



**THE CITY OF WINNIPEG**

# **BID OPPORTUNITY**

**BID OPPORTUNITY NO. 676-2007**

**WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF ANALYTICAL  
INSTRUMENT SYSTEMS**

## TABLE OF CONTENTS

### PART A - BID SUBMISSION

|                |   |
|----------------|---|
| Form A: Bid    | 1 |
| Form B: Prices | 3 |

### PART B - BIDDING PROCEDURES

|   |   |
|---|---|
| B1. Contract Title                              | 1 |
| B2. Submission Deadline                         | 1 |
| B3. Site Investigation                          | 1 |
| B4. Enquiries                                   | 1 |
| B5. Addenda                                     | 2 |
| B6. Substitutes                                 | 2 |
| B7. Bid Submission                              | 3 |
| B8. Bid   | 4 |
| B9. Prices                                      | 4 |
| B10. Qualification                              | 5 |
| B11. Opening of Bids and Release of Information | 5 |
| B12. Irrevocable Bid                            | 6 |
| B13. Withdrawal of Bids                         | 6 |
| B14. Evaluation of Bids                         | 6 |
| B15. Award of Contract                          | 7 |

### PART C - GENERAL CONDITIONS

|                        |   |
|------------------------|---|
| C1. General Conditions | 1 |
|------------------------|---|

### PART D - SUPPLEMENTAL CONDITIONS

#### General

|                            |   |
|----------------------------|---|
| D1. General Conditions     | 1 |
| D2. Scope of Work          | 1 |
| D3. Definitions            | 1 |
| D4. Contract Administrator | 4 |
| D5. Notices                | 5 |

#### Submissions

|                                    |   |
|------------------------------------|---|
| D6. Authority to Carry on Business | 6 |
| D7. Workers Compensation           | 6 |
| D8. Insurance                      | 6 |
| D9. Material Safety Data Sheets    | 7 |
| D10. Performance Security          | 7 |
| D11. Subcontractor List            | 7 |
| D12. Detailed Work Schedule        | 8 |
| D13. Security Clearance            | 9 |

#### Schedule of Work

|                              |    |
|------------------------------|----|
| D14. Commencement            | 9  |
| D15. Forfeiture of Contract  | 10 |
| D16. Critical Stages         | 10 |
| D17. Substantial Performance | 10 |
| D18. Total Performance       | 11 |
| D19. Liquidated Damages      | 11 |

#### Control of Work

|  |    |
|--|----|
| D20. Job Meetings  | 11 |
| D21. Prime Contractor – The Workplace Safety and Health Act (Manitoba) | 12 |

#### Measurement and Payment

|                       |    |
|-----------------------|----|
| D22. Payment          | 12 |
| D23. Payment Schedule | 12 |

**Indemnity**

|                |    |
|----------------|----|
| D24. Indemnity | 13 |
|----------------|----|

**Warranty**

|               |    |
|---------------|----|
| D25. Warranty | 13 |
|---------------|----|

|                           |    |
|---------------------------|----|
| Form H1: Performance Bond | 14 |
|---------------------------|----|

|   |    |
|---|----|
| Form H2: Irrevocable Standby Letter of Credit | 16 |
|---|----|

|                            |    |
|----------------------------|----|
| Form J: Subcontractor List | 18 |
|----------------------------|----|

**PART E - SPECIFICATIONS**

**General**

|  |   |
|--|---|
| E1. Applicable Specifications and Drawings | 1 |
|--|---|

|           |   |
|-----------|---|
| E2. Goods | 1 |
|-----------|---|

|                 |   |
|-----------------|---|
| E3. Site Access | 1 |
|-----------------|---|

| <u>Specification No.</u> | <u>Specification Title</u>                       |
|--------------------------|--|
| 01300                    | Submittals                                       |
| 01450                    | Quality Control                                  |
| 01650                    | Equipment Installation                           |
| 01730                    | Operation And Maintenance Manuals                |
| 17010                    | Instrumentation And Control General Requirements |
| 17015                    | Scope of Supply                                  |
| 17700                    | Instrument Index                                 |
| 17700-A                  | Instrument Index                                 |
| 17701                    | Instrument Specification Sheets                  |
| 17701-A                  | Instrument Specification Sheets                  |

## **PART B - BIDDING PROCEDURES**

### **B1. CONTRACT TITLE**

- B1.1 WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF ANALYTICAL INSTRUMENT SYSTEMS

### **B2. SUBMISSION DEADLINE**

- B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, June 3, 2008.
- B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.
- B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

### **B3. SITE INVESTIGATION**

- B3.1 Further to GC.2.01, the Bidder may make an appointment to view the Site by contacting the Contract Administrator.
- B3.2 The Bidder shall not be entitled to rely on any information or interpretation received at the Site investigation unless that information or interpretation is the Bidder's direct observation, or is provided by the Contract Administrator in writing.

### **B4. ENQUIRIES**

- B4.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.
- B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall promptly notify the Contract Administrator of the error, discrepancy or omission at least five (5) Business Days prior to the Submission Deadline.
- B4.3 If the Bidder is unsure of the meaning or intent of any provision therein, the Bidder should request clarification as to the meaning or intent prior to the Submission Deadline.
- B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.
- B4.5 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.
- B4.6 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B3 unless that response or interpretation is provided by the Contract Administrator in writing.

### **B5. ADDENDA**

- B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.
- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 9 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.
- B6. SUBSTITUTES**
- B6.1 The Work is based on the materials, equipment, methods and products specified in the Bid Opportunity.
- B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.
- B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:
- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the material, equipment, method or product as either an approved equal or alternative;
  - (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
  - (c) identify any anticipated cost or time savings that may be associated with the substitute;
  - (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract;
  - (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the Contract.
- B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an "approved equal" or as an "approved alternative", or may refuse to grant approval of the substitute.
- B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.
- B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.
- B6.7 If the Contract Administrator approves a substitute as an "approved equal", any Bidder may use the approved equal in place of the specified item.
- B6.8 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative shall base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B14.

- B6.9 No later claim by the Contractor for an addition to the price(s) because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

**B7. BID SUBMISSION**

- B7.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
  - (b) Form B: Prices.
- B7.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.
- B7.3 The Bid Submission shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.
- B7.3.1 Samples or other components of the Bid Submission which cannot reasonably be enclosed in the envelope may be packaged separately, but shall be clearly marked with the Bid Opportunity number, the Bidder's name and address, and an indication that the contents are part of the Bidder's Bid Submission.
- B7.4 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.
- B7.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, may result in the Bid being determined to be non-responsive.
- B7.6 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B7.7 Bids shall be submitted to:
- The City of Winnipeg  
Corporate Finance Department  
Materials Management Branch  
185 King Street, Main Floor  
Winnipeg MB R3B 1J1

**B8. BID**

- B8.1 The Bidder shall complete Form A: Bid, making all required entries.
- B8.2 Paragraph 2 of Form A: Bid shall be completed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;
  - (b) if the Bidder is a partnership, the full name of the partnership shall be inserted;
  - (c) if the Bidder is a corporation, the full name of the corporation shall be inserted;
  - (d) if the Bidder is carrying on business under a name other than his own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.
- B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

- B8.4 Paragraph 11 of Form A: Bid shall be signed in accordance with the following requirements:
- (a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;
  - (b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;
  - (c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, should be affixed;
  - (d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.
- B8.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.
- B8.4.2 All signatures should be witnessed, except where a corporate seal has been affixed.
- B8.5 If a Bid is submitted jointly by two or more persons, the word "Bidder" shall mean each and all such persons, and the undertakings, covenants and obligations of such joint Bidders in the Bid and the Contract, when awarded, shall be both joint and several.

## **B9. PRICES**

- B9.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B9.1.1 Prices on Form B: Prices shall include:
- (a) duty;
  - (b) freight and cartage;
  - (c) Provincial and Federal taxes [except the Goods and Services Tax (GST) and Manitoba Retail Sales Tax (MRST, also known as PST), which shall be extra where applicable] and all charges governmental or otherwise paid;
  - (d) profit and all compensation which shall be due to the Contractor for the Work and all risks and contingencies connected therewith.
- B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.
- B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

## **B10. QUALIFICATION**

- B10.1 The Bidder shall:
- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Bidder does not carry on business in Manitoba, in the jurisdiction where the Bidder does carry on business; and
  - (b) be financially capable of carrying out the terms of the Contract; and
  - (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract; and
  - (d) be normally engaged and fully competent in the type of Work described in Section 17010 of the Specifications and be continuously and successfully engaged in this business for at least the last five (5) years.

- B10.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) be responsible and not be suspended, debarred or in default of any obligations to the City a list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>.
- B10.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
  - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
  - (c) have a written workplace safety and health program, if required, pursuant to The Workplace Safety and Health Act (Manitoba).
- B10.4 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B10.5 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

## **B11. OPENING OF BIDS AND RELEASE OF INFORMATION**

- B11.1 Bids will not be opened publicly.
- B11.2 Following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements or evaluated prices) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>
- B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>
- B11.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

## **B12. IRREVOCABLE BID**

- B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 10 of Form A: Bid.
- B12.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 10 of Form A: Bid.

## **B13. WITHDRAWAL OF BIDS**

- B13.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B13.1.1 Notwithstanding GC.7.05(2), the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.



- B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
  - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 11 of Form A: Bid; and
  - (c) if the notice has been given by any one of the persons specified in B13.1.3(b), declare the Bid withdrawn.
- B13.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B12.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law.

#### **B14. EVALUATION OF BIDS**

- B14.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity and degree of compliance with specifications or acceptable deviation therefrom (pass/fail);
  - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
  - (c) Total Bid Price;
  - (d) economic analysis of any approved alternative pursuant to B6.
- B14.2 Further to B14.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities if the interests of the City so require.
- B14.3 Further to B14.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid or in other information required to be submitted, that he is responsible and qualified.
- B14.4 Further to B14.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.
- B14.4.2 Further to B14.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.
- B14.4.3 This Contract will be awarded as a whole.

#### **B15. AWARD OF CONTRACT**

- B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B15.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

- B15.2.1 Without limiting the generality of B15.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
  - (b) the prices are materially in excess of the prices received for similar work in the past;
  - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
  - (d) only one Bid is received; or
  - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B15.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.
- B15.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

## **PART C - GENERAL CONDITIONS**

### **C1. GENERAL CONDITIONS**

C1.1 The *General Conditions for the Supply and Delivery of Goods* (Form 21: 88 03) are applicable to the Work of the Contract.

C1.1.1 The *General Conditions for the Supply and Delivery of Goods* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt>

## PART D - SUPPLEMENTAL CONDITIONS

### GENERAL

#### D1. GENERAL CONDITIONS

- D1.1 In addition to the *General Conditions for the Supply and Delivery of Goods*, these Supplemental Conditions are applicable to the Work of the Contract.
- D1.2 The General Conditions are amended by striking out "The City of Winnipeg Act" wherever it appears in the General Conditions and substituting "The City of Winnipeg Charter".
- D1.3 The General Conditions are amended by striking out "Board of Commissioners" or "Commissioner" wherever it appears in the General Conditions and substituting the "Chief Administrative Officer".
- D1.4 The General Conditions are amended by striking out "Tender Package" wherever it appears in the General Conditions and substituting "Bid Opportunity".
- D1.5 The General Conditions are amended by striking out "Tender Submission" wherever it appears in the General Conditions and substituting "Bid Submission".
- D1.6 The General Conditions are amended by striking out "Bidding Instructions" wherever it appears in the General Conditions and substituting "Bidding Procedures".

#### D2. SCOPE OF WORK

- D2.1 The Work to be done under the Contract shall consist of the supply of analytical instrument systems.
- D2.2 The major components of the Work are as follows:
- (a) The supply of all materials as specified in the Contract Documents including, but not limited to:
    - (i) inline turbidity meters;
    - (ii) pH/temperature analyzers;
    - (iii) chlorine residual analyzers, and
    - (iv) online total chlorine, free ammonia, total ammonia and monochloramine analyzers.
  - (b) For all equipment supplied under this Contract provide: delivery to Site, training, Performance Verification support, operation and maintenance manuals, equipment accessories and spare parts.
  - (c) During the Performance Verification and training period the Contractor shall provide qualified representation on Site as required to assist the Installation Contractor in achieving and demonstrating satisfactory performance of the Goods as installed.

#### D3. DEFINITIONS

- D3.1 When used in this Bid Opportunity:
- (a) "**Award Authority**" means the authority having the jurisdiction to award the Contract according to the City's by-laws, policies or procedures;
  - (b) "**Business Day**" means any Calendar Day, other than a Saturday, Sunday, or a Statutory or Civic Holiday;
  - (c) "**Submission Deadline**" and "**Time and Date Set for the Final Receipt of Bids**" mean the time and date set out in the Bidding Procedures for final receipt of Bids;

- (d) **Acceptable Shop Drawings** means all required Shop Drawings have been reviewed by the Contract Administrator and have been annotated and stamped as “reviewed” or “reviewed as modified” in accordance with Section 01300 of this Bid Opportunity
- (e) **API** means American Petroleum Institute
- (f) **CEMA** means Canadian Electrical Manufacturer’s Association
- (g) **CSA** means Canadian Standards Association
- (h) **City Supplied Equipment** means equipment supplied and installed by the City under a separate contract which shall be controlled by the PLC and HMI hardware supplied and programmed under this Contract.
- (i) **City Warehouse** means the enclosed and heated City owned warehouse located at 1500 Plessis Road, Winnipeg, Manitoba
- (j) **Commissioning Operations Agent** means a qualified operations team, retained by the City under a separate contract, that takes primary responsibility for operation of the WTP during the Commissioning Period
- (k) **Commissioning Period** means the time between the completion of Performance Verification and Total Performance during which a system is operated under Commissioning Operations Agent’s control to demonstrate to the City that it operates in conformance with the design intent
- (l) **Contract Work Schedule** means a Gantt Chart developed by the Contractor developed using the critical path method which shows the proposed progress of the major items of work which are to be performed under this Contract
- (m) **Control System Integrator** or **Systems Integrator** means a Contractor retained by the City (under a different contract) to program and configure the water treatment plant SCADA system.
- (n) **DAF** means Dissolved Air Flotation
- (o) **DBPS** means Deacon Booster Pumping Station
- (p) **EEMAC** means Electrical and Electronic Manufacturer Association of Canada
- (q) **FAT** means factory acceptance test
- (r) **FDS** or **Functional Design Specification** means a submittal prepared by the Contractor that details the solution he will supply and install to meet the City defined requirements for the WTP control system. The FDS shall provide the basis of the software configuration and shall be validated during Performance Verification to ensure that all required functions are present and that they operate correctly
- (s) **FS** means Federal Specifications
- (t) **Furnish** means supply
- (u) **GOX** means gaseous oxygen
- (v) **HDS** or **Hardware Design Specification** means a submittal prepared by the Contractor that fully describes all the hardware aspects of the Work
- (w) **I&C** means instrumentation and control
- (x) **I/O** means input/output
- (y) **ILD** means instrument loop diagram
- (z) **IEC** means International Electrotechnical Commission
- (aa) **IEEE** means Institute of Electrical and Electronics Engineers
- (bb) **Installation Contractor** or **Installer** means a contractor retained by the City, under a different contract, to install certain pieces of equipment supplied under this Contract
- (cc) **ISA** means the Instrumentation Systems and Automation Society
- (dd) **ISO** means International Organization for Standardization

- (ee) **HMI** means human machine interface
- (ff) **LOX** means liquid oxygen
- (gg) **Manufacturer** means the person, partnership or corporation responsible for the manufacture and fabrication of equipment supplied by the Contractor for the completion of the Work
- (hh) **Manufacturer's Representative** means a trained serviceman empowered by the Manufacturer to provide installation, testing, and commissioning assistance to the Contractor in his performance of those functions
- (ii) **MCC** means motor control centre
- (jj) **MV** means medium voltage
- (kk) **NEMA** means National Electrical Manufacturers Association
- (ll) **NFPA** means National Fire Protection Association
- (mm) **O&M** means operation and maintenance
- (nn) **OSHA** means Occupational Safety and Health Act
- (oo) **P&ID** means process and instrumentation diagram
- (pp) **PLC** means programmable logic controller
- (qq) **Project Master Schedule** means a schedule developed by the Contract Administrator which includes and coordinates the Contract Work Schedules of several City contracts, including this Contract
- (rr) **Professional Engineer** means a professional engineer registered in the Province of Manitoba
- (ss) **Performance Verification** means all factory and field tests, demonstrations and other activities required from the Contractor to complete all required Forms 103 – Certificate of Satisfactory Performance and to demonstrate to the Contract Administrator's satisfaction that the equipment installed under this Contract is performing as specified herein
- (tt) **Process Unit** means a complete equipment package supplied either by the Contractor or as part of City Supplied Equipment and which includes individual process components, skid mounted equipment and any related appurtenances
- (uu) **PVC** means polyvinyl chloride
- (vv) **Record Drawings** means a minimum of one (1) complete set of Contract Documents and Certified Shop Drawings maintained at the Contractor's Site office on which the Contractor clearly shall clearly record in red pencil all Addenda, Change Orders, Field Instructions, and other revisions or as-built conditions which deviate from the original Contract Documents or Certified Shop Drawings
- (ww) **RTD** means resistance temperature detector
- (xx) **RWPS** means raw water pumping station.
- (yy) **SAT** means Site acceptance test
- (zz) **SCADA** means supervisory control and data acquisition
- (aaa) **SDS** or **Software Design Specification** means a submittal prepared by the Contractor that describes how the software will be encoded in a structured and efficient manner
- (bbb) **SPLC** or **S-PLC** means the DBPS master PLC
- (ccc) **SQL** means standard query language and is a computer language for the retrieval and management of data in relational database management systems
- (ddd) **Substantial Performance** shall have the meaning attributed to it in the Builders' Liens Act (Manitoba), or any successor legislation thereto
- (eee) **Supplemental Training** means training provided by qualified Manufacturers' Representatives during the Warranty Period

- (fff) **TEFC** means totally enclosed fan-cooled
- (ggg) **TPSH** means twisted pair shielded cable
- (hhh) **ULC** means Underwriter's Laboratories of Canada
- (iii) **UPS** means uninterruptible power supply
- (jjj) **URS** or **User Requirement Specification** means a written explanation, prepared by the City, of the control philosophy for equipment shown on the P&IDs
- (kkk) **UV** means ultraviolet
- (lll) **UVM** means UV master PLC
- (mmm) **VFD** means variable frequency drive
- (nnn) **VSD** means variable speed drive
- (ooo) **Vendor Package** means a manufactured equipment package supplied and installed by the Contractor
- (ppp) **WTP** means the Winnipeg Water Treatment Plant and includes the structure and all equipment and materials supplied and installed into the building, under multiple construction contracts, including portions of the Work provided under this Contract
- (qqq) **WTP Facility** means the Winnipeg Water Treatment Plant and all ancillary support facilities located on the Site identified in E3.3, including all structures, equipment and materials supplied and installed into the buildings, under multiple construction contracts, including portions of the Work provided under this Contract

- D3.2 The definitions of technical terms, abbreviations, and symbols will be those of the American Society for Testing and Materials, Canadian Standards Association and the applicable Codes and Standards. In the event of a dispute, the Contract Administrator's decision will be final.
- D3.3 Certain definitions related to the technical components of the Work shall be as defined in Section 17010.
- D3.4 The Manufacturer and Manufacturer's Representative are not parties to this Contract. All work required from the Manufacturer and Manufacturer's Representative shall be provided and coordinated by the Contractor.
- D3.5 Specialized terms relating to instrumentation and control and which are not explicitly defined herein shall be as defined in The Instrumentation Systems and Automation Society (ISA) S51.1, National Electrical Manufacturer's Association (NEMA) Industrial Control and Systems (ICS) 1, American National Standards Institute (ANSI)/Institute of Electrical and Electronic Engineers (IEEE) Std 100, and the Communications Standard Dictionary, by Martin H. Weik.

#### **D4. CONTRACT ADMINISTRATOR**

- D4.1 The Contract Administrator is UMA Projects (CM) Ltd., represented by:  
Bill Richert, P. Eng.  
1479 Buffalo Place  
Winnipeg, MB  
R3T 1L7  
e-mail: bill.richert@uma.aecom.com  
Telephone No. (204) 986-6053  
Facsimile No. (204) 986-8393
- D4.2 Before commencement of Work, the Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

## **D5. NOTICES**

- D5.1 GC.7.05 is hereby amended to delete reference to "registered mail" and to replace same with "ordinary mail".
- D5.2 GC.7.05 is further amended hereby to include delivery by facsimile transmission (fax) as an acceptable means of delivering notices, consents, approvals, statements, authorizations, documents or other communications required or permitted to be given under this Contract. Deliveries by fax will be deemed to have been received on the day of delivery, if a business day, or if not a business day, on the business day next following the day of delivery.
- D5.3 Further to GC.7.05, all notices, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.4, D5.5 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D4.1.
- D5.4 All notices of appeal to the Chief Administrative Officer shall be sent to the Chief Financial Officer at the following address or facsimile number:  
The City of Winnipeg  
Chief Administrative Officer Secretariat  
Attn: Chief Administrative Officer  
Administration Building, 3rd Floor  
510 Main Street  
Winnipeg MB R3B 1B9  
Facsimile No.: (204) 949-1174
- D5.5 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following address or facsimile number:  
The City of Winnipeg  
Corporate Services Department  
Legal Services Division  
Attn: City Solicitor  
185 King Street, 3rd Floor  
Winnipeg MB R3B 1J1  
Facsimile No.: (204) 947-9155

## **SUBMISSIONS**

### **D6. AUTHORITY TO CARRY ON BUSINESS**

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

### **D7. WORKERS COMPENSATION**

- D7.1 The Contractor shall be registered with the Workers Compensation Board of Manitoba, shall provide and maintain Workers Compensation coverage throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

### **D8. INSURANCE**

- D8.1 The City will provide and maintain the following Project Insurance Coverages:



- (a) Builder's Risk Insurance in the amount of one hundred percent (100%) of the total project cost.
  - (i) The Contractor shall be responsible for deductibles up to \$25,000.00 maximum of any one loss.
- (b) Wrap-Up Liability Insurance in an amount of no less than 10 million dollars (\$10,000,000.00)
  - (i) The Contractor shall be responsible for deductibles up to \$25,000.00 maximum of any one loss.
- (c) The City of Winnipeg will carry such insurance to cover all parties engaged in the Work in this Contract. Provision of this insurance by the City of Winnipeg is not intended in any way to relieve the Contractor from his obligations under the terms of the Contract. Specifically, losses relating to deductibles for insurance, as well as losses in excess of limits of coverage and any risk of loss that is not covered under the terms of the insurance provided by the City of Winnipeg remains with the Contractor.

D8.2 The Contractor shall provide and maintain the following insurance coverage at all times during the performance of the Work:

- (a) Automobile liability insurance for owned and non-owned automobiles used for or in connection with the work in the amount of at least two million dollars (\$2,000,000.00).
  - (i) Deductibles shall be borne by the Contractor;
  - (ii) The Contractor shall not cancel, materially alter, or cause the policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator;
  - (iii) The Contractor shall provide the Contract Administrator with evidence of insurance of the policy at least two (2) Business Days prior to the commencement of any Work on the Site but in no event later than seven (7) Calendar Days from notification of the award of Contract.

D8.3 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

## **D9. MATERIAL SAFETY DATA SHEETS**

D9.1 The Contractor shall provide the Contract Administrator with one (1) copy of Material Safety Data Sheets (MSDS's) for each product to be supplied under the Contract at least two (2) Business Days prior to the commencement of Work but in no event later than the date specified in GC.3.01 for the return of the executed Contract.

D9.2 Throughout the term of the Contract, the Contractor shall provide the Contract Administrator with revisions or updates of the MSDS's as soon as may be reasonably possible.

## **D10. PERFORMANCE SECURITY**

D10.1 The Contractor shall provide and maintain performance security until the expiration of the warranty period in the form of:

- (a) a performance bond of a company registered to conduct the business of a surety in Manitoba, in the form attached to these Supplemental Conditions (Form H1: Performance Bond), in the amount of fifty percent (50%) of the Contract Price; or
- (b) an irrevocable standby letter of credit issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form attached to these Supplemental Conditions (Form H2: Irrevocable Standby Letter of Credit), in the amount of fifty percent (50%) of the Contract Price; or
- (c) a certified cheque or draft payable to "The City of Winnipeg", drawn on a bank or other financial institution registered to conduct business in Manitoba, in the amount of fifty percent (50%) of the Contract Price.

D10.1.1 Where the performance security is in the form of a certified cheque or draft, it will be deposited by the City. The City will not pay any interest on certified cheques or drafts furnished as performance security.

D10.2 The Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site.

## **D11. SUBCONTRACTOR LIST**

D11.1 The Contractor shall provide the Contract Administrator with a complete list of the Subcontractors whom the Contractor proposes to engage (Form J: Subcontractor List) at least two (2) Business Days prior to the commencement of any Work on the Site.

## **D12. DETAILED WORK SCHEDULE**

D12.1 The Contract Administrator has developed a Project Master Schedule for the work. This schedule will be available in the offices of the Contract Administrator and will be updated as required as the Work progresses.

D12.2 The Contractor shall, within fifteen (15) Business Days of award of Contract, prepare a detailed Contract Work Schedule for his work based on a critical path method (CPM) approach.

D12.3 The schedule shall conform to the Project Master Schedule and show, in a clear graphical manner, through the use of Gantt charts, in a maximum of weekly stages, the proposed progress of the main items, structures and subtrades of the Contract and indicate the labour, construction crews, Plant and equipment to be employed. Indicate the delivery date of major pieces of equipment to be supplied. The schedule shall be predicated on the completion of all work on or before the date of Substantial Performance.

D12.4 The Contract Work Schedule shall be updated as the Work requires and submitted to the Contract Administrator.

D12.5 Upon acceptance by the Contract Administrator, distribute copies of the revised schedule to Subcontractors and other concerned parties.

D12.6 The Contractor shall instruct recipients to report to the Contractor immediately any problems anticipated by the timetable shown in the Contract Work Schedule.

D12.7 While it is intended that the Contractor shall be allowed, in general, to carry on the Contract in accordance with such general plans as may appear to him to be most desirable, the Contract Administrator, at his discretion, may direct the order in which, and points at which, parts of the Work shall be undertaken.

D12.8 This control shall be exercised in the interests of the City so that the work or other contractors who may be working on the Site may be coordinated with the Work on this Contract. A program of work will be drawn up and agreed to before the commencement of the Contract.

D12.9 The Contract Administrator shall be notified immediately when the work under the Contract Work Schedule will adversely affect the work of other contractors and the critical path of the Project Master Schedule as the work under the Contractor's Contract Work Schedule is an integral part of the Project Master Schedule.

D12.10 The Contractor shall be familiar with all other Contract Work Schedules as contracted by the City with other contractors and the critical path of the Project Master Schedule.

### **D13. SECURITY CLEARANCE**

- D13.1 Each individual proposed to perform Work under the Contract shall be required to obtain a Criminal Record Search Certificate from the police service having jurisdiction at his place of residence.
- D13.2 Prior to the commencement of any Work, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Contractor shall supply the Contract Administrator with a Criminal Record Search Certificate obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform the Work.
- D13.3 Any individual for whom a Criminal Record Search Certificate is not provided, or for whom a Criminal Record Search Certificate indicates any convictions or pending charges related to property offences or crimes against another person, will not be permitted to perform any Work.
- D13.4 Any Criminal Record Search Certificate obtained thereby will be deemed valid for the duration of the Contract subject to a repeated records search as hereinafter specified.
- D13.5 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 records search. Any individual who fails to provide a satisfactory Criminal Record Search Certificate as a result of a repeated criminal records search will not be permitted to continue to perform any Work.

### **SCHEDULE OF WORK**

#### **D14. COMMENCEMENT**

- D14.1 The Contractor shall not commence any Work until he is in receipt of a notice of award from the City authorizing the commencement of the Work.
- D14.2 The Contractor shall not commence any Work on the Site until:
- (a) the Contract Administrator has confirmed receipt and approval of:
    - (i) evidence of authority to carry on business specified in D6;
    - (ii) evidence of the workers compensation coverage specified in D7;
    - (iii) evidence of the insurance specified in D8;
    - (iv) the Material Safety Data Sheets specified in D9;
    - (v) the performance security specified in D10;
    - (vi) the Subcontractor list specified in D11;
    - (vii) the detailed work schedule specified in D12; and
    - (viii) the security clearances specified in D13.
  - (b) the Contractor has attended a meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting.

#### **D15. FORFEITURE OF CONTRACT**

- D15.1 Notwithstanding GC.8.02 (1) and GC.8.02 (3), the City shall have the full right and power to take the whole of the Work, or any part or parts thereof, out of the hands of the Contractor, without process or action at law, upon giving the Contractor written Notice.

#### **D16. CRITICAL STAGES**

- D16.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

- (a) Delivery: All Goods shall be delivered to the Site on or before August 31, 2008. Delivery shall be considered complete upon the issuance of Form 100: Certificate Of Equipment Delivery and Form 101: Certificate Readiness To Install for all Goods.
- (b) Satisfactory Installation: The Contractor shall provide support to the Installation Contractor as required to achieve the satisfactory installation of all Goods by September 30, 2008.
  - (i) This support shall include, but is not limited to, providing a qualified representative on Site as required to assist the Installation Contractor in achieving satisfactory installation of the Goods.
  - (ii) Satisfactory installation shall be considered complete upon the issuance of Form 102: Certificate Of Satisfactory Installation.
- (c) Satisfactory Performance Verification and training: Performance Verification and training shall be achieved before December 1, 2008. Satisfactory Performance Verification and training shall be considered complete upon the issuance of Form 103: Certificate Of Satisfactory Equipment Performance and Form T1: Certificate Of Satisfactory Training.

#### **D17. SUBSTANTIAL PERFORMANCE**

- D17.1 The Contractor shall achieve Substantial Performance by December 1, 2008.
- D17.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D17.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.
- D17.4 Substantial Performance cannot be completed without the completion of Performance Verification.

#### **D18. TOTAL PERFORMANCE**

- D18.1 The Contractor shall achieve Total Performance by December 31, 2008.
- D18.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D18.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

#### **D19. LIQUIDATED DAMAGES**

- D19.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the day fixed herein for same, the Contractor shall pay the City the following amounts per Calendar Day for each and every Calendar Day following the days fixed herein for same during which such failure continues:
  - (a) Delivery in accordance with D16.1(a) – two thousand, six hundred dollars (\$2,600.00);
  - (b) Substantial Performance – two thousand, six hundred dollars (\$2,600.00);
  - (c) Total Performance – six hundred dollars (\$600).

- D19.2 The amount specified for liquidated damages in D19.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the day fixed herein for same.
- D19.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

## **CONTROL OF WORK**

### **D20. JOB MEETINGS**

- D20.1 Following the delivery of Goods to the Site, regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.
- D20.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

### **D21. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)**

- D21.1 UMA Projects (CM) Ltd. shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).
- D21.2 As Prime Contractor, UMA Projects (CM) Ltd. will administer a Safety and Health Management Plan. Compliance with this Plan will be mandatory for all personnel on the construction site and orientation of all staff by the Prime Contractor's Safety Officer will be required.
- D21.3 The Water Treatment Program Project Safety and Health Management Plan is available on the City of Winnipeg, Corporate Finance, Materials Management Branch internet site at <http://www.winnipeg.ca/matmgt/projects>.

## **MEASUREMENT AND PAYMENT**

### **D22. PAYMENT**

- D22.1 Further to GC.9.03, effective January 1, 2007 the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

### **D23. PAYMENT SCHEDULE**

- D23.1 Further to GC.9.01 and GC.9.03, payment shall be in accordance with the following payment schedule:
- (a) For items 1, 2, 3 and 4 from Form B: Prices:
    - (i) Eighty (80) percent of the unit price will be paid upon issuance of Forms 100: Certificate of Equipment Delivery and 101: Certificate of Readiness to Install.
    - (ii) A further ten (10) percent of the unit price will be paid upon issuance of Form 102: Certificate of Satisfactory Installation.
    - (iii) The final ten (10) percent of the unit price will be paid upon the issuance of Form 103: Certificate of Satisfactory Equipment.
  - (b) Measurement and payment for item 5 "supply of operations and maintenance manuals" will be made at the fixed lump sum amount set out in Form B: Prices.

- (c) Measurement and Payment for item 6 “supply of training services” will be made at the fixed lump sum amount set out in Form B: Prices upon issuance of Form T1: Certificate of Satisfactory Training.

**D23.2 Further to GC.9.03:**

- (a) Any payment made by the City to the Contractor on account of a progress estimate shall be less any holdback required to be made by The Builders' Liens Act, and such holdbacks or other amounts which the City is entitled to withhold pursuant to the Contract;
- (b) Payment on account of the final progress estimate, including the holdback made by the City pursuant to The Builders' Liens Act, shall be paid to the Contractor when the time for filing liens or trust claims has elapsed, unless the City is in receipt of a lien or trust claim

- D23.1** Further to GC.9.01 and GC.9.03, payment shall be in Canadian funds net thirty (30) Calendar Days after receipt and approval of the Contractor's invoice.

**INDEMNITY**

**D24. INDEMNITY**

- D24.1** Notwithstanding GC.7.03, the Contractor shall indemnify the City in the amount of two million dollars (\$2,000,000), plus a minimum of twice the Contract value.

**WARRANTY**

**D25. WARRANTY**

- D25.1** Further to GC.10.01, if a defect or deficiency prevents the full and normal use or operation of the Work or any portion thereof, for purposes of calculating the warranty period, time shall be deemed to cease to elapse for the defective or deficient portion, and for any portion of the Work whose use or operation is prevented by such defect or deficiency, as of the date on which the defect or deficiency is observed or the use or operation is prevented and shall begin to run again when the defect or deficiency has been corrected or the Work may be used or operated to the satisfaction of the Contract Administrator.

**FORM H1: PERFORMANCE BOND**  
(See D10)

KNOW ALL MEN BY THESE PRESENTS THAT

\_\_\_\_\_  
(hereinafter called the "Principal"), and

\_\_\_\_\_,  
(hereinafter called the "Surety"), are held and firmly bound unto **THE CITY OF WINNIPEG** (hereinafter called the "Obligee"), in the sum of

\_\_\_\_\_ dollars (\$\_\_\_\_\_)

of lawful money of Canada to be paid to the Obligee, or its successors or assigns, for the payment of which sum the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal has entered into a written contract with the Obligee dated the

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, for:

BID OPPORTUNITY NO. 676-2007

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF ANALYTICAL INSTRUMENT SYSTEMS

which is by reference made part hereof and is hereinafter referred to as the "Contract".

NOW THEREFORE the condition of the above obligation is such that if the Principal shall:

- (a) carry out and perform the Contract and every part thereof in the manner and within the times set forth in the Contract and in accordance with the terms and conditions specified in the Contract;
- (b) perform the Work in a good, proper, workmanlike manner;
- (c) make all the payments whether to the Obligee or to others as therein provided;
- (d) in every other respect comply with the conditions and perform the covenants contained in the Contract; and
- (e) indemnify and save harmless the Obligee against and from all loss, costs, damages, claims, and demands of every description as set forth in the Contract, and from all penalties, assessments, claims, actions for loss, damages or compensation whether arising under "The Workers Compensation Act", or any other Act or otherwise arising out of or in any way connected with the performance or non-performance of the Contract or any part thereof during the term of the Contract and the warranty period provided for therein;

THEN THIS OBLIGATION SHALL BE VOID, but otherwise shall remain in full force and effect. The Surety shall not, however, be liable for a greater sum than the sum specified above.

AND IT IS HEREBY DECLARED AND AGREED that the Surety shall be liable as Principal, and that nothing of any kind or matter whatsoever that will not discharge the Principal shall operate as a discharge or release of liability of the Surety, any law or usage relating to the liability of Sureties to the contrary notwithstanding.

IN WITNESS WHEREOF the Principal and Surety have signed and sealed this bond the

\_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

SIGNED AND SEALED  
in the presence of:

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Name of Principal)

Per: \_\_\_\_\_ (Seal)

Per: \_\_\_\_\_

\_\_\_\_\_  
(Name of Surety)

By: \_\_\_\_\_ (Seal)  
(Attorney-in-Fact)



**FORM H2: IRREVOCABLE STANDBY LETTER OF CREDIT  
(PERFORMANCE SECURITY)**  
(See D10)

\_\_\_\_\_  
(Date)

The City of Winnipeg  
Corporate Services Department  
Legal Services Division  
185 King Street, 3rd Floor  
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 676-2007

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF ANALYTICAL INSTRUMENT  
SYSTEMS

Pursuant to the request of and for the account of our customer,

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

WE HEREBY ESTABLISH in your favour our irrevocable Standby Letter of Credit for a sum not exceeding  
in the aggregate

\_\_\_\_\_ Canadian dollars.

This Standby Letter of Credit may be drawn on by you at any time and from time to time upon written demand for payment made upon us by you. It is understood that we are obligated under this Standby Letter of Credit for the payment of monies only and we hereby agree that we shall honour your demand for payment without inquiring whether you have a right as between yourself and our customer to make such demand and without recognizing any claim of our customer or objection by the customer to payment by us.

The amount of this Standby Letter of Credit may be reduced from time to time only by amounts drawn upon it by you or by formal notice in writing given to us by you if you desire such reduction or are willing that it be made.

Partial drawings are permitted.

We engage with you that all demands for payment made within the terms and currency of this Standby Letter of Credit will be duly honoured if presented to us at:

\_\_\_\_\_  
(Address)

and we confirm and hereby undertake to ensure that all demands for payment will be duly honoured by us.

All demands for payment shall specifically state that they are drawn under this Standby Letter of Credit.

Subject to the condition hereinafter set forth, this Standby Letter of Credit will expire on

\_\_\_\_\_  
(Date)

It is a condition of this Standby Letter of Credit that it shall be deemed to be automatically extended from year to year without amendment from the present or any future expiry date, unless at least 30 days prior to the present or any future expiry date, we notify you in writing that we elect not to consider this Standby Letter of Credit to be renewable for any additional period.

This Standby Letter of Credit may not be revoked or amended without your prior written approval.

This credit is subject to the Uniform Customs and Practice for Documentary Credit (1993 Revision), International Chamber of Commerce Publication Number 500.

\_\_\_\_\_  
(Name of bank or financial institution)

Per: \_\_\_\_\_

(Authorized Signing Officer)

Per: \_\_\_\_\_

(Authorized Signing Officer)

(See D11)

## WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF ANALYTICAL INSTRUMENT SYSTEMS

[illegible]

## **PART E - SPECIFICATIONS**

### **GENERAL**

#### **E1. APPLICABLE SPECIFICATIONS AND DRAWINGS**

E1.1 These Specifications shall apply to the Work.

E1.2 The following are applicable to the Work:

| <u>Specification No.</u> | <u>Specification Title</u>                       |
|--------------------------|--|
| 01300                    | Submittals                                       |
| 01450                    | Quality Control                                  |
| 01650                    | Equipment Installation                           |
| 01730                    | Operation And Maintenance Manuals                |
| 17010                    | Instrumentation And Control General Requirements |
| 17015                    | Scope of Supply                                  |
| 17700                    | Instrument Index                                 |
| 17700-A                  | Instrument Index                                 |
| 17701                    | Instrument Specification Sheets                  |
| 17701-A                  | Instrument Specification Sheets                  |

E1.3 Bidders are reminded that requests for approval of substitutes as an approved equal or an approved alternative shall be made in accordance with B6.

#### **E2. GOODS**

E2.1 The Contractor shall supply analytical instrument systems in accordance with the requirements hereinafter specified.

#### **E3. SITE ACCESS**

E3.1 The Contractor shall have access to the Site on Business Days between 07:00 and 18:00 unless otherwise approved by the Contract Administrator.

E3.2 Access to the work site is restricted and cooperation with other contractors on site is necessary in the best interest of all parties.

E3.3 The Site is located on Provincial Road 207, 3.2 km north of Highway 1 in R.M. of Springfield, Manitoba.

E3.4 The Site address is PR 207, Lot 57082, Dugald, Manitoba.

## **SUBMITTALS**

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### **1. SHOP DRAWINGS**

#### **1.1 General**

- .1 Arrange for the preparation of clearly identified Shop Drawings as specified or as the Contract Administrator may reasonably request. Shop Drawings are to clearly indicate materials, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of the Work. Where articles or equipment attach or connect to other articles or equipment, clearly indicate that all such attachments and connections have been properly coordinated, regardless of the trade under which the adjacent articles or equipment will be supplied and installed. Shop Drawings are to indicate their relationship to design Drawings and Specifications. Notify the Contract Administrator of any deviations in Shop Drawings from the requirements of the Contract Documents to allow the Contract Administrator to assess the deviations.
- .2 Where all or part of the Shop Drawings are to be prepared under the stamp and seal of a Professional Engineer registered in the Province of Manitoba, the Contract Administrator will limit that review to an assessment of the completeness of the part of the submission so stamped and sealed.

#### **1.2 Electrical and Controls Installation Information**

- .1 Key information will be taken from Shop Drawings to prepare electrical and instrumentation Drawings and/or layout Drawings, control schematics, and interconnection wiring diagrams.

#### **1.3 Submission Requirements**

- .1 Coordinate each submission with requirements of the Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
- .2 Accompany all submissions with a transmittal letter, in duplicate, containing:
  - .1 Date
  - .2 Project title and Bid Opportunity number
  - .3 Contractor's name and address
  - .4 Specification Section number for each submittal
  - .5 Submittal number and revision number in the following format:
    - .1 676 - Spec Section # - Submittal # - Revision # (e.g. 676-17124-001-1).
    - .2 The first submittal is numbered 1 with sequential numbering after that for revisions.
  - .6 Identification and quantity of each Shop Drawing product

## **SUBMITTALS**

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- .7 Equipment tag number
- .8 Other pertinent data
- .3 Submissions shall include:
  - .1 Date and revision dates
  - .2 Project title and number
  - .3 Name, email address, and address of:
    - .1 Contractor
    - .2 Manufacturer
  - .4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
  - .5 As required in the specifications, the seal and signature of a Professional Engineer registered in the Province of Manitoba.
- .4 Details of appropriate portions of work as applicable:
  - .1 Fabrication
  - .2 Layout showing dimensions including identified field dimensions and clearances
  - .3 Setting or erection details
  - .4 Capacities
  - .5 Performance characteristics
  - .6 Standards
  - .7 Operating weight
  - .8 Wiring diagrams
  - .9 Single line and schematic diagrams
  - .10 Method of control of equipment and its communication with the City's SCADA system

### **1.4 Drawings**

- .1 Original drawings or modified standard drawings provided by the Contractor to illustrate details of portions of Work which are specific to project requirements.

## **SUBMITTALS**

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- .2 Maximum sheet size: 850 x 1050 mm.
- .3 Submit digital (pdf) copies of Shop Drawings. The Contract Administrator will return one copy with comments transcribed.
- .4 Cross-reference Shop Drawing information to applicable portions of the Contract Documents.
- .5 Include reviewed Shop Drawings in all O&M Manuals.

### **1.5 Product Data**

- .1 Product Data; Manufacturer's catalogue sheets, brochures, literature, performance charts, and diagrams used to illustrate standard manufactured products.
- .2 Submit twelve (12) copies of product data.
- .3 Sheet size: 215 x 280 mm.

### **1.6 Procedure and Routing**

- .1 The Contractor shall provide to the Contract Administrator digital (pdf) copies of the Shop Drawings and corresponding submittal transmittal form(s) complete with the information specified in 1.3 Submission Requirements.
- .2 The Contractor shall simultaneously email the .pdf version of these same Shop Drawings and submittal transmittal forms to the Contract Administrator. The Contractor shall ensure the .pdf version of the Shop Drawings and corresponding submittal transmittal form(s) are identical to the printed copies being distributed for review. When the total size of the email is greater than 5 MB, the Contractor shall post the .pdf version of the Shop Drawings and submittal transmittal form(s) to an accessible place on the internet (provided by the Contract Administrator) and an e-mail notification is to be sent to all parties listed above when posting is complete.
- .3 The routing and the names of individuals responsible for receiving submittals will be identified by the Contract Administrator at the pre-construction meeting held pursuant to D4.2.
- .4 Upon review of the Shop Drawings, the Contract Administrator will e-mail the .pdf version of the annotated Shop Drawings and corresponding transmittal form(s) to the Contractor. When the total size of the email is greater than 5 MB, the Contract Administrator will post the .pdf version of the Shop Drawings and corresponding transmittal form(s) to the same accessible place on the internet and an e-mail notification will be sent to the Contractor. Two (2) printed copies of the reviewed Shop Drawings will be sent back to the Contractor.

## **SUBMITTALS**

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### **1.7 Shop Drawing Review**

- .1 Shop Drawing review by the Contract Administrator is solely to ascertain conformance with the general design concept. Responsibility for the approval of detail design inherent in Shop Drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.
- .2 Review by the Contract Administrator shall not relieve the Contractor of his responsibility for errors or omissions in Shop Drawings or for proper completion of the Work in accordance with the Contract Documents.
- .3 Shop Drawings will be returned to the Contractor with one of the following notations:
  - .1 When stamped "REVIEWED", distribute additional copies as required for execution of the Work.
  - .2 When stamped "REVIEWED AS MODIFIED", ensure that all copies for use are modified and distributed, same as specified for "REVIEWED".
  - .3 When stamped "REVISE AND RE-SUBMIT", make the necessary revisions, as indicated, consistent with the Contract Documents and submit again for review.
  - .4 When stamped "NOT REVIEWED", submit other drawings, brochures, etc., for review consistent with the Contract Documents.
  - .5 Only Shop Drawings bearing "REVIEWED" or "REVIEWED AS MODIFIED" shall be used on the Work unless otherwise authorized by the Contract Administrator.
- .4 After submittals are stamped "REVIEWED" or "REVIEWED AS MODIFIED", no further revisions are permitted unless re-submitted to the Contract Administrator for further review.
- .5 Any adjustments made on Shop Drawings by the Contract Administrator are not intended to change the Contract Price. If it is deemed that such adjustments affect the Contract Price, clearly state as such in writing prior to proceeding with fabrication and installation of Work.
- .6 Make changes in Shop Drawings which the Contract Administrator may require consistent with Contract Documents. When re-submitting, notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.
- .7 Shop Drawings indicating design requirements not included in the Contract Documents require the seal of a Professional Engineer registered in the Province of Manitoba. If requested, submit engineering calculations for review, sealed by a Professional Engineer.

### **1.8 Operating and Maintenance Manuals**

- .1 Refer to Section 01730 – Operations and Maintenance Manuals.

**END OF SECTION**



## **QUALITY CONTROL**

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### **1. GENERAL**

#### **1.1 Section Includes**

- .1 Quality assurance requirements
- .2 Inspection and testing, administrative and enforcement requirements.

#### **1.2 Related Sections (Not Used)**

#### **1.3 References**

- .1 Unless the edition number and/or date are specified, any reference to the Manufacturer's and published codes, standards and specifications shall mean the latest edition published by the issuing authority, and in effect three (3) Business Days before the Submission Deadline.
- .2 Referenced standards and specifications define minimum requirements. Work in quality exceeding these minimum requirements conforms to the Contract.
- .3 Any reference to a Manufacturer's direction, instruction, or specification shall be deemed to include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the products pertinent to their use and their relationship to the products with which they are incorporated.
- .4 Any reference to regulatory authorities includes all authorities having jurisdiction.
- .5 Any reference to a Specification section includes all Drawings and Schedules related to the work of that section.

#### **1.4 Independent Inspection Agencies**

- .1 Except where inspecting, testing and similar quality control services are specifically indicated to be the Contractor's responsibility, the City will engage Independent Inspection/Testing Agencies for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the City.
- .2 Where inspecting, testing and similar quality control services are specifically indicated in the Specification Sections as the Contractor's responsibility, the Contractor shall engage appropriate Independent Inspection/Testing Agencies. Cost of such services will be borne by the Contractor.
- .3 Where the City has engaged an Inspection/Testing Agency for testing and inspection of a part of the Work and the Contractor is also required to engage an Inspection/Testing Agency for the same or related part of the Work; the Contractor shall not employ the same agency engaged by the City without the prior written approval of the Contract Administrator.

## QUALITY CONTROL

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- .4 Employment of Inspection/Testing Agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 If defects are revealed during inspection and/or testing, appointed agency may require additional inspection and/or testing to ascertain full degree of defect. Regardless of original responsibility, pay costs for additional inspection and testing, retesting, re-inspection.

### 1.5 Procedures

- .1 Submit for the Contract Administrator's approval a written Quality Assurance Plan prior to start of any on site activities. The plan shall include as a minimum:
  - .1 Contractor's approach and philosophy to QA/QC during construction.
  - .2 Contractor's method for identification and tracking of all control documents.
  - .3 Organization chart showing proposed personnel and key contacts for QA/QC.
  - .4 QC Representative and any subordinate experts. Submit resumes for the Contract Administrator's approval.
  - .5 QC Representative's on Site presence and participation in pre-installation, and Subcontractor meetings.
  - .6 Contractor's bi-weekly QC report, including results of contractor certifications, test results, corrective action and follow-up on any deficiencies in the Project's quality control.
  - .7 A list of proposed Inspection/Testing Agencies and their qualifications.
- .2 The QC Representative shall be:
  - .1 Independent of the Contractor's Supervisor
  - .2 Qualified by experience and training to monitor construction quality.
  - .3 Responsible for the overall quality assurance of the Contractor's work and compliance with Contract.
  - .4 Responsible to observe and certify the performance of contractor tests and pre-inspections identified, and to attend meetings on site. The QC Representative may elect to use an alternate expert to observe/certify performance.
  - .5 Authorized to stop work at any time that quality problems necessitate. This authority shall be delineated in a letter of appointment from a Contractor, and shall be included in the QA Plan.

## QUALITY CONTROL

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- .3 Notify appropriate agency and the Contract Administrator not less than forty eight (48) hours in advance of requirement for tests, in order that attendance arrangements can be made.
- .4 Submit samples and/or materials required for testing, as specified in Specification section. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .5 Provide labour and facilities to obtain and handle samples and materials on the Site.
- .6 Provide suitable facilities for the storage of specimens or samples at correct temperature, free from vibration or damage in accordance with the instruction of the Inspection/Testing Agency and the governing standard.

### 1.6 Rejected Work

- .1 Make good other Contractor's work damaged by such removals or replacements promptly.

### 1.7 Reports

- .1 For inspecting, testing and similar quality control services which are the Contractor's responsibility, submit four (4) copies of inspection and test reports to the Contract Administrator, unless specified otherwise.
- .2 Each report shall include:
  - .1 Date of issue
  - .2 Contract name and number
  - .3 Name, address and telephone number of Inspection/Testing Agency
  - .4 Name and signature of inspector and tester
  - .5 Date of inspection or test
  - .6 Identification of the product and Specification section covering inspected or tested Work
  - .7 Location of the inspection or the location from which the tested product was derived
  - .8 Type of inspection or test
  - .9 Complete inspection or test data.
  - .10 Test results and an interpretation of test results.
  - .11 Ambient conditions at the time of sample taking and testing.

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**QUALITY CONTROL**

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- .12 The remarks and observations on compliance with the Contract Documents
- .13 Recommendations on retesting or other corrective action where necessary
- .14 Signature of a qualified and authorized representative of the Agency
- .3 Submit reports within forty eight (48) hours, and notify the Contract Administrator forthwith if the report indicates improper conditions or procedures.
- .4 Refer to Specification section for definitive requirements.

**END OF SECTION**

## **EQUIPMENT INSTALLATION**

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### **1. INTENT**

- .1 This Section describes general requirements for all equipment supplied under the Contract relating to the installation, supervision of installation, testing, operation, and Performance Verification. The Contractor shall be responsible for advising the Installation Contractor testing, operation, and Performance Verification of equipment in this Contract.

### **2. EXPERTISE AND RESPONSIBILITY**

- .1 The Contract Administrator recognizes the expertise of the Manufacturer.
- .2 Should the Contract Administrator issue an Addendum, Field Order, Change Order, or Instruction to change the Work which would, in the opinion of the Contractor, compromise the success or safety of the Work, then it shall be incumbent on the Contractor to notify in the Contract Administrator in writing to this effect within two (2) days.

### **3. EQUIPMENT DELIVERY**

- .1 The Contractor shall be responsible for equipment delivery to the Site. When the Contractor accepts the equipment delivery, he shall certify the delivery by completing Form 100 – Certificate of Equipment Delivery, attached to this specification for each individual item of equipment.
- .2 The Contractor shall be responsible for all Plant, Materials in his custody at the Site or any alternative storage location.
- .3 The Contractor shall ensure that he is fully informed of precautions to be taken in the unloading of equipment and its subsequent storage including any required maintenance.
- .4 If equipment off-site storage is required, then the second move of the equipment to the Site will be at the Contractor's cost.

### **4. INSTALLATION**

- .1 The Contractor shall conduct a detailed inspection of the installation including alignment, electrical connections, belt tensions, rotation direction, running clearances, lubrication, workmanship and all other items as required to ensure successful operation of the equipment.
- .2 The Contractor shall identify any outstanding deficiencies in the installation.
- .3 Where the deficiencies are the responsibility of the Contractor, they shall be rectified by the Contractor and the Work will be re-inspected at the Contractor's cost.

## **EQUIPMENT INSTALLATION**

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- .4 When the Contractor accepts the installation, he shall certify the installation by completing Form 102 – Certificate of Satisfactory Installation, attached to this specification.
- .5 Deliver the completed Form 102 to the Contract Administrator prior to departure of the Contractor from the site.
- .6 Tag the equipment with a 100 x 200 mm card stating “Equipment Checked. Do Not Run.” stenciled in large black letters. Sign and date each card.
- .7 Provide separate copies of Form 102 for different equipment.

### **5. OPERATION AND PERFORMANCE VERIFICATION**

- .1 Materials will be subjected to a demonstration, running test, and performance test after the installation has been verified and any identified deficiencies have been remedied.
- .2 During the demonstration, running tests, and performance tests, the Contractor shall operate equipment as required to complete the Performance Verification required from all Divisions of this Specification.
- .3 Inform the Contract Administrator at least fourteen (14) Calendar Days in advance of conducting the tests. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Contractor and the Contract Administrator.
- .4 The Contractor shall conduct all necessary checks to equipment or other work needed prior to confirming the installed Goods are ready to run.
- .5 The Contractor shall then operate the installed Goods for at least one (1) hour to demonstrate to himself the operation of the Goods and any required ancillary services. Any remedial measures required to ensure satisfactory operation shall be promptly undertaken.
- .6 Demonstration:
  - .1 The Contractor shall then notify the Contract Administrator of his readiness to demonstrate the operation of the Goods. The Contract Administrator shall attend, as expeditiously as possible.
  - .2 The equipment shall be operated for one (1) hour.
- .7 Running Test:
  - .1 The installed Goods shall be run continuously for a minimum of three (3) Calendar Days (72 hours) or as otherwise specified. During this period, as practicable, conditions shall be simulated which represent maximum or most severe, average and minimum or least severe conditions. These conditions will be mutually agreed by the Contractor and Contract Administrator on the basis of the information contained in the technical specifications, as well as the methods utilized to create the simulated conditions and the time period allotted to each.

## **EQUIPMENT INSTALLATION**

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- .8 Performance Tests:
- .1 Performance tests shall be conducted subsequent to the running tests, as practicable and scheduling of the Performance test shall be agreed between the Contract Administrator, and the Contractor.
  - .2 The installed Goods shall be run continuously for a minimum of seven (7) days (168 hours) or as specified.
  - .3 Performance tests shall be as dictated in the technical specifications for each item supplied or as reasonably required by the Contract Administrator to prove adherence to the requirements listed in the specification.
  - .4 The Contractor shall submit the results of the performance tests within twenty four (24) hours to the Contract Administrator, and final documented and summarized results in a format acceptable to the Contract Administrator within seven (7) Calendar Days. The Contract Administrator reserves the right to request additional testing. No Goods shall be accepted and handed over to the City prior to the satisfactory completion of the performance test(s) and receipt of the test reports.
  - .5 Performance testing will occur when the full water treatment process is available, including the dosing of chemicals intended to be used in the treatment process.
  - .6 During the Commissioning Period the City may operate the installed Goods in accordance with their normal operating procedures, as required to verify the performance of water treatment plant equipment supplied and install by others.
- .9 Unless otherwise specified, all water, chemicals, power (except portable generators), or any other ancillary services required to complete the initial demonstration, running test and performance tests are the responsibility of the City. Operational decision to release water shall be the City's.
- .10 Should the initial demonstration, running test or performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, running tests, and/or performance tests shall be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Contractor, the Contract Administrator, or the City, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor if, in the opinion of the Contract Administrator, the failure is a result of the Contractor's deficiency.
- .11 On successful completion of the demonstration, running test, and performance tests, Form 103 – Certificate of Equipment Satisfactory Performance attached to this Specification will be signed by the Contractor and the Contract Administrator for each individual item supplied.
- .12 The Contractor shall affix to the tested equipment a 100 x 200 mm card reading "Operable Condition - Do Not Operate without Contractor's Permission." stenciled on in large black letters.

**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF EQUIPMENT DELIVERY  
FORM 100**

We certify that the equipment listed below has been received and delivered into the care of the Installation Contractor. The equipment has been found to be in satisfactory condition. No defects in the equipment were found.

**PROJECT:** \_\_\_\_\_

**ITEM OF EQUIPMENT:** \_\_\_\_\_

\_\_\_\_\_

**TAG NO:** \_\_\_\_\_

**REFERENCE  
SPECIFICATION:** \_\_\_\_\_

\_\_\_\_\_  
(Authorized Signing Representative of the Installation Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contract Administrator)

\_\_\_\_\_  
Date



**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF READINESS TO INSTALL  
FORM 101**

I have familiarized the Installation Contractor of the specific installation requirements related to the equipment listed below and am satisfied that he understands the required procedures.

**PROJECT:**

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**ITEM OF EQUIPMENT:**

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**TAG NO:**

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**REFERENCE**

**SPECIFICATION:**

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(Authorized Signing Representative of the Contractor)

---

Date

I certify that I have received satisfactory installation instructions from the equipment Manufacturer/Supplier.

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(Authorized Signing Representative of the Installation Contractor)

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Date

**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF SATISFACTORY INSTALLATION  
FORM 102**

I have completed my check and inspection of the installation listed below and confirm that it is satisfactory and that defects have been remedied to my satisfaction except any as noted below:

**PROJECT:** \_\_\_\_\_

**ITEM OF EQUIPMENT:** \_\_\_\_\_

**TAG NO:** \_\_\_\_\_

**REFERENCE  
SPECIFICATION:** \_\_\_\_\_

**OUTSTANDING DEFECTS:** \_\_\_\_\_

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Installation Contractor)

\_\_\_\_\_  
Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contract Administrator)

\_\_\_\_\_  
Date

**EQUIPMENT INSTALLATION**

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**CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE  
FORM 103**

We certify that the equipment listed below has been continuously operated for at least seven (7) consecutive days and that the equipment operates satisfactorily and meets its specified operating criteria. No defects in the equipment were found. The equipment is therefore classed as "conforming".

**PROJECT:** \_\_\_\_\_

**ITEM OF EQUIPMENT:** \_\_\_\_\_

**TAG NO:** \_\_\_\_\_

**REFERENCE  
SPECIFICATION:** \_\_\_\_\_

\_\_\_\_\_  
(Authorized Signing Representative of the Contractor)      Date

\_\_\_\_\_  
(Authorized Signing Representative of the Installation Contractor)      Date

\_\_\_\_\_  
(Authorized Signing Representative of the Contract Administrator)      Date

1. Acknowledgement of Receipt of O&M Manuals.

\_\_\_\_\_  
(Authorized Signing Representative of the City)      Date

**END OF SECTION**

## **OPERATION AND MAINTENANCE MANUALS**

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### **1. DESCRIPTION**

- .1 This Section supplements the requirements for the provision of O&M Manuals as described in Section 01300 – Submittals.
- .2 Furnish complete operations manuals and maintenance information as specified in this Section for installation, check-out, operation, maintenance, and lubrication requirements for each unit of mechanical, electrical, and instrumentation equipment or system and each instrument.
- .3 Customize the operations manuals and maintenance information to describe the equipment actually furnished. Do not include extraneous data for models, options, or sizes not furnished (cross out or remove if required). When more than one model or size of equipment type is furnished, show the information pertaining to each model, option, or size.
- .4 Assemble, coordinate, bind, and index required data into an O&M Manual.
- .5 Three (3) draft copies of the manuals shall be submitted a minimum of sixty (60) days prior to Substantial Performance of the Work for review and comments. A maximum of eight (8) weeks after review, twelve (12) copies of the final manuals shall be supplied.
- .6 In addition to the twelve (12) hard copies, submit a draft, review, and final version of the O&M Manual electronically, concurrently with the submission of hard copies.
- .7 Materials: Label each Section with tabs protected with celluloid covers, fastened to hard paper dividing sheets.
- .8 Type lists and notes.
- .9 Drawings, diagrams and Manufacturer's literature must be legible. Drawings larger than 280 x 430 mm must be folded and placed inside plastic pockets.

### **2. OPERATION AND MAINTENANCE MANUAL CONTENTS AND ORGANIZATION**

- .1 Provide the Manufacturer's standard O&M manuals for the equipment or instruments supplied. If the Manufacturer's standard manuals do not contain all the required information, provide the missing information in supplementary documents and Drawings inserted behind appropriate tabs in the manual binder.
- .2 When more than one (1) piece of identical equipment or instruments are supplied, provide only one (1) set of operations manuals.
- .3 One (1) set of operations manuals may be provided when more than one (1) piece of similar equipment or instruments are supplied, such as different sizes of the same model, and all similar pieces are covered in the same standard Manufacturer's O&M manual.

## **OPERATION AND MAINTENANCE MANUALS**

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- .4 When similar equipment or instruments are provided by the same Manufacturer, but are not covered in the same standard Manufacturer's O&M manual, their specific manuals may be bound in the same 3-ring binder. Separate specific manuals with tab dividers labelled with the appropriate equipment numbers.
- .5 Provide a cover sheet, bound as the first page of each manual, with the following information:
  - .1 Contract name and number.
  - .2 Equipment number or, if more than one (1) piece of equipment is provided, equipment numbers for equipment or instruments covered by the manual. Include functional description of equipment after each number.
- .6 Provide a table of contents listing the contents of the manual and identifying where specific information can be located.
- .7 Insert the specific information described below in the O&M manuals in a format similar to that listed:
  - .1 Tab 1 – General Information
    - .1 Functional title of the system, equipment, material, or instrument.
    - .2 Relevant Specification Section number and Drawing reference.
    - .3 Address and telephone number of the Manufacturer and the nearest Manufacturer's Representative.
  - .2 Tab 2 - Equipment Data
    - .1 Insert Specification Section and completed Equipment and Instrumentation Data sheets for equipment supplied. Attach all Addenda, Change Orders, and change directives that refer to that specific item of equipment.
  - .3 Tab 3 – Operation Information
    - .1 Include the Manufacturer's recommended step-by-step procedures for starting and stopping under normal and emergency operation. Include all specified modes of operation including recommended operation after the assembly or equipment has been in long-term storage.
    - .2 Provide control diagrams with data and information to explain operation and control of systems and specific equipment. Identify normal operating setpoints and alarm conditions.
    - .3 Provide technical information on all alarms and monitoring devices provided with the equipment.

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## OPERATION AND MAINTENANCE MANUALS

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- .4 Provide troubleshooting information. Clearly identify which problems to look for and how to solve them.
- .4 Tab 4 - Technical Data
  - .1 Insert Manufacturer's Technical Specification and data sheets.
  - .2 Insert Manufacturer's certified performance and calibration curves for the equipment and instruments.
- .5 Tab 5 - Maintenance Information
  - .1 Include the description and schedule for all Manufacturers' recommended routine preventative maintenance procedures including specific lubrication recommendations. Indicate whether procedure is to be done daily, weekly, monthly, quarterly, semi-annually, annually, or fill in hours of operation.
- .6 Tab 6 - Maintenance Instructions
  - .1 Provide requirements to set-up and check out each system for use. Include all required and recommended step-by-step inspections, lubrications, adjustments, alignments, balancing, and calibrations. Include protective device settings, warnings, and cautions to prevent equipment damage and to insure personnel safety.
  - .2 Provide Manufacturer's description of routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair.
  - .3 Provide Manufacturer's recommendations on procedures and instructions for correcting problems and making repairs.
  - .4 Provide step-by-step procedures to isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.
  - .5 Provide step-by-step procedures and list special required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required.
- .7 Tab 7 - Assembly Drawings
  - .1 Provide Drawings which completely document the equipment, assembly, subassembly, or material for which the instruction is written. Provide the following Drawings as applicable: fabrication details, wiring and connection diagrams, electrical and piping schematics, block or logic diagrams, Shop

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## **OPERATION AND MAINTENANCE MANUALS**

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Drawings, installation Drawings, layout and dimension Drawings, and electrical component fabrication Drawings.

- .2 Provide clear and legible illustrations, Drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

### **.8 Tab 8 - Bills of Materials**

- .1 Provide a clear, legible copy of the Bill of Materials that was shipped with the equipment. The Bill of Materials should list all equipment, instruments, components, accessories, tools, and other items that were shipped with the equipment.

### **.9 Tab 9 - Lubrication Data**

- .1 Provide a table showing recommended lubricants for specific temperature ranges and applications.
- .2 Provide charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- .3 If the equipment or instrument is not lubricated, add a sheet under this Tab with the words "".

## **3. FIELD CHANGES NOT APPLICABLE**

- .1 Following the acceptable installation and operation of an equipment item, modify and supplement the item's instructions and procedures to reflect any field changes or information requiring field data.

## **4. COMMISSIONING DATA**

- .1 Provide in hard cover 3-ring binders for 215 x 280 mm paper labelled "COMMISSIONING DATA" one (1) copy of:
  - .1 All completed equipment testing and commissioning forms.
  - .2 All completed equipment checklists and performance reports, including noise and vibration analysis, instrumentation calibration data, and all other relevant information.
  - .3 All system performance reports.

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**OPERATION AND MAINTENANCE MANUALS**

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**5. WARRANTIES**

- .1 Provide in hard cover 3-ring binders for 215 x 280 mm paper labelled "WARRANTIES" one (1) copy of:
  - .1 Manufacturers' standard Warrants and Guarantees. Include the name and telephone number of the contact person. Indicate the time frame of each Warrant or Guarantee on the list.

**END OF SECTION**



## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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### **1. GENERAL**

#### **1.1 Requirements of Work**

- .1 Supply, and provide warranty for complete and fully documented Analytical Instrumentation in accordance with the Specifications. The instrumentation will form a subsystem of the overall WTP control system which contains Manufacture's equipment. City supplied equipment and Vendor Packages as specified in this and other Sections of the Specification.
- .2 Component subsystems of the I&C system will include, but are not limited to, the following:
  - .1 Primary elements and transmitters
  - .2 I&C field devices
  - .3 I&C junction boxes, local control panels, and marshalling panels
  - .4 Analyzer and transmitter manufacturer's configuration and programming software
- .3 Documentation provided by the Contractor shall include as a minimum:
  - .1 Equipment descriptive data.
  - .2 Equipment installation instructions, service manuals, O&M manuals, bills of materials, and recommended spare parts lists.
  - .3 Shop Drawings, face layouts, schematics, and point-to-point wiring diagrams sealed by a Professional Engineer registered in the Province of Manitoba.
- .4 Documentation provided by the Contractor shall be formatted as follows:
  - .1 Instrument Index – A sorted index of the detailed information for the devices shown on the P&IDs. The index lists the appropriate support documentation for the devices' supply and installation. The instrument index is the controlling document for the supply of materials.
  - .2 Instrument Specification Sheets – Detail the relevant data for the supply of devices.
  - .3 Detailed Specification – Lists qualifications, quality of materials and workmanship, and supplementary information.
- .5 References
  - .1 This Specification contains references to the following documents. They are a part of this Section as specified and modified. In case of conflict between the requirements of this Section and those of the listed documents, the requirements of this Section prevail.

## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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| <b><u>Reference</u></b>     | <b><u>Title</u></b>  |
|-----------------------------|--|
| <b>API 550</b>              | Manual on Installation of Refinery Instruments and Control Systems, Part I – Process Instrumentation and Control Section one (1) through thirteen (13) |
| <b>ASTM D883-00</b>         | Terms Relating to Plastics   |
| <b>IEEE 100-00</b>          | Dictionary of Electrical and Electronic Terms  |
| <b>ANSI/ISA-7.0.01 1996</b> | Quality Standard For Instrument Air  |
| <b>ISA 5.4-1999</b>         | Instrument Loop Diagrams   |
| <b>ISA S51.1-79(1993)</b>   | Process Instrumentation Terminology  |
| <b>NEMA 250-2003</b>        | Enclosures for Electrical Equipment (1000V Max)  |
| <b>NEMA ICS 1-00(R2005)</b> | General Standards for Industrial Controls and Systems  |
| <b>NEMA ICS 2-2000</b>      | Industrial Control and Systems, Controllers, Contactors  |
| <b>NFPA 70-2005</b>         | National Electrical Code   |
| <b>SAMA PMC 17-10-63</b>    | Bushings and Wells for Temperature Sensing Elements  |
| <b>UBC-88</b>               | Uniform Building Code  |
| <b>UL 1012-89</b>           | Power Supplies   |
| <b>UL 94-06</b>             | Tests for Flammability of Plastic Materials for Parts in Devices and Appliances  |
| <b>Weik, Martin H.</b>      | Communications Standard Dictionary, Van Nostrand Reinhold Co., 1983  |

**.6 Codes, Rules, Permits and Fees**

- .1** Give all required notices, submit Drawings, obtain all permits, licenses, and certificates, and pay all fees required for this Work.

**.7 Qualifications**

- .1** The Contractor shall be a firm normally engaged and fully competent in the type of Work described in this Section of the Specification. The firm shall have been continuously and successfully engaged in this business for at least five (5) years.

## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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### **.8 Standards of Workmanship**

- .1 Arrange and install products to fit properly into designated building spaces.
- .2 Install products in accordance with the recommendations and ratings of the product Manufacturers.

## **1.2 Equipment**

### **.1 Receiving, storing, and protection of components during construction:**

- .1 Examine each component upon delivery to Site. Report all damage noted to the Contract Administrator prior to accepting or rejecting delivery. Perform a preliminary examination upon delivery to ensure that:
  - .1 All components supplied for work carried out under this Section of the Specifications comply with the requirements described therein.
  - .2 Itemize all non-conformities noted above and forward them to the Contract Administrator. Any delays in construction resulting from the delivery to Site of non-conforming components shall be borne by the Contractor.
  - .3 Ensure that covers where required are properly installed on all equipment. Provide all covers, padding, guards, etc. as required to guard any equipment against damage.
- .2 Take all necessary precautions to ensure that equipment is supplied free of damage. If deemed necessary by the Contract Administrator, damaged equipment shall be replaced with new product at no additional cost to the City. The Contractor shall bear any costs due to construction delays resulting from the delay in delivery of acceptable equipment.

## **1.3 Documentation**

### **.1 Submittals**

- .1 Submit Shop Drawings for all products supplied by this Division. Submit Shop Drawings for review prior to purchase of any products or equipment and sufficiently in advance to allow ample time for checking.
- .2 Contractor to review, modify, and approve the Shop Drawings prior to submitting Shop Drawings to the Contract Administrator for review. Contractor approval of a Drawing indicates the following:
  - .1 The Drawing has been checked by the person making the approval.
  - .2 The equipment or material complies in all respects with the requirements of the Specifications and Drawings.
  - .3 The quantities indicated are correct.

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**INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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- .4 The physical dimensions of the components are such that they can be installed without interference with the building structure or other equipment, and after installation, there are sufficient clearances on all sides for maintenance, servicing and operation of the equipment.
- .5 The points of attachment are clearly indicated, i.e. TOP, BOTTOM, SIDE, etc.
- .6 The arrangement and location are properly oriented.
- .7 The product is suitable for its intended use.
- .8 The submission consists of sufficient information to adequately convey the scope of supply and the specific product to be supplied is highlighted.
- .9 The submission contains sufficient information to install the equipment or systems.
- .3 Stamp and sign the Shop Drawing to show approval, indicating the above has been complied with. If Contractor revisions are too extensive, return the submission to the Manufacturer for revision, then repeat the Shop Drawing approval process before submitting to the Contract Administrator.
- .4 Manufacture of products shall conform to Shop Drawings marked as reviewed by the Contract Administrator and returned to the Contractor.
- .5 Keep one (1) complete, maintained set of Shop Drawings at the Job Site during the construction period. Record modifications and changes as they arise during the construction period and incorporate these changes in the Record Drawings.
- .6 Refer to Division 1 for further information on Shop Drawing submittals.
- .2 O&M Manuals
  - .1 Refer to Division 1 for general O&M manual submittal information.
  - .2 In addition to the requirements specified in Division 1, provide the following information:
    - .1 Table of Contents – Arrange contents sequentially by systems under section numbers. Label tabs of dividers between each to match section numbers in the Table of Contents.
    - .2 Systems Descriptions – A brief synopsis of each system typed and inserted at the beginning of each section. Include sketches and diagrams where appropriate.
    - .3 O&M instructions of all equipment and controls – These operating instructions need not be Manufacturer's data but may be typewritten instructions in simple language to guide the City in the proper O&M of this installation.
    - .4 A copy of all wiring diagrams complete with wiring coding.

## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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- .5 Include type and accuracy of instruments used.
- .6 Set of final reviewed Shop Drawings.
- .7 Provide a tabulated list of all consumables utilized (fuses, lamps, etc.) indicating where used, type, rating and reorder details.

## **2. PRODUCTS**

### **2.1 General**

- .1 Refer to the requirements of Division 1.
- .2 Selected Products:
  - .1 The design has been based on the use of the first named product where multiple products have been listed.
- .3 Quality of Products
  - .1 All products provided should be CSA approved, ULC approved where applicable, and new unless otherwise specified.
  - .2 If products specified are not CSA approved, obtain special approval of the relevant provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.
  - .3 Products provided, if not specified, shall be new, of a quality best suited to the purpose required and their use subject to approval by the Contract Administrator.
- .4 Uniformity of Manufacture
  - .1 Unless otherwise specifically called for in the Specification, uniformity of manufacture to be maintained for similar products throughout the Work.
- .5 Product Finishes
  - .1 Contractor to specify proposed finishes to be used for Contract Administrator's review.
- .6 Use of Products During Construction
  - .1 Any equipment used for temporary or construction purposes is to be approved by the Contract Administrator. Clean and restore to "as new" condition all equipment prior to the time of Substantial Performance.

### **2.2 Instrumentation**

- .1 General

## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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- .1 Instruments are to be suitable for the environmental conditions in which they are to be installed.
- .2 Determine where injurious conditions may be expected to occur and make proper provision to protect the instruments to ensure their proper and reliable operation.
- .3 Provide power surge protection, heating cables, and devices to protect instruments, equipment, and lines from being functionally impaired or damaged by power surges or environmental conditions such as moisture or freezing.

### **2.3 Identification**

- .1 Provide lamacoid nameplates with 6 mm black lettering on white background. Identify the loop tag number (where applicable) and the device name, function, and instrument range or setpoint value on the nameplate.
- .2 Where it is not possible to attach a lamacoid nameplate to a field instrument component, provide the component with a stainless steel metal tag firmly wired to the device and identified with the loop tag number.
- .3 Identify all wires where they terminate at the marshalling panels, junction boxes, control panels, and field devices with a heat shrink sleeve with machine printed labeling.
- .4 Clearly mark all panels, pull boxes, junction boxes, etc. to indicate the nature of service.
- .5 For direct current wiring use black for positive and white for negative.

## **3. EXECUTION**

### **3.1 Product Handling**

- .1 Any damage to the products and/or installed Work caused by the Contractor shall be repaired or replaced to the approval of the Contract Administrator by the Contractor.
- .2 Remove advertising labels from all products installed that have such labels attached. Identification or CSA labels are not to be removed.
- .3 Remove dirt, rubbish, grease, etc. resulting from Work performed under this Division of the Contract from all surfaces.

### **3.2 Separation of Services**

- .1 Classifications of Circuits
  - .1 The circuit categorization shall of first priority follow Canadian Electrical Code with respect to separation for electrical safety and the following shall apply with respect to electro-magnetic compatibility:

## INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS

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|                |  |
|----------------|--|
| Very Noisy     | High voltage circuits and their associated grounding   |
|                | High current (>200 A) LV circuits.   |
|                | Harmonic-rich LV circuits.   |
|                | DC circuits: un-suppressed or above 50 V.  |
| Noisy          | Low current class two (2) circuits.  |
|                | Medium power pulsed or radio frequency circuits.   |
| Indifferent    | ELV digital status circuits.   |
|                | Intrinsically safe circuits.   |
|                | Telecommunications circuits.   |
|                | Fire alarm and emergency lighting circuits (note that some fire alarm circuits may fall into the category of signal circuits). |
|                | Any other emergency, shutdown, or high integrity circuit (e.g. toxic gas alarm).   |
| Sensitive      | Analogue signal circuits.  |
|                | Data communication circuits.   |
| Very Sensitive | Low level voltage and current signals (e.g. from instrument sensors).  |

### 3.3 Wire and Cable

- .1 By Installation Contractor.

### 3.4 Tagging Standards for Devices and Wiring

- .1 Tag all devices, wires, and I/O using the assigned loop, equipment, or device tag name. Where tag naming and numbering is not specified, the Contract Administrator will provide naming and numbering that is consistent with the WTP naming conventions.

### 3.5 Calibration

- .1 Instruments are to be factory pre-calibrated. Verify calibration after installation for all instruments installed under these Specifications. Provide a printed record of the factory calibration parameters for “smart” devices.
- .2 Prior to calibration, completely program all “smart” transmitters including entries of the appropriate range and tag number. Provide a printed record of smart device serial numbers against their assigned tag number.
- .3 Instruments are to be set up and calibrated by an accredited instrument technician working under the approval of the instrument Manufacturer.
- .4 Calibrate all instruments to an accuracy of 0.5% of full range, or to the manufacturer’s stated accuracy of the instrument whenever an accuracy of 0.5% is not achievable.
- .5 Perform the following applicable calibration verification for each instrument and its associated signal conditioning equipment:

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**INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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- .1 Calibrate all inline flow meters by a draw-down test.
- .2 Calibrate all density meters by lab samples.
- .3 Calibrate all vacuum and pressure instruments by manometer or accurate test instrument and hand test pump.
- .4 Calibrate gas detectors using standard gas samples.
- .5 Calibrate temperature instruments against a standard lab thermometer.
- .6 Online analyzers with known samples.

**3.6 Test Forms**

| <b><u>Form No.</u></b> | <b><u>Title</u></b>     |
|------------------------|-------------------------|
| .1 ITR                 | Instrument Test Report. |
| .2 LCR                 | Loop Check Report.      |



**INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

**INSTRUMENT TEST REPORT**

**FORM NO. ITR**

SYSTEM: \_\_\_\_\_  
SERVICE: \_\_\_\_\_ TAG NO.: \_\_\_\_\_  
LOCATION: \_\_\_\_\_  
MAKE: \_\_\_\_\_ MODEL: \_\_\_\_\_  
SERIAL NO.: \_\_\_\_\_ CSA: \_\_\_\_\_  
ELEMENT: \_\_\_\_\_ RANGE: \_\_\_\_\_  
DESIGN SETTING/RANGE: \_\_\_\_\_ CONTACT TO: \_\_\_\_\_ ON: \_\_\_\_\_  
SIGNAL IN: \_\_\_\_\_ OUT: \_\_\_\_\_ ASSOCIATED INSTRUMENT: \_\_\_\_\_  
INSTRUMENT CONDITION: \_\_\_\_\_ CONFORM TO SPEC: \_\_\_\_\_  
PROJECT NO: \_\_\_\_\_ DATA SHEET: \_\_\_\_\_

|              | TEST 1 |      |        |      | TEST 2 |      |        |      |
|--------------|--------|------|--------|------|--------|------|--------|------|
| TEST METHOD  |        |      |        |      |        |      |        |      |
|              |        |      |        |      |        |      |        |      |
|              | INPUT  |      | OUTPUT |      | INPUT  |      | OUTPUT |      |
| PROCESS      | INC.   | DEC. | INC.   | DEC. | INC.   | DEC. | INC.   | DEC. |
| TEST POINT 1 |        |      |        |      |        |      |        |      |
| TEST POINT 2 |        |      |        |      |        |      |        |      |
| TEST POINT 3 |        |      |        |      |        |      |        |      |
| TEST POINT 4 |        |      |        |      |        |      |        |      |
| TEST POINT 5 |        |      |        |      |        |      |        |      |
| COMMENTS     |        |      |        |      |        |      |        |      |
|              |        |      |        |      |        |      |        |      |
|              |        |      |        |      |        |      |        |      |
| GRAPHS       |        |      |        |      |        |      |        |      |
|              |        |      |        |      |        |      |        |      |

TESTED BY: \_\_\_\_\_ CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_ DATE: \_\_\_\_\_

**INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

**LOOP CHECK REPORT FORM NO. LCR**

- ☐ CHECKED OUT OK  
☐ NOT APPLICABLE  
☐ FURTHER ACTION REQUIRED

|                              | INSTRUMENT TAG NO. |  |  |  |  |  |  |  |
|------------------------------|--------------------|--|--|--|--|--|--|--|
| LOOP NO. _____               |                    |  |  |  |  |  |  |  |
| SHEET NO. _____              |                    |  |  |  |  |  |  |  |
| P & I DWG. NO. _____         |                    |  |  |  |  |  |  |  |
| <b>INSTALLATION COMPLETE</b> |                    |  |  |  |  |  |  |  |
| Primary Element.             |                    |  |  |  |  |  |  |  |
| Impulse Lines.               |                    |  |  |  |  |  |  |  |
| Block and Drain Valves.      |                    |  |  |  |  |  |  |  |
| Air Supply/Filter/Reg.       |                    |  |  |  |  |  |  |  |
| Wiring.                      |                    |  |  |  |  |  |  |  |
| Tracing/Insulation/Housing.  |                    |  |  |  |  |  |  |  |
| Mounting and Location.       |                    |  |  |  |  |  |  |  |
| PLC/SCADA I/O & Status.      |                    |  |  |  |  |  |  |  |
| <b>CALIBRATED</b>            |                    |  |  |  |  |  |  |  |
| Impulse Lines Press. Tested. |                    |  |  |  |  |  |  |  |
| <b>LOOP CHECKED</b>          |                    |  |  |  |  |  |  |  |
| Element to Receiver.         |                    |  |  |  |  |  |  |  |
| X Mtr. To Receiver.          |                    |  |  |  |  |  |  |  |
| X Mtr./Trans. to Receiver.   |                    |  |  |  |  |  |  |  |
| X Mtr./Trans. to Switches.   |                    |  |  |  |  |  |  |  |
| Switches to Annunciator.     |                    |  |  |  |  |  |  |  |
| Interlocking Circuit.        |                    |  |  |  |  |  |  |  |
| Controller to Valve.         |                    |  |  |  |  |  |  |  |
| Controller Action D or R.    |                    |  |  |  |  |  |  |  |

REMARKS:

**READY FOR START-UP**

Date: \_\_\_\_\_

Installed by: \_\_\_\_\_

Checked by: \_\_\_\_\_

## **INSTRUMENTATION AND CONTROL GENERAL REQUIREMENTS**

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### **3.7 Installation and Performance Testing**

- .1 Refer to the requirements of Division 1 for additional requirements.
- .2 Inspections
  - .1 Provide two (2) weeks' written notice to the Contract Administrator prior to energizing any system to allow for inspection by the Contract Administrator of the following:
    - .1 Proper mounting.
    - .2 Proper connections.
- .3 During Performance Verification, demonstrate to the Contract Administrator proper calibration and correct operation of instruments and gauges.
- .4 Performance Verification of the Instrumentation System is to include but not be limited to the following:
  - .1 Verify installation of components, wiring connections, and piping connections.
  - .2 Supervise wiring continuity and pipe leak tests.
  - .3 Verify instrument calibration and provide written reports.
  - .4 Function check and adjust the I&C equipment under operational conditions.
  - .5 Coordinate manufacturer's service personnel as required for complete system testing.
  - .6 Instruct City personnel in correct method of I&C equipment operation.
  - .7 Direct City personnel at hand-over as to final adjustment of the system for correct operation of WTP.
  - .8 Ensure that the Manufacturer's Representatives cooperate to complete the Work of this Section.
  - .9 Verify signal levels and wiring connections to all I&C equipment.
  - .10 Coordinate and cooperate with City staff and the Contract Administrator during the Commissioning Period to commission the interface between the WTP SCADA and the PLC based control system.

### **3.8 Training**

- .1 Provide training, in the proper operation and maintenance of all control devices, control valves, and ancillary instrumentation described under this Division of the Specifications and complete Form T1- Certificate of Satisfactory Training.

**TRAINING**

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**CERTIFICATE OF SATISFACTORY TRAINING  
FORM T1**

We certify that the initial training for the equipment listed below has been provided as per the Specifications.

**PROJECT:** \_\_\_\_\_

**ITEM OF EQUIPMENT:** \_\_\_\_\_

**TAG NO:** \_\_\_\_\_

**REFERENCE  
SPECIFICATION:** \_\_\_\_\_

\_\_\_\_\_  
(Trainer) \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_  
(Contractor) \_\_\_\_\_ Date \_\_\_\_\_

\_\_\_\_\_  
(Authorized Signing Representative of the City) \_\_\_\_\_ Date \_\_\_\_\_

**END OF SECTION**

## **SCOPE OF SUPPLY**

---

### **1. GENERAL**

#### **1.1 Requirements of work**

- .1 This Section describes the I&C scope of supply for analytical instrumentation for the Clearwell Inlet Building and Deacon Booster Pumping Station.
- .2 The Contractor shall supply and provide Performance Verification of the Goods.

#### **1.2 General Requirements**

- .1 Shop Drawings
- .2 Record Drawings
- .3 O&M Data

#### **1.3 Specific Requirements**

- .1 Supply, deliver to Site, and verify the performance of all instrumentation, components, materials and ancillary equipment covered under Division 17 of this Contract. The equipment shall be installed by others.
- .2 Clearwell Inlet Building
  - .1 Supply all analytical instrumentation as listed in the Section 17000-A.
- .3 Deacon Booster Pumping Station
  - .1 Supply all analytical instrumentation as listed in the Section 17000-A

#### **1.4 Additional Requirements**

- .1 Provide all necessary testing, detailed wiring continuity checks, installation integrity checks, equipment functional operation checks, and written system verification reports to provide a complete system that is ready for System Demonstration.
- .2 Provide Performance Verification of all Goods supplied.

**END OF SECTION**

## **INSTRUMENT INDEX**

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### **1. GENERAL**

#### **1.1 References - General**

- .1 Refer to Section 17010 – Instrumentation and Control General Requirements.

#### **1.2 Instrument Index**

- .1 The spreadsheet in Section 17700-A gives an itemized list of the instrumentation included as part of this Work.

### **2. PRODUCTS (NOT USED)**

### **3. EXECUTION (NOT USED)**

**END OF SECTION**

# INSTRUMENT INDEX

| RECORD NO. | REV. No. | TAG NAME | DESCRIPTION                        |  | SPEC.      | P&ID     | INSTRUMENT | INSTALLATION | LOCATION |
|------------|----------|----------|------------------------------------|--|------------|----------|------------|--------------|----------|
|            |          |          | INSTRUMENT TYPE                    | SERVICE  | DATA SHEET | DRAWING  | LOOP DIA.  | DETAIL       | DWG.     |
| 5          | 3        | FI-T104A | Sample Flow Indicator              | Clearwell Chloramination Analyzer Sample Flow                                |            | WT-P001  |            |              |          |
| 6          | 3        | AE-T104A | Analyzer Element                   | Clearwell Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine     | I180       | WT-P001  |            |              | WT-E0112 |
| 7          | 3        | AT-T104A | Analyzer/Transmitter               | Clearwell Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine     | I180       | WT-P001  |            |              | WT-E0112 |
| 8          | 3        | FI-T105A | Sample Flow Indicator              | Clearwell Free Chlorine Analyzer Sample Flow                                 |            | WT-P001  |            |              |          |
| 9          | 3        | AE-T105A | Analyzer Element                   | Clearwell Free Chlorine  | I170       | WT-P001  |            |              | WT-E0112 |
| 10         | 3        | AT-T105A | Free Chlorine Analyzer/Transmitter | Clearwell Free Chlorine  | I170       | WT-P001  |            |              | WT-E0112 |
| 12         | 4        | AE-T106A | Analyzer Element                   | Clearwell pH   | I170       | WT-P001  |            |              | WT-E0112 |
| 13         | 4        | AT-T106A | pH Analyzer/Transmitter            | Clearwell pH   | I170       | WT-P001  |            |              | WT-E0112 |
| 14         | 3        | FI-T107A | Sample Flow Indicator              | Clearwell Turbidity Analyzer Sample Flow                                     |            | WT-P001  |            |              |          |
| 15         | 3        | AE-T107A | Analyzer Element                   | Clearwell Turbidity  | I162       | WT-P001  |            |              | WT-E0112 |
| 16         | 3        | AT-T107A | Turbidity Analyzer/Transmitter     | Clearwell Turbidity  | I162       | WT-P001  |            |              | WT-E0112 |
| 21         | 3        | FI-T204A | Sample Flow Indicator              | Clearwell Chloramination Analyzer Sample Flow                                |            | WT-P001  |            |              |          |
| 22         | 3        | AE-T204A | Analyzer Element                   | Clearwell Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine     | I180       | WT-P001  |            |              | WT-E0112 |
| 23         | 3        | AT-T204A | Analyzer/Transmitter               | Clearwell Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine     | I180       | WT-P001  |            |              | WT-E0112 |
| 24         | 3        | FI-T205A | Sample Flow Indicator              | Clearwell Free Chlorine Analyzer Sample Flow                                 |            | WT-P001  |            |              |          |
| 25         | 3        | AE-T205A | Analyzer Element                   | Clearwell Free Chlorine  | I170       | WT-P001  |            |              | WT-E0112 |
| 26         | 3        | AT-T205A | Free Chlorine Analyzer/Transmitter | Clearwell Free Chlorine  | I170       | WT-P001  |            |              | WT-E0112 |
| 28         | 4        | AE-T206A | Analyzer Element                   | Clearwell pH   | I170       | WT-P001  |            |              | WT-E0112 |
| 29         | 4        | AT-T206A | pH Analyzer/Transmitter            | Clearwell pH   | I170       | WT-P001  |            |              | WT-E0112 |
| 30         | 3        | FI-T207A | Sample Flow Indicator              | Clearwell Turbidity Analyzer Sample Flow                                     |            | WT-P001  |            |              |          |
| 31         | 3        | AE-T207A | Analyzer Element                   | Clearwell Turbidity  | I165       | WT-P001  |            |              | WT-E0112 |
| 32         | 3        | AT-T207A | Turbidity Analyzer/Transmitter     | Clearwell Turbidity  | I165       | WT-P001  |            |              | WT-E0112 |
|            | 1        | SP-T103A | Sample Pump                        | Clearwell Sample Pump #1 SP-T103A  |            | WT-P001  |            |              | WT-E0112 |
|            | 1        | SP-T203A | Sample Pump                        | Clearwell Sample Pump #2 SP-T203A  |            | WT-P001  |            |              | WT-E0112 |
|            | 1        | AT-D911A | Analyzer/Transmitter               | DBPS Branch 2 Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine |            | WD-P0006 |            |              |          |
|            | 1        | AE-D911A | Analyzer Element                   | DBPS Branch 2 Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine |            | WD-P0006 |            |              |          |
|            |          | FI-D911A | Sample Flow Indicator              | DBPS Branch 2 Chloramination Analyzer Sample Flow                            |            | WD-P0006 |            |              |          |
|            |          | FI-D912A | Sample Flow Indicator              | DBPS Branch 2 Free Chlorine Analyzer Sample Flow                             |            | WD-P0006 |            |              |          |
|            | 1        | AT-D912A | Free Chlorine Analyzer/Transmitter | DBPS Branch 2 Free Chlorine  |            | WD-P0006 |            |              |          |
|            | 1        | AE-D912A | Analyzer Element                   | DBPS Branch 2 Free Chlorine  |            | WD-P0006 |            |              |          |
|            | 1        | AT-D901A | Analyzer/Transmitter               | DBPS Branch 1 Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine |            | WD-P0013 |            |              |          |
|            | 1        | AE-D901A | Analyzer Element                   | DBPS Branch 1 Total Chlorine, Total Ammonia, Free Ammonia and Monochloramine |            | WD-P0013 |            |              |          |
|            |          | FI-D901A | Sample Flow Indicator              | DBPS Branch 1 Chloramination Analyzer Sample Flow                            |            | WD-P0013 |            |              |          |
|            |          | FI-D902A | Sample Flow Indicator              | DBPS Branch 1 Free Chlorine Analyzer Sample Flow                             |            | WD-P0013 |            |              |          |
|            | 1        | AT-D902A | Free Chlorine Analyzer/Transmitter | DBPS Branch 1 Free Chlorine  |            | WD-P0013 |            |              |          |
|            | 1        | AE-D902A | Analyzer Element                   | DBPS Branch 1 Free Chlorine  |            | WD-P0013 |            |              |          |

## **INSTRUMENT SPECIFICATION SHEETS**

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### **1. GENERAL**

#### **1.1 References - General**

- .1 The Work includes the provision of all instrument as listed in the instrument specification sheets.
- .2 Refer to Section 17010 – Instrumentation and Control General Requirements for general instrumentation and control requirements related to instrument specification sheets.

#### **1.2 Instrument Specification Sheets**

- .1 Provide data sheets to itemize detailed as-built information regarding the specification of instruments included as part of this Work for each instrument supplied. The data sheets already included in this Section list specific minimum requirements for particular applications.
- .2 Use forms in accordance with the ISA Standard S20 as a template for the preparation of the specification sheets.

### **2. PRODUCTS (NOT USED)**

### **3. EXECUTION (NOT USED)**

**END OF SECTION**



**INSTRUMENT SPECIFICATION SHEETS**

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|   |  |
|---|--|
| <b>INSTRUMENT<br/>SPECIFICATION NUMBER:<br/>DEVICE:</b> | I162<br>Inline Turbidimeter  |
| <b>TAG:</b>   | Refer to Instrument Index, Section 17700   |
| <b>SERVICE:</b>   | Refer to Instrument Index and P&ID   |
| <b>MOUNTING:</b>  | Wall mount.  |
| <b>MEASUREMENT METHOD</b>                               | NIR to ISO 7027  |
| <b>RANGE:</b>   | 0.001 – 100 NTU  |
| <b>INACCURACY:</b>                                      | ±2% of reading from 0 to 40 NTU;<br>±5% of reading from 40 to 100 NTU                            |
| <b>REPEATABILITY</b>                                    | Less than 1% of reading  |
| <b>OUTPUT:</b>  | 4 to 20 mA DC into 500 ohm load<br>2 Configurable alarm relays including a dedicated fault relay |
| <b>POWER SUPPLY:</b>                                    | 120 VAC, 60 Hz   |
| <b>INDICATION:</b>                                      | Local indication of Turbidity  |
| <b>ELECTRONIC ENCLOSURE:</b>                            | NEMA 4X.   |
| <b>MANUFACTURER<br/>AND MODEL:</b>                      | Endress & Hauser   |

**INSTRUMENT SPECIFICATION SHEETS**

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|   |   |
|---|---|
| <b>INSTRUMENT<br/>SPECIFICATION NUMBER:</b>         | I165  |
| <b>DEVICE:</b>                                      | Flow Through pH/Temperature Analyzer  |
| <b>TAG:</b>   | Refer to Instrument Index, Section 17700  |
| <b>SERVICE:</b>                                     | Refer to Instrument Index and P&ID  |
| <b>SENSOR MATERIAL:</b>                             | Glass electrode, Memosens plug in head  |
| <b>SENSOR MOUNTING</b>                              | Flow through sensor mount   |
| <b>TEMPERATURE<br/>COMPENSATION:</b>                | Automatic, 0 to 100 Deg. C  |
| <b>RANGE:</b>                                       | 0-14 pH   |
| <b>INACCURACY:</b>                                  | Less than $\pm 0.5\%$ of span   |
| <b>REPEATABILITY</b>                                | Less than 0.01 pH   |
| <b>OUTPUT:</b>                                      | Two 4-20 mA DC outputs for process measurement and temperature<br>4 Configurable alarm relays including a dedicated fault relay |
| <b>POWER SUPPLY:</b>                                | 120 VAC, 60 Hz  |
| <b>INDICATION:</b>                                  | Local indication of pH and temperature  |
| <b>ENCLOSURE:</b>                                   | NEMA 4X transmitter housing. Wall-mount sensor and transmitter.   |
| <b>ACCESSORIES:<br/>MANUFACTURER<br/>AND MODEL:</b> | Endress & Hauser  |

**INSTRUMENT SPECIFICATION SHEETS**

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| <b>INSTRUMENT SPECIFICATION NUMBER:</b> | I170   |
| <b>DEVICE:</b>                          | Online Chlorine Residual/ pH Analyzer  |
| <b>TAG:</b>                             | Refer to Instrument Index, Section 17700   |
| <b>SERVICE:</b>                         | Refer to Instrument Index and P&ID   |
| <b>MEASUREMENT METHOD:</b>              | Amperometric with pH compensation  |
| <b>SENSOR TYPE</b>                      | <p>For Chlorine passively operated PTFE membrane covered sensor Wwith gold cathode and silver/ silver chloride anode, electrolyte filled. Ph to be gell filled (no electrolyte). Both Chlorine and pH sensor shall have plug in cable connections to sensor head.</p> <p>Sensors mounted in clear acrylic flow through assembly complete with rotameter and sample flow switch</p> |
| <b>MOUNTING:</b>                        | Wall mount   |
| <b>RANGE:</b>                           | 0.01-5 mg/L  |
| <b>INACCURACY:</b>                      | Less than $\pm 1.0\%$ of span  |
| <b>REPEATABILITY</b>                    | Less than $\pm 1.0\%$ of span  |
| <b>OUTPUT:</b>                          | <p>4 to 20 mA DC into maximum 600 ohm load for each paramameter.</p> <p>3 Configurable alarm relays including a dedicated fault relay.</p> <p>Low sample flow alarm from flow switch</p>   |
| <b>POWER SUPPLY:</b>                    | 120 VAC, 60 Hz   |
| <b>INDICATION:</b>                      | Local indication of Free/Total Chlorine and pH   |
| <b>ENCLOSURE:</b>                       | NEMA 4X transmitter housing. Wall-mount sensor and transmitter.  |
| <b>MANUFACTURER AND MODEL:</b>          | Endress & Hauser CCS141-N Chlorine Sensor, cca250-y1 flow through assembly, CPS31 pH sensor, CCM 253 Transmitter.  |

**INSTRUMENT SPECIFICATION SHEETS**

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|---|---|
| <b>INSTRUMENT SPECIFICATION NUMBER:</b> | I180  |
| <b>DEVICE:</b>                          | Online Total Chlorine, Free Ammonia, Total Ammonia, Monochloramine Analyzer     |
| <b>TAG:</b>                             | Refer to Instrument Index, Section 17700  |
| <b>SERVICE:</b>                         | Refer to Instrument Index and P&ID  |
| <b>MEASUREMENT METHOD:</b>              | UV Absorbance   |
| <b>MOUNTING:</b>                        | Wall mount  |
| <b>RANGE:</b>                           | 0-5 mg/L Total Chlorine, Free Ammonia, Total Ammonia, Monochloramine            |
| <b>INACCURACY:</b>                      | Less than $\pm 5.0\%$ of span   |
| <b>OUTPUT:</b>                          | Four 4-20 mA DC<br><br>Dedicated fault relay                                    |
| <b>POWER SUPPLY:</b>                    | 120 VAC, 60 Hz  |
| <b>INDICATION:</b>                      | Local LCD and keypad for indication of Measured Parameters<br>Ammonia Residuals |
| <b>ENCLOSURE:</b>                       | NEMA 4  |
| <b>MANUFACTURER AND MODEL:</b>          | Chemscan UV-2150/S  |

**END OF SECTION**