THE CITY OF WINNIPEG

BID OPPORTUNITY

791-2006 BID OPPORTUNITY

WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

TABLE OF CONTENTS

Division 5

Section No.	Description
05500	Miscellaneous Metals and Aqueduct Saddle Connection
05530	Aluminium Fabrications

Division 7

Section No.	Description
07120	Dampproofing
07212	Rigid Insulation

Division 15

Section No.	Description
15202	Process Valves and Operators

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

B1.1 WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

B2. SUBMISSION DEADLINE

B2.1 The Submission Deadline is 12:00 noon Winnipeg time, February 23, 2007.

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

B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. BIDDERS' CONFERENCE

B3.1 Further to C:3.1, the Contract Administrator will hold a Bidders' Conference at the Site from 10:00 a.m. to 12:00 Noon on February 9, 2007, commencing in the meeting room at UMA Projects site office.

B3.2 The Bidder is advised that, at the Bidders' Conference, site logistics, staging of the work and impacts on operations will be discussed.

B3.3 The Bidder shall not be entitled to rely on any information or interpretation received at the Bidders' Conference unless that information or interpretation is provided by the Contract Administrator in writing.

B4. ENQUIRIES

B4.1 All enquiries shall be directed to the Contract Administrator identified in D3.1.

B4.2 If the Bidder finds errors, discrepancies or omissions in the Bid Opportunity, or is unsure of the meaning or intent of any provision therein, the Bidder shall notify the Contract Administrator of the error, discrepancy or omission, or request a clarification as to the meaning or intent of the provision at least five (5) Business Days prior to the Submission Deadline.

B4.3 Responses to enquiries which, in the sole judgment of the Contract Administrator, require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator to all Bidders by issuing an addendum.

B4.4 Responses to enquiries which, in the sole judgment of the Contract Administrator, do not require a correction to or a clarification of the Bid Opportunity will be provided by the Contract Administrator only to the Bidder who made the enquiry.

B4.5 The Bidder shall not be entitled to rely on any response or interpretation received pursuant to B4 unless that response or interpretation is provided by the Contract Administrator in writing.

B5. ADDENDA

B5.1 The Contract Administrator may, at any time prior to the Submission Deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.

B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.

B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B5.2.2 The Bidder is responsible for ensuring that he has received all addenda and is advised to check the Materials Management Branch internet site for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.

B5.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B6. SUBSTITUTES

B6.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.

B6.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.

B6.3 Requests for approval of a substitute will not be considered unless received in writing by the Contract Administrator at least five (5) Business Days prior to the Submission Deadline.

B6.4 The Bidder shall ensure that any and all requests for approval of a substitute:

(a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;

(b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;

(c) identify any anticipated cost or time savings that may be associated with the substitute;

(d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;

(e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his sole discretion grant approval for the use of a substitute as an “approved equal” or as an “approved alternative”, or may refuse to grant approval of the substitute.

B6.6 The Contract Administrator will provide a response in writing, at least two (2) Business Days prior to the Submission Deadline, only to the Bidder who requested approval of the substitute.

B6.6.1 The Bidder requesting and obtaining the approval of a substitute shall be entirely responsible for disseminating information regarding the approval to any person or persons he wishes to inform.

B6.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.

B6.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative shall base his Total Bid Price upon the specified item but may also indicate an alternative price based upon the approved alternative. Such alternatives will be evaluated in accordance with B15.

B6.9 No later claim by the Contractor for an addition to the Total Bid Price because of any other changes in the Work necessitated by the use of an approved equal or an approved alternative will be considered.

B7. BID COMPONENTS

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

(a) Form A: Bid;

(b) Form B: Prices;

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

B7.2 All components of the Bid shall be fully completed or provided, and submitted by the Bidder no later than the Submission Deadline, with all required entries made clearly and completely, to constitute a responsive Bid.

B7.3 The Bid shall be submitted enclosed and sealed in an envelope clearly marked with the Bid Opportunity number and the Bidder's name and address.

B7.3.1 Samples or other components of the Bid 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.

B7.4 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.5 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, may result in the Bid being determined to be non-responsive.

B7.6 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.7 Bids shall be submitted to:

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

B8. BID

B8.1 The Bidder shall complete Form A: Bid, making all required entries.

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

(a) if the Bidder is a sole proprietor carrying on business in his own name, his name shall be inserted;

(b) if the Bidder is a partnership, the full name of the partnership shall be inserted;

(c) if the Bidder is a corporation, the full name of the corporation shall be inserted;

(d) if the Bidder is carrying on business under a name other than his own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.

B8.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B8.2.

B8.3 In Paragraph 3 of Form A: Bid, the Bidder shall identify a contact person who is authorized to represent the Bidder for purposes of the Bid.

B8.4 Paragraph 12 of Form A: Bid shall be signed in accordance with the following requirements:

(a) if the Bidder is a sole proprietor carrying on business in his own name, it shall be signed by the Bidder;

(b) if the Bidder is a partnership, it shall be signed by the partner or partners who have authority to sign for the partnership;

(c) if the Bidder is a corporation, it shall be signed by its duly authorized officer or officers and the corporate seal, if the corporation has one, should be affixed;

(d) if the Bidder is carrying on business under a name other than his own, it shall be signed by the registered owner of the business name, or by the registered owner's authorized officials if the owner is a partnership or a corporation.

B8.4.1 The name and official capacity of all individuals signing Form A: Bid shall be printed below such signatures.

B8.4.2 All signatures should be witnessed, except where a corporate seal has been affixed.

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

B9. PRICES

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

B9.2 The quantities listed on Form B: Prices are to be considered approximate only. The City will use said quantities for the purpose of comparing Bids.

B9.3 The quantities for which payment will be made to the Contractor are to be determined by the Work actually performed and completed by the Contractor, to be measured as specified in the applicable Specifications.

B10. QUALIFICATION

B10.1 The Bidder shall:

(a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and

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

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

B10.2 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

(a) be responsible and not be suspended, debarred or in default of any obligations to the City (a list of suspended or debarred individuals and companies is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt); and

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

(c) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and

(d) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B10.3 The Bidder shall, within three (3) Business Days of a request by the Contract Administrator, provide the Contract Administrator with evidence of the qualification, including a complete list of relevant project experience and key project personnel whom the Bidder proposes to engage (Form L: Contractor Experience). Bidders shall complete Form L with, at a minimum, the following information:

(a) Details of three (3) projects including contact references that demonstrate the Bidder's or relevant Subcontractor's ability to successfully install large diameter concrete pipe (1372 mm or larger); and

(b) Details of one (1) project including contact references that demonstrate the Bidder's or relevant Subcontractor's ability to successfully install pressure pipe in diameters 600 mm or larger; and

(c) Resumes of key project personnel who will be dedicated to this Project, detailing relevant experience in meeting the technical requirements of sub-clauses a) and b) above. Key personnel shall be deemed to include General and/or Site Superintendents. A minimum of one (1) key personnel must have direct experience in the installation of AWWA C905 pipe

B10.4 Further to B10.2(d), the Bidder shall, within three (3) Business Days of a request by the Contract Administrator, provide proof satisfactory to the Contract Administrator that the Bidder/Subcontractor has a workplace safety and health program meeting the requirements of The Workplace Safety and Health Act (Manitoba), by providing:

(a) a valid COR certification number under the Certificate of Recognition (COR) Program administered by the Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or

(b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template 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.)

B10.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.

B10.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B11. BID SECURITY

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

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

(b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or

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

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

B11.1.2 All signatures on bid securities shall be original, and shall be witnessed or sealed as required.

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

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

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

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

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Branch, or in such other office as may be designated by the Manager of Materials.

B12.1.1 Bidders or their representatives may attend.

B12.1.2 Bids determined by the Manager of Materials, or his designate, to not include the bid security specified in B11 will not be read out.

B12.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract Amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt.

B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

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

B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

B14.1 A Bidder may withdraw his Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.

B14.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.

B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.

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

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

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

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

B14.2 A Bidder who withdraws his Bid after the Submission Deadline but before his Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

B15.1 Award of the Contract shall be based on the following bid evaluation criteria:

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

(b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);

(c) Total Bid Price;

(d) economic analysis of any approved alternative pursuant to B6.

B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.

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

B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B:Prices.

B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, sum of the quantities multiplied by the unit prices for each item shall take precedence.

B16. AWARD OF CONTRACT

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

B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.

B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:

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

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

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

(d) only one Bid is received; or

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

B16.3 Subject to B16.2, 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.

B16.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C0. GENERAL CONDITIONS

C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.

C0.1.1 The *General Conditions for Construction* 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.

C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix "**C**" designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of the construction of water treatment plant overflow and supernatant lines.

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

(a) Supply and installation of approximately 210 lineal metres of 2134 millimetre diameter reinforced concrete sewer pipe, fittings and appurtenances

(b) Supply, installation and removal of Excavation Shoring

(c) Supply and installation of approximately 8 lineal metres of 762 millimetre diameter AWWA C301 Prestressed Concrete Cylinder pipe, plus valve chamber fittings and appurtenances.

(d) Supply and installation of saddle connection to existing 2438 mm reinforced concrete Aqueduct

(e) Supply and installation of approximately 16 lineal metres of 750 millimetre diameter AWWA C301 Prestressed Concrete Cylinder pipe.

(f) Supply and installation of approximately 70 lineal metres of 750 millimetre diameter AWWA C905 PVC DR 25 pipe.

(g) Supply and installation of approximately 54 lineal metres of 200 millimetre diameter AWWA C900 PVC Watermain and appurtenances.

(h) Supply and installation of approximately 60 lineal metres of 150 millimetre diameter AWWA C900 PVC Sludge Forcemain.

(i) Excavation and backfilling as required by the Work.

(j) Supply and installation of pre-cast concrete piles.

(k) Construction of a cast-in-place concrete valve chambers.

D2.3 Definitions

(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) **Supply Contractor** means a contractor retained by the City, under a separate contract, to supply City Supplied Equipment which shall be installed by the Contractor;

(d) **City Supplied Equipment** means equipment purchased by the City under a separate contract which is supplied into the care of the Contractor for installation under this Contract.

(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 supplied by the Contractor 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 Contractor in his performance of those functions.

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

(x) **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

(y) **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

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

(aa) **Major Equipment** means all equipment for which Shop Drawing submittals are required as specified herein.

(bb) **Performance Verification** means all factory and field tests, demonstrations and other activities required from the Contractor to complete all required Forms 103 – Certificate of Satisfactory Performance and to demonstrate to the Contract Administrator's satisfaction that the equipment installed under this Contract is performing as specified herein.

(cc) **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.

(dd) **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.

(ee) **WTP** means the Winnipeg Water Treatment Plant and includes the structure and all equipment and materials supplied and installed into the building, under multiple construction contracts, including portions of the Work provided under this Contract.

(ff) **City Warehouse** means the enclosed and heated City owned warehouse located at 1500 Plessis Road, Winnipeg, Manitoba.

(gg) **Record Drawings** means a minimum of one (1) complete set of Contract Documents and Certified Shop Drawings maintained at the Contractor's Site office on which the Contractor clearly shall clearly record in red pencil all Addenda, Change Orders, Field Instructions, and other revisions or as-built conditions which deviate from the original Contract Documents or Certified Shop Drawings.

(hh) **O&M** means operation and maintenance

(ii) **PVC** means polyvinyl chloride

(jj) **ULC** means Underwriter's Laboratories of Canada

(kk) **AWS** means American Welding Society

D2.3.1 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.

D2.3.2 The Manufacturer and Manufacturer's Representative are not parties to this Contract. All work required from the Manufacturer and Manufacturer's Representative shall be provided and coordinated by the Contractor.

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is UMA Projects (CM) Ltd., represented by:

Lawrence Recksiedler, C.E.T.
Contract Administrator
1479 Buffalo Place
Winnipeg, MB. R3T 1L7

e-mail: Lawrence.recksiedler@uma.aecom.com

Telephone No. (204) 986-4246
Facsimile No. (204) 986-8393

D3.2 At the pre-construction meeting, Contract Administrator will identify additional personnel representing the Contract Administrator and their respective roles and responsibilities for the Work.

D4. CONTRACTOR'S SUPERVISOR

D4.1 At the pre-construction meeting, the Contractor shall identify his designated supervisor and any additional personnel representing the Contractor and their respective roles and responsibilities for the Work.

D5. NOTICES

D5.1 Except as provided for in C23.2.2, all notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the Contractor shall be sent to the address or facsimile number identified by the Contractor in Paragraph 2 of Form A: Bid.

D5.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D5.3, D5.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the address or facsimile number identified in D3.1.

D5.3 All notices of appeal to the Chief Administrative Officer shall be sent to the following address or facsimile number:

The City of Winnipeg
Chief Administrative Officer Secretariat
Attn: Chief Administrative Officer
Administration Building, 3rd Floor
510 Main Street
Winnipeg MB R3B 1B9

Facsimile No.: (204) 949-1174

D5.4 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications required to be submitted or returned to the City Solicitor shall be sent to the following address or facsimile number:

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

Facsimile No.: (204) 947-9155

D6. FURNISHING OF DOCUMENTS

D6.1 Upon award of the Contract, the Contractor will be provided with five (5) complete sets of the Bid Opportunity. If the Contractor requires additional sets of the Bid Opportunity, they will be supplied to him at cost.

SUBMISSIONS

D7. AUTHORITY TO CARRY ON BUSINESS

D7.1 The Contractor shall be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba, or if the Contractor does not carry on business in Manitoba, in the jurisdiction where the Contractor does carry on business, throughout the term of the Contract, and shall provide the Contract Administrator with evidence thereof upon request.

D8. SAFE WORK PLAN

D8.1 The Contractor shall provide the Contract Administrator with a Safe Work Plan at least five (5) Business Days prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 for the return of the executed Contract.

D8.2 The Safe Work Plan should 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 Branch internet site at http://www.winnipeg.ca/matmgt.

D9. MATERIAL SAFETY DATA SHEETS

D9.1 The Contractor shall provide the Contract Administrator with one (1) copy of Material Safety Data Sheets (MSDS's) for all products to used in the performance of the Work at least two (2) Business Days prior to bringing such materials to Site or as otherwise specified in the Contract Documents.

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

D10. INSURANCE

D10.1 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.

D10.2 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.

D10.3 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least fifteen (15) Calendar Days prior written notice to the Contract Administrator.

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 was not a certified cheque or draft pursuant to B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site but in no event later than the date specified in C4.1 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 C4.1 for the return of the executed Contract.

D13. DETAILED WORK SCHEDULE

D13.1 The Contract Administrator has developed a Project Master Schedule for the Work. This schedule will be available in the offices of the Contract Administrator and will be updated as required as the Work progresses.

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, parts of 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 under the Contract shall be required to obtain a Criminal Record 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 the Work.

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.

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 any Work.

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 of authority to carry on business specified in D7;

(ii) evidence of the workers compensation coverage specified in C6.15;

(iii) the Safe Work Plan specified in D8;

(iv) evidence of the insurance specified in D10;

(v) the performance security specified in D11;

(vi) the Subcontractor list specified in D12;

(vii) the detailed work schedule specified in D13; and

(viii) the security clearances specified in D14.

D15.3 the Contractor has attended a pre-construction meeting with the Contract Administrator, or the Contract Administrator has waived the requirement for a pre-construction meeting.

D15.4 The City of Winnipeg will endeavour to award the Contract within 30 Calendar Days of the Submission Deadline. If award is not made within that time period, Contract Dates identified in D16 Critical Stages, D17 Substantial Performance, D18 Total Performance and D19 Liquidated Damages will be extended by an equivalent number of Calendar Days until such a time an award is made.

D16. CRITICAL STAGES

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

(a) November 16, 2007 – Completion of 750 Supernatent, 150 Sludge FM, Valve Chamber 1 and Valve Chamber 2.

(b) October 31, 2007 Completion of 2134 WTP Overflow from connection to existing 1524 overflow to one pipe section north of the 2134 TEE.

D16.2 Where Critical Stages cannot be met due to delays beyond the Contractor's control, such as delay of material delivery from sources outside this Bid Opportunity or delay of preceding work by others, the dates for Critical Stages will be adjusted by an equivalent amount of Calendar Days until such time as materials or preceding work by others is completed satisfactorily.

D17. SUBSTANTIAL PERFORMANCE

D17.1 The Contractor shall achieve Substantial Performance by June 30, 2008.

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

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

D18. TOTAL PERFORMANCE

D18.1 The Contractor shall achieve Total Performance by July 18, 2008.

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

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

D19. LIQUIDATED DAMAGES

D19.1 If the Contractor fails to achieve 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) Substantial Performance – two thousand, six hundred dollars ($2,600.00);

(b) 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 Substantial Performance or Total Performance earlier than the dates specified herein.

CONTROL OF WORK

D20. JOB MEETINGS

D20.1 Regular weekly job meetings will be held at the Site. These meetings shall be attended by a minimum of one representative of the Contract Administrator, one representative of the City and one representative of the Contractor. Each representative shall be a responsible person capable of expressing the position of the Contract Administrator, the City and the Contractor respectively on any matter discussed at the meeting including the Work schedule and the need to make any revisions to the Work schedule. The progress of the Work will be reviewed at each of these meetings.

D20.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he deems it necessary.

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

D21.1 Further to C:6.26, UMA Projects (CM) Ltd. shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D21.2 As Prime Contractor, UMA Projects (CM) Ltd. will administer a Safety and Health Management Plan. Compliance with this Plan will be mandatory for all personnel on the construction site and orientation of all staff by the Prime Contractor's Safety Officer will be required. Further to C:6.26, the Contractor shall be the Prime Contractor and shall serve as, and have the duties of the Prime Contractor in accordance with The Workplace Safety and Health Act (Manitoba).

D21.3 The Water Treatment Program Project Safety and Health Management Plan is available on the City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt/projects

D22. PARTNERING

D22.1 In order to effectively and efficiently accomplish the Work of this Contract, The City of Winnipeg, Water and Waste Department is encouraging the formation of a cohesive, mutually beneficial working relationship with the Contractor and his Subcontractors. This working relationship will endeavour to draw on individual and corporate and community strengths, skills and knowledge to achieve a quality project to the benefit of all participants. The objective of Partnering is to build co-operative relationships, avoid or minimize disputes and actively pursue the attainment of common goals. Success will depend upon teamwork with open and effective communication while adhering to the highest professional standards.

D22.2 Participation in Partnering will not in any way affect the application or legal obligation of the Contract.

D22.3 The Partnering Initiation Workshop is typically a one (1) day session for a project of this magnitude, which would be held in conjunction with the pre-construction meeting. The Partnering Initiation Workshop will be scheduled for a date approximately two weeks after award.

D22.4 The Partnering Initiation Workshop shall be carried out at no cost to the Contractor nor shall any payment be made for time and travel expenses incurred by the Contractor associated with participation in the Partnering Initiation Workshop. It shall be considered incidental to the Work included in this project.

D23. COOPERATION WITH OTHERS

D23.1 The Contractor shall note that several other construction contracts will be underway at the time of construction, including, but not limited to;

(a) Bid Opportunity 583-2005 Water Treatment Program - Water Treatment Plant Foundations and Concrete Structures

(b) Bid Opportunity 742-2005 Winnipeg Water Treatment Program – The Supply and Installation of Water Treatment Plant Process Mechanical and Electrical

(c) Bid Opportunity 34-2006 Winnipeg Water Treatment Program – Construction of Dewatering Cells

(d) Bid Opportunity 35-2006 Winnipeg Water Treatment Program – Deacon Booster Pumping Station Upgrade

(e) Bid Opportunity 36-2006 Winnipeg Water Treatment Program – Construction of Surge Tower Overflow Piping

(f) Bid Opportunity 37-2006 Winnipeg Water Treatment Program – Surge Tower Construction

(g) Bid Opportunity 171-2006 Winnipeg Water Treatment Program – Supply and Installation of Water Treatment Plant Precast Roof Panels

(h) Bid Opportunity 498-2006 Winnipeg Water Treatment Program – Construction of Standby Generator Building

(i) Bid Opportunity 792-2006 Winnipeg Water Treatment Program – Construction of Sodium Hypochlorite and Chemical Storage Buildings

(j) Bid Opportunity 793-2006 Winnipeg Water Treatment Program – Construction of Water Treatment Plant Building Envelope

(k) Bid Opportunity 94-2007 Winnipeg Water Treatment Program – Construction of Site Utilities

(l) Bid Opportunity 95-2007 Winnipeg Water Treatment Program – Construction of Offices & Plant Interior Finishes

(m) Bid Opportunity 96-2007 Winnipeg Water Treatment Program – Supply and Installation of Forcemain

(n) Bid Opportunity 97-2007 Winnipeg Water Treatment Program – Construction of Roads and Landscaping

D23.2 Bid Opportunities for the above are available at the City of Winnipeg Materials Management website at http://www.winnipeg.ca/matmgt/bidopp.asp.

D23.3 The Contractor will not have exclusive use of the Site. The Contractor shall coordinate activities with others and minimize disruptions to others, where possible.

D23.4 Where site access requires relocation for installation of works, the Contractor shall construct suitable, all-weather detours, as required.

D23.5 The Contractor shall note that the Deacon Booster Pumping Station and surrounding compound will be in use during the construction period. The Contractor shall maintain reasonable access to all existing plant, valve chambers, rail, mechanical and electrical facilities at all times. The Contractor shall provide all reasonable assistance to City operations personnel to provide safe, secure access to operational facilities.

D24. SITE SECURITY

D24.1 Deacon Booster Pumping Station and compound is a fenced, secure site. The project site and staging areas are fenced, and all access points controlled. The Contractor shall provide temporary steel mesh fencing (minimum 2400 high) around the work site to maintain a secure compound and reinstate the fence on completion of the Work. The fence may be opened on a daily basis to permit access (on a limited basis) but the Contractor must reinstate the fencing to maintain a fenced, secure site during non working hours.

D24.2 Personnel, material and equipment will only be permitted to access the Site via the main entrance gate, located west of Provincial Road 207, as indicated on Construction Site Layout Drawing CM G001 This gate will normally be staffed 24 hours a day, seven days a week. Access to the DBPS compound is normally through the main gate of the compound and is normally restricted to the hours of 7:00 am to 5:00 pm, Monday to Friday. Alternate site access arrangements can be made through the Contract Administrator. Access to the Site through other designated gates must be approved by the Contract Administrator.

D25. SCHEDULE RESTRICTIONS

D25.1 Aqueduct, Yard Piping and Reservoir Operations

(a) Aqueducts, existing yard piping and reservoir shutdown periods are scheduled based on a number of factors including routine maintenance and repair work along the Aqueduct, water demand, weather, reservoir operation and other factors. The City shall endeavour to make the specified time periods available to the Contractor to schedule his work requiring removal of the Aqueduct, yard piping and reservoir from service, without limiting the City's control over the operation of the regional water infrastructure to complete other work, maintain adequate water supply and storage of water and maintain the integrity of the

infrastructure. The City shall reserve the right to cancel and/or delay these schedule dates at any time, due to any circumstances that could adversely affect the Aqueducts or water supply, including but not limited to high water demand, abnormal weather, failures of related water system components and/or security concerns.

(b) A shutdown of the Aqueduct will not be required during the excavation to expose the 750 supernatant tie-in to the aqueduct.

(c) A shutdown of the Aqueduct will be required during the excavation and construction of the 750 supernatant tie-in to the aqueduct. The shutdown is scheduled from October 1, 2007 to October 12, 2007.

D25.2 Coordination with Others Contractors

(a) Raw Water Pump Station

(i) Backfill of the Raw Water Pump Station must be completed prior to the installation of the 750 supernatant line and the 150 sludge FM.

(b) DBPS Pump Installation

(i) The Contract for the DBPS Pump Installation in the DBPS will be completed during the same general time frame as this Contract. The Contractor shall coordinate his work and cooperate to provide access for the DBPS Pump Installation Contractor to the DBPS.

MEASUREMENT AND PAYMENT

D26. PAYMENT

D26.1 Further to C12, effective January 1, 2007 the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

D27. PAYMENT SCHEDULE

D27.1 Further to C12, payment shall be in accordance with the unit prices shown on Form B: Prices.

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. 791-2006

WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

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. 791-2006

WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

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 D12)

WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

Name	Address

FORM L: CONTRACTOR EXPERIENCE
(See B10.3)
WINNIPEG WATER TREATMENT PROGRAM - CONSTRUCTION OF WATER TREATMENT PLANT OVERFLOW AND SUPERNATANT LINE

1. Project References: _____

Project Client/Contact: _____
(Name)
_____
(Address)

Year	Description of Project, including type of pipe	Value

2. Project References: _____

Project Client/Contact : _____
(Name)
_____
(Address)

Year	Description of Past Project, including type of pipe	Value

3. Project References: _____

Project Client/Contact: _____
(Name)
_____
(Address)

Year	Description of Past Project, including type of pipe	Value

4. Project References: _____

Project Client/Contact: _____
(Name)

_____
(Address)

Year	Description of Past Project, including type of pipe	Value

5. Project Personnel:

Name and Title:_____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

6. Project Personnel:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

7. Project Personnel:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

8. Project Personnel:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

9. Project Personnel-Suppliers:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

10. Project Personnel-Suppliers:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

11. Project Personnel-Suppliers:

Name and Title: _____
(Name)

Qualifications: (attach resume and fill out information below)

Year	Description of Past Project	For Whom Work Was Performed	Value

_____
Name of Bidder

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

E1.1 These Specifications shall apply to the Work.

E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.

E1.2.1 *The City of Winnipeg Standard Construction Specifications* 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.

E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.

E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.

E1.3 The following are applicable to the Work:

Specifications:

Division 1

Section No.	Description
01210	City Supplied Equipment
01300	Submittals
01450	Quality Control
01600	Material and Equipment
01650	Equipment Installation

Division 2

Section No.	Description
02223	Excavation and Backfilling for Structures
02315	Excavation, Trenching and Backfilling
02451	Pile Foundations, General
02468	Precast Concrete Piles
02511	Watermains
02511A	Large Watermains
02530	Sanitary Sewers
02531	Sewage Forcemains
02630	Gravity Sewers

Division 3

Section No.	Description
03100	Concrete Formwork
03200	Concrete Reinforcement
03250	Concrete Accessories
03300	Cast-In-Place Concrete

Division 5

Section No.	Description
05500	Miscellaneous Metals and Aqueduct Saddle Connection
05530	Aluminium Fabrications

Division 7

Section No.	Description
07120	Dampproofing
07212	Rigid Insulation

Division 15

Section No.	Description
15202	Process Valves and Operators

Drawings:

Consultant Drawing No.	City Drawing No.	Title
CM G001		CONSTRUCTION SITE LAYOUT
WY-C0190	1-0601Y-C-C0190-001-00D	CIVIL - WATER TREATMENT PLANT OVERFLOW PIPING - GENERAL PLAN
WY-C0200	1-0601Y-C-C0200-001-00D	CIVIL - W.T.P. OVERFLOW PIPIING - PLAN & PROFILE -EXISTING 1500 DIA OVERFLOW CONN TO MATCH LINE 1+100.00
WY-C0201	1-0601Y-C-C0201-001-00D	CIVIL - W.T.P. OVERFLOW PIPIING - PLAN & PROFILE – MATCH LINE STA 1+100.00 TO WATER TREATMENT PLANT
WY-C0202	1-0601Y-C-C0202-001-00D	CIVIL - 750 DIA SUPERNATANT CONNECTION TO EXISTING AQUEDUCT - LOCATION PLAN, SECTIONS AND DETAILS
WY-C0203	1-0601Y-C-C0203-001-00D	CIVIL - 2134 DIA SIPHON - MISCELLANEOUS SECTIONS AND DETAILS
WY-C0204	1-0601Y-C-C0204-001-00D	CIVIL - 2134 DIA TEE & CONNECTION - MISCELLANEOUS SECTIONS AND DETAILS
WY-C0205	1-0601Y-C-C0205-001-00D	CIVIL - 2134 DIA RCP - - MISCELLANEOUS SECTIONS AND DETAILS
WY-C0211	1-0601Y-C-C0211-001-00D	CIVIL - 750 SUPERNATANT LINE / 150 SLUDGE FORCEMAIN - WTP MAIN BUILDING TO AQUEDUCT
WY-C0212	1-0601Y-C-C0212-001-00D	CIVIL - ENCASEMENT PIPE - OVERALL LAYOUT
WY-C0213	1-0601Y-C-C0213-001-00D	CIVIL - SUPERNATANT VALVE CHAMBER 1 - PLAN, SECTIONS AND DETAILS
WY-C0214	1-0601Y-C-C0214-001-00D	CIVIL - SUPERNATANT VALVE CHAMBER 2 - PLAN, SECTIONS & DETAILS
WY-C0215	1-0601Y-C-C0215-001-00D	CIVIL - POTABLE WATER SUPPLY - DEACON BOOSTER PUMP STATION TO 1+22
WY-S0401	1-0601Y-A-S0401-001-00D	STRUCTURAL - SUPERNATANT VALVE CHAMBER 1 - PLAN VIEWS
WY-S0402	1-0601Y-A-S0402-001-00D	STRUCTURAL - SUPERNATANT VALVE CHAMBER 1 - SECTIONS & DETAILS
WY-S0403	1-0601Y-A-S0403-001-00D	STRUCTURAL - SUPERNATANT VALVE CHAMBER 2 - PLAN VIEWS
WY-S0404	1-0601Y-A-S0404-001-00D	STRUCTURAL - SUPERNATANT VALVE CHAMBER 2 - SECTIONS & DETAILS
WY-S0405	1-0601Y-A-S0405-001-00D	STRUCTURAL - SUPERNATANT VALVE CHAMBER 2 - SECTIONS & DETAILS
WY-S0406	1-0601Y-A-S0406-001-00D	STRUCTURAL - SITE LOCATION PLAN VALVE CHAMBER 2 - GENERAL NOTES

SOILS INVESTIGATION REPORT

E2. SOILS INVESTIGATION REPORT

E2.1 Further to C:3.1, a copy of the geotechnical information is available on the Winnipeg Water Treatment Program – Project Site Information page at The City of Winnipeg, Corporate Finance, Materials Management Branch internet site at http://www.winnipeg.ca/matmgt/projects

E2.2 Test Hole Logs

E2.2.1 Geotechnical information has been compiled from various sources to summarize subsurface conditions within the work area. Test Hole Logs Sets 1 through 3 are available at the aforementioned internet site.

(a) By UMA Engineering

(i) TH's 04-01 to 04-10, 04-12 to 04-24, 04-31, and 04-33 to 04-50 (2004)

(ii) TH's 1 to 3 (1996)

(b) By Others

(i) TH A13 by KGS Group (1991)

(ii) TH's 3 to 6 by RM Hardy & Associates (1977)

(iii) TH 1 and 2 by Dyregrov Consultants (1993)

(c) Within the City of Winnipeg Water Treatment Plant Preliminary Design Report – Section 14 Geotechnical Investigation (2005), UMA Test Hole information is considered accurate at the locations drilled and at the time of the investigations. The inclusion of test hole data recorded by others does not represent any guarantees to the accuracy of this data.

(d) Test hole information is provided to assist in the Bidder's evaluation of subsurface conditions and the Bidder shall solely be responsible for any interpretation that they make from this information. Variations in soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities or operation of the Floodway.

E2.3 Test Pile Driving Records

E2.3.1 Test_Pile_Driving_Records-Set1.pdf at the internet site identified in E2.2. shows data recorded by UMA Engineering Ltd. during driving of ten (10) test piles at the site in March, 2005.

E2.4 Clearwell Pile Driving Records

E2.4.1 166-2005_Clearwell_Pile_Driving_Records.pdf at the internet site identified in E2.2. shows data recorded by Earth Tech Canada Ltd. during the construction of the Clearwell in 2005.

E2.5 Water Treatment Plant Pile Driving Records

E2.5.1 Pile Driving Records for the Water Treatment Plant – Area F are provided at the internet site, identified as Pile_Driving_Records.pdf.

E2.6 Reports

E2.6.1 Additional reports and geotechnical information listed as follows are available for viewing at the offices of Earth Tech Canada Inc., 850 Pembina Highway, Winnipeg, Manitoba.

(a) The City of Winnipeg Water Treatment Plant Preliminary Design Report – Section 14 Geotechnical Investigation (2005)

(b) Water Impounding Reservoir - Cell #2 and Booster Pumping Station Deacon Manitoba by RM Hardy & Associates Ltd. (1977)

(c) Proposed Venturi Chambers Deacon Reservoir by Dyregrov Consultants (1993)

(d) Deacon Reservoir Expansion Proposed Groundwater Monitoring Program by KGS Group (1993)

(e) Shoal Lake Aqueduct Program 5 – Deacon Drainage Improvements by UMA Engineering Ltd. (1996)

(f) Pile Driving records from Deacon Booster Pumping Station by RM Hardy and Associates (1979).

Information in these reports has been provided to assist in the Bidder's evaluation of subsurface conditions and the Bidder shall solely be responsible for any interpretation that they make from this information.

E3. PILE CUT-OFF ELEVATIONS

E3.1 The elevations for pile cut-offs shall be as shown on the Drawings. Should the top of the pile be driven below cut-off elevation by up to 1.8 metres, the Contractor shall construct a pile extension as shown on the Drawings at no additional cost to the City.

E3.2 Should the top of pile be driven below cut-off elevation by more than 1.8 metres, the Contractor shall supply and install a replacement pile at a location designated by the Contract Administrator. The replacement pile will be paid as additional work to the Contract in accordance with C:7.

E4. OFFICE AND SITE FACILITIES

E4.1 The Contractor shall supply office facilities for his own use. The facilities shall be situated at the area designated on CM G001.

E4.2 With reference to drawing CM G001, the City will provide to the Contractor without cost:

(a) Space for a 40A two pole breaker in the Main Temporary Power Supply will be available to serve office lighting, receptacles and convenience power (electric space heating equipment is not allowed), the Contractor shall supply and install the breaker, cabling and the step down transformer (600v to 120/208v); the contractor shall provide portable generators for operation of small tools at the construction site.

(b) Communications connections for four telephone and internet. The Contractor shall supply and install the telephone service from the City's existing telephone service pedestal that is located east of the DBPS compound entrance;

(c) Onsite washroom and toilet facilities with non-potable water supply;

(d) Unless otherwise specified, all required over-current protection, portable distribution panels and transformations, cables, conductors, grounding and other materials required to provide construction power for the Work shall be supplied and installed by the Contractor.

E4.3 The Contractor may arrange for additional facilities with the approval of the Contract Administrator and at the Contractor's cost.

E5. SITE ROADS AND WORK SITE ACCESS

E5.1 The Contractor shall have access to the Site on Business Days between 07:00 and 18:00 unless otherwise approved by the Contract Administrator.

E5.2 Access to the work site is restricted and cooperation with other contractors on site is necessary in the best interest of all parties.

E5.3 The Site is located on Provincial Road 207, 3.2 km north of Highway 1 in Dugald, Manitoba.

E5.3.1 The Site address is PR 207, Lot 57082, Dugald, Manitoba.

E5.4 Provincial Road 207 north of the GWWD rail crossing is a Class B1 road and is subject to load restrictions which will affect the maximum weight of individual deliveries. The approximately 3.2 km of PR 207 between the entrance to the Site and Highway 1 is a TAC Route.

E5.5 Access to the Site from the west is generally limted to access via the temporary road from west of the Clearwell. The access road will be used by other contractors during the duration of this contract (maintenance will be shared accordingly) and will remain in place to be utilized by future contracts.

E5.6 Access to the Site will be interrupted approximately once a month for a duration of approximately four hours due to deliveries of chemical via the railway.

E5.7 Other on site access roads will be installed by others as shown on Drawing CM G001.

E5.8 Maintenance and upkeep of the noted roads is the shared responsibility of all contractors who use the roads, including the Contractor.

E5.9 Construction and removal, if necessary, of any additional access roads is the responsibility of this Contractor.

E6. FIELD ENGINEERING

E6.1 Unless otherwise specified, the Contract Administrator will layout the Work in accordance with article 3.15 of CW 1130.

E6.2 The Contractor shall engage a qualified surveyor to layout the works and record as-constructed measurements for Record Drawings related to the construction of the Valve Chambers.

E6.2.1 The surveyor shall be a registered Manitoba Land Surveyor, or an instrumentman or surveying firm experienced in layout of similar projects, subject to the approval of the Contract Administrator.

E6.2.2 Survey reference points for horizontal and vertical control are indicated on the drawings. The Contractor shall locate, confirm and preserve the reference points during construction.

E7. SITE DRAINAGE

E7.1 The Contractor shall be responsible for drainage of all excavations associated with the Work from Award until Total Performance.

E7.2 Provision of adequate site drainage during the performance of the Contract shall be the Contractor's responsibility. The Contractor shall maintain site grading as necessary to provide for proper drainage away from the excavated areas. This water is to be re-directed into ditches outside of the site. Silt fences shall be properly erected and keyed into the primary ditches to prevent eroded materials from leaving the site. No extra payment or time extension will be granted as a result of difficulties associated with site access resulting from poor site drainage during any part of the performance of the Work.

E8. SANITATION FACILITY

E8.1 Portable toilets may be provided by the Contractor. Any portable toilet shall be cleaned on a weekly basis and provided with regular maintenance as required to ensure proper operation.

E8.2 Portable toilets shall be located in an area acceptable to the Contract Administrator.

E9. WASTE CONTAINER

E9.1 A waste container to dispose of garbage produced from the site shall be provided by the Contractor. It shall be located in a safe, convenient location, and be emptied as necessary by the Contractor. The provision, maintenance and removal of a waste container shall be considered a subsidiary obligation of the Contractor

E10. CONDITION, PROTECTION OF AND ACCESS TO THE AQUEDUCT

E10.1 Condition of the Aqueduct and Existing Yard Piping

E10.1.1 The Deacon Booster Pumping Station and area contains numerous water conduits of various constructions and vintages. All are critical components of the City of Winnipeg Water Supply and shall be treated with the utmost caution. Work around any of these pipelines shall be well planned and executed to ensure that the Aqueduct and water transmission lines are not subjected to construction related loads, including excessive vibrations and concentrated or asymmetrical lateral loads during backfill placement.

E10.1.2 The Shoal Lake Aqueduct A Section, north of the main access road, between PR 207 and the existing DBPS compound is a 2438 mm diameter cast-in-place reinforced concrete pipe, vintage 1916-1917. The Branch I Aqueduct running east to west, immediately south of the Booster Pumping Station, commencing at the existing main entrance to the station, is constructed of precast reinforced concrete pipe, vintage 1918-1919. The Branch II Aqueduct, running southerly from the surge tower structure, is constructed of AWWA C301 pre-stressed concrete cylinder pipe vintage 1958-1960. Other existing water transmission lines within the Deacon Booster Pumping Station compound and adjacent areas, consist of AWWA C301 pre-stressed concrete cylinder pipe vintage 1970-1995. All of these pipelines have limited capacity to support additional soil cover and live loads beyond their original design condition.

E10.2 Protection of the Aqueducts and Water Transmission Lines

E10.2.1 Contractors carrying out repair work or working in the vicinity of the Aqueducts and transmission lines shall ensure that:

(a) Equipment shall only be permitted to cross the pipes at designated locations. Under no circumstances will equipment be permitted to cross the A section of the Aqueduct other than at bridging structures.

(b) Granular material, construction material, soil or other material shall not be stockpiled on the Aqueduct or within 5 metres of the Aqueduct centerline.

(c) Construction practices shall not subject the Aqueduct to asymmetrical loading at any time.

(d) Construction practices or procedures at or near the Aqueduct shall not impart excessive vibration loads on the Aqueduct and/or cause settlement of the subgrade below the Aqueduct.

(e) Asymmetrical water pressures shall not be permitted to build up on one side of the Aqueduct arch.

(f) Further to CW 2030-R6, only smooth edged excavation buckets, soft excavation or hand excavation shall be used for excavation adjacent to and over the pipelines.

E10.2.2 It is the Contractors' responsibility to ensure that all work crew members understand, observe, and work to the requirements of Specifications.

E10.3 Equipment Restrictions

E10.3.1 Equipment must cross the Aqueduct in a responsible and careful manner (i.e. slowly).

E10.3.2 Loads for Highway No. 207 shall be limited to the weight restrictions in place for the road unless otherwise permitted.

E11. ENVIRONMENTAL PROTECTION

E11.1 The Contractor shall be aware that the Aqueduct is for potable water supply and no contamination by fuel, chemicals, etc. shall be permitted at any time. Fuels or chemicals shall not be stored within 30 metres of the Aqueduct.

E11.2 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the environmental protection measures as herein specified.

E11.3 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work:

E11.3.1 Federal

(a) Canadian Environmental Protection Act (CEPA) c.16

(b) Transportation of Dangerous Goods Act and Regulations c.34

E11.3.2 Provincial

(a) The Dangerous Goods Handling and Transportation Act D12

(b) The Endangered Species Act E111

(c) The Environment Act c.E125

(d) The Fire Prevention Act F80

(e) The Manitoba Nuisance Act N120

(f) The Public Health Act c.P210

(g) The Workplace Safety and Health Act W120

(h) Current applicable associated regulations.

(i) The Fisheries Act

(j) The Migratory Birds Act

(k) The Historic Resources Act

(l) Drinking Water Safety Act

E11.3.3 The Contractor is advised that the following environmental protection measures apply to the Work.

E11.3.4 Materials Handling and Storage

(a) Construction materials shall not be stored within ten (10) metres of the Aqueduct centerline without the approval of the Contract Administrator.

E11.3.5 Fuel Handling and Storage

(a) The Contractor shall abide by the requirements of Manitoba Conservation storage and handling of Petroleum Products and Allied Products Regulations for handling and storage of fuel products.

(b) All fuel handling and storage facilities shall comply with The Dangerous Goods and Transportation Act Storage and Handling of Petroleum Products Regulation and any local land use permits.

(c) Fuels, lubricants, and other potentially hazardous materials as defined in The Dangerous Goods and Transportation Act shall be stored and handled within the approved storage areas.

(d) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.

(e) Products transferred from the fuel storage area(s) to specific work sites shall not exceed the daily usage requirement.

(f) When servicing requires the drainage or pumping of fuels, lubricating oils or other fluids from equipment, a groundsheet of suitable material (such as HDPE) and size shall be spread on the ground to catch the fluid in the event of a leak or spill. No repairs within 30 m of aqueduct or watercourse will be permitted.

(g) Refuelling of mobile equipment and vehicles shall take place at least 30 m from a watercourse.

(h) The area around storage sites and fuel lines shall be distinctly marked and kept clear of snow and debris to allow for routine inspection and leak detection.

(i) A sufficient supply of materials, such as absorbent material and plastic oil booms, to clean up minor spills shall be stored nearby on-site. The Contractor shall ensure that additional material can be made available on short notice. All refuelling vehicles shall be equipped with a spill response kit.

E11.3.6 Waste Handling and Disposal

(a) The construction area shall be kept clean and orderly at all times during and at completion of construction.

(b) At no time during construction shall personal or construction waste be permitted to accumulate for more than one day at any location on the construction site, other than at a dedicated storage area as may be approved by the Contract Administrator.

(c) Indiscriminate dumping, littering, or abandonment shall not take place.

(d) No on-site burning of waste is permitted.

(e) Equipment shall not be cleaned within 30 m of watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.

E11.3.7 Dangerous Goods/Hazardous Waste Handling and Disposal

(a) Dangerous goods/hazardous waste are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.

(b) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations and meet training requirements for these Regulations.

E11.3.8 Emergency Spill Response

(a) The Contractor shall ensure that due care and caution is taken to prevent spills.

(b) The Contractor shall report all major spills of petroleum products or other hazardous substances with the potential for impacting the environment and threat to human health and safety to the Contract Administrator and Manitoba Conservation, immediately after occurrence of the environmental accident, by calling the 24-hour emergency telephone phone number (204) 945-4888.

(c) The Contractor shall designate a qualified supervisor as the on-site emergency response coordinator for the project. The emergency response coordinator shall have the authority to redirect manpower in order to respond in the event of a spill. (Should include reference to a site-specific Emergency Response Plan and Environmental Protection Plan.)

(d) The following actions shall be taken by the person in charge of the spilled material or the first person(s) arriving at the scene of a hazardous material accident or the on-site emergency response coordinator:

(i) Notify emergency-response coordinator of the accident:

- identify exact location and time of accident
- indicate injuries, if any
- request assistance as required by magnitude of accident Manitoba Conservation 24-hour Spill Response Line (204) 945-4888, RCMP (Oakbank Detachment) (911), City of Winnipeg Fire Department

(911), Springfield Ambulance (911), company backup, contact Contract Administrator.

(ii) Assess situation and gather information on the status of the situation, noting:

- personnel on site
- cause and effect of spill
- estimated extent of damage
- amount and type of material involved
- proximity to waterways and the Aqueduct

(iii) If safe to do so, try to stop the dispersion or flow of spill material:

- approach from upwind
- stop or reduce leak if safe to do so
- dyke spill material with dry, inert sorbent material or dry clay soil or sand
- prevent spill material from entering waterways and utilities by dyking
- prevent spill material from entering Aqueduct manholes and other openings by covering with rubber spill mats or dyking

(iv) Resume any effective action to contain, clean up, or stop the flow of the spilled product.

E11.4 The emergency response coordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to the Manitoba Conservation according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.

E12. SITE RESTORATION

E12.1 The Contractor shall remove the temporary Site office and storage facilities prior to Total Performance.

E12.2 The Contractor will be responsible for grounds restoration, as determined necessary by the Contract Administrator.

E12.3 The Contractor will be responsible for any damage caused by his forces on roadways or accesses.

E13. RECORD DRAWINGS

E13.1 The Contract Administrator will record all as-built conditions which deviate from the original Contract documents except for the work related to the valve chambers which will be recorded by the Contractor.

E13.2 The Contractor shall keep one (1) complete set of white prints at their Site office, including all Addenda, Change Orders, Field Instructions, and other revisions for the purposes of Record Drawings. As the Work proceeds, the Contractor shall clearly record in red pencil all as-built conditions which deviate from the original Contract documents.

E13.3 The Record Drawings shall be available for review by the Contract Administrator upon request at any time during the performance of the Work.

E13.4 Prior to achieving Substantial Performance, the Contractor shall submit the Record Drawings prepared to the Contract Administrator for his review and use. If, in the opinion of the Contract Administrator, the Record Drawings are incomplete or inaccurate, the Record Drawings will be returned to the Contractor and the Contractor shall revise and resubmit the Record Drawings at his cost.

E13.5 Substantial Performance cannot be achieved without the submission of Record Drawings that are acceptable to the Contract Administrator.

CITY SUPPLIED EQUIPMENT

1. GENERAL

.1 The City has entered into a number of equipment supply contracts based on the Bid Opportunities described in Part D. Installation of City Supplied Equipment is the responsibility of this Contractor.

.2 The City Supplied Equipment will be delivered to and stored at the City Warehouse. The cost for pick-up and delivery of equipment from the City's Warehouse to the jobsite will be borne by the Contractor.

.3 All forms referred to in this Section (Form 100, 101, 102 and 103) will be initiated by the Supply Contractor to be completed by the Contractor as detailed below.

.4 Prior to accepting any of the equipment to be supplied by a Supply Contractor, the Contractor shall inspect the equipment. A representative from each of the following groups will be in attendance at the time of pick-up and delivery: the Supply Contractor, Contractor, and Contract Administrator. A duly executed Form 100 – Certificate of Equipment Delivery shall be completed. Any minor damage identified during the inspection shall be repaired as per the Supply Contractor's instructions at the Supply Contractor's cost. Any severe damage will be grounds for rejection of the equipment. The severely damaged equipment will be replaced at the Supply Contractor's cost. The Contractor shall accept the equipment and assume risk and responsibility for the equipment and fill out Form 100 - Certificate of Equipment Delivery.

.5 If the Contractor's inspection reveals any deficiencies in the equipment, then these shall be noted in writing prior to the Contractor accepting the equipment. Only deficiencies noted and documented in the foregoing manner will be deemed not the responsibility of the Contractor.

.6 The Contractor shall be responsible for the installation of City Supplied Equipment in addition to all equipment supplied under this Contract. City Supplied Equipment shall be installed in accordance with the Supply Contractor's installation instructions.

.7 For the purposes of Form 100, the Supply Contractor will be the Manufacturer.

2. SUPERVISION OF INSTALLATION, START-UP, AND FIELD TESTING

.1 For City Supplied Equipment, each Supply Contractor will provide the services of a qualified representative to assist in the installation, start-up, and performance testing of all of the equipment. The Contractor shall refer to Sections 01650 – Equipment Installation, and Divisions 2 and 15 for details on the services and procedures not included in this Section. The services to be performed by the Supply Contractors are as follows:

.1 Prior to the Contractor beginning the installation, the Supply Contractor will provide to the Contractor instructions and advice regarding the detailed requirements for the equipment installation. The Supply Contractor will be required to provide Form 101 –

CITY SUPPLIED EQUIPMENT

Certificate of Readiness to Install. The Contractor shall be required to sign Form 101 to acknowledge that he has received adequate instruction. During installation, if the Contractor has additional questions regarding installation requirements or procedures, he shall contact the Supply Contractor, with the assistance of the Contract Administrator, as required. No additional compensation to the Contractor based on claims of inadequate training from a Supply Contractor will be entertained should he install equipment improperly.

.2 Following the completion of the installation, the Supply Contractor will inspect the installation of the equipment to verify that it has been installed in accordance with the Supply Contractor's requirements. The Supply Contractor will be required to provide Form 102 – Certificate of Satisfactory Installation. If any deficiencies in the installation exist at the time of inspection, these shall be noted on Form 102 by the Supply Contractor. The Contractor shall be responsible for the prompt correction of these deficiencies prior to performance testing of the equipment.

.3 The Supply Contractor shall assist the Contractor in Performance Verification of the equipment as specified in Divisions 2 and 15.

.4 The Supply Contractors for City Supplied Equipment have been contracted to provide site visits for inspection of installation and for assistance of Performance Verification.

END OF SECTION

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 Submission Requirements

.1 Coordinate each submission with requirements of the Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Accompany all submissions with a transmittal letter, in duplicate, containing:

.1 Date

.2 Project title and Bid Opportunity number

.3 Contractor's name and address

.4 Specification Section number for each submittal

.5 Submittal number and revision number in the following format:

.1 791 - Spec Section # - Submittal # - Revision # (e.g. 791-05500-001-1).

.2 The first submittal is numbered 1 with sequential numbering after that for revisions.

.6 Identification and quantity of each Shop Drawing product

.7 Equipment tag number

.8 Other pertinent data

.3 Submissions shall include:

.1 Date and revision dates

.2 Project title and number

.3 Name, email address, and address of:

.1 Contractor

.2 Manufacturer

.4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 As required in the specifications, the seal and signature of a Professional Engineer registered in the Province of Manitoba.

.4 Details of appropriate portions of work as applicable:

.1 Fabrication

.2 Layout showing dimensions including identified field dimensions and clearances

.3 Setting or erection details

.4 Capacities

.5 Performance characteristics

.6 Standards

.7 Operating weight

1.3 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 twelve (12) 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.

SUBMITTALS

1.4 Product Data

.1 Product Data; Manufacturer's catalogue sheets, brochures, literature, performance charts, and diagrams used to illustrate standard manufactured products.

.2 Submit twelve (12) copies of product data.

.3 Sheet size: 215 x 280 mm.

1.5 Procedure and Routing

.1 The Contractor shall provide to the Contract Administrator thirteen (13) printed copies of the Shop Drawings and corresponding submittal transmittal form(s) complete with the information specified in 1.3 Submission Requirements.

.2 The Contractor shall simultaneously email the .pdf version of these same Shop Drawings and submittal transmittal forms to the Contract Administrator. The Contractor shall ensure the .pdf version of the Shop Drawings and corresponding submittal transmittal form(s) are identical to the printed copies being distributed for review. When the total size of the email is greater than 5 MB, the Contractor shall post the .pdf version of the Shop Drawings and submittal transmittal form(s) to an accessible place on the internet (provided by the Contract Administrator) and an e-mail notification is to be sent to all parties listed above when posting is complete.

.3 The routing and the names of individuals responsible for receiving submittals will be identified by the Contract Administrator at the pre-construction meeting held pursuant to D3.2.

.4 Upon review of the Shop Drawings, the Contract Administrator will e-mail the .pdf version of the annotated Shop Drawings and corresponding transmittal form(s) to the Contractor. When the total size of the email is greater than 5 MB, the Contract Administrator will post the .pdf version of the Shop Drawings and corresponding transmittal form(s) to the same accessible place on the internet and an e-mail notification will be sent to the Contractor. Two (2) printed copies of the reviewed Shop Drawings will be sent back to the Contractor.

1.6 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.

END OF SECTION

QUALITY CONTROL

1. GENERAL

1.1 Section Includes

.1 Quality assurance requirements

.2 Inspection and testing, administrative and enforcement requirements.

.3 Tests and mix designs.

.4 Mock-ups.

.5 Mill tests.

1.2 Precedence

.1 Refer to C:2.

1.3 Related Sections (Not Used)

1.4 References

.1 Unless the edition number and/or date are specified, any reference to the Manufacturer's and published codes, standards and specifications shall mean the latest edition published by the issuing authority, and in effect three (3) Business Days before the Submission Deadline.

.2 Referenced standards and specifications define minimum requirements. Work in quality exceeding these minimum requirements conforms to the Contract.

.3 Any reference to a Manufacturer's direction, instruction, or specification shall be deemed to include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the products pertinent to their use and their relationship to the products with which they are incorporated.

.4 Any reference to regulatory authorities includes all authorities having jurisdiction.

.5 Any reference to a Specification section includes all Drawings and Schedules related to the work of that section.

1.5 Inspection

.1 Refer to C:11.

1.6 Independent Inspection Agencies

.1 Except where inspecting, testing and similar quality control services are specifically indicated to be the Contractor's responsibility, the City will engage Independent

Inspection/Testing Agencies for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the City.

.2 Where inspecting, testing and similar quality control services are specifically indicated in the Specification Sections as the Contractor's responsibility, the Contractor shall engage appropriate Independent Inspection/Testing Agencies. Cost of such services will be borne by the Contractor.

.3 Where the City has engaged an Inspection/Testing Agency for testing and inspection of a part of the Work and the Contractor is also required to engage an Inspection/Testing Agency for the same or related part of the Work; the Contractor shall not employ the same agency engaged by the City without the prior written approval of the Contract Administrator.

.4 Employment of Inspection/Testing Agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.5 If defects are revealed during inspection and/or testing, appointed agency may require additional inspection and/or testing to ascertain full degree of defect. Regardless of original responsibility, pay costs for additional inspection and testing, retesting, re-inspection.

1.7 Access to Work

.1 Refer to C:11.

1.8 Procedures

.1 Refer to C:11.

.2 Submit for the Contract Administrator's approval a written Quality Assurance Plan prior to start of any on site activities. The plan shall include as a minimum:

.1 Contractor's approach and philosophy to QA/QC during construction.

.2 Contractor's method for identification and tracking of all control documents.

.3 Organization chart showing proposed personnel and key contacts for QA/QC.

.4 QC Representative and any subordinate experts. Submit resumes for the Contract Administrator's approval.

.5 QC Representative's on Site presence and participation in pre-installation, and Subcontractor meetings.

.6 Contractor's bi-weekly QC report, including results of contractor certifications, test results, corrective action and follow-up on any deficiencies in the Project's quality control.

.7 A list of proposed Inspection/Testing Agencies and their qualifications.

.3 The QC Representative shall be:

.1 Independent of the Contractor's Supervisor

.2 Qualified by experience and training to monitor construction quality.

.3 Responsible for the overall quality assurance of the Contractor's work and compliance with Contract.

.4 Responsible to observe and certify the performance of contractor tests and pre-inspections identified, and to attend meetings on site. The QC Representative may elect to use an alternate expert to observe/certify performance.

.5 Authorized to stop work at any time that quality problems necessitate. This authority shall be delineated in a letter of appointment from a Contractor, and shall be included in the QA Plan.

.4 Notify appropriate agency and the Contract Administrator not less than forty eight (48) hours in advance of requirement for tests, in order that attendance arrangements can be made.

.5 Submit samples and/or materials required for testing, as specified in Specification section. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.6 Provide labour and facilities to obtain and handle samples and materials on the Site.

.7 Provide suitable facilities for the storage of specimens or samples at correct temperature, free from vibration or damage in accordance with the instruction of the Inspection/Testing Agency and the governing standard.

1.9 Rejected Work

.1 Refer to C:11.

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

1.10 Reports

.1 For inspecting, testing and similar quality control services which are the Contractor's responsibility, submit four (4) copies of inspection and test reports to the Contract Administrator, unless specified otherwise.

.2 Each report shall include:

.1 Date of issue

.2 Contract name and number

.3 Name, address and telephone number of Inspection/Testing Agency

.4 Name and signature of inspector and tester

.5 Date of inspection or test

.6 Identification of the product and Specification section covering inspected or tested Work

.7 Location of the inspection or the location from which the tested product was derived

.8 Type of inspection or test

.9 Complete inspection or test data.

.10 Test results and an interpretation of test results.

.11 Ambient conditions at the time of sample taking and testing.

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

.13 Recommendations on retesting or other corrective action where necessary

.14 Signature of a qualified and authorized representative of the Agency

.3 Submit reports within forty eight (48) hours, and notify the Contract Administrator forthwith if the report indicates improper conditions or procedures.

.4 Refer to Specification section for definitive requirements.

1.11 Tests and Mix Designs

.1 Furnish test results and mix designs as specified or reasonably required by the Contract Administrator.

.2 Refer to Specification section for definitive requirements.

1.12 Mock-ups

.1 Prepare mock-ups as identified in Specification sections. Include for Work of all Sections required to provide mock-ups.

.2 Construct in locations as identified in Specification sections or as otherwise approved by the Contract Administrator.

.3 Prepare mock-ups for the Contract Administrator's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.13 Mill Tests

.1 Submit mill test certificates as specified or reasonably required by the Contract Administrator.

.2 Refer to Specification section for definitive requirements.

1.14 Equipment and Systems

.1 Submit adjustment and balancing reports for mechanical, electrical, and other equipment systems.

.2 Refer to Specification section for definitive requirements.

END OF SECTION

MATERIAL AND EQUIPMENT

1. PRODUCTS

1.1 Manufacturers' Directions

.1 Unless otherwise specified, install or erect all products in accordance with Manufacturers' recommendations. Do not rely on labels or enclosures provided with products. Obtain instructions directly from manufacturers.

.2 Notify the Contract Administrator, in writing, of any conflicts between the Specifications and Manufacturers' instructions so that the Contract Administrator may establish the course of action.

.3 Improper installation or erection of products due to failure in complying with these requirements authorizes the Contract Administrator to require any removal and re-installation that may be considered necessary, at no increase in Contract Price.

2. WORKMANSHIP

2.1 Concealment

.1 In finished areas conceal all pipes, ducts and wiring except where indicated otherwise on Drawings or in Specifications.

.2 Before installation inform the Contract Administrator if there is a contradictory situation.

2.2 Location of Fixtures

.1 Consider the location of fixtures, outlets, and other mechanical and electrical items indicated on Drawings as approximate. The actual location of these items is to be as required or directed to site conditions at the time of installation and as is reasonable.

.2 Before installation inform the Contract Administrator if there is a contradictory situation. Install as directed.

2.3 Cutting and Remedial Work

.1 Perform all cutting and remedial work that may be required to make the several parts of the Work come together properly. Coordinate and schedule the Work to ensure that cutting and remedial work are kept to a minimum.

.2 Employ specialists familiar with the materials affected in performing cutting and remedial work. Perform in a manner to neither damage nor endanger any portion of the Work.

.3 Do not cut, drill or sleeve any load-bearing members without written acceptance of the Contract Administrator.

.4 The Contractor is to perform work so as to minimize dust.

2.4 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent material unless otherwise specified.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive, non-staining fasteners and anchors for securing exterior Work unless otherwise specified.

.4 Space anchors within their load limit or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and lay out neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

3. MEASUREMENT

3.1 Metric Project

.1 Unless otherwise noted, this Project has been designed and is to be constructed in the SI nominal metric system of measurements.

END OF SECTION

EQUIPMENT INSTALLATION

1. INTENT

.1 This Section describes general requirements for all equipment supplied under the Contract relating to the supervision of installation, testing, operation, and Performance Verification. The Contractor shall be responsible for the installation work, testing, operation, and Performance Verification of equipment in this Contract and for City Supplied Equipment, reference Section 01210 - City Supplied Equipment.

2. EXPERTISE AND RESPONSIBILITY

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

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

3. EQUIPMENT DELIVERY

.1 The Contractor shall be responsible for equipment delivery to the Site. When the Contractor accepts the equipment delivery, he shall certify the delivery by completing Form 100 – Certificate of Equipment Delivery, attached to this specification.

.2 Ten (10) days before delivery, notice shall be given to the Contract Administrator so that arrangements for receipt and for inspection can be made. The shipping lists of materials will be carefully checked by the Manufacturers Representative in the presence of the Contract Administrator and the Contractor.

.3 The Contractor shall be responsible for all equipment at the Site or any alternative storage location.

.4 The Contractor shall ensure that he is fully informed of precautions to be taken in the unloading of equipment and its subsequent storage including any required maintenance.

.5 If equipment off-site storage is required, then the second move of the equipment to the Site will be at the Contractor’s cost.

4. INSTALLATION ASSISTANCE

.1 Before commencing installation of equipment, the Contractor shall arrange for the attendance of the Manufacturer's Representative to provide instructions in the methods, techniques, precautions, and any other information relevant to the successful installation of the 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 Contractor is aware of all installation requirements, he shall so certify by completing Form 101 – Certificate of Readiness to Install 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 Contract Administrator has advised that he has received the completed Form 101.

.6 Separate copies of Form 101 shall be used for different equipment.

5. INSTALLATION

.1 If necessary, or if so directed by the Contract Administrator during the course of installation, the Contractor shall contact the Manufacturer’s Representative 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 Contractor 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 Contractor shall inform the Manufacturer’s Representative and 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 Contractor and the Manufacturer’s Representative will be required to re-inspect the installation, at the Contractor’s cost.

.7 When the Manufacturer’s Representative accepts the installation, he shall certify the installation by completing Form 102 – Certificate of Satisfactory Installation, 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 Provide separate copies of Form 102 for different equipment.

6. OPERATION AND PERFORMANCE VERIFICATION

.1 Equipment will be subjected to a demonstration, and performance test after the installation has been verified and any identified deficiencies have been remedied.

.2 During the demonstration, and performance tests, the Contractor shall operate equipment as required to complete the Performance Verification required from all Divisions of this Specification.

.3 Inform the Contract Administrator at least fourteen (14) 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 Contractor and the Contract Administrator.

.4 The Manufacturer's Representative shall conduct all necessary checks to equipment and if necessary, advise the Contractor 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 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 Demonstration:

.1 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.

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

.3 On satisfactory completion of the demonstration, critical parameters, such as alignment, shall be rechecked.

.7 Performance Tests:

.1 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.

.2 The Contractor shall submit the results of the performance tests within 24 hours to the Contract Administrator, and final documented and summarized results in a format acceptable to the Contract Administrator within 7 calendar days. 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.

.8 Should the initial demonstration, or performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, and/or performance tests shall be repeated to the satisfaction of the Contract Administrator. Additional costs incurred by the Contractor, the Contract Administrator, or the City, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor.

.9 On successful completion of the demonstration, running test, and performance tests, Form 103 – Certificate of Equipment Satisfactory Performance attached to this specification will be signed by the Manufacturer's Representative, the Contractor, and the Contract Administrator.

EQUIPMENT INSTALLATION

CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

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

EQUIPMENT INSTALLATION

CERTIFICATE OF READINESS TO INSTALL
FORM 101

I have familiarized the Contractor 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/ Supplier.

_____ _____
(Authorized Signing Representative of the Contractor) Date

EQUIPMENT INSTALLATION

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 Contractor) Date

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

CERTIFICATE OF EQUIPMENT SATISFACTORY PERFORMANCE
FORM 103

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

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Contractor) Date

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

1. Acknowledgement of Receipt of O&M Manuals.

_____ _____
(Authorized Signing Representative of the City) Date

END OF SECTION

EXCAVATION AND BACKFILLING FOR STRUCTURES

1. GENERAL

1.1 Work Included

.1 Work under this Section includes, but is not necessarily limited to the following items:

.1 Excavation to required elevations for the Valve Chambers.

.2 Backfill to required finish elevations of the Valve Chambers.

.3 Disposal of surplus excavated material.

.4 Dewatering of excavations during construction.

1.2 Reference Standards

.1 Conform to requirements of the NBC and the Canadian Construction Safety Code.

.2 Comply with excavation and trenching regulations of Provincial authorities.

1.3 Samples

.1 All materials incorporated into the Work of this Specification shall be subject to review and testing by the Contract Administrator, including all operations from the selection and separation of the materials, through to final acceptance of the specified Work.

.2 The Contractor shall be wholly responsible for the control of all operations incidental to the Work, notwithstanding any review or acceptance that may have previously been given.

.3 The Contract Administrator reserves the right to reject any materials or works that are not in accordance with the requirements of this Specification.

.4 There shall be no charge for any materials taken by the Contract Administrator for testing purposes.

.5 All materials shall be reviewed and accepted by the Contract Administrator at least ten (10) working days before any construction is undertaken.

.6 For granular materials, submit a 25 kg sample for coarse, gravelly soil, or 75 kg sample for coarse, crushed stone and sand of each type, clearly labelled for type and source of the materials, for analysis by testing laboratory. Ship samples prepaid or deliver in tightly closed containers to testing laboratory designated by Contract Administrator.

.7 Costs for analysis will be paid by the City.

1.4 Submittals

.1 All submittals shall be done in accordance with Section 01300 – Submittals.

.2 The Contractor shall submit an excavation plan two (2) weeks prior to commencement of construction to the Contract Administrator for review and acceptance.

.3 The Contractor shall submit a dewatering plan two (2) weeks prior to commencement of construction to the Contract Administrator for review and acceptance.

1.5 Compaction Testing

.1 Testing of compacted fill materials will be performed by an independent inspection and testing firm appointed and paid by the City. Testing will be performed so as to least encumber the performance of the Work.

.2 The City will pay for the first series of tests only, on the area being evaluated. Pay costs for additional testing, if required, due to improper performance of Work.

.3 Tests will be performed in accordance with ASTM D698 for Standard Proctor Density on representative samples to control compaction requirements. The Contract Administrator will decide the frequency and number of tests required.

.4 The field density of the compacted layers shall be verified by field density tests in accordance with ASTM D2922, using nuclear methods performed by the inspection and testing firm. The frequency and number of tests required will be decided by the Contract Administrator.

.5 Notify the Contract Administrator when Work of this Section or portions of Work are completed to own satisfaction. Do not proceed with additional portions of Work until test results have been verified and accepted.

.6 During Work tests, if tests indicate that compacted materials do not meet specified required materials, remove defective Work, replace, and re-test at own expense.

.7 Ensure compacted fills are tested and accepted before proceeding with placement of surface materials.

1.6 Geotechnical Information

.1 Refer to Specification E2 for a list of test hole logs and reports available associated with the Site.

.2 The Contractor should be aware that the soil condition in the excavation may be soft.

1.7 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

2. PRODUCTS

2.1 General

.1 All materials to be subject to Contract Administrator's acceptance.

.2 Granular materials to be composed of sound, hard, uncoated particles, free from injurious quantities of clay, flaky particles, soft shale, friable materials, roots, vegetable matter, and frozen lumps.

.3 Grading of granular materials to show no marked fluctuations between opposite ends of extreme limits.

2.2 Backfill Material

.1 Type 1: pit run granular backfill shall consist of a clean, well-graded, and free-draining pit run material with a maximum size of 75 mm, and less than 5% by weight finer than 0.075 mm.

.2 Type 2: crushed gravel – not used in this Contract.

.3 Type 3: pit run sand for levelling with maximum stone size 20 mm.

.4 Type 4: common clay backfill shall be free from organic material and rocks larger than 150 mm in size and building debris. Fill under landscaped areas to be free from alkali, salt, petroleum products and other materials detrimental to plant growth. Common backfill shall be obtained from Disposal Sites 1 and 2 indicated on the Drawings subject to review by Contract Administrator.

3. EXECUTION

3.1 General

.1 Before starting Work, locate all utilities crossing the Work Site. Notify all agencies or companies having jurisdiction over the specific utilities and protect, relocate, remove, or discontinue service according to their requirements. Any damages shall be repaired at the Contractor's expense.

.2 Protect and restore pavements, boulevards, grassed areas, etc., that may be opened or damaged in the performance of the Work.

.3 During construction, maintain roadways in a clean and safe condition and, at the completion of the Contract, clean and restore all roads used to perform the Work.

3.2 Finish Elevations and Lines

.1 For setting and establishing finish elevations and lines, secure the services of a registered surveyor or experienced instrumentman acceptable to the Contract Administrator.

.2 Carefully preserve all data and all monuments set by the registered surveyor. If displaced or lost, immediately replace to the acceptance of the Contract Administrator, at no additional cost to the City.

3.3 Excavation

.1 Perform excavation in strict compliance to Work Place Safety and Health and authorities that have jurisdiction.

.2 Excavate to noted limits and as required for the Work of this Contract. Stockpile material to be used for backfilling on Site as directed by the Contract Administrator. Excess material is to be disposed of immediately as per item entitled "Disposal" below.

.3 When complete, request Contract Administrator to review excavations.

.4 Local pockets of material which, in the opinion of the Contract Administrator are unsuitable, shall be removed to such depths as required by the Contract Administrator.

.5 The completed excavation shall provide clean, level, solid, and water-free surfaces at the required elevations, ready to receive construction.

.6 Excavations are not to encroach on existing slopes and as indicated in the geotechnical information.

.7 Make good all damage occurring as a result of inadequate, unauthorized, or defective methods of protection.

.8 Areas used for temporary stockpiling shall be restored to existing condition or better.

3.4 Shoring and Bracing

.1 Supply and install all shoring and bracing required for the Work to prevent damage to existing structures, excavations, and injury to personnel.

.2 Comply with all applicable rules and regulations of governmental authorities.

.3 Erect shoring and bracing independent of utilities and structures.

.4 Prefabricated cages or shields may be used to supplement or replace conventional shoring, provided they comply with all applicable safety regulations.

.5 Assume full responsibility for any failure, collapse, or movement of existing structures, shoring and bracing, earth banks, trenches, and other excavations.

3.5 Dewatering

.1 Refer to Specification E7 for dewatering requirements.

3.6 Backfilling, Fill, and Compaction

.1 Preparation

.1 Ensure areas to be backfilled are free from debris, snow, ice, and water; and that ground surfaces are not in a frozen condition.

.2 Backfilling and Filling

.1 Backfill and fill to grades, contours, levels, and elevations as directed by the Contract Administrator.

.2 Maintain optimum moisture content of materials to permit compaction to specified densities.

.3 Compact each soil layer to at least the specified minimum degree; repeat compaction process until plan grade is attained. Compaction densities indicated herein are based on ASTM D698 for Standard Proctor Density.

.4 Fill for over-excavation: backfill over-excavation with Type 1 pit run gravel placed in uniform lifts not greater than 200 mm in thickness and compact to a density of at least 95% Standard Proctor Density at no additional cost to the City.

.5 Fill around structures: backfill around structures with Type 1 granular and Type 4 common fill placed in uniform lifts not greater than 200 mm in thickness and compact to a density of at least 95% Standard Proctor Density. Care shall be taken to leave no voids against the structures.

.6 Levelling for void form: spread Type 3 sand as required for installation of void form to required elevation and compact to a density of 85% Standard Proctor Density for a level firm surface.

3.7 Disposal

.1 Surplus material not required for backfill and fill purposes shall be disposed of on Site to a location designated by the Contract Administrator at no extra cost to the City.

3.8 Clean-Up

.1 As excavation proceeds, keep roads, streets, and sidewalks clean of dirt and excavated material.

.2 Clean-up and wash down to remove all dirt and excavated materials caused by Work of this Section.

.3 Clean at the end of each working day.

END OF SECTION

EXCAVATION, TRENCHING AND BACKFILLING

1. GENERAL

1.1 Description

.1 This Section provides the requirements associated with the excavation, trenching and backfilling for utilities.

1.2 References

.1 The following Specifications of the City of Winnipeg Standard Construction Specifications-latest edition are applicable to the Work:

.1 CW 2030 Excavation, Bedding and Backfill

.2 Division 3 Standard Details – Underground Works

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

.3 Division 3 Approved Products for Underground Works

1.3 Measurement and Payment

.1 Except as specified herein, measurement and payment for excavation, trenching and backfilling will be as specified in CW 2030.

.2 Cement-Stabilized Fill

.1 Cement-stabilized fill will be measured on a volume basis and paid for at the Contract Unit Price for "Cement-Stabilized Fill". Volume to be paid for will be the total number of cubic metres of cement stabilized fill supplied and placed, including the excavation and disposal of in situ material in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for cement stabilized fill will be made by calculating the volume of the excavation constructed to receive cement stabilized fill using the method of Average End Areas.

2. PRODUCTS

2.1 Materials

.1 Products shall be as specified in CW 2030.

3. EXECUTION

3.1 General

.1 Protection

.1 Before starting Work, locate all utilities serving the Site. Notify all agencies or companies having jurisdiction over the specific utilities and protect, relocate, remove, or discontinue service according to their requirements. Any damages shall be repaired at the Contractor's expense.

.2 Protect and restore pavements, boulevards, grassed areas, etc., that may be opened or damaged in the performance of the Work.

.3 During construction, as well as at the completion of the Contract, all roads used to haul materials shall be cleaned of materials dropped on them.

Refer to E10 for work restrictions in the vicinity of water transmission mains or aqueduct.

.2 Do excavation, trenching and backfill to CW 2030.

.3 Where indicated on the construction drawings, or as directed by the Contract Administrator over excavate the trench sub-grade and replace with cement stabilized fill. Do not lay pipe on cement-stabilized fill until sufficient strength has been attained.

.4 Except as specifically noted on the construction drawings, backfill requirements are as follows:

.1 Class 4 Backfill.

.2 Where trenchless installation is specified, backfill shafts with the class of backfill noted on the construction Drawings.

.3 Backfill above the Aqueduct A section shall be lightly compacted with lightweight compaction equipment, maximum 450 kg. Material shall be uniformly mounded to 300 mm above existing grades to allow for subsidence of backfill.

.5 Stockpile material to be used for backfilling on Site as directed by the Contract Administrator. Excess material is to be disposed of on Site as directed by the Contract Administrator.

.6 All excavated or disturbed areas are to be restored to a condition better than or equal to original.

END OF SECTION

PILE FOUNDATIONS, GENERAL

1. GENERAL

1.1 Work Included

.1 Supply and install precast concrete piles.

1.2 Storage, Handling, and Installation

.1 Protect piles from damage due to excessive bending stresses, impact, abrasion, or other causes from the point of pick-up, and during storage and handling. Install piles to stated driving tolerances.

.2 The Contract Administrator shall be the sole judge of the acceptability of supplied piles.

.3 Replace rejected piles to satisfaction of Contract Administrator. Causes for pile rejection are as follows:

.1 Out of fabrication tolerances at time of installation.

.2 Cracked, spalled, or broken piles.

.3 Out of stated driving tolerances.

1.3 Geotechnical Information

.1 Refer to Specification E2 for geotechnical information including a list of test hole logs and reports available associated with the Site.

.2 Notify Contract Administrator in writing if subsurface conditions at Site differ materially from those indicated and await further instructions from Contract Administrator.

1.4 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Materials

.1 Piles shall be fabricated and supplied as specified in Section 02468 – Precast Concrete Piles.

.2 Piles shall be full length piles as indicated, without cutting and splicing requirements. Contractor shall provide equipment to handle full length piles.

.3 In the event that site conditions require pile extensions, the extensions shall be constructed in accordance with the detail shown on the Drawings.

3. EXECUTION

3.1 Equipment

.1 Prior to the commencement of pile installation, submit details of equipment for installation of piles to Contract Administrator for review.

.1 Impact hammers: provide to the Contract Administrator; Manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.

.2 Hammer:

.1 Hammers with proven performance in local conditions for piles of the same type and size specified in the Contract documents will be accepted for use on this Work. For other hammers driveability analysis as outlined in the following paragraphs shall be submitted to the contract Administrator for review prior to driving piles.

.2 Hammers to be selected on the basis of driveability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.

.3 The driveability analysis shall include, but not be limited to, the following: hammer, cushion, and capblock details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses, and energy throughput at representative penetrations.

.4 Driveability analysis shall be submitted to the Contract Administrator for review of the hammer or hammers.

.5 When required criteria cannot be achieved with the proposed hammer, use larger hammer and take other measures as required.

.6 Drop hammers are not permitted.

.3 Leads:

.1 Construct pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom, with guys, stiff braces, or other means to ensure support to pile while being driven.

.2 Length: provide length of leads so that use of a follower is unnecessary.

.3 Swing leads: firmly guy top and bottom to hold pile in position during driving operation.

.4 Followers: when permitted by the Contract Administrator, provide followers of such size, shape, length, and mass to permit driving pile in desired location to required depth and resistance. Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.

3.2 Preparation

.1 Ensure that ground conditions at pile locations are adequate to support pile driving operation. Make provision for access and support of piling equipment during performance of work.

.2 Pre-bore with a 400 mm diameter auger to a minimum depth of 224.600 unless permitted by the Contract Administrator. Pre-bore shall not exceed this depth unless authorized by the Contract Administrator in writing.

3.3 Field Measurement

.1 Contractor shall cooperate with the Contract Administrator and shall allow access during the pile installation operations so that all the field measurements can be performed expeditiously.

3.4 Driving

.1 Drive precast piles only when concrete has attained strength of 35 MPa as determined by related concrete compression testing in accordance with CSA/CSA-A23.2-00.

.2 Use driving caps and cushions to protect piles. Reinforce pile heads as required by Contract Administrator. Piles with damaged heads as determined by Contract Administrator will be rejected.

.3 Hold piles securely and accurately in position while driving.

.4 Deliver hammer blows along axis of pile.

.5 Drive piles to practical refusal, as outlined in the geotechnical information. Blow count requirements shall be determined by the Contract Administrator. If followers are used, established criteria for refusal will be increased by 50% or as determined by the Contract Administrator.

.6 When driving precast concrete piles, adjust hammer, as required, to deliver reduced impact so that reflected tensile stress in pile does not exceed allowable stress.

.7 Do not drive piles within 10 m of masonry or concrete which has been in place less than seven (7) Calendar Days. Do not drive piles within 30 m of masonry or concrete which has been in place less than one (1) Calendar Day.

.8 Re-strike already driven piles lifted from original set during driving of adjacent piles to confirm and assure set. Maximum allowable uplift of piles from original set is 3 mm. The

Contractor should expect the influence of uplift from driving adjacent piles to be up to 9 m and that it may be necessary to re-strike piles more than once until minimum acceptable uplift of 3 mm is achieved.

.9 Remove loose and displaced material from around piles after completion of driving, and leave clean, solid surfaces to receive foundation concrete.

.10 Cut off piles neatly and squarely at elevation ranges as indicated on the Drawings. Final cut off elevations will be confirmed during construction. Provide sufficient length above cut-off elevation so that the part damaged during driving is cut off. Do not cut tendons or other reinforcement which will be used to tie supported structure above to pile. A minimum of 450 mm of strands shall remain for this purpose. The cut off surface of the piles shall be mechanically chipped to expose sound concrete.

.11 Remove cut-off lengths from Site on completion of Work.

3.5 Design Load Capacity

.1 Allowable design load capacity of piles at specified loads is:

.1 400 mm diameter hex - 800 kN.

.2 Installation of each pile will be subject to the review of the Contract Administrator. Contract Administrator will be the sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration, or other criteria used to determine load capacity. Contractor shall allow Contract Administrator to review final driving of all piles prior to removal of pile driving rig from Site.

3.6 Driving Tolerances

.1 Pile heads shall be within ± 100 mm of locations as indicated.

.2 Piles shall not to be more than 2% of length out of vertical alignment.

3.7 Obstructions

.1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, proceed as directed by Contract Administrator.

3.8 Repair/Restoration

.1 The Contract Administrator may require one (1) or more of the following remedial measures:

.1 Pull out rejected piles and replace with new piles.

.2 Remove rejected pile and replace with a new, and if necessary, a longer pile.

.3 Remove rejected pile and fill hole as directed by Contract Administrator.

.4 Leave rejected pile in place and cut off as directed by Contract Administrator.

.5 Leave rejected pile in place, place adjacent pile(s), and modify pile cap as directed by Contract Administrator.

.2 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

3.9 Safety and Protection

.1 Protect adjacent structures, services, and work of other sections from hazards due to pile driving operations.

.2 Arrange sequencing of pile driving operations and methods such that no damage occurs to adjacent existing structures. If damaged, remedy damaged items to restore to original or better condition at own expense.

.3 Undertake review of all adjacent infrastructures with the Contract Administrator complete with a photographic record sufficient to establish pre-driving conditions of the existing adjacent infrastructure.

.4 Protection for pile strand ends:

.1 Highly visible protection safety caps shall be installed for all pile reinforcing strand ends immediately following strand exposure operations. One protection cap may be used for each pile by grouping and securely tying the strands.

.2 The protection safety caps shall be highly visible and shall be made secure so that accidental contact will not easily dislodge the caps. Dislodged caps shall be re-installed immediately.

.3 Pile reinforcing strands shall be protected from severe bending. Kinked or broken strands shall be repaired to the satisfaction of the Contract Administrator.

END OF SECTION

PRECAST CONCRETE PILES

1. GENERAL

1.1 Work Included

.1 Fabrication, storage, and installation of precast concrete piles.

1.2 References

.1 CSA:

.1 CAN/CSA-A23.1-00/A23.2-00, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CSA A23.4-00/A251-00, Precast Concrete – Materials and Construction/Qualification Code for Architectural and Structural Precast Concrete Products.

.3 CAN/CSA-A3000-03, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004, and A3005).

.2 ASTM:

.1 ASTM A416/A416M, Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

1.3 Design

.1 Piles shall be solid core prestressed concrete piles with longitudinal prestressing strands and spiral reinforcement.

.2 Strand tensioning stress shall be 0.7 times the tensile strength of the strand.

.3 When permitted, pile splices at predetermined locations shall be of the mechanical locking type.

1.4 Submittals

.1 Submit Shop Drawings in accordance with Section 01300 – Submittals.

.2 Each Shop Drawing submitted shall bear the signature and stamp of a qualified Professional Engineer registered in the Province of Manitoba.

.3 Indicate the following items of Shop Drawings:

.1 Lifting point details and locations

.2 Storage support point locations

.3 Mechanical pile splice details complete with calculations

.4 Concrete strength

.5 Reinforcing details

.6 Type and grade of steel

.4 Submit concrete quality control records for all precast piles delivered to Site prior to installation.

1.5 Certificates

.1 Piles delivered to Site to be certified by Manufacturer that each batch of piles meets the strength requirement of 35 MPa at twenty eight (28) Calendar Days.

1.6 Qualifications

.1 Pile type shall have a proven record of successful service in the Province of Manitoba of at least twenty (20) years.

1.7 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Materials

.1 Concrete mixes and materials: to CAN/CSA-A23.1-00 and CSA A23.4.

.2 Reinforcing steel: to CAN/CSA-G30.18.

.3 Prestressing tendons: seven wire low-relaxation strands to ASTM A416/A416M.

.4 Spiral reinforcement: 6 mm diameter hot-rolled rod conforming to Chemical Composition Specification C1008, minimum yield strength 250 MPa.

.5 Fabricate and supply full length piles as indicated and provide equipment capable to handle piles without altering them.

2.2 Concrete Mixes

.1 Proportion normal density concrete produce following properties:

.1 Exposure category for very severe sulphate resistance: S-1.

.2 Minimum compressive strength at twenty-eight (28) days: 35 MPa.

.3 Nominal size of coarse aggregate: 20 mm maximum.

.4 Air content: 4 to 7%, to ASTM C260.

.5 Chemical admixtures: in accordance with ASTM 494.

.6 Supplementary cementing materials: in accordance with CAN/CSA-A3000.

3. EXECUTION

3.1 Fabrication

.1 Fabricate precast concrete piles to lengths determined in the fabrication schedule.

.2 Fabricate piles to following finish tolerances:

.1 Length: plus or minus 3 mm/m of length.

.2 Cross section:

.1 Side width: minus 5 mm to plus 10 mm.

.2 Deviation from straight line: not more than 3 mm/m of length and not more than 10 mm in full length.

.3 Deviation of reinforcing cage from true position: 10 mm.

.4 Pile head: 10 mm/m from true right angle plane; surface irregularities 3 mm.

.5 Location of reinforcing steel main reinforcing cover: minus 3 mm to plus 5 mm; spiral: 10 mm.

.3 Strand projection: strands shall be cut off flush or be slightly below pile head surface.

.3 Prestress piles under the direction of an experienced and competent supervisor. All personnel operating the stressing equipment shall have been trained in its use.

.4 De-tension in a manner to keep eccentricity to a minimum.

3.2 Handling, Storage, and Delivery

.1 Delivery – the project site has insufficient space for long term storage. Delivery to the Site shall be on an as required-for-installation basis.

.2 Protect piles from damage due to excessive bending stresses, impact, abrasion, or other causes during delivery, storage, and handling.

.3 Replace damaged piles to satisfaction of Contract Administrator.

END OF SECTION

WATERMAINS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of new 200 mm potable watermain and appurtenances by open trench and trenchless methods.

.2 Pressure testing and disinfection of new water piping.

1.2 References

.1 The following Specifications of the City of Winnipeg Standard Construction Specifications-latest edition are applicable to the Work:

.1 Section 02315 – Excavation, Trenching, and Backfilling

.2 CW 2110 Watermains

.3 CW 2125 Flushing, Hydrostatic Leakage Testing and Disinfection of Watermains and Water Services

.4 CW 2160 Concrete Underground Structures and Works

.5 Division 3 Standard Details – Underground Works

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

.4 SD-004 Concrete Thrust Blocks for Horizontal Watermain Fittings

.5 SD-005 Concrete Thrust Blocks for Vertical Watermain Fittings

.6 SD-008 Location Map for Watermain Valve Closing Direction

.7 SD-016 Standard Watermain Valve Installation

.6 Division 3 Approved Products for Underground Works

.2 Standards:

.1 Work and materials to be in accordance with the following standards.

.1 ANSI/AWWA:

.1 AWWA C605, Underground Installation of PVC Pressure Pipe and Fittings for Water.

.2 AWWA M11, Steel Pipe – A Guide for Design and Installation.

.2 ASTM:

.1 ASTM Standard F1674, "Standard Test Method for Joint Restraint Products for use with PVC Pipe.

.3 CSA International:

.1 CSA B137.3-02, Rigid PVC Pipe for Pressure Applications

1.3 Measurement and Payment

.1 Measurement and payment for watermains and appurtenances will be measured as specified in CW 2110 except as specified herein.

.2 Installation of New Watermain in Casing Pipe

.1 Watermain installed in a casing will be measured on a length basis for each size and paid for at the Contract Unit Price per metre for "Watermains Installed in Casing Pipe". Length to be paid for will be the total number of linear metres supplied and installed including all excavation and backfill, watermain piping, casing spacers, and casing end seals, installed in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for length of watermain installed in a casing will be made horizontally at grade above the centerline of pipe from end of casing to end of casing.

.3 Separate measurement will be made for the installation of Casing Pipe as specified in Section 02530 – Sanitary Sewers.

2. PRODUCTS

2.1 Materials

.1 Use only those Products listed as Approved Products for Underground Use in the City of Winnipeg in the City of Winnipeg Standard Construction Specifications.

.2 Joint Restraint System

.1 Joint restraint systems to CW 2110 and as specified herein

.2 Joint restraint systems to be rated for pressure equal to or greater than the rated pressure of the pipe. Ratings must include a minimum safety factor of 2 to 1.

.3 Fasteners and restraining rods to be 316 stainless steel.

.4 Coating: fusion bonded epoxy or approved equal.

.5 Acceptable products:

.1 EBBA Iron

.2 Romac Industries

.3 Ford/Uni-Flange

.3 Casing Spacers

.1 Manufactured casing spacers around sized to ensure the watermain does not rest on the pipe bells and is centred within +/-10% of the centreline of the casing pipe. Acceptable product:

.1 PSI - Ranger II Midi

.2 Advance Products and Systems – APS Model CI

.2 Fasteners to be 316 Stainless Steel

3. EXECUTION

3.1 General

.1 Familiarization

.1 Prior to all Work of this Section, become thoroughly familiar with the Site, the Site conditions, and all portions of the Work falling within this Section.

.2 Review and understand the Geotechnical Report.

3.2 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to Section 02315 – Excavation, Trenching and Backfilling. Pipe bedding to be Class B Sand bedding.

3.3 Installation

.1 Installation to CW 2110.

.2 Install pipes to the lines and grades shown on the Drawings.

.3 Coordinate all shut downs with Contract Administrator and submit schedule for shut downs fourteen (14) days prior to Work.

.4 Connection to Existing Piping at Structures:

.1 Locate the existing pipe prior to making connection.

.2 Submit schedule of connection to Contract Administrator forty eight (48) hours prior to Work.

.3 Construction connections utilizing flexible couplings as indicated on the Construction Drawings.

.5 Thermoplastic pipes shall be installed with continuous copper tracer wire buried 150 mm above the top of the pipe. At each end, and every 120 m tracer wires shall be brought to the surface in 100 mm PVC SDR35 casings topped with cast iron valve box tops to City of Winnipeg standards. Valve box top to be marked "W".

.6 Thrust Restraint:

.1 Provide mechanically restrained joints at locations indicated on drawings.

.2 Provide concrete thrust blocks to the details shown on the construction drawings where pipe is installed in virgin ground.

.7 Install pipe in casings where shown on drawings. Support pipe on casing spacers as indicated on the drawings. Ends of the casing shall be sealed against the watermain pipe by wrapping the casing and watermain with two wraps of geotextile drainage fabric meeting the requirements of CW 3120 and be products listed as Approved Products for Surface Works. The geotextile fabric shall be banded with three rows of minimum 10 mm wide stainless steel band spaced 150 mm apart along each of the pipe and the casing. The fabric shall be placed loosely at the each of the casing such that it is not in tension when backfilled. Pipe and casing shall be carefully bedded and backfilled with sand to 200 mm above the casing.

3.4 Testing

.1 Perform hydrostatic leakage testing and disinfect pipe in accordance with CW 2125.

END OF SECTION

LARGE WATERMAINS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of 750 mm diameter supernatant forcemain by open trench methods, from the main WTP building to the aqueduct.

.2 Construction of valve chambers.

.3 Connection of the new supernatant line to the Aqueduct.

1.2 References

.1 Section 02315 – Excavation, Trenching and Backfilling

.2 Section 15202 – Process Valves and Operators

.3 The following specifications of the City of Winnipeg Standard Construction Specifications latest edition are applicable to the Work:

.1 CW 2160 Concrete Underground Structures and Works

.2 Division 3 Approved Products for Underground Works

.3 Division 3 Standard Details – Underground Works

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

1.3 Standards

.1 Work and materials to be in accordance with the following standards.

.1 NSF

.2 ANSI/AWWA

.1 AWWA M9 Manual, Concrete Pressure Pipe – Manual of Water Supply Practices.

.2 AWWA C301-99, Prestressed Concrete Pressure Pipe, Steel-Cylinder type.

.3 AWWA C304-99, Design of Prestressed Concrete Cylinder Pipe

.4 AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

.5 AWWA C905, PVC Pressure Pipe and Fabricated Fittings, 350 mm through 1200 mm for water transmission and distribution.

.6 AWWA C200-97, Steel Water Pipe - 6 in (150 mm) and Larger

.7 AWWA M11, Steel Pipe - A Guide for Design and Installation.

.8 AWWA C504-00, Rubber-Seated Butterfly Valves.

.9 AWWA C207-01, Steel Pipe Flanges for Waterworks Service, 4 Inch through 144 Inch (100 mm through 3,600 mm)

.10 ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.

.3 ASTM

.1 ASTM Standard F1674, "Standard Test Method for Joint Restraint Products for Use with PVC Pipe.

.4 CSA International

.1 CSA B137.3-02, Rigid PVC Pipe for Pressure Applications

1.4 Submittals

.1 Submit Manufacturer's test data and certification at least two weeks prior to beginning Work in accordance with Section 01300 – Submittals.

.2 PVC pipe submittals:

.1 Submit affidavit of compliance from the pipe manufacturer that materials supplied are in accordance with AWWA C905.

.2 Submit shop drawings of all fabricated fittings.

.3 Submit laying schedule for approval prior to pipe fabrications.

.3 Prestressed Concrete Pressure Pipe Submittals:

.1 Shop Drawings shall show full details of reinforcement, concrete and joint dimensions for the straight pipe, specials and connections. No pipe shall be manufactured until the drawings have been entirely reviewed and accepted by the Contract Administrator.

.2 The data submitted by the Contractor shall include a tabulated laying schedule with reference to the stationing and grade lines shown on the Drawings. This schedule shall show the locations and length of each class of pipe which the Contractor proposes to

furnish, and the point of change from one class to the next shall be clearly indicated by station number. The area of steel per linear metre and such other details as are required shall be listed for each of the pipe classes proposed by the Contractor.

.3 The Contractor shall be responsible for the accurate details, fabrication and fit of the pipe and specials.

.4 The Contractor shall submit to the Contract Administrator for review, design calculations for the determination of the details of the pipe reinforcement prior to the manufacture of any pipe. The Manufacturer of the pipe shall have sufficient data to verify all design strengths.

.5 The Contractor shall provide complete Record Drawings for the pipe, including revised laying schedules, closure lengths for field trimmed pieces or other modifications required for the pipe installation.

.6 An affidavit of compliance signed by an officer of the pipe manufacturing company shall be provided stating that the pipe and fittings comply with this Specification, in accordance with Section 6.3 of AWWA C301-99.

.7 Manufacturing quality records:

.1 Submit the following reports to the Contract Administrator:

.1 Mortar absorption tests

.2 Mortar compressive strength tests

.3 Steel tests

.4 Concrete compressive strength tests

.5 Cylinder pressure tests

.6 Bell and spigot ring dimensional records

.7 Any other quality control records normally documented during manufacture process

.2 Where possible, quality records shall cross reference pipe manufacture by date, and/or pipe serial or mark numbers.

1.5 Measurement and Payment

.1 Supernatant Forcemain:

.1 Supernatant Forcemain installation will be measured on a length basis for each size, type of pipe, method of installation, type of bedding and type of backfill and paid for at the Contract Unit Price per metre for “Supernatant Forcemain”. Length to be paid for

will be the total number of linear metres supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for length of Supernatant Forcemain installed in a trench will be made horizontally at grade above the centreline of pipe through fittings.

.3 No separate measurement will be made for pipe installed with joint restraint harnesses.

.2 Fittings, Specials, Couplings, and Closures:

.1 The supply and installation of fittings and specials shall be measured and paid on a unit basis. The price paid shall be the Contract Unit Price per unit for "Fittings" of each type, class and size, measured as specified herein, which price shall be payment in full for supplying and delivering all fittings, accessories and appurtenances and for performing all operations herein described and all other items incidental to the Work included in this Specification.

.2 No separate measurement will be made for couplings. Costs are to be included in the price bid for “Supernatant Forcemain”.

.3 No measurement will be made for fittings, specials or couplings within valve chambers. Costs are to be included in the price bid for “Valve Chamber Construction”.

.4 No separate measurement will be made for closures, include costs in price bid for “Connection to Aqueduct”.

.3 Installation of Butterfly Valves:

.1 Large diameter butterfly valve installation will not be measured for payment. They are to be included in the price bid for “Valve Chamber Construction”.

.4 Construction of Valve Chambers:

.1 Construction of Valve Chambers shall be measured on a lump sum basis, for each valve chamber constructed in accordance to these specifications. The lump sum price shall include excavation, backfill, cast-in-place concrete works, piles, support beam and piles from the WTP to the valve chamber, hatches, installation of butterfly valves, supply and installation of prestressed concrete chamber piping, supply and installation of miscellaneous valves, appurtenances, miscellaneous metals, couplings, sub drains, interior plumbing, miscellaneous materials and bollards. Chamber piping shall be considered all piping within the chamber, including the piping cast into the chamber walls to 550 mm the outside face of the chamber wall.

.5 Connections to Existing Pipe at the WTP:

.1 Connections to existing stubs will be measure on a lump sum basis, and paid for at the Contract Unit Price for “Connection to Existing 750 mm Piping at WTP”. The lump sum price shall include excavations, backfill, removal of existing flanges, provision of new gaskets and bolts, and corrosion protection of the completed piping connection.

.6 Connection to the Aqueduct:

.1 Connections to the aqueduct will be measure on a lump sum basis, and paid for at the Contract Unit Price for "Supply and Installation of Aqueduct Saddle Connection". The lump sum price shall include all work and materials specified herein and in Section 05500 – Miscellaneous Metals and Aqueduct Saddle Connection necessary for the completion of the connection.

.7 Trench Insulation:

.1 Trench insulation will be measured on a length basis and paid for at the Contract Unit Price for "Trench Insulation". Length to be paid for will be the total length of trench insulation supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement of trench insulation will be made horizontally at grade along the centreline of the insulation.

.8 Flushing, Hydrostatic Leakage Testing and Disinfection:

.1 Flushing, hydrostatic leakage testing and disinfection of Supernatant Forcemain will be included with payment for "Supernatant Forcemain".

.9 Bacteriological Testing:

.1 Bacteriological testing will be paid for by the City.

.10 Bollards:

.1 Bollards will be measured on a unit basis. The number to be paid shall be the total number installed and accepted by the Contract Administrator.

2. PRODUCTS

2.1 Materials

.1 Piping: pipe material, pressure class and coatings where applicable are indicated on the Construction Drawings.

.2 PVC pipe:

.1 PVC DR 25 CIOD to AWWA C905, CSA-B137.3, ASTM D 2241 and NSF 61. All pipes shall be certified by CSA as being made in accordance to their specifications and stamped accordingly with the CSA logo.

.2 Standard laying length: 6m.

.3 PVC fittings: thermally butt welded PVC fitting over-wrapped with fibreglass reinforcing in accordance with AWWA C905 and CSA B137.3. DR to be the same as that specified for pipe. Fittings shall be designed and manufactured with sufficient reinforcing to permit the use of bell joint restraint harnesses at the test pressure.

.4 Quality Assurance:

.1 The Contractor shall provide access to the Contract Administrator or his appointed representative to conduct plant inspections, in accordance to Section 5.3 of AWWA C905. The Contractor shall provide a minimum of 14 calendar days notice of commencement of pipe manufacture, for the purposes of scheduling plant inspections.

.2 The Contract Administrator reserves the right to conduct third party quality control testing.

.3 In addition to the requirements of AWWA C905, Section 5.1.1, dimensional checks shall be carried out for each and every pipe in the production run.

.3 Prestressed Concrete Pressure Pipe:

.1 Prestressed Concrete Pressure Pipe to AWWA C301 embedded cylinder pipe or lined cylinder pipe.

.2 Pipe and fittings shall be design and constructed to withstand the following service conditions:

Commodity	Supernatant
Working Pressure	0 - 140 kPa
Surge Pressure	200 kPa
Test Pressure	350 kPa
Trench	To be considered as positive projecting embankment. Note: installations may be in zones of backfill from previous excavations, refer to the Construction Drawings.
Loading	
Live load	under roadways: CAN/CSA-SA-00 CL-625 highway loading
Dead load – Soils properties	Unit Weight - 1925 kg/m^3 Kμ' = 0.110 in Cover – as indicated on drawings
Bedding	AWWA M9 Type R4

.3 Laying length: standard laying lengths shall be used except as noted below:

.1 Lengths within valve chambers as indicated on the Drawings.

.2 Provide 1.0 m lengths as first pipe outside structures, valve chambers, and the connection to the Aqueduct.

.4 Cement:

.1 Portland Cement shall be CAN/CSA A3000 Type HS Sulphate resistant cement.

.2 Approval in writing is required if the Contractor proposed to use fly ash or pozzolan as a supplementary cementing material in conformance with AWWA Standard C301, Section 4.4.1.

.3 Approval requests should be accompanied by a submission from an independent testing laboratory complete with sampling and testing results of the material conforming to ASTM Standard C311.

.5 Mortar Coating:

.1 External mortar coating shall contain 10% silica fume by weight of cement.

.2 Mortar coating shall be a minimum of 24 mm thick measured from the outside of the high tensile wire.

.3 Notwithstanding AWWA C301-99 4.6.8.3, no individual absorption test may exceed 10% and the average of absorption of test values shall be limited to 8%.

.4 Every effort shall be taken to limit this absorption to 8% as measured in accordance with the ASTM Standard C497. The City will not accept pipe with an absorption rate in excess of 10. No pipe shall be shipped until the absorption results related to the particular shipment have been obtained and are satisfactory.

.6 Bell and Spigot Joint Rings

.1 All bell and spigot joint rings shall be shall be testable, double ‘O’ ring joints.

.7 Fittings

.1 Joint configurations as indicated on the Construction Drawings.

.2 Flanges for fittings shall be AWWA C207 minimum Class B Flanges.

.8 Quality Assurance:

.1 The Contractor shall provide access to the Contract Administrator or his appointed representative to conduct plant inspections, in accordance to Section 5.1 of AWWA C301-99. The Contractor shall provide a minimum of fourteen (14) calendar days notice of commencement of pipe manufacture, for the purposes of scheduling plant inspections.

.2 The Contract Administrator reserves the right to conduct third party quality control testing.

.3 In addition to the requirements of AWWA C301-99 4.6.8.3, mortar tests shall be conducted on a daily basis for the entire production run.

.4 Fittings and special pipe shall be tested in the same manner as pipe except that fittings and special pipe shall be tested for tightness by the dye penetrant method as specified in Section 4.7.2.22 of AWWA Standard C301-99.

.4 Couplings:

.1 Design pressure 1.0 MPa.

.2 AWWA C219 Bolted Sleeve-Type Couplings:

.1 Minimum sleeve length: 250 mm buried applications; 175 mm within structures.

.2 Capable of accommodating up to 3 degrees deflection with out leakage at up to the design pressure.

.3 Bolts and nuts: 316 Stainless Steel.

.4 Coating and Lining: fusion bonded epoxy coated to AWWA C213, and meeting the requirements of ANSI/NSF 61 “Standard for Drinking Water System Components – Health Effects”

.5 Provide insulating boot where connecting to metal pipe.

.3 Grooved end couplings to AWWA C606, gasket EPDM for potable water service. Victaulic Style 44. Bolts and nuts 316 stainless steel.

.4 Victaulic Dependo-Lok Type ExE Type 2, gasket EPDM for potable water service. 316 Stainless steel or ASTM A36 carbon steel lined and coated to AWWA C213. Capable of accommodating up to 3 degrees deflection with out leakage at up to the design pressure.

.5 Joint restraints systems:

.1 Joint restraint systems to CW 2110 and as specified herein.

.2 Joint restrain systems to be rated for pressure equal to or greater than the rated pressure of the pipe. Ratings must include a minimum safety factor of 2 to 1.

.3 Fasteners and restraining rods to be 316 stainless steel.

.4 Coating: fusion bonded epoxy or approved equal.

.5 Acceptable products:

.1 EBBA Iron

.2 Romac Industries

.3 Ford/Uni-Flange

.6 Field applied petrolatum tape and coatings, to AWWA C217. Acceptable products: Polyken, Tec-Wrap or Denso.

.7 Paint:

.1 Paint for exposed metal surfaces shall be in accordance to AWWA C210.

.2 Linings and coatings shall comply with ANSI/NSF 61 "Drinking Water System Components – Heath Effects"

.3 Linings and coatings shall be two (2) or more layers (0.127 mm minimum each coat) polyamide epoxy. Acceptable products: Amerlock 400, Tnemec Series 140F Pota-Pox Plus, Devoe Bar-Rust 233-H or approved equal.

.8 Epoxy Injection Resin:

.1 Kemko 077 epoxy injection resin or approved equal.

.9 Aqueduct Connection Saddle:

.1 Fabricate to Section 05500 – Miscellaneous Metals and Aqueduct Saddle Connection

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2030, except as noted herein.

.2 Pipe bedding and initial backfill shall be sand as specified in Table CW 2030.1.

.3 Backfill over excavations adjacent to structures with cement stabilized fill to provide stable foundation for bedding material.

3.2 Installation

.1 PVC pipe: installation to CW 2110.

.2 Prestressed Concrete Pressure Pipe:

.1 Lay pipes in accordance with AWWA Manual M9 Concrete Pressure Pipe.

.2 Bedding: Type R4 as specified in AWWA M9; minimum thickness 150 mm.

.3 Install pipe within valve chambers. Provide temporary supports for wall pieces during wall casting, and prior to completion of thrust and support blocks.

.4 Install pipe by open trench methods.

.5 Install pipe on reinforced concrete beams where indicated on the Construction Drawings.

.6 Lay pipe and fit together so that when complete, the pipe will have a smooth and uniform invert.

.7 Protect exposed end of the pipe with an approved stopper to prevent foreign matter from entering the pipe. The interior of the pipe shall be kept free of all dirt, concrete or superfluous material as the Work proceeds.

.8 Jointing

.1 Immediately prior to connecting two lengths of concrete pressure pipe, the spigot end of the pipe shall be thoroughly cleaned. Prior to insertion of the rubber gasket in the spigot groove, the spigot grove shall be lubricated with vegetable soap. The gasket shall then be thoroughly cleaned and then lubricated with a vegetable soap approved by the pipe manufacturer. In stretching the gasket, care shall be exercised to maintain a uniform tension or volume of rubber around the whole circumference of the spigot. The bell of the pipe already in place shall be carefully cleaned and lubricated with vegetable soap. The spigot shall then be pushed into the bell and against steel inserts placed between the top of the spigot and the shoulder of the bell to provide a space for inserting the feeler gauge. The entire circumference of the joint shall be gauged to determine that the rubber gasket is in its proper position. If the gasket cannot be felt all around the pipe, the pipe shall be withdrawn and the gasket examined for cuts. If the gasket is undamaged it may be reused, but only after the bell ring and gasket have been lubricated with soap again, as previously specified, before the pipe is re-laid. When it has been determined that the gasket is in its proper position, the steel inserts shall be removed and the pipe pushed completely “home”.

.2 The outer joint of the concrete pipe shall be made using diaper bands approved by the pipe manufacturer and shall be made of burlap or other approved porous material. Diaper bands to hold grout in place shall be used according to the manufacturer’s instructions. Immediately before pouring cement grout, the entire joint shall be thoroughly wetted. A cement grout of one part Sulphate-Resistant cement to two parts sand shall be poured between the diaper and the pipe, to ensure a thorough sealing of the joint around the portion of the pipe covered by the band. Silt, slush, water or polluted mortar grout shall be carefully forced out by the pouring and removed. The upper portion of the joint shall then be filled with mortar and a bead made around the outside of the top half of the pipe joint with a sufficient amount of additional mortar. The completed joints shall immediately be protected from the air, sun or cold with proper coverings and shall be kept protected for such a period as necessary to secure satisfactory curing of the mortar.

No backfilling around joints shall be done until the joints have been fully inspected and accepted by the Contract Administrator.

.3 The inside joint recess of the concrete pipe, sizes 600 mm and larger, shall be completely filled with mortar made from one part cement and one part sand so as to provide a smooth continuous flush surface across the joint. The Contractor shall comply with all requirements and regulations of the Workplace, Safety and Health Division concerning air supply for workers performing operations inside the pipe and any associated costs shall be considered incidental to the installation.

.4 Grouting and diapering of short pipe joints immediately outside of chamber shall be delayed until completion of construction and partial backfill of chamber, to allow maximum differential deflection and settlement prior to final backfill.

.9 Frost Conditions

.1 No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Contract Administrator shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation. Every precaution must be taken to prevent frost from penetrating the ground to depths below the foundations during construction. Any pipe which, in the opinion of the Contract Administrator, shall have been injured through neglect of this provision of the specifications, shall be removed and replaced by the Contractor and at the Contractor's expense.

.2 Heating of the pipe, sand, mortar and gaskets shall commence when the ambient temperature falls below -5°C. The pipe shall be heated throughout with a low heat immediately prior to installation (warm to the touch).

.3 All mortar for joints shall be heated, and heated sand shall be placed around the pipe for the full height of the specified bedding and initial backfill and to at least 600 mm on either side of the joint.

.3 Closures

.1 Closures shall be constructed where noted on the construction drawings. Closure pieces shall be manufactured with additional length of 150 mm to allow for field trimming for final fitment.

.2 Buried pipe closures shall be accurately measured, cut and installed.

.3 All flange and closure assemblies not in valve chambers shall be coated in accordance to AWWA C213 on all exposed metal surfaces. Touch-up trimmed field closures with liquid epoxy in accordance with AWWA C210.

.4 Following the completion of buried flanged or coupled joints prime joint with petrolatum primer. Pack coupler irregularities, around all bolts, sleeves and flanges with profiling mastic in accordance to manufacturers recommendations. Wrap coupler or flange and all exposed steel pipe completely with tape in accordance to AWWA C217.

.5 Buried flanges shall then be coated with a minimum 50 mm thickness of sulphate-resistant cement mortar, reinforced with a light wire mesh approved by the Contract Administrator.

.4 Insulate trenches to City of Winnipeg standard detail SD 018 where noted.

.5 The Contractor shall take every reasonable precaution during construction to prevent debris from entering the supernatant forcemain. If, in the opinion of the Contract Administrator, deleterious substances have entered the supernatant forcemain, the Contractor shall flush the pipeline with sanitized pipeline cleaning equipment. Flushing, as specified in CW 2125, will not be required for the supernatant forcemain.

.6 Thermoplastic pipes shall be installed with continuous copper tracer wire buried 150 mm above the top of the pipe. At each end, and every 120 m tracer wires shall be brought to the surface in 100 mm PVC SDR35 casings topped with cast iron valve box tops to City of Winnipeg standards. Valve box top to be marked "SUP". Locate tracer wire access risers against the outside of valve chamber hatches. A separate tracer wire for the sludge forcemain is not required.

.7 Thrust Restraint:

.1 Supply and install joint restraint harnesses at locations indicated on drawings.

.2 Construct concrete thrust blocks to the details shown on the construction drawings where pipe is installed in virgin ground.

3.3 Valve Chambers

.1 Drain piping as specified in Section 02530 – Sanitary Sewers.

.2 Valves as per Section 15200.

.3 Painting

.1 All exposed metal surfaces including valves, fittings, anchor bolts, flange bolts etc. where not specified to be copper, brass, aluminum or galvanized shall be painted.

.2 Metal surfaces shall be cleaned thoroughly by wire brushing or abrasive blasting.

.3 Paint exposed surfaces in accordance to AWWA C210.

3.4 Connection to Aqueduct

.1 Do not commence connection to the Aqueduct without receiving written approval from the Contract Administrator

.2 Construct connection to Aqueduct as indicated on the Drawings and as specified in Section 05500 – Miscellaneous Metals and Aqueduct Saddle Connection Testing.

.3 Perform hydrostatic leakage testing in accordance with CW 2125 and as indicated herein:

.1 Provide all blind flanges, caps, plugs, temporary thrust restraints and test ports as required to complete hydrostatic leakage testing

.2 Test all supernatant piping from the east branch outside supernatant valve chamber No. 2 to the valve in supernatant valve chamber No. 1.

.3 Test pressure for the supernatant forcemain to be 350 kPa at the lowest point in the pipeline. Test duration shall be two hours.

.4 Allowable Leakage:

.1 Allow for absorption time in prestressed concrete pressure pipe prior to commencing pressure testing.

.2 Allowable leakage will be defined by the formula:

$$L = \frac{ND\sqrt{P}}{130{,}400}$$

Where:

L = allowable leakage, in litres per hour

N = number of joints in the length of pipeline tested

D = nominal diameter of the pipe, in millimetres

P = average test pressure during the leakage test, in kPa

.5 Disinfect supernatant forcemain in accordance with CW 2125.

END OF SECTION

SANITARY SEWERS

1. GENERAL

1.1 Work Included

.1 Construction of new sump drains from supernatant valve chamber No. 1 to the Aqueduct under drain system, and from supernatant valve chamber No. 2 to the RWPS drain tile manhole.

.2 Construction of casing pipes for the installation of watermain and fire main undercrossing of the emergency overflow pipe and Cell 3 outlet pipe.

1.2 References

.1 The following Specifications of the City of Winnipeg Standard Construction Specifications latest edition are applicable to the Work:

.1 Section 02315 – Excavation, Trenching and Backfilling

.2 CW 2130 Gravity Sewers

.3 CW 2160 Concrete Underground Structures and Works

.4 Division 3 Standard Details – Underground Works

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

.5 Division 3 Approved Products for Underground Works

1.3 Measurement and Payment

.1 Measurement and payment for sanitary sewers will be as specified in CW 2130 except as specified herein.

.2 Casing Pipe:

.1 Casing pipe will be measured on a length basis for each size, method of installation, and type of backfill and paid for at the Contract Unit Price per metre for "Supply and Installation of Casing Pipe". Length to be paid for will be the total number of linear metres supplied and installed including all excavation and backfill, watermain piping, casing spacers, and casing end seals, installed in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for length of casing pipe will be made horizontally at grade above the centerline of casing pipe.

2. PRODUCTS

2.1 Materials

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg in the City of Winnipeg Standards Construction Specifications.

.2 Casing pipes shall be PVC SDR 35 as specified in CW 2130.

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2030.

.2 Pipe bedding shall be minimum Class B compacted sand bedding.

.3 Provide minimum Class B compacted Type 3 bedding and pipe surround at connection to aqueduct underdrain.

.4 Provide Class 2 backfill to the underside of parallel or crossing utilities.

3.2 Installation

.1 Installation to CW 2130.

.2 Seals ends of casings intended for future use with 6 mil polyethylene sheeting and 20 mm plywood. Provide 50 x 250 planks extending from invert of casings to ground line to mark location.

END OF SECTION

SEWAGE FORCEMAINS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of 150 mm sludge forcemain from main WTP to station 1+66.678.

1.2 References

.1 Section 02315 Excavation, Trenching and Backfilling

.2 The following specifications of the City of Winnipeg Standard Construction Specifications latest edition are applicable to the Work:

.1 CW 2110 - Watermains

.2 CW 2160 Concrete Underground Structures and Works

.3 Division 3 Standard Details – Underground Works

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

.4 Division 3 Approved Products for Underground Works

1.3 Standards

.1 Work and materials to be in accordance with the following standards.

.1 ANSI/AWWA

.1 AWWA C605, Underground Installation of PVC Pressure Pipe and Fittings for Water.

.2 AWWA C900, PVC Pressure Pipe and Fabricated Fittings, 4 in. Through 12 in. (100 mm through 300 mm), for Water Distribution.

.3 AWWA C907, PVC Pressure Pipe and Fittings for Water

.4 AWWA C200-97, Steel Water Pipe - 6 in (150 mm) and Larger

.5 AWWA M11, Steel Pipe - A Guide for Design and Installation.

.6 AWWA C207-01, Steel Pipe Flanges for Waterworks Service, 4 Inch through 144 Inch (100 mm through 3,600 mm)

.2 ASTM

.1 ASTM Standard F1674, "Standard Test Method for Joint Restraint Products for Use with PVC Pipe.

1.4 Submittals

.1 Submit Manufacturer's test data and certification at least two weeks prior to beginning Work in accordance with Section 01300 – Submittals.

1.5 Measurement and Payment

.1 Sludge Forcemain

.1 Sludge Forcemain installation will be measured on a length basis for each size, type of pipe, method of installation, type of bedding and type of backfill and paid for at the Contract Unit Price per metre for “Sludge Forcemain”. Length to be paid for will be the total number of linear metres supplied and installed in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for length of Sludge Forcemain installed in a trench will be made horizontally at grade above the centerline of pipe through fittings.

.3 No separate measurement will be made for pipe installed with joint restraint harnesses.

.2 Fittings, and Couplings

.1 The supply and installation of fittings shall be measured and paid on a unit basis. The price paid shall be the Contract Unit Price per unit for "Fittings" of each type, class and size, measured as specified herein, which price shall be payment in full for supplying and delivering all fittings, accessories and appurtenances and for performing all operations herein described and all other items incidental to the Work included in this Specification.

.2 No separate measurement will be made for couplings. Costs are to be included in the price bid for “Sludge Forcemain”.

.3 Connections to Existing Pipe at the WTP

.1 Connections to existing stubs will be measure on a lump sum basis, and paid for at the Contract Unit Price for “Connection to Existing 150 mm Piping at WTP”. The lump sum price shall include excavations, backfill, removal of existing flanges, provision of new gaskets and bolts, and corrosion protection of the completed piping connection.

.4 Flushing, Hydrostatic and Leakage Testing

.1 Flushing and hydrostatic leakage testing of Sludge Forcemain will be included with payment for "Sludge Forcemain".

2. PRODUCTS

2.1 Materials

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg in the City of Winnipeg Standards Construction Specifications except as noted herein.

.2 Piping: pipe material, pressure class and coatings where applicable are indicated on the Construction Drawings.

.3 PVC pipe: to the requirements of CW 2110.

.4 Steel Pipe:

.1 Steel water pipe: Black carbon steel, ASTM A106, Grade B seamless or ASTM A53, Grade B, seamless or ERW. Wall thickness: Schedule 40. Flanged joints.

.2 Lining and Coating: Shop-Applied Liquid Epoxy Apply in strict accordance with manufacturer's instructions and requirements of AWWA C210:

.1 3 coats, 0.08 mm minimum dry film thickness per coat

.3 Flanges: AWWA C207, Class D, slip-on. Supply and install flat-faced flanges when mating with flat-faced valves and fittings.

.4 Pipe fittings: to AWWA C208, linings and coatings as specified above.

.5 Flexible couplings at connections to structures shall conform to City of Winnipeg Standard AT-4.1.1.65.

.6 Joint restraints systems:

.1 Joint restraint systems to CW 2110 and as specified herein:

.2 Joint restrain systems to be rated for pressure equal to or greater than the rated pressure of the pipe. Ratings must include a minimum safety factor of 2 to 1.

.3 Fasteners and restraining rods to be 316 stainless steel.

.4 Coating: fusion bonded epoxy or approved equal.

.5 Acceptable products:

.1 EBBA Iron

.2 Romac Industries

.3 Ford/Uni-Flange

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2110.

.2 Pipe bedding and initial backfill shall be Type 2 material as specified in Table CW 2030.1.

3.2 Installation

.1 Installation to CW 2110.

.2 Thrust Restraint:

.1 Supply and install joint restraint harnesses at locations indicated on drawings.

.2 Construct concrete thrust blocks to CW 2110 where pipe is installed in virgin ground.

3.3 Testing

.1 Perform hydrostatic leakage testing in accordance with CW 2125 and as indicated herein:

.1 Test sludge forcemain from the connection point of PVC C900 piping to steel piping at the support beam adjacent to supernatant valve chamber No. 2 to the terminus of piping at station 1+66.678.

.2 Test pressure for the sludge forcemain to be 1.0 MPa at the lowest point in the pipeline.

.2 Disinfection of sludge forcemain is not required.

END OF SECTION

GRAVITY SEWERS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of 2,134 mm diameter WTP overflow and land drainage trunk sewer by open trench and trenchless methods, from the main WTP building to the existing 1,524 mm diameter Deacon drain.

1.2 References

.1 CW 2130 Gravity Sewers

.2 CW 2160 Concrete Underground Structures and Works.

.3 Division 3 Standard Details – Underground Works:

.1 SD-001 Standard Pipe Bedding

.2 SD-002 Standard Trench and Excavation Backfill

.3 Division 3 Approved Products for Underground Works

.4 ASTM:

.1 ASTM C14M, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).

.2 ASTM C76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).

.3 ASTM C443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

.5 CSA International:

.1 CAN/CSA-A257 Series, Standards for Concrete Pipe.

.2 CSA B1800, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.1 CSA B182.2, PVC Sewer Pipe and Fittings (PSM Type).

.2 CSA B182.4, Profile PVC Sewer Pipe and Fittings.

.3 CSA B182.11-, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 01300 - Submittals.

.2 Submit proposed method of installation and sequencing for under-crossings.

.3 Submit Shop Drawings for excavation shoring in accordance with CW 2030. Shoring shall be designed and stamped by a Professional Engineer experienced in shoring design and licensed to practice in Province of Manitoba.

.4 Submit Shop Drawings for reinforced concrete pipe layout. Shop drawings shall include laying schedule, indicating standard and non-standard pipe lengths and special fittings required to conform to geometry shown on the Drawings.

.5 Where reinforced concrete pipe design is carried out by direct design methods the Contractor shall make a Shop Drawing submission (stamped with the seal of a Professional Engineer) in accordance with Section 01300 – Submittals summarizing all structural analysis and pipe wall design for each unique design section, at least two (2) weeks prior to beginning Work.

.6 Submit samples in accordance with Section 01300 - Submittals.

.7 Submit manufacturer's test data and certification at least two (2) weeks prior to beginning Work.

.8 Submit to Contract Administrator copy of manufacturer's installation instructions.

2. PRODUCTS

2.1 Materials

.1 Concrete pipe:

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: http://www.winnipeg.ca/matmgt/spec/ except as noted herein.

.2 Reinforced circular concrete pipe and fittings: to CAN/CSA-A257 and ASTM C76M, strength classification as indicated on the Drawings.

.3 Notwithstanding the pipe classes noted on the Construction Drawings the Contractor may elect to have the reinforced concrete pipe designed by direct design methods in accordance with the ASCE Standard Practice for Concrete Pipe Design (SIDD). Where direct design methods are employed the following minimum design requirements shall apply:

.1 Arching coefficients and earth pressure distribution shall be based on a Type 2 Standard installation with positive projection embankment.

.2 Minimum soil density shall be 1920 kg/m^3.

.3 Ground elevation used for design shall be as follows:

.1 238.0 from station 0+999.8 to station 1+070.10.

.2 238.5 from station 1+070.10 to station 1+209.51.

.4 Wall thickness shall conform to ASTM C76 for either a Wall B or Wall C.

.5 Concrete strength and reinforcing steel requirements shall be determined for each section based on the greatest height of cover in that section. The design shall not further be broken down between the sections listed below:

.1 From connection to existing sewer to the first joint immediately downstream of the vertical bend for the Cell 3 Outlet siphon.

.2 Cell 3 Outlet siphon.

.3 From the first joint immediately upstream of the vertical bend for the Cell 3 Outlet siphon to the connection with the WTP overflow.

.6 Minimum live loading requirements shall be based on the equivalent live load due to an AASHTO HS20 design vehicle.

.7 All pipe and fittings shall be designed and constructed to withstand maximum design surface water geodetic elevation of 236.0 m.

.8 Under no circumstances shall the design cross section be less than required to facilitate installation by jacking methods.

.4 Pipe 900 mm in diameter and larger installed by jacking shall be supplied complete with a steel banding plate around the bell end of the pipe. The banding plate shall be manufactured with 14 gauge steel and shall have a width 1.5 times the length of the bell end groove or approved equal.

.2 Plastic Pipe

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: http://www.winnipeg.ca/matmgt/spec/ except as noted herein.

.2 Type PSM PVC: to ASTM D3034 and CSA-B182.2.

.1 Standard Dimensional Ratio (SDR): 35.

.3 Pipe Bedding and Initial Backfill

.1 Pipe bedding and initial backfill shall be sand bedding material as specified in Table CW 2030.1.

.4 Backfill Material

.1 Granular backfill to Table CW 2030.1 Type 1 material.

.2 Cement Stabilized Fill to Table CW 2160.1

.5 Joint Mortar

.1 Portland cement: to CAN/CSA-A3000, Type HS.

.2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2030.

.2 Supply and install excavation shoring adjacent to the Cell 3 outlet pipe.

.3 Supply and install foundation material in shafts for trenchless installations in accordance with CW 2030 Clause 3.7.

.4 All WTP overflow piping shall be Class II backfill to CW 2030.

.5 Advise Contract Administrator if unsuitable foundation or trench wall conditions are encountered. Replace unsuitable material with Type I granular material compacted to Class II standards.

3.2 Trenchless Installation

.1 Trenchless installations under existing pipes shall be installed by jacking methods.

.2 Pipe jacking shall be completed in a manner that minimizes ground movement.

.3 Monitor crossing utilities constantly during construction. Report movement in excess of 3 mm to the Contract Administrator.

.4 Excavation face shall not proceed more than 300 mm in advance of pipe face.

.5 Annulus around pipeline shall not exceed 25 mm.

3.3 Installation in a Trench

.1 Installation to CW 2130.

.2 Backfill parallel mains and crossing mains to invert of the higher pipe to CW 2030 Class 2 standards.

3.4 Field Closures

.1 Confirm dimensions and configuration of existing bell and spigot joints prior to construction.

.2 At field closures, accurately cut pipe to required length and geometry as shown on the Drawings. Where assembling adjoining pipes, cut pipe to required length minus bell depth plus 25 mm to permit assembly.

.3 Assemble pipes to line and grade.

.4 Install formwork, reinforcing and concrete collars in accordance with CW 2160.

.5 Grout interior joints smooth.

3.5 Field Testing

.1 Inspection

.1 The Contractor shall afford the Contract Administrator every facility to access and inspect all Plant to be provided, work to be performed, Materials to be supplied and equipment or machinery to be installed.

.2 Line and Grade

.1 The pipe shall be installed to the line and grade shown on the Drawings and as set in the field by the Contract Administrator. Vertical variance from grade shall not exceed 25 mm and horizontal variance from line shall not exceed 100 mm. Tees and bends shall be installed to the grades and at the locations shown on the Drawings or where required to connect to existing pipelines.

.3 Joint Testing

.1 Acceptance testing to confirm the hydrostatic integrity of the joints of the installed pipe shall be carried out by testing each individual joint with an approved testing device in accordance with ASTM C1103, except the test duration shall be 20 seconds. The joint tester shall be an Air-Loc Cherne Joint Tester or approved equal. Acceptance testing shall be to confirm acceptable joint behaviour at 90 kPa (13 psi) of applied internal pressure and shall be completed once the pipe has been backfilled to the final grade.

.4 Video Inspection:

.1 In accordance to CW 2130 Clause 3.25 and CW 2145.

4. METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 Supply and Installation of 2134 Sewer in a Trench

.1 Supply and installation of 2134 sewer in a trench shall be in accordance with CW 2130. Cost for relocation of existing catch basins, catch basin leads, removal of existing 1524 sewer piping, coring and connection of 100 drain, provision of temporary access road, restoration of existing gravel roadway and provision of temporary support for crossing utilities shall be included in the price for supply and installation of 2134 sewer.

4.2 Supply and Installation of 2134 Sewer by Trenchless Methods

.1 Supply and installation of 2134 sewer by trenchless methods from station 1+046.67 to station 1+070.10 shall be in accordance with CW 2130. Cost for excavating tunnelling shaft, installation of shoring, and temporary support of crossing utilities shall be included in the price for supply and installation of 2134 sewer.

4.3 Supply and Installation of Sewer Fittings

.1 Supply and installation of pre-cast sewer fittings shall be included in the price for supply and installation of 2134 sewer.

.2 Supply and installation of cast-in-place fittings shall be on a measured for payment on a unit basis and shall be paid for at the Contract Unit Price for "Supply and Installation of Cast-in-Place Sewer Fittings." The price shall be payment for supply and installation of each type in accordance with this Specification, accepted and measured by the Contract Administrator. Payment will be in addition to the payment measured and paid for "Land Drainage Sewers."

.3 Supply and installation of field closures shall be included in the price for supply and installation of 2134 sewer.

4.4 Supply and Installation of Granular Backfill

.1 Supply and installation of granular backfill shall be measured for payment on a volume basis and shall be paid for at the Contract Unit Price for "Supply and Installation of Granular Backfill." The price shall be payment for removal of unsuitable site material and supply and installation of granular backfill.

END OF SECTION

CONCRETE FORMWORK

1. GENERAL

1.1 Work Included

.1 Forms for all concrete and supporting falsework including design.

.2 Wood or steel forms for all cast-in-place concrete.

.3 Void forms between structural elements and soil below.

.4 Shoring, bracing, and anchorage.

.5 Form openings for other trades.

.6 Coordinate installation of concrete accessories.

.7 Set anchor bolts, anchors, sleeves, frames, and other items supplied by other trades.

.8 Clean erected formwork prior to concrete placement.

.9 Remove forms and supporting falsework.

1.2 Design Standards

.1 Design and detail forms and supporting falsework in accordance with the NBC, CSA Standards CAN/CSA-A23.1-00, CSA S269.1, CAN/CSA S269-3, ACI 347R, and applicable construction safety regulations.

.2 Design to be done by a Professional Engineer, registered in the Province of Manitoba.

1.3 Quality Assurance

.1 Construct and erect concrete formwork in accordance with CAN/CSA-A23.1-00, CAN/CSA S269.3, ACI 347R, and all applicable construction safety regulations for the place of Work.

1.4 Shop Drawings

.1 Submit shop drawings in accordance with Section 01300 – Submittals.

.2 Clearly indicate sizes, methods of construction, materials, arrangement of joints, ties and shores, location and size of falsework, schedule of erection, and stripping, reshoring, etc.

.3 For void form indicate thickness, crushing load, method for moisture protection, and method to ensure collapse after concrete achieves design strength.

.4 Shop Drawings and design briefs are to bear the seal of a Professional Engineer, registered in the Province of Manitoba.

.5 Formwork, falsework, and reshoring are to be reviewed by the same Professional Engineer prior to each concrete pour.

.6 Professional Engineer to report, in writing, that reviewed formwork, falsework, and reshoring are in accordance with the design prior to each concrete pour.

1.5 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various items of work as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Exposed Surfaces

.1 Square-edged, smooth surfaced panels true in plane, free of holes, surface markings, or defects.

2.2 Unexposed Surfaces

.1 Square-edged T&G lumber, plywood or other material, suitable to retain concrete without leakage or distortion.

2.3 Wood Materials

.1 Plywood: Douglas Fir, conforming to CSA O121-M solid one side, sheathing grade. Sound undamaged sheets with clean true edges.

.2 Lumber: conforming to CSA O141-M.

.3 Nails, spikes, and staples: galvanized; conforming to CSA B111.

2.4 Prefabricated Forms

.1 Steel type: minimum 1.6 mm steel thickness; well matched, tight fitting, and adequately stiffened to support weight of concrete without deflection detrimental to structural tolerances and appearance of finished concrete surface.

.2 Void forms: moisture-resistant treated paper faces; bio-degradable, structurally sufficient to support weight of wet concrete mix and construction loads until initial set under structurally supported slabs, walls, and beams where indicated on the Drawings. Protection shall be one (1) layer of 12.7 mm thick spruce plywood sheeting.

2.5 Accessories

.1 Form ties: removable snap-off metal type, galvanized, fixed length, minimum working strength of 13 kN when assembled. For non-water retaining structures use minimum 25 mm deep plastic cone snap type or screw type on exposed surfaces. Wire ties are not permitted.

.2 Form release agent: colourless mineral oil which will not stain concrete or impair natural bonding or colour characteristics of coating intended for use on concrete.

.3 Corner or chamfer fillets: mill finished pine, widths as indicated on the Drawings, maximum possible lengths, mitre ends.

.4 Reglets: mill finished pine, shaped to required cross-section, maximum possible lengths, mitre ends.

.5 Sealing tape: reinforced, self-adhesive, waterproof kraft.

3. EXECUTION

3.1 Examination

.1 Before starting this Work, examine Work done by others which affects this Work.

.2 Notify the Contract Administrator of any conditions which would prejudice proper completion of this Work.

.3 Commencement of Work implies acceptance of existing conditions.

3.2 Erection

.1 Verify lines, levels, and centres before proceeding with formwork. Ensure dimensions agree with Drawings.

.2 Construct formwork and falsework to meet design and regulatory requirements, and to produce finished concrete conforming to surfaces, shapes, lines, and dimensions indicated on Drawings.

.3 Arrange and assemble formwork to permit removal without damage to concrete.

.4 Align joints and make watertight to prevent leakage of cement paste and disfiguration of concrete. Keep form joints to a minimum. Tape as necessary.

.5 Arrange forms to allow removal without removal of principal shores, where these are required to remain in place.

.6 Obtain Contract Administrator's acceptance before framing openings in concrete slabs, walls, and beams not indicated on Drawings.

.7 Provide falsework to ensure stability of formwork. Brace or strengthen all previously constructed parts liable to be overstressed by construction loads.

.8 Position form joints to suit any expressed lines required in exposed concrete.

.9 Provide chamfer on all internal and external corners and edges, vertical and horizontal, of exposed concrete unless shown otherwise.

.10 Form chases, slots, openings, drips, and recesses as detailed on Drawings.

.11 Set screeds with top edge level to required elevations.

.12 Check and readjust formwork to required lines and levels during placing of concrete.

.13 Locate construction joints for beams and suspended slabs where shown or noted on the Drawings.

.14 Provide reveals or reglets on construction joints as shown on the Drawings.

3.3 Void Form

.1 Void forms shall be placed on prepared surfaces of levelling sand so that the top of the void forms present flat forming surfaces.

.2 Protect void form from wetting from fresh concrete and moisture from ground as per manufacturer's instructions.

.3 Ensure collapse of void form after concrete has achieved design strength.

3.4 Tolerance

.1 Construct formwork to produce concrete with dimensions, lines, and levels within tolerances specified in ACI 347R, Guide to Formwork for Concrete, or as shown on the Drawings; the most stringent requirements shall apply.

3.5 Inserts/Embedded Items/Openings

.1 Provide formed openings where required for pipes, conduits, sleeves, and other Work to be embedded in and passing through concrete members.

.2 Accurately locate and set in place items which are to be cast directly into concrete.

.3 Coordinate Work of other Sections and cooperate with trades involved in forming openings, slots, recesses, chases, and setting sleeves, bolts, anchors, and other inserts.

.4 Coordinate installation of concrete accessories specified in Section 03250 – Concrete Accessories.

.5 Provide temporary ports or openings in formwork where required to facilitate cleaning and construction review. Locate openings at bottom of forms to allow flushing water to drain.

.6 Close temporary ports or openings with tight fitting panels, flush with inside face of forms, neatly fitted so no leakage occurs, and to provide uniform surface on exposed concrete.

3.6 Field Quality Control

.1 Inspect and check complete formwork, falsework, shoring, and bracing to ensure that Work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and parts are secure. Submit written report from Professional Engineer responsible for this work as specified in Clause 1.4 Shop Drawings.

.2 Inform Contract Administrator when formwork is complete and has been cleaned, to allow for review. Contract Administrator's review will be for verification that forms are clean and free from debris.

.3 Allow Contract Administrator to review each section of formwork prior to re-use. Formwork may be re-used if acceptable to the Contract Administrator.

3.7 Cleaning

.1 Clean forms to remove foreign matter as erection proceeds. Remove cuttings, shavings, and debris from within forms. Flush completely with water to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

.2 During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out completed forms, unless formwork and concrete construction proceed within a heated enclosure. Use compressed air or other means to remove foreign matter.

3.8 Formwork Preparation

.1 Apply form release agent in accordance with Manufacturer's recommendations, prior to placing reinforcing steel, anchoring devices, and embedded parts.

.2 Do not apply form release agent where concrete surfaces are to receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces moist prior to placing concrete.

3.9 Form Removal

.1 Notify Contract Administrator prior to removing formwork.

.2 Do not remove forms and falsework until concrete has gained sufficient strength to carry its own weight plus construction and design loads that are liable to be imposed. Verify strength of concrete by compression tests to satisfaction of Contract Administrator.

.3 Forms shall remain in place a minimum of two (2) calendar days and the concrete shall have attained 75% of design strength verified by field cured test cylinders.

.4 Remove falsework progressively, in accordance with regulatory requirements and ensure that no shock loads or imbalanced loads are imposed on structure.

.5 Loosen forms carefully without damaging concrete surfaces. Do not apply tools to exposed concrete surfaces.

.6 If forms are left loosely in place for protection until curing requirements are complete, ensure all concrete surfaces are kept continuously wet with use of soaker hoses. Otherwise remove forms and start wet cure immediately by use of soaker hoses or accepted curing compound.

3.10 Reshoring

.1 If reshoring is required, prepare and submit a schedule to Contract Administrator for review.

.2 Reshore structural members where required due to design requirements or construction conditions under the direction of the Professional Engineer responsible for this work.

.3 Install reshoring as required to permit progressive construction.

END OF SECTION

CONCRETE REINFORCEMENT

1. GENERAL

1.1 Work Included

.1 Reinforcing steel bars for cast-in-place concrete complete with tie wire.

.2 Support chairs, bolsters, bar supports, and spacers for reinforcing.

1.2 Quality Assurance

.1 Perform concrete reinforcing Work in accordance with CSA Standard CAN/CSA-A23.1-00.

1.3 Inspection and Testing

.1 If requested by Contract Administrator, submit three (3) certified copies of mill test report of reinforcement supplied, indicating physical and chemical analysis.

1.4 Shop Drawings

.1 Submit Shop Drawings in accordance with Section 01300 – Submittals.

.2 Clearly indicate bar sizes, spacings, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices.

.3 Drawings and details to conform to CAN/CSA-A23.1-00, CAN/CSA-A23.3, and RSIC Reinforcing Steel Manual of Standard Practice.

.4 Detail placement of reinforcing where special conditions occur.

.5 Detail lap lengths and bar development lengths to CAN/CSA-A23.1-00, unless otherwise shown on the Drawings.

1.5 Delivery and Storage

.1 Deliver, handle, and store reinforcement in a manner to prevent damage and contamination.

.2 Deliver bars in bundles, clearly identified in relation to bar lists.

1.6 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various items of work as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Reinforcing Materials

.1 Reinforcing steel: minimum 400 MPa yield grade; deformed billet steel bars conforming to CAN/CSA-G30.18; plain finish.

.2 Welded steel wire fabric: plain type, conforming to ASTM A185; flat sheets; plain finish.

2.2 Accessory Materials

.1 Tie wire: minimum 1.6 mm annealed type, or patented system accepted by Contract Administrator.

.2 Chairs, bolsters, bar supports, spacers: adequately sized for strength and support of reinforcing steel during construction.

.3 Bar chairs for exposed surfaces: to be non-corrosive PVC chairs or concrete chairs purpose made. Steel bar chairs, galvanized bar chairs, concrete bricks, broken concrete blocks, or wood supports are not acceptable.

.4 Bar chairs for non-exposed surfaces: broken concrete blocks, stones, and wood supports are not acceptable.

3. EXECUTION

3.1 Fabrication

.1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1-00 and Drawings.

.2 Locate reinforcing splices not indicated on Drawings at points of minimum stress.

.3 Fabricate within the following tolerances:

.1 Sheared length: plus 0, minus 25 mm.

.2 Stirrups, ties, and spirals: plus 0, minus 10 mm.

.3 Other bends: plus 0, minus 25 mm.

.4 All bending shall be done cold with a suitable machine accurately producing all lengths, depths, and radii shown on the bending details.

.5 After initial fabrication, reinforcing steel shall not be rebent or straightened unless so indicated on the Drawings.

.6 Heating of reinforcing steel will not be permitted.

3.2 Installation

.1 Place reinforcing steel in accordance with reviewed Shop Drawings and CAN/CSA-A23.1-00. Chair slab reinforcing not further apart than 1.2 m in either direction. Tie reinforcing steel at maximum spacing 600 mm.

.2 Adequately support reinforcing and secure against displacement within tolerances permitted.

.3 Place reinforcing steel to provide concrete cover required by CAN/CSA-A23.1-00, but not less than shown on Drawing Concrete Notes.

.4 Maintain alignment as follows:

.1 Slabs: ± 5 mm.

.2 Other structural members: ± 10 mm.

.3 Rebar bends and ends: ± 50 mm.

.5 Do not disturb or damage polyethylene film or void form while placing reinforcing steel.

.6 Install purpose made highly visible protective safety caps on all exposed projecting bar ends to the satisfaction of the Contract Administrator.

3.3 Cleaning

.1 Ensure concrete reinforcing is clean and free from oil and deleterious matter.

.2 Remove all loose scale, loose rust, concrete from prior pours, and other deleterious matter from surfaces of reinforcing prior to next adjacent concrete pour.

.3 Remove concrete splatter on bars before concrete has hardened.

END OF SECTION

CONCRETE ACCESSORIES

1. GENERAL

1.1 Work Included

.1 Joint Sealants.

.2 Expansive Waterstop.

.3 Joint Filler.

.4 Non-ferrous Grout.

.5 Latex Patching Agent.

.6 Epoxy Bonding Agent.

.7 Curing Compound.

.8 Moisture Retention Film.

.9 Fasteners.

1.2 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various items of work as listed in the Schedule of Prices.

2. PRODUCTS

2.1 General

.1 All materials shall be subject to the acceptance of the Contract Administrator.

2.2 Materials

.1 Joint Sealants:

.1 Sealants for all joints shall be non-sag two-part polysulphide, acceptable product Thiokol 2235M by PolySpec.

.2 Use compatible primer as per sealant Manufacturer's requirements.

.2 Expansive waterstop: acceptable products are SikaSwell S Sealant by Sika and CS-231 Controlled Expansion Waterstop by ConSeal Concrete Sealants.

.3 Joint filler: rigid closed cell foam, CPD PVC Closed Cell Joint Filler.

.4 Non-ferrous grout: pre-mixed, non-shrink, Master Builders 713, Sika M-Bed, CPD Non-Shrink Grout, Steel C1 Grout, Grace In-Pakt Grout, minimum 35 MPa compressive strength.

.5 Latex patching agent: Acrl Stix, Daraweld-C Latex Bonding Agent.

.6 Epoxy bonding agent: Master Builders Concresive 1001 LPL, Dural Duralbond, Sikadur 32 HI-bond.

.7 Curing compound: conforming to ASTM C309.

.8 Moisture retention film: Master Builders Confilm.

.9 Fasteners: fasteners (all nuts, bolts, washers, screws, etc.) stainless steel for all aluminum items, conforming to ASTM 304 or 316, sizes and locations as required by item manufacturer.

2.3 Shop Drawings

.1 Submit shop drawings in accordance with Section 01300 – Submittals.

.2 Submit product information for review for materials to be incorporated into the Work.

3. EXECUTION

3.1 Installation

.1 Coordinate Work of this Section with other construction.

.2 Install all concrete accessories in accordance with Drawings and Manufacturer's recommendations and ensure compatibility. Install straight, level, and plumb.

.3 Ensure items are not disturbed during concrete placement.

.4 Curing and sealing compounds are to be used for curing purposes of all concrete where practical or compatible with finishes.

.5 Joint sealant shall be applied per manufacturer’s instructions. If joint surfaces are damp, dry the joint surfaces and apply primer as recommended by Manufacturer.

.6 Expansive waterstop: apply to clean surfaces in uniform continuous beads per manufacturer’s instructions.

.7 Latex patching agent is to be used for patching formed concrete surfaces where required.

.8 Epoxy bonding agent is to be used to bond new concrete to existing concrete surfaces.

.9 Moisture retention film is to be used during hot windy weather conditions to prevent moisture loss immediately after concrete placement; apply per Manufacturer's instructions.

END OF SECTION

CAST-IN-PLACE CONCRETE

1. GENERAL

1.1 Work Included

.1 All reinforced cast-in-place concrete shown on the Drawings.

.2 Setting anchors, inserts, frames, sleeves, and other items supplied by other Sections.

.3 Repairing concrete imperfections.

.4 Finishing formed concrete surfaces.

.5 Finishing concrete slab surfaces.

.6 Curing of concrete.

1.2 Quality Assurance

.1 Cast-in-place concrete shall conform to the CAN/CSA-A23.1-00.

.2 Testing shall conform to CAN/CSA-A23.2-00.

.3 These standards shall be available in the Contractor's Site office for the use of the Contractor, sub-trades, and Contract Administrator.

.4 A Concrete Pour Release Form shall be completed prior to each concrete pour. The Contractor shall be responsible for completing the forms. Each form shall be signed by the Contractor and Contract Administrator prior to each pour.

1.3 Qualification

.1 Concrete flatwork finishing is to be done by an established firm having at least five (5) years of proven, satisfactory experience in this trade and employing skilled personnel.

.2 Submit proof of qualifications in writing to the Contract Administrator.

1.4 Inspection & Testing

.1 Notify the Contract Administrator at least forty eight (48) hours before complete formwork and concrete reinforcement is ready for review. Reinforcing in walls shall be reviewed prior to closing forms.

.2 Allow ample time for notification, review, and corrective Work, if required, before scheduling concrete placement.

.3 Concrete sampling, inspection, and testing is to be performed by a CSA certified inspection and testing firm appointed and paid for by the City.

.4 Provide unencumbered access to all portions of Work and cooperate with appointed firm.

.5 Submit proposed mix design statements for each class of concrete to the Contract Administrator for review ten (10) Business Days prior to commencement of the Work. If blended cement is proposed for sulphate resistant concrete, testing data supporting conformance to CSA-A3000 shall be submitted with the mix design statement

.6 Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.

.7 Notify the Contract Administrator at least twenty four (24) hours in advance of any concrete placement.

.8 At least three (3) concrete test cylinders will be taken for every seventy five (75) or less m^3 of each class of concrete placed.

.9 At least three (3) test cylinders will be taken daily for each class of concrete placed.

.10 One (1) slump test and one (1) air content test will be taken for each set of test cylinders taken.

.11 Additional slump and air content tests may be taken as necessary (up to every truck) to verify quality of concrete at the discretion of the Contract Administrator.

.12 Testing of concrete will be performed in accordance with CAN/CSA-A23.2-00. Test results will be issued to the Contractor, the Contract Administrator, and the City.

.13 The Contractor shall pay costs for required retesting due to defective materials or workmanship.

.14 If accepted by the Contract Administrator, the Contractor may arrange and pay for additional tests for use as evidence to expedite construction.

.15 To conform to the strength requirements, the average of all tests shall exceed the specified strength. When three (3) or more tests of the same class of concrete are available, the average of any three (3) consecutive tests shall be equal to, or greater than the specified strength, and no strength test shall fall more than 3.5 MPa below the specified strength. If any of the criteria of the above clause are not met, the Contract Administrator shall have the right to require one or more of the following:

.1 Changes in mix proportions for the remainder of the Work.

.2 Cores drilled and tested from the areas in question as directed by the Contract Administrator and in accordance with CAN/CSA-A23.2-00. The test results shall be indicative of the strength of the in-place concrete.

.3 Load testing of the structural elements.

.4 The changes in the mix proportions, cores drilled and tested, and load testing shall be at the Contractor's expense.

.5 Concrete failing to meet the strength requirements of this Specification shall be strengthened or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator.

1.5 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various items of work as listed in the Schedule of Prices.

2. PRODUCTS

2.1 General

.1 All materials in concrete mixes shall be compatible.

2.2 Concrete Materials

.1 Cement: sulphate resistant Normal Type 50 Portland Cement or HSb conforming to CSA-A3000. When HSb is proposed, submit supporting testing data showing conformance to CSA-A3000 satisfactory to the Contract Administrator.

.2 Fine aggregate: conforming to Normal-Density Fine Aggregate, CAN/CSA-23.1-00. If requested by the Contract Administrator, submit evidence at least two (2) weeks before use in concrete mix showing conformance to Normal-Density Fine Aggregate, CAN/CSA-A23.1-00, Table 4 and Table 6.

.3 Coarse aggregate: conforming to Normal-Density Coarse Aggregate, CAN/CSA-23.1-00, Group I, 40-5 mm, 20-5 mm, and 10 to 2.5 mm. If requested by the Contract Administrator, submit evidence at least two (2) weeks before use in concrete mix showing conformance to Normal-Density Coarse Aggregate, CAN/CSA-A23.1-00, Table 5 and Table 6. Group II may be used for special requirements such as gap grading, pumping, or for blending two (2) or more sizes to produce Group I gradings.

.4 Ensure that no aggregates are used that may undergo volume change due to alkali reactivity, moisture retention, or other causes. Confirm suitability of aggregate with a petrographic analysis if deemed necessary by the Contract Administrator.

.5 Water: potable, clean, and free from injurious amounts of oil, alkali, organic matter, or other deleterious matter.

.6 Materials are to be obtained from the same source of supply or Manufacturer for the duration of the project.

.7 Supplementary cementing materials: conforming to CSA-A23.5.

2.3 Admixtures

.1 No admixtures other than air-entraining agent, water-reducing agent, and superplasticizer shall be used without the written authorization of the Contract Administrator, unless specified.

.2 Air entrainment: conforming to ASTM Standard C260.

.3 Water-reducing agent: Type WN conforming to ASTM Standard C494.

.4 Superplacticizer: conforming to ASTM Standard C494.

.5 General chemical admixtures: conforming to ASTM Standard C494.

.6 Calcium chloride or admixtures containing calcium chloride shall not be used in concrete.

2.4 Accessories

.1 For accessories refer to Section 03250 – Concrete Accessories.

2.5 Concrete Mixes

.1 Pay all costs for mix design. Submit mix designs to the Contract Administrator for review a minimum of ten (10) Business Days prior to concrete pour.

.2 Provide concrete mixed in accordance with requirements of CAN/CSA-A23.1-00 and as indicated on the Drawings. The Drawing requirements shall govern where there is a difference between the Drawings and CAN/CSA-A23.1-00, Tables 6 to 10 requirements.

.3 Maximum allowable substitution of cement with supplementary cementing materials shall be 20% by weight except that blended cements may contain the amount of supplementary cementing materials as required for the intended purpose such as sulphate resistance. Blended cements shall be used as blended by the Manufacturer without additional substitution of cement with supplementary cementing materials unless the resulting blend is supported with testing data showing conformance to CSA-A3000 satisfactory to the Contract Administrator.

.4 Concrete: exposure class S1, minimum design 56-day compressive strength 35 MPa, nominal aggregate Group 20 - 5 mm, maximum water:cementitious material 0.40, total air 4% to 7%. Concrete for walls and beams shall be superplasticized.

.5 Use accelerating admixtures in cold weather only when accepted by the Contract Administrator. If accepted, the use of admixtures will not relax cold weather placement requirements. Do not use calcium chloride.

.6 Use set-retarding admixtures during hot weather only when accepted by the Contract Administrator.

.7 All materials and admixtures must be compatible within the mix. Concrete with freezing and thawing exposure must satisfy the durability requirements of CAN/CSA-A23.1-00, Sections 14 and 15.

.8 All admixtures are subject to acceptance by the Contract Administrator. List all proposed admixtures in mix design submission. Do not change or add admixtures to accepted design mixes without the Contract Administrator's review and acceptance.

.9 Concrete delivered to Site must be accompanied by a delivery slip indicating time of completion of mixing, design strength of concrete, air content, and actual water-cement ratio.

.10 Patching Mortar:

.1 The patching mortar shall be made of the same material and of approximately the same proportions as used for the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cementitious material to two and a half (2.5) parts sand by damp loose volume.

.2 White Portland Cement shall be substituted for a part of the grey Portland Cement on exposed concrete in order to produce a colour matching the colour of the surrounding concrete, as determined by a trial patch.

.3 The quantity of mixing water shall be no more than necessary for handling or placing. Mixing water shall include one (1) part latex bonding agent to three (3) parts water. Maximum water:cementitious material ratio shall be 0.40.

.11 Self-compacting concrete mixes will not be permitted for use on this project.

3. EXECUTION

3.1 Placing Concrete

.1 Place concrete in accordance with requirements of CAN/CSA-A23.1-00 and as indicated on the Drawings. Layout of the Work and accuracy of same is the Contractor's sole responsibility.

.2 Notify the Contract Administrator a minimum of twenty four (24) hours prior to pouring concrete. Under no circumstances shall concrete be poured without notifying Contract Administrator, or in his absence, arranging for review of the Work and sampling of concrete.

.3 The concrete shall be placed rapidly and evenly as near to its final position as possible to reduce the risk of segregation, flowlines, and cold joints. Concrete shall be placed within one and a half (1.5) hours of mixing.

.4 Ensure all anchor bolts, seats, plates, and other items to be cast into concrete are securely placed and will not interfere with concrete placement.

.5 All equipment for transporting the concrete shall be cleaned of hardened concrete and foreign materials before placing concrete.

.6 Immediately before concrete is placed, Contractor shall carefully inspect all forms to ensure that they are properly placed, sufficiently rigid and tight, and that all reinforcing steel and embedded parts are in the correct position and secured against movement during the placing operation. All forms shall be thoroughly cleaned and material removed.

.7 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods, which will prevent the separation or loss of the ingredients. Concrete shall be deposited in the forms as nearly as practicable in its final position to avoid re-handling or flowing. Vibrators shall not be used to move concrete. Under no circumstances shall the concrete, which has partially hardened, be deposited in the forms.

.8 Concrete shall be thoroughly compacted by mechanical vibrators during placing operations. Concrete shall be thoroughly worked around the reinforcement, embedded fixtures, and into the corners of the forms.

.9 Vibrate concrete using the appropriate size equipment as placing proceeds, in accordance with CAN/CSA-A23.1-00. Check frequency and amplitude of vibrations prior to use. Provide additional standby vibrators in the event of equipment failure.

.10 Prepare set or existing concrete by removing all laitance and loose or unsound materials and apply bonding agent in accordance with Manufacturer's recommendations.

.11 Where placing operations would involve dropping the concrete more than 1500 mm, it shall be placed through canvas hoses or galvanized iron chutes. Concrete shall not be raised at a rate greater than that for which proper vibration may be affected.

.12 In locations where new concrete is dowelled to existing concrete, drill holes in existing concrete, insert steel dowels, and pack solidly with non-shrink grout.

.13 A minimum of three (3) days shall elapse between adjacent pours separated by construction joints or expansion joints.

.14 Do not place concrete if carbon dioxide producing equipment has been in operation in the building or in the enclosure during the twelve (12) hours preceding the pour. This equipment shall not be used during placing or for twenty four (24) hours after placing. During placing and curing concrete, surfaces shall be protected by formwork or an impermeable membrane from direct exposure to carbon dioxide, combustion gases, or drying from heaters.

.15 Honeycomb or embedded debris is not acceptable.

.16 Remove and replace defective concrete.

.17 Maintain accurate records of cast-in-place concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

.18 Prior to the erection of the formwork for walls, the construction joint shall be sand blasted and cleaned as per Clause 3.14 of this specification section. A layer of grout slurry approximately 12 mm to 25 mm thick shall be placed immediately prior to the placement of concrete.

3.2 Cold Weather Concreting

.1 The requirements of this section shall be applied to all concreting operations during cold weather, i.e., if the mean daily temperature falls below 5°C during placing or curing.

.2 Supplementary equipment as required below shall be at the job Site if concrete is likely to be placed in cold weather.

.3 Formwork and reinforcing steel shall be heated to at least 5°C before concrete is placed.

.4 The temperature of the concrete shall be maintained at not less than 10°C for seven (7) calendar days. The concrete shall be kept above freezing temperature for at least a period of seven (7) calendar days. In no case, shall the heating be removed until the concrete has reached a minimum compressive strength which will be specified by the Contract Administrator as determined from compressive strength tests on specimens cured under the same conditions as the concrete Works in question.

.5 Aggregates shall be heated to a temperature of not less that 20°C and not more than 65°C. Water shall be heated to a temperature between 55°C and 65°C. The temperature of the concrete at the time of placing in the forms shall be within the range specified in CAN/CSA-A23.1-00 for the thickness of the section being placed.

.6 When the mean daily temperature may fall below 5°C, a complete housing of the Work, complete with heaters, fuel, maintenance, and attendants shall be provided.

.7 Combustion-type heaters may be used if their exhaust gases are vented outside the enclosures and not allowed to come into contact with concrete surfaces. Fire extinguishers must be readily at hand wherever combustion-type heaters are used.

.8 When the ambient temperature is below -15°C, the housing shall be constructed so as to allow the concrete to be placed without the housing having to be opened. If the mixing is done outside of the housing, the concrete shall be placed by means of hoppers installed through the housing. The hoppers are to be plugged when not in use.

.9 When the ambient temperature is equal to or above -15°C, the Contractor will be permitted to open small portions of the housing for a limited time to facilitate the placing of the concrete.

.10 Before depositing any of the concrete, the Contractor shall show that enough heating equipment is available to keep the air temperature surrounding the forms within the specified range. This shall be accomplished by bringing the temperature inside of the housing to the specified 10°C at least twelve (12) hours prior to the start of the concrete placing.

.11 The Contractor shall supply all required heating apparatuses and the necessary fuel. When dry heat is used, a means of maintaining atmospheric moisture shall be provided.

.12 Sufficient standby heating equipment must be available to allow for any sudden drop in outside temperatures and any breakdowns which may occur in the equipment.

.13 The Contractor shall keep a curing record of each concrete pour. The curing record shall include date and location of the pour, mean daily temperature, temperatures above and below the concrete within the enclosures, temperatures of the concrete surface at several points, and notes regarding the type of heating, enclosure, unusual weather conditions, etc. This record shall be available for review by the Contract Administrator at all times, and shall be turned over to the Contract Administrator at the end of the concreting operations.

3.3 Hot Weather Concreting

.1 General

.1 The requirements of this Clause shall be applied during hot weather, i.e., air temperatures above 25°C during placing.

.2 Concrete shall be placed at as low a temperature as possible, preferably below 15°C, but not above 27°C. Aggregate stockpiles may be cooled by water sprays and sun shades.

.3 Ice may be substituted for a portion of the mixing water provided the ice has melted by the time mixing is completed.

.4 Forms and conveying equipment shall be kept as cool as possible before concreting by shading them from the sun, painting their surfaces white, and/or the use of water sprays.

.5 Sun shades and wind breaks shall be used as required during placing and finishing.

.6 Work shall be planned so that concrete can be placed as quickly as possible to avoid “cold joints”.

.7 The Contract Administrator’s acceptance is necessary before the Contractor may use admixtures such as retardants to delay setting, or water-reducing agents to maintain workability and strength, and these are to be included in the mix designs submitted to the Contract Administrator.

.8 Curing shall follow immediately after the finishing operation.

.2 Hot-Weather Curing

.1 When the air temperature is at or above 25°C, curing shall be accomplished by water or by using saturated absorptive fabric, in order to achieve cooling by evaporation. Mass concrete shall be water cured for the basic curing period when the air temperature is at or above 20°C, in order to minimize the temperature rise of the concrete.

.3 Job Preparation

.1 When the air temperature is at or above 25°C, or when there is the probability of its rising to 25°C during the placing period, facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions. Under severe drying conditions, as defined under "Sever Drying Conditions" below, the formwork, reinforcement, and concreting equipment shall be protected from the direct rays of the sun or cooled by fogging and evaporation.

.4 Concrete Temperature

.1 The temperature of the concrete as placed shall be as low as practicable and in no case greater than that shown below for the indicated size of the concrete section.

Thickness of Section (metres)	**Temperatures (°C)**	
	Minimum	**Maximum**
less than 0.3	10	27
0.3 – 1	10	27
1.2	5	25

.5 Protection from Drying

.1 Moderate Drying Conditions

.1 When surface moisture evaporation exceeds 0.75 kg/m^2/hr, windbreaks shall be erected around the sides of the structural element.

.2 Severe Drying Conditions

.1 When surface moisture evaporation exceeds 1.0 kg/m^2/hr, additional measures shall be taken to prevent rapid loss of moisture from the surface of the concrete. Such additional measures shall consist of the following:

.1 Erecting sunshades over the concrete during finishing and placing operations.

.2 Lowering the concrete temperature.

.3 Increasing humidity by applying fog spray immediately after placement and before finishing.

.4 Care shall be taken to prevent accumulation of water that may reduce the quality of the cement paste.

.5 Beginning the concrete curing immediately after trowelling.

.6 Application of moisture retention film.

.3 Surface Moisture Evaporation Rate

.1 The monograph, Figure D1, Appendix D of CAN/CSA-A23.1-00 shall be used to estimate surface moisture evaporation rates.

3.4 Concrete Protection for Reinforcement

.1 Ensure reinforcement is placed to provide minimum concrete cover in accordance with Section 03200 – Concrete Reinforcement.

3.5 Construction Tolerance

.1 The Work shall be carefully and accurately set out; true to the positioning, levels, slopes, and dimensions shown on the Drawings and conforming to Sections 03100 – Concrete Formwork and 03200 – Concrete Reinforcement.

.1 Sizes of member or thickness of slabs:

.1 300 mm or less: +/- 6 mm

.2 301 mm to 1000 mm: +/- 12 mm

.3 1001 mm or greater: +/- 20 mm

.2 Cover of concrete over reinforcement: ±3 mm.

.3 Variations from plumb: 6 mm in 3.0 m, 14 mm maximum.

.4 Variations from flat: 3 mm in 3.0 m, 6 mm maximum.

.2 If these tolerances are exceeded the Contractor may, at the discretion of the Contract Administrator, be required to remove and replace or to modify the placed concrete before acceptance. The costs incurred by the Contract Administrator for such investigation, testing, or review of reconstruction and the cost of reconstruction shall be borne by the Contractor.

3.6 Finishing Slab Surfaces

.1 Finish all slab surfaces conforming to CAN/CSA-A23.1-00, Clause 22 and as specified below.

.2 Bull Floating

.1 Immediately after screeding, bull float floor surfaces to remove ridges and fill voids.

.2 Complete bull floating before any excess moisture or bleed water is visible on surface.

.3 Mechanical Floating

.1 Mechanical float floor surfaces when bleed water has disappeared and surfaces are sufficiently hard to prevent working excess mortar to surface.

.2 Continue floating as necessary to produce surfaces of uniform texture, free from hollows, bumps, and screed marks.

.3 For surfaces to be trowelled, continue floating as necessary to embed coarse aggregate particles firmly below surface mortar.

.4 Hand float in corners, restricted areas, and around cast-in items.

.4 Trowelling

.1 Trowel floor surfaces with mechanical trowelling machines fitted with steel blades.

.2 Commence trowelling when surfaces are sufficiently hard to prevent working excess fine material to surface.

.3 Perform additional trowelling at intervals so final trowelling is done just before concrete becomes so hard that further trowelling is ineffective.

.4 Finish trowelled surfaces to be hard, dense, and free from blemishes and other imperfections.

.5 Hand trowel in corners, restricted areas, and around cast-in items.

.6 Cure concrete as specified.

.7 Protect all floors from damage during construction.

3.7 Curing and Protection

.1 Cure and protect freshly placed concrete in accordance with Clause 21 of CAN/CSA-A23.1-00.

.2 All concrete shall receive moist curing for a period of at least seven (7) calendar days. One of the following methods shall be used as soon as the concrete has hardened sufficiently to prevent marring:

.1 Surface covered with canvas or other satisfactory material and kept thoroughly and continuously wet with soaker hoses.

.2 A liquid membrane forming curing sealer, applied at the rate recommended by the Manufacturer. Curing sealer shall not be used on a surface where bond is required for the finishes.

.3 Surfaces of concrete, which are protected by formwork that is left in place for seven (7) calendar days, shall not require any additional curing (except as specified for hot weather). If the formwork is removed in less than seven (7) calendar days, the concrete shall receive moist curing as above.

.3 No concreting will be allowed until all materials required for the curing phase are on Site and ready for use.

.4 At the end of the curing and protection period, the temperature of the concrete shall be reduced gradually at a rate not exceeding 10°C per day until the outside air temperature has been reached.

.5 Concrete that is allowed to freeze or attain insufficient curing conditions shall be subject to all necessary investigations and testing as deemed necessary by the Contract Administrator and all such concrete shall be removed and the portion reconstructed as directed by the Contract Administrator, at Contractor's cost.

.6 The supply (both quantity and time of supply) of water for curing concrete shall be subject to control of the City and prior arrangements shall be made by the Contractor with the City for its supply. The Contractor shall be responsible for, at his own cost, to supply, install, maintain, and move extensions to water services as required for conveying water to the work Site. Water required for curing concrete will be supplied by the City, from the DBPS.

3.8 Formed Concrete

.1 Allow the Contract Administrator to review concrete surfaces immediately upon removal of the forms.

.2 Modify or replace concrete not conforming to qualities, lines, details, and elevations specified herein or indicated on the Drawings to the acceptance of the Contract Administrator.

3.9 Finishing Formed Surfaces

.1 Finish surfaces exposed to view to Smooth-Form Finish conforming to CAN/CSA-A23.1-00, Clause 24.3.6.

.2 Finish non-exposed surfaces to Rough-Formed Finish conforming to CAN/CSA-A23.1-00, Clause 24.3.5.

3.10 Equipment Pads, Pipe Supports, and Cast in Metal Frames

.1 Provide concrete pads and supports for equipment where and as indicated on Drawings. Adjust dimensions to reviewed equipment Shop Drawings.

.2 Insert bolts and sleeves and pack solidly with non-shrink grout, in accordance with setting details and templates.

.3 Steel trowel surface smooth. Chamfer exposed horizontal and vertical edges.

.4 Clean excess concrete from metal frames, inserts, weld plates, etc. Clean and tool concrete around the above noted items.

3.11 Grouting

.1 Grout all miscellaneous anchor bolts with non-ferrous or epoxy grout as specified using templates for accurate positioning.

.2 Grout under base plates and other items to provide continuous support over the entire contact area as required and shown on the Drawings.

3.12 Defective Concrete

.1 Concrete not meeting the requirements of the Specifications and Drawings will be considered defective concrete.

.2 Concrete not conforming to the lines, details, and grades specified herein or as shown on the Drawings shall be modified or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator. Finished lines, dimensions, and surfaces shall be correct and true within tolerances specified herein and in Section 03100 – Concrete Formwork.

.3 Concrete not properly placed resulting in honeycombing and other defects shall be repaired or replaced at the Contractor's expense and to the satisfaction of the Contract Administrator.

3.13 Patching

.1 Allow Contract Administrator to review concrete surfaces immediately upon removal of all formwork.

.2 Remove all exposed metal form ties, nails and wires, break off fins, and remove all loose concrete.

.3 Any imperfect joints, voids, stone pockets, or other defective areas and tie holes, as specified, shall at once be patched before the concrete is thoroughly dry. Defective areas shall be chipped away to a depth of not less than 40 mm with the edges perpendicular to the surface. The area to be patched and a space at least 150 mm wide entirely surrounding it shall be wetted to prevent absorption of water from the patching mortar.

.4 Cure all patches thoroughly in accordance to Manufacturer’s instructions.

3.14 Construction Joints

.1 Construction joint locations shall be as shown on the Drawings.

.2 Joints not indicated on the Drawings shall be located so as to least impair the strength of the structure. The location of these joints shall be subject to prior review and acceptance by the Contract Administrator. Joints shall be in accordance with CAN/CSA-A23.1-00, or as indicated on the Drawings.

.3 The surface of hardened concrete shall be thoroughly cleaned of foreign matter and laitance by sand blasting, and shall be thoroughly wetted with water, but not saturated, and the forms shall be re-tightened against the face of the hardened concrete before depositing additional concrete. Any concrete splatter on reinforcing bars shall be removed by sand blasting or other mechanical means.

.4 For horizontal construction joints, the concrete shall be thoroughly compacted by hand trowel in and around the reinforcing bars.

3.15 Clean-Up

.1 As Work progresses and at the completion of Work, remove from Site all debris, excess materials, and equipment.

END OF SECTION

MISCELLANEOUS METALS AND AQUEDUCT SADDLE CONNECTION

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Supply and installation of the saddle connection to the existing Aqueduct.

.2 Supply and installation of the valve stem support.

1.2 References

.1 City of Winnipeg Standard Construction Specifications

.1 Section 02315 – Excavation, Trenching and Backfilling

.2 Division 3 – Cast-in-Place Concrete

.2 ASTM:

.1 ASTM A36/A36M, Specification for Carbon Structural Steel

.2 ASTM A283/A283M Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

.3 CSA International

.1 CAN/CSA-G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-S16.1, Limit States Design of Steel Structures.

.3 CSA W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.4 CSA W59,Welded Steel Construction (Metal Arc Welding) (Imperial Version).

.5 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 Submittals

.1 Product Data:

.1 Submit Manufacturer's printed product literature, specifications and data sheet in accordance with Section 01300 - Submittals.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01300 – Submittals.

.2 Drawings for all items shall clearly indicate dimensions, materials, installation procedures and any other pertinent information.

2. PRODUCTS

2.1 Materials

.1 Saddle plate and steel cylinder: 8 mm thick, ASTM A283 or A36 steel.

.2 Valve stem support: to CAN/CSA-G40.21 steel.

.3 Chemical anchors: Hilti HVA capsule adhesive anchor or approved equal.

.4 Epoxy injection resin shall be Kemko 077 epoxy injection resin or approved equal.

.5 Gasket Material: Neporene Duro 60.

2.2 Fabrication

.1 The Contractor shall arrange with the Manufacturer of the saddle plate to have a qualified representative visit the site to examine and take measurements of the Aqueduct at the connection location for the purposes of making an accurate template for the saddle plate.

.2 The saddle plate shall be welded to the steel cylinder as shown on the Drawings. Backing for the rubber gasket shall be welded onto the saddle plate as shown on the Drawings. The steel cylinder shall extend 300 mm from the concrete encasement.

.3 The Contractor shall provide the Contract Administrator with seven (7) Calendar Days written notice of his intention to examine the Aqueduct with the Manufacturer's Representative. As the Aqueduct will be in service during the pre-installation inspection, the Contractor shall exercise care and caution when exposing and backfilling the Aqueduct. The work shall be carried out in the presence of the Contract Administrator.

.4 The Contractor shall coordinate the hole size in the valve stem support to accommodate the valve stem requirements. The valve stem support shall be galvanized.

2.3 Shop Painting

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

3. EXECUTION

3.1 Scheduling

.1 Dewatering of the Aqueduct will be completed by City forces and will be coordinated by the Contract Administrator. The Contractor shall ensure all of the work described in Stage I below, is completed before the start of the scheduled shutdown in order to enable coring of the opening in the Aqueduct during the shutdown window. All of the work must be completed during the Aqueduct shutdown window of five (5) Calendar Days.

3.2 Excavation

.1 Excavation shall be done in accordance with Section 02315. All excavation and backfill operations shall be done in the presence of the Contract Administrator.

.2 The Contractor shall exercise extreme care so as not to damage or disturb the Aqueduct. The exposed section of the Aqueduct shall be fully and adequately supported to the satisfaction of the Contract Administrator so as not to allow any shearing action to occur on the pipe at the limit of the excavation or at the joints. At no time will excavation equipment, machinery or vehicular traffic be allowed to be placed on or over the Aqueduct. Adequate bracing, shoring and cribbing of the excavation shall be provided as necessary so as not to lose any ground from under and around the Aqueduct outside of the excavation limits.

3.3 Access to the Interior of the Aqueduct

.1 Access to the Aqueduct interior shall be through the existing 400 millimetre diameter pressure manhole, PMH 160 (Mile 12.87).

3.4 Connection to the Aqueduct

.1 Grout any spalling and cracks of the exterior concrete of the Aqueduct under the saddle connection, if necessary. Install saddle in accordance to the Drawings

.2 Remove the saddle connection and couplings to facilitate cutting the Aqueduct opening. Once the Aqueduct has been dewatered for the shutdown, core the opening from the outside of the Aqueduct. The method of coring shall be subject to the approval of the Contract Administrator.

.3 Drill bolt holes in saddle so as to avoid reinforcing bars in Aqueduct using electric hammer drill (pneumatic drill not permitted). Prepare the surface of the Aqueduct and install the saddle and grout gaskets. Pressure test the annular space between the saddle connection and the Aqueduct exterior wall using the grout injection ports to 15 psi. Inject annular space with approved epoxy resin.

.4 Clean and roughen the exterior surface of the Aqueduct using high pressure (35 MPa) water blasting where the saddle encasement is to be installed. Install concrete encasement in accordance to Division 3.

.5 Disinfect the saddle connection, interior of the Aqueduct and supernatant piping to the butterfly valve in the valve chamber, by applying a 200 mg/litre hypochlorite solution to all surfaces in accordance with AWWA C652 Method B.

3.5 Backfill

.1 Backfilled in accordance with Section 02315 and CW 2030 for Class 4 backfill. .

3.6 Testing of Fittings and Connection to the Aqueduct

.1 The leakage test will be conducted while the Aqueduct is being returned to service. The supernatant piping connection to the Aqueduct will be considered to have failed the test if water is observed flowing from the connection, or if moisture, other than precipitation or condensation, can be transferred to a dry hand from the exterior surfaces of the drain pipe and Aqueduct.

.2 The Contractor shall be responsible for repairing any visible leaks.

3.7 Valve Stem Support

.1 Install valve stem support located as shown on the Drawings.

.2 Ensure that correct operation of the valve stem is maintained; make any required adjustments.

4. METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 Supply and Installation of the Aqueduct Saddle Connection

.1 Supply and installation of the Aqueduct saddle connection shall be measured on a lump sum basis, and paid for at the Contract Unit Price for "Supply and Installation of Aqueduct Saddle Connection" in accordance with these specifications. The lump sum price shall include excavation, backfill, cast-in-place concrete works, fabrication of saddle template and saddle, installation of saddle connection, removal and replacement of fence, removal and replacement of utilities, and connection of drain from valve chamber to the Aqueduct underdrain.

.2 Supply and Installation of Valve Stem Support

.3 Supply and installation of the valve stem support shall not be measured for payment. The supply and installation of valve stem supports shall be included in the price for "Construction of Valve Chamber".

END OF SECTION

ALUMINIUM FABRICATIONS

1. GENERAL

1.1 Design Requirements

.1 Comply with CSA S157/A157.1 for strength design in aluminium work.

.2 Floor covers and platform grating: unless otherwise indicated, minimum uniform loading of 9.6 kN/m^2 at maximum deflection of L/360 of clear span.

1.2 Quality Assurance

.1 Retain a Professional Engineer registered in the Province of Manitoba, with experience in work of comparable complexity and scope, to perform the following services as part of the Work of this Section:

.1 Design aluminium fabrication items as required to resist live, dead, lateral, wind, and seismic loads.

.2 Structural design.

.3 Review, stamp, and sign Shop Drawings.

.4 Conduct shop and Site inspections.

.5 Prepare and submit inspection reports.

.2 Do aluminium welding to CSA W59.2 by fabricators certified by the Canadian Welding Bureau to CSA W47.2.

1.3 Submittals

.1 Shop Drawings: bearing professional seal and signature of the Professional Engineer responsible for the engineering design. Show work of this Section including large scale detail of members and materials, of connection and jointing details, and of anchorage devices, dimensions, thicknesses, description of materials, aluminium finishing, as well as other pertinent data and information.

1.4 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

ALUMINIUM FABRICATIONS

2. PRODUCTS

2.1 Materials

.1 Aluminium plates, shapes, and extrusions: 6061-T6 alloy, anodizing quality.

.2 Welding rods, aluminium: 5356 alloy.

.3 Grating: to style 30-102M as manufactured by Fisher & Ludlow using 6063-T6 aluminum alloy for bearing bars and 6063-T5 aluminum alloy for cross bars, corners and junctions ground smooth. Weld perimeter banding bars, same size as bearing bars, at grating edges and openings.

.4 Fasteners: stainless steel ASTM 316 bolts, nuts, washers, rivets, lock washers, anchor bolts, machine screws, and machine bolts complete with applicable isolation washers.

.5 Drilled anchors: RAWL by Anchor Construction Industrial Products or HSL by Hilti Inc. heavy-duty anchors, sizes to suit.

.6 Bituminous Paint: to MPI (Master Paint Institute) EXT 5.5D, without thinner.

2.2 Fabrication

.1 Verify dimensions of installed Work before commencing fabrications and report any discrepancies to Contract Administrator.

.2 Fit and assemble Work in shop where possible. Execute Work in accordance with details and reviewed Shop Drawings. Where shop fabrication is not possible, make trial assembly in shop.

.3 Unless indicated otherwise, provide welded connection for work of this Section.

.4 Carefully make and fit details. Take special care with exposed finished Work to produce a neat and correct appearance to Contract Administrator's acceptance.

.5 Assemble members without twists or open joints.

.6 Correctly size holes for connecting Work of other Sections where such can be determined prior to fabrication. Where possible, show holes on Shop Drawings. Place holes not to cause appreciable reduction in strength of member.

2.3 Welding

.1 Execute welding to avoid damage or distortion to Work. Execute welding in accordance with following standards:

.1 CSA W48: for welding materials; if rods are used, only coated rods are allowed.

.2 CSA W59.2: for design of connections and workmanship.

.3 CAN/CSA W117.2: for safety.

.2 Thoroughly clean welded joints and exposed aluminium surfaces for a sufficient distance to perform welding operations.

.3 Test welds for conformance and remove work not meeting specified standards and replace to Contract Administrator's acceptance.

.4 Continuous weld all joints for the full length of each joint. Finish exposed welds smooth and flush, file, or grind as required.

2.4 Anchors and Fastening

.1 Use weld studs of size not larger than 10 mm for attaching miscellaneous materials and equipment to structure. If weight of item requires larger fasteners use clips or brackets and secure by welding or through bolting.

.2 Use self-drilling expansion type concrete anchors for attaching to masonry and concrete.

2.5 Inserts and Hangers

.1 Install inserts, hangers, and supports. Make inserts drilled type.

.2 Before openings are cut through structure, obtain Contract Administrator's written acceptance for procedures, locations and reinforcements required.

2.6 Aluminium Finishes

.1 Clear anodic finish: AA-M12C22A41, as fabricated nonspecular mechanical finish, medium matte etched chemical finish, architectural class I clear anodic coating of minimum 18 µm (0.7 mil) thick complying with AAMA 611.

3. EXECUTION

3.1 Erection

.1 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work plumb, true, square, straight, level, and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.

.2 Perform drilling of concrete as required to fasten Work of this Section.

.3 Unless otherwise indicated, grout set work in concrete with non-shrink grout. Trowel surface smooth and flush with adjacent surfaces.

.4 Insulate aluminium where necessary to prevent corrosion due to contact between dissimilar metals and between aluminium and masonry, or concrete. Use bituminous paint, butyl tape, building paper, or other accepted means.

3.2 Schedule of Aluminium Works

.1 General: supply and install work indicated on Drawings and not included in work of other Sections in addition to items listed below. Where items are required to be built into concrete or other work, supply such items to respective Sections with all anchors and accessories for building in.

.2 Itemized list: supply and install following Work unless specifically designated to be supplied only. List supplied herein is not necessarily complete and shall be augmented by thorough inspection of Drawings and all other requirements to complete Work. Each item shall be as indicated on Drawings and as detailed on reviewed Shop Drawings:

.1 Access ladders: construct access ladders of stringers with solid rungs rigidly secured to the stringers. Supply and install angle clips and anchor bolts to secure the ladders in place.

.2 Grating: fabricate removable and fixed gratings in sections weighing maximum 75 kg each. Install grating loose laid in place.

.3 Checkered plate covers: diamond shaped raised pattern, of nominal thickness shown exclusive of raised pattern.

END OF SECTION

DAMPPROOFING

1. GENERAL

1.1 Submittals

.1 Product data: include product characteristics, performance criteria, application methods.

1.2 Delivery, Storage, and Handling

.1 Provide and maintain dry, off-ground weatherproof storage.

.2 Store materials on supports to prevent deformation.

.3 Remove only in quantities required for same day use.

.4 Store materials in accordance with Manufacturer's written instructions.

1.3 Project and Site Environmental Requirements

.1 Apply dampproofing materials only when surfaces and ambient temperatures are within Manufacturers' prescribed limits.

.2 Do not proceed with work when wind chill effect would tend to set bitumen before proper curing takes place.

.3 Maintain air temperature and substrate temperature at dampproofing installation area above the Manufacturer’s recommended installation temperature for 24 hours before, during, and 24 hours after installation.

.4 Do not apply dampproofing in wet weather.

1.4 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Materials

.1 Compatibility: only use materials that are mutually compatible.

.2 For application and curing at temperatures above 5°C:

.1 Primer: emulsified asphalt, cut 50% with potable water.

.2 Asphalt: emulsified asphalt, filled.

.3 For application and curing at temperatures below 5°C:

.1 Primer: cutback asphalt, unfilled.

.2 Asphalt: cutback asphalt, filled.

.4 Sealing compound: plastic cutback asphalt cement.

3. EXECUTION

3.1 Preparation and Installation

.1 Remove loose materials, laitance, frost, oil, grease, and other materials affecting bonding, by wire brushing or sand blasting.

.2 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

.3 Apply primer.

.4 Apply continuous, uniform coating, at coverage recommended by Manufacturer, to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.5 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 225 mm on each side, and all around and for 225 mm along pipes passing through walls.

END OF SECTION

RIGID INSULATION

1. GENERAL

1.1 Work Included

.1 Below grade insulation.

1.2 References

.1 ASTM D2842 - Water Absorption of Rigid Cellular Plastics.

.2 CAN/ULC-S701 - Thermal Insulation, Expanded, Extruded Polystyrene.

1.3 Measurement and Payment

.1 No measurement will be made for the Work in this Section.

.2 Include costs in the unit prices bid for the various structures as listed in the Schedule of Prices.

2. PRODUCTS

2.1 Materials

.1 Board Insulation: rigid insulation, CAN/ULC-S701, Type 4, extruded cellular polystyrene, square edges, Celfort by Celfortec or Styrofoam SM by Dow Chemical; thickness as indicated on Drawings.

.2 Fasteners: plated mechanical fasteners.

.3 Protection board: fibreboard, minimum 12 mm thickness.

3. EXECUTION

3.1 Preparation

.1 Verify substrate surface is flat, free of honeycomb, fins, irregularities, and any other material that will impede installation of insulation.

.2 Verify insulation boards are unbroken, free of damage, with face membrane undamaged.

.3 Verify walls being insulated have been reviewed and accepted.

3.2 Installation

.1 Install insulation vertically and horizontally as indicated. Apply mechanical fasteners to Manufacturer’s instructions.

.2 Butt edges and ends tight to adjacent boards.

.3 Protect insulation with fibreboard during backfilling.

END OF SECTION

PROCESS VALVES AND OPERATORS

1. GENERAL

1.1 Work Included

.1 Supply and installation of miscellaneous valves, 50 mm to 75 mm, in valve chambers.

.2 Installation and testing of 750 mm butterfly valves and operators supplied under separate contract.

1.2 References

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

.1 ANSI:

.1 B16.1, Cast Iron Pipe Flanges and Flanged Fittings.

.2 ASTM:

.1 B62, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 AWWA:

.1 C500, Metal Seated Gate Valves for Water Supply Service.

.2 C504, Rubber Seated Butterfly Valves.

.3 C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

1.3 Submittals

.1 Identify process area in the title of all submittal transmittals.

.2 Shop Drawings:

.1 Product data sheets for make and model.

.2 Complete catalog information, descriptive literature, specifications and identification of materials of construction.

.3 Information Submittals:

.1 Certification of NSF 61B compliance.

1.4 Measurement and Payment

.1 No measurement or payment will be made for the work in this section. Include costs in the unit prices bid for “Valve Chambers” as listed in the Schedule of Prices.

2. PRODUCTS

2.1 General

.1 All valves to include operator, handwheel, and accessories for a complete operation.

.2 Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.

.3 Valve same size as adjoining pipe.

.4 Valve ends to suit adjacent piping.

.5 Size operator to operate valve for the full range of pressures and velocities.

.6 Valve to open by turning counterclockwise.

.7 Provide lubricants of the type recommended by the equipment Manufacturer in sufficient quantity to fill all lubricant reservoirs and to replace all consumption during testing, start-up and operation prior to Substantial Performance. Lubrication systems and lubrications shall be certified to ANSI/NSF Standard 61, to be compatible with potable water use.

2.2 Materials

.1 Brass and bronze valve components and accessories that have surfaces in contact with water to be alloys containing less than 16% zinc and 2% aluminum.

.1 Bronze material shall conform to ASTM B62.

2.3 Valves

.1 Gate Valves:

.1 Small diameter threaded gate valves (75 mm diameter and less) shall be all cast bronze, solid wedge disk, rising stem c/w hand wheel rated for minimum 1.0 MPa non-shock cold water service. Direction of opening shall be counter clockwise and shall be indicated on the hand wheel.

.2 Acceptable product; Crane, Jenkins, Kennedy, Mueller, or approved equal.

3. EXECUTION

3.1 Installation by Contractor

.1 Flange Ends:

.1 Flanged valve boltholes shall straddle vertical centerline of pipe.

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

.2 Screwed Ends:

.1 Clean threads by wire brushing or swabbing.

.2 Apply joint compound.

.3 Valve Orientation:

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

3.2 Field Finishing by Contractor

.1 Equipment as specified in Section 02511 – Watermains.

3.3 Field Quality Control by Contractor

.1 Performance Test: In accordance with operating conditions indicated in supplemental valve schedules sheets.

.2 Valve may be either tested while testing pipelines, or as a separate step.

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

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

3.4 Manufacturer's Representative Field Services

.1 The valve(s) as listed below require Manufacturer’s field services:

.1 750mm Butterfly Valves

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

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

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

.5 The minimum periods of Site attendance as total number of business days for all equipment are identified in the following table along with the form to be completed on each of these trips.

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

Item	Description	Total number of business days	Form
1	Certificate of Equipment Delivery	1	100
2	Certificate of Readiness to Install	2	101
3	Certificate of Satisfactory Installation	2	102
4	Certificate of Equipment Satisfactory Performance Testing	1	103

3.5 Installation Witnessing

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

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

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

3.6 Equipment Performance Testing

.1 The Manufacturer’s Representative shall ensure that each pump, including all component parts, operates as intended.

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

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

END OF SECTION