



THE CITY OF WINNIPEG

REQUEST FOR PROPOSAL

RFP NO. 224-2012

**REQUEST FOR PROPOSAL FOR PROFESSIONAL CONSULTING SERVICES FOR THE
PLC REPLACEMENT AND POWER RELIABILITY UPGRADES PRELIMINARY DESIGN**

Proposals shall be submitted to:

**The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 REQUEST FOR PROPOSAL FOR PROFESSIONAL CONSULTING SERVICES FOR THE PLC REPLACEMENT AND POWER RELIABILITY UPGRADES PRELIMINARY DESIGN

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, June 15, 2012.

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

B2.3 The Project Manager 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. SITE INVESTIGATION

B3.1 The Project Manager or an authorized representative will be available at the Deacon Pumping Station on Tuesday, June 5, 2012 at 9:00 am to provide a tour of the facility for Proponents.

B3.1.1 Detailed information regarding the access to the Deacon site will be given to the Proponent upon completion of the registration process.

B3.1.2 Proponents will not be permitted to walk through the facility unattended.

B3.2 The Project Manager or an authorized representative will be available on Friday, June 8, 2012 at 9:00 am to provide a tour for Proponents of the following facilities:

(a) McPhillips Pumping Station

(b) Tache Booster Station

B3.2.1 The meeting point will be the McPhillips Pumping Station located at 360 McPhillips Street.

B3.2.2 Proponents must provide their own transportation between the facilities.

B3.2.3 Proponents will not be permitted to walk through the facility unattended.

B3.3 Proponents interested in a site investigation of the Shoal Lake Intake are required to make an appointment with the Project Manager identified in D2.

B3.4 Proponents will not be allowed to take pictures at any of the site investigations. The Proponent may request pictures of specific areas from the Project Manager identified in D2. The pictures will then be issued to all the Proponents registered for the site investigations.

B3.5 Although attendance at the Site Investigations is not mandatory, the City strongly suggests that Proponents attend.

B3.6 Proponents are required to register for the Site Investigations at least 48 hrs prior by contacting the Project Manager identified in D2.

B3.7 Proponents registered for the site visit must provide the Project Manager identified in D2 with a Public Safety Verification search obtained not earlier than one (1) year prior to the site visit.

B3.7.1 The Public Safety Verification Check may be obtained from BackCheck. Forms to be completed can be found on the website at: <http://www.backcheck.net/>. Note that the check will take between 12 and 48 hrs to complete.

- B3.8 Proponents are required to bring their own personal protective equipment (PPE) for the site investigations. This includes safety boots and hard hat.
- B3.9 The Proponent shall not be entitled to rely on any information or interpretation received at the Site Investigation unless that information or interpretation is the Proponent's direct observation, or is provided by the Project Manager in writing.

B4. ENQUIRIES

- B4.1 All enquiries shall be directed to the Project Manager identified in D2.
- B4.2 If the Proponent finds errors, discrepancies or omissions in the Request for Proposal (RFP), or is unsure of the meaning or intent of any provision therein, the Proponent shall promptly notify the Project Manager of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.
- B4.3 If the Proponent is unsure of the meaning or intent of any provision therein, the Proponent should request clarification as to the meaning or intent prior to the Submission Deadline.
- B4.4 Responses to enquiries which, in the sole judgment of the Project Manager, require a correction to or a clarification of the RFP will be provided by the Project Manager to all Proponents by issuing an addendum.
- B4.5 Responses to enquiries which, in the sole judgment of the Project Manager, do not require a correction to or a clarification of the RFP will be provided by the Project Manager only to the Proponent who made the enquiry.
- B4.6 The Proponent shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Project Manager in writing.

B5. CONFIDENTIALITY

- B5.1 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 Project Manager. 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.
- B5.2 The Proponent shall not make any statement of fact or opinion regarding any aspect of the Request for Proposals to the media or any member of the public without the prior written authorization of the Project Manager.

B6. ADDENDA

- B6.1 The Project Manager 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.
- B6.2 The Project Manager 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.
- B6.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>

B6.2.2 The Bidder is responsible for ensuring that it has received all Addenda and is advised to check the Materials Management Division website for Addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B6.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 9 of Form A: Proposal. Failure to acknowledge receipt of an addendum may render a Proposal non-responsive.

B7. PROPOSAL SUBMISSION

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

- (a) Form A: Proposal (Section A) in accordance with B8;
- (b) Form B: Fees (Section B) in accordance with B9;

B7.2 The Proposal should also consist of the following components:

- (a) Experience of Proponent and Subconsultants (Section C) in accordance with B10;
- (b) Experience of Key Personnel Assigned to the Project (Section D), in accordance with B11;
- (c) Past Performance of Proponent and Subconsultants on recent or ongoing City of Winnipeg Projects (Section E), in accordance with B12;
- (d) Project Understanding and Methodology (Section F) in accordance with B13; and
- (e) Project Schedule (Section G) in accordance with B14.

B7.3 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, to constitute a responsive Proposal.

B7.4 Further to B7.2, all Subconsultants must be clearly identified in the Proposal Submission.

B7.5 Proponents should submit one (1) unbound 8.5" x 11" original (marked "original") including drawings and four (4) copies (copies can be in any size format) for sections identified in B7.1 and B7.2.

B7.6 Proposal format, including type of binding, number of pages, size of pages and, font, etc., will not be regulated, except that the Proposal should be presented in the Sections identified above. Proponents are encouraged to use their creativity to submit a Proposal which provides the requested information for evaluation and other information which illustrates the strength of their team.

B7.7 Proponents are advised that inclusion of terms and conditions inconsistent with the Request for Proposal, will be evaluated in accordance with B21.1(a).

B7.8 The Proposal shall be submitted enclosed and sealed in an envelope/package clearly marked with the RFP number and the Proponent's name and address.

B7.9 Proposals submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.10 Proposals shall be submitted to:

The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B7.11 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 (SECTION A)

- B8.1 The Proponent shall complete Form A: Proposal, making all required entries.
- B8.2 Paragraph 2 of Form A: 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: Proposal, the Proponent shall identify a contact person who is authorized to represent the Proponent for purposes of the Proposal.
- B8.4 Paragraph 11 of Form A: 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 and the corporate seal, if the corporation has one, should be affixed;
 - (d) if the Proponent is carrying on business under a name other than its 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: Proposal should be printed 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. FEES (SECTION B)

- B9.1 The Proponent shall complete Form B: Fees, making all required entries and summarizing Fees for the Scope of Services.
- B9.2 As noted in Form B, all disciplines and/or phases identified in D5 Scope of Services with the exception of the provision of P&ID Drawings as defined in Sections D5.3(e) and D5.8 shall be provided on a **Fixed Fee** basis.
- B9.3 As noted in Form B, the provision of P&ID Drawings as defined in Sections D5.3(e) and D5.8 shall be calculated on a **Time Basis**.
- (a) An evaluation was performed and the amount of hours required to complete the provision of P&ID Drawings for all the facilities was determined to be 1270 hours.
 - (b) The Proponent must indicate a proposed average hourly rate on Form B. This rate should be a total weighted hourly rate that will take into account all of the resources required to complete the task.

- (c) The proponent must indicate on Form B the percentage of hours allotted to the following employee classifications and their charge out rates for the completion of the P&ID Drawings:

- (i) Senior Engineer;
- (ii) Intermediate Engineer;
- (iii) Engineer-In-Training
- (iv) Draft Person; and
- (v) Miscellaneous (Administration).

Note that the percentages and rates given should add up to the proposed total weighted hourly rate noted above.

- B9.4 Adjustments to Fees will only be considered based on increases to the Scope of Services.
- B9.4.1 The City will not consider an adjustment to the Fees based on changes in the Project budget or the Final Total Construction Cost.
- B9.5 All hourly fees billed on Form B, Item 2 shall be specifically for the provision of P&IDs. Hourly fees utilized for other Preliminary Design services will not be accepted by the City.
- B9.6 Notwithstanding C1.1(b), Fees shall include costs for out of town travel, related meals and accommodations for the duration of the Project and shall not be considered an Allowable Disbursement.
- B9.7 An allowance for Allowable Disbursements as defined in C1.1(b) is included in Form B, but shall exclude the costs of any materials testing, soils and hazardous materials investigation during construction.
- B9.8 Notwithstanding C10.1, Fees submitted 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.
- B9.9 Payments to Non-Resident Consultants are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10. EXPERIENCE OF PROPONENT AND SUBCONSULTANTS (SECTION C)

- B10.1 Proposals should include:
- (a) details demonstrating the history and experience of the Proponent and Subconsultants in providing PLC selection and programming pre-design or design services on up to three projects of similar size and complexity.
- B10.2 For each project listed in B10.1(a), the Proponent should submit:
- (a) description of the project;
 - (b) role of the consultant;
 - (c) project's original contracted construction cost and final construction cost (if applicable);
 - (d) design and construction schedule; anticipated project schedule and actual project delivery schedule, showing design and construction separately (if applicable);
 - (e) project owner; and
 - (f) reference information (two current names with telephone numbers per project).
- B10.2.1 Where applicable, information should be separated into Proponent and Subconsultant 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 Subconsultants.

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 comparable size and complexity, including the principals-in-charge, the Consultants Representative, managers of the key disciplines and lead designers. Include educational background and degrees, professional recognition, job title, years of experience in current position, years of experience in design and construction, 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; and
 - (d) Reference information (two current names with telephone numbers per project).

B12. PAST PERFORMANCE OF PROPONENT AND SUBCONSULTANTS (SECTION E)

- B12.1 Proposal should include a list of three recent or ongoing projects that the Proponent and/or Subconsultant has worked on for the City of Winnipeg. For each project provide the following:
- (a) Name of the project;
 - (b) Date of assignment; and
 - (c) Name of City of Winnipeg Project Manager.
- B12.2 Utilizing the information requested in Section B12.1, but not limited to this information, the Proponent will be rated by City Project Managers on the following criteria:
- (a) Adherence to Project Budget;
 - (b) Adherence to Project Schedule;
 - (c) Quality of work; and
 - (d) Overall satisfaction with the Proponent.
- B12.3 Proponents that have not worked with the City before will be evaluated based on the testimonials of the references provided in Section B10.

B13. PROJECT UNDERSTANDING AND METHODOLOGY (SECTION F)

- B13.1 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.
- B13.2 Methodology should be presented in accordance with the Scope of Services identified in D5.
- B13.3 Describe the collaborative process/method to be used by the Key Personnel of the team in the various phases of the Project.
- B13.4 Proposals should address:
- (a) the team's understanding of the broad functional and technical requirements;
 - (b) The team's understanding of the constraints that will affect the undertaking of the work;

- (c) the team's proposed methodology with respect to the information provided within this RFP;
and
- (d) any other issue that conveys your team's understanding of the Project requirements.

B13.5 For each person identified in B11.2, list the number of hours to be dedicated to the Project in accordance with the Scope of Services identified in D5. Hours allotted to the provision of P&ID Drawings as defined in Sections D5.3(e) and D5.8 are not required as they would have already been disclosed on Form B.

B14. PROJECT SCHEDULE (SECTION G)

B14.1 Proponents should present a carefully considered Critical Path Method schedule using Microsoft Project or similar project management software, complete with resource assignments (key designers), durations (weekly timescale) and milestone dates or events. The schedule should address each requirement of the Scope of Services.

B14.2 The Proponent's schedule should include critical dates for review and approval processes by the City and other organizations anticipated during the Project. Reasonable times should be allowed for completion of these processes.

B15. QUALIFICATION

B15.1 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;
- (c) have all the necessary experience, capital, organization, and equipment to perform the Services in strict accordance with the terms and provisions of the Contract;

B15.2 The Proponent and any proposed Subconsultant (for the portion of the Services proposed to be subcontracted to them) shall:

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

B15.3 The Proponent and/or any proposed Subconsultant (for the portion of the Services proposed to be subcontracted to them) shall:

- (a) have successfully carried out services for the programming; design, management of construction and contract administration for architectural and/or engineering projects of similar complexity, scope and value; and to those required for this Project;
- (b) be fully capable of performing the Services required to be in strict accordance with the terms and provisions of the Contract;
- (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba);
- (d) have the knowledge and resources to administer the requirements of The Workplace Safety and Health Act (Manitoba) during the construction works associated with this Contract;
- (e) undertake to meet all licensing and regulatory requirements of the appropriate governing authorities and associations in the Province of Manitoba; and
- (f) provide proof satisfactory to the Project Manager of the Security Clearances as identified in Appendix A;

B15.4 The Proponent shall submit, within three (3) Business Days of a request by the Project Manager, further proof satisfactory to the Project Manager of the qualifications of the Proponent and of any proposed Subconsultant.

B15.5 The Proponent shall provide, on the request of the Project Manager, full access to any of the Proponent's equipment and facilities to confirm, to the Project Manager's satisfaction, that the Proponent's equipment and facilities are adequate to perform the Services.

B16. OPENING OF PROPOSALS AND RELEASE OF INFORMATION

B16.1 Proposals will not be opened publicly.

B16.2 After award of Contract, the name(s) of the successful Proponent and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

B16.3 To the extent permitted, the City shall treat all Proposal Submissions as confidential. However, the Proponent is advised that any information contained in any Proposal may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B16.4 Following the award of Contract, a Proponent will be provided with information related to the evaluation of its submission upon written request to the Project Manager.

B17. IRREVOCABLE OFFER

B17.1 The Proposal(s) submitted by the Proponent shall be irrevocable for the time period specified in Paragraph 10 of Form A: Proposal.

B17.2 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 Services until a Contract for the Services has been duly executed as herein provided, but any offer shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 10 of Form A: Proposal.

B18. WITHDRAWAL OF OFFERS

B18.1 A Proponent may withdraw its Proposal without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B18.1.1 The time and date of receipt of any notice withdrawing a Proposal shall be the time and date of receipt as determined by the Manager of Materials.

B18.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Proposal or the Proponent's authorized representatives named in Paragraph 11 of Form A: Proposal, and only such person, has authority to give notice of withdrawal.

B18.1.3 If a Proponent gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:

- (a) retain the Proposal until after the Submission Deadline has elapsed;
- (b) open the Proposal to identify the contact person named in Paragraph 3 of Form A: Proposal and the Proponent's authorized representatives named in Paragraph 11 of Form A: Proposal; and
- (c) if the notice has been given by any one of the persons specified in B18.1.3(b), declare the Proposal withdrawn.

B18.2 A Proponent who withdraws its Proposal after the Submission Deadline but before its offer has been released or has lapsed as provided for in B17.2 shall be liable for such damages as are imposed upon the Proponent by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

B19. INTERVIEWS

B19.1 The Project Manager may, in his/her sole discretion, interview Proponents during the evaluation process.

B20. NEGOTIATIONS

B20.1 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.

B20.2 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.

B20.3 If, in the course of negotiations pursuant to B20.2 or otherwise, 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.

B21. EVALUATION OF PROPOSALS

B21.1 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 there from: (pass/fail)
- (b) qualifications of the Proponent and the Subconsultants, if any, pursuant to B15: (pass/fail)
- (c) Fees; (Section B) 40%
- (d) Experience of Proponent and Subconsultants; (Section C) 9%
- (e) Experience of Key Personnel Assigned to the Project; (Section D) 14%
- (f) Past Performance of Proponent and Subconsultants; (Section E) 13%
- (g) Project Understanding and Methodology (Section F) 16%
- (h) Project Schedule. (Section G) 8%

B21.2 Further to B21.1(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.

B21.3 Further to B21.1(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 responsible and qualified.

B21.4 Further to B21.1(c), Fees will be evaluated based on Fees submitted in accordance with B9.

B21.5 Further to B21.1(c), if the highest evaluated responsive Proposal submitted by a responsible and qualified Proponent exceeds the budgetary provision for the Work, the Fees of all

responsive Proposals submitted by responsible and qualified Proponents may be adjusted by deducting Item 2 "Provision of P&ID Drawings" to achieve a Total Fee within the budgetary provision for the Work.

- B21.6 Further to B21.1(d), Experience of Proponent and Subconsultants will be evaluated considering the information provided in response to B10 including, but not limited the following criteria:
- (a) Ability of Proponent to complete the job;
 - (b) Similarity of the Proponents past projects to the PLC Replacement Project; and
 - (c) Success of the Proponent on past projects.
- B21.7 Further to B21.1(e), Experience of Key Personnel Assigned to the Project will be evaluated considering the information provided in response to B11, including but not limited to the following criteria:
- (a) Appropriateness of related years of experience of the Key Personal;
 - (b) Relevancy of experience of the Key Personal;
 - (c) Reputation of the Key Personal; and
 - (d) Appropriateness of approach to overall team formation and coordination of team members.
- B21.8 Further to B21.1(f), Past Performance of Proponent and Subconsultants will be evaluated considering the information provided in response to B12 including, but not limited to the following criteria
- (a) Adherence to Project Budget;
 - (b) Adherence to Project Schedule;
 - (c) Quality of work; and
 - (d) Overall satisfaction with the Proponent.
- B21.8.1 Proponents that have not worked with the City will be evaluated based on the testimonials of the references provided in Section B10.
- B21.9 Further to B21.1(g) Project Understanding and Methodology will be evaluated considering the information provided in response to B13 including, but not limited to the following criteria:
- (a) The appropriateness of the Project Management Approach;
 - (b) The Methodology including appropriateness of hours assigned to individual tasks;
 - (c) The appropriateness of the collaborative approach;
 - (d) The Proponent's understanding of the project and its constraints; and
 - (e) Demonstration of insight beyond the information that was presented in the Request for Proposal
- B21.10 Further to B21.1(h), Project Schedule will be evaluated considering the information provided in response to B14 including but not limited to the following criteria:
- (a) The completeness of the project schedule
 - (b) The appropriateness of the timelines provided
- B21.11 Notwithstanding B21.1(d) to B21.1(h), where Proponents fail to provide complete responses to B7.2(a) to B7.2(e), the score of zero will be assigned to the incomplete part of the response.
- B22. AWARD OF CONTRACT**
- B22.1 The City will give notice of the award of the Contract, or will give notice that no award will be made.

- B22.2 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 responsible and qualified, and the Proposals are determined to be responsive.
- B22.2.1 Without limiting the generality of B22.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Services;
 - (b) the prices are materially in excess of the prices received for similar services in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Services, 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.
- B22.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Proponent submitting the most advantageous offer.
- B22.4 The City may, at its discretion, award the Contract in phases.
- B22.5 Notwithstanding Paragraph 6 of Form A: Proposal and C4, the City will issue a Letter of Intent to the successful Bidder in lieu of execution of a Contract.
- B22.5.1 The Contract documents as defined in C1.1(n)(ii) in their entirety shall be deemed to be incorporated in and to form a part of the Letter of Intent notwithstanding that they are not necessarily attached to or accompany said Letter of Intent.
- B22.6 The form of Contract with the City of Winnipeg will be based on the Contract as defined in C1.1(n).
- B22.7 Further to Paragraph 6 of Form A: Proposal and C4, the successful Bidder will be provided with Contract documents for execution following issuance of a Letter of Intent.
- B22.8 Following the award of Contract, a Proponent will be provided with information related to the evaluation of its Proposal upon written request to the Project Manager.
- B22.9 If, after the award of Contract, the Project is cancelled, the City reserves the right to terminate the Contract. The Consultant will be paid for all Services rendered up to time of termination.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Consultant Services* (Revision 2010-10-01) are applicable to the Services of the Contract.
- C0.1.1 The *General Conditions for Consultant 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 sub clause with the prefix “**C**” designates a section, clause or sub clause in the *General Conditions for Consultant Services*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. PROJECT MANAGER

D2.1 The Project Manager is:

Linda McCusker, P.Eng.

Email: lmccusker@winnipeg.ca

Telephone No. (204) 986-6669

Facsimile No. (204) 224-0032

D2.2 All correspondence or contact by Proponents with the City in respect of this RFP must be directly and only with the City's Project Manager. Failure to restrict correspondence and contact to the Project Manager may result in the rejection of the Proponents Proposal Submission.

D2.3 At the pre-commencement meeting, the Project Manager will identify additional personnel representing the Project Manager and their respective roles and responsibilities for the Services.

D2.4 Proposal Submissions must be submitted to the address in B7.10

D3. DEFINITIONS AND ABBREVIATIONS

D3.1 When used in this Request for Proposal:

- (a) "PLC" means "Programmable Logic Controller".
- (b) "RFP" means "Request for Proposal".
- (c) "PPE" means "personal protective equipment".
- (d) "LCP" means "local control panel".
- (e) "I/O" means "Inputs/Outputs".
- (f) "SCADA" means "Supervisory Control and Data Acquisition".
- (g) "WTP" means "Water Treatment Plant".
- (h) "HMI" means "Human Machine Interface".
- (i) "UV" means "Ultraviolet".

D4. BACKGROUND

D4.1 General

D4.1.1 The PLCs utilized within the Regional Pumping Stations, the Deacon and Tache Booster Stations, and the Shoal Lake Intake are Modicon Compact PLCs with PC-A984-145 and PC-A984-E255 processors. These processors were removed from active sale on December 30, 2003 and the production of the complete line of Compact PLCs was stopped on June 30, 2006.

D4.2 Regional Pumping Stations

D4.2.1 The primary task of the control systems at the three regional pumping stations (Hurst, MacLean, and McPhillips) is to maintain the discharge pressure of each station at the

appropriate setpoint by starting, stopping, and controlling the speed of the pumps. The control system also provides pump sequencing and protection functions, as well as control and monitoring of other station services such as chlorine dosing and residuals, reservoirs levels, and alarms.

D4.2.2 The control systems at the three regional pumping stations are PLC based architectures. The existing PLC hardware consists of Modicon Compact series PLCs with E984-255 and A984-145 processors. The PLC control logic is implemented in Modicon 984 ladder logic and was originally programmed using ProWorx programming software. The PLC control logic has been converted to FasTrak Softworks PLC Workshop for Modicon (32-bit) programs since the original implementation. While the current PLC hardware and control logic continues to function as designed, it is reaching the end-of-life in terms of spare parts availability.

D4.2.3 Each regional pumping station consists of a series of pumps that are driven by either electric or natural gas engines (Hurst – 6 Electric, MacLean – 3 Electric & 2 Gas, McPhillips – 3 Electric & 3 Gas). Each pump has a local control panel (LCP) for control and monitoring of the pump which contains: a dedicated Modicon Compact A984-145 series Pump PLC (PPLC); local pump Inputs/Outputs (I/O), and a Bently Nevada temperature/vibration monitor. In addition, every regional pumping station has a station PLC panel that houses four PLCs. Station PLC1 (SPLC1) and Station PLC33 (SPLC33) are identical Modicon Compact E984-255 series PLCs configured to operate in a quasi-redundant hot/standby configuration, where both PLCs execute logic concurrently with the Regional SCADA system communicating only to the primary SPLC under normal operating conditions. If a failure occurs communicating to the primary SPLC, the Regional SCADA system will switch the route to communicate with the secondary SPLC. The primary SPLC1 and secondary SPLC33 pair function as Station Master PLCs that are responsible for: monitoring pump, engine, and motor statuses; pump control by starting and stopping required pumps via a pump sequencer to maintain station discharge pressure at the desired setpoint; as well as monitoring and control of other station functions such as chlorine dosing and burglar alarms. The remaining two PLCs in the station PLC panel, PLC11 and PLC12, are Modicon Compact A984-145 series PLCs that function as I/O PLCs, as they are responsible for collection of digital and analog I/O from all other station devices and instrumentation other than the pumps. The Station Master PLCs do not have any local I/O. They obtain pump and station device I/O, required for control and monitoring of pumps and station functions, from the individual pump PLCs and I/O PLCs via Modbus Plus communications.

D4.2.4 The Station Master, Pump, and I/O PLCs in each regional pumping station are connected via a Modbus Plus network setup in a ring configuration. The Modbus Plus network connects the PLCs (Pump, Station Master, and I/O), a Modicon BP85 Bridge Plus module, a Modicon BM85 Bridge Multiplexer module, and a Modicon Modbus+/Ethernet Bridge. The Modbus+/Ethernet Bridge allows the Regional SCADA system to communicate with the Station Master PLCs and Bently Nevada units, via Ethernet WAN, for remote control and monitoring of the pumping station. The BM85 Bridge Multiplexer allows the Regional SCADA system to communicate with Modbus devices, such as the Bently Nevadas, over the Modbus Plus network. The BM85 Bridge Multiplexer also acts as the tie in point for radio communications, which serves as the backup communications medium for the Regional SCADA system to devices such as the Station Master PLCs in the event of a failure of the Ethernet WAN or Modbus+/Ethernet Bridge. The BP85 Bridge Plus connects the two ends of the Modbus Plus network ring and is intended to allow the Modbus Plus network to continue operation even with a single break in the network ring.

D4.3 Tache Booster Pumping Station

D4.3.1 The primary task of the control system at the Tache Booster Pumping Station is to provide control and monitoring of the three single-speed station pumps for the purpose of providing additional flow to the McPhillips Pumping Station via the Branch I Aqueduct. The control system also provides pump protection functions, as well as control and monitoring of other station equipment and services such as motorized valves, surge tower, electrical distribution, and station alarms.

- D4.3.2 The control system at the Tache Booster Pumping Station is a PLC based architecture. The existing PLC hardware consists of Modicon Compact series PLCs with A984-145 processors. The PLC control logic is implemented in Modicon 984 ladder logic and was originally programmed using ProWorx programming software. The PLC control logic has been converted to FasTrak Softworks PLC Workshop for Modicon (32-bit) programs since the original implementation. While the current PLC hardware and control logic continues to function as designed, it is reaching the end-of-life in terms of spare parts availability.
- D4.3.3 The Tache Booster Pumping Station consists of three single-speed pumps driven by electric engines. Each pump has a LCP for local control and monitoring of the pump which contains: start/stop buttons, a computer/hand switch, alarm lamps, and a Bently Nevada temperature/vibration monitor. In addition to the LCPs for the pumps, the Tache Booster Pumping Station has a station PLC panel that houses three PLCs. Station PLC2 (SPLC2) and Station PLC34 (SPLC34) are identical Modicon Compact A984-145 series PLCs configured to operate in a quasi-redundant hot/standby configuration, where both PLCs execute logic concurrently with the Regional SCADA system communicating only to the primary SPLC under normal operating conditions. If a failure occurs communicating to the primary SPLC, the Regional SCADA system will switch the route to communicate with the secondary SPLC. The primary SPLC2 and secondary SPLC34 pair function as Station Master PLCs that are responsible control and monitoring of all three station pumps as well as all other station functions such as surge tower control. Pump control and monitoring logic is located in the Station Master PLCs, as each pump does not have a dedicated pump PLC. The remaining PLC in the station PLC panel is PLC11, is a Modicon Compact A984-145 series PLC which functions as the I/O PLC responsible for collection of digital and analog I/O from all station devices and instrumentation, including the electric pumps. The Station Master PLCs do not have any local I/O. They obtain pump and station device I/O, required for control and monitoring of pumps and station functions, from the I/O PLC via Modbus Plus communications.
- D4.3.4 The Station Master and I/O PLCs in the Tache Booster Pumping Station are connected via a Modbus Plus network setup in a ring configuration. The Modbus Plus network connects the PLCs (Station Master and I/O), a Modicon BP85 Bridge Plus module, a Modicon BM85 Bridge Multiplexer module, and a Modicon Modbus+/Ethernet Bridge. The Modbus+/Ethernet Bridge allows the Regional SCADA system to communicate with the Station Master PLCs and Bently Nevada units, via Ethernet WAN, for remote control and monitoring of the booster pumping station. The BM85 Bridge Multiplexer allows the Regional SCADA system to communicate with Modbus devices, such as the Bently Nevadas, over the Modbus Plus network. The BM85 Bridge Multiplexer also acts as the tie in point for radio communications, which serves as the backup communications medium for the Regional SCADA system to devices such as the Station Master PLCs in the event of a failure of the Ethernet WAN or Modbus+/Ethernet Bridge. The BP85 Bridge Plus connects the two ends of the Modbus Plus network ring and is intended to allow the Modbus Plus network to continue operation even with a single break in the network ring.
- D4.4 Deacon Booster Pumping Station and Deacon Chemical Feed Facility
- D4.4.1 The control systems at the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility are responsible for control and monitoring of three key tasks: maintain station water flow from the Water Treatment Plant to the Regional Pumping Stations via the Branch I & II Aqueducts at the desired flow rate setpoint by starting, stopping, and controlling pump speeds and discharge valves; maintain UV treatment dosage at setpoints required by the City of Winnipeg's operating license by starting and stopping reactors and controlling reactor flow and UV output; and maintain chemical dosages of fluoride and phosphate at desired setpoints by flow pacing the chemical injection based on water flow rate out of the Deacon Booster Pumping Station. The control systems also provide pump protection functions, UV reactor sequencing and protection functions, as well as control and monitoring of other station equipment and services such as reservoir levels, chemical dosing level monitoring, surge towers, electrical distribution, and station alarms.
- D4.4.2 The control systems at the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility are PLC based architectures. The existing PLC hardware consists of two

distinct vintages of Modicon PLCs: Modicon Compact series PLCs (A984-145 processors) used for the Station Master, I/O and Pump (two-speed) PLCs at the Deacon Booster Pumping Station; and Modicon Quantum series PLCs (140-113, 140-434 and 140-671 processors) used for the UV Master, UV Reactor, and Pump (variable speed) D21 PLC in the Deacon Booster Pumping Station as well as the Chemical Feed PLC in the Deacon Chemical Feed Facility. The PLC control logic implemented in all the Modicon Compact PLCs, as well as the Modicon Quantum PLCs for the UV Reactor and Chemical Feed PLCs, is Modicon 984 ladder logic. Originally programmed using ProWorx programming software, their PLC logic has since been converted to FasTrak Softworks PLC Workshop for Modicon (32-bit). The PLC control logic used in the UV Master and Pump D21 PLCs is Modicon IEC 1131-3 Defined Function Block logic, developed with Modicon Unity Pro programming software. While the current PLC hardware and control logic continues to function as designed, the Modicon Compact series PLC hardware at the Deacon Booster Pumping Station is reaching the end-of-life in terms of spare parts availability. The Modicon Quantum series PLCs continue to be supported by Schnieder Electric and spare parts are readily available.

- D4.4.3 The Deacon Booster Pumping Station and the Deacon Chemical Feed Facility contain three distinct control systems: the UV system for the control and monitoring of the UV treatment process; the D21 PLC system for control and monitoring of the variable speed electric pumps (P-D001A and P-002A); and the Station control system for control and monitoring of the two-speed electric pumps (P-D003A, P-D004A, and P-D005A), chemical feed systems (fluoride and phosphate), and general Deacon Booster Pumping Station and Deacon Chemical Feed Facility systems (reservoir levels, electrical distribution, security, alarms).
- D4.4.4 The station control system for the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility is similar in design to the control systems for the Regional Pumping Stations. The Deacon Booster Pumping Station consists of three two-speed electric pumps responsible for providing all or part of the desired water flow to the Regional Pumping Stations. Each pump has a LCP for control and monitoring of the pump which contains: a dedicated Modicon Compact A984-145 series Pump PLC (PPLC); local pump I/O, and a Bently Nevada temperature/vibration monitor. In addition to the LCPs for the pumps, the Regional Pumping Stations has a station PLC panel that houses four PLCs, while the Deacon Chemical Feed Facility has a chemical feed PLC panel with a single PLC. In the station PLC panel, Station PLC2 (SPLC2) and Station PLC34 (SPLC34) are identical Modicon Compact A984-145 series PLCs configured to operate in a quasi-redundant hot/standby configuration, where both PLCs execute logic concurrently with the Regional SCADA system communicating only to the primary SPLC under normal operating conditions. If a failure occurs communicating to the primary SPLC, the Regional SCADA system will switch the route to communicate with the secondary SPLC. The primary SPLC2 and secondary SPLC34 pair function as Station Master PLCs that are responsible for monitoring the two-speed pump statuses, pump control by starting and stopping required two-speed pumps via operator command, as well as all other station functions such as reservoir level monitoring, surge tower control and alarms. In addition, the Station Master PLCs transmit permissives, statuses, and data to/from the UV Master PLC, via the Modbus Plus network, to ensure coordinated operation of UV and booster pump station systems. The remaining two PLCs in the station PLC panel, PLC11 and PLC12, are Modicon Compact A984-145 series PLCs that function as I/O PLCs, as they are responsible for collection of digital and analog I/O from all other station devices and instrumentation other than the pumps. The Station Master PLCs do not have any local I/O. They obtain pump and station device I/O, required for control and monitoring of pumps and station functions, from the individual pump PLCs and I/O PLCs via Modbus Plus communications. The Deacon Chemical Feed Facility PLC panel houses the Modicon Quantum 140-113 series Chemical Feed PLC (PLC24), which is responsible for the control and monitoring of fluoride and phosphate dosing. Chemical dosing is proportionally controlled based on water flow from the Deacon Booster Pumping Station. Water flows required for chemical dosing are written directly from the Regional SCADA system to Chemical Feed PLC, there is no direct transmission of process information and/or data between the Station Master and Chemical Feed PLCs. The Chemical Feed PLC is also

responsible for monitoring Deacon Chemical Feed Facility equipment and services such as chemical tanks, analyzers, and facility alarms.

- D4.4.5 The UV system located in the Deacon Booster Pumping Station consists of six UV reactors responsible for UV treatment of all finished water flow to the Regional Pumping Stations. Each reactor has a LCP for control and monitoring of the reactor which contains: a dedicated Modicon Quantum 140-434 series Reactor PLC (UVR PLC); local pump I/O, and a Pro-Face Digital touchscreen HMI. In addition to the LCPs for the UV reactors, the Deacon Booster Pumping Station has a UV PLC panel that contains a single PLC. In the UV PLC panel, UV Master PLC1 (UVM PLC1) and UV Master PLC33 (UVM PLC33) are identical Modicon Quantum 140-671 series PLCs configured to operate in a fully redundant hot/standby configuration, where the hot PLC executes logic and transmits operating data to the standby PLC. If a failure occurs with the hot PLC, the logic execution is taken over immediately by the standby PLC. The primary UVM PLC1 and secondary UVM PLC33 pair function as UV Master PLCs that are responsible for monitoring reactor statuses, reactor control by starting and stopping required reactors via a UV sequencer, as well as other UV and station functions such as station emergency shutdown (ESD) protection, station flow control, and alarms. The UV Master PLCs share common local I/O, which they access via remote I/O also located in the UV PLC panel. In addition, the UV Master PLCs transmit permissives, statuses, and data to/from the Station Master PLCs, via the Modbus Plus network, and the D21 PLC, via the Ethernet network, to ensure coordinated operation of UV, booster pump station, and water treatment plant systems. The UV Master PLCs use both their local I/O along with permissives, statuses and I/O they obtain from the Reactor, Station Master and D21 PLCs, to control and monitor the UV system and some Deacon Booster Pumping Station equipment and functions.
- D4.4.6 The D21 PLC system in the Deacon Booster Pumping Station consists of two variable speed electric pumps responsible for providing all or part of the desired water flow to the Regional Pumping Stations. Each pump has a LCP for control and monitoring of the pump which contains local pump I/O and a Telemecanique Magelis touchscreen HMI. In addition to the LCPs for the pumps, the Deacon Booster Pumping Station has a D21 PLC panel that houses a single PLC. In the D21 PLC panel, D21 PLC1 and D21 PLC33 are identical Modicon Quantum 140-671 series PLCs configured to operate in a fully redundant hot/standby configuration, where the hot PLC executes logic and transmits operating data to the standby PLC. If a failure occurs with the hot PLC, the logic execution is taken over immediately by the standby PLC. The primary D21 PLC1 and secondary D21 PLC33 pair are responsible for monitoring the variable speed pump statuses, pump control by starting and stopping required variable speed pumps via operator command, as well as all other functions such as clearwell level monitoring and alarms. In addition, the D21 PLCs transmit permissives, statuses and data to/from the UV Master PLCs, via the Ethernet network, to ensure coordinated operation of UV, booster pump station, and water treatment plant systems. The D21 PLCs use both their local I/O along with permissives, statuses and I/O they obtain from the variable speed pump LCPs, via remote I/O, and UV Master PLCs to control and monitor the variable speed pumps along with some Deacon Booster Pumping Station equipment and functions.
- D4.4.7 The Station UV and D21 PLC control systems within the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility vary in design with regard to the communication networks utilized to transmit process information such as I/O, permissives, commands, and data. Further, the communication networks utilized by these three control systems are interconnected, as noted earlier, for the purpose of transmitting permissives, statuses, and data between the Station Master, UV Master, and D21 PLCs to ensure coordinated operation of the UV, booster pump station, and water treatment plant systems.
- D4.4.8 The Station control system utilizes a communications network similar in design to that of the Regional Pumping Stations. The Station Master, Pump, I/O, and Chemical Feed PLC that are part of the Station control system are connected via a Modbus Plus network setup in a line configuration with a terminating end resistor. The Modbus Plus network connects the PLCs (Pump, Station Master, Chemical Feed, and I/O), a Modicon BM85 Bridge Multiplexer module, and a Modicon Modbus+/Ethernet Bridge. In addition, the UV Master PLC resides on this Modbus Plus network to transmit permissives, statuses, and data

to/from the Station Master PLCs. The Modbus+/Ethernet Bridge allows the Regional SCADA system to communicate with the Station Master, Chemical Feed and UV Master PLCs as well as Bently Nevada units, via Ethernet WAN, for remote control and monitoring of the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility. The BM85 Bridge Multiplexer allows the Regional SCADA system to communicate with Modbus devices, such as the Bently Nevadas, over the Modbus Plus network. The BM85 Bridge Multiplexer also acts as the tie in point for radio communications, which serves as the backup communications medium for the Regional SCADA system to devices such as the Station Master PLCs in the event of a failure of the Ethernet WAN or Modbus+/Ethernet Bridge.

- D4.4.9 The UV control system utilizes a Modbus Plus communications network that connects the UV Master and Reactor PLCs, as well as an RSView HMI workstation. Much like the station control system, the Modbus Plus network for the UV control system is a line topology with a terminating end resistor. The UV Master PLCs transmit permissives, statuses, and data to/from the individual Reactor PLCs on the Modbus Plus network, while the RSView HMI workstation allows the UV SCADA system to control and monitor the UV system directly over the Modbus Plus network. The UV Master PLCs are also connected to the Modbus Plus network for the Station control system, as noted earlier, to transmit permissives, statuses, and data to/from the Station Master PLCs. In addition, the UV Master PLCs are connected to the Ethernet networks of both the Regional SCADA and WTP SCADA systems. The Regional SCADA and UV SCADA servers/clients access the UV Master PLCs for remote control and monitoring purposes, via the Modbus+/Ethernet Bridge, which bridges the Station control system Modbus Plus network and the Regional SCADA Ethernet WAN. The UV Master PLCs reside directly on the WTP SCADA Ethernet network as they are equipped with Quantum NOE modules. WTP SCADA servers/clients and the D21 PLCs connect directly to the UV Master PLCs via the WTP SCADA Ethernet network, for the purpose of remote control and monitoring of the UV system, as well as transmission of permissives, statuses, and data to/from the UV Master PLCs.
- D4.4.10 The D21 PLC control system communications network is a hybrid of remote I/O and Ethernet communications. The pump LCPs for the variable speed pumps contain remote I/O drops that are directly connected to a remote I/O head located in the D21 PLC panel. All local pump I/O for both variable speed pumps are transmitted to the D21 PLCs via this remote I/O connection, for remote control and monitoring of the variable speed pumps. The Telemecanique Magelis touchscreen HMIs in the variable speed pump LCPs have built-in Ethernet cards and the D21 PLCs are equipped Quantum NOE modules, which are all directly connected to the WTP SCADA Ethernet network. Local control of the variable speed pumps from the touchscreen HMIs is achieved via the direct Ethernet links from the HMIs to the D21 PLCs. WTP SCADA servers/clients and UV Master PLCs also connect directly to the D21 PLCs via the WTP SCADA Ethernet network, for the purpose of remote control and monitoring of the variable speed pumps, as well as transmission of permissives, statuses, and data to/from the D21 PLCs.
- D4.5 Shoal Lake Intake Facility
- D4.5.1 The primary task of the control system at the Shoal Lake Intake is to provide basic control functions and monitoring of various systems, buildings, and operational conditions at the Shoal Lake Intake and Aqueduct Solar Sites. The control system primarily monitors equipment status and alarm conditions for the various Intake and Aqueduct systems and buildings. These monitored statuses and alarms, such as building intrusion, electrical faults, PLC faults, equipment statuses, and communications alarms, are enunciated by HMIs located in the Intake Control Room, staff house, and residences, for operator notification and action. In addition, the control system provides basic control and monitoring functions such as the Emergency Remote Chlorine Shutdown system, setpoint control for aqueduct and chlorine mass flows, and monitoring of aqueduct levels, lake levels, and valve positions.
- D4.5.2 The control system at the Shoal Lake Intake is a PLC based architecture with supporting touchscreen and PC based HMIs for operator monitoring, alarm annunciation, and acknowledgement. The existing PLC hardware consists of Modicon Compact series PLCs

with E984-255 and A984-145 processors. The PLC control logic is implemented in Modicon 984 ladder logic and was originally programmed using ProWorx programming software. The PLC control logic has been converted to FasTrak Softworks PLC Workshop for Modicon (32-bit) programs since the original implementation. There are two types of HMI hardware utilized at the Shoal Lake Intake: GE QuickPanels touchscreens and a Microsoft Windows based PC. The GE QuickPanel HMI software was developed with QuickDesigner software while the PC based HMI was developed with CitectSCADA. While the current PLC hardware and control logic continues to function as designed, it is reaching the end-of-life in terms of spare parts availability. Both the touchscreen and PC HMI hardware continue to be supported and spare parts readily available. However, the two systems use disparate development tools that require duplication of effort when HMI software modifications are required.

- D4.5.3 The Shoal Lake Intake control system consists of eleven PLCs comprised of a Station PLC pair in the Intake Control Room Panel and nine PLCs distributed throughout the Shoal Lake Intake site, each dedicated to a specific operational area. Similar to the Regional Pumping Stations, Station PLC1 (SPLC1) and Station PLC33 (SPLC33) are identical Modicon Compact E984-255 series PLCs configured to operate in a quasi-redundant hot/standby configuration, where both PLCs execute logic concurrently with the Regional SCADA system communicating only to the primary SPLC under normal operating conditions. If a failure occurs communicating to the primary SPLC, the Regional SCADA system and Intake HMIs will switch the route to communicate with the secondary SPLC. The primary SPLC1 and secondary SPLC33 pair function as Station Master PLCs responsible for collecting I/O, via Modbus Plus communications, from the nine PLCs distributed throughout the Shoal Lake Intake site. The Station Master PLCs use the collected I/O to provide operational data and alarms, as well as basic control functions, to the Regional SCADA system. The remaining nine PLCs are Modicon Compact A984-145 series PLCs, located in panels throughout the Shoal Lake Intake site, include the following: Standby Generator PLC (PLC23); Transfer Switch PLC (PLC24); Acid Building PLC (PLC25); Chlorine Building PLC (PLC26); De-Chlorination PLC (PLC27); Electrical Room PLC (PLC28); Pump Room PLC #1 (PLC29); Pump Room PLC #2 (PLC30); and Domestic Water Pumps PLC (PLC31). These nine PLCs are responsible for basic control functions, as well as collection of digital and analog I/O from devices and instrumentation in their specific operational area which is written to both Station Master PLCs. The Station Master PLCs do not have any local I/O. They obtain station device I/O, required for control and monitoring of Shoal Lake Intake and Aqueduct Solar Site functions, from the nine PLCs noted above via Modbus Plus communications.
- D4.5.4 The control system at the Shoal Lake Intake has six HMIs used by operators for control and monitoring of the various operational areas of the Shoal Lake Intake and Aqueduct Solar Sites. The Intake Control Room houses one QuickPanel touchscreen HMI located in the Intake Control Room Panel and a CitectSCADA PC HMI at the control room desk. Both of the Intake Control Room HMIs provide operators: basic control functions such as setpoint entry; displays operational information such as aqueduct flows and equipment statuses; and alarm annunciation and acknowledgement. The other four HMIs are QuickPanel Junior touchscreens located in the staffhouse and residences. The QuickPanel Junior HMIs only provide alarms annunciation and the ability to silence the local alarm buzzer in the location of the HMI.
- D4.5.5 The Station Master and nine area PLCs at the Shoal Lake Intake are connected via a Modbus Plus network setup in a ring configuration. The Modbus Plus network connects the Station Master PLCs, nine area PLCs, a Quickpanel touchscreen HMI, a Modicon BP85 Bridge Plus module, a Modicon BM85 Bridge Multiplexer module, and a Modicon Modbus+/Ethernet Bridge. The Modbus+/Ethernet Bridge allows the Regional SCADA system and Citect SCADA HMI to communicate with the Station Master PLCs, via Ethernet WAN, for remote control and monitoring of the Shoal Lake Intake. The BM85 Bridge Multiplexer allows the staffhouse and residence Quickpanel Junior touchscreen HMIs and Aqueduct Solar Sites to connect to the Modbus Plus network. In addition, the BM85 Bridge Multiplexer allows the Regional SCADA system and CitectSCADA HMI to communicate with Modbus devices over the Modbus Plus network and acts as the tie in point for radio communications, which serves as the backup communications medium for the Regional

SCADA system to devices such as the Station Master PLCs in the event of a failure of the radio TCP/IP link to McPhillips Control Centre or the Modbus+/Ethernet Bridge. The BP85 Bridge Plus connects the two ends of the Modbus Plus network ring and is intended to allow the Modbus Plus network to continue operation even with a single break in the network ring.

D5. SCOPE OF SERVICES

- D5.1 Unless otherwise stated, Appendix B – Definition of Professional Consultant Services (Consulting Engineering Services) shall be applicable to the provision of Professional Engineering services for this project. These services are specific to Preliminary Design.
- D5.2 Refer to Appendix C for Relevant Documents with regards to the Project.
- D5.3 Provide consulting engineering services necessary to complete the preliminary design of the following:
- (a) PLC hardware upgrades for the McPhillips, MacLean, and Hurst Pumping Stations, the Tache Booster Station, the Deacon Booster Pumping Station, the Deacon Chemical Feed Facility, and the Shoal Lake Intake. Item is described in further detail in Section D5.4.
 - (b) Rewrite of the PLC logic at the McPhillips, MacLean, and Hurst Pumping Stations, the Tache Booster Station, the Deacon Booster Pumping Station, the Deacon Chemical Feed Facility, and the Shoal Lake Intake. Item is described in further detail in Section D5.5.
 - (c) Identification in the Preliminary Design Report of various PLC logic problems and power reliability upgrades. Item is described in further detail in Section D5.6.
 - (d) Preliminary design of various power reliability upgrades. Item is described in further detail in Section D5.7.
 - (e) Provision of a comprehensive P&ID drawing set for the McPhillips, MacLean, and Hurst Pumping Stations, the Tache Booster Station, the Deacon Booster Pumping Station, the Deacon Chemical Feed Facility, and the Shoal Lake Intake. Item is described in further detail in Section D5.8. Note that this portion of work may be removed from the overall scope if the Fees submitted exceed the budgetary provision for the Work.
- D5.4 Preliminary design for the PLC hardware upgrades shall include the following:
- D5.4.1 Overall:
- (a) The general network architecture.
 - (b) An evaluation and selection of PLCs to be utilized. The design is to be based on Schneider Electric Modicon PLCs in order to maintain consistency with the Water Treatment Plant and the Regional SCADA system.
 - (c) An overall implementation plan, that allows for the continued operation of all the City facilities.
 - (d) Coordination with the City to identify future I/O plans and verification that the proposed control system can handle future requirements.
 - (e) Provision of Preliminary Design Drawings for each of the facilities identified in Section D5.3(a). This shall include:
 - (i) Network block diagrams indicating all PLCs, remote I/O, switches, HMIs, radio communications interfaces and other significant network components.
 - (ii) Plan drawings indicating the location and size of the proposed facility PLC panels (new or existing). Note that the available space at some of the facilities is extremely limited.
 - (f) Update existing I/O documents to meet the City's P&ID and identification standards. It should be noted that a separate initiative is in place to update the City's P&ID and identification standards.
- D5.4.2 Tache Booster Pumping Station:

- (a) Provision of a hot/standby station PLC.
- (b) Proposal of PLC architecture to replace the existing dedicated PLC for digital and analog inputs.
- (c) An implementation strategy proposal for the new PLCs.
- (d) Verification that the new PLCs can fit within the existing control panels and accommodate the migration of the new PLCs within the facility's operational requirements. If the migration of the new PLCs into the existing control panels is not feasible, propose an alternate implementation strategy addressing this.
- (e) Creation of an I/O list of this facility based on the existing PLC program and the site investigation.
- (f) The existing electrical equipment at the facility is outdated and planned for replacement. Provide capability in the proposed design for integration with a replaced electrical system.
- (g) The report write-up shall include the following:
 - (i) A plan drawing indicating the location for the existing and proposed station PLC(s) for the facility.
 - (ii) A panel layout drawing for all PLC panels indicating the location, size, and clearances of the proposed PLC, including a Bill of Materials for all PLC components (eg. CPUs, I/O modules etc).
 - (iii) A sketch to indicate the proposed modifications to the existing station PLC panel.
 - (iv) A network drawing clearly showing the connection of all PLCs and other networked devices. The drawing(s) shall incorporate existing backup radio communications infrastructure as part of the overall network communications plan.
 - (v) I/O list.
- (h) It is anticipated that the PLC replacement will start at the Tache Booster Pumping Station. The Tache Booster pumping station has the most flexibility in terms of shutdowns.

D5.4.3 Maclean, McPhillips, and Hurst Pumping Stations:

- (a) Provision of a hot/standby station PLC and individual PLCs for each pump.
- (b) Verification that the pump PLCs can be replaced by simply swapping out the PLC backplanes (racks). If the pump PLCs cannot be replaced by simply swapping out the PLC backplanes, propose an alternate implementation strategy.
- (c) Proposal of PLC architecture to replace the existing dedicated PLCs for digital and analog inputs.
- (d) An implementation strategy proposal for the Station PLCs.
- (e) Verification that the new PLCs can fit within the existing control panels and accommodate the migration of the new PLCs within the facility's operational requirements. If the migration of the new PLCs into the existing control panels is not feasible, propose an alternate implementation strategy addressing this.
- (f) Creation of an updated I/O list for each station based on the existing PLC program and field investigations.
- (g) Incorporation of the MacLean Pumping Station intelligent MCCs connection into the design. The MCCs at MacLean Pumping Station is being replaced as part of a separate initiative. The MCCs will be replaced with intelligent MCCs, with network communications for motor starter monitoring. As part of the MCC Replacement project, the MCC communications will be set up and tested, however the PLC integration will be deferred until the PLC Upgrade.
- (h) Incorporation of the future connection of the McPhillips Pumping Station intelligent MCCs into the design. The MCCs at the McPhillips Pumping Station are aged, and it

is expected that an initiative to replace the MCCs will be initiated within the next five years. The MCCs will be replaced with intelligent MCCs with network communication. Incorporate the future connection of the intelligent MCCs into the design.

- (i) The report write-up shall include the following:
 - (i) A plan drawing indicating the location for the existing and proposed station PLC(s) for each facility.
 - (ii) A panel layout drawing for all PLC panel indicating the location, size, and clearances of the proposed PLC, including a Bill of Materials for all PLC components (eg. CPUs, I/O modules etc).
 - (iii) Sketches to indicate proposed modifications to each of the three existing station PLC panels.
 - (iv) A network drawing clearly showing the connection of all PLCs and other networked devices. The drawing(s) shall incorporate existing backup radio communications infrastructure as part of the overall network communications plan.
 - (v) Updated I/O lists.
- (j) Note the following constraints:
 - (i) Only one pump PLC will be allowed to be taken out of service at any given time.
 - (ii) The station PLCs cannot be shut down for prolonged periods of time. Only night time shutdowns will be permitted. For the MacLean and Hurst Pumping Stations, shutdowns will not be permitted from May to September.

D5.4.4 Deacon Booster Pumping Station and Deacon Chemical Feed Facility:

- (a) The following Modicon Compact PLCs are to be replaced by this project:
 - (i) Station PLCs – Hot/Standby
 - (ii) Three (3) Pump PLCs – For Pumps 3, 4, and 5
 - (iii) I/O PLCs
 - (iv) Chemical Feed PLC
- (b) Verification that the pump PLCs can be replaced by simply swapping out the PLC backplanes (racks). If the pump PLCs cannot be replaced by simply swapping out the PLC backplanes, propose an alternate implementation strategy.
- (c) Proposal of PLC architecture to replace the existing dedicated PLCs for digital and analog inputs.
- (d) An implementation strategy proposal for the station PLCs. This will include an investigation as to whether or not the station PLCs could be abandoned and the associated control integrated into the redundant D21 PLCs.
- (e) An implementation/migration strategy proposal for the Chemical Feed PLC as part of the Deacon Booster Pumping Station control system. This will include an investigation as to whether or not the Chemical Feed PLC could be abandoned and the associated control integrated into the redundant D21 PLCs.
- (f) Verification that the new PLCs can fit within the existing control panels and accommodate the migration of the new PLCs within the facility's operational requirements. If the migration of the new PLCs into the existing control panels is not feasible, propose an alternate implementation strategy addressing this.
- (g) Creation of an updated I/O list of this facility based on the existing PLC programs and field investigations.
- (h) There are existing PLCs within the Deacon Booster Pumping Station, the Deacon, Chemical Feed Facility, and the Water Treatment Plant Facilities that do not require replacement. These include the UV PLCs and the redundant D21 PLCs which controls Pumps 1 and 2. Perform field investigations and documentation reviews. Update and/or create updated network block diagrams showing the existing

infrastructure. Create a new block diagram indicating the integration of the replaced PLCs into the overall control system network.

- (i) The report write-up shall include the following:
 - (i) A plan drawing(s) indicating the location for all control panels containing existing and proposed PLCs.
 - (ii) A panel layout drawing for all PLC panels indicating the location, size, and clearances of the proposed PLC, including a Bill of Materials for all PLC components (eg. CPUs, I/O modules etc).
 - (iii) Sketches to indicate proposed modifications to the PLC panels.
 - (iv) A network drawing clearly showing the connection of all PLCs and other networked devices. The drawing(s) shall incorporate existing backup radio communications infrastructure as part of the overall network communications plan.
 - (v) Updated I/O lists.
- (j) Note the following constraints:
 - (i) Only one pump PLC will be allowed to be taken out of service at any given time.
 - (ii) The Deacon Booster Pumping Station and the Deacon Chemical Feed Facility cannot be shut down for more than 12 hours and cannot be shut down from May to September. In addition, there will have to be at least one week between shutdowns.
 - (iii) It is anticipated that the PLC replacement at the Deacon Booster Pumping Station and the Deacon Chemical Feed Facility will be performed last in the overall PLC replacement project. The Deacon Booster Pumping Station supplies all of the three regional pumping stations with treated water. It is therefore a singular crucial piece of the overall water supply system.

D5.4.5 Shoal Lake Intake Facility:

- (a) The following Modicon Compact PLCs are to be replaced by this project:
 - (i) Station PLCs – Hot/Standby
 - (ii) Standby Generator PLC (PLC23)
 - (iii) Transfer Switch PLC (PLC24)
 - (iv) Chlorine Building PLC (PLC26)
 - (v) Electrical Room PLC (PLC28)
 - (vi) Pump Room PLC #1 (PLC29)
 - (vii) Pump Room PLC #2 (PLC30)
 - (viii) Domestic Water Pumps PLC (PLC31)
- (b) The PLCs at Shoal Lake Intake that are no longer required (i.e. obsolete) and therefore do not require replacement are:
 - (i) Acid Building PLC (PLC25)
 - (ii) De-Chlorination PLC (PLC27)
- (c) Assessment of the criticality of each of the PLCs in terms of what type of shutdown could be accommodated for implementation of the updated PLCs. This will require a field investigation to the Shoal Lake Intake and discussions with City Operations personnel.
- (d) Proposal of an implementation strategy for the new PLCs.
- (e) Verification that the new PLCs can fit within the existing control panels and accommodate the migration of the new PLCs within the facility's operational requirements. If the migration of the new PLCs into the existing control panels is not feasible, propose an alternate implementation strategy addressing this.
- (f) Identify a plan to upgrade and replace the six (6) existing HMIs, which include the following:

- (i) GE QuickPanel Touchscreen HMI (Intake Control Room)
- (ii) CitectSCADA PC HMI (Intake Control Room)
- (iii) QuickPanel Junior Touchscreen HMI (Foreman's Residence)
- (iv) QuickPanel Junior Touchscreen HMI (Lake Residence)
- (v) QuickPanel Junior Touchscreen HMI (Intake Residence)
- (vi) QuickPanel Junior Touchscreen HMI (Staffhouse)

In addition, review the requirements for local monitoring and control with City personnel and propose new or modified installations to meet City requirements.

- (g) Creation of an I/O list of this facility based on the existing PLC program and field investigations.
- (h) The report write-up shall include the following:
 - (i) A plan drawing(s) indicating the location for all control panels containing existing and proposed PLCs.
 - (ii) A panel layout drawing for all PLC panels indicating the location, size, and clearances of the proposed PLC, including a Bill of Materials for all PLC components (eg. CPUs, I/O modules etc).
 - (iii) Sketches to indicate proposed modifications to the PLC panels.
 - (iv) A network drawing clearly showing the connection of all PLCs and other networked devices. The drawing(s) shall incorporate existing backup radio communications infrastructure as part of the overall network communications plan.
 - (v) Updated I/O lists.
- (i) Note the following constraints:
 - (i) Shoal Lake Intake can only be accessed by high rail.
 - (ii) A complete shutdown of the intake can only be accommodated for one week. In addition, there will have to be at least two weeks between shutdowns.

D5.5 Preliminary design for the rewrite of the PLC logic at the McPhillips, MacLean, and Hurst Pumping Stations, the Deacon and Tache Booster Stations, and the Shoal Lake intake shall include the following:

D5.5.1 The existing PLC logic has numerous instances of inefficient logic which affect the operation and maintenance of the stations. Preliminary design for this item shall include the following:

- (a) Confirmation of the IEC61131 standard language the most appropriate for the various applications. It is desirable that the resulting language be consistent with each of the facilities identified in Section D5.3(b) and with the WTP.
- (b) Provision of recommendations regarding language implementation.
- (c) Verification of the impact of the proposed logic rewrite on the interface with the Regional, WTP, and UV SCADA systems.
- (d) Proposal of a method of migration from the existing PLC control logic to the software logic appropriate to the new PLC hardware platform. **Note it is expected that a complete PLC rewrite will be required.**

D5.5.2 Provision of a SCADA interface review. Preliminary design for this item shall include the following:

- (a) Provision of a detailed review of the existing SCADA Interface, specifically remote equipment control via the SCADA Interface.
- (b) Review and make recommendations regarding the writing of set points and control commands to the PLCs.
- (c) Make recommendations regarding implementation strategies to minimize the operational impact during the PLC replacement.

- (d) Provision of recommendations to ensure the highest level of reliability and resiliency for the SCADA interface while minimizing the modification work required for integration.

D5.6 There are several deficiencies of the current PLC logic and additional power reliability upgrades that require no further investigation during the preliminary design phase. However, these items require identification in the Preliminary Design Report to ensure that they will be addressed in the detailed design phase. They are as follows:

D5.6.1 Incorporation of contact debouncing logic at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 9 of the "Pumping Stations Power Reliability Study".

D5.6.2 Removal of the timer relay between the under voltage relay and the PLC input at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 12 of the "Pumping Stations Power Reliability Study".

D5.6.3 Removal of the PLC logic which enables the station PLC to write data to the future Pump 24 at the MacLean Pumping Station. Refer to Recommendation 20 of the "Pumping Stations Power Reliability Study".

D5.6.4 Modifications of the station PLC logic to have the outputs go to a predetermined safe state during communication failure at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 21 of the "Pumping Stations Power Reliability Study".

D5.6.5 Modifications to the electric pump restart prevention philosophy at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 24 of the "Pumping Stations Power Reliability Study".

D5.6.6 Modification of the PLC logic to ensure the SCADA will always receive the "Reverse Spin Alarm" at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 35 of the "Pumping Stations Power Reliability Study".

D5.6.7 Modification of the PLC logic and settings associated with the Discharge Pressure Timeout to ensure that the SCADA will receive the "Discharge Pressure Timeout" alarm within a reasonable timeframe at the McPhillips, MacLean, and Hurst Pumping Stations. Refer to Recommendation 36 of the "Pumping Stations Power Reliability Study".

D5.6.8 Implementation of a reservoir suction valve shutdown upon "Station Flood" alarm for the MacLean and McPhillips Pumping Stations. Refer to Recommendation 47 of the "Pumping Stations Power Reliability Study".

D5.6.9 Removal of logic associated with "Overnight Mode" at the McPhillips, MacLean, and Hurst Pumping Stations.

D5.6.10 Rectification of PLC logic issues as defined in Section 4.4.5 of the "Water Pumping Stations Power Reliability Study".

D5.7 Preliminary design for power reliability upgrades shall include the following:

D5.7.1 Addition of discharge pressure instrumentation redundancy for the McPhillips, MacLean, and Hurst Pumping Stations.

No control redundancy for the discharge pressure instrumentation is currently provided. Failure of the pressure transmitter would result in loss of automatic control of the pumps. If the pressure sensor failed on a low pressure, this may result in over pressurization of the discharge header. Refer to Recommendation 3 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Evaluation of the two existing pressure transmitters, and their connections to the process and PLCs.
- (b) Proposal of modifications to the discharge pressure instrumentation to provide greater reliability and redundancy.

- (c) Provision of a high level functional description as to how the new system would operate.
- (d) Provision of a P&ID diagram of the proposed pressure instrumentation and associated piping.
- (e) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.2 The potential installation of pump emergency stop buttons for the McPhillips, MacLean, and Hurst Pumping Stations

There is currently no emergency stop buttons on any of the pumps. This may be a safety issue. Refer to Recommendation 5 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) An investigation as to the City's protocol for starting up and shutting down the pumps. Note that the City is apprehensive about having the emergency stop buttons due to the consequences (pressure drops, pipe breaks) associated with sudden stoppage of the pumps.
- (b) A determination if the City's protocols negate the requirement of having emergency stop buttons installed.
- (c) If it is determined that emergency stop buttons are required, provide a conceptual design as to how they will be located and configured.
- (d) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.3 Elimination of unnecessary alarms on pump PLC start-up for the McPhillips, MacLean, and Hurst Pumping Stations.

Each pump is controlled by its own pump PLC. The pump PLC is powered by the UPS but on certain occasions, such as a UPS blip or a maintenance event, it may be powered off. When the pump PLC powers back up, a series of alarms are generated. These alarms lock out the pump and it cannot be restarted until an operator locally resets them. Refer to Recommendation 6 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Identification of all the alarms associated with PLC start-up and confirmation with the City as to what alarms should be masked.

D5.7.4 Installation of two additional station flood sensors for each of the McPhillips, MacLean, and Hurst Pumping Stations.

There is currently only one flood sensor per station. Failure or accidental triggering of this sensor could result in a complete loss of pumping. Refer to Recommendation 7 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Determination of the existing flood sensor configuration and evaluation of its adequacy.
- (b) Proposal of modifications to the flood sensor configuration to provide greater reliability and redundancy. Discuss the proposed location of the sensors.
- (c) Provision of a high level functional description as to how the new system would operate.
- (d) Provision of a P&ID diagram of the proposed flood sensor instrumentation and associated piping.
- (e) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.5 Addition of remote alarm reset capability for certain pump alarms at the McPhillips, MacLean, and Hurst Pumping Stations.

Operators cannot remotely reset pump alarms and have to travel to the pumping station to manually reset them. This is inclusive of every alarm. Refer to Recommendation 11 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Identification of all the pump alarms and determination of which alarms should be designated critical (cannot be remotely reset) and non-critical (can be remotely reset). This will require consultation with City Staff.

D5.7.6 Installation of under voltage relays with inverse time under voltage characteristics at the McPhillips, MacLean, and Hurst Pumping Stations.

The existing under voltage relays do not allow for voltage sag ride through. Consequently, short voltage sags, which the pump motor is easily capable of riding through, will trip the pump. Refer to Recommendation 13 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Provision of a conceptual design including the type of under voltage proposed, details of the connection in the control system and motor starter, and overall functionality. The deliverables will include a detailed description in the report and a block diagram.
- (b) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.7 Revisions to the pump power fail sequencers for the McPhillips and MacLean Pumping Stations.

There are documented cases where the current logic has, under certain circumstances, caused undesirable actions, which increased the impact of a power failure. Refer to Recommendation 18 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) An investigation as to how the City's power failure duty tables for the pumps are currently set up.
- (b) Propose a duty table configuration along with associated transition logic that would ensure maximum continuity during pump fail events. The deliverables will include a detailed description of how the logic will be implemented.

D5.7.8 Addition of a load ratio controller for each station and load to speed converter for each pump at each of the McPhillips, MacLean, and Hurst Pumping Stations.

Currently the pumps are controlled by pressure control logic. This method does not take into account the non-linearity of the pump curves. Consequently, the pump control is tuned very slow to compensate which leads to long lag durations to reach stable operation. In addition, the pumps are not all the same at the Hurst Pumping Station but the logic assumes that they are. This leads to disproportionate flow splits between the pumps. Refer to Recommendation 23 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Proposal outlining the set of functional requirements for implementation in the detailed design phase.
- (b) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.9 Modification of the electric pump PLC logic to turn off the pump starter output immediately upon appropriate fault events at the McPhillips, MacLean, and Hurst Pumping Stations.

Refer to Recommendation 24 of the "Pumping Stations Power Reliability Study".

Preliminary design for this item shall include the following:

- (a) Provision of a design to address the issues identified in Recommendation 24 of the "Pumping Stations Power Reliability Study".

D5.7.10 Review of the SCADA / PLC Communications

As part of Recommendation 26 of the “Pumping Stations Power Reliability Study”, it was noted that there were communication issues between the Regional SCADA System located at the McPhillips Control Centre and the station PLCs at the McPhillips, Hurst, and MacLean Pumping Stations. The Regional SCADA system and associated communications were upgraded in 2006, and it is generally understood that communications with the stations has improved. In addition, the Regional SCADA System was migrated to the WTP Control Center in 2009 and has experienced further improvement.

Preliminary design for this item shall include the following:

- (a) Review with City operations personnel the current status of communications with the Regional Pumping Stations. Identify any issues presented.
- (b) With assistance of Operations personnel, test and document turnaround times for various equipment commands such as pump starts and valve operations from the WTP Control Center.
- (c) Make recommendations regarding additional work required.

D5.7.11 Addition of PLC network redundancy for each of the McPhillips, MacLean, and Hurst Pumping Stations

The PLCs in each pumping station are currently connected via a Modbus Plus network that is configured as a loop but is not fully redundant. Refer to Recommendation 32 of the “Pumping Stations Power Reliability Study”.

Preliminary design for this item shall include the following:

- (a) Proposal of a network redundancy architecture and general layout, including the communication protocol to be used over the network.
- (b) Proposal for the integration of existing radio communications infrastructure at the pumping stations, as part of network architecture proposed in D5.7.11(a), for the purposes of SCADA communications redundancy with the Water Treatment Plant Control Room and McPhillips Control Centre.
- (c) Provision of a network block diagram for each station.
- (d) Provision of a Class 3 cost estimate of this component performed as a part of the overall PLC upgrade project.

D5.7.12 Modifications to the electric pump restart prevention philosophy at the McPhillips, MacLean, and Hurst Pumping Stations.

Currently, the electric pumps have two methods to prevent the pumps from restarting after a specific time period; through the motor protection relays and through the pump PLC logic. The pump restart lockout times between the two are not coordinated which can cause misleading alarms if the PLC is trying to start the pump but the motor protection relays won't let it. Refer to Recommendation 37 of the “Pumping Stations Power Reliability Study”.

Preliminary design for this item shall include the following:

- (a) Confirmation of the strategy provided in the Power Reliability Report.
- (b) If this strategy is found to not address the problem, propose an alternate strategy.

D5.7.13 Elimination of nuisance power fail alarm messages at the McPhillips, MacLean, and Hurst Pumping Stations.

During power failure, the Operator is inundated with alarm messages, many which provide no benefit. A review will be performed to determine which alarms are pertinent and changes will be implemented in the PLC and SCADA systems. Refer to Recommendation 45 of the “Pumping Stations Power Reliability Study”.

Preliminary design for this item shall include the following:

- (a) Identification of all the alarms associated with power failure. This will require a review of the existing PLC logic and alarm logs of existing power fail events. The City will provide the alarms logs for review.
- (b) Determination of which alarms are pertinent. This will require consultation with City Staff.

D5.8 Provision of a comprehensive P&ID drawing set for each facility shall include the following:

D5.8.1 General

- (a) Update existing P&ID drawings and create new P&ID drawings to meet the City's P&ID and identification standards. It should be noted that a separate initiative is in place to update the City's P&ID and identification standards, and all modified and new P&IDs shall meet the new identification standard to the satisfaction of the City's Project Director. It is expected that while some drawings can be modified, all modified drawings will require significant revision to meet the City's new identification standards.
- (b) Layout all P&ID drawings in manner to allow for a clear understanding of the process, as well as the control system's functionality in monitoring and controlling the process. ISA 5.1, the City's Identification Standard, and good design practice conventions are to be followed.
- (c) Cross-reference all P&IDs with the PLC I/O and logic and updated accordingly.
- (d) Ensure accurate drawing links are provided between all P&ID drawings.
- (e) Provide drawing numbers in accordance with the City's drawing numbering system.
- (f) Provide new equipment identifiers as per the new Identification Standard and indicate previous identifiers in parenthesis below.
- (g) Provide new instrument symbols and identifiers as per the new Identification Standard. Provide a straight-forward means on each drawing to cross-reference existing instrument identifiers.
- (h) Determine and indicate engineering unit ranges for analog instrumentation.
- (i) Ensure all instrument and process line-types meet the latest ISA 5.1 standard and the City's Identification Standard.
- (j) Create/update all applicable P&ID legend sheets.
- (k) Identify on the P&IDs all inconsistencies between new identification, and current labelling on site and the existing electrical / instrumentation documentation.
- (l) Provide process line-type codes and pipe diameter for all piping.

D5.8.2 Tache Booster Pumping Station

- (a) Creation of a complete set of P&ID drawings, including all process pumping, the surge tower, and auxiliary systems including HVAC. The source of every PLC I/O point should be referenced on the P&IDs. It is anticipated that a significant amount of the required information can be obtained from existing documentation. However, extensive field investigations and verification will be required.

D5.8.3 MacLean Pumping Station

- (a) Update the existing P&ID Drawings to provide a comprehensive P&ID set. The existing P&ID drawings include all process pumping, reservoir, and interfaces to auxiliary systems, but do not include HVAC systems. The updates are to reference the work performed under the MCC Replacement project.
- (b) Create new P&ID drawings for the HVAC systems and building services. Note that the MacLean Pumping Station is the only location requiring P&ID drawings for the HVAC systems due to the required connection to the HVAC motor starters in the soon to be installed intelligent MCCs.

D5.8.4 McPhillips Pumping Station

- (a) Update the existing P&ID Drawings to provide a comprehensive P&ID set. The existing P&ID drawings are to include all process pumping, reservoir, and interfaces to auxiliary systems, but not HVAC systems.
- (b) Creation of a new P&ID drawing for the McPhillips valve chamber.

D5.8.5 Hurst Pumping Station

- (a) Update the existing P&ID Drawings. The existing P&ID drawings are to include all process pumping, reservoir, and interfaces to auxiliary systems, but do not include HVAC systems.

D5.8.6 Deacon Booster Pumping Station and Deacon Chemical Feed Facility

- (a) Update the existing P&ID Drawings of the entire facility. This will require a detailed field investigation of the existing systems. It is anticipated that there are consistency issues with the existing P&ID Drawings.
- (b) Create a new single comprehensive set of P&ID Drawings for the Deacon buildings. that will only include items associated with the PLCs that are to be replaced. The P&IDs will exclude the UV Disinfection System.

D5.8.7 Shoal Lake Intake Facility

- (a) Update the existing P&ID Drawings, created within the last ten years, based upon field investigations.
- (b) Create a new comprehensive set of P&ID Drawings for the Shoal Lake Intake. The scope of equipment must include all equipment monitored and controlled by the PLC. Integrate the existing P&ID drawings created within the last ten years.

D5.9 The scope of services shall include but not necessarily limited to:

D5.9.1 Project Management

- (a) Plan, organize, secure and manage resources to bring about the successful completion of specific project goals and objectives.
- (b) Create a Project Management Plan.
 - (i) Submit one (1) hard copy and one (1) electronic PDF copy of the "draft Project Management Plan".
 - (ii) Upon receipt of City review comments submit three (3) hard copies and one (1) electronic copy of the "final Project Management Plan".
- (c) Structure the Project into manageable sub-entities and prepare a Work Breakdown Structure (WBS).
- (d) Develop a Project schedule identifying Project activities, milestones, responsibility, time lines for each and links to other project activities and deliverables.
- (e) Establish protocol for all communication issues throughout the Project including change of management.
- (f) Establish appropriate levels of review and approvals for all Project deliverables.
- (g) Guide the Project team in the identification of risks and, where appropriate, contingency plans.
- (h) Ensure Project team members, including the Project Manager, understand the established project methodology and gain commitment from all team members on activities and deliverables identified in the plan.
- (i) Identify to the Project Manager the impact (time, quality, cost) of proposed changes so that the Project Manager may make well-informed decisions whether or not to proceed with the proposed changes.
- (j) Continuously review and assess the status of the actual cost, projected costs to completion, and schedule.

- (k) Submit a monthly project status report outlining project cost, schedule and scope. Monthly report shall include: an updated project schedule, line charts detailing budget, actual cost, and projected costs for tasks defined in the WBS. Monthly status reports shall be limited to a maximum of three (3) pages including charts.
 - (i) Submit one (1) electronic PDF copy of the "Monthly Project Status Report" within three (3) working days of months end.
- (l) Chair regular Project meetings and provide Minutes.
 - (i) Once per month meet in-person with the City's Project Manager to discuss the Monthly Project Status Report and other project management related issues.
- (m) Resolve Project disputes in a timely manner.

D5.9.2

Preliminary Design

- (a) Collect and review all available existing information about the sites including files, reports, drawings, condition assessments, etc. Where necessary conduct field investigations to verify existing conditions and to supplement available information.
- (b) Examine site constraints and develop installation strategies for PLC replacements and power reliability upgrades considering:
 - (i) Required shutdowns of sites
 - (ii) Site access
 - (iii) Lead times for delivery of new equipment
 - (iv) Special requirements
 - (v) Seasonal Flow variations
- (c) Identify all permits necessary for construction.
- (d) Develop a construction work plan addressing site constraints.
- (e) Provide a Class 3 cost estimate of the entire project, including PLC replacement and power reliability upgrades. Where specifically asked for, provide cost estimates for individual components of work.
- (f) Prepare a project schedule.
- (g) Throughout preliminary design meet with City Steering Committee to discuss findings, obtain input from City personnel, and discuss design. A minimum of three (3) formal meetings will be required:
 - (i) Review of the draft preliminary design for the PLC hardware as detailed in Section D5.4.
 - (ii) Presentation and review of the draft Preliminary Design Report
 - (iii) Presentation and review of the draft P&ID DrawingsAdditional formal meetings can be accommodated to suit proponents' requirements.
- (h) Prepare a comprehensive Preliminary Design Report documenting investigations performed, findings, functional design, updated drawings, recommendations, Class 3 cost estimates, and proposed construction schedule.
- (i) Submit five (5) hard copies and one (1) electronic PDF copy of the "Draft Preliminary Design Report". All drawings, except for the P&IDs, will be attached to the report as an appendix in an 11x17 format.
- (j) Submit five (5) 11x17 hard copies and one (1) electronic PDF copy of the draft P&ID drawings for each facility.
- (k) Upon receipt of City review comments submit five (5) hard copies and two (2) electronic PDF copies of the "Final Preliminary Design Report". All drawings, except for the P&IDs, will be attached to the report as an appendix in an 11x17 format.
- (l) Submit five (5) 11x17 hard copies and one (1) electronic PDF copies of the final P&ID drawings for each facility. In addition, submit an AutoCAD file for each P&ID drawing, formatted as per the City's standards.

D6. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

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

SUBMISSIONS PRIOR TO START OF SERVICES

D7. AUTHORITY TO CARRY ON BUSINESS

- D7.1 The Consultant 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 Consultant does not carry on business in Manitoba, in the jurisdiction where the Consultant does carry on business, throughout the term of the Contract, and shall provide the Project Manager with evidence thereof upon request.

D8. INSURANCE

- D8.1 The Consultant shall procure and maintain, at its own expense and cost, insurance policies with limits no less than those shown below.
- D8.2 As a minimum, the Consultant shall, without limiting its obligations or liabilities under any other contract with the City, procure and maintain, at its own expense and cost, the following insurance policies:
- (a) Comprehensive or Commercial General Liability Insurance including:
 - (i) an inclusive limit of not less than \$2,000,000.00 for each occurrence or accident with a minimum \$2,000,000.00 Products and Completed Operations aggregate and \$5,000,000.00 general aggregate;
 - (ii) all sums which the Consultant shall become legally obligated to pay for damages because of bodily injury (including death at any time resulting there from) sustained by any person or persons or because of damage to or destruction of property caused by an occurrence or accident arising out of or related to the Services or any operations carried on in connection with this Contract;
 - (iii) coverage for Products/Completed Operations, Blanket Contractual, Contractor's Protective, Personal Injury, Contingent Employer's Liability, Broad Form Property Damage, Employees as Additional Insurers, and Non-Owned Automobile Liability;
 - (iv) a Cross Liability clause and/or Severability of Interest Clause providing that the inclusion of more than one Insured shall not in any way affect the rights of any other Insured hereunder in respect to any claim, demand, suit or judgment made against any other Insured;
 - (v) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Consultant directly or indirectly in the performance of the Services. The Limit of Liability shall not be less than

\$2,000,000.00 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.

- (b) If applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Consultant directly or indirectly in the performance of the Service. The Limit of Liability shall not be less than \$2,000,000.00 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
- (c) Professional Errors and Omissions Liability Insurance including:
 - (i) an amount not less than \$5,000,000.00 per claim and \$5,000,000.00 in the aggregate.

- D8.2.1 The Consultant's Professional Errors and Omissions Liability Insurance shall remain in force for the duration of the Project and for twelve (12) months after total performance.
- D8.3 The policies required in D8.2(a) shall provide that the City is named as an Additional Insured there under and that said policies are primary without any right of contribution from any insurance otherwise maintained by the City.
- D8.4 The Consultant shall require each of its Subconsultants to provide comparable insurance to that set forth under D8.2(a).
- D8.5 The Consultant shall provide the Project Manager with a certificate(s) of insurance for itself and for all of its Subconsultants, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Services, but in no event later than the date specified in C4.1 for the return of the executed Contract. Such Certificates shall state the exact description of the Services and provide for written notice in accordance with D8.10.
- D8.6 The Consultant may take out such additional insurance as it may consider necessary and desirable. All such additional insurance shall be at no expense to the City.
- D8.7 All insurance, which the Consultant is required to obtain with respect to this Contract, shall be with insurance companies registered in and licensed to underwrite such insurance in the Province of Manitoba.
- D8.8 If the Consultant fails to do all or anything which is required of it with regard to insurance, the City may do all that is necessary to affect and maintain such insurance, and any monies expended by the City shall be repayable by and recovered from the Consultant.
- D8.9 The failure or refusal to pay losses by any insurance company providing insurance on behalf of the Consultant or any Subconsultants shall not be held to waive or release the Consultant or Subconsultants from any of the provisions of the insurance requirements or this Contract. Any insurance deductible maintained by the Consultant or any Subconsultants under any of the insurance policies is solely for their account and any such amount incurred by the City will be recovered from the Consultant as stated in D8.8.
- D8.10 The Consultant shall not cancel, materially alter, or cause any policy to lapse without providing at least thirty (30) Calendar Days prior written notice to the City.

SCHEDULE OF SERVICES

D9. COMMENCEMENT

- D9.1 The Consultant shall not commence any Services until it is in receipt of a notice of award from the City authorizing the commencement of the Services.
- D9.2 The Consultant shall not commence any Services until:
 - (a) the Project Manager has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D7;

- (ii) evidence of the insurance specified in D8;and
- (b) the Consultant has attended a meeting with the Project Manager, or the Project Manager has waived the requirement for a meeting.

D9.3 The City intends to award this Contract by July 16, 2012.

D10. CRITICAL STAGES

D10.1 The Consultant shall achieve critical stages of the Services for this Contract in accordance with the following requirements:

- (a) Completion of the draft preliminary design for the PLC hardware as detailed in Section D5.4 by December 10th, 2012.
- (b) Completion of the Preliminary Design Report by February 4th, 2013.
- (c) Completion of the P&ID Drawings by May 1, 2013.

APPENDIX A – SECURITY CLEARANCE

1. SECURITY CLEARANCE

1.1 Each individual proposed to perform Work under the Contract within City facilities including but not limited to:

- (a) MacLean Pumping Station
- (b) McPhillips Pumping Station
- (c) Hurst Pumping Station
- (d) Tache Booster Station
- (e) Deacon Booster Station
- (f) Shoal Lake Intake

shall be required to provide a Criminal Record Search Certificate and a Public Safety Verification Check as detailed below.

1.2 Prior to the commencement of any Work specified in 1.1, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Consultant shall supply the Contract Administrator with a Criminal Record Search Certificate and a Public Safety Verification Check obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform such Work.

1.2.1 The Public Safety Verification Check may be obtained from BackCheck. Forms to be completed can be found on the website at: <http://www.backcheck.net/>.

1.2.2 The Criminal Record Search Certificate may be obtained from any one of the following:

- (a) Police service having jurisdiction at his/her place of residence (note the City of Winnipeg Police Service requires 3 to 4 weeks to complete the search); or
- (b) BackCheck, forms to be completed can be found on the website at: <http://www.backcheck.net/> (note that BackCheck requires 12 to 48 hrs to complete the search); or
- (c) Core of Commissionaires, forms to be completed can be found on the website at: <http://www.commissionaires.mb.ca/> (Note that Core of Commissionaires requires 48 hrs to complete the search).

1.3 Any individual for whom a Criminal Record Search Certificate and a Public Safety Verification Check is not provided, or for whom a Criminal Record Search Certificate or and a Public Safety Verification Check indicates any convictions or pending charges related to property offences or crimes against another person, will not be permitted to perform any Work specified in 1.1.

1.4 Any Criminal Record Search Certificate and Public Safety Verification Check obtained thereby will be deemed valid for one (1) year beyond the date which it was obtained. If the Consultant continues to perform work as specified in 1.1 beyond this date, they will be required to provide the Contract Administrator with an updated Criminal Record Search Certificate and Public Safety Verification Check.

1.5 Notwithstanding the foregoing, at any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require an updated criminal record search or a Public Safety Verification Check. Any individual who fails to provide a satisfactory Criminal Record Search Certificate or a Public Safety Verification Check as a result of a repeated criminal records search will not be permitted to continue to perform any Work specified in 1.1.

APPENDIX B – DEFINITION OF PROFESSIONAL CONSULTANT SERVICES (CONSULTING ENGINEERING SERVICES)

1. INTRODUCTION

- 1.1 It is the intent of the City of Winnipeg, in defining Professional Consultant Services (Consulting Engineering Services), to clarify the role required of consulting Engineers; to more fully identify the services to be rendered by consulting Engineers to the City and to other parties on behalf of the City; and to provide a more clearly determined basis of obligation in respect thereof by consulting Engineers to the City and to third parties in the provision of such services.
- 1.2 The services shall be performed in the City of Winnipeg, unless otherwise authorized by the City, under direct supervision of a professional Engineer. All drawings, reports, recommendations and other documents, originating therefrom involving the practice of professional engineering, shall bear the stamp or seal and signature of a qualified Engineer as required by the Engineering and Geoscientific Professions Act of the Province of Manitoba and By-laws of the Association of Professional Engineers and Geoscientists of the Province of Manitoba. Other reports and documents not involving the "practice of professional engineering", such as letters of information, minutes of meetings, construction progress reports, may be originated and signed by other responsible personnel engaged by the consulting Engineer and accepted by the City. Progress estimates, completion certificates and other reports related to the technical aspects of a project, must be endorsed by the Engineer in a manner acceptable to the City.

2. ADVISORY SERVICES

- 2.1 Advisory services are normally not associated with or followed by preliminary design and/or design services, and include, but are not limited to:
- (a) Expert Testimony;
 - (b) Appraisals;
 - (c) Valuations;
 - (d) Rate structure and tariff studies;
 - (e) Management services other than construction management;
 - (f) Feasibility studies;
 - (g) Planning studies;
 - (h) Surveying and mapping;
 - (i) Soil mechanics and foundation engineering;
 - (j) Inspection, testing, research, studies, or reports concerning the collection, analysis, evaluation; and
 - (k) Interpretation of data and information leading to conclusions and recommendations based upon specialized engineering experience and knowledge.

3. PRELIMINARY DESIGN

- 3.1 Preliminary design services are normally a prelude to the detailed design of a project and include, but are not limited to:
- (a) Preliminary engineering studies;
 - (b) Engineering investigation;
 - (c) Surface and subsurface site explorations, measurements, investigations, and surveys;
 - (d) Operations studies including drainage studies, traffic studies, etc.;
 - (e) Functional planning;

- (f) Physical, economical (capital and operating) and environmental studies including evaluation, comparison, and recommendation regarding alternative preliminary designs;
- (g) Preparation and submission of a report and appropriate drawings to the City, fully documenting data gathered, explaining adequately the assessment made, stating with clarity the resulting conclusions, and containing all recommendations which are relevant to this stage of project implementation;
- (h) Special applications to public agencies for necessary authorizations, preparation and submission of reports and drawings thereto and appearance before same in support of the application.

4. DETAILED DESIGN

4.1 Detailed design services normally involve preparation of detailed designs, tender specifications and drawings, and analysis of bids and recommendations for contract award, and include, but are not limited to:

- (a) Addressing alternative methods of accommodating; relocating; avoiding, and/or avoiding injury to Utilities and railways; proposing alternative methods of solution, reviewing same with the appropriate Regulatory approval agencies and stakeholders;
- (b) Application to public agencies for necessary authorizations, preparation and submission of reports and drawings thereto, and appearance before same in support of the application;
- (c) Preparation and submission of detailed engineering calculations, drawings, and criteria employed in the design(s), securing review of and an acceptance by the City;
- (d) Preparation of detailed engineering drawings, specifications and tender documents consistent with the standards and guidelines of the City, securing review of acceptance by the City;
- (e) Preparation and provision to the City in written form, a fully detailed formal construction contract estimate;
- (f) Provision of appropriate response to bidders and advice to the City during the bid period and, subject to acceptance by the City, issuing addenda to the tender documents;
- (g) Submission of a review, analysis, comparison, tabulation, calculation, and evaluation of the bids received, to the City;
- (h) Preparation of a report including revised contract estimate, identifying and explaining variations from the earlier formal estimate, and containing recommendation regarding contract award identifying the reasons therefore.

5. CONTRACT ADMINISTRATION SERVICES

5.1 Contract administration services are associated with the construction of a project and include the office and field services required to ensure the conduct of the project in accordance with the intent of the City and in conformance with the particulars of the drawings and specifications; and include but are not limited to:

5.2 NON-RESIDENT SERVICES

- (a) Consultation with and advice to the City during the course of construction;
- (b) Review and acceptance of shop drawings supplied by the contractor or supplier to ensure that the drawings are in conformance with the drawings and specifications, without relieving the contractor of his contractual and other legal obligations in respect thereof;
- (c) Review and report to the City upon laboratory, shop and other tests conducted upon materials and/or equipment placed or installed by the contractor to ensure to the City conformance with the drawings and specifications, without relieving the contractor of his contractual and other legal obligations in respect thereof;

- (d) Acceptance of alternate materials and methods, subject to prior acceptance by the City, without relieving the contractor of his contractual and other legal obligations in respect thereof;
- (e) Provision to the City of a complete current report on the project status on a monthly basis;
- (f) Provision to the City a current update of revised contract-end cost estimate on a monthly basis, or more frequently if found necessary, with explanation and justification of any significant variation from the preceding contract-end cost estimate;
- (g) Definition and justification of and estimate of cost for additions to or deletions from the contract for authorization by the City;
- (h) Furnishing the City with a copy of all significant correspondence relating directly or indirectly to the project, originating from or distributed to, parties external to the consulting Engineer, immediately following receipt or dispatch of same by the consulting Engineer;
- (i) Provision of adequate and timely direction of field personnel by senior officers of the Consultant;
- (j) Establishment prior to construction and submission to the City of written and photographic records of, and assessment of the physical condition of adjacent buildings, facilities, and structures sufficient to equip the consulting Engineer to provide valid evidence and relevant testimony in settlement of any claim involving the City by any court of law, or by any other party for damages thereto arising from the project;
- (k) Arranging and attending pre-construction meetings and on-site or off-site review meetings, which meetings shall include representatives of the contractor and the City;
- (l) The preparation and submission of:
 - (i) a detailed design notes package including items such as structural, geotechnical, hydraulic and heating, air-conditioning and ventilation design calculations; mechanical and electrical design calculations related to process equipment and building services; process design calculations; and instrumentation and process control design calculations;
 - (ii) approved related shop drawings and equipment process manuals all within one (1) month of completion of each separate installation contract required to complete the Works.

5.3 RESIDENT SERVICES

- (a) Provision of qualified resident personnel acceptable to the City present at the project site to carry out the services as specified immediately below, without relieving the contractor of his contractual and other legal obligations in respect thereof:
 - (i) inspection of all pipe prior to installation;
 - (ii) inspection and acceptance of excavation for, and full time inspection at the time of bedding placement, pipe laying and backfilling in respect of installation of watermains, land drainage sewers, and wastewater sewers;
 - (iii) inspection of installation of all connections to watermains, sewers, manholes, valves, hydrants or house services, and excavation and/or exposing of all underground services, structures, or facilities;
 - (iv) "full time inspection" and/or testing of watermains and sewers;
 - (v) inspection of all excavations to determine soil adequacy prior to installation of base and subbase courses for sidewalks, public back lanes, and street pavements.

5.4 It is to be understood that "full time inspection" will require assignment of a qualified person to each specific location when the referenced work is being undertaken by the contractor.

- (a) Without relieving the contractor of his contractual and other legal obligations in respect thereof, conduct detailed inspection of construction sufficient to ensure that the construction carried out by the contractor is in conformance with the drawings and specifications;

- (b) Co-ordination and staging of all other works on the project site including traffic signal installations, hydro, telephone, and gas utility work, railway work forces and City or developer work;
- (c) In conjunction with the City, provision of notice to adjacent residents and businesses of those stages of construction of the project that will interrupt public services or access thereto, sufficiently in advance of same to permit preparation therefore;
- (d) Enforcement of contractor conformance with the City of Winnipeg Manual of Temporary Traffic Control in Work Areas on City Streets and with reasonable standards of safety for motorists and pedestrians, without relieving the contractor of his contractual and other legal obligations in respect thereof;
- (e) Provision of reference line and elevation to the contractor and checking upon the contractor's adherence thereto, without relieving the contractor of his contractual and other legal obligations in respect thereof;
- (f) Responsible, sensitive, and prompt reaction to the reasonable requests and complaints of citizens regarding the conduct of the project, acting in the interest of the City;
- (g) Arranging for and carrying out of testing of materials utilized by the contractor to ensure conformance with the drawings and specifications, without relieving the contractor of his contractual and other legal obligations in respect thereof;
- (h) Preparation, certification, and prompt submission of progress estimates to the City for payment to the contractor for construction performed in accordance with the drawings and specifications;
- (i) Arrange, attend and prepare and distribute records of and minutes for, regularly held on-site or offsite project review meetings including representatives of the contractor and the City;
- (j) Promptly reporting to the City upon any significant and unusual circumstances;
- (k) Promptly arranging for and taking part in a detailed final inspection of the project with the contractor and the City prior to commencement of the period of contractor maintenance guarantee specified in the contract for the project and providing to the City in written form an appropriate recommendation of acceptance of the constructed or partially constructed project;
- (l) Act as Payment Certifier and administer all contracts as required under the Builder's Liens Act of Manitoba;
- (m) Prepare a Certificate of Substantial Performance;
- (n) Preparation and submission to the City of "as-constructed" drawings for the project within 1 month of project completion;
- (o) Prepare a Certificate of Total Performance;
- (p) Provision of inspection services during the maintenance guarantee period of the contract;
- (q) Undertake a detailed inspection of the project with the contractor and the City prior to the end of the period of contractor maintenance guarantee specified in the contract for the project;
- (r) Keep a continuous record of working days and days lost due to inclement weather during the course of contract works;
- (s) Prepare a Certificate of Acceptance.

6. ADDITIONAL SERVICES

- 6.1 Additional services are in addition to those specified in other Types of Services and may or may not be associated with a construction project, but are not in place of or in substitution for those services elsewhere specified in the Definition of Standard Consulting Engineering Services in respect of other Types or Categories of Services.
- (a) Revision of completed, or substantially completed, drawings and/or specifications that were in conformance with the original intent of the City or had been accepted by the City;

- (b) Preparation of operating manuals and/or training of operating personnel;
- (c) Startup and/or operation of operating plants;
- (d) Procurement of materials and equipment for the City;
- (e) Preparation for and appearance in litigation on behalf of the City;
- (f) Preparation of environmental studies and reports and presentation thereof in public hearings.

APPENDIX C – RELEVANT DOCUMENTS

1. The following document is available for viewing at 1199 Pacific Avenue through the Project Manager:

- SNC Lavalin (February 2018) Water Pumping Stations Power Reliability Study