THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 731-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF LARGE BUTTERFLY VALVES

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PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF LARGE BUTTERFLY VALVES

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, January 18, 2006.

B2.2 Bid Submissions 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 Contract Administrator or an authorized representative will be available at the City Warehouse from 11:00 to 12:00 on January 6, 2006 to provide Bidders access to the City Warehouse.

B3.2 The Bidder is advised that the delivery for Goods shall be made at the City Warehouse noted in B3.1, and limited City supplied off loading facilities exist at this location.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the City Warehouse 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 notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 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.

B4.4 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.

B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 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 shortly before submitting his Bid.

B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 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 seven (7) 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 B15.

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 Submission consists of the following components:

(a) Form A: Bid;

(b) Form B: Prices;

(c) Form G1: Bid Bond and Agreement to Bond, or
Form G2: Irrevocable Standby Letter of Credit and Undertaking, or
a certified cheque or draft;

B7.2 All components of the Bid Submission 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 in ink, 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 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.5 Bid Submissions 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 12 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 shall be original and shall 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 Submission 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;

(b) be responsible and not be suspended, debarred or in default of any obligation to the City;

(c) be financially capable of carrying out the terms of the Contract;

(d) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract;

(e) have successfully carried out work, similar in nature, scope and value to the Work;

(f) employ only Subcontractors who:

(i) are responsible and not suspended, debarred or in default of any obligation 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); and

(ii) have successfully carried out work similar in nature, scope and value to the portion of the Work proposed to be subcontracted to them, and are fully capable of performing the Work required to be done in accordance with the terms of the Contract;

(g) have a written workplace safety and health program in accordance with The Workplace Safety and Health Act (Manitoba);

B10.2 The Bidder shall be prepared to 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.

B10.3 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. BID SECURITY

B11.1 The Bidder shall provide bid security in the form of:

(a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or

(b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking 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 included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

(c) a certified cheque or draft payable to “The City of Winnipeg”, in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.

B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.

B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.

B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bid Submissions will not be opened publicly.

B12.2 Within two (2) Business Days following the Submission Deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) 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.

B12.3 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.

B12.4 The Bidder is advised that any information contained in any Bid Submission 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.

B13. IRREVOCABLE BID

B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B13.2 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 11 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

B14.1 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.

B14.1.1 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.

B14.1.2 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 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials shall:

(a) retain the Bid Submission until after the Submission Deadline has elapsed;

(b) open the Bid Submission to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and

(c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.

B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 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, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

B15.1 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 (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.

B15.2 Further to B15.1(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 if the interests of the City so require.

B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.

B15.4 Further to B15.1(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.

B15.4.1 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.

B15.5 This Contract will be awarded as a whole.

B16. AWARD OF CONTRACT

B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

B16.2 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.

B16.2.1 Without limiting the generality of B16.2, 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.

B16.3 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.

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 and delivery of five (5) butterfly valves and actuators including (but not limited to) delivery, in-warehouse testing, installation support and performance verification support.

D2.2 The major components of the Work are as follows:

(a) Supply and delivery of two (2) 1350mm nominal diameter AWWA C504 butterfly valves with electric actuators.

(b) Supply and delivery of three (3) 1350mm nominal diameter AWWA C504 butterfly valves with manual actuators.

(c) Provision of installation support and performance verification support services. In-warehouse performance verification shall be performed using a City supplied 1350 mm blind flange. All other testing materials required for in-warehouse testing shall be provided by the Contractor.

(d) Provision of training and operations and maintenance manuals.

D3. DEFINITIONS

D3.1 When used in this Bid Opportunity:

(a) “**Business Day**" means any Calendar Day, other than a Saturday, Sunday, or a Statutory or Civic Holiday;

(b) “**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;

(c) **Installation Contractor and/or Installer** means the General Contractor retained by the City, under a separate contract, to install the equipment supplied under this contract;

(d) **Substantial Performance** shall have the meaning attributed to it in the Builders' Lien Act (Manitoba), or any successor legislation thereto.

(e) **ANSI** means American National Standards Institute

(f) **ASME** means American Society of Mechanical Engineers

(g) **ASTM** means American Society for Testing and Materials

(h) **AWWA** means American Water Works Association

(i) **CSA** means Canadian Standards Association

(j) **DAF** means Dissolved Air Flotation

(k) **IEC** means International Electrotechnical Commission

(l) **ISO** means International Organization for Standardization

(m) **NACE** means National Association of Corrosion Engineers

(n) **NEMA** means National Electrical Manufacturers Association

(o) **NSF** means National Sanitation Foundation

(p) **SAE** means Society of Automotive Engineers

(q) **CEC** means Canadian Electrical Code

(r) **LOX** means liquid oxygen

(s) **Manufacturer** means the person, partnership or corporation responsible for the manufacture and fabrication of equipment provided to the City for the completion of the work.

(t) **Manufacturer's Representative** means a trained serviceman empowered by the manufacturer to provide installation, testing, and commissioning assistance to the City in his performance of those functions.

(u) **IEEE** means Institute of Electrical and Electronics Engineers

(v) **NEMA** means National Electrical Manufacturer's Association

(w) **Furnish** means supply

(x) **ISA** means the Instrumentation Systems and Automation Society

(y) **Total Performance** means that the entire Work, except those items arising from the Provision of GC.10.01 have been performed in accordance with this Contract

(z) **AGMA** means American Gear Manufacturer's Association.

(aa) **API** means American Petroleum Institute

(bb) **EEMAC** means Electrical and Electronic Manufacturer of Canada

(cc) **VSD** means Variable Speed Drive

(dd) **VFD** means Variable Frequency Drive

(ee) **Contract Work Schedule** means a Gantt Charter 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

(ff) **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

(gg) **Professional Engineer** means a professional engineer registered in the Province of Manitoba.

(hh) **Major Equipment** means all equipment for which shop drawing submittals are required as specified in Division 11, 16 and 17.

(ii) **Certified Shop Drawings** means Shop Drawings prepared by the Contractor after all required Shop Drawings have been "reviewed" or "reviewed as modified" in accordance with Section 01300 of this Bid Opportunity and which incorporate all modifications to the Shop Drawings, comments and notations made by the Contract Administrator in the course of the review.

(jj) **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

(kk) **SCADA** means supervisor control and data acquisition.

(ll) **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.

(mm) **City Warehouse** means the City warehouse located at 1500 Plessis Road, Winnipeg.

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 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.

D3.4 The Site includes the delivery location at the City Warehouse and the installation location at PR207, Lot 57082, Dugald, Manitoba.

D4. CONTRACT ADMINISTRATOR

D4.1 The Contract Administrator is UMA Projects (CM) Ltd., represented by:

Bill Richert, P. Eng.
1479 Buffalo Place
Winnipeg, Manitoba, R3T 1L7

Telephone No. (204) 986-6053
Facsimile No. (204) 986-8393
e-mail: bill.richert@uma.aecom.com

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 attention of the Chief Financial Officer at the following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
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
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

Facsimile No.: (204) 947-9155

D6. INDEMNITY

D6.1 Notwithstanding GC.7.03, the Contractor shall save harmless and indemnify the City for twice the contract price plus two (2) million dollars against all costs, damages or expenses arising from actions, claims, demands and proceedings, by whomsoever brought, made or taken as a result of acts or omissions of the Contractor, his/her Subcontractors, employees or agents in the performance or purported performance of the Work, and more particularly from:

(a) accidental injury to or death of any person whether retained by or in the employ of the Contractor or not, arising directly or indirectly by reason of the performance of the Work, or by reason of any trespass on or damage to property;

(b) damage to any property owned in whole or in part by the City, or which the City by duty or custom is obliged, directly or indirectly, in any way or to any degree, to construct, repair or maintain;

(c) damage to, or trespass or encroachment upon, property owned by persons other than the City;

(d) failure to pay and obtain a discharge of a notice of claim for lien served upon the City in accordance with the requirements of The Builder's Liens Act;

(e) failure to pay a Workers Compensation assessment, or Federal or Provincial taxes;

(f) unauthorized use of any design, device, material or process covered by letters patent, copyright, trademark or trade name in connection with the Work;

(g) inaccuracies in any information provided to the City by the Contractor.

SUBMISSIONS

D7. AUTHORITY TO CARRY ON BUSINESS

D7.1 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.

D8. WORKERS COMPENSATION

D8.1 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.

D9. INSURANCE

D9.1 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 $10,000.00 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 $10,000.00 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.

D9.2 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.

(b) 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.

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 If the bid security provided in his Bid Submission was not a certified cheque or draft pursuant to B11.1(c), 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 but in no event later than the date specified in GC.3.01 for the return of the executed Contract.

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 but in no event later than the date specified in GC.3.01 for the return of the executed Contract.

D12. WORK SCHEDULE

D12.1 The Contract Administrator has developed a Project Master Schedule for the project. 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 5 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 Upon acceptance by the Contract Administrator, distribute copies of the revised schedule to Subcontractors and other concerned parties.

D12.5 The Contract Work Schedule shall be updated as the work requires and submitted to the Contract Administrator.

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, 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 on the Site 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 on the Site, 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 Work within City facilities or on private property.

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 within City facilities or on private property.

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 Work under the Contract within City facilities or on private property.

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he is in receipt of a letter of intent from the Award Authority 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 that the Contractor is 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;

(ii) evidence of the workers compensation coverage specified in D8;

(iii) evidence of the insurance specified in D9;

(iv) the performance security specified in D10;

(v) the Subcontractor list specified in D11;

(vi) the detailed work schedule specified in D12; and

(vii) the security clearances specified in D13.

(b) the Contractor has attended a post-award meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a meeting. This meeting shall take place in Winnipeg, Manitoba approximately 10 days after the Award.

D15. CRITICAL STAGES

D15.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

(a) Shop Drawings:

(i) Acceptable Shop Drawings for all Major Equipment shall be completed within 40 Business Days of the Award of the Contract. Shop Drawing completion shall not be achieved until drawings are reviewed by the Contract Administrator.

(b) Delivery:

(i) Delivery of Goods to the City Warehouse shall begin no earlier than October 1, 2006 and be completed no later than November 30, 2006,

(ii) The detailed delivery schedule will be based on the Installation Contractor's and the City's requirements and will be coordinated by the Contract Administrator, and included in the Contract Work Schedule. The Contractor shall be responsible to unload the Goods and maintain custody until completion of in-warehouse testing.

(iii) Delivery of the Goods shall be considered complete upon the issuance of Form 100: Certificate of Equipment Delivery and Form 101: Certificate of Readiness to Install. A separate form shall be provided for each major component. These forms are included in Section 01650.Form 101 shall be completed only after the in-warehouse testing is completed to the satisfaction of the Contract Administrator. Upon completion of Form 101, custody of the Goods will transfer to the Installation Contractor.

(c) Satisfactory Installation: The Contractor shall provide support to the Installation Contractor as required to achieve satisfactory installation of all Goods by February 28, 2007.

(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 supplied under this Contract.

(ii) Satisfactory installation shall be considered complete upon the issuance of Form 102: Certificate of Satisfactory Installation. A single form is required for each butterfly valve.

(d) Equipment Satisfactory Performance and Training: Performance Verification and Training shall begin no earlier than July 3, 2007 and shall be completed on or before achieving Substantial Performance.

(i) The Contract Administrator will coordinate the performance verification and training to coincide with the project commissioning schedule and will provide the Contractor a minimum of thirty (30) Calendar Days written notification of the acceptable date for the start of performance verification and training.

(ii) 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 supplied under this Contract.

(iii) Equipment satisfactory performance and training shall be considered complete upon the issuance of Form 103: Certificate of Equipment Satisfactory Performance and Form T1: Certificate of Satisfactory Training.

D15.2 It is expected that The Contract Administrator will endeavour to review Shop Drawings within ten (10) Business Days upon their submission. If review is not made within that time period, Contract dates specified in D15.1(a) will be extended by an equivalent number of Business Days.

D15.3 All Shop Drawings submitted pursuant to D15.1(a) shall be provided in a single submission.

D16. SUBSTANTIAL PERFORMANCE

D16.1 The Contractor shall achieve Substantial Performance by September 24, 2007.

D16.2 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.

D16.3 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.

D16.4 Substantial Performances cannot be achieved without completion of Forms 103 and T1 for all Major Equipment supplied under this Contract.

D17. TOTAL PERFORMANCE

D17.1 The Contractor shall achieve Total Performance by December 31, 2007.

D17.2 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.

D17.3 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.

D18. LIQUIDATED DAMAGES

D18.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the days 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) Acceptable Shop Drawings in accordance with D15.1(a) – two thousand, six hundred dollars ($2,600.00);

(b) Delivery in accordance with D15.1(b) – two thousand, six hundred dollars ($2,600.00);

(c) Satisfactory installation in accordance with D15.1(c) - zero dollars ($0.00);

(d) Substantial Performance – two thousand, six hundred dollars ($2,600.00);

(e) Total Performance – six hundred dollars ($600).

D18.2 The amounts specified for liquidated damages in D18.1 is based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.

D18.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D18.4 The City will not pay a bonus if the Contractor reaches critical stages, Substantial Performance or Total Performance earlier than the dates specified herein.

MEASUREMENT AND PAYMENT

D19. PAYMENT SCHEDULE

D19.1 Further to GC.9.01 and GC.9.03, payment shall be in accordance with the following payment schedule:

(a) Measurement and payment for Item 1 “supply and delivery of AWWA C504 butterfly valves” will be made at the Contract Unit Price for each size and type of butterfly valve in Form B: Prices, and shall include all Shop Drawings, equipment, accessories, spare parts, delivery, installation support and performance verification. For items 1a) and 1b) 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, including completion of the in-warehouse testing.

(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 Equipment Satisfactory Performance.

(b) Measurement and payment for item 2, “additional days for the supply of installation support and performance verification support services” will be made at the Contract Unit Price bid for each day of on-site supervision requested by the Contract Administrator. Payment will be made only for additional days beyond the days required to verify performance and provide instruction as specified in Section 15204.

(c) Measurement and payment for item 3 “provision of operations and maintenance manuals” will be made at the fixed lump sum amount set out in Form B: Prices.

(d) Measurement and Payment for item 4 “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.

D19.2 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.

WARRANTY

D20. WARRANTY

D20.1 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.

D20.2 Notwithstanding GC.10.01, GC.10.02 and D20.1, if any law of Manitoba or of the jurisdiction in which the Work was manufactured requires, or if the manufacturer provides, a longer warranty

period or a warranty which is more extensive in its nature, then the provisions of such law or manufacturer's warranty shall apply.

D20.3 New components which replace defective components under warranty shall have a warranty period identical to the warranty period that replaced component had at Total Performance. The warranty period for the new components shall begin on the date that they are performance tested and accepted by the City.

CONTROL OF WORK

D21. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT

D21.1 Further to GC6.26, 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 Project Safety and Health Management Plan. Compliance with this Plan will be mandatory for all personnel on the construction site and training and certification of all staff by the Prime Contractor's Safety Officer will be required.

D21.3 The Water Treatment Program Project Health and Safety Management Plan is available on the City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt/projects. This plan may be updated periodically during the course of this project.

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. 731-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF LARGE BUTTERFLY VALVES

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. 731-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF LARGE BUTTERFLY VALVES

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)

FORM J: SUBCONTRACTOR LIST
(See D11)

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF LARGE BUTTERFLY VALVES

Name	Address

PART E - SPECIFICATIONS

GENERAL

E1. GENERAL

E1.1 These Specifications shall apply to the Work.

E1.2 The following are applicable to the Work:

Sections

Section	Description
Division 01 – General Requirements	
01300	Submittals
01400	Quality Control
01650	Equipment Installation
01730	Operation and Maintenance Manuals
Division 15 – Mechanical	
15204	Large Butterfly Valves

E2. GOODS

E2.1 The Contractor shall supply butterfly valves in accordance with the requirements hereinafter specified.

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 submissions with a transmittal letter, in duplicate, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each Shop Drawing product.

.5 Equipment tag number.

.6 Other pertinent data.

.3 Submissions shall include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name 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 Supervisory Control and Data Acquisition (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.

.2 Maximum sheet size: 850 x 1050 mm.

.3 Submit six (6) prints and one (1) reproducible copy of Shop Drawings. The Contract Administrator will return the reproducible copy with comments transcribed.

.4 Cross-reference Shop Drawing information to applicable portions of the Contract Documents.

.5 Include reviewed Shop Drawings in all Operation and Maintenance (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 six (6) copies of product data.

.3 Sheet size: 215 x 280 mm.

1.6 Electronic Submittals

.1 Provide electronic copies of all submittals within sixty (60) business days of stamped "Reviewed" or "Reviewed as Modified".

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 - Operation and Maintenance Manuals**.

END OF SECTION

QUALITY CONTROL

1. CODES AND STANDARDS

.1 In the case of a conflict or discrepancy between the Contract Documents and the governing standards, the more stringent requirements shall apply.

.2 Unless the edition number and date are specified, the reference to the Manufacturer's and published codes, standards, and Specifications are to be the latest edition published by the issuing authority, current at the Submission Deadline.

.3 Reference standards and Specifications are quoted in this Specification to establish minimum standards. Work in quality exceeding these minimum standards conforms to the Contract.

.4 Where reference is made to a Manufacturer's direction, instruction, or Specification, it is 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.

.5 Confine apparatus, the storage of products, and the operations of workers to limits indicated by laws, ordinances, permits, and by directions of the Contract Administrator. Do not unreasonably encumber the premises with products.

.6 Where reference is made to regulatory authorities, it includes all authorities who have, within their constituted powers, the right to enforce the laws of the place of Work.

2. TESTING AND QUALITY CONTROL

.1 Provide to the Contract Administrator, when requested and consistent with progress of the Work, test results and designs specified in the Contract Documents or required by by-laws, statutes, and regulations relating to the Work and the preservation of public health, including the following:

.1 Inspection and testing performed exclusively for the Contractor's convenience;

.2 Testing, adjusting, and balancing of process equipment and systems, conveying equipment and systems, mechanical, electrical, and instrumentation and control (I&C) equipment and systems;

.3 Mill tests and certificates of compliance;

.4 Tests for reinforcing steel unidentified by mill test reports.

.2 The Contract Administrator will select and the City will pay for the services of a testing agency or laboratory for material quality control tests that are required but not specified. Tests required by by-laws, statutes, and regulations applicable to the Work are the responsibility of the Contractor.

.3 Compliance and performance testing of equipment, pipe, conduit, wiring, and other items covered in other Divisions of this Specification are the responsibility of the Contractor, unless specified otherwise. The City may replicate any series of tests to provide random checks on the compliance and performance tests at the City's cost.

.4 Remove and replace products indicated in inspection and test reports as failing to comply with the Contract Documents.

.5 Correct improper installation procedures reported in the inspection and test reports.

.6 Pay the costs for the re-inspection and re-testing of replaced Work.

.7 It is not the responsibility of the inspection and testing agents to supervise, instruct in current methods or accept or reject a part of the Work, but only to inspect, test, and to report conditions.

.8 Notify the Contract Administrator and the appropriate inspection and testing agent not less than forty-eight (48) hours prior to the commencement of the part of the Work to be inspected and tested.

.9 Ensure the presence of the authorized inspection and testing agent at the commencement of the part of the Work specified to be inspected or tested.

.10 Ensure the inspection and testing reports are issued within forty-eight (48) hours, and that the Contract Administrator is notified forthwith if the report indicates improper conditions or procedures.

.11 Cooperate with and provide facilities for the inspection and testing agents to perform their duties.

.12 Provide proper facilities for the storage of specimens or samples at correct temperature, free from vibration or damage in accordance with the instruction of the inspection and testing agent and the governing standard.

.13 Submit four (4) copies of each laboratory test report, unless specified otherwise, each copy signed by a responsible officer of the inspection and testing laboratory. Each report is to include:

.1 Date of issue.

.2 Contract name and number.

.3 Name and address of inspection and testing company.

.4 Name and signature of inspector or 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 the inspection or test.

.9 The remarks and observations on compliance with the Contract Documents.

.14 Correct defective Work within the Contract Time; the performing of such Work is not a cause for an extension of the Contract Time.

END OF SECTION

EQUIPMENT INSTALLATION

1. INTENT

.1 This Section describes general requirements for equipment relating to supply, installation, testing, operation, and performance verification.

2. EXPERTISE AND RESPONSIBILITY

.1 The Contract Administrator recognizes the expertise of the Contractor and the Manufacturer.

.2 Should the Contract Administrator issue a 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 writing the Contract Administrator to this effect within two (2) days.

3. EQUIPMENT DELIVERY

.1 The Contractor shall be responsible for receiving, off-loading, and placing into storage all equipment at the City warehouse. **Form 100** shall be completed.

4. INSTALLATION ASSISTANCE

.1 The Contractor shall arrange for the attendance of the Manufacturer's Representative to meet with the Installation Contractor to provide instructions in the methods, techniques, precautions, and any other information relevant to the successful installation of the equipment prior to commencing installation of equipment.

.2 The Contractor shall inform the Contract Administrator, in writing, of the attendance at the Site of any Manufacturer's Representative for installation training at least fourteen (14) days prior to arrival.

.3 When the Manufacturer's Representative is satisfied that the Installation Contractor is aware of all installation requirements, he shall so certify by completing **Form 101** attached to this Specification.

.4 The completed form shall be delivered to the Contract Administrator prior to departure of the Manufacturer's Representative from the Site.

.5 Installation of the equipment shall not commence until the Contract Administrator has advised that he has received the completed **Form 101**.

.6 Separate copies of **Form 101** shall be used for each individual unit process item of equipment.

5. INSTALLATION

.1 If necessary, or if so directed by the Contract Administrator during the course of installation, the Installer may contact the Manufacturer to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in an appropriate manner. The Contractor shall provide this installation assistance at his own cost.

.2 If it is found necessary, or if so directed by the Contract Administrator, the Installer may contact the Contractor who shall arrange for the Manufacturer's Representative to visit the Site to provide assistance during installation, all at the Contractor's cost.

.3 Prior to completing installation, the Installer will inform the Contractor who shall arrange for the attendance at the Site of the Manufacturer's Representative to verify successful installation.

.4 The Manufacturer's Representative 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.

.5 The Manufacturer's Representative shall identify any outstanding deficiencies in the installation.

.6 The deficiencies shall be rectified by the Installer and the Manufacturer's Representative shall re-inspect the installation, at the Installation Contractor's cost.

.7 When the Manufacturer's Representative accepts the installation, he shall certify the installation by completing **Form 102**, attached to this Specification.

.8 Deliver the completed **Form 102** to the Contract Administrator prior to departure of the Manufacturer's Representative from the Site.

.9 Tag the equipment with a 100 mm x 200 mm card stating "EQUIPMENT CHECKED. DO NOT RUN." stencilled in large black letters. Sign and date each card.

6. OPERATION AND PERFORMANCE VERIFICATION

.1 Equipment shall be subjected to a demonstration, running test, and performance tests after the installation has been verified and any identified deficiencies have been remedied and after completion of **Form 102**.

.2 Inform the Contract Administrator at least fourteen (14) days in advance of conducting the tests and arrange for the attendance of the Manufacturer's Representative. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Installer, Contractor, and the Contract Administrator. All testing shall conform to the project schedule as directed by the Contract Administrator.

.3 All operation and performance verification testing shall conform to the project master schedule.

.4 The Manufacturer's Representative shall conduct all necessary checks to equipment and if necessary, advise the Installer of any further checking, flushing, cleaning, or other Work needed prior to confirming the equipment is ready to run.

.5 The Contractor shall then operate the equipment for at least one (1) hour to demonstrate to himself the operation of the equipment and any required ancillary services. Any remedial measures required to ensure satisfactory operation shall be promptly undertaken.

.6 The Contractor shall then notify the Contract Administrator of his readiness to demonstrate the operation of the equipment. The Contract Administrator will attend, as expeditiously as possible.

.7 Demonstration:

.1 With the assistance of the Manufacturer's Representative, the Contractor shall demonstrate that the equipment is properly installed. Alignment, piping connections, electrical connections, etc., shall be checked and if appropriate, code certifications provided.

.2 The equipment shall then be run for one (1) hour. Local controls shall be satisfactorily verified by cycling the equipment through several start-stop operations, modulating its output, or some combination. Operating parameters such as temperature, pressure, voltage, vibration, etc., shall be checked to ensure that they are within the specified or Manufacturer's recommended limits, whichever is more stringent.

.3 On satisfactory completion of the one (1) hour demonstration, the equipment shall be stopped and critical parameters, such as alignment, shall be rechecked.

.8 Running Test:

.1 The equipment shall be restarted and run continuously for five (5) days. During this period, as practicable, conditions shall be simulated which represent the full range of operating conditions. These conditions shall be mutually agreed by the Manufacturer's Representative, the Contractor, and the 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 periods allotted to each.

.9 Performance Test:

.1 Performance tests shall be conducted either concurrent with or subsequent to the running test, as practicable and agreed between the Contract Administrator and the Contractor. Performance tests of equipment shall be carried out jointly with the City's Supervisory Control and Data Acquisition (SCADA) programming team. Instrumentation and Controls (I&C) connected to the marshalling panel shall include, but not to be limited to, simulation through SCADA. Performance tests shall also be

attended by the City's operations staff as part of the acceptance procedure. Testing procedures and conditions shall be agreed to among the Contractor, Contract Administrator, and the City based on information in the Specification. The Contract Administrator is the final arbiter. However, the Contractor is solely responsible for conducting the tests.

.2 Performance tests shall be as dictated in the technical Specifications for each item of equipment or as reasonably required by the Contract Administrator to prove adherence to the requirements listed in the Specification.

.3 The Contractor shall submit the results of the performance tests to the Contract Administrator, documented and summarized in a format acceptable to the Contract Administrator. The Contract Administrator reserves the right to request additional testing. No equipment 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.

.10 All water, temporary power, heating, or any other ancillary services required to complete the initial demonstration, running test, and performance tests are the responsibility of the Installer. Chemicals are to be provided by the City.

.11 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. If the defects are attributed to the Contractor, additional costs incurred by the Installer, the Contract Administrator, or the City, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor.

.12 On successful completion of the demonstration, running test, and performance tests, **Form 103** attached to this Specification shall be signed by the Manufacturer's Representative, the Installer, and the Contract Administrator.

.13 When the Contract Administrator confirms that **Forms 103** and **T1** have been completed for all unit processes in the plant and they are ready to be operated in concert, the twenty-eight (28) day commissioning period shall commence. The equipment supplied under this Contract shall operate continuously over the twenty-eight (28) day period without experiencing a critical failure. A critical failure is defined as one that prevents the equipment from operating for an eight (8) hour period or that presents a safety hazard. For equipment that is designed not to operate on a daily basis, the commissioning period shall be defined as twenty-eight (28) consecutive days over which the piece of equipment is operated. Upon completion of the twenty-eight (28) day commissioning period, the equipment shall be deemed to have been handed-over and accepted by the Contract Administrator, unless the Contractor or Manufacturer's Representative is notified otherwise.

7. OPERATOR TRAINING

.1 For equipment specified to include training, arrange for the attendance of the Manufacturer's Representative to provide classroom training session(s) to operation and maintenance (O&M) staff.

.2 The training sessions shall last two (2) days each unless otherwise specified. The training sessions shall be given twice, to allow the City's staff to attend either session. The training sessions shall be given during the three (3) week period preceding the start of the five (5) day running test required for **Form 103**.

.3 Coordinate the training session(s) with the Contract Administrator.

.4 Prepare a draft handout taking the form of the relevant sections of the O&M Manual supplemented with any other information needed to fully explain the equipment operation.

.5 Prepare a draft agenda outlining the content of the training sessions. Allow half an hour at the beginning of the first period for the Contract Administrator to provide a summary of the design intent relating to that equipment. Following the engineering design overview, provide (as a minimum) information covering major equipment operation, mechanical and instrumentation engineering.

.6 Submit the draft handout and draft agenda to the Contract Administrator for review. Upon obtaining the Contract Administrator's acceptance, prepare ten (10) copies of the handout and submit to the Contract Administrator.

.7 Inform the Contract Administrator of any requirements for audio-visual aids five (5) days before the training session.

.8 The Manufacturers' Representative shall provide five (5) sets of training seminar manuals in similar format to the O&M Manuals prior to the training session. In addition, the Manufacturers' Representative shall be responsible to document each training session with a detailed set of minutes.

.9 Upon completion of training, the Contractor shall issue **Form T1**: Certificate of Satisfactory Training, complete with all required signatures.

CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100

We certify that the equipment listed below has been delivered into the care of the Installer. 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 Contractor) Date

_____ _____
(Authorized Signing Representative of Installer) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

CERTIFICATE OF READINESS TO INSTALL
FORM 101

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

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

_____ _____
(Authorized Signing Representative of the Installer) Date

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 Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Installer) Date

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE
FORM 103

We certify that the equipment listed below has been continuously operated for at least five (5) 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 Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Installer) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

1. Acknowledgement of Receipt of O&M Manuals.

_____ _____
(Authorized Signing Representative of the City) Date

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

_____ _____
(Authorized Signing Representative of the Installer) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

END OF SECTION

OPERATION AND MAINTENANCE MANUALS

1. DESCRIPTION

.1 This Section supplements the requirements for the provision of Operation and Maintenance (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 an electronic version of the O&M Manual.

.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 mm 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.

.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 three (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.

.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 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 "Not Applicable".

3. FIELD CHANGES

.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 three (3)-ring binders for 215 x 280 mm paper labelled "Commissioning Data" one 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.

5. WARRANTIES

.1 Provide in hard cover three (3)-ring binders for 215 mm 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

LARGE BUTTERFLY VALVES

1. GENERAL

1.1 Scope of Supply

.1 Rubber seated butterfly valves conforming to the latest version of American Water Works Association (AWWA) C504, and as specified herein.

.2 Manual actuators conforming to the latest version of AWWA C504, and as specified herein.

.3 Power Actuating Devices for valves in conformance to AWWA C540, and as specified herein.

.4 Test bulkheads and appurtenances for in-warehouse pressure testing of valves.

.5 Inspection of installation in accordance with the requirements hereinafter specified.

.6 Manuals for operation and maintenance of valves and actuators.

.7 Training services accordance with the requirements hereinafter specified.

1.2 Submittals

.1 Shop Drawings

.1 Submit Shop Drawings in accordance to **Section 01300 – Submittals**.

.2 Shop Drawings shall state all performance and design criteria.

.3 Allow fourteen (14) Calendar Days in delivery schedule for review of Shop Drawings, commencing at the date of receipt by the Contract Administrator.

.4 At the time of submission, the Contractor shall inform the Contract Administrator in writing of any deviation in the Shop Drawings from the requirements of the Contract Documents. The Shop Drawings shall include a copy of the technical Specifications attached in Part E and marked by the Contractor as either in "compliance" or "deviation" with comment.

.5 Submit a completed ISA S20.50 Instrument Specification Sheet for each valve actuator.

.2 Affidavit of Compliances

.1 Provide Affidavit of Compliance stating that valves meet requirements of the latest revision of American National Standards Institute (ANSI)/AWWA C504 and terms of this Specification.

.3 Testing

.1 Provide all factory pressure test reports.

.2 Provide protective coating thickness measurements as specified in ANSI/AWWA C550.

.3 Provide recent coating qualification testing results as specified in ANSI/AWWA C550 Section 5.2.1.

1.3 Coordination

.1 The actuators will be installed by the Installation Contractor, in a weatherproof superstructure. However, power supply and controls may not be installed to the valve actuators after their installation. Heat may not be available within the structure until that time. The Contractor shall identify special handling procedures and/or protection requirements, if any, to safeguard actuators from damage during that period.

2. PRODUCTS

2.1 Butterfly Valves

.1 This Specification shall cover the design and manufacture of butterfly valves to be supplied under this Contract. This Specification is supplementary to and shall be read together with the latest revision of AWWA Standard C504, "Rubber Seated Butterfly Valves".

.2 All butterfly valves supplied under this Contract shall be designed and manufactured by a company having at least five (5) years prior experience in manufacturing these types of products in the sizes and to the pressure ratings as those specified herein.

.3 Acceptable products

1. DeZurik
2. Pratt
3. Rodney Hunt
4. Val-Matic

2.2 Design Requirements

.1 Design, materials and construction of all valves shall conform to the latest version of AWWA C504.

.2 Design, materials, and construction of all valves larger than 1800 mm shall generally conform to AWWA C504, except minimum design dimensions and parameters beyond those listed in AWWA C504 shall be considered special designs. The Manufacturer shall, at a minimum, provide design for body shell thickness and minimum shaft diameter.

.3 This product shall be certified as suitable for contact with drinking water by an accredited certification organization in accordance with ANSI/National Sanitation Foundation (NSF) 61 “Drinking Water System Components – Health Effects”.

2.3 Design Parameters

.1 Dissolved Air Flotation (DAF) Influent Gallery

.1	Service	Potable Water
.2	Chemical Resistance	50 mg/L chlorides 45 mg/L sulfuric acid
.3	pH	5.5 - 6.0
.4	Installation	Non Submerged
.5	Operating service	5°C to 40 °C
.6	Water Temperature Service	0°C to 25°C
.7	Maximum System Operating Head	13.0 m Static Head
.8	Maximum System Operating Pressure	135 kPa
.9	Maximum Hydraulic Flow Rate	300 ML/d
.10	.Maximum Process Design Flow Rate	209 ML/d
.11	.Valve Test Pressure (2 times Operating)	270 kPa
.12	Valve torques and safety factors design pressure	135 kPa.
.13	Type of Body (All)	Flanged Short Body
.14	Maximum Non-Shock Shut-Off Pressure (All)	150 kPa
.15	Body (All)	Cast Iron
.16	Headloss	Maximum K value: 0.5

Nominal Pipe Size (mm)	Quantity	Tag Numbers	Actuator Type	Valve Class	Primary Service Function
1350	3	V-I011A V-I012A V-I016A	Manual	75B	Isolation (Open/Close)

.2 Filter Area

.1	Service	Potable Water
.2	Chemical Resistance	50 mg/L chlorides
.3	pH	5.5 - 6.0
.4	Installation	Non Submerged
.5	Operating service	5°C to 40 °C
.6	Water Temperature Service	0°C to 25°C
.7	Maximum System Operating Head	13.0 m Static Head
.8	Maximum System Operating Pressure	135 kPa
.9	Maximum Hydraulic Flow Rate	300 ML/d
.10	Maximum Process Design Flow Rate	236 ML/d
.11	Valve Test Pressure (2 times Operating)	270 kPa
.12	Valve torques and safety factors design pressure	135 kPa.
.13	Type of Body (All)	Flanged Short Body
.14	Maximum Non-Shock Shut-Off Pressure (All)	150 kPa
.15	Body (All)	Cast Iron
.16	Headloss	Maximum K value: 0.5

Nominal Pipe Size (mm)	Quantity	Tag Numbers	Actuator Type	Valve Class	Primary Service Function
1350	2	FV-F051A FV-F052A	Electric	75B	Isolation (Open/Close)

2.4 Materials

.1 General

.1 Materials for butterfly valves shall meet or exceed the latest revision requirements of AWWA C504 and shall meet or exceed the requirements of this Specification.

.2 Materials throughout shall be the best of their respective kinds. The equipment shall be designed for the very highest class of service, shall include the highest degree of strength, durability and reliability for continuous operation and for most convenient maintenance.

.3 Liberal factors of safety (minimum of fifty percent (50%)) shall be used throughout especially for all parts subject to alternating stresses or shock.

.4 All joints shall be machined and all castings shall be spot-faced for nuts. All rods shall be finished. All mating faces shall be drilled and tapped, peened, or finished as subsequently specified.

.5 The mechanical features of the equipment covered by these Specifications shall conform to the appropriate standards of the American Society of Mechanical Engineers (ASME).

.6 Threads on all screws, bolts, studs, and nuts shall be American Standard. Tapped holes in flanges shall be standard unified national threads of the coarse-thread series.

.2 Stainless Steel Components

.1 All components specified in the latest revision of AWWA Standard C504 as stainless steel and the valve shaft, pins, clamps and retaining rings for the rubber seats shall be Type 316 Stainless Steel.

.3 Workmanship

.1 All foundry and machine work shall be in accordance with the best modern practice for the class of work involved.

.2 All parts shall conform accurately to the required dimensions and shall be free from injurious defects. All machine parts shall be made to template or gauge.

.3 No repairs to metal such as welding, plugging, peening or stitching will be permitted. Any valve or actuator exhibiting such repairs will be rejected.

.4 All joints shall be faced true and shall be watertight where subject to water pressure.

.5 The bolt holes of all cast iron flanges and flanged fittings shall be spot faced to the specified thickness of flange with a plus tolerance of 3 mm ($^1/_8$ inch).

.6 All iron parts receiving bronze mounting shall be finished to fit. Such hand work shall be done in finishing as is required to produce a neat, workmanlike, well fitting, and smooth operating job throughout.

.7 All parts of the same size and same make shall be interchangeable.

.4 Ferrous Castings

.1 All castings shall be true to pattern, of workmanlike finish and of uniform fine grain quality and condition, free from blowholes, porosity, hard spots, shrinkage defects, cracks, or other injurious defects and shall be smooth and well cleaned before inspection. Castings shall be readily machinable. Castings shall not be repaired, plugged, or welded.

.5 Valve Bodies

.1 Valve bodies shall be short body and constructed of either of cast iron confirming to American Society for Testing and Materials (ASTM) A126, Class B or ASTM A48, Class 40; of ductile iron conforming to ASTM A536, Grade 65-45-12; or of alloy cast iron conforming to ASTM A436, Type 1 and 2, or ASTM A439, Type D-2 with a maximum lead content of 0.003 percent.

.6 Valve Ends

.1 The ends of the valves shall be flanged and drilled to ANSI B16.1 standard for cast iron flanges (1034 kPa (150 psi) standard).

.7 Valve Discs

.1 The design and materials of valve discs shall conform to the requirements of Section 4.5 of the latest revision of AWWA Standard C504.

.2 Discs shall be offset to provide an uninterrupted 360° seating edge and shall be cast iron per ASTM A48, Class 40 or ductile iron per ASTM A536 (65-45-12).

.3 The disc seating edge shall be solid 316 stainless steel.

.4 The disc shall be securely attached to the valve shaft using 304 stainless steel taper fasteners.

.5 Disc structures containing hollow cavities are not acceptable.

.8 Valve Shaft

.1 Valve shaft shall be constructed of Type 316 stainless steel.

.9 Valve Seats

.1 Valve seats shall be reinforced natural or synthetic rubber reinforced with high resiliency fabric inserts. The mating seat shall be of 316 stainless steel. Seats shall be of a design that permits adjustment, removal or replacement of the seat at the site of the installation without removal of the valve from the line. Seats that are clamped or mechanically secured are preferred over epoxy retained seats.

.2 Valve seats shall be manufactured from a solid mass rather than layers of rubber bonded together.

.3 Valves with a rubber seat mounted on the valve disc shall meet the following conditions:

.1 The disc seats shall be offset from the centre line of the shafts so that the rubber seat forms a continuous uninterrupted ring.

.2 An insert of stainless steel shall be provided in the body to provide a smooth seating surface for the rubber disc seat.

.4 Mechanically retained rubber seats shall be held in position on the disc or body by a segmented retaining ring secured by Type 316 Stainless Steel nuts and bolts which by tightening will slightly deform the rubber seat to maintain proper contact with the seat face throughout the entire circumference.

.10 Bearings

.1 Bearings in the valve body for shaft ends shall be of the sleeve type made of self-lubricating material such as Teflon filled acetal or approved equal.

.2 Each valve shall be equipped with one or two thrust bearings of corrosion resistant material on the shaft, outboard of the shaft seal or in the actuator housing.

.11 Shaft Seals

.1 Shaft seals shall be designed for the use of standard split-V type packing, standard O-ring seals or pull down packing as described in Section 4.5.7 of the latest revision of AWWA Standard C504.

.12 Painting and Coating

.1 Interior surfaces shall be coated with a protective system in accordance to AWWA C550 – Protective interior coatings of Valves and Hydrants, which can be used in a potable water system.

.2 Interior Coatings shall comply with ANSI/NSF 61 “Drinking Water System Components – Heath Effects”.

.3 Coating shall be two (2) or more layers (5 mils minimum each coat) Polyamide Epoxy, Amerlock 400, Tnemec Series 140F Pota-Pox Plus or approved equal. Application as per Manufacturer’s recommendations.

.4 Coatings shall be holiday free as defined in Section 5.2.3 of AWWA C550.

.5 Exterior surfaces shall be painted consistent with interior surfaces.

.6 Surfaces shall be prepared to National Association of Corrosion Engineers (NACE) SSPC-SP10- Near-White Metal Blast Cleaning.

.7 All machined surfaces shall be protected with an approved coating, prior to assembly to prevent rusting. Machined surfaces for valve seats shall have particular attention paid to, as this area if untreated, has proven to support "barnacle growth" which can prevent watertight closure of the valve.

2.5 Valve Source Quality Testing

.1 General

.1 All acceptance testing shall be completed in the presence of the Contract Administrator or his appointed representative. Provide a minimum of two (2) weeks notice of testing schedule to the Contract Administrator.

.2 Testing of valves and actuators, including pressure tests, paint and coatings and electrical tests shall be coordinated to minimize number of plant visits.

.3 The Contract Administrator will attend and witness testing in a maximum of two (2) separate factory visits, of up to five (5) days duration, at no cost to the Contractor. Additional plant revisits required due to failure of testing or non-conformance of products to Specifications shall be bourne by the Contractor.

.2 Butterfly Valves

.1 All valves shall be tested with mated actuators mounted and adjusted.

.2 All valves shall be tested with valves mounted in the vertical operating orientation.

.3 Each valve shall be subjected to hydrostatic tests under a pressure (270 kPa for class 75B Valves) by the Manufacturer at their facilities prior to shipping. The tests shall be conducted in the following manner, in accordance with the latest revision of AWWA Standard C504.

.1 A hydrostatic pressure of (270 kPa for class 75B Valves) shall be applied through bulkheads, alternately to the two sides of the closed disc with the opposite side open to inspection. Under this pressure, the valve seat shall be perfectly watertight.

.2 A hydrostatic pressure of (1000 kPa for class 75B Valves) shall be applied to the body of the valve with bulkheads closing both flanges and the disc open. Under this pressure there shall be no leakage through the metal or joints, no permanent deformation of the castings, and no other defects.

.4 The following information shall be supplied by the Contractor prior to delivery of the valves:

.1 A certified copy of the chemical and physical analysis on all materials used in the Manufacturer of the valve(s) or certification that the materials used are in strict accordance with this Specification.

.2 Copies of the test reports for performance, leakage and hydrostatic tests performed in accordance with AWWA Standard C504. Included in the report shall be the signature of the official who is responsible for the valve assembly and testing.

.3 Protective Coatings

.1 Conduct non-destructive film thickness testing, in accordance to NACE SSPC PA 2, on both interior and exterior surfaces and provide comparison to qualification standard, as per AWWA C550.

.2 Conduct low voltage Holiday testing as specified in AWWA C550 Section 5.2.3. Completed coating shall be Holiday-free.

.3 The Contract Administrator will conduct Holiday testing to NACE RP01188-88.

.4 The Contract Administrator will conduct disbondment testing in accordance to ASTM D 4541. Tensile adhesion shall be acceptable if a minimum tensile adhesion rating of 3447 kPa (500 psi) is achieved.

2.6 Electrical Valve Actuators

.1 General

.1 This section shall cover the design and manufacture of electric actuators for butterfly valves supplied under this Contract. This Specification is supplementary to and shall be read together with the latest revision of AWWA Standard C540, "Power-Actuating Devices for Valves and Sluice Gates".

.2 All electric actuators supplied under this Contract shall be designed and manufactured by a company having at least five (5) years prior experience in manufacturing these types of products in the size and to the pressure ratings as those specified herein.

.3 All technologies and devices used in the actuator must have a minimum of five (5) years of commercial operating experience for that specific Manufacturer. This is to include torque and position sensing, lubrication, and electrical compartment design.

.4 Unless otherwise noted, the actuator shall fail to the last position when the control function or power fails.

.2 Acceptable products

.1 Limitorque

.2 Rotork

.3 Design Parameters

.1	Valve Size	1350 mm Class 75 B AWWA C504 Butterfly Valve
.2	Service	Open/Close, Class 4, 60 starts / hour
.3	Opening	Quarter Turn, Counter Clockwise to open
.4	Electric Motor	Nominal 575 VAC, 3 phase 60 Hz power supply
.5	Service Temperature	-40°C to +70°C (-22°F to +158°F)
.6	Opening/Closing Time	30 to 180 seconds

.7 Mounting: Remote, floor stand mounted and coupler shaft, or direct mounted on coupler shaft above checker plate cover over valve chamber.

.8 It shall be possible to carry out the setting of the torque, turns, and configuration of the indication contacts without the necessity to remove any electrical compartment covers.

.4 Actuator Sizing

.1 The electric actuators for the butterfly valves shall be sized to provide the torque required to close or open the valve for full bi-directional flow at a differential pressure equal to the AWWA numerical class designation of the valve. The maximum thrust output of the actuator shall not exceed the valve shaft torque capability as indicated in the latest revision of AWWA Standard C504.

.5 Mounting

.1 Electric Actuator shall be designed and constructed for remote mounting on torque tube above open grating cover over valve chamber. Torque tube and shafts shall be designed and constructed such that the centre of the handwheel is 900 mm above the operating floor. The length of the extension shafts shall be confirmed by field measurement prior to manufacture. Approximate lengths are provided below. Shaft length shall be based on the information provided below, plus or minus 100 mm;

Valve Tags	**Valve Service**	**Valve Size**	**Valve Invert (m)**	**Operating Floor Elevation (m)**
FV-F051A	Filtered Water discharge valve for Filters #1 to #4	1350	231.125	232.800
FV-F052A	Filtered Water discharge valve for Filters #5 to #8	1350	231.125	232.800

.2 Torque tubes and coupling shaft shall be designed using 316 stainless steel materials to accommodate actuator torque for the length of shaft required.

.6 Motor

.1 Motors shall be Canadian Standards Association (CSA) Approved, of the totally-enclosed, reversing, squirrel cage induction type with Class 'B' insulated windings and suitable for operation at 10% above and below normal 575 V, 3 phase, 60 cycle power supply. Motor duty rating shall be sufficient for one (1) complete operating cycle (open-close-open) without exceeding its temperature rating. Motor bearings shall be amply proportioned, of the anti-friction type and permanently lubricated.

.2 The motor shall be of a design that allows for electrical and mechanical disconnection without disturbing the gear case or valve position. Electrical and mechanical disconnection of the motor should be possible without draining the lubricant from the actuator gear case. Plugs and sockets are not acceptable as a means of electrical connection for the motor.

.3 The actuator shall include circuitry to ensure the motor runs with the correct rotation for the required direction of operation with either phase sequence of the 3-phase power supply.

.7 Motor Protection

.1 Protection shall be provided for the motor as follows:

.1 The motor shall be de-energized in the event of a stall when attempting to unseat a jammed valve.

.2 Motor temperature shall be sensed by a thermostat to protect against overheating.

.3 Single phasing protection.

.4 Instantaneous reversal protection whereby an automatic time delay circuit limits the current surges when the actuator is signalled to instantaneously reverse direction.

.8 Integral Starter and Transformer

.1 The reversing starter, control transformer and local controls shall be integral with the valve actuator, suitably housed to prevent breathing and condensation built-up. For ON/Off service, the starter shall be an electromechanical type suitable for 60 starts per hour, and of rating appropriate to motor size. For modulating duty, the starter shall be a solid state type suitable for up to a maximum of 1,200 starts per hour with a duty in accordance with IEC34-1 to S4 50%. The controls supply transformer shall be fed from two of the incoming three phases. It shall have the necessary tappings and be adequately rated to provide power for the following functions:

.1 120 VAC energization of the contactor coils

.2 24 VDC output where required for remote controls

.3 Supply for all the internal electrical circuits

.2 The primary and secondary windings shall be protected by easily replaceable fuses.

.3 The reversing motor controller shall consist of separate contactors for controlling valve movement in either the opening or closing direction. Each contactor shall be magnetic, full voltage across-the-line type, sized to suit the motor power rating, and shall provide low voltage and thermal overload protection by means of three (3) bi-metallic or melting alloy elements which shall be correctly related to the motor nameplate full load current and temperature rise of the motor. The contactors shall be of robust construction with double break contacts, requiring a minimum of maintenance and being easily replaceable; mechanical and electrical interlocks shall be provided.

.9 Gearing

.1 The actuator gearing shall be totally encased in an oil or filled sealed gear case complete with fill and drain taps, suitable for operation at any angle. All gearing shall be of hardened steel alloy and alloy bronze construction with machine cut teeth. Thrust bearings of the ball or roller type shall be provided at the base of the operator. The gear case shall be designed to be opened for inspection or repair without releasing the stem thrust or taking the valve out of service.

.2 Standard SAE80EP gear oil shall be used to lubricate the gear case. Special or exotic lubricants shall not be used as they may be difficult to source.

.10 Manual Operation

.1 Motorized actuators shall be provided with a handwheel, which shall not rotate during motor operation. The handwheel shall be made of cast iron or aluminum with the word "OPEN" and a directional arrow cast in relief on the rim. Spinners shall be provided on the handwheels. The handwheel operation shall be accomplished by a padlockable declutch lever. The handwheel shall disengage automatically from the operating mechanism once the motor is capable of operation. The handwheel shall be located sufficiently away from the valve flanges, housings, etc. that personnel will not hit their knuckles on any of these obstructions when using the handwheel.

.2 The handwheel shall be positioned above the operating floor as indicated in clause 5.2.3.1 above.

.3 The handwheel shall be sized to allow one man operation with a maximum rim pull of 356 N (80 ft. lbs.) at maximum torque conditions.

.4 Clockwise operation of the handwheel shall give closing movement of the valve unless otherwise stated in this Specification.

.11 Drive Bushing

.1 The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. The drive bushing shall be positioned in the base of the actuator to facilitate the valve stem extensions.

.2 Thrust bearings, when housed in a separate thrust base, should be of the sealed-for-life type.

.12 Position Limit and Torque Limit Switches

.1 Limit switches shall be provided and set to stop the motion of the valve when it reaches the fully open and fully closed position. In addition, torque limiting switches shall be provided for open and close position as well to prevent damage to the operating mechanism in the case of torque overload. The torque switch shall be fitted with a mechanical interlock to prevent torque trip on valve opening. Provision shall be made for four extra limit switches, adjustable to any valve position.

.2 Switch design shall permit visual verification of switch position without disassembly.

.3 For remote indication provide the actuator with two (2) SPDT travel limit switches, 10A, 125 VAC, CSA listed. The travel limit switches to be adjustable.

.4 Torque protection reset shall not allow repeated starting in the same direction when control signal is maintained.

.5 The Manufacturer's representative shall field check the calibrations and settings of the limit and torque switches after installation, in the presence of the Contract Administrator or his representative.

.6 Torque and turns limitation to be adjustable as follows:

.1 Position setting range: 0.5 to 100,000 turns, with resolution to 15° of actuator output.

.2 Torque setting: 40% to 100% rated torque.

.3 Torque sensing must be affected purely electrically or electronically. Extrapolating torque from mechanically measured motor speed is not acceptable due to response time.

.4 “Latching" to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.

.13 Position Indication

.1 The actuator shall incorporate an illuminated, mechanical dial indicator and digital readout to show continuous movement from fully open to fully closed in 1% increments. The digital display shall be maintained even when the power to the actuator is isolated.

.2 The local display should be large enough to be viewed from a distance of 1.83 m when the actuator is powered up.

.3 Provision shall be made in the design for a contactless transmitter to give a 4 to 20 mA analog signal corresponding to valve travel for remote indication.

.14 Push Buttons and Selector Switches

.1 Each actuator shall be complete with a local Open-Stop-Close push-button station with external Red-Open, Green-Closed indicating lights and a Local-Off-Remote selector switch padlockable in any one of the following three positions:

.1 Local Control Only

.2 Off (No Electrical Operation)

.3 Remote Control plus Local Stop Only

.2 It shall be possible to select maintained or non-maintained local control.

.3 The local controls shall be arranged so that the direction of valve travel can be reversed without the necessity of stopping the actuator.

.15 Controls

.1 The internal control and monitoring circuits shall operate at nominal 24 VDC with interposing relays to energize the 120 VAC contactor coil circuits (where employed). All necessary transformers shall be provided.

.2 .Removable links for substitution by external interlocks to inhibit valve opening and/or closing.

.3 Provide a terminal board for field wiring. Include contacts to indicate the open/closed status of the valve.

.4 Modulating actuators shall accept a 4 to 20 mA control signal for remote proportional control.

.5 The internal circuits associated with the control and monitoring functions are to be designed to withstand simulated lightning impulses of up to 1 kV.

.16 Minimum monitoring and control signal requirements

.1 Open Close actuators:

.1 Momentary Open Command (Remote dry contact).

.2 Momentary Close Command (Remote dry contact).

.3 Open Status (Dry contact for remote indication).

.4 Closed Status (Dry contact for remote indication).

.5 Computer (Remote) Mode (Dry contact for remote indication).

.6 Remote dry contacts will be rated 2 Amps at 120 VAC minimum.

.2 Modulating actuators:

.1 Input signal: 4 to 20 mA for position control from programmable logic controller (PLC).

.2 Output signal: 4 to 20 mA to PLC for position monitoring.

.3 Computer (Remote) Mode (Dry contact for remote indication).

.17 Wiring and Terminals

.1 Internal wiring shall be of CSA approved insulated stranded cable of appropriate size for the control and 3-phase power. Each wire shall be clearly identified at each end. Permanent heat shrunk labelling shall be used.

.2 The terminals shall be embedded in terminal block of high tracking-resistance compound.

.3 The terminal compartment shall be separated from the inner electrical components of the actuator by means of a watertight 'O' ring seal.

.4 The terminal compartment of the actuator shall be provided with a minimum of two (2) threaded cable entries.

.5 All wiring supplied as part of the actuator is to be contained within the main enclosure for physical and environmental protection. External conduit connections between components is not acceptable.

.6 Control logic circuit boards and relay boards must be mounted on plastic mounts to comply with double insulated standards. No more than a single primary size fuse shall be provided to minimize the need to remove single covers for replacement.

.7 A durable terminal identification card showing plan of terminals shall be attached to the inside of the terminal box cover indicating:

.1 Serial number

.2 External voltage values

.3 Wiring diagram number

.4 Terminal Layout

.8 The identification card must be suitable to inscribe cable core identification alongside terminal numbers.

.18 Enclosure

.1 Actuators shall be O-ring sealed, watertight to National Electrical Manufacturer's Association (NEMA) 6/IP68 as well as have an inner watertight and dustproof O-ring seal between the terminal compartment and the internal electrical elements of the actuator, fully protecting the switch mechanism, motor and all other internal electrical elements of the actuator from ingress of moisture and dust when the terminal cover is removed On-Site for cabling.

.2 All external fasteners should be of stainless steel.

.19 Start-Up Kit

.1 Each actuator shall be supplied with a start-up kit comprising installation instructions, electrical wiring diagrams and sufficient spare cover screws and seals to make good any site losses during the twenty eight (28) day commissioning period.

.20 Protective Coatings

.1 All external ferrous components including floor stands, adaptors and mounting plates, shall be epoxy painted and tested in accordance with the colour to be specified at time of shop drawing submittal.

.2 Any touch-up paintwork required during installation shall be undertaken by the Installation Contractor. The touch-up paint shall be of the same colour and Specifications used in the above clauses and shall be supplied by the Manufacturer. The Manufacturer shall provide a minimum of 1 L of paint product per valve for this purpose.

2.7 Electric Actuator Source Quality Testing

.1 Each electric motorized actuator shall be performance tested by the Manufacturer at their facilities prior to shipping. The test shall simulate a typical valve torque load from full-open to full-close and full-close to full-open. The following information shall be recorded:

.1 Torque at Maximum Torque Setting

.2 Current at Maximum Torque Setting

.3 Test Voltage and Frequency

.4 Flash Test Voltage

.5 Actuator Output Speed and Operating Time for Full-Open to Full-Close

.6 Amperage draw on motors at breakaway and normal operation.

.2 Copies of the test reports for the above performance tests signed by the official who is responsible for the actuator assembly and testing shall be forwarded to the Contract Administrator as soon as completed.

.3 In addition, the test reports shall include details of Specification such as gear ratios for both manual and automatic drive, closing direction, wiring diagram code number, etc.

.4 Actuators

.1 Electric actuators shall be tested in accordance with the latest revision of AWWA Standard C540.

.2 In addition to factory inspection and the witness of tests by the Contract Administrator the Contractor shall provide copies of the following test reports prior to delivery of the actuators:

.1 proof-of-design test, and

.2 performance tests.

.5 Electric Actuators

.1 The City will perform voltage, current draw, cycle speed and whatever other tests are deemed appropriate, once valves and actuators have been delivered to the City of Winnipeg Warehouse location.

2.8 Manual Valve Actuators

.1 General

.1 This Specification shall cover the design and manufacture of manual actuators for butterfly valves to be supplied under this Contract. This Specification is supplementary to and shall be read together with the latest revision of AWWA Standard C504, "Rubber-Seated Butterfly Valves".

.2 All manual actuators to be supplied under this Contract shall be designed and manufactured by a company having at least five (5) years prior experience in manufacturing these types of products in the size and to the pressure ratings as those specified herein.

.2 General Design Requirements

.1 Quarter turn, manual geared actuators shall be of worm gear drive type designed for one man operation and for a maximum pull on the handwheel rim at maximum torque conditions of not more than 356 N (80 ft. lbs.).

.3 Gearing and Enclosure

.1 Actuators shall be manual geared with a ball bearing mounted worm gear drive, machine cut gear teeth, and be totally enclosed in a sealed housing sufficient to permit normal operation even when totally submerged in water. Traveling nut type of mechanisms will not be accepted. Gear lubricant shall be of the bulk grease type; synthetic lubricants will not be accepted.

.2 Number of actuator turns to open or close the valve shall be kept to as few as possible to avoid over torquing and damage to the actuator.

.3 Submersible rating shall be adequate for 7.5 m water submergence for forty eight (48) hours.

.4 Accessible parts of the actuator requiring lubrication shall be provided with button-head alemite grease fittings.

.4 Input Limit Stops

.1 Adjustable, external stop-limiting devices shall be provided on the actuators to prevent over-travel of the valve disc in the open and closed position.

.2 Under circumstances where spur gear attachments are installed on the input side of the actuator to facilitate the maximum input operating torque of 356 N (80 ft. lbs.), input limit stops shall be installed on the input side of the spur gear attachment.

.3 A shear pin or other torque regulating device shall be provided on the actuator or handwheel/operating nut as an extra precaution against actuators being over-torqued.

.5 Handwheel

.1 Each actuator shall be equipped with a 450 mm (min.) to 600 mm (max.) diameter handwheel fitted with an operating nut secured in position by a lock nut, pin or key. The operating nut shall be 49 mm^2 at the top, 51 mm^2 at the base and 45 mm high. The handwheel shall be made of cast iron of the rimmed type with finger grips, an arrow, the word "OPEN" cast in relief on the rim and have an easy slide fit onto the mating shaft. Direction of opening shall be counter clockwise. Spinners shall be provided on all handwheels.

.2 The handwheel shall be located sufficiently away from the valve flanges, housings, etc. that personnel will not hit their knuckles on any of these obstructions when using the handwheel.

.6 Valve Position Indicator

.1 A mechanical, valve position indicator shall be provided and mounted on the outside of each valve actuator. The dial or scale plate shall be 316SS and shall be clearly graduated and marked. A 316SS pointer shall be aligned to show the exact position of the valve disc in the valve body. The fastener for the indicator dial shall be made of 316SS stainless steel.

.2 There shall also be a visible indication on the valve shaft end showing the position of the valve disc in relation to the shaft to ensure proper relation of the disc and indicating mechanism in the event an actuator has to be removed and replaced on a valve.

.3 Open and closed limit switches (Form C, 120 VAC Rated) shall be provided as contacts for remote position indication. The limit switch enclosure shall be water tight to NEMA 6/IP68. Provide screw terminals and 19 mm ($^3/_4$ inch) NPT conduit hub for customer connection to the limit switch.

.7 Protective Coatings

.1 All external ferrous components including adaptor and mounting plates, shall be painted and tested in accordance with the colour to be specified at time of shop drawing submittal.

.2 Any touch-up paintwork required during installation will be undertaken by the Installation Contractor. The touch-up paint shall be of the same colour and Specifications used in the above clauses and shall be supplied by the Manufacturer. The Manufacturer shall provide a minimum of 1 L of paint product per valve for this purpose.

3. EXECUTION

3.1 Installation by Installation Contractor

.1 Flange Ends:

.1 Flanged valve bolt holes shall straddle vertical centerline of pipe.

.2 Clean flanged faces, insert gasket and bolts, and tighten nuts progressively and uniformly.

.3 Valve Orientation:

.1 Install operating stem vertical when valve is installed in horizontal runs of pipe having centerline elevations 1476 mm or less above finished floor, unless otherwise shown.

.2 Install operating stem horizontal in horizontal runs of pipe having centerline elevations between 1476 mm and 2057 mm above finish floor, unless otherwise shown.

.3 Orient butterfly valve shaft so that unbalanced flows or eddies are equally divided to each half of the disc, i.e., shaft is in the plane of rotation of the eddy.

.4 Extension Stem for Operator: Where the depth of the valve is such that its centerline is more than 984 mm below grade, furnish an operating extension stem

with 50 mm operating nut to bring the operating nut to a point 152 mm below the surface of the ground and/or box cover.

.5 Torque Tube: Where operator for quarter-turn valve is mounted on torque tube, furnish extension stem torque tube of a type properly sized for maximum torque capacity of the valve.

3.2 Field Finishing by Installation Contractor

.1 Provide field finishing with touch up paint for any items scored or damaged.

3.3 Field Quality Control by Installation Contractor

.1 Demonstration Tests: Conduct position and travel tests on each valve locally, and remotely if automated. Provide checklist of functional testing for all valves.

.2 Performance Test: In accordance with operating conditions indicated in clause 2.3 of this Section.

.3 Valve may be hydrostatic tested as installed while testing pipelines, or as a separate step.

.4 Test that valves open and close smoothly under operating pressure conditions. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.

.5 Count and record number of turns to open and close valve; account for any discrepancies with Manufacturer's data.

.6 Automatic valves to be tested in conjunction with control system testing. Set all opening and closing speeds, limit switches, as required or recommended by the Contract Administrator.

.7 As the system will not be capable of full operation until the final twenty eight (28) day commissioning period, as may be amended by the Project Master Schedule, performance verification will consist of the following steps:

.1 Dry operation of all valves through two (2) complete open and closed cycles in each operational configuration (both manual and electric for power actuated valves).

.2 For valves capable of wet operation at the time of installation, operate all valves through two (2) complete open and closed cycle in flow conditions.

.3 Confirmation that valves are watertight under system head.

.4 Confirmation that valves are watertight under system head at the end of the twenty eight (28) day commissioning period.

3.4 Manufacturer's Representative Field Services

.1 The valves in this section require Manufacturer's field services.

.2 Verify satisfactory delivery of the equipment by completing **Form 100**, illustrated in **Section 01650 – Equipment Installation**.

.3 The Contractor shall provide the following materials to facilitate field tests:

.1 3 mm thick cloth impregnated black gasket of sufficient number to complete testing.

.2 One complete set of carbon steel bolts to ASTM A307 Grade B conforming to AWWA C207, of sufficient length to couple valve to blind flange.

.3 Valve stands, blocking, pipe supports and actuator stand sufficient to properly brace valves securely in an upright position.

.4 The Contractor shall perform a hydrostatic leak test, in the presence of the Contract Administrator, on all valves once they are delivered. The test shall be performed as follows:

.1 The valve shall be orientated in the vertical position.

.2 A gasketed, steel blind flange with a tapped fitting suitable for introduction of compressed water, shall be bolted in place.

.3 The space between the blind flange and valve disc shall be filled through the center port, and air bled off through the top port. Once all air has been expelled, the top test port shall be closed.

.4 A pressure of 260 kPa for class 75B Valves shall be applied through the fitting and maintained for ten minutes. Under this pressure the valve seat shall be perfectly watertight.

.5 The test shall be repeated for the opposite side.

.6 The Contractor shall ensure a qualified representative of the valve Manufacturer is present for the testing of the valves to correct any deficiencies found.

.5 Instruct Installer in the methods and precautions to be followed in the installation of the equipment. Certify the Installation Contractor's understanding by completing **Form 101**, illustrated in **Section 01650 – Equipment Installation**.

.6 Arrange for a technically qualified Manufacturer's Representative to attend the installation work, certify correct installation, train operating and maintenance staff and undertake the testing of the system for sufficient periods, to ensure the equipment is installed, operated, and maintained in accordance with the Manufacturer's recommended procedures.

.7 The minimum periods of site attendance are identified in the following table along with the form to be completed on each of these trips.

.8 The total number of trips will depend on the Contract Work Schedule. The cost of additional trips, to be determined by the Contract Administrator, shall be provided at the Contract Unit Price. Arrange for a technically qualified Manufacturer's Representative to attend the installation work, certify correct installation, train operating and maintenance staff and undertake the testing of the system for sufficient periods, to ensure the equipment is installed, operated, and maintained in accordance with the Manufacturer's recommended procedures.

Item	Description	Total number of Business Days	Form
1	Equipment Delivery & Warehouse Testing	2	100
2	Installation Assistance	1	101
3	Witnessing of Equipment Installation	1	102
4	Assistance in Equipment Performance Testing	4	103
5	Operator and Maintenance Training	4	T1

3.5 Installation Witnessing

.1 The Installation Contractor will ensure that equipment is installed plumb, square and true within tolerances specified by the Manufacturer's Representative and as indicated in the Contract Documents.

.2 The Manufacturer's Representative shall ensure the equipment is installed as required to provide satisfactory service.

.3 The Manufacturer's Representative and the Installation Contractor are to cooperate to fulfill the requirements for a successful installation as documented by **Form 102**, illustrated in **Section 01650 – Equipment Installation**.

3.6 Equipment Performance Testing

.1 The Manufacturer's Representative shall ensure that all equipment, including all component parts, operates as intended.

.2 The Manufacturer's Representative shall demonstrate satisfaction of requirements specified herein.

.3 The Manufacturer's Representative and the Installation Contractor are to cooperate to fulfill the requirements for successful testing of the equipment as documented by **Form 103**, illustrated in **Section 01650 – Equipment Installation**.

3.7 Training

.1 The Manufacturer's Representative shall provide the services of factory trained instructors for the purpose of training the City's personnel in the proper operation and maintenance of the equipment as documented by **Form T1**. Conform to the requirements of **Section 01650 – Equipment Installation**.

END OF SECTION