THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 427-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF GRANULAR ACTIVATED CARBON FILTRATION SYSTEM

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PART B - BIDDING PROCEDURES

B1. PROJECT TITLE

B1.1 WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF GRANULAR ACTIVATED CARBON FILTRATION SYSTEM

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 4:00 p.m. Winnipeg time, September 1, 2005.

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. ENQUIRIES

B3.1 All enquiries shall be directed to the Contract Administrator identified in D4.1.

B3.2 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.

B3.3 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.

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

B3.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B2.3 unless that response or interpretation is provided by the Contract Administrator in writing.

B4. ADDENDA

B4.1 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.

B4.2 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.

B4.2.1 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.

B4.2.2 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.

B4.3 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.

B5. SUBSTITUTES

B5.1 The Work is based on the materials, equipment, methods and products specified in the Bid Opportunity.

B5.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B5.3 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.

B5.4 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.

B5.5 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.

B5.6 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.

B5.6.1 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.

B5.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B5.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative shall base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B14.

B5.9 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.

B6. BID SUBMISSION

B6.1 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;

B6.2 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.

B6.3 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.

B6.3.1 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.

B6.4 Bid Submissions submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B6.5 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

B7. BID

B7.1 The Bidder shall complete Form A: Bid, making all required entries.

B7.2 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.

B7.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B7.2.

B7.3 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.

B7.4 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.

B7.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.

B7.4.2 All signatures shall be original and shall be witnessed except where a corporate seal has been affixed.

B7.5 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.

B8. PRICES

B8.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices, Alternative 1.

B8.1.1 If the Bidder submits separate unit prices for all three items in Alternative 1 he may also submit a Lump Sum Price using Form B: Prices, Alternative 2.

B8.1.2 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. QUALIFICATION

B9.1 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);

B9.2 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.

B9.2.1 Proof satisfactory to the Contract Administrator will include (but is not limited to):

(a) Evidence that the Bidder has a minimum of ten (10) years experience in supplying GAC to municipal drinking water treatment plants.

(b) References and data (including turbidity and organic contaminant removal) showing that the Bidder has successfully supplied GAC in municipal water treatment plants

(c) Evidence that the Bidder has a minimum of fifteen (15) successful installations of a complete underdrain system.

B9.3 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..

B10. BID SECURITY

B10.1 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.

B10.1.1 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.

B10.2 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.

B10.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B10.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.

B10.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.

B10.3 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.

B11. OPENING OF BIDS AND RELEASE OF INFORMATION

B11.1 Bid Submissions will not be opened publicly.

B11.2 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.

B11.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B11.4 The Bidder is advised that any information contained in any Bid 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.

B12. IRREVOCABLE BID

B12.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.

B12.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work for the time period specified in Paragraph 11 of Form A: Bid.

B13. WITHDRAWAL OF BIDS

B13.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B13.1.1 Notwithstanding GC.7.05(2), the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B13.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

B13.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials 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 B13.1.3(b), declare the Bid withdrawn.

B13.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B12.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative

Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B14. EVALUATION OF BIDS

B14.1 Award of the Contract shall be based on the following bid evaluation criteria:

(a) compliance by the Bidder with the requirements of the Bid Opportunity (pass/fail);

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B9 (pass/fail);

(c) Bid Price;

(d) economic analysis of any approved alternative pursuant to B5.

B14.2 Further to B14.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid Submission is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements if the interests of the City so require.

B14.3 Further to B14.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his Bid Submission or in other information required to be submitted, that he is responsible and qualified.

B14.4 Further to B14.1(c), for Alternative 1, the Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.

B14.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.

B14.5 Further to B14.1(c), for Alternative 2, the Bid Price shall be the lump sum price shown on Form B: Prices.

B14.5.1 If there is any discrepancy between the lump sum price written in figures and the lump sum price written in words, the price written in words shall take precedence

B14.6 This Contract may be awarded separately by item (Alternative 1) or as a whole (Alternative 2) as identified on Form B: Prices.

B14.6.1 Notwithstanding B8.1, the Bidder may, but is not required to, bid on any one or more of the items in Alternative 1.

B14.6.2 The City shall have the right to choose the alternative that is in its best interests. If the Bidder has not bid on both alternatives or on all items in Alternative 1, he shall have no claim against the City if his partial Bid is rejected in favour of an award of the Contract on the basis of an alternative or item(s) upon which he has not bid.

B15. AWARD OF CONTRACT

B15.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

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

B15.2.1 Without limiting the generality of B15.2, the City will have no obligation to award a Contract where:

(a) the prices exceed the available City funds for the Work;

(b) the prices are materially in excess of the prices received for similar work in the past;

(c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;

(d) only one Bid is received; or

(e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.

B15.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

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

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

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D1.2 The General Conditions are amended by striking out “The City of Winnipeg Act” wherever it appears in the General Conditions and substituting “The City of Winnipeg Charter”.

D1.3 The General Conditions are amended by striking out “Board of Commissioners” or “Commissioner” wherever it appears in the General Conditions and substituting the “Chief Administrative Officer”.

D1.4 The General Conditions are amended by striking out “Tender Package” wherever it appears in the General Conditions and substituting “Bid Opportunity”.

D1.5 The General Conditions are amended by striking out “Tender Submission” wherever it appears in the General Conditions and substituting “Bid Submission”.

D1.6 The General Conditions are amended by striking out “Bidding Instructions” wherever it appears in the General Conditions and substituting “Bidding Procedures”.

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the supply of a granular activated carbon filtration system (Alternative 2) or components thereof (Alternative 1)

D2.1.1 If the Contract is awarded by item (Alternative 1), each Contractor shall perform the Work of the item(s) awarded to him.

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

(a) Item 1 - Supply and install filter media in accordance with Section 11201 of the Specifications;

(b) Item 2 - Supply filter underdrains in accordance with Section 11203 of the Specifications;

(c) Item 3- Supply filter troughs in accordance with Section 11205 of the Specifications.

D2.3 The Site is located on Provincial Road 207, 3 km north of Highway 1 in Dugald, Manitoba.

D2.3.1 The Site address is PR207, Lot 57082, Dugald, Manitoba.

D2.3.2 Provincial Road 207 is a class B1 road and is subject to seasonal load restrictions which will affect the maximum weight of individual deliveries. The Contractor shall be responsible for the payment all fees and acquire all permits from the authority having jurisdiction as required by GC.7.01

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) **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.

(r) **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.

(s) **IEEE** means Insitutute of Electrical and Electronics Engineers

(t) **NEMA** means National Electrical Manufacturer's Association

(u) **Furnish** means supply

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

(w) **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

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

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

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

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

(bb) **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

(cc) **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

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

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

(ff) **NSA** means National Sanitation Association.

(gg) **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.

(hh) **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.

(ii) **GAC** means granulated activated carbon.

(jj) **Prorated Total Bid Price** means a price calculated for the purposes of payment for a Contract awarded as a whole pursuant to Alternative 2 from Form B: Prices. The Prorated Total Bid Price is the product of the Total Bid Price for a Bid submitted pursuant to Alternative 2, multiplied by the Contractor's unit price for an item from Alternative 1, divided by the Total Bid Price from Alternative 1. A Contract awarded as a whole will have three Prorated Total Bid Prices; one each for the supply of filter underdrains, supply of filter troughs and the supply and installation of filter media.

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.

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) 986-8392
Facsimile No. (204) 986-8393

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

SUBMISSIONS

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.

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. SAFE WORK PLAN

D10.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of the installation of the filter media but in no event later than the date specified in GC:4.1 for the return of the executed Contract.

D10.2 The Safe Work Plan shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division internet site at http://www.winnipeg.ca/matmgt.

D11. PERFORMANCE SECURITY

D11.1 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.

D11.1.1 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.

D11.2 If the bid security provided in his Bid Submission was not a certified cheque or draft pursuant to B10.1(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.

D12. SUBCONTRACTOR LIST

D12.1 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.

D13. WORK SCHEDULE

D13.1 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.

D13.2 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.

D13.3 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.

D13.4 Upon acceptance by the Contract Administrator, distribute copies of the revised schedule to Subcontractors and other concerned parties.

D13.5 The Contract Work Schedule shall be updated as the work requires and submitted to the Contract Administrator.

D13.6 The Contractor shall instruct recipients to report to the Contractor immediately any problems anticipated by the timetable shown in the Contract Work Schedule.

D13.7 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.

D13.8 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.

D13.9 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.

D13.10 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.

D14. SECURITY CLEARANCE

D14.1 Each individual proposed to perform Work on the Site shall be required to obtain a Criminal Record Check Search Certificate from the Police Service having jurisdiction at his place of residence.

D14.2 Prior to the commencement of any Work, and during the term of the Contract if additional or replacement individuals are proposed to perform Work, the Contractor shall supply the Contract Administrator with a Criminal Record Search Certificate obtained not earlier than one (1) year prior to the Submission Deadline, or a certified true copy thereof, for each individual proposed to perform Work within City facilities or on private property.

D14.3 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.

D14.4 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.

D14.5 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

D15. COMMENCEMENT

D15.1 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.

D15.2 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 safe work plan specified in D10

(v) the performance security specified in D11;

(vi) the Subcontractor list specified in D12;

(vii) the Contract Work Schedule specified in D13;

(viii) the security clearances specified in D14.

(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 Calgary, Alberta approximately 10 Business Days after the Award..

D16. CRITICAL STAGES

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

(a) Shop Drawings: Acceptable Shop Drawings for all Major Equipment shall be completed by November 1, 2005. Shop drawing completion shall not be achieved until drawings are reviewed by the Contract Administrator.

(b) Supply and delivery of Goods specified in Sections 11203 and 11205 (filter underdrains and filter troughs):

(i) Delivery of Goods to the Site shall begin no earlier than August 1, 2006 and be completed no later than September 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 Goods shall be supplied into the care of the Installation Contractor in accordance with this schedule,

(iii) Equipment delivery 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 included in Section 01650.

(c) Supply and Installation of Goods specified in Section 11201 (filter media):

(i) Delivery of Goods to the Site shall begin no earlier than May 1, 2007 and be completed no later than May 31, 2007.

(d) Satisfactory Installation: The Contractor shall provide support to the Installation Contractor(s) as required to achieve satisfactory installation of all equipment by July 3, 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. Unless otherwise specified, a single form is required for the entire system.

(e) 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 sixty (60) 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) Satisfactory performance shall be considered complete upon the issuance of Form 103: Certificate of Equipment Satisfactory Performance.

(iv) Satisfactory training shall be considered complete upon the issuance of Form T1: Certificate of Satisfactory Training.

D16.2 The City will endeavour to award the Contract within twenty-one (21) Calendar Days of the Submission Deadline. If award is not made within that time period, Contract dates specified in D16.1(a) will be extended by an equivalent number of Calendar Days.

D16.3 The Contract Administrator will endeavour to review Shop Drawings within ten (10) Calendar Days upon their submission. If review is not made within that time period, Contract dates specified in D16.1(a) will be extended by an equivalent number of Calendar Days.

D16.3.1 All Shop Drawings submitted pursuant to D16.1(a) shall be provided in a single submission.

D17. SUBSTANTIAL PERFORMANCE

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

D17.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D17.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D17.4 Substantial Performance cannot be achieved without completion of Forms 103 and T1 for all major equipment supplied under this Contract.

D18. TOTAL PERFORMANCE

D18.1 The Contractor shall achieve Total Performance by December 31, 2007.

D18.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.

D18.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D19. LIQUIDATED DAMAGES

D19.1 If the Contractor fails to achieve critical stages, Substantial Performance or Total Performance in accordance with the Contract by the 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 D16.1(a) – two thousand, six hundred dollars ($2,600.00);

(b) Delivery in accordance with D16.1(b) – two thousand, six hundred dollars ($2,600.00);

(c) Satisfactory installation in accordance with D16.1(c) and D16.1(d) - zero dollars ($0.00);

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

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

D19.2 The amounts specified for liquidated damages in D19.1 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.

D19.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D19.4 The City will not pay a bonus for performance if the Contractor reaches critical stages earlier than those specified in D16.

MEASUREMENT AND PAYMENT

D20. PAYMENT SCHEDULE

D20.1 Further to GC.9.01 and GC.9.03, payment shall be in accordance with the following payment schedule:

D20.1.1 For contracts awarded based on Form B: Prices, Alternative 1:

(a) Filter underdrains and filter troughs: for items 2 and 3 of Form B: Prices, measurement and payment for each item shall be as follows:

(i) Two (2) percent of the unit price will be paid upon the issuance of Certified Shop Drawings for the entire scope covered by the unit price.

(ii) Seventy three (73) percent of the unit price will be paid upon issuance of Forms 100: Certificate of Equipment Delivery and 101: Certificate of Readiness to Install and for transference of title to the City of Winnipeg for all equipment.

(iii) A further ten (10) percent of the unit price will be paid upon issuance of Form 102: Certificate of Satisfactory Installation.

(iv) A further ten (10) percent of the unit price will be paid upon the issuance of Form 103: Certificate of Satisfactory Performance.

(v) A further five (5) percent of the unit price will be paid upon the issuance of Form T1: Certificate of Satisfactory Training.

(b) Filter media: for item 1 of Form B: Prices, measurement and payment for this item shall be as follows:

(i) Seventy five (75) percent of the unit price will be paid upon issuance of Forms 100: Certificate of Equipment Delivery and 101: Certificate of Readiness to Install and for transference of title to the City of Winnipeg for all Goods.

(ii) A further ten (10) percent of the unit price will be paid upon issuance of Form 102: Certificate of Satisfactory Installation.

(iii) A further ten (10) percent of the unit price will be paid upon the issuance of Form 103: Certificate of Satisfactory Performance.

(iv) A further five (5) percent of the unit price will be paid upon the issuance of Form T1: Certificate of Satisfactory Training.

D20.1.2 For a contract awarded based on Form B: Prices, Alternative 2:, the Total Bid Price shall be prorated into three parts for the purposes of payment, with each part weighted in proportion to the Contractor's Bid Submission of Alternative 1, Form B: Prices.

(a) Filter underdrains and filter troughs: measurement and payment shall be based on the Prorated Total Bid Price for each item and as follows:

(i) Two (2) percent of the Prorated Total Bid Price will be paid upon the issuance of Certified Shop Drawings for the entire scope included in the Prorated Total Bid Price.

(ii) Seventy three (73) percent of the Prorated Total Bid Price will be paid upon issuance of Forms 100: Certificate of Equipment Delivery and 101: Certificate of Readiness to Install and for transference of title to the City of Winnipeg for all equipment included in the Prorated Total Bid Price.

(iii) A further ten (10) percent of the Prorated Total Bid Price will be paid upon issuance of Form 102: Certificate of Satisfactory Installation for all equipment included in the Prorated Total Bid Price.

(iv) A further ten (10) percent of the Prorated Total Bid Price will be paid upon the issuance of Form 103: Certificate of Satisfactory Performance for all equipment included in the Prorated Total Bid Price.

(v) A further five (5) percent of the Prorated Total Bid Price will be paid upon the issuance of Form T1: Certificate of Satisfactory Training for all equipment included in the Prorated Total Bid Price.

(b) Filter media: measurement and payment shall be based on the Prorated Total Bid Price for this item and as follows:

(i) Seventy five (75) percent of the Prorated Total Bid Price will be paid upon issuance of Forms 100: Certificate of Equipment Delivery and 101: Certificate of Readiness to Install and for transference of title to the City of Winnipeg for all Goods included in the Prorated Total Bid Price.

(ii) A further ten (10) percent of the Prorated Total Bid Price will be paid upon issuance of Form 102: Certificate of Satisfactory Installation for all Goods included in the Prorated Total Bid Price.

(iii) A further ten (10) percent of the Prorated Total Bid Price will be paid upon the issuance of Form 103: Certificate of Satisfactory Performance included in the Prorated Total Bid Price.

(iv) A further five (5) percent of the Prorated Total Bid Price will be paid upon the issuance of Form T1: Certificate of Satisfactory Training.

D20.1.3 Further to GC.9.03:

(i) 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;

(ii) 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

D21. WARRANTY

D21.1 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.

D21.2 Notwithstanding GC.10.01, GC.10.02 and D21.1, 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.

D21.3 New components which replace defective components under warranty shall have a warranty period identical to the warranty period that replaced component had at substantial 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

D22. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT

D22.1 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).

D22.2 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.

D22.3 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

FORM H1: PERFORMANCE BOND
(See D11)

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. 427-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF GRANULAR ACTIVATED CARBON FILTRATION SYSTEM

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 D11)

_____
(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. 427-2005

WINNIPEG WATER TREATMENT PROGRAM – SUPPLY OF GRANULAR ACTIVATED CARBON FILTRATION SYSTEM

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 GRANULAR ACTIVATED CARBON FILTRATION SYSTEM

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	Filter Quality Control
01650	Filter Equipment Installation
01730	Filter Operation and Maintenance Manuals
Division 11 – Process	
11201	Filter Media
11203	Filter Underdrains
11205	Filter Troughs

Drawings

Drawing No.	Description
WF-M0001	Filter Box Dimensions

E2. GOODS

E2.1 The Contractor shall supply and install (as applicable) a granular activated carbon filtration system in accordance with the requirements hereinafter specified.

FILTER SUBMITTALS

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.

END OF SECTION

FILTER 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 date of Tender closing.

.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

FILTER 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 Installer shall be responsible for receiving, off-loading, and placing into storage all equipment at the Site. 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 shall 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.

.2 If it is found necessary, or if so directed by the Contract Administrator, the Installer shall 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 shall 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.

.10 Provide a copy of Form 102 for the entire system supplied under this contract.

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.

.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 shall attend, as expeditiously as possible.

.7 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.

.8 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.

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

.10 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.

.11 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.

.12 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.

.13 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.

.14 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.

.15 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.

.16 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.

.17 When the Contract Administrator confirms all unit processes in the plant are tested as per Form 103 and training provided as per Form T1, the twenty-eight (28) day commissioning period shall commence. The equipment 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. 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 operating period 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

FILTER 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.

.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 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 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

FILTER MEDIA

1. GENERAL

1.1 Summary

.1 This Specification describes the Granular Activated Carbon (GAC) products for use as filter media in biological filtration and filter-adsorbers. The GAC shall be capable of removing turbidity, color, tastes, odors and other organic contaminants from water after dissolved air flotation, ozonation and polymer pretreatment processes, and shall be able to function as biological filters. The GAC shall be made from selected grades of bituminous coal capable of withstanding repeated backwash procedures without significant change in physical sizes. Only coal-based GAC will be acceptable.

1.2 References

.1 The following is a list of standards which may be referenced in this section:

.1 American Water Works Association (AWWA): B604, Granular Activated Carbon (GAC).

.2 ANSI / National Sanitation Foundation (NSF) Standard 61 classified for use in potable water applications.

.3 AWWA Disinfection Procedure C652-02

.4 ASTM E11 Standard for sieve calibration

1.3 Submittals

.1 Action Submittals:

.1 Shop Drawings: Submit manufacturer's product information in accordance with the Contract Work Schedule, including grain size ranges for GAC media as specified. Fine media sizes shall be in millimeters and include Effective Size (ES) and Uniformity Coefficient (UC). Data on media headloss versus flow rate, and flow rate versus expansion of the media during fluidization backwashing at 1, 10, and 22 degrees Celsius shall also be included. Include the iodine number and total ash content. Submit NSF – 61 Certification.

.2 Submit gradation test results of GAC media, including sieve analysis conducted on actual media to be shipped, prior to loading and shipment.

.3 Submit a 5 kg sample of actual GAC media shipped for reference testing. Additional samples may be taken and analyzes upon delivery.

2. PRODUCTS

2.1 Approved GAC Filter Media Manufacturers

.1 CALGON Carbon Corp., FILTRASORB F-820

.2 NORIT Americas Inc., NORIT GAC 820

.3 US FILTER Westates Carbon, AQUACARB 820

2.2 GAC Media Filters

.1 Provide GAC media to final depth of 2100 millimetres (or 83 inches) for eight (8) water filters, each 9.0 metres (29.53 feet) wide by 9.0 metres (29.53 feet) long as per attached drawing FN-WF-M0001 showing filter layout, dimensions and piping configuration: Clean, hard, durable particles in conformance with AWWA B604 modified as follows:

.1 Deliver GAC in bulk containers or bulk trailer to Site.

.2 The GAC shall be ANSI/NSF Standard 61 certified virgin material manufactured from select grades of North American based bituminous coal having the following properties:

.1 GAC of effective size 1.0 to 1.2 millimetres, and uniformity coefficient not more than 1.5. The particle size shall be determined by screening through standard sieves calibrated in accordance with ASTM E11.

.2 Particle size distribution: 8 by 20 carbon with maximum of 5 percent by weight larger than No. 8 mesh sieve (2.36 millimetres) and maximum of 4 percent by weight smaller than No. 20 mesh sieve (0.85 millimetres).

.3 Minimum abrasion number of 75 (75 percent as determined by either the AWWA stirring abrasion test or the Ro-Tap abrasion test).

.4 Minimum adsorptive capacity as measured by iodine number of 900 milligram iodine per gram carbon.

.5 Minimum surface area of 900 square metres per gram.

.6 Maximum total ash content of 8 percent by weight.

.7 Maximum water soluble ash of 0.5 percent by weight.

.8 Maximum moisture as packed of 2.0 percent by weight.

.9 Real Density of 2.1 grams per cubic centimetre.

.10 Apparent Density, backwashed and drained of 0.46-0.60 grams per cubic centimetre.

.11 Particle Density, wetted in water of 1.3-1.4 grams per cubic centimetre.

.12 Pore Volume of 0.75-0.85 cubic centimetre per gram.

2.3 Source Quality Control

.1 Contract Administrator will test samples in accordance with procedures specified in AWWA B604 and in Clause 3.3, Testing.

.2 The Contract Administrator reserves the right to reject any material not meeting these specifications. All material rejected shall be replaced at no cost to the City.

3. EXECUTION

3.1 Work by Installation Contractor (not included in this contract)

.1 The following work related to the installation of the filter media will be provided by the Installation Contractor under a separate contract, and includes but is not limited to:

.1 GAC depletes oxygen from air and can be hazardous in a confined situation. Installation Contractor shall be responsible for worker's safety and follow all local, Provincial, and Federal guidelines pertaining to confined space entry procedures. Obtain necessary permits for work in confined areas.

.2 Prior to GAC placement, the Installation Contractor shall clean and disinfect entire filter area including underdrains, troughs and piping in accordance with the requirements of AWWA C652-02 for Disinfection of Water Systems. GAC media shall not be disinfected.

.3 Do not permit workers to walk or stand directly on media. Use boards that will sustain workers' weight without displacing media.

.4 Form 103 for Backwash Pumps, filter underdrains and troughs must be completed and accepted in order to demonstrate acceptable backwash system performance prior to GAC filter media installation.

.5 Installation Contactor is responsible for operating filter controls during backwashing and shall coordinate with Contract Administrator and Manufacturer's Representative to ensure proper startup sequence is followed.

3.2 Installation by Contractor

.1 Installation includes but is not limited to:

.1 GAC depletes oxygen from air and can be hazardous in a confined situation. Contractor shall be responsible for worker's safety and follow all local, Provincial, and Federal guidelines pertaining to confined space entry procedures. Obtain necessary permits for work in confined areas.

.2 The GAC shall be installed in the filters as a wet slurry to minimize abrasion and dust, as specified in AWWA B604. Excess water shall be drained from the filter tanks and pumped to sanitary sewer as necessary.

.3 Do not permit workers to walk or stand directly on media. Use boards that will sustain workers' weight without displacing media.

.4 Before media is placed, mark top of all layers on side of filter, and confirm depth measurements with Contract Administrator.

.5 Transport and place GAC media carefully to prevent contamination of any sort.

.6 Any filter media which becomes contaminated or dirty (i.e. contains more than 0.5 percent of foreign material by weight), either before or after it has been placed in the filters, shall be removed and replaced with clean media.

.7 Level GAC media by backwashing at a reduced rate (less than 12.5 cubic metres per hour per square metre or less than 5 gallons per minute per square foot).

.8 Install in following sequence:

.1 Place the GAC media in seven lifts of 300 millimetres (or 12 inches) up to total depth of 2100 millimetres (or 83 inches) and level by backwashing after placement of each lift.

.2 After placement of each lift, backwash the bed with water only (no air) at a reduced rate (less than 12.5 cubic metres per hour per square metre or less than 5 gallons per minute per square foot) to remove carbon fines. As the fines are removed and the media is clearly visible, backwash at a rate of 37.5 cubic metres per hour per square metre (or 15 gallons per minute per square foot) for approximately 10 minutes. Reduce backwash rate to less than 12.5 cubic metres per hour per square metre (or less than 5 gallons per minute per square foot) and hold for at least 30 seconds, and then slowly close the backwash valve.

.3 After placement of the last lift, perform a total of three backwashes according to the description above. After each backwash add enough additional GAC to bring the total depth to specified depth of 2100 millimetres (or 83 inches).

.9 Final depth of GAC media after washing and scraping shall be a minimum 2100 millimetres (or 83 inches) and a maximum of 2150 mm (85 inches).

3.3 Testing

.1 Contractor shall coordinate performance tests, document results and provide instructions to the Installation Contractor who will operate the equipment as required to perform tests.

.2 After GAC media placement is complete the filter bed shall be fluidized at a rate of 37.5 cubic metres per hour per square metre (or 15 gallons per minute per square foot) for approximately 10 minutes. After backwashing, a full depth core sample through the GAC media layer shall be taken within each filter cell using coring equipment. The cores shall be dried and sieve analyzed to confirm gradation, the ES and UC, iodine number, and total ash content.

.3 If GAC media does not meet specifications, Manufacturer shall replace some or all of the GAC media until specifications are met or accepted by Contract Administrator.

.4 Contract Administrator is responsible for taking and analyzing media samples after delivery.

3.4 Manufacturer's Services

.1 A manufacturer's technical representative for the GAC media specified shall be present at the jobsite continuously during placement of media for installation supervision, inspection, and certification of the installation. The representative shall be a full-time, direct employee of the filter media supplier and shall have a minimum of 2 years experience during the past 5 years in filter media installation.

.2 In accordance with Division 1, General Requirements and Section 01650, provide separate Certificates for each of the eight filters:

.1 Form 100 Certificate of Equipment Delivery.

.2 Form 101 Certificate of Readiness to Install.

.3 Form 102 Certificate of Satisfactory Installation.

.4 Form 103 Certificate of Equipment Satisfactory Performance.

.5 Form T1 Certificate of Satisfactory Training.

END OF SECTION

FILTER UNDERDRAINS

1. GENERAL

1.1 Submittals

.1 Action Submittals: In addition to the requirements of Division 1, General Requirements, and Section 01300, Submittals, submit the following detailed shop drawing information including complete and explicit details of the design, construction, and operating characteristics of the filter underdrain system prior to commencing any work on the system. Submittal data shall include:

.1 Manufacturer's catalog cuts, sales literature, and technical literature describing the filter underdrains, list of installations, and identifying all components.

.2 Complete scaled and dimensioned construction drawings indicating dimension, material specifications, and proposed layout within the filter boxes signed and stamped by a Professional Engineer registered in the Province of Manitoba.

.3 Complete structural design calculations showing conformity with all Specification requirements signed and stamped by a Professional Engineer registered in the Province of Manitoba.

.4 Detailed installation requirements including required block-outs and anchorage.

.5 Materials of construction.

.6 Complete head loss data for air, water, and combined air/water flows.

.7 Installation details and leveling requirements.

.8 Recommended detailed concrete specifications for the concrete false floor slab design by the underdrain system manufacturer.

.9 Proper documentation showing NSF-61 certification of all underdrain components including sealing compound, caulks, and other materials.

.10 The Manufacturer's proposed method of testing the installed underdrain flow distribution, and the manufacturer's proposed method for starting up the filters.

.11 Field Test Reports: Submit to the Contract Administrator three copies of full and complete test reports for all tests, describing the units tested; the type of test; test set-ups, procedures, and instrumentation; and test flow rates, pressures, levels, and all other data and results as required to demonstrate that all items tested meet specified requirements.

.12 Maldistribution curves and flow distribution calculations.

.13 All other data which in the judgment of the Contract Administrator is necessary to demonstrate conformance with all Specification requirements.

.2 Information Submittals: Conform to the requirements of Section 01300, Submittals. Provide the following quality control submittals:

.1 Special shipping, storage and protection, and handling instructions.

.2 Certification of Compatibility of the filter underdrain system with the Granular Activated Carbon (GAC) filter media specified as follows: Effective size 1.0-1.2 millimetre, Uniformity coefficient of 1.5 or less, minimum abrasion number of 75 (75 percent as determined by either the AWWA stirring abrasion test or the Ro-Tap abrasion test).

.3 Manufacturer's warranty.

.4 Recommended spare parts.

.3 Operation and Maintenance Manual and Maintenance Summary: Provide an Operation and Maintenance Manual and Maintenance Summary in conformance with the requirements of Division 1, General Requirements, and Section 01730, Operation and Maintenance Manuals.

1.2 Product Delivery and Unloading

.1 Product delivery and unloading at the jobsite shall comply with Division 1, General Requirements.

1.3 Quality Assurance

.1 Polyvinyl chloride support columns, plastic false floor forms, nozzle inserts with caps, nozzles with O-rings, and any specialties required for installation such as stainless steel perimeter support angles, wedge anchors, special anchorage, access manway, etc., shall be the products of a single manufacturer and included with filter underdrain scope of supply.

.2 Manufacturer shall have as a minimum 15 successful installations of a complete underdrain system.

1.4 Performance Requirements

.1 Flow Design Requirements:

.1 Design the filter underdrain system to produce uniform air and water flows throughout the filter cell over the full range of normal backwash flow rates. Flow uniformity per square metre of filter area shall be as required to permit efficient and effective filtration and backwashing.

.2 Head Loss at maximum backwash rate: Less than 762 millimetres (30 inches) of water column at a flow rate of 61 cubic metres per hour per square metre (25 gallons per minute per square foot) at 22 degrees Celsius (71 degrees Fahrenheit).

.3 Head Loss at maximum filtration rate: Less than 500 millimetres (20 inches) of water column at a flow rate of 39 cubic metres per hour per square metre (16 gallons per minute per square foot) at 22 degrees Celsius (71 degrees Fahrenheit).

.4 The installed filter underdrain system shall satisfy one of the following criteria for acceptable flow uniformity:

.1 Maldistribution of air and water flows during backwash, for specified flow conditions, shall not exceed:

.1 Plus or minus 10 percent of average standard cubic metres of air per minute per square metre of filter area.

.2 Plus or minus 5 percent of average cubic metres of water per minute per square metre of filter area.

.2 Visual tests shall reveal neither evidence of maldistribution nor disturbance of filter media.

.5 The filter underdrain system shall be furnished and installed to perform satisfactorily as specified when operated under the following conditions to be tested prior to filter media installation to confirm acceptable hydraulic performance, and after filter media installation to ensure acceptable performance without media loss:

.1 Downflow of filtered water at 15 to 30 cubic metres per hour per square metre (6 to 12 gallons per minute per square foot).

.2 Upflow of backwash water at 15 to 61 cubic metres per hour per square metre (6 to 25 gallons per minute per square foot).

.3 Upflow of backwash air only at a minimum of 590 Standard cubic metres per hour per square metre (3 Standard cubic feet per minute per square foot).

.4 Upflow of combined air/water backwash at a minimum of 590 Standard cubic metres of air per hour per square metre (3 Standard cubic feet per minute per square foot, combined with water at a maximum rate of 20 cubic metres per hour per square metre (8 gallons per minute per square foot).

.2 Structural Design by Manufacturer - Requirements for Filter Underdrain System:

.1 General: The filter underdrain system, including anchorage, supports, etc., shall be designed to safely withstand loadings as specified.

.2 Internal Loading: The filter underdrain system, when installed, shall be designed for a net internal loading during backwash of the greater of either 100 kilopascals (2,100 pounds per square foot) or 200 percent of maximum pressure at maximum air, water or combined air/water backwash rates. No credit shall be taken for the weight of filter media in the design calculations.

.3 Downward Load: The filter underdrain system shall also be designed to withstand a net downward loading of not less than 100 kilopascals (2,100 pounds per square foot) plus its own dead weight.

.4 Concrete Design: The concrete shall have a minimum compressive strength of 35 megapascals (5,000 pounds per square inch).

.5 Safety Factor: Adequate safety factors shall be included in the design to account for dynamic loadings which may occur during the initiation and termination of air, water or combined air/water backwash.

.6 Handling Loads: The design shall adequately provide for all loads incurred during shipment, handling, and installation.

.7 Media Design: The filter underdrain system shall be compatible with 2100 mm depth of GAC media (ES of 1.0-1.2 mm and <1.5 UC).

2. PRODUCTS

2.1 Approved Nozzle Plenum Filter Underdrain System Manufacturers

.1 U.S. Filter, Ames IA; Multicrete II Plenum type underdrain.

.2 Infilco Degremont, Inc., Richmond, VA; Monoflor® HD Plenum type underdrain.

.3 Dorr Oliver, Eimco FlexKleen Plenum type underdrain.

2.2 Nozzle Plenum Filter Underdrain System

.1 The filter underdrain shall consist of a false concrete bottom in each filter cell supported above the true concrete bottom of the filter box. Manufacturer shall design and provide component parts for the underdrain system for eight (8) water filters, each 9000 millimetres (29.53 feet) wide by 9000 millimetres (29.53 feet) long as per attached drawing FN-WF-M0001 showing filter layout and piping configuration.

.2 The underdrain system shall be constructed onsite by the Installation Contractor using corrosion resistant plastic underdrain forms, plastic underdrain nozzles, cylindrical PVC pier forms provided by the Manufacturer and cast-in-place reinforced concrete provided by the Installation Contractor. Plastic concrete inserts shall be provided by Manufacturer which shall be field attached to the forms with solvent according to Manufacturer instructions. Each insert shall be provided with screwed plastic end protectors which shall prevent concrete from entering the insert and shall be removed after the concrete has set so that media retaining nozzles may be screwed into the insert.

.3 Underdrain forms and anchor/post grid shall be nominally 600 millimetres (24 inches) square and designed by Manufacturer to interlock with the pier forms. They shall be designed to support the weight of the wet concrete and remain in place after the concrete has set.

.4 The Manufacturer shall provide filler forms to close the area along the perimeter walls where a full form cannot fit. The filler forms will be cut to the appropriate size by the Installation Contractor onsite to ensure accuracy.

.5 Pier form shall be 150 millimetre (6-inches) diameter Schedule 80 PVC pipe notched, if required, to accept the underdrain form.

.6 Manufacturer shall design the concrete underdrain slab and pier reinforcement with 10M or 15M reinforcing steel bars. Show reinforcement arrangement on the Shop drawings submittal.

.7 Manufacturer shall design and size the Type 316 stainless steel anchor bolts, c/w nuts and washers. Anchors embedded in concrete must be adhesive type.

.8 Type 316 stainless steel backwash air scour (AS) header pipes, 316 stainless steel perimeter angle, underdrain forms, concrete inserts, underdrain nozzles, insert end protector caps, pier forms, bar chairs, and general arrangement drawings shall be by underdrain Manufacturer. Reinforcing steel, concrete and ABS solvent shall be provided by the Installation Contractor. Underdrain access manways will be provided beside backwash pipe location by the Installation Contractor that are 900 millimetre diameter (36 inch).

.9 Underdrain Nozzles:

.1 The nozzles shall be General Filter Model MCA or approved equal equipped with a plastic tail pipe having properly sized orifices located at the bottom of the concrete underdrain slab to provide uniform distribution of air for air scour only, and for air during combined air/water. Nozzles shall be constructed of high strength erosion resistant ABS plastic. The nozzles shall be of the slotted type wherein the slots lie in a horizontal plane so that the backwash water is uniformly discharged horizontally into the filter media. The slot dimensions shall be designed to present sharp edges to the retained media. The slots in the nozzles shall be designed to get progressively larger toward the inside of the assembly to prevent loading of media in the slot. Hardware shall be stainless steel and shall be limited to bolts, nuts and washers and shall not be in contact with the distributor opening.

.2 Provide 150 extra nozzles as spare parts.

.10 Air Scour Piping:

.1 Manufacturer shall design and provide each filter cell with air scour piping within the basin proper to ensure uniform distribution of air during backwash.

.2 The air scour piping layout within the basin shall be butt welded, and the design and supply of the Manufacturer. An embedded wall pipe spool will be provided by the Installation Contractor for flange connection of the air piping within the filter plenum.

.3 Materials of construction for the air scour piping and supporting hardware shall meet the requirements specified as follows:

Item	Size	Description
Pipe	50 mm & smaller	Schedule 40S: ASTM A312/A312M, Type 316 seamless, pickled and passivated.
	60 mm thru 150 mm	Schedule 10S: ASTM A778, “as-welded” grade, Type 316L..
	200 mm & larger	Schedule 5S: ASTM A778, “as-welded” grade, Type 316L.
Joints	50 mm & smaller	Threaded or flanged at equipment as required.
	60 mm & larger	Butt-welded or flanged at valves and equipment.

Item	Size	Description
Fittings	50 mm & smaller	Threaded Forged: 1,000 CWP, ASTM A182/A182M, Grade F316L.
	60 mm & larger	Butt-Welded: ASTM A774/A774M Grade 316L conforming to MSS SP 43, "as-welded" grade, pickled and passivated; fitting wall thickness to match adjoining pipe; long radius elbows unless shown otherwise.
Flanges	All	Forged Stainless Steel: ASTM A182/A182M, Grade F316L, ANSI B16.5 Class 150 or Class 300, slip-on weld neck or raised face.
Bolting	All	Forged Flanges: Type 316 stainless steel, ASTM A320/A320M Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex head nuts.
Gaskets	All Flanges	Flanged, Hot Air and Fuel Gas Service: 3 mm thick, unless otherwise specified, homogeneous black rubber (EPDM), hardness 60 (Shore A), rated to 150 degrees C, conforming to ANSI B16.21 and ASTM D1330 Steam Grade. Blind flanges shall be gasketed covering entire inside face with gasket cemented to blind flange.

3. EXECUTION

3.1 Installation by Installation Contractor

.1 Installation of the nozzle plenum filter underdrain system will be by the Installation Contractor in accordance with the Contractor's instructions. Installation includes but is not limited to:

.1 General: Install the filter underdrain systems in strict accordance with the Manufacturer's installation instructions, drawings and printed recommendations and as specified. Obtain from the underdrain Manufacturer such written installation details, recommendations, and training required to acceptably interface the filter underdrain system with all surrounding structures, including any requirement for grouting keys and pockets, dowels, support ledges and piers, anchorage, etc. Prepare the false floor support forms and piers as necessary to enable installation within the required level tolerance.

.2 Coordinate the placement of the monolithic cast-in-place concrete slab and piers with the Manufacturer. The concrete structural slab shall be finished to a true and level plane within the lesser of plus or minus 3.2 millimetre (1/8 inch) or the tolerance specified by the manufacturer of the filter underdrain. Failure of the filter underdrain system to meet the level tolerances shall require removal of the failed sections and replacement with new underdrain sections to within level tolerances.

.3 Should any underdrain material, including the false floor forms, nozzle inserts, and nozzles become chipped, plugged, bent or damaged in any way, they shall be removed and replaced before the false floor concrete is placed. Pull out testing of anchors will be completed before underdrains are assembled and concrete is placed.

.4 Before installation of the media, the Installation Contractor shall vacuum clean the underdrain area, all cell effluent and backwash supply piping, and all surfaces that come into contact with the backwash supply water. All air supply piping shall be thoroughly cleaned and flushed with air only. The Contract Administrator and filter underdrain Contractor must approve this cleaning before the Installation Contractor can begin placement of the filter media.

3.2 Backwash Performance and Testing

.1 The Contractor shall coordinate performance tests, document results and provide instructions to the Installation Contractor who will operate the equipment as required to perform tests.

.2 Performance Testing:

.1 Filtration Process: The filtration process shall consist of gravity filters using a GAC media bed and the sustained simultaneous use of air and water for backwashing while overflowing the wash troughs for any desired duration. The intent of this Specification is to provide the City a filtration system capable of maintaining good suspended solids removal performance and long filter run length with low backwash water recycle.

.2 Backwash Method: The filter backwash method shall consist of sustained air, simultaneous use of air and water, and water.

.3 General Testing Requirements:

.1 Perform backwash test on completed system following installation of underdrain system, curing of concrete and grout and prior to placing of filter media.

.2 Form 103 for Backwash Pumps, filter underdrains and filter troughs must be completed and accepted in order to demonstrate acceptable backwash system performance prior to GAC filter media installation.

.3 Installation Contactor is responsible for operating filter controls during backwashing and shall coordinate with Contract Administrator and Manufacturer's Representative to ensure proper startup sequence is followed.

.4 Apply backwash at rates described in Clause 1.4.1.5.

.5 Check for and correct leaks and non-uniform flow of backwash water or backwash air, structural instability, or other defects. During the test, flow from each nozzle as well as any sign of dead spots or boils shall be visually observed.

.6 Any evidence of flow maldistribution such as a water "mound" or "boil" in any area of the filter will constitute a failed test.

.7 If correction of defects is required, retest as necessary until results acceptable to the Contract Administrator are obtained.

.4 Performance Requirements:

.1 The provisions of a backwash system that maintains the filter media in a clean condition and minimizes mud ball formation and surface cracking is essential to maintaining a high quality effluent. Additionally, the backwash system must be designed so that filter media is not lost during the backwash cycle to the extent continued media replacement will be required.

.2 Establish that the filter media loss shall not exceed 200 millimetres (8 inches) per year. Filter media loss shall be determined by measuring average media bed depth at two points in time: once at the end of the 28 day commissioning period with continuous operation, and the second 120 days thereafter, and expressing the difference in millimetres (inches) of media loss per equivalent year of operation.

.3 Correct and retest as necessary until results acceptable to Contract Administrator are obtained.

3.3 Manufacturer's Field Services

.1 Installation Guidance, Inspection and Startup Assistance:

.1 The Manufacturer shall provide installation guidance, inspection and startup assistance services until completion of the 28 day commissioning period. All costs for services furnished by the Manufacturer shall be included in the total Contract price, with no additional compensation provided. Manufacturer and Installation Contractor must coordinate for installation requirements.

.2 Manufacturer's Representative: Present at site or classroom designated by Contract Administrator, for minimum person days listed below, travel time excluded:

.1 16 working days for installation assistance and inspections.

.2 5 working days for functional and performance testing, and completion of Manufacturer's Certificates.

.3 4 working days for training of City personnel.

.4 2 working days for facility startup assistance during commissioning period.

Training shall not commence until accepted detailed lesson plan for each training activity has been reviewed by Contract Administrator.

.3 In accordance with Division 1, General Requirements and Section 01650 Equipment Installation, provide the following Certificates for each of the eight filters:

.1 Form 100 Certificate of Equipment Delivery.

.2 Form 101 Certificate of Readiness to Install.

.3 Form 102 Certificate of Satisfactory Installation.

.4 Form 103 Certificate of Equipment Satisfactory Performance.

.5 Form T1 Certificate of Satisfactory Training.

END OF SECTION

FILTER TROUGHS

1. GENERAL

1.1 Submittals

.1 Action Submittals: In addition to the requirements of Division 1, General Requirements, and Section 01300, Submittals, submit the following detailed shop drawing information:

.1 Manufacturer's catalog cuts, sales literature, and technical literature describing the filter troughs, and identifying all components of the troughs.

.2 Complete scaled and dimensioned construction drawings indicating dimension, material specifications, and layout within the filter boxes, including all brackets and supports required.

.3 Detailed installation requirements including required block-outs, water stop seals and anchorage.

.4 Detailed drawings and description of the leveling mechanism.

.5 Structural calculations for load bearing and deflection, as described herein, stamped by a registered Professional Engineer licensed in the Province of Manitoba.

.2 Information Submittals: Conform to the requirements of Section 01300, Submittals. Provide the following quality control submittals:

.1 Special shipping, storage and protection, and handling instructions.

.2 Certification of Compatibility of the media retaining trough system with the Granular Activated Carbon (GAC) filter media specified as follows: Effective size 1.0-1.2 millimetre, Uniformity coefficient of 1.5 or less, minimum abrasion number of 75 (75 percent as determined by either the AWWA stirring abrasion test or the Ro-Tap abrasion test).

.3 Manufacturer's warranty.

.4 Recommended spare parts.

.3 Operation and Maintenance Manual and Maintenance Summary: Provide an Operation and Maintenance Manual and Maintenance Summary in conformance with the requirements of Division 1, GENERAL REQUIREMENTS, and Section 01730, Operation and Maintenance Manuals.

1.2 Product Delivery and Unloading

.1 Product delivery and unloading at the jobsite shall comply with Division 1, General Requirements.

1.3 Quality Assurance

.1 316 Stainless Steel materials used in trough, baffle and support components shall have mill test results submitted, and any specialties required for installation such as stainless steel perimeter support angles, wedge anchors, special anchorage, water stop seals, etc., shall be the products of a single manufacturer and included with filter trough scope of supply.

.2 Manufacturer shall have as a minimum 10 successful installations of a complete filter media retaining trough system.

1.4 Performance Requirements

.1 Flow Design Requirements:

.1 Design the filter trough system to collect uniform water flows throughout the filter cell over the full range of normal backwash flow rates. Flow uniformity per square metre of filter area shall be as required to permit efficient and effective filtration and backwashing, prevent loss of filter media, and ensure that water levels in the filter troughs are lower than 50 mm (2 inches) below trough weirs in all locations.

.2 The installed filter trough system shall satisfy one of the following criteria for acceptable flow uniformity:

.1 Maldistribution of water flows collected over trough weirs during backwash, for specified flow conditions, shall not exceed:

.1 Plus or minus 5 percent of average cubic metres of water per minute per square metre of filter area.

.2 Visual tests shall reveal neither evidence of maldistribution nor disturbance of filter media.

.2 The filter trough system shall be furnished and installed to perform satisfactorily as specified when operated under the following conditions to be tested prior to filter media installation to confirm acceptable hydraulic performance, and after filter media installation to ensure acceptable performance without media loss:

.1 Upflow of backwash water at 15 to 61 cubic metres per hour per square metre (6 to 25 gallons per minute per square foot).

.2 Upflow of backwash air only at a minimum of 590 Standard cubic metres per hour per square metre (3 Standard cubic feet per minute per square foot).

.3 Upflow of combined air/water backwash at a minimum of 590 Standard cubic metres of air per hour per square metre (3 Standard cubic feet per minute per square foot, combined with water at a maximum rate of 20 cubic metres per hour per square metre (8 gallons per minute per square foot).

2. PRODUCTS

2.1 Approved Filter Trough Manufacturers

.1 Filter Media Retaining Type 316 Stainless Steel Troughs: Materials, equipment, components, and accessories specified in this Section shall be products of:

.1 US Filter/General Filter, Inc.: ESSDTM Low Profile Media Retaining Washtroughs

.2 Leopold Technology Inc.: Trough GuardTM Media Backwash Troughs

.3 Eimco Water Technology, Inc.: Scour GuardTM Media Backwash Troughs

2.2 Filter Trough Performance and Functional Requirements

.1 The Manufacturer shall provide five filter backwash troughs in each of eight filter cells (40 troughs total), as shown on drawing FN-WF-M0001 for a typical filter. Each trough shall have a capacity of 16,483 litres per minute (4,000 gallons per minute) at a minimum freeboard of 50 millimetres (2 inches). Spacing between the troughs shall be as shown on the drawing, not to exceed 1800 millimetres (6 feet 0 inches) centerline to centerline, and minimum end wall clearance of 300 millimetres (12 inches).

.2 Each trough shall have straight vertical sides, a rounded bottom, and separator baffles for media retention. The length of each trough shall be adequate to span the filter, and penetrate the gullet wall as per attached drawing FN-WF-M0001 showing filter layout and piping configuration. Required length of the troughs is 9.0 metres (or 29.53 feet) plus the thickness of the filter gullet wall assumed to be 600 millimetres (2 feet) or less. Final length to be confirmed at time of Shop Drawing submittal.

.3 The troughs shall be designed such that the liquid level in the troughs is always at least 50 millimetres (2 inches) below the weirs during backwash at the maximum backwash rates of 61 cubic metres per hour per square metre (25 gallons per minute per square foot) with water only, and up to 20 cubic metres per hour per square metre (8 gallons per minute per square foot) with combined water and air scour 590 Standard cubic metres per hour per square metre (3 Standard cubic feet per minute per square foot).

.4 The troughs shall have one closed end for attaching to the filter wall, designed to allow elevation adjustments to ensure level tolerances are met. The other end shall be open to allow flow to exit the filter with trough ends extending through the filter gullet wall.

.5 The troughs and support connections shall be designed to withstand all loading conditions that will be experienced during filtration and backwashing operations. The troughs shall be designed in accordance with the most current edition of the American Iron and Steel Institute (AISI) specifications. The maximum bending stress and shear stress under the most severe load conditions shall not be greater than 80 megapascals (or 11,400 pounds per square inch) and 95 megapascals (or 14,000 pounds per square inch) respectively. Design calculations shall be submitted with the shop drawings.

.6 Troughs and launders incorporated into this work shall support, within stress and deflection limitations, the following loadings:

.1 Gravity (downward vertical) loads including the weight of the trough and appurtenant attachments, such as weir plates and the spreader bars together with the weight of water to fill the trough. All additional loads, such as piping, etc., shall also be considered. Filter box shall be assumed to be empty of water for these calculations.

.2 Buoyant (upward vertical) loads including the force equal to the weight of displaced water (trough weight neglected). The line of action shall be considered to pass through the centroid of the submerged cross-sectional area.

.3 Lateral loads acting against the trough side walls; specifically those induced by differential water levels on either side of the trough walls. The maximum possible differential, existing when the trough is empty and the tank is full, or when the trough is full and the tank is empty, shall be used when calculating deflection, stress, etc.

.7 Troughs and launders shall accommodate temperature induced stresses resulting from differences in coefficients of thermal expansion (and contraction) between the trough and tank/support materials.

.8 The trough system shall be designed and constructed to prevent oscillations caused by the flow of water over the trough edges or by operation of the air and water backwash system.

.9 Maximum vertical deflection under full buoyant load or full gravity load shall not exceed L/1000, where "L" is the unsupported trough length, including the weight of water filling the trough. Deflection shall be measured at midpoint between trough supports. Maximum trough sidewall horizontal deflection shall not exceed D/100, where "D" is the inside trough depth.

.10 Each trough shall be provided with media separator baffles along the length of the trough to prevent loss of media during all backwash conditions. Media separator baffles shall be designed to assure uniform flow collections and prevention of loss of filter media.

2.3 Materials

.1 Wash troughs: The troughs shall be constructed of minimum 14 gauge, Type 316 stainless steel. Trough width shall be no less than 600 millimetres (24 inches), and trough depth shall be no less than 700 millimetres (28 inches). All exposed metallic surfaces, bolts, anchors, anchor bolts, etc., shall be Type 316 stainless steel and provided by the Manufacturer.

.2 Separator Baffles: Baffles shall be attached to the filter cell walls and wash troughs using stainless steel bolts and supports. Baffle to baffle and trough to baffle stabilizers shall be furnished as required by the Manufacturer. The baffle system along with all spreaders, hangers, support rods and appurtenant structural items shall be Type 316 stainless steel. Air vents shall be constructed of PVC.

.3 End Supports: The closed end of the trough shall be supported by end supports consisting of a stainless steel angle with wall concrete anchors and support rods. All materials shall be Type 316 stainless steel.

.4 Other Supports: Intermediate trough supports shall be designed and provided by Manufacturer where required to provide stability and meet deflection criteria. All exposed metallic surfaces, brackets, beams, stabilizers, bolts, anchors, anchor bolts, etc., shall be Type 316 stainless steel.

.5 Water stop: An integrally molded water stop seal shall be provided on the discharge end of the trough, where it passes through the filter gullet wall.

.6 All miscellaneous hardware shall be Type 316 stainless steel.

2.4 General Requirements

.1 Nameplates: Equipment nameplates of Type 316 stainless steel shall be engraved or stamped and fastened to the equipment in accessible locations with Type 316 stainless steel screws or drive pins. Nameplates shall contain the manufacturer's name, model, serial number, size, characteristics, and appropriate data describing the equipment performance ratings.

2.5 Source Quality Control

.1 Factory or Shop Inspections and Tests: Perform manufacturer's recommended standard inspections and testing.

.2 Provide mill test certificates for 316 stainless steel used in troughs and supports.

2.6 Manufacture

.1 Top of the trough shall be level and parallel with a tolerance of plus or minus 3.2 millimetres (or 1/8 inch) as measured when trough is not loaded.

.2 Length of trough shall have a tolerance of plus or minus 3.2 millimetres (or 1/8 inch) per 3 metres (or 10 feet) of length.

3. EXECUTION

3.1 Installation by Installation Contractor

.1 Installation of the filter trough system will be by the Installation Contractor in accordance with the Contractor's instructions. Installation includes but is not limited to:

.1 All trough mounting brackets, beams, hardware and stabilizers shall be Type 316 stainless steel and shall be supplied by the trough Manufacturer.

.2 Troughs shall be installed so that weir edges are level to within plus or minus 3.2 millimetres (or 1/8 inch) per 3 metres (or 10 feet) of length.

.3 Final elevation adjustment shall be performed by the Installation Contractor after installation of the troughs using adjustable support rods and prior to grouting.

.4 No field welding shall be required or allowed for installation of the troughs.

.5 Disinfection: Refer to AWWA C-652-02 Disinfection of Water Systems for appropriate disinfection methods for pipes and tanks in drinking water systems.

3.2 Backwash Performance and Testing

.1 The Contractor shall coordinate performance tests, document results and provide instructions to the Installation Contractor who will operate the equipment as required to perform tests.

.2 Performance Testing:

.1 Filtration Process: The filtration process shall consist of gravity filters using a GAC media bed and the sustained simultaneous use of air and water for backwashing while overflowing the wash troughs for any desired duration. The intent of this Specification is to provide the City a filtration system capable of maintaining good suspended solids removal performance and long filter run length with low backwash water recycle.

.2 Backwash Method: The filter backwash method shall consist of sustained air, simultaneous use of air and water, and water.

.3 General Testing Requirements:

.1 Perform backwash test on completed system following installation of underdrains and trough systems, and prior to placing of filter media.

.2 Form 103 for Backwash Pumps, filter underdrains and filter troughs must be completed and accepted in order to demonstrate acceptable backwash system performance prior to GAC filter media installation.

.3 Installation Contactor is responsible for operating filter controls during backwashing and shall coordinate with Contract Administrator and Manufacturer's Representative to ensure proper startup sequence is followed.

.4 Apply backwash at rates described in Clause 1.4.1.3.

.5 Check for and correct leaks and non-uniform flow of backwash water, structural instability, or other defects. During the test, flow from each trough as well as any sign of dead spots or uneven flow at trough weirs shall be visually observed.

.6 Any evidence of flow maldistribution in any area of the filter troughs will constitute a failed test.

.7 If correction of defects is required, retest as necessary until results acceptable to the Contract Administrator are obtained.

.4 Performance Requirements:

.1 The provisions of a backwash system that maintains the filter media in a clean condition and minimizes mud ball formation and surface cracking is essential to maintaining a high quality effluent. Additionally, the backwash system must be designed so that filter media is not lost during the backwash cycle to the extent continued media replacement will be required.

.2 Establish that the filter media loss shall not exceed 200 millimetres (8 inches) per year. Filter media loss shall be determined by measuring average media bed depth at two

points in time: once at the end of the 28 day commissioning period with continuous operation, and the second 120 days thereafter, and expressing the difference in millimetres (inches) of media loss per equivalent year of operation.

.3 Correct and retest as necessary until results acceptable to Contract Administrator are obtained.

3.3 Manufacturer's Field Services

.1 Installation Guidance, Inspection and Startup Assistance:

.1 The Manufacturer shall provide installation guidance, inspection and startup assistance services until completion of the 28 day commissioning period. All costs for services furnished by the Manufacturer shall be included in the total Contract price, with no additional compensation provided. Manufacturer and Installation Contractor must coordinate for installation requirements.

.2 Manufacturer's Representative: Present at site or classroom designated by Contract Administrator, for minimum person days listed below, travel time excluded:

.1 8 working days for installation assistance and inspections.

.2 5 working days for functional and performance testing, and completion of Manufacturer's Certificates.

.3 4 working days for training of City personnel.

.4 2 working days for facility startup assistance during commissioning period.

Training shall not commence until accepted detailed lesson plan for each training activity has been reviewed by Contract Administrator.

.3 In accordance with Division 1, General Requirements and Section 01650 Equipment Installation, provide the following Certificates for each of the eight filters:

.1 Form 100 Certificate of Equipment Delivery.

.2 Form 101 Certificate of Readiness to Install.

.3 Form 102 Certificate of Satisfactory Installation.

.4 Form 103 Certificate of Equipment Satisfactory Performance.

.5 Form T1 Certificate of Satisfactory Training.

END OF SECTION