) in accordance with B12; and
 - (d) Technical Understanding (Section F) in accordance with B13.
- B7.3 Further to B7.1 all components of the Proposal shall be fully completed or provided in the order indicated, and submitted by the Proponent no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Proposal.
- B7.4 Further to B7.2, all components of the Proposal should be fully completed or provided in the order indicated, and submitted by the Proponent no later than the Submission Deadline, with all required entries made clearly and completely.
- B7.5 Proposal format, including number of pages, size of pages and, font, etc., will be regulated as follows:
- (a) The Proposal should be presented in the Sections identified in B7.1 and B7.2.
 - (b) The Proposal(s) should be submitted on 8.5” x 11” paper; with a font of not less than 11 pt Arial; margins of not less than 0.75”; line-spacing of not less than single; and shall be no more than twelve (12) pages in length exclusive of the required form(s). Only the first twelve (12) pages of each Proposal will be evaluated.
 - (c) Anything included as an appendix will not be evaluated.
- B7.6 The Proposal shall be submitted electronically through MERX at www.merx.com.
- B7.6.1 Proposals will **only** be accepted electronically through MERX.
- B7.7 Proponents are advised that inclusion of terms and conditions inconsistent with the Request for Proposal, will be evaluated in accordance with B22.1(a).

B7.8 Any cost or expense incurred by the Proponent that is associated with the preparation of the Proposal shall be borne solely by the Proponent.

B8. PROPOSAL

B8.1 The Proponent shall complete Form A: Bid/Proposal, making all required entries.

B8.2 Paragraph 2 of Form A: Bid/Proposal shall be completed in accordance with the following requirements:

- (a) if the Proponent is a sole proprietor carrying on business in his/her own name, his/her name shall be inserted;
- (b) if the Proponent is a partnership, the full name of the partnership shall be inserted;
- (c) if the Proponent is a corporation, the full name of the corporation shall be inserted;
- (d) if the Proponent 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 Proposal 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/Proposal, the Proponent shall identify a contact person who is authorized to represent the Proponent for purposes of the Proposal.

B8.4 Paragraph 13 of Form A: Bid/Proposal shall be signed in accordance with the following requirements:

- (a) if the Proponent is a sole proprietor carrying on business in his/her own name, it shall be signed by the Proponent;
- (b) if the Proponent is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
- (c) if the Proponent is a corporation, it shall be signed by its duly authorized officer or officers;
- (d) if the Proponent 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/Proposal should be entered below such signatures.

B8.5 If a Proposal is submitted jointly by two or more persons, the word "Proponent" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Proponents in the Proposal and the Contract, when awarded, shall be both joint and several.

B9. PRICES

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

B9.1.1 Notwithstanding C12.2.3, prices on Form B: Prices shall not include the Goods and Services Tax (GST) or Manitoba Retail Sales Tax (MRST, also known as PST), 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 Proposals.

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.

B9.4 Where applicable, payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10. EXPERIENCE OF PROPONENT AND SUBCONTRACTORS (SECTION C)

B10.1 Proposals should include:

- (a) details demonstrating the history and experience of the Proponent and Subcontractors in providing:
 - (i) road weather condition forecasting services; and
 - (ii) snow measurements services
- as it relates to three projects of similar complexity, scope and value.

B10.2 For each project listed in B10.1(a), the Proponent should submit:

- (a) description of the services;
- (b) web-portal capabilities;
- (c) role of the contractor;
- (d) original contracted cost and final cost;
- (e) owner along with reference information (current names with telephone numbers per project).

B10.2.1 Where applicable, information should be separated into Proponent and Subcontractor project listings.

B10.3 The Proposal should include general firm profile information, including years in business, average volume of work, number of employees and other pertinent information for the Proponent and all Subcontractors.

B11. EXPERIENCE OF KEY PERSONNEL ASSIGNED TO THE PROJECT (SECTION D)

B11.1 Describe your approach to overall team formation and coordination of team members.

B11.1.1 Include an organizational chart for the Project.

B11.2 Submit the experience and qualifications of the Key Personnel assigned to the Project for projects of similar complexity, scope and value, including the principals-in-charge, managers of the key disciplines and lead professionals. Include educational background and degrees, professional recognition, job title, years of experience in current position, years of experience in services and years of experience with existing employer. Roles of each of the Key Personnel in the Project should be identified in the organizational chart referred to in B11.1.1.

B11.3 For each person identified, list at least two comparable projects in which they have played a primary role. If a project selected for a key person is included in B10, provide only the project name and the role of the key person. For other projects provide the following:

- (a) Description of project;
- (b) Role of the person;
- (c) Project Owner;
- (d) Reference information (one current name with telephone number per project).

B12. PROJECT UNDERSTANDING AND METHODOLOGY (SECTION E)

B12.1 Describe your firm's project management approach and team organization during the performance of Services, so that the evaluation committee has a clear understanding of the methods the Proponent will use in the delivery of this Project.

B12.2 Methodology should be presented in accordance with the Scope of Services identified in D2. Describe the collaborative process/method to be used by the Key Personnel of the team in the various phases of the Project.

B12.3 Proposals should address:

- (a) the team's understanding of the broad functional and technical requirements;
- (b) the team's understanding of regional weather forecasting issues;
- (c) any other issue that conveys your team's understanding of the Project requirements.

B12.4 For each person identified in B11.2, list the percent of the person's time to be dedicated to the Project in accordance with the Scope of Services identified in D2.

B13. TECHNICAL UNDERSTANDING (SECTION F)

B13.1 Proponents should present a carefully detailed synopsis of:

- (a) Their web-portal configuration and capabilities in accordance with E5, E6, E7, E8, E9 and/or E10;
- (b) Road weather forecasting in accordance with E5, E6, E7, E8, E9; and
- (c) Snow measurement and reporting in accordance with E8.

B14. DISCLOSURE

B14.1 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.

B14.2 The Persons are:

- (a) N/A

B15. CONFLICT OF INTEREST AND GOOD FAITH

B15.1 Further to C3.2, Proponents, by responding to this RFP, declare that no Conflict of Interest currently exists, or is reasonably expected to exist in the future.

B15.2 Conflict of Interest means any situation or circumstance where a Proponent or Key Personnel 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 Proposals or award of the Contract; or
 - (ii) compromise, impair or be incompatible with the effective performance of a Proponent'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 RFP process or the Project; or
 - (f) has knowledge of confidential information (other than confidential information disclosed by the City in the normal course of the RFP process) of strategic and/or material relevance to

the RFP process or to the Project that is not available to other proponents and that could or would be seen to give that Proponent an unfair competitive advantage.

- B15.3** In connection with its Proposal, each entity identified in B15.2 shall:
- (a) avoid any perceived, potential or actual Conflict of Interest in relation to the procurement process and the Project;
 - (b) upon discovering any perceived, potential or actual Conflict of Interest at any time during the RFP 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.
- B15.4** Without limiting B15.3, 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 Proponent 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.
- B15.5** Without limiting B15.3, 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 Proponent that fails to disclose a perceived, potential or actual Conflict of Interest of the Proponent or any of its Key Personnel;
 - (b) require the removal or replacement of any Key Personnel 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 Proponent or Key Personnel proposed for the Work that fails to comply with any requirements prescribed by the City pursuant to B15.4 to avoid or mitigate a Conflict of Interest; and
 - (d) disqualify a Proponent if the Proponent, or one of its Key Personnel proposed for the Project, has a perceived, potential or actual Conflict of Interest that, in the City's sole discretion, cannot be avoided or mitigated, or otherwise resolved.
- B15.6** The final determination of whether a perceived, potential or actual Conflict of Interest exists shall be made by the City, in its sole discretion.

B16. QUALIFICATION

- B16.1** The Proponent 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 Proponent does not carry on business in Manitoba, in the jurisdiction where the Proponent 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.
- B16.2** The Proponent 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://www.winnipeg.ca/matmgt/Templates/files/debar.pdf>

B16.3 The Proponent 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); and
- (d) meet the City's requirements for the confidentiality and security of information; including compliance with and ISO/IEC standards 27001, 27002, 27017, and 27018 (or equivalent).

B16.4 The Proponent 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 Proponent and of any proposed Subcontractor.

B16.5 Further to B16.3(b), the Proponent shall, within five (5) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator of the following:

B16.5.1 That all information and materials acquired by the Proponent, or to which the Proponent may be given access, if successful under this Request for Proposal ("Confidential Information") shall be treated in accordance with D8 by providing:

- (a) confirmation that Confidential Information shall be maintained for the full term of the Contract at minimum, unless otherwise directed by the City in writing;
- (b) a description of how the Proponent's proposed Solution meets the requirements in D8, including:
 - (i) how the proposed Solution meets the requirements for rapid repatriation of Confidential Information;
 - (ii) the data format of the Confidential Information once extracted from the proposed Solution;
 - (iii) the proposed Solution's ability to purge Confidential Information based on City-approved records retention and disposition schedules; and
 - (iv) how the Proponent would address official, time sensitive access to information requests.

B16.5.2 That Confidential Information shall be stored, transported, and transmitted ("Sited") in a secure jurisdiction by providing:

- (a) written confirmation that Confidential Information shall not be Sited outside of Canada, and that no duplicates or portions thereof shall be sited outside of Canada, in whole or in part; or
- (b) written confirmation that the Confidential Information shall be Sited in a proposed alternative jurisdiction that will apply equivalent or greater protections to the Confidential Information, and that no duplicates or portions thereof shall be sited outside of said proposed alternative jurisdiction, in whole or in part, and shall provide full details of such proposed alternative, including:
 - (i) what Confidential Information will not be Sited in Canada;
 - (ii) under what circumstances the above Confidential Information will not be Sited in Canada; and
 - (iii) where the above Confidential Information will be Sited.

The City reserves the right to assess proposed alternative jurisdictions, and may in its sole discretion determine whether such proposed alternative jurisdictions provide equivalent or greater protections to the Confidential Information than Canada.

- B16.5.3 That the proposed Solution is compliant with ISO/IEC standards 27001, 27002, 27017, and 27018 (or equivalent), by providing:
- (a) a certificate of compliance with ISO/IEC 27001 (or a functionally equivalent standard, as determined by the City, such as the AICPA SOC auditing framework or NIST SP 800-53) from an accredited certification body; or
 - (b) a written description of how the proposed Solution complies with ISO/IEC 27001, 27002, 27017, and 27018 (or functionally equivalent standards, as determined by the City, such as the AICPA SOC auditing framework or NIST SP 800-53).

The City reserves the right to assess any proposed functional equivalents to the ISO/IEC standards, and may in its sole and absolute discretion determine whether such proposed functional equivalents provide a satisfactorily equivalent level of protection.

The City further reserves the right to assess any written descriptions of compliance with the ISO/IEC standards (or equivalents) to determine whether such written descriptions provide evidence of compliance that is satisfactory to the City, in its sole and absolute discretion.

B17. OPENING OF PROPOSALS AND RELEASE OF INFORMATION

- B17.1 Proposals will not be opened publicly.
- B17.2 After award of Contract, the Contract amount and the name of the successful Proponent and their address will be available on the MERX website at www.merx.com.
- B17.3 The Proponent is advised any information contained in any Proposal Submission 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).
- B17.3.1 To the extent permitted, the City shall treat as confidential information, those aspects of a Proposal Submission identified by the Proponent 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.
- B17.4 Following the award of Contract, a Proponent will be provided with information related to the evaluation of his/her submission upon written request to the Contract Administrator.

B18. IRREVOCABLE OFFER

- B18.1 The Proposal(s) submitted by the Proponent shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid/Proposal.
- B18.2 The acceptance by the City of any Proposal shall not release the Proposals of the other responsive Proponents and these Proponents shall be bound by their offers on such until a Contract for the Work has been duly formed and the contract securities have been furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid/Proposal.

B19. WITHDRAWAL OF OFFERS

- B19.1 A Proponent may withdraw his/her Proposal without penalty prior to the Submission Deadline.

B20. INTERVIEWS

- B20.1 The Contract Administrator may, in his/her sole discretion, interview Proponents during the evaluation process.
- B20.2 The Contract Administrator may, in his/her sole discretion, ask Proponents to provide product demonstrations to given scenarios. Scenarios could include any of the Work outlined in D2. The

City expects that the Proponent would be demonstrating a functional version of their proposed system.

B20.3 The Proponent will bear all costs associated with or incurred in the preparation and presentation of its proposal, including, if applicable, costs incurred for interviews or demonstrations.

B21. NEGOTIATIONS

B21.1 The City reserves the right to negotiate details of the Contract with any Proponent. Proponents are advised to present their best offer, not a starting point for negotiations in their Proposal Submission.

B21.2 The City may negotiate with the Proponents submitting, in the City's opinion, the most advantageous Proposals. The City may enter into negotiations with one or more Proponents without being obligated to offer the same opportunity to any other Proponents. Negotiations may be concurrent and will involve each Proponent individually. The City shall incur no liability to any Proponent as a result of such negotiations.

B21.3 If, in the course of negotiations pursuant to B21.2, the Proponent amends or modifies a Proposal after the Submission Deadline, the City may consider the amended Proposal as an alternative to the Proposal already submitted without releasing the Proponent from the Proposal as originally submitted.

B22. EVALUATION OF PROPOSALS

B22.1 Award of the Contract shall be based on the following evaluation criteria:

- (a) compliance by the Proponent with the requirements of the Request for Proposal or acceptable deviation therefrom: (pass/fail)
- (b) qualifications of the Proponent and the Subcontractors, if any, pursuant to B16: (pass/fail)
- (c) Total Bid Price; (Section B) 40%
- (d) Experience of Proponent and Subcontractor; (Section C) 15%
- (e) Experience of Key Personnel Assigned to the Project; (Section D) 20%
- (f) Project Understanding and Methodology (Section E) 10%
- (g) Technical Understanding. (Section F) 15%

B22.2 Further to B22.1(a), the Award Authority may reject a Proposal as being non-responsive if the Proposal 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 Proposal, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.

B22.3 Further to B22.1(b), the Award Authority shall reject any Proposal submitted by a Proponent who does not demonstrate, in its Proposal or in other information required to be submitted, that it is qualified.

B22.4 If, in the sole opinion of the City, a Proposal does not achieve a pass rating for B22.1(a) and B22.1(b), the Proposal will be determined to be non-responsive and will not be further evaluated.

B22.5 Further to B22.1(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.

B22.5.1 Further to B22.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

- B22.6 Further to B22.1(d), Experience of Proponent and Subcontractors will be evaluated considering the experience of the organization on projects of similar size and complexity as well as other information requested, in accordance with B10.
- B22.7 Further to B22.1(e), Experience of Key Personnel Assigned to the Project will be evaluated considering the experience and qualifications of the Key Personnel and Subcontractor personnel on Projects of comparable size and complexity, in accordance with B11.
- B22.8 Further to B22.1(f), Project Understanding and Methodology will be evaluated considering your firm's understanding of the City's Project, project management approach and team organization, in accordance with B12.
- B22.9 Further to B22.1(g), Technical Understanding will be evaluated considering the Proponent's technical ability to comply with the requirements of the Project, in accordance with B13.
- B22.10 Notwithstanding B22.1(d) to B22.1(g), where Proponents fail to provide a response to B7.2(a) to B7.2(d), the score of zero may be assigned to the incomplete part of the response.
- B22.11 Proposals will be evaluated considering the information in the Proposal Submission and any interviews held in accordance with B20.
- B22.12 Where references are requested, the reference checks to confirm information provided may not be restricted to only those submitted by the Proponent, and may include organizations representing Persons, known to have done business with the Proponent.
- B22.13 This Contract may be awarded as a whole (Alternative 1) or separately in sections (Alternative 2) as identified on Form B: Prices.
- B22.13.1 Notwithstanding B9.1, the Proponent may, but is not required to, bid on both alternatives, or on any one or more sections in Alternative 2.
- B22.13.2 Notwithstanding B23.3, the City shall not be obligated to award any section to the responsible Proponent submitting the most advantageous offer for that section and shall have the right to choose the alternative which is in its best interests. If the Proponent has not bid on both alternatives or on all sections in Alternative 2, he/she shall have no claim against the City if his/her partial offer is rejected in favour of an award of the Contract on the basis of an alternative or section upon which he/she has not bid.

B23. AWARD OF CONTRACT

- B23.1 The City will give notice of the award of the Contract, or will give notice that no award will be made.
- B23.2 The City will have no obligation to award a Contract to a Proponent, even though one or all of the Proponents are determined to be qualified, and the Proposals are determined to be responsive.
- B23.2.1 Without limiting the generality of B23.2, 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 Proposal 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.
- B23.3 Where an award of Contract is made by the City, the award shall be made to the qualified Proponent submitting the most advantageous offer.

- B23.3.1 Following the award of contract, a Proponent will be provided with information related to the evaluation of his/her Proposal upon written request to the Contract Administrator.
- B23.4 Notwithstanding C4, the City may issue a purchase order to the successful Proponent in lieu of the execution of a Contract.
- B23.5 The Contract Documents, as defined in C1.1(p), 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 Supply of Services* (Revision 2020-01-31) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Supply of Services* 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 Request for Proposal to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Supply of Services*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF SERVICES

D2.1 The Work to be done under the Contract shall consist of consist weather forecasting, road condition forecasting and snow measurements for the period from date of award until September 30, 2021, with the option of three (3) mutually agreed upon one (1) year extensions.

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

D2.1.2 Changes resulting from such negotiations shall become effective on October 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 major components of the Work are as follows:

- (a) provide weather forecast for the City as a region;
- (b) poll two (2) RWIS stations within the City. The station locations are at Bishop Grandin and Disraeli;
- (c) poll 5 frost control stations within the City;
- (d) poll 2 mobile RWIS stations;
- (e) provide road condition forecasting and imagery capturing;
- (f) radar and satellite imagery display;
- (g) snow measurements;
- (h) web portal displaying:
 - (i) RWIS, mobile RWIS and frost control observations and road forecast;
 - (ii) road condition forecast;
 - (iii) radar and satellite imagery;
 - (iv) weather forecast; and/or
 - (v) snow measurements;
- (i) meteorological support; and
- (j) store and maintain accurate and timely data.

D2.3 Notwithstanding D2.1, the type and quantity of Work to be performed under this Contract is subject to annual approval of monies therefore in a budget by Council. Proponents are advised that monies have been approved for work up to and including December 31, 2020.

D2.4 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) kilometers 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 Request for Proposal:
- (a) **24-Hour Forecast** " means a weather forecast outlook twenty four (24) hours into the future;
 - (b) **Blowing** " means snow lifted from the surface of the earth by the wind to a height of 2 m or more above the surface (higher than drifting snow), and blown about in such quantities that horizontal visibility is reduced to less than 11 km. Blowing snow can be falling snow or snow that already accumulated but is picked up and blown about by strong winds. It is one of the classic requirements for a blizzard;
 - (c) **Coordinated Universal Time** " or **(UTC)** " means coordinated universal time (UTC) is the mean solar time on the Prime Meridian at Greenwich, UK. It is used as a global time standard in meteorology to synchronize observations;
 - (d) **Drifting snow** " means snow raised from the surface of the earth by the wind to a height of less than 2 m above the surface. It is unlikely to restrict visibility. When snow is raised 2 m or more above the surface, it is classified as blowing snow;
 - (e) **Drizzle** " means precipitation in the form of liquid water drops that are generally less than 0.5 mm in diameter, and are much more numerous than rain drops, and reduce visibility much more than light rain.
 - (f) **Fog** " means water droplets suspended in the atmosphere in the vicinity the earth's surface that affect visibility. According to international definition, fog reduces visibility to below 1 km. Fog differs from cloud only in that the base of fog is at the earth's surface while clouds are above the surface. When composed of ice crystals, it is termed ice/hoar/freezing fog. Fogs of all types originate when the temperature and dewpoint of the

air become identical (or nearly so). Fog seldom forms when the difference between the temperature and dewpoint is greater than 2°C.

- (g) "**Freezing drizzle**" means drizzle that falls in liquid form but freezes upon impact to form a coating of glaze;
- (h) "**Freezing fog/Hoar frost**" means a fog where the droplets of which freeze upon contact with exposed objects and form a coating of rime and/or glaze;
- (i) "**Freezing rain**" means rain that falls in liquid form but freezes upon impact to form a coating of glaze upon the ground and on exposed objects;
- (j) "**Frost**" means the fuzzy layer of ice crystals on a cold object, such as a window or bridge, that forms by direct deposition of water vapor to solid ice. The condition that exists when the temperature of the earth's surface and earthbound objects fall below freezing but the temperatures is near or equal to the dewpoint temperature;
- (k) "**Graupel**" means same as snow pellets;
- (l) "**Hail**" means precipitation in the form of balls or irregular lumps of ice, always produced by convective clouds, nearly always cumulonimbus. An individual unit of hail is called a hailstone. By convention, hail has a diameter of 5 mm or more, while smaller particles of similar origin, formerly called small hail, may be classed as either ice pellets or snow pellets;
- (m) "**Ice crystals**" means a barely visible crystalline form of ice that has the shape of needles, columns or plates. Ice crystals are so small that they seem to be suspended in air. Ice crystals occur at very low temperatures in a stable atmosphere, most often under clear or sunny skies;
- (n) "**Ice pellets**" means a type of precipitation consisting of transparent or translucent pellets of ice, less than 5 mm in diameter. If the diameter is larger than 5 mm, the precipitation is considered hail. They may be spherical, irregular, or (rarely) conical in shape. Ice pellets usually bounce when hitting hard ground and make a sound upon impact. Now internationally recognized, ice pellets includes two basically different types of precipitation, known in the United States as 1) sleet and 2) small hail. Thus, a two-part definition is given: 1) sleet or grains of ice, generally transparent, globular, solid grains of ice that have formed from the freezing of raindrops or the refreezing of largely melted snowflakes when falling through a below-freezing layer of air near the earth's surface; 2) small hail, generally translucent particles, consisting of snow pellets encased in a thin layer of ice. The ice layer may form either by the accretion of droplets upon the snow pellet or by the melting and refreezing of the surface of the snow pellet;
- (o) "**Long-Term Forecast**" means a weather forecast outlook fourteen (14) days into the future;
- (p) "**Poll**" means an application method to access data from a cellular modem, rest API, API or other communication protocol necessary to capture data from road weather sensors;
- (q) "**Proponent**" means any Person or Persons submitting a Proposal for Services;
- (r) "**Rain**" means precipitation in the form of liquid water drops that have diameters greater than 0.5 mm, or, if widely scattered, the drops may be smaller. The only other form of liquid precipitation, drizzle, is to be distinguished from rain in that drizzle drops are generally less than 0.5 mm in diameter, are very much more numerous, and reduce visibility much more than does light rain;
- (s) "**RWIS**" means Road Weather Information System;
- (t) "**Short-Term Forecast**" means a weather forecast outlooks seventy two (72) hours into the future;
- (u) "**Snow**" means precipitation composed of white or translucent ice crystals, mainly in complex branch hexagonal form and often agglomerated into snowflakes;
- (v) "**Snow board**" means a specially constructed board, placed on the ground at the snow measurement site, that is used to measure new snow or ice that has accumulated. The snow board provides the reference level for the measurement of new snowfall and ice.

They are constructed of thin metal, wood, or other light material, to not sink in the snow. Snow boards should be at least 1 m by 1 m and can be covered in plastic to easily clear the snowfall off it;

- (w) "**Snow gauge**" means a 10.2 cm (4 inch) diameter and 35.6 cm (14 inch) in length cylindrical rain gauge that is adapted for catching snowfall. The instrument is used to melt down new snowfall that has accumulated in the snow gauge to find the liquid equivalent of the new snowfall. A snow gauge is typically made from rugged plastic and mounted on a pole at the snow measuring site;
- (x) "**Snow grains**" means precipitation in the form of very small, white opaque particles of ice; the solid equivalent of drizzle. They resemble snow pellets in external appearance, but are more flattened and elongated, and generally have diameters of less than 1 mm; they neither shatter nor bounce when they hit a hard surface. Descriptions of the physical structure of snow grains vary widely and include very fine, simple ice crystals; tiny, complex snow crystals; small, compact bundles of rime; and particles with a rime core and a fine glaze coating. It is agreed that snow grains usually fall in very small quantities, mostly from stratus clouds or from fog, and never in the form of a shower;
- (y) "**Snow pellets**" or "**soft hail**" or "**graupel**" means precipitation consisting of white, opaque, approximately round (sometimes conical) ice particles having a snow-like structure, and from about 2 mm to less than 5 mm in diameter. They rebound when they fall on a hard surface and often break up; and
- (z) "**Synoptic observation**" means measurements taken every 6 hours, at 0000, 0600, 1200, and 1800 UTC.

D5. CONTRACT ADMINISTRATOR

D5.1 The Contract Administrator is:

Jean-Luc Lambert, P.Eng.
Support Services Engineer

Telephone No. 204- 986-7087

Email Address.: JeanLambert@winnipeg.ca

D5.2 At the pre-commencement meeting, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D6. INFORMATION MANAGEMENT

D6.1 The Contractor acknowledges that The Freedom of Information and Protection of Privacy Act ("FIPPA", the "Act") imposes obligations on the City to collect, store, use, disclose, and destroy "personal information", as that term is defined in FIPPA, ("Personal Information") in the strictest of confidence and in accordance with that Act.

D6.2 For the purposes of D8, any reference to "Representatives" shall mean the directors, officers, shareholders, employees, parents, subsidiaries, subcontractors, partners, volunteers, affiliates, insurers, reinsurers, agents, delegates, and other representatives of the Contractor.

D6.3 While this Contract is in effect, and at all times thereafter, the Contractor and its Representatives shall treat as confidential any and all information and materials (regardless of form or medium) acquired by it in the performance of this Contract, or to which it is given access during the course of the performance of the Contract, and any copies thereof (the "Confidential Information"). For the purposes of this Contract, Personal Information shall be considered to be Confidential Information.

D6.4 With respect to Confidential Information provided by the City to the Contract, the Contractor shall be deemed an "information manager", as that term is defined by section 44.1 of FIPPA, and any collection, storage, use, disclosure, or destruction of, or access to (collectively, "Use"), Personal Information by the Contractor or its Representatives shall be done pursuant to the Act.

- D6.5 Further to D7, all Confidential Information is and shall remain the property of the City. Neither the Contractor nor its Representatives shall not disclose or appropriate to their own use, or to the use of any third party, all or any part of the Confidential Information without the prior written consent of the City. The Contractor and its Representatives shall not at any time make any public announcement, or press release, nor make any statement of fact or opinion regarding the Contract, the Project, the Services or the Confidential Information without the prior written authorization of the City.
- D6.6 Further to D7, while this Contract is in effect and at all times thereafter the Contractor shall:
- (a) only Use the Confidential Information for the purposes expressly permitted by the City, and only to the extent necessary to perform its obligations under this Contract;
 - (b) ensure that access to the Confidential Information is only provided or permitted on a “need to know” basis, and that access, when given, shall be the minimum amount necessary to accomplish the task;
 - (c) not disclose or permit the disclosure of the Confidential Information or any copies thereof, whether in whole or in part and in any form or medium, to any third party, including Subcontractors or agents, without the prior written consent of the Contract Administrator;
 - (d) not reproduce any Confidential Information, in whole or in part, in any form or medium, without the express prior written consent of the City; and
 - (e) inform its Representatives of the obligations imposed upon it under this Contract and FIPPA, and shall take whatever steps are necessary to ensure that all of its Representatives comply with those obligations, including (but not limited to) binding said Representatives to terms no less strict than those herein through written confidentiality agreements, if requested.
- D6.7 Upon request, or upon expiration or termination of this Contract for any reason, the Contractor shall rapidly repatriate to the City a complete, accurate copy of the Confidential Information (in a form satisfactory to the City), and shall thereafter destroy the Confidential Information (including all copies in any form) in a manner which adequately protects the confidentiality of the Confidential Information within two (2) weeks, unless otherwise directed by the City in writing.
- D6.8 The Contractor shall put into place reasonable security arrangements, including administrative, technical, and physical safeguards that ensure the confidentiality and security of the Confidential Information. The standard of such security arrangements shall be the greater of:
- (a) the standards the Contractor has in place to protect its own confidential information; or
 - (b) the standards imposed on the Contractor by the City.
- D6.9 Upon becoming aware of any unauthorized Use of the Confidential Information (a “Confidentiality Breach”), the Contractor shall immediately notify the City in writing, take all reasonable steps to prevent the recurrence of any such Confidentiality Breach, and notify the City of said steps in writing.
- D6.10 Upon receiving a subpoena or other validly issued administrative or judicial order seeking Confidential Information, the Contractor shall provide the City with prompt notice thereof, deliver a copy of its proposed response to the City, and thereafter be entitled to comply with the demand to the extent permitted or required by law (unless the demand has been time-limited, quashed, or extended). The Contractor shall cooperate with the City in the defense of the demand, if so requested by the City.
- D6.11 The Contractor and its Representatives shall comply with all directives issued by the City with respect to safeguarding or otherwise ensuring the confidentiality of the Confidential Information, and shall cooperate with the City so that the City can verify that the Contractor has complied, and is complying, with its obligations hereunder.
- D6.12 If the Contractor is a reseller or distributor, or is otherwise supplying a third party’s product as its proposed System, then the Contractor shall ensure that any such third-party product supplied by the Contractor under this Contract and any such third-party supplier are compliant with the

requirements of this D8. Failure to do so may, at the City's sole and absolute discretion, be deemed an event of default pursuant to C17.

- D6.13 The Contractor shall have a security information and event management (SIEM) service that logs and monitors all logical access to customer data.
- D6.14 The Contractor shall enforce separation of duties to ensure that audit logs are protected against unauthorized modification and deletion.
- D6.15 The Contractor shall undertake appropriate pre-employment vetting for all staff that have access to customer data.
- D6.16 The Contractor shall perform on-going checks of integrity and conduct of employees during the period of employment.
- D6.17 When collecting personal information from an individual, there shall be a privacy statement/notification included on the collection form worded as follows:
- (a) Your personal information is being collected in accordance with s.36(1)(b) of The Freedom of Information and Protection of Privacy Act. This information will be used to support the City of Winnipeg's Leisure Guide program provision, including program registration, emergency contact, program promotion and evaluation, compliance with contractual obligations and to share with appropriate certifying bodies (where applicable) and will not be used or disclosed for any other purposes, except as authorized by law. If you have any questions about the collection of this information, contact the Corporate Access and Privacy Officer by mail to City Clerk's Department, Susan A. Thompson Building, 510 Main Street, Winnipeg MB, R3B 1B9, or by telephone at 311.

D7. NOTICES

- D7.1 Except as provided for in C22.4, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid/Proposal.
- D7.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in, D7.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator identified in D4.
- D7.3 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following facsimile number:

The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

- D8.1 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.

D9. INSURANCE

- D9.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured; such liability policy to also contain a cross-liability clause, non-owned automobile liability and products and completed operations cover, to remain in place at all times during the performance of the Work;
 - (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Service. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence;
- D9.2 Deductibles shall be borne by the Contractor.
- D9.3 The Contractor shall provide the Contract Administrator with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract Documents, if applicable.
- D9.4 The Contractor shall not cancel, materially alter, or cause the policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the Contract Administrator.
- D9.5 The City shall have the right to alter the limits and/or coverages as reasonably required from time to time during the continuance of this agreement.

D10. SUBCONTRACTOR LIST

- D10.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site.

SCHEDULE OF WORK

D11. COMMENCEMENT

- D11.1 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.
- D11.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.14;
 - (iii) evidence of the insurance specified in D9;
 - (iv) the Subcontractor list specified in D10;
 - (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.

D12. LIQUIDATED DAMAGES

- D12.1 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City five hundred dollars (\$500.00) per Working Day for each and every Working Day following the day fixed herein for Total Performance during which such failure continues.

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 Total Performance 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 service may be placed.

MEASUREMENT AND PAYMENT

D14. INVOICES

D14.1 Further to C12, the Contractor shall submit an invoice for each portion of work performed 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
Send Invoices to CityWpgAP-INVOICES@winnipeg.ca
Send Invoice Inquiries to CityWpgAP-INQUIRIES@winnipeg.ca

D14.2 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 work performed;
- (e) the amount payable with GST and MRST shown as separate amounts; and
- (f) the Contractor's GST registration number.

D14.3 The City will bear no responsibility for delays in approval of invoices which are improperly submitted.

D15. PAYMENT

D15.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D16. PAYMENT SCHEDULE

D16.1 Further to C12, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

WARRANTY

D17. WARRANTY

D17.1 Warranty is as stated in C13.

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.
- E1.3 The Work under this contract should follow the cloud-based security items below and be intergraded into the Road Weather Forecasting web-based system:
- (a) Independent audits and certificates compliant with any of the following Security Frameworks:
 - (i) ISO/IEC 27001 – Information Security Management System;
 - (ii) COBIT – Control Objective for Information and Related Technologies;
 - (iii) HIPPA – Health Insurance Portability and Accountability Act;
 - (iv) NIST 800.53 – Recommended Security Controls for Federal Information Systems and Organizations;
 - (b) OWASP vulnerabilities scans on a quarterly basis and subsequent to every major software release;
 - (c) Patching strategy which includes responding to emerging threats;
 - (d) Password enforced in the authentication scheme;
 - (e) Rating achieved in SSL lab testing on externally facing web properties;
 - (f) Type of segmentation used in a zoned approach to separate processing domains and classes of data;
 - (g) Type of role based access control for customers;
 - (h) Type of role based access controls for Bidders staff;
 - (i) The use of access controls to enforce segregation of duties;
 - (j) The use of idle session timeout that are greater than fifteen (15) minutes;
 - (k) Revoking employee access to system immediately upon termination of employment;
 - (l) The use of employee signed confidentiality/agreements to prevent unauthorized access, use and disclosure of information accesses;
 - (m) The use of multi-factor authentication enforced for any administrative access to the system, by either customer or Bidder;
 - (n) The use of data encrypting in the transit utilizing TLS 1.2 or higher;
 - (o) The use of rest data encryption while storing outside the boundaries of the City's data centers;
 - (p) The use of physical security controls to meet industry standard security guidelines to protect information stored in the cloud service;
 - (q) The use of audit logs and automated export in a format compatible with industry standard log management platforms.

E2. SERVICES

- E2.1 The Contractor shall provide weather forecasting, road condition forecasting and snow measurements in accordance with the requirements hereinafter specified.
- E2.2 Item No. 1 - Web Portal shall be services for a secure website portal for multiple users that clearly and effectively visually displays the requirements of E5, E6, E7, E8, E9 and/or E10 .
- E2.3 Item No. 2 - Road Condition Forecasting shall be services for weather forecasting and road condition forecasting in accordance with E5, E6, E7, E8 and E9.
- E2.4 Item No. 3 - Snow Measurements shall be for snow measurement services as per E10.

E3. RECORDS

- E3.1 The Contractor shall keep detailed records of the services supplied under the Contract.
- E3.2 To satisfy City of Winnipeg recordkeeping requirements, the system shall either:
- (a) allow for records input into/created within it to be maintained within the system for a minimum of 2 years, and allow records to be permanently deleted once they are legally authorized for disposal; and
 - (b) allow for records to be exported out in a human-readable file format for management and retention by City of Winnipeg.
- E3.3 The Contractor shall provide the Contract Administrator with a copy of the records for each month of the year within three (3) Calendar Days after the final day of the month to the Contract Administrator.

E4. WEATHER NOTICES

- E4.1 The Contractor shall be able to send road weather condition notices by text and email to designated City operational staff. The notices should be triggered by the following but not limited to the weather or road conditions:
- (a) major freezing precipitation snow events;
 - (b) blowing wind events;
 - (c) wet, frost, ice and snow covered pavement conditions
- E4.2 The Contractor shall send weather and road forecast notices to designated City operational staff on a set schedule as specified by the Contract Administrator.

E5. WEATHER FORECAST

- E5.1 The Contractor shall provide once per twenty four (24) hour a written 24-hour, short-term and long-term weather forecast synoptic detailing but not limited to development of weather patterns and local environmental conditions affecting the forecast.
- E5.2 The Contractor shall provide current weather conditions observed at the Winnipeg Richardson International Airport, two (2) City operated RWIS and five (5) frost control stations.
- E5.3 The Contractor shall provide four (4) Short-Term Forecast per twenty four (24) hour period at 6:00 a.m., 10:00 a.m., 2:00 p.m., 6:00 p.m. and 10:00 p.m. during the term of the Contract. Each forecast update should include information detailing the forecast on an hourly basis for the following:
- (a) Environment Canada Weather Warnings;
 - (b) snow fall accumulation per 15 minute interval;
 - (c) rain fall accumulation per 15 minute interval;
 - (d) temperature;

- (e) relative humidity;
- (f) dew point temperature;
- (g) wind speed and direction;
- (h) wind chill; and
- (i) probability of precipitation.

E5.4 The Contractor shall provide four (4) Long-Term Forecast per twenty four (24) hour period at 6:00 a.m., 10:00 a.m., 2:00 p.m., 6:00 p.m. and 10:00 p.m. during the term of the Contract. Each forecast update should include information detailing the forecast on an hourly basis for the following:

- (a) description of weather forecast;
- (b) snow fall accumulation during the day and night time;
- (c) rain fall accumulation during the day and night time;
- (d) maximum and minimum temperatures;
- (e) wind speed and direction; and
- (f) wind chill.

E6. RWIS ROAD CONDITION, FORECASTING AND IMAGERY

E6.1 The Contractor shall Poll two (2) RWIS station and provide current road conditions every ten (10) minutes and the archive the data every hour of a twenty four (24) hour period. The current road conditions shall include but is not limited to the following:

- (a) road surface temperature;
- (b) ground soil temperature;
- (c) air temperature;
- (d) relative humidity and dew point;
- (e) wind speed, direction and gust;
- (f) atmospheric pressure;
- (g) road surface conditions;
- (h) precipitation type, accumulation and intensity;
- (i) visibility; and
- (j) up to eight (8) camera images per station.

E6.2 For each RWIS station the Contractor shall provide hourly 24-Hour and Short-Term Forecast for weather and road condition. The forecast shall include but is not limited to the following:

- (a) lowest road surface temperature;
- (b) road surface conditions such as dry, wet, chemically wet, ice, snow cover;
- (c) precipitation conditions such as rain, hail, fog, ice pellets, drizzle, freezing drizzle, freezing fog, snow;
- (d) Blowing and drifting snow;
- (e) precipitation intensity and accumulation;
- (f) air temperature;
- (g) dew point;
- (h) relative humidity;
- (i) sky conditions;
- (j) visibility;
- (k) wind speed, direction and gust: and

- (l) wind chill

E7. MOBILE RWIS ROAD CONDITION AND IMAGERY

E7.1 The Contractor shall Poll three (3) mobile RWIS station and provide current road segment conditions every thirty (30) seconds and archive the data. The current road conditions shall include but is not limited to the following:

- (a) road surface temperature;
- (b) road surface state such as dry, wet, chemically wet, ice, snow cover;
- (c) friction or grip;
- (d) GPS coordinates;
- (e) frost and dew point; and
- (f) Image.

E7.2 The data collected must be able to be made available into a map view that shows the temporal condition of road segments and images taken.

E8. FROST CONTROL MEASUREMENTS AND FORECAST

E8.1 The Contractor shall Poll five (5) frost control station and provide road surface measurements every fifteen (15) seconds and archive the data. The current road surface measurements shall include but is not limited to the following:

- (a) road surface temperature;
- (b) relative humidity; and
- (c) dew point;

E8.2 For each frost control station the Contractor shall provide hourly 24-Hour and Short-Term Forecast for weather and road condition. The forecast shall include but is not limited to the following:

- (a) road surface temperature;
- (b) air temperature;
- (c) frost and dew point;
- (d) relative humidity;

E9. DATA OWNERSHIP

E9.1 The City owns all data collected from its RWIS, mobile RWIS and frost control stations and reserves the right to share any of the data with any agency or organization it chooses.

E10. SNOW MEASUREMENTS

E10.1 Snow Measurements and observations shall be taken and recorded every six (6) hours every Calendar Day from October 1st to April 30th.

E10.1.1 Measurements and observations shall be recorded at 00h00, 06h00, 12h00 and 18h00 for every Calendar Day.

E10.2 The location of the siting area form snow measurements will be identified by the Contract Administrator.

E10.3 Instrumentation and siting

E10.3.1 This section describes the instruments necessary to take winter precipitation measurements and their respective siting requirements. The siting of snow measurement sites shall be specified by the Contract Administrator upon award of contract.

- E10.3.2 **Snow gauge;** the observer shall use a Stratus RG202 rain/snow gauge, or equivalent. The snow gauge should be 10.2 cm in diameter and 35.6 cm in length. It comes with an inner tube and funnel for use during rainfall events. This inner tube and funnel can be removed for use during snow or other frozen precipitation events. The snow gauge is typically mounted on a post, at least 1.5 m above the ground for the measurements to not be affected by drifting snow. The snow gauge should be located within 20 m of the snow board.
- E10.3.3 **Ruler;** snow depth measurements shall be taken using a durable and precise ruler which is graduated at 1-mm increments. Furthermore, the ruler should contain graduations at every whole centimetre.
- E10.3.4 **Snow board;** a snow board shall be used as a base for new snow depth measurements. The snow board shall be a sturdy, flat, and uniform surface that can be placed securely on top of the existing surface (e.g. grass, dirt, pavement, etc). The dimensions of the snow board shall be at least 1 m by 1 m. The snow board should be located within 20 m of the snow gauge.
- E10.4 Measurement methodology
- E10.4.1 This section describes how to take measurements of new snow depth, snow-water equivalent, snow on the ground, and other forms of winter precipitation. The presence, or absence, of blowing snow or melting snow may cause the observer to follow a different methodology for obtaining an accurate measurement. A template for an Observer's Notebook is provided in E12. This template is referenced throughout the methodology section.
- E10.4.2 **New snow depth;** New snow depth is the accumulation of new snow over the 6 hrs prior to the synoptic observation hour. For the purposes of this section, snow is considered to also include snow pellets/graupel and snow grains. Three regimes may be present during new snow depth measurements: no blowing snow, blowing snow, or melted snow. The following subsections describe the measurement procedures for each of these regimes:
- (a) **No blowing snow method;** The observer shall follow the no blowing snow method when new snow has fallen uniformly without notable variations in depth. At each synoptic observation:
- (i) A minimum of 3 measurements shall be taken on the snow board using an approved ruler. These measurements shall be averaged and rounded to the nearest 0.2 cm.
 - (ii) The snow board shall be cleaned and the observer shall ensure it remains in a level location that is free from obstructions.
 - (iii) The measurement shall be entered into the "snowfall" column of the Observer's Notebook.
- (b) **Blowing snow method;** When new snow has accumulated non-uniformly with noticeable variations in depth, the observer shall use the blowing snow method. Below are 5 different procedures for measuring new snow depth when blowing snow has occurred or is occurring. At each synoptic observation, the observer shall begin by attempting to use procedure (i). Should procedure (i) fail, the observer shall proceed to procedure (ii). Should procedure (ii) fail, the observer shall try procedure (iii), and so on until a suitable method is found.
- (i) Take a minimum of 5 measurements from the snow board. These measurements should account for the variations in new snow depth. If some areas of board have been blown bare, they should be accounted for by a new snow depth of zero. If, in the observer's opinion, these 5 measurements produce a representative sample of the new snow depth, the measurements shall be averaged and recorded to the nearest 0.2 cm, and recorded as the new snow depth.
 - (ii) If the snow board is blown clean, or appears to not be representative of the newly fallen snow, an appropriate area within a 100-m radius of the snow board shall be used to take 5 measurements. These measurements should account for the variations in new snow depth. If some areas of ground have been blown

- bare, they should be accounted for by a new snow depth of zero. If, in the observer's opinion, these 5 measurements produce a representative sample of the new snow depth, they shall be averaged and rounded to the nearest 0.2 cm, and this average shall be recorded as the new snow depth.
- (iii) If the observer believes the blowing snow has been too severe for an accurate measurement to be produced using procedures (i) or (ii), no measurement of new snow depth shall be taken.
 - ◆ The observer shall follow the appropriate procedure for measuring the snow-water equivalent in E8.4.3 (b) and use it to estimate the new snow depth by multiplying by the appropriate monthly climatological ratio of the liquid water equivalent as per E9 to produce a new snow depth estimate.
 - (iv) If neither the new snow depth or liquid equivalent can be measured accurately due to severe blowing snow, no measurement of new snow depth shall be taken.
 - ◆ The observer shall then average the snow-water equivalent recorded by the Environment and Climate Change Canada weather stations at the Winnipeg Airport (CXWG) and The Forks (CXWN). The average measurement from these two stations shall then be multiplied by the appropriate monthly climatological ratio of the liquid water equivalent found in E9 to produce a new snow depth estimate
 - (v) If snow has accumulated on the snow board due to blowing snow which resulted from the wind only and not atmospheric production of new snow, the new snow depth shall be recorded as "0".

In all cases, the observer shall record the new snow depth in the "snowfall" column, note in the observation notebook that blowing snow was present, and which procedure (i-v) was used to estimate new snow depth.

In all cases, the observer shall clean the snow board after each measurement.

- (c) **Melted snow method;** If melting occurs between synoptic observations, the amount of snow left at the time of the observation will not be the same as the total depth of the snow that has fallen since the previous observation. Under such conditions the amount reported will be an estimate of what the depth would have been if no melting had occurred.
 - (i) The observer shall obtain the snow-water equivalent using the appropriate procedure in E8.4.3 (c). The snow-water equivalent shall be multiplied by the appropriate ratio in E9.
 - (ii) The measurement shall be entered into the "snowfall" column of the Observer's Notebook.
 - (iii) In all cases, the observer shall clean the snow board after each measurement.

E10.4.3

Snow-water equivalent; Snow-water equivalent is the liquid produced when the new snowfall over the 6 hrs prior to the synoptic observation is melted. Three regimes may be present during snow-water equivalent measurements: no blowing snow, blowing snow, or melted snow. The following subsections describe the measurement procedures for each of these regimes:

- (a) **No blowing snow method;** The observer shall follow the no blowing snow method when new snow has fallen uniformly without notable variations in depth and the snow gauge has caught a representative sample of the new snow and there has been no rain by the time of the observation. At each synoptic observation, the observer shall:
 - (i) Melt the snow caught in the snow gauge using one of the methods in E5 and measure the snow-water equivalent to the nearest 0.1 mm.
 - (ii) Replace the snow gauge after it has been cleaned and dried.
 - (iii) The measurement shall be entered into the "snowWaterEquivalent" column of the Observer's Notebook.
- (b) **Blowing snow method;** The observer shall follow the blowing snow method when new snow has not fallen uniformly with notable variations in depth and the snow

gauge has not caught a representative sample of the new snow and there has been no rain by the time of the observation. At each synoptic observation, the observer shall begin by attempting to use procedure (i). Should procedure (i) fail, the observer shall proceed to procedure (ii). Should procedure (ii) fail, the observer shall try procedure (iii), and so on until a suitable method is found.

- (i) If, in the observer's opinion, the snow gauge has caught a representative sample of snow, the snow caught in the snow gauge shall be melted using one of the methods in E11 and the snow-water equivalent shall be measured to the nearest 0.1 mm.
- (ii) If the observer believes the blowing snow has been too severe for an accurate measurement to be produced using procedure (i), no measurement of snow-water equivalent shall be taken.
 - ◆ The observer shall follow the regular procedure for measuring the new snow depth in E10.4.2(b) and use it to estimate the new snow-water equivalent by multiplying by the appropriate monthly climatological snow-to-liquid ratio as per E11 to produce a new snow-water equivalent estimate.
- (iii) If neither the new snow depth or snow-water equivalent can be measured accurately due to severe blowing snow. a. The observer shall then average the snow-water equivalent recorded by the Environment and Climate Change Canada weather stations at the Winnipeg Airport (CXWG) and The Forks (CXWN). The average measurement from these two stations shall then be used as an estimate of new snow-water equivalent.
- (iv) If snow has accumulated in the snow gauge due to blowing snow which resulted from the wind only and not atmospheric production of new snow, the snow-water equivalent shall be recorded as "0".

In all cases, the observer shall record the measurement in the "snowWaterEquivalent" column, replace the snow gauge after it has been cleaned and dried and record in the observer's notebook which procedure (i-v) was used to measure the snow-water equivalent.

- (c) **Melted snow method;** If, by the time of the observation, all new snow in the snow gauge has melted, the observer shall:
 - (i) Measure the liquid that is present in the snow gauge at the time of the observation and record it as the snow-water equivalent.
 - (ii) Replace the snow gauge after it has been cleaned and dried.

The measurement shall be entered into the "snowWaterEquivalent" column of the Observer's Notebook.

E10.4.4 Snow on the ground; The depth of snow on the ground includes both new and existing snow. At each synoptic observation, the observer shall:

- (a) Measure the total snow on the ground, to the nearest centimetre, by making a minimum of 5 measurements, within a 100-m radius of the normal measurement site, and taking the average. The measurement should reflect the average depth of snow, ice pellets, and glaze ice on the ground at the normal measurement site.
- (b) The measurement shall be taken from the soil to the top of the snow cover. No correction shall be made to account for grass or other ground cover. Care shall be taken to ensure that the total depth is measured including the depth of any layers of ice which are present. When using a measuring stick or ruler, make sure the ruler is pushed vertically into the snow until the bottom of the stick rests on the ground. Do not mistake an ice layer or crusted snow as "ground".
- (c) Measurements from rooftops, paved areas, or areas where snow has been mechanically stored in piles, should not be made.
- (d) If there is snow on the ground, but it covers less than 50 percent of the exposed ground within a 100-m radius of the normal measuring location, even though the covered areas have a significant depth, the snow on the ground should be recorded

as a trace (T). Mechanically-stored snow should not be considered when making this assessment.

- (e) If no snow or ice is on the ground (snow may be present in surrounding forested or otherwise protected areas) in exposed areas within a 100-m radius of the snow measurement site, the snow on the ground shall be recorded as "0". Mechanically-stored snow should not be considered when making this assessment.
- (f) The measurement shall be entered into the "snowOnGround" column of the Observer's Notebook.

E10.4.5

Freezing, mixed, or other types of precipitation; If multiple forms of precipitation occur during an observation period, or types of precipitation not described in E10.4.2 to E10.4.4 occur, the methods in this section shall be used.

- (a) **Freezing drizzle or freezing rain method;** If freezing drizzle or freezing rain has accumulated in the snow gauge, the observer shall:
 - (i) Melt any ice that has accumulated in the snow gauge (if necessary) using one of the methods in E11 and measure it to the nearest 0.1 mm. This amount shall be entered in the "freezingRainfall" column and a note will be entered indicating if ice accretion was occurring on surfaces. The new snow depth and snow-water equivalent for freezing rain and freezing drizzle events shall be recorded as "0".
 - (ii) Replace the snow gauge after it has been cleaned and dried.
- (b) **Ice pellets or ice crystals;** When ice pellets or ice crystals occur, the observer shall:
 - (i) Take three measurements of the total new accumulation on the ground and average them to the nearest 0.2 cm. The total new accumulation is entered in the "snowfall" column.
 - (ii) Melt the ice pellets or ice crystals caught in the snow gauge using one of the methods in E11 and measure to the nearest 0.1 mm. The liquid equivalent should be entered in the "snowWaterEquivalent" column.
 - (iii) The observer shall make a note that the precipitation was ice pellets or ice crystals and not snow.
 - (iv) Replace the snow gauge after it has been cleaned and dried.
- (c) **Hail;** When hail occurs, the observer shall:
 - (i) Enter the diameter of the hail stones in the Observer's Notebook in the notes section and include the amount and duration of the hail event.
 - (ii) Any hail accumulation in the snow gauge shall be melted using one of the methods in E11 and included in the "rainfall" column of the Observer's Notebook.
 - (iii) Replace the snow gauge after it has been cleaned and dried.
- (d) **Mixed precipitation method;** When multiple forms of precipitation occur during an observation period, the observer shall:
 - (i) Measure the total amount of precipitation from the contents of the snow gauge. If necessary, snow or ice in the gauge shall be melted using one of the methods in E11. The relative amounts of rainfall, freezing rainfall, ice pellets, and snowfall shall be estimated, taking into consideration the amount of snow, if any, that accumulated on the ground previous to melting, and the intensity and length of time during which the snow fell.
 - (ii) If the new snow depth is estimated, it should then be transformed into a snow water equivalent value using the climatological ratio in E9.
 - (iii) Example case: A weather event occurs where there is snow for 2 hours followed immediately by rain for another 2 hours. The total precipitation measured in the snow gauge was 2.8 mm, and the snowfall was estimated as 1.0 cm (with a water equivalent of 1.0 mm). The amount of snowfall was estimated by the observer, taking into account approximately how much snow had accumulated just before the rain began. The freezing rainfall and ice pellets were estimated to be 0.0 mm. By subtracting the snow-water equivalent of the

- snowfall from the total precipitation (2.8 mm - 1.0 mm) the rainfall amount was estimated to be 1.8 mm.
- (iv) In this example, 1.0 cm would be entered in the “snowfall” column, 1.8 mm would be entered in the “rainfall” column, 0.0 mm would be entered in the “freezingRainfall” column, and 1.0 mm would be entered in the “snowWaterEquivalent” column.
 - (v) Given the difficulty in estimating different types of precipitation from a mixed precipitation event, the observer shall make careful notes about the method(s) used to estimate accumulations.
 - (vi) Replace the snow gauge after it has been cleaned and dried.

E10.5 Data Storage

- E10.5.1 All observations shall be recorded in an observer’s notebook which follows the format provided in E10. The notebook shall be kept electronically in a database, using the column names and data types specified in E10. The electronic version should be kept as a SQL-type database which can be queried and permits the data to be exported into spreadsheets for analysis. Appropriate backup systems should be used to ensure the data is preserved.
- (a) **Date and time units;** The measurement of time in meteorology uses UTC, in order to synchronize meteorological observations on a global basis. Local time in Winnipeg, Manitoba is offset from UTC by -6 hours during CST (Central Standard Time) in the winter and -5 hours during CDT (Central Daylight Time) in the summer. Mandatory meteorological measurements are taken every 6 hours at 0000 UTC, 0600 UTC, 1200 UTC and 1800 UTC. A conversion table is given below to transform UTC into CST and CDT.

Conversions between coordinated universal time (UTC) and central standard time (CST) and central daylight time (CDT)		
UTC	CST	CDT
00:00	18:00	19:00
06:00	00:00	01:00
12:00	06:00	07:00
18:00	12:00	13:00

- E10.5.2 **Measurement units;** Precipitation; All winter precipitation measurements shall use metric units. The table below shows the standard units and precision for each type of measurement:

Precipitation measurement types along with their respective units and precision.		
Measurement Type	Units	Precision
New snow depth	centimetres	0.2 cm
Snow-water equivalent	millimetres	0.1 mm
Snow on the ground	centimetres	1 cm
Rain/Freezing rain	millimetres	0.1 mm

- E10.5.3 **Blowing snow;** Blowing snow shall be recorded as “0”, “1”, “2”, or “3” based on the criteria in the table below. The observer shall judge the visibility based either on the distance to a known reference point or using the visibility reported at Winnipeg James Armstrong Richardson International Airport (CYWG). The observer shall note any unusual circumstances encountered when assessing the visibility in the notes.

Blowing snow categories and their respective criteria
--

Blowing Snow	Value	Description
None	0	Visibility is > 10.0 km
Light	1	Visibility is 2.0 – 10.0 km
Moderate	2	Visibility is 0.4 – 2.0 km
Heavy	3	< 0.4 km

- E10.5.4 **Snow-to-liquid ratio;** Snow-to-liquid ratio shall be calculated when at least 1 cm of new snow was measured over the previous 6-hr period. The snow-to-liquid ratio shall be calculated by dividing the depth of new snow in centimetres by the snow-water equivalent in millimetres, then multiplying the result by 10. The resulting ratio gives the amount of snow in centimetres produced by 1 cm of snow-water equivalent.
- E10.5.5 The observer shall make a note whenever directed by this standard. Furthermore, the observer may use his or her discretion to make a note about anything not addressed by this standard. This may include observations of meteorological phenomena not addressed by this standard or difficulties with the measurement process.
- E10.6 In rare circumstances when the Observer encounters a measurement situation that is not covered by this standard, the Observer shall use their best judgement to obtain an accurate measurement. If the Observer must use a method not covered by this standard, he or she shall always include a note indicating the method used. Furthermore, the Observer should immediately report the change in methodology to the Contract Administrator.

E11. SNOW-TO-LIQUID RATIOS CLIMATOLOGY

- E11.1 Snow-to-liquid climatology rations will be made available by the Contract Administrator to the contractor.

E12. DATABASE TEMPLATE

- E12.1 The table below identifies the variable name, unit, and data type for recording and storage of snow measurement information.

Variable Name	Units	Data Type	Example
year	UTC year at time of observation	Integer	2018
month	UTC month at time of observation	Integer	1
day	UTC day at time of observation	Integer	12
hour	UTC hour at time of observation	Integer	6
rainfall	Previous 6-hr rainfall accumulation to the nearest 0.1 mm.	Float	6
freezingRainfall	Previous 6-hr freezing rainfall accumulation to the nearest 0.1 mm.	Float	0.8
snowfall	Previous 6-hr snowfall accumulation to the nearest 0.2 cm.	Float	5.4

snowWaterEquivalent	Previous 6-hr snow-water equivalent accumulation to the nearest 0.1 mm.	Float	2.3
snowLiquidRatio	Division of the new snow depth (cm) by the snow-water equivalent (mm) multiplied by 10, rounded to the nearest whole number.	Float	15:1
snowOnGround	Snow on the ground to the nearest 1cm.	Integer	3
blowingSnow	Blowing snow at the time of the observation: 0 for none (visibility > 10 km), 1 for light (Visibility 2 to 10 km), 2 for moderate (visibility 0.4 to 2 km), 3 for heavy (visibility less than 0.4 km).	Integer	3
observerName	First and last name of observer	Varchar (max length 255 characters)	John Doe
notes	Notes made by the observer	Text (max length 65,535 characters)	New snow depth method 3 was used.

E13. PROCEDURES TO MELT SNOW

E13.1 Method 1 – Room temperature or low heat source

E13.1.1 The observer shall allow the snow caught by the snow gauge to melt at room temperature or use a low intensity heat source. If a heat source is used, it shall be a low-intensity source, such as an electric blanket, or running the outside of the snow gauge under warm water (do not allow water to enter the snow gauge). Under no circumstances should a high-intensity source, such as a stove or kettle, be used to melt the snow. The observer shall then measure the liquid equivalent using the inner tube of the snow gauge.

E13.2 Method 2 – Warm water

E13.2.1 The observer shall fill the inner tube of the snow gauge with warm water. The temperature of the water shall be no warmer than 50 °C. The observer shall then note the amount of warm water in the inner tube.

E13.2.2 The observer shall then pour the warm water into the snow gauge to melt the snow that accumulated within the snow gauge.

E13.2.3 The observer shall then carefully pour the entire contents of the snow gauge into the inner tube of the snow gauge. The observer shall ensure the inner tube is dry before pouring the snow gauge contents into it. The observer shall then record the amount of liquid in the inner tube and subtract the amount of warm water that was used to melt the snow in the snow gauge.

E13.2.4 Example:

The observer fills the inner tube of the snow gauge with 20 mm of warm water.

The observer pours the warm water into the snow gauge, which melts the snow.

The observer pours the entire contents of the snow gauge back into the inner tube of the snow gauge and records a measurement of 28.4 mm.

The observer then subtracts the amount of warm water added to the inner tube (20 mm) to get the final snow-liquid equivalent for the observation of 8.4 mm.

E14. OBSERVERS NOTES

E14.1 The snow measurement observer shall maintain notes in a table format containing at minimum the following column headings:

- (i) Year;
- (ii) Month;
- (iii) Day;
- (iv) Hour;
- (v) Rainfall (mm);
- (vi) Freezing Rainfall (mm);
- (vii) Snowfall (mm);
- (viii) Snow Water Equivalent (mm);
- (ix) Snow to Liquid Ratio;
- (x) Snow on the Ground (cm);
- (xi) Observer Name;
- (xii) Notes.