



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 915-2013

**CONSTRUCTION OF THE NEW BYNG PLACE OUTFALL AND GATE CHAMBER
AND RIVERBANK STABILITY IMPROVEMENTS- COCKBURN /CALROSSIE
COMBINED SEWER RELIEF WORKS**

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PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

- B1.1 CONSTRUCTION OF THE NEW BYNG PLACE OUTFALL AND GATE CHAMBER AND RIVERBANK STABILITY IMPROVEMENTS- COCKBURN /CALROSSIE COMBINED SEWER RELIEF WORKS

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, November 20, 2013.
- B2.2 Bids determined by the Manager of Materials to have been received later than the Submission Deadline will not be accepted and will be returned upon request.
- B2.3 The Contract Administrator or the Manager of Materials may extend the Submission Deadline by issuing an addendum at any time prior to the time and date specified in B2.1.

B3. SITE INVESTIGATION

- B3.1 Further to C3.1, the Bidder may view the Site without making an appointment.

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. CONFIDENTIALITY

- B5.1 Information provided to a Bidder by the City or acquired by a Bidder by way of further enquiries or through investigation is confidential. Such information shall not be used or disclosed in any way without the prior written authorization of the Contract Administrator. The use and disclosure of the confidential information shall not apply to information which:
- (a) was known to the Bidder before receipt hereof; or
 - (b) becomes publicly known other than through the Bidder; or
 - (c) is disclosed pursuant to the requirements of a governmental authority or judicial order.
- B5.2 The Bidder shall not make any statement of fact or opinion regarding any aspect of the Bid Opportunity to the media or any member of the public without the prior written authorization of the Contract Administrator.

B6. ADDENDA

- B6.1 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.
- B6.2 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.
- B6.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>
- B6.2.2 The Bidder is responsible for ensuring that he/she has received all addenda and is advised to check the Materials Management Division website for addenda regularly and shortly before the Submission Deadline, as may be amended by addendum.
- B6.3 The Bidder shall acknowledge receipt of each addendum in Paragraph 10 of Form A: Bid. Failure to acknowledge receipt of an addendum may render a Bid non-responsive.

B7. SUBSTITUTES

- B7.1 The Work is based on the Plant, Materials and methods specified in the Bid Opportunity.
- B7.2 Substitutions shall not be allowed unless application has been made to and prior approval has been granted by the Contract Administrator in writing.
- B7.3 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.
- B7.4 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.
- B7.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/her 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.
- B7.6 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.

- B7.6.1 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/she wishes to inform.
- B7.7 If the Contract Administrator approves a substitute as an “approved equal”, any Bidder may use the approved equal in place of the specified item.
- B7.8 If the Contract Administrator approves a substitute as an “approved alternative”, any Bidder bidding that approved alternative may base his/her 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 B16.
- B7.9 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.
- B7.10 Notwithstanding B7.2 to B7.9, and in accordance with B8.6 deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B16.1(a).

B8. BID COMPONENTS

- B8.1 The Bid shall consist of the following components:
- (a) Form A: Bid;
 - (b) Form B: Prices;
 - (c) Bid Security
 - (i) Form G1: Bid Bond and Agreement to Bond, or Form G2: Irrevocable Standby Letter of Credit and Undertaking, or a certified cheque or draft;
- B8.2 Further to B8.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B7.
- B8.3 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.
- B8.4 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.
- B8.4.1 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.
- B8.5 Bidders are advised not to include any information/literature except as requested in accordance with B8.1.
- B8.6 Bidders are advised that inclusion of terms and conditions inconsistent with the Bid Opportunity document, including the General Conditions, will be evaluated in accordance with B16.1(a).
- B8.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.
- B8.8 Bids shall be submitted to:
- The City of Winnipeg
Corporate Finance Department
Materials Management Division
185 King Street, Main Floor
Winnipeg MB R3B 1J1

B9. BID

- B9.1 The Bidder shall complete Form A: Bid, making all required entries.
- B9.2 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/her own name, his/her 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/her own, the business name and the name of every partner or corporation who is the owner of such business name shall be inserted.
- B9.2.1 If a Bid is submitted jointly by two or more persons, each and all such persons shall identify themselves in accordance with B9.2.
- B9.3 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.
- B9.4 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/her 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/her 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.
- B9.4.1 The name and official capacity of all individuals signing Form A: Bid should be printed below such signatures.
- B9.5 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.

B10. PRICES

- B10.1 The Bidder shall state a price in Canadian funds for each item of the Work identified on Form B: Prices.
- B10.2 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.
- B10.3 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.
- B10.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B11. QUALIFICATION

B11.1 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.

B11.2 The Bidder and any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

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

B11.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:

- (a) have successfully carried out work similar in nature, scope and value to the Work; and
- (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
- (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);

B11.4 Further to B11.3(c), the Bidder shall, within five (5) 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 Construction Safety Association of Manitoba or by the Manitoba Heavy Construction Association's WORKSAFELY™ COR™ 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 Division website at <http://www.winnipeg.ca/matmgt/>

B11.5 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.

B11.6 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.

B12. BID SECURITY

B12.1 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.

- B12.1.1 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.
- B12.1.2 All signatures on bid securities shall be original.
- B12.1.3 The Bidder shall sign the Bid Bond.
- B12.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.
- B12.2 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.
- B12.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B12.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B12.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B12.3 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.

B13. OPENING OF BIDS AND RELEASE OF INFORMATION

- B13.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.
 - B13.1.1 Bidders or their representatives may attend.
 - B13.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B12 will not be read out.
- B13.2 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 Division website at <http://www.winnipeg.ca/matmgt/>
- B13.3 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 Division website at <http://www.winnipeg.ca/matmgt/>
- B13.4 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.

B14. IRREVOCABLE BID

- B14.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B14.2 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.

B15. WITHDRAWAL OF BIDS

- B15.1 A Bidder may withdraw his/her Bid without penalty by giving written notice to the Manager of Materials at any time prior to the Submission Deadline.
- B15.1.1 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.
- B15.1.2 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.
- B15.1.3 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 B15.1.3(b), declare the Bid withdrawn.
- B15.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B14.2 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.

B16. EVALUATION OF BIDS

- B16.1 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, or acceptable deviation there from (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B11 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B7.
- B16.2 Further to B16.1(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.
- B16.3 Further to B16.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.
- B16.4 Further to B16.1(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.
- B16.4.1 Further to B16.1(a), in the event that a unit price is not provided on Form B: Prices, the City will determine the unit price by dividing the Amount (extended price) by the approximate quantity, for the purposes of evaluation and payment.

B17. AWARD OF CONTRACT

- B17.1 The City will give notice of the award of the Contract or will give notice that no award will be made.

- B17.2 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.
- B17.2.1 Without limiting the generality of B17.2, 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.
- B17.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B16.
- B17.3.1 Following the award of contract, a Bidder will be provided with information related to the evaluation of his/her Bid upon written request to the Contract Administrator.

PART C - GENERAL CONDITIONS

C1. GENERAL CONDITIONS

- C1.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C1.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C1.2 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 construction of the new Byng Place Outfall, Gate Chamber, and associated works.

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

(a) Construction of new Gate Chamber

(i) (Note: the Gates, Thimbles and Operator have been procured under a separate tender and will be supplied by the City of Winnipeg. Delivery of the thimbles is expected on December 15, 2013. Delivery of the gates, mechanical lift operator, stems and miscellaneous hardware is expected on February 1st, 2014. The contractor will be responsible for picking up these materials and transporting them to site. Materials will be stored at 360 McPhillips Street (beside the Wastewater Collection Building)

(b) Installation of 83.5 metres of 2700 mm dia. Pipe

(c) Riverbank stabilization utilizing shear key, rock fill columns, and rip rap.

(d) General Park Improvements

(e) Site Restoration

D3. CONTRACT ADMINISTRATOR

D3.1 The Contract Administrator is KGS Group, represented by:

Ray Offman, M.Sc, (CE), P.Eng.
Infrastructure Engineer/ Project Manager
3rd Floor – 865 Waverly Street

Telephone No. (204) 896-1209

Facsimile No. (204) 896-0754

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

D3.3 Bids Submissions must be submitted to the address in B8.8

D4. CONTRACTOR'S SUPERVISOR

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

D5. OWNERSHIP OF INFORMATION, CONFIDENTIALITY AND NON DISCLOSURE

D5.1 The Contract, all deliverables produced or developed, and information provided to or acquired by the Contractor are the property of the City and shall not be appropriated for the Contractors own use, or for the use of any third party.

- D5.2 The Contractor shall not make any public announcements or press releases regarding the Contract, without the prior written authorization of the Contract Administrator.
- D5.3 The following shall be confidential and shall not be disclosed by the Contractor to the media or any member of the public without the prior written authorization of the Contract Administrator;
- (a) information provided to the Contractor by the City or acquired by the Contractor during the course of the Work;
 - (b) the Contract, all deliverables produced or developed; and
 - (c) any statement of fact or opinion regarding any aspect of the Contract.
- D5.4 A Contractor who violates any provision of D5 may be determined to be in breach of Contract.

D6. NOTICES

- D6.1 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.
- D6.2 All notices, requests, nominations, proposals, consents, approvals, statements, authorizations, documents or other communications to the City, except as expressly otherwise required in D6.3, D6.4 or elsewhere in the Contract, shall be sent to the attention of the Contract Administrator at the facsimile number identified in D3.1.
- D6.3 Notwithstanding C21, all notices of appeal to the Chief Administrative Officer shall be sent to the attention of the Chief Financial Officer at the following facsimile number:
- The City of Winnipeg
Chief Financial Officer
Facsimile No.: 204 949-1174
- D6.4 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 facsimile number:
- The City of Winnipeg
Legal Services Department
Attn: Director of Legal Services
Facsimile No.: 204 947-9155

D7. FURNISHING OF DOCUMENTS

- D7.1 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/her at cost.

SUBMISSIONS

D8. AUTHORITY TO CARRY ON BUSINESS

- D8.1 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.

D9. SAFE WORK PLAN

- D9.1 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.
- D9.2 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 Division website at <http://www.winnipeg.ca/matmgt/Safety/default.stm>

D10. INSURANCE

- D10.1 The Contractor shall provide and maintain the following insurance coverage:
- (a) commercial general liability insurance, in the amount of at least two million dollars (\$2,000,000.00) inclusive, with The City of Winnipeg added as an additional insured, with a cross-liability clause, such liability policy to also contain contractual liability, unlicensed motor vehicle liability, non-owned automobile liability, broad form property damage cover and products and completed operations, to remain in place at all times during the performance of the Work and throughout the warranty period;
 - (b) if applicable, Automobile Liability Insurance covering all motor vehicles, owned and operated and used or to be used by the Contractor directly or indirectly in the performance of the Work. The Limit of Liability shall not be less than \$2,000,000 inclusive for loss or damage including personal injuries and death resulting from any one accident or occurrence.
 - (c) an all risks Installation Floater carrying adequate limits to cover all machinery, equipment, supplies and/or materials intended to enter into and form part of any installation.
- D10.2 Deductibles shall be borne by the Contractor.
- D10.3 The Contractor shall provide the City Solicitor with a certificate(s) of insurance, in a form satisfactory to the City Solicitor, at least two (2) Business Days prior to the commencement of any Work but in no event later than the date specified in C4.1 for the return of the executed Contract.
- D10.4 The Contractor shall not cancel, materially alter, or cause each policy to lapse without providing at least thirty (30) 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/her Bid was not a certified cheque or draft pursuant to B12.1(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 the General Conditions for the return of the executed Contract.\

D13. DETAILED WORK SCHEDULE

D13.1 The Contractor shall provide the Contract Administrator with a detailed work schedule 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 the General Conditions for the return of the executed Contract.

D13.2 The detailed work schedule shall consist of the following:

(a) A Gantt chart for the Work

D13.3 Further to D13.2 the Gantt chart shall clearly identify the start and completion dates of all of the following activities/tasks making up the work, separated by outfall Site:

- (a) Installation of temporary trench shoring
- (b) Installation of new outfall pipe
- (c) Riverbank stabilization works
- (d) Installation of slide gate
- (e) Completion of the new gate chamber
- (f) General Site Works
- (g) Site Restoration

SCHEDULE OF WORK

D14. COMMENCEMENT

D14.1 The Contractor shall not commence any Work until he/she is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.

D14.2 The Contractor shall not commence any Work on the Site until:

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the Safe Work Plan specified in D9;
 - (iv) evidence of the insurance specified in D10;
 - (v) the performance security specified in D11
 - (vi) the Subcontractor list specified in D12; and
 - (vii) the Detailed Work Schedule specified in D13.
- (b) 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.

D14.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D15. CRITICAL STAGES

- D15.1 The Contractor shall achieve the critical stage of the Work in accordance with the following requirements:
- (a) All work associated with the Riverbank Stability Improvements shall be completed by **March 15, 2014**
 - (b) All work associated with the Outfall Works shall be completed by **March 15, 2014**
 - (c) The positive gate and the portion of the gate chamber (as described below) must be completed by **March 15, 2014**. The gate chamber must be installed such that it is capable of controlling flows into the chamber due to elevated river levels from the annual spring flood; and to support the completion of the remaining works associated with the gate chamber. Any temporary pumping requirement after this date shall be borne by the contractor.

D16. SUBSTANTIAL PERFORMANCE

- D16.1 The Contractor shall achieve Substantial Performance by April 15, 2014
- D16.2 When the Contractor considers the Work to be substantially performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Substantial Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D16.3 The date on which the Work has been certified by the Contract Administrator as being substantially performed to the requirements of the Contract through the issue of a certificate of Substantial Performance is the date on which Substantial Performance has been achieved.

D17. TOTAL PERFORMANCE

- D17.1 The Contractor shall achieve Total Performance by June 15, 2014
- D17.2 When the Contractor or the Contract Administrator considers the Work to be totally performed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Total Performance. Any defects or deficiencies in the Work noted during that inspection shall be remedied by the Contractor at the earliest possible instance and the Contract Administrator notified so that the Work can be reinspected.
- D17.3 The date on which the Work has been certified by the Contract Administrator as being totally performed to the requirements of the Contract through the issue of a certificate of Total Performance is the date on which Total Performance has been achieved.

D18. LIQUIDATED DAMAGES

- D18.1 If the Contractor fails to achieve Critical Stages in accordance with the Contract by the day fixed herein for Critical Stages, the Contractor shall pay the City two thousand dollars (\$2,000) per Calendar Day for each and every Calendar Day following the day fixed herein for Critical Stages during which such failure continues.
- (a) The amount specified for liquidated damages in D18.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Critical Stages by the day fixed herein for same.
- D18.2 If the Contractor fails to Substantial Performance in accordance with the Contract by the day fixed herein for Substantial Performance, the Contractor shall pay the City one thousand five hundred dollars (\$1,500) per Working Day for each and every Working Day following the day fixed herein for Substantial Performance during which such failure continues.

- (a) The amount specified for liquidated damages in D18.1 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Critical Stages and Substantial Performance by the day fixed herein for same.

D18.3 If the Contractor fails to achieve Total Performance in accordance with the Contract by the day fixed herein for Total Performance, the Contractor shall pay the City five hundred dollars (\$500) per Working Day for each and every Working Day following the day fixed herein for Total Performance during which such failure continues.

- (a) The amount specified for liquidated damages in D18.3 is based on a genuine pre-estimate of the City's damages in the event that the Contractor does not achieve Total Performance by the day fixed herein for same.

D18.4 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D19. SCHEDULED MAINTENANCE

D19.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:

- (a) Maintenance of GrassPave access road following manufactures recommendations until established,
- (b) Watering and maintaining of all new trees and vegetation until established.
- (c) Removal struts and bracing for internal pipe support once directed by Contract Administrator,

D19.2 Determination of Substantial Performance and Total Performance shall be exclusive of scheduled maintenance identified herein. All scheduled maintenance shall be completed prior to the expiration of the warranty period. Where the scheduled maintenance cannot be completed during the warranty period, the warranty period shall be extended for such period of time as it takes the Contractor to complete the scheduled maintenance.

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/she deems it necessary.

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

D21.1 Further to C6.24, 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).

D22. THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA) – QUALIFICATIONS

D22.1 Further to B11.4, the Contractor/Subcontractor must, throughout the term of the Contract, have a Workplace Safety and Health Program meeting the requirements of The Workplace Safety and Health Act (Manitoba). At any time during the term of the Contract, the City may, at its sole discretion and acting reasonably, require updated proof of compliance, as set out in B11.4.

MEASUREMENT AND PAYMENT

D23. PAYMENT

- D23.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D24. WARRANTY

- D24.1 Warranty is as stated in C13.

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 for

BID OPPORTUNITY NO. 915-2013

CONSTRUCTION OF THE NEW BYNG PLACE OUTFALL AND GATE CHAMBER AND RIVERBANK STABILITY IMPROVEMENTS- COCKBURN /CALROSSIE COMBINED SEWER RELIEF WORKS

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 as to Principal if no seal)

(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
Legal Services Department
185 King Street, 3rd Floor
Winnipeg MB R3B 1J1

RE: PERFORMANCE SECURITY - BID OPPORTUNITY NO. 915-2013

CONSTRUCTION OF THE NEW BYNG PLACE OUTFALL AND GATE CHAMBER AND
RIVERBANK STABILITY IMPROVEMENTS- COCKBURN /CALROSSIE COMBINED SEWER RELIEF
WORKS

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 (2007 Revision), International Chamber of Commerce Publication Number 600.

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

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.
- E1.3 The City of Winnipeg Standard Construction Specifications is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- E1.4 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.5 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over The City of Winnipeg Standard Construction Specifications.
- E1.6 The following are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>
	Cover Sheet
LD-7231	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Outfall (RR-37B) - Plan and Profile
LD-7232	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Outfall (RR-37B) - Outfall Details
LD-7233	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Outfall (RR-37B) - Miscellaneous Details
LD-7234	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Outfall (RR-37B) – Riverbank Remediation: Plan
LD-7235	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Outfall (RR-37B) – Riverbank Remediation: Section and Details
LD-7236	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Gate Chamber (RR-37B) – Structural: Plans
LD-7237	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Gate Chamber (RR-37B) – Structural: Sections & Details
LD-7238	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Gate Chamber (RR-37B) – Structural: Reinforcing Details
LD-7239	Cockburn/Calrossie Combined Sewer Relief Works – New Byng Place Gate Chamber (RR-37B) – Structural: Misc Metals Details
LD-7240	Toilers Park Architectural Upgrades

E2. SOILS INVESTIGATION REPORT

- E2.1 Further to C3.1,
- (a) Geotechnical test holes have been drilled in the vicinity of the proposed Works for the Byng outfall site to determine the character of the subsurface soil to facilitate the design of the Work. The information listed is considered accurate at the locations indicated and at the time of the investigation. However, considerable variations in the soil conditions may exist between test holes and fluctuations in ground water levels can be expected seasonally. Test hole logs are included as an appendix.

- (b) Bidders are responsible for any interpretation they place on the supplied information and are expected to make such additional investigation of the soil at each of the Sites as they feel necessary to satisfy themselves.
- (c) Any test borings made by the Bidder shall be done in accordance with the requirements of the appropriate authority of the City of Winnipeg. Bidders shall notify the Contract Administrator prior to starting any soil boring operation.

GENERAL REQUIREMENTS

E3. OFFICE FACILITIES

- E3.1 The Contractor shall supply a site trailer with available office space for use by the Contract Administrator.
- E3.2 The office facility shall meeting the following requirements:
 - (a) The field office shall be for the exclusive use of the Contract Administrator and City staff and will be used for weekly site meetings.
 - (b) The building shall be conveniently located near the Site of the Work.
 - (c) The building shall have a minimum floor area of 25 square metres, two windows and a door entrance with a suitable lock.
 - (d) The building shall be suitable for all weather use. It shall be equipped with an electric heater and air conditioner so that the room temperature can be maintained between either 16-18°C or 24-25 °C.
 - (e) The building shall be adequately lighted with fluorescent fixtures and have a minimum of three wall outlets.
 - (f) The building shall be furnished with two desks, one drafting tables, table 3m X 1.2m, one stool, one two drawer legal size filing cabinet, and a minimum of 12 chairs.
 - (g) A portable toilet shall be located near the field office building. The toilet shall have a locking door.
 - (h) The field office building and the portable toilet shall be cleaned on a weekly basis immediately prior to each Site meeting. The Contract Administrator may request additional cleaning when he deems it necessary.
- E3.3 Payment
 - (a) Payment for the office facility will be considered incidental to site development and restoration.

E4. SHOP DRAWINGS

- E4.1 Description
 - (a) This Specification shall revise, amend and supplement the requirements of CW 1100.
 - (i) The term 'shop drawings' means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including Site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the Work.
 - (ii) The Contractor shall submit specified shop drawings to the Contract Administrator for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be show on all submissions for Engineering review.
 - (b) Shop Drawings
 - (i) Original drawings are to be prepared by Contractor, SubContractor, Supplier, Distributor, or Manufacturer, which illustrate appropriate portion of Work; showing fabrication, layout, setting or erection details as specified in appropriate sections.
 - (ii) Shop drawings for the following structural components shall bear the seal of a Registered Professional Engineer in the Province of Manitoba.

- (a) Shoring.
 - (b) Reinforcing steel.
 - (c) Metal Fabrications.
- (c) Contractor's Responsibilities
 - (i) Review shop drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.
 - (ii) Verify:
 - (a) Field Measurements
 - (b) Field Construction Criteria
 - (c) Catalogue numbers and similar data
 - (iii) Coordinate each submission with requirements of Work and Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.
 - (iv) Notify Contract Administrator, in writing at time of submission, of deviations from requirements of Contract Documents.
 - (v) Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator's review of submission, unless Contract Administrator gives written acceptance of specified deviations.
 - (vi) Responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.
 - (vii) The Contractor shall make any corrections required by the Contract Administrator and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Contract Administrator on previous submission.
 - (viii) After Contract Administrator's review and return of copies, distribute copies to subtrades as appropriate.
 - (ix) Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the Site of the Work for use and reference of the Contract Administrator and SubContractors.
- (d) Submission Requirements
 - (i) Schedule submissions at least 14 Calendar Days before dates reviewed submissions will be needed, and allow for a 14 Calendar Day period for review by the Contract Administrator of each individual submission and re-submission, unless noted otherwise in the Contract Documents.
 - (ii) Submit five (5) paper prints of shop drawings. The Contractor is advised that the Contract Administrator will retain three (3) copies of all submittals and return two (2) copies to the Contractor.
 - (iii) Accompany submissions with transmittal letter, containing:
 - (a) Date
 - (b) Project title and Bid Opportunity number
 - (c) Contractor's name and address
 - (d) Number of each shop drawing, product data and sample submitted
 - (e) Specification Section, Title, Number and Clause
 - (f) Drawing Number and Detail/Section Number
 - (g) Other pertinent data
 - (iv) Submissions shall include:
 - (a) Date and revision dates.
 - (b) Project title and Bid Opportunity number.
 - (c) Name of:
 - (a) Contractor
 - (b) SubContractor
 - (c) Supplier
 - (d) Manufacturer
 - (e) Separate detailer when pertinent

- (d) Identification of product of material.
 - (e) Relation to adjacent structure or materials.
 - (f) Field dimensions, clearly identified as such.
 - (g) Specification section name, number and clause number or drawing number and detail/section number.
 - (h) Applicable standards, such as CSA or CGSB numbers.
 - (i) Contractor's stamp, initialed or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.
- (e) Other Considerations
- (i) Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.
 - (ii) Material and equipment delivered to the Site of the Works will not be paid for at least until pertinent shop drawings have been submitted and reviewed.
 - (iii) Incomplete shop drawing information will be considered as stipulated deductions for the purposes of progress payment certificates.
 - (iv) No delay or cost claims will be allowed that arise because of delays in submissions, re-submissions and review of shop drawings.

E5. TRUCK WEIGHT LIMITS

- E5.1 The City shall not pay for any portion of material which results in the vehicle exceeding the maximum gross vehicle weight allowed under The City of Winnipeg Traffic By-Law, unless such vehicle is operating under special permit.

E6. DANGEROUS WORK CONDITIONS

- E6.1 Further to clause C 6.24 of the General Conditions, the Contractor shall be aware that underground chambers, manholes, and sewers are considered a confined space and shall follow the "Guidelines for confined Entry Work" as published by the Manitoba Workplace Safety and Health Division.
- E6.2 The Contractor shall be aware of the potential hazards that can be encountered in gate chambers, manholes and sewers such as explosive gases, toxic gases and oxygen deficiency.
- E6.3 The air in a confined space must be tested before entry and continuously during the time that personnel are inside the space. Equipment for continuous monitoring of gases must be explosion-proof and equipped with a visible and audible alarm. The principal tests are for oxygen deficiency, explosion range and toxic gases. Testing equipment must be calibrated in accordance with manufacturer's specifications.
- E6.4 The Contractor shall ventilate all confined spaces including underground chambers, tunnels, pipes and shafts as required and approved by the Manitoba Workplace Safety and Health Act (the "Act"). If no ventilation is supplied, a Worker must wear a respirator or supplied air to enter the confined space.
- E6.5 Workers must wear a respirator or supplied air at all times when entering a chamber, manhole or sewer where live sewage is present.
- E6.6 The Contractor shall provide a photoionization detector (PID) on Site at all times to monitor potential hydrocarbon vapours in the confined spaces. The gas detector and safety equipment conforming to the Act shall be made available to the Contract Administrator for his use during inspections. In addition, the Contract Administrator shall collect discrete air samples for laboratory analysis.
- E6.7 The Contract Administrator may issue a Stop Work order to the Contractor if the above guidelines are not being followed. The Contractor shall not resume his operations until the Contract Administrator is satisfied the Contractor is following the appropriate procedures. The Contractor

shall have no claim for extra time or costs due to the Stop Work order for not following these safety guidelines.

E7. TRAFFIC MANAGEMENT

E7.1 Further to clause 3.7 of CW 1130:

E7.1.1 Maintain both lanes of traffic open on Riverside Drive during the Works.

E7.1.2 No stockpiling of material will be permitted on the roadway.

E7.1.3 Intersecting street and private approach access shall be maintained at all times.

E7.1.4 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he shall review the planned disruption with the business or residence and the Contract Administrator, and take reasonable measures to minimize the impact. The Contractor shall provide a minimum of 24 hours notification to the affected residence or business and the Contract Administrator, prior to disruption of access.

E7.1.5 Pedestrian access on west side of Riverside Drive and ambulance/emergency vehicle access must be maintained at all times.

E7.2 Payment

- (a) No separate pay item exists for this work. All work associated with Traffic Management is considered incidental to Site Development and Restoration.

E8. WATERWAY BY-LAW AND PERMITS

E8.1 The Contractor shall note that all Works fall within 107 metres (350 feet) of the regulated summer water level of the Red River and Assiniboine River and are therefore within the jurisdiction of the Waterway By-law. The Contract Administrator will apply and arrange for payment by the City for the required Waterway Permits for the permanent Work. The Contractor shall adhere to restrictions imposed by the permit.

E8.2 The Contractor shall be responsible to apply and pay for a Waterway Permit for all temporary Works including construction access ramps as outlined in E10.3.

E8.3 Under no circumstances will stockpiling of any material be permitted within 107 metres of the regulated summer water level of the Red River.

E9. ENVIRONMENTAL PROTECTION PLAN

E9.1 The Contractor shall plan and implement the Work of this Contract strictly in accordance with the requirements of the Environmental Protection Plan as herein specified, Fisheries Authorization & CEAA Screening report.

E9.2 The Contractor is advised that at least the following Acts, Regulations, and By-laws apply to the Work and are available for viewing at the office of the Contract Administrator.

(a) Federal

- (i) Canadian Environmental Assessment Act (CEAA) c.37
- (ii) Transportation of Dangerous Goods Act and Regulations c.34
- (iii) The Fisheries Act
- (iv) Navigable Waters Protection Act

(b) Provincial

- (i) The Dangerous Goods Handling and Transportation Act D12
- (ii) The Endangered Species Act E111
- (iii) The Environment Act c.E125

- (iv) The Fire Prevention Act F80
 - (v) The Manitoba Heritage Resources Act H39.1
 - (vi) The Manitoba Noxious Weeds Act N110
 - (vii) The Manitoba Nuisance Act N120
 - (viii) The Public Health Act c.P210
 - (ix) The Workplace Safety and Health Act W210
 - (x) And current applicable associated regulations.
- (Note: Provincial regulations updated as of September 1999)

- (c) Municipal
 - (i) The City of Winnipeg By-law No. 1/2008
 - (ii) And any other applicable Acts, Regulations, and By-Laws.

E9.3 The Contractor is advised that the following environmental protection measures apply to the Work.

- (a) Materials Handling and Storage
 - (i) Construction materials shall not be deposited or stored on riverbanks or river shorelines unless written acceptance from the Contract Administrator is received in advance.
 - (ii) Construction materials and debris shall be prevented from entering the Red River and Assiniboine River. In the event that materials and/or debris inadvertently enter the watercourse, the Contract shall be required to remove the material and restore the watercourse to its original condition.
- (b) Fuel Handling and Storage
 - (i) The Contractor shall obtain all necessary permits from Manitoba Conservation for the handling and storage of fuel products and shall provide copies to the Contract Administrator.
 - (ii) 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.
 - (iii) 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.
 - (iv) In accordance with Section 2.5 (Construction: General Guidelines) of the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, (DFO and DNR, 1996), the Contractor shall ensure that any temporary fuel storage areas established for construction of the project are contained by an impermeable dike and are located a minimum distance of 100 metres away from the high water line of the Red River. Dikes shall be designed, constructed, and maintained to retain not less than 100% of the capacity of the total number of containers or 110% of the largest container, whichever is greatest. The dikes shall be constructed of clay or similar impervious material. If this type of material is not available, the dike shall be constructed of locally available material and lined with high density polyethylene (HDPE). Furthermore, the fuel storage area(s) shall be secured by a barrier such as a high fence and gate to prevent vandalism.
 - (v) The Contractor shall ensure that all fuel storage containers are inspected daily for leaks and spillage.
 - (vi) Products transferred from the fuel storage area(s) to specific Work Sites shall not exceed the daily usage requirement.
 - (vii) 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.
 - (viii) Refuelling of mobile equipment and vehicles shall take place at least 100 metres from a watercourse.
 - (ix) 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.

- (x) 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.
- (c) Waste Handling and Disposal
 - (i) The construction area shall be kept clean and orderly at all times during and at completion of construction.
 - (ii) 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.
 - (iii) All resulting debris shall be deposited at a Waste Disposal Ground operating under the authority of Manitoba Regulation #150/91. Exceptions are liquid industrial and hazardous wastes which may require special disposal methods (see SC:21.4 D).
 - (iv) Indiscriminate dumping, littering, or abandonment shall not take place.
 - (v) No on-site burning of waste is permitted.
 - (vi) Waste storage areas shall not be located so as to block natural drainage.
 - (vii) Run-off from a waste storage area shall not be allowed to cause siltation of a watercourse.
 - (viii) Waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.
 - (ix) Equipment shall not be cleaned near watercourses; contaminated water from onshore cleaning operations shall not be permitted to enter watercourses.
- (d) Dangerous Goods/Hazardous Waste Handling and Disposal
 - (i) Dangerous goods/hazardous wastes are identified by, and shall be handled according to, The Dangerous Goods Handling and Transportation Act and Regulations.
 - (ii) The Contractor shall be familiar with The Dangerous Goods Handling and Transportation Act and Regulations.
 - (iii) The Contractor shall have on-site staff that is trained and certified in the handling of the dangerous/hazardous goods, when said dangerous/hazardous goods are being utilized on-site for the performance of the Work.
 - (iv) Different waste streams shall not be mixed.
 - (v) Disposal of dangerous goods/hazardous wastes shall be at approved hazardous waste facilities.
 - (vi) Liquid hydrocarbons shall not be stored or disposed of in earthen pits on-site.
 - (vii) Used oils shall be stored in appropriate drums, or tankage, until shipment to waste oil recycling centres, incinerators, or secure disposal facilities approved for such wastes.
 - (viii) Used oil filters shall be drained, placed in suitable storage containers, and buried or incinerated at approved hazardous waste treatment and disposal facilities.
 - (ix) Dangerous goods/hazardous waste storage areas shall be located at least 100 metres away from the high water line and be dyked.
 - (x) Dangerous goods/hazardous waste storage areas shall not be located so as to block natural drainage.
 - (xi) Run-off from a dangerous goods/hazardous waste storage area shall not be allowed to cause siltation of a watercourse.
 - (xii) Dangerous goods/hazardous waste storage areas shall be left in a neat and finished appearance and/or restored to their original condition to the satisfaction of the Contract Administrator.
- (e) Emergency Response
 - (i) The Contractor shall ensure that due care and caution is taken to prevent spills.
 - (ii) The Contractor shall report all major spills of petroleum products or other hazardous substances with significant impact on the environment and threat to human health and safety (as defined in Table 1 below) to Manitoba Conservation, immediately after

- occurrence of the environmental accident, by calling the 24-hour emergency phone number (204) 945-4888. The Contract Administrator shall also be notified.
- (iii) The Contractor shall designate a qualified supervisor as the on-site emergency response co-ordinator for the project. The emergency response co-ordinator shall have the authority to redirect manpower in order to respond in the event of a spill.
 - (iv) 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 co-ordinator:
 - (i) Notify emergency-response co-ordinator 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, Police, Fire Department, Ambulance, company backup)
 - (ii) Attend to public safety:
 - ◆ stop traffic, roadblock/cordon off the immediate danger area
 - ◆ eliminate ignition sources
 - ◆ initiate evacuation procedures if necessary
 - (iii) 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, sewers, and manholes
 - (iv) 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
 - ◆ dike spill material with dry, inert sorbet material or dry clay soil or sand
 - ◆ prevent spill material from entering waterways and utilities by diking
 - ◆ prevent spill material from entering manholes and other openings by covering with rubber spill mats or diking. Resume any effective action to contain, clean up, or stop the flow of the spilled product.
 - (v) The emergency response co-ordinator shall ensure that all environmental accidents involving contaminants shall be documented and reported to Manitoba Conservation according to The Dangerous Goods Handling and Transportation Act Environmental Accident Report Regulation 439/87.
 - (vi) When dangerous goods are used on-site, materials for containment and cleanup of spill material (e.g. absorbent materials, plastic oil booms, and oversized recovery drums) shall be available on-site.
 - (vii) Minor spills of such substances that may be contained on land with no significant impact on the environment may be responded to with in-house resources without formal notification to Manitoba Environment.
 - (viii) City emergency response, 9-1-1, shall be used if other means are not available.
 - (ix) The on-site emergency response coordinator shall contact The Canadian Coast Guard, Selkirk (204) 785-6030, if the spill material reaches and is on or in the Red or Assiniboine Rivers.

Table 1 Spills that must be reported to the Manitoba Conservation as Environmental Accidents

<u>Classification</u>	<u>Hazard</u>	<u>Reportable Quantity/Level</u>
1	Explosives	All
2.1	Compressed Gas (flammable)	100 L*
2.2	Compressed Gas	100 L*
2.3	Compressed Gas (toxic)	All
2.4	Compressed Gas (corrosive)	All
3	Flammable Liquids	100 L
4	Flammable Solids	1 kg
5.1	PG** I & II PG III	Oxidizer 1 kg or 1 L 50 kg or 50 L
5.2	Organic Peroxide	1 kg or 1 L
6.1	PG I PG II & III	Acute Toxic 1 kg or 1 L 5 kg or 5 L
6.2	Infectious	All
7	Radioactive	Any discharge or radiation level exceeding 10 mSv/h at the package surface and 200 uSv/h at 1 m from the package surface
8	Corrosive	5 kg or 5 L
9.1	Miscellaneous	50 kg (except PCB mixtures)
9.1	PCB Mixtures	500 g
9.2	Aquatic Toxic	1 kg or 1 L
9.3	Wastes (Chronic Toxic)	5 kg or 5 L

* Container capacity (refers to container water capacity)

** PG = Packing Group(s)

(f) Vegetation

- (i) Vegetation shall not be distributed without written permission of the Contract Administrator. The Contractor shall protect plants or trees which may be at risk of accidental damage. Such measures may include protective fencing or signage and shall be approved in advance by the Contractor Administrator.
- (ii) Trees damaged during construction activities shall be examined by bonded tree care professionals; viable trees damaged during construction activities shall be pruned according to good practise by bonded tree care professionals. Damaged trees which are not viable shall be replaced at the expense of the Contractor.
- (iii) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400 millimetre wood planks, or suitably protected as approved by the Contract Administrator.
- (iv) Herbicides and pesticides shall not be used adjacent to any surface watercourses.
- (v) All landowners adjacent to the area of application of herbicides or pesticides shall be notified prior to the Work.
- (vi) Trees or shrubs shall not be felled into watercourses.
- (vii) Areas where vegetation is removed during clearing, construction, and decommissioning activities, shall be revegetated as soon as possible in accordance with the landscaping plans forming part of the contract, or as directed by the Contract Administrator.

- (g) Red and Assiniboine Rivers Navigation Protection
Dangerous Goods/Hazardous Waste Handling and Disposal
- (a) The Red and Assiniboine Rivers are open to navigation from approximately mid April to mid November, annually. During this period, it will be the responsibility of the Contractor to fully ensure the safety of river users.
 - (b) The Contractor shall provide, install, and maintain adequate warning signs and lighting on any structure beyond the water's edge to notify boats and other craft navigating on the Red River that construction is underway. These warnings shall meet the requirements of the City of Winnipeg Waterways Authority and of the Canadian Coast Guard.
 - (c) Prior to commencing any applicable operations over the Red River, the Contractor shall provide to the Contract Administrator a copy of all necessary approvals received by the Contractor.

E10. SITE DEVELOPMENT AND RESTORATION

E10.1 Description

- E10.1.1 This Specification shall cover all aspects of the Site Development and Restoration Work, including but not limited to mobilization and demobilization, erection, maintenance and removal of safety fencing, traffic control and signage, sediment control Works, snow clearing, flow control, temporary cofferdams, protection of existing trees, removal of fallen trees and debris, relocate existing site furniture, office facilities, general access development, access maintenance and removal, and Site restoration.

E10.2 Materials

E10.2.1 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the Work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good Working order, and have sufficient standby equipment available at all times, as required.

E10.3 Construction Methods

E10.3.1 Site and Construction Access

- (a) The Contractor shall be responsible to develop suitable Site access. This includes but is not limited to, temporary bridging over structures, temporary removal and reinstallation of safety fencing, any landscaping and grading repairs, restoration of vegetation, etc. necessary to restore any Site and construction access areas to their pre-existing condition. Prior to commencing construction the Contractor shall submit their site access plan to the Contract Administrator for approval.
- (b) All construction access ramps from the top bank area down to the edge of the river shall be constructed by excavating to the necessary ramp grade and disposing of the material off Site. Under no circumstances will the excavated material or any additional materials be placed as fill in the ramp area. Detailed construction access ramp drawings are to be submitted to the Contract Administrator for approval a minimum seven (7) days prior to any construction activity on Site.
- (c) The Contractor is responsible for obtaining and paying for all required permits and permissions that are necessary for Site access, including a Waterways Permit, if required by the City of Winnipeg. Contact the Riverbank Management Contract Administrator at 986-5159 for information regarding Waterways Permits.
- (d) The locations of the Contractor's construction access ramps shall be restored to the same condition or better than it was prior to the initiation of any Work.

E10.3.2 Frozen Waterways Permit

The Contractor is responsible for obtaining a Frozen Water Permit for permission to Work on the river ice. Contact the City of Winnipeg Police Service.

E10.3.3 Diversion of Flows

Flows such as snowmelt, rainfall, a watermain break, or any other flow traveling through the outfall shall be diverted during construction as specified in this Specification. The cost of the flow diversion is considered incidental to the installation of the pipe.

E10.3.4 Temporary Cofferd Dam

The Contractor shall erect a temporary cofferdam to provide a safe environment to carry out the Work associated with this project. Cofferdam shall be constructed in the manner shown on the drawings. Material for the cofferdam shall be inspected and approved by the Contract Administrator before construction. Cofferdam materials shall be completely removed following construction.

E10.3.5 Vegetation Removal

Some vegetation (living trees smaller than 50 mm, fallen larger trees and sod) removal may be permitted in order to facilitate Site access. Existing vegetation shall not be removed without prior approval from the Contract Administrator. The Contractor shall load and haul any removed vegetation, and dispose of the material off Site immediately upon collection. Stockpiling shall not be permitted unless written approval has been obtained from the Contract Administrator.

E10.3.6 Snow and Ice Removal

Snow cover shall be cleared from the riverbank and hauled off-site prior to placement of the rockfill riprap. The methodology to clear the snow shall be subject to the approval of the Contract Administrator.

Ice at the shoreline of the River shall be broken and cleared before the placement of riprap below ice level. Care shall be taken to ensure that the ice is removed, and does not become trapped below rockfill riprap placement.

E10.3.7 Safety Fence

The Contractor shall erect and maintain for the duration of the project a safety fence, acceptable to the Contract Administrator, to restrict access to the Site. The fencing shall enclose the entire Site with appropriate gates or openings that are closed at the end of each Work day. Appropriate signs shall be erected to warn all recreational users of the river that an open water hazard exists. This shall include but not be limited to snowmobilers and skiers. The installed fencing shall consist of Dupont Number L70 orange plastic safety fence or approved equal in accordance with B7, with a mesh spacing of 45 mm, constructed as shown in the Drawings. Upon completion of the Work, the fence shall be removed and disposed of off Site.

E10.3.8 Environmental Regulations

- (a) The Contractor shall adhere to all relevant Federal and Provincial environmental regulations.
- (b) The Contractor shall plan to Work in accordance with the current environmental regulations of "Manitoba Stream Crossing Guidelines for Protection of Fish and Fish Habitat", Fisheries and Oceans, and Manitoba Natural Resources.
- (c) The Contractor shall supply, in writing, prior to commencement of Work on-site, a detailed plan for sediment control on this project.
- (d) The Contractor shall ensure that a sufficient supply of suitable spill kits are on-site to cleanup minor spills, should they occur. The Contractor shall supply the name, address and phone number of a local supplier, where additional kits are available on short notice.

E10.3.9 General Site Cleanup and Restoration

- (a) All areas of the construction Site shall be restored to a condition at least equivalent to its original condition prior to initiation of Work. This may include, but is not necessarily limited to the Contractor's lay down area, the removal of the Contract Administrator Site trailer, and removal of all temporary fencing.

E10.3.10 Topsoil and Sod

All topsoil and sodding Work shall be performed in accordance with CW 3510. Topsoil and Sodding Work shall include all existing grassed areas disturbed by the Contractor during construction. The Contractor shall restore all areas disturbed during construction to existing condition or better, using topsoil and sod at his own cost.

E10.4 Method of Measurement and Payment

Site Development and Restoration

The Site development and restoration will be measured and paid for at the Contract Lump Sum Price for "Site Development and Restoration", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification.

50% of the Site Development and Restoration unit price will be paid on the first progress payment following commencement of the work on the specific Site being developed.

The remaining 50% of the Site Development and Restoration unit price will be paid subsequent to the completion of the Work and restoration and clean up of the Site

E11. FLOW CONTROL

E11.1 Description

- E11.1.1 During winter months land drainage and storm relief sewers can receive flow of an undetermined amount from groundwater infiltration, watermain breaks, snow melt and other unforeseen sources.
- E11.1.2 Provide flow control measures to contend with and maintain flows in the 600 mm diameter storm relief outfall and overland flows and groundwater within all the excavations. Flow control measures shall include but not be limited to diversions, flumes and by-pass pumping.
- E11.1.3 Discharge hoses for by-pass pumping shall not be laid across vehicle or pedestrian traffic areas and must be protected from freezing during winter months. Pumping equipment if used, shall be set-up in a location and in such a way to not be a noise problem for nearby residences
- E11.1.4 **Provide a flow control plan to the Contract Administrator for review before removing any existing sewer pipe.**
- E11.1.5 In the event the flow in the sewer system is expected to exceed the sewer capacity due to spring runoff, the Contract Administrator may suspend Work activities that require temporary by-pass pumping and temporary shutdown of the Site. Suspension of these activities will continue until the high flow diminishes in the sewer.
- E11.1.6 If in the opinion of the Contract Administrator suspension of Work activities that require temporary by-pass pumping and temporary shutdown of the Site may cause a delay in completion of the Work through no fault of the Contractor, the completion date of the Work will be adjusted accordingly.

E11.2 Payment

- E11.2.1 Payment for flow control shall be included under the item "Site Development and Restoration".

E12. CHANNEL PROTECTION

The ice surface and riverbank channel shall be cleared of construction materials prior to ice break-up. The Contractor shall clean up all materials, including but not limited to: soil, snow fence, construction debris, etc. from this construction activity. All items that will have an adverse impact on the channel shall be removed. Channel Protection shall be considered incidental to the Works of this Contract and no measurement or payment will be made for this item.

E13. INSTALLATION OF SILT FENCE

E13.1 Description

E13.1.1 This specification covers the erection of temporary silt fencing, which shall be installed and maintained at the locations shown on the drawings to control runoff and minimize the release of detrimental silt loading to watercourses.

E13.1.2 The scope Work included in this specification is as follows:

- (a) Supply and Install temporary silt fencing at the locations as indicated on the Drawings, in accordance with the detailed drawing provided, immediately upon completion of the riprap placement and prior to undertaking any other activities on the Site where silt fencing is required.
- (b) Maintain the silt fencing in serviceable condition throughout the entire duration of activities at the Site where silt fencing is required, including final restoration and cleanup of the construction Site.
- (c) Remove the silt fencing and restore the area where the fencing was installed, without further disturbing the area and without releasing any deleterious substances to the adjacent watercourse.

E13.2 Materials

E13.2.1 Fence Posts

- (a) Fence posts shall be 100 mm diameter untreated wood posts or 50 mm diameter steel.

E13.2.2 Filter Fabric

- (a) Filter Fabric Shall be a woven geotextile material specifically designed for a silt fence applications, meeting the following minimum requirements:

Property	Test Method	Value
Grab Tensile Strength	ASTM D 4632	0.55 kN
Grab Tensile Elongation	ASTM D 4632	15%
Mullen Burst	ASTM D 4786	2060 kPa
Puncture	ASTM D 4833	0.285 kN
Trapezoid Tear	ASTM D 4533	0.285 kN
UV Resistance	ASTM D 435	5 80 % @ 500 hrs
Apparent Opening Size (AOS)	ASTM D 4751	0.60 mm
Flow Rate	ASTM D 4491	405 l/min/m ²

Acceptable Product: "Amoco 2130 Silt Fence Fabric" or approved equal in accordance with B7.

E13.2.3 Wire Mesh

- (a) Wire mesh shall be galvanized or plain metal with wire gauge = 3.0 mm, wire spacing @ 150 mm o/c.

E13.2.4 Fencing Material Fasteners

- (a) Staples or wire ties of sufficient strength and spacing to withstand 500 N (100 lbf) pull test at any point on the wire mesh.

E13.3 Construction Methods

E13.3.1 Ensure that no deleterious substances are discharged into the adjacent watercourse at any time during construction activities.

E13.3.2 Silt Fence Installation

- (a) Excavate 150 x 150 anchor trench along alignment of silt fence as indicated.
- (b) Install fence posts as indicated. Ensure that fence posts are firmly driven into undisturbed soil, or are completely and firmly backfilled if installed via auger methods. Attach wire mesh as support backing for silt fence filter fabric with fasteners as specified in E13.2.4. Attach silt fence filter fabric on top of wire mesh in similar fashion. Overlap any fence seams (wire mesh or filter fabric) by 450 mm minimum. Ensure that wire mesh and filter fabric are installed on the upslope side of the post and are fully laid in anchor trench as shown.
- (c) Install and compact impermeable excavated materials into anchor trench and slope as indicated. Compact to 95% of maximum dry density (ASTM D-698).

E13.3.3 Silt Fence Maintenance

- (a) Inspect silt fence daily, prior to starting any other construction activities. If fence posts are found loose or not upright, repair in accordance with installation procedure as specified in E13.3.2. If silt fence is found to be loose or torn, repair or replace as necessary to comply with E13.3.2.
- (b) If silt deposition at the fence is 300 mm or more in depth, carefully remove and dispose of silt offsite without disturbing silt fence.

E13.3.4 Silt Fence Removal

- (a) The silt fence shall remain in place until new vegetation growth has established on the bank, as determined by the Contract Administrator.
- (b) Upon authorization of the Contract Administrator, remove all fence posts, wire mesh, fabric, and fasteners from Site.
- (c) Restore areas disturbed in accordance with E10 without releasing any deleterious substances to the adjacent watercourse.

E13.4 Measurement and Payment

E13.4.1 The supply, placement, and removal of silt fence shall be measured on a length basis and paid for at the Contract Unit Price per lineal metre for "Silt Fence". The length to be paid for shall be the total number of metres supplied and placed in accordance with this Specification, accepted and measured by the Contract Administrator. Payment of silt fence shall be in accordance with the following payment schedule:

- (a) Sixty percent (60%) of the Contract Unit Price per lineal metre for "Silt Fence" shall be paid following supply and installation.
- (b) Forty percent (40%) of the Contract Unit Price per lineal metre for "Silt Fence" shall be paid following final removal.

E13.4.2 Removal of accumulated sediment from the silt fence is considered incidental to the Work and no separate measurement or payment will be made.

E14. STRAW MULCH

E14.1 Description

E14.1.1 This Specification shall cover the supply and placement of straw mulch on all areas of the riverbank to provide temporary erosion protection where existing vegetation has been removed.

E14.2 Materials

E14.2.1 The material shall consist of wheat or barley straw, or other plants approved by the Contract Administrator. The straw mulch shall be air dried, reasonably light in colour, and shall not be musty, mouldy, caked or otherwise of low quality. The mulch shall be free of coarse (chaff) material and free of noxious weeds and/or seeds to prevent the introduction of weeds into previously seeded and planted areas. Dry mulching material that breaks down and does not bend will not be acceptable. The power mulching process shall produce a minimum of 75% of the straw being between 150 mm and 200 mm in length.

E14.3 Construction Methods

E14.3.1 General

- (a) The Contractor shall supply and place straw mulch material immediately after final grading is completed and prior to March 31 of any year.
- (b) Straw mulch shall be placed ensuring that there is a minimum of 90% ground coverage by area, as measured and accepted by the Contract Administrator.
- (c) Mulched areas shall be inspected periodically and after runoff producing storm events. Damaged areas shall be repaired immediately as determined by the Contract Administrator. Areas requiring remulching as directed by the Contract Administrator will be re-measured and additionally paid for at the Contract Unit Price for the Work item.

E14.3.2 Spreading of Straw Mulch Material

- (a) The straw mulch material shall be spread at a rate of 0.45 kg/m², to a layer 25 to 50 mm in thickness. Mulch that remains clumped or bunched after application shall be separated and respread.

E14.3.3 Removal of Straw Mulch

- (a) Immediately prior to placement of topsoil and sod and/or topsoil and seed all straw mulch shall be removed and disposed of off Site.

E14.4 Measurement and Payment

E14.4.1 Supply placement and removal of straw mulch will be measured on an area basis and paid for at the Contract Unit Price for "Straw Mulch". The area to be paid for shall be the total number of square metres of ground covered by straw mulch, supplied and placed in accordance with this specification, accepted and measured by the Contract Administrator.

E15. PROTECTION OF EXISTING TREES

E15.1 Removal of some trees will be required. The Contract Administrator will identify which trees will be removed. The Contractor shall take the following precautionary steps to avoid damage from construction activities to any existing trees not marked for removal within the limits of the construction area.

E15.1.1 Do not stockpile materials and soil or park vehicles and equipment within 2 metres of trees.

E15.1.2 Strap mature tree trunks with 25 x 150 x 2400 wood planks. Smaller trees shall be similarly protected using appropriately sized wood planks.

- E15.1.3 Excavations shall be carried out in a manner to minimize damage to existing root systems. Where roots must be cut to facilitate an excavation they shall be neatly pruned at the face of the excavation.
- E15.1.4 Work on Site shall be carried out in a manner to minimize damage to existing tree branches. Where damage to tree branches does occur, the Contractor shall neatly prune the damaged branch.
- E15.1.5 American elm trees shall not be pruned between April 1st and August 1st and Siberian elm trees between April 1st and July 1st of any year under provisions of The Dutch Elm Disease Act.
- E15.2 All damage to existing trees due to construction activities shall be repaired to the requirements and satisfaction of the City of Winnipeg, Public Works Department, Forestry Branch at the Contractor's expense.
- E15.3 Costs for protection of trees shall be considered incidental to "Site Development and Restoration".

E16. TREE REMOVAL

E16.1 Description

- E16.1.1 This specification shall cover the removal of existing trees.
- E16.1.2 The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for and incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E16.2 Materials

E16.2.1 Existing Trees to be Removed

The existing trees to be removed include, but not limited to ash, elm, cottonwood, basswood, oak, pine, maple, spruce, etc., all of which may be cut with standard chain saw equipment. The existing trees range from 50 mm to 250 mm diameter.

- E16.2.2 Prior to commencement of the Work the Contract Administrator shall identify all trees for removal. The Contractor shall cut down only trees designated to be removed, and grub out all stumps and roots greater than 100 mm diameter. In general, the Contractor shall start at the top of the tree and remove branches or trunks not longer than 2 m. Trees are to be felled so as to land within the limits of the Works. The Contractor shall load and haul all trees, stumps, roots, logs, brush, rubbish and all other surface litter from the Site and dispose of these materials at an approved disposal Site, acceptable to the Contract Administrator.

- E16.2.3 The Contractor shall take all precautions to prevent damage to structures, adjacent property and to trees and shrubs. In the event of damage, the Contractor will be held liable, and shall be required to provide appropriate restoration at his cost, to the satisfaction of the Contract Administrator.

- E16.2.4 Any trees damaged during construction activities shall be examined by a bonded tree care professional and pruned as required. Damaged trees which are not viable shall be replaced by the Contractor at his own cost.

E16.3 Measurement and Payment

- E16.3.1 The removal of existing trees shall be measured on a per tree basis and paid for at the Contract Unit Price per unit for the "Items of Work" listed below. The amount to be paid shall be the total number of trees removed in accordance with this Specification, accepted and measured by the Contract Administrator.

Items of Work: Tree Removal

- i. 50 mm to 250 mm Diameter

- E16.3.2 The removal of trees and brush less than 50 mm diameter is considered incidental to the Work and no separate measurement or payment will be made.

E17. OUTFALL SEWER CONSTRUCTION

E17.1 Description

This Specification shall amend and supplement Standard Specifications CW 2130, CW 2160, and CW 3610.

The Work to be done by the Contract under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Work hereinafter specified.

E17.1.1 Submittals

- (a) The Contractor shall submit the following items for review and approval to the Contract Administrator at least one (1) week prior to the commencement of Work:
- (i) The HDPE spiral wound pipe design, including calculations for loads, wall thickness, and other design considerations according to the manufacturer's recommendations.
 - (ii) The installation procedure for the HDPE spiral wound pipe including joining, heat shrink sleeve installation, temporary bracing, setup locations and end treatments.
- (b) The fusing of the pipe must be performed by qualified personnel with a minimum of three (3) years of experience in HDPE pipe fusing. The Bidder shall submit proof of experience, in writing, within 3 days of request by the Contract Administrator.

E17.2 Materials

E17.2.1 Handling and Storage of Materials

All materials shall be handled and stored in a careful and Workman-like manner, to the satisfaction of the Contract Administrator.

The Contractor shall observe the Manufacture's recommendations for safe lifting of all pipe sections and shall ensure tolerance for pipe deflection is not exceeded.

E17.2.2 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Contract Administrator or by the Testing Laboratory designated by the Contract Administrator. There shall be no charge to the City for any materials supplied for testing purposes.

E17.2.3 Pipe Foundation Material

- (a) Where required, pipe foundation material shall be well graded 50 mm max crushed sub-base material having the following grading requirements.

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
50	100%
5	25-80%
0.8	5-18%

E17.2.4 Bedding and Backfill Material

Sand bedding and Modified Class 2 backfill material as per CW 2030, modified to have 0.6 m of compacted excavated Site select material as opposed to the detailed 0.3 m of compacted excavated material.

E17.2.5 Spiral Wound HDPE Pipe

(a) Pipe Requirements

- (i) The pipe shall be manufactured from a high density polyethylene material which meets or exceeds the minimum cell classification 345444C when classified in accordance with ASTM D3350.
- (ii) The raw material used to produce the pipe shall be a polyethylene compound qualified as Type II, Category 5, Class C, and Grade P34 in accordance with ASTM D1248.
- (iii) The polyethylene raw material shall contain a minimum of 2% well dispersed finely divided carbon black for UV stabilization. Additives, which can be conclusively proven not to be detrimental to the pipe, may also be used provided that the pipe produced meets or exceeds all of the requirements of this Specification.
- (iv) The pipe shall contain no recycled compound except that generated in the manufacturers own plant from resin of the same specification and from the same raw material supplier.
- (v) The pipe manufacturer's Quality System shall be certified by an appropriate independent body to meet the requirements of the ISO 9002 Quality Management Program.
- (vi) Compliance with the requirements of E17.2.5 of this specification shall be certified, in writing, by the pipe supplier, upon request.

(b) Spiral Wound HDPE Pipe Design

- (i) The pipe shall be manufactured with dimensions and tolerances in accordance with ASTM F714, ASTM F894 or CSA B182.6.
- (ii) The required pipe structural characteristics shall be selected based on considerations of both the installation process and the anticipated traffic or service loads and other location specific conditions. These conditions normally include an evaluation of:
 - Flow capacity of the outfall,
 - External loads (earth and traffic), and
 - Construction or installation loads.
- (iii) The pipe should have sufficient wall stiffness to safely resist external hydrostatic pressures generated by ground water levels above the top of the pipe and by soil pressures.

(c) Acceptable Product for High Density Polyethylene (HDPE) Spiral Wound Pipe

Trade name: **KWH Weholite**

Manufacturer: KWH Pipe (Canada) Ltd.

- (i) The Contractor may elect to use an alternative product upon review and approval by the Contract Administrator in accordance with B7. The Contractor shall request the Manufacturer to directly submit written information to the Contract Administrator on the preparation, materials, design, performance, references, and use of proposed products.

E17.2.6 Debris Grating

Shop drawings shall be submitted for the debris gratings and shall be installed as shown on the Drawings. Galvanizing shall be hot-dip conforming to requirements of CSA G164- N1981 to a minimum net retention of 600 g/m².

All bolts and nuts shall be typical steel, conforming to ASTM A-320 Grade B8M.

All welding shall be fully approved by the Canadian Welding Bureau in conformance with CSA Standard W47.1. Welding shall be done by currently licensed welders only. Welding splatter

and other fabricator burrs, where exposed, shall be ground off and/or filed smooth, and left ready for subsequent operations.

All miscellaneous metal, after fabrication, shall be hot-dip galvanized. No separate measurement will be made for hot-dip galvanizing.

E17.2.7 Handrails and Pipe Sleeve

Shop drawings shall be submitted for the three-rail handrail and pipe sleeve and shall be installed as shown on the drawings. Galvanizing shall be hot-dip conforming to requirements of CSA G164-N1981 to a minimum net retention of 600g/m². All bolts and nuts shall be type 316 stainless steel conforming to ASTM A-320 Grade B8M. All welding shall be fully approved by the Canadian Welding Bureau in conformance with CSA Standard W47.1. Currently licensed welders shall do the welding. Welding splatter and other fabricator burrs where exposed, shall be ground off and/or filed smooth, and left ready for subsequent operations. All miscellaneous metal, after fabrication, shall be hot-dip galvanized. No separate measurement will be made for hot-dip galvanizing

E17.2.8 Equipment

All equipment, implements, tools and facilities used shall be of a size and type as required to complete the Work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good Working order, and have sufficient standby equipment available at all times, as required.

E17.3 Construction Methods

E17.3.1 Pipe Foundation

- (a) Insitu soils shall be excavated to the trench width and subgrade elevations specified on the Drawings.
- (b) The subgrade shall be proof rolled to inspect for soft spots.
- (c) Where soft spots are observed, the subgrade shall be further sub-excavated and filled with additional compacted granular material to the depths specified by the Contract Administrator.
- (d) The Contractor shall abide by the Manufacture's recommendations for pipe foundation.
- (e) Separation geotextile shall be installed between granular material and the insitu soils.
- (f) 50 mm crushed granular material shall be placed in 100mm lifts and compacted to 100% Standard Proctor density.

E17.3.2 Bedding

- (a) Ensure bedding is thoroughly tamped and that the pipe is uniformly supported throughout and completed in accordance with CW 2030 and the Drawings, unless otherwise indicated by the Contract Administrator
- (b) The Contractor shall abide by the Manufacture's recommendations for pipe bedding.

E17.3.3 Backfill

- (a) Backfill around the pipe, in maximum 150 mm lifts, alternating from side to side. At no time should the difference in backfill elevation on either side of the pipe be greater than 450 mm. Work must be completed in accordance with CW 2030, unless otherwise indicated by the Contract Administrator.
- (b) The Contractor shall abide by the Manufacture's recommendations for pipe backfill, procedure and ensure that compaction and backfill procedures do not cause the pipe to deform beyond the Manufacture's recommended tolerance.

- (c) Backfilling above the pipe shall be in accordance with CW 2030 for Modified Class 2 backfill. The top 600-mm of backfill is to be Site select excavated material, as approved on Site by the Contract Administrator, not the standard 300 mm excavated material.
- (d) The Contractor shall ensure the compaction equipment utilized, is consistent with degree of compactive effort required to achieve the specified densities, and adequately protects against overloading the pipe.

E17.3.4 Spiral Wound HDPE Pipe

- (a) Installation
 - (i) The Contractor must ensure that all obstructions and joint offsets are removed or corrected as required to facilitate the installation of the HDPE pipe. The Contractor will be responsible for the cleaning of all pipes as required prior to the installation of the pipe. The cost for cleaning shall be incidental to the cost of the installation of the HDPE pipe.
 - (ii) The Contractor must confirm, with the HDPE pipe manufacturer, the allowable bending tolerances of the HDPE pipe prior to installation to ensure that pipe deflections do not exceed the manufacturers recommended limits (also refer to Guide-1/95; Guideline document from "The Society of the Plastics Inc.)
- (b) Fusing of Pipe
 - (i) Wherever possible, the HDPE pipe should be joined by the method of thermal butt fusion, as outlined in ASTM D 2657, Heat Joining Polyolefin Pipe and fittings. Full butt fusion joining of the pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer.
 - (ii) The temperature of the heater plate shall not exceed 425 degrees Fahrenheit (+/- 25 degrees Fahrenheit).
 - (iii) The joining interfacial pressure should not exceed 25 pounds per square inch of projected end area for European design fusion machines or 75 pounds per square inch of projected end area for American design fusion machines.
- (c) Sealing the Cut Ends of the Pipe
 - (i) All cut ends and cut-out sections of the HDPE spiral wound pipe shall be sealed by a method to be determined by the pipe supplier and approved by the Contract Administrator.

E17.3.5 Removal of Existing CSP Outfall Pipe

- (a) CSP field cuts shall be straight circumferential cuts. Clean all ends free of burrs etc., and touch up all areas affected by Work with galvanized primer.
- (b) The Contractor shall excavate and dispose of the existing outfall piping and debris grate in accordance with the Standard Construction Specifications.

E17.3.6 Supply and Installation of Handrails and Pipe Sleeves

Supply and Installation of Handrails and Pipe Sleeves shall be installed as detailed and in the location shown on the contract drawings.

E17.3.7 Installation of Debris Grate

Debris Grates shall be installed as detailed and in the location shown on the Drawings.

E17.4 Method of Measurement and Payment

E17.4.1 Supply and Installation of HDPE Spiral Wound Pipe

- (a) The supply and installation of HDPE Spiral Wound Pipe shall be measured on a linear basis. The length to be paid for shall be the total number of linear meters acceptably supplied and installed complete with approved joints, grouting, construction of transitions

and necessary hardware, measured horizontally, at grade, above the centre line of the pipe, as computed by measurement made by the Contract Administrator.

- (a) Payment for excavation, pipe removal, pipe foundation, bedding and backfill shall be included in the price per metre of Supply and Installation of HDPE Spiral Wound Pipe
- (b) No payment shall be made for fusing, blocking, temporary bracing, internal pipe repairs, pipe cleaning, and concrete transitions as these items and all other items relevant to the installation of the pipe that are not specifically called out on Form B shall be considered incidental to the installation of the pipe.
- (c) Supply and Installation of HDPE Spiral Wound Pipe will be paid for at the Contract Unit Price for "Items of Work" listed below, measured specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described and as shown on the Drawings and Details and all other items incidental to the Work included in this Specification.

Items of Work: Supply and Installation of HDPE Spiral Wound Pipe

- (i) 2740 mm I.D. HDPE Spiral Wound Pipe

E17.4.2 Supply and Installation of Debris Gate

- (d) The supply and installation of the Debris Gate shall be measured on a unit basis. The units to be paid for shall be the total number of Debris Gates installed in accordance with this Specification and acceptable to the Contract Administrator as computed from measurements made by the Contract Administrator.
- (e) Supply and installation of Debris Gate will be paid for at the Contract Unit Price for "Items of Work", measured specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the Work included in this Specification.

Items of Work:

Supply and Installation of Debris Gate

- i. 2740 mm dia. Debris Gate

E17.4.3 Connection Of Existing 600 mm CSP Outfall to new 2700 mm HDPE Outfall

The connection of the existing 600 mm CSP outfall pipe to the new 2740 mm HDPE Spiral Wound Pipe will be measured and paid for at the Lump Sum Price for "Connection of Existing 600 mm outfall to new 2740 mm Outfall", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations shown on the Drawings, herein described and all other items incidental to the work included in this Specification.

E17.4.4 Removal of Existing CSP Outfall Pipe

Removal of the existing outfall pipe shall be paid for at the Linear Metre Price for "Remove Existing 600 mm CSP", measured as specified herein, which price shall be payment in full for performing all operations herein described.

E17.4.5 Supply and Installation of Handrails and Pipe Sleeves

Supply and installation of Handrails and Pipe Sleeves will be measured and paid for at the contract lump sum price for "Supply and Installation of Handrails and Pipe Sleeves", measured specified herein, which price shall be payment in full for performing all operations described and all other items incidental to the Work included in this Specification. Removal of the existing handrails and pipe sleeve will be considered incidental to the supply and installation of handrails and pipe sleeves

E18. ROCKFILL RIPRAP

E18.1 Description

- (a) This Specification shall cover the supply and placement of rockfill riprap.

E18.2 Materials

- (a) The rockfill material for use as riprap shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.
- (b) No rockfill will be permitted to be placed without providing the source and the supplier to the Contract Administrator. Inspection of the source will be performed by the Contract Administrator prior to written acceptance of the product.
- (c) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.
- (d) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.
- (e) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

- (f) Rockfill riprap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

<u>Canadian Metric Sieve Size (millimeters)</u>	<u>Percent of Total Dry Weight Passing Each Sieve</u>
450	100%
300	35-80%
100	20-60%
50	10-30%
5	0-5%

E18.3 Submittals

- (a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of riprap.
- (b) Representative samples of the rockfill riprap submitted for material testing purposes shall be completed as specified herein.

E18.4 Quarry Sites

- (a) Contractors supplying rockfill riprap shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material Specifications contained herein.

E18.5 Testing and Approval

- (a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.
- (b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of riprap.
- (c) No supply and placement of riprap will be permitted prior to the Contract Administrator reviewing the source.
- (d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the riprap that will be used, subject to the acceptance of the Contract Administrator.
- (e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E18.6 Construction Methods

- (a) Snow and ice shall be removed from the bank in accordance with these Specifications.
- (b) Riprap shall be placed over the geotextile membrane at the location of the backfilled outfall excavation as shown on the Drawings.
- (c) Rockfill Riprap shall be pushed or rolled into place in such a manner that the larger rocks are uniformly distributed and the smaller rocks serve to fill the places between the larger rocks such that excessive segregation of the various particle sizes does not occur.
- (d) Sufficient levelling shall be done to produce a neat and uniform surface, conforming to the shape and dimensions shown on the Drawings.
- (e) The allowable fill tolerances shall be within ± 50 mm of the grades and thickness shown on the Drawings, provided positive downslope grading is achieved.
- (f) Provide a smooth uniform surface from the existing grade and new riprap when placing outside edges or transitions, as accepted by the Contract Administrator.
- (g) Temporary stockpiling of riprap along the riverbank shall not be permitted. Material shall be placed to the required lines and grade shown the Drawing immediately upon delivery to the Site.

E18.7 Quality Control

E18.7.1 Inspection

- (a) All workmanship and all materials furnished and supplied under this Special Provision are subject to close and systematic inspection and testing by the Contract Administrator including all operations from the selection and production of materials through the final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given.

E18.7.2 Access

- (a) The Contract Administrator shall be afforded full access for the inspection and control testing of materials at the Site to determine whether the material is being selected and placed in accordance with this Specification.

E18.8 Measurement and Payment

E18.8.1 Rockfill Riprap

- (a) The supply and placement of rockfill riprap shall be measured on a weight basis and paid for at the Contract Unit Price for "Rockfill Riprap". The weight to be paid for shall be the total number of metric tonnes of rockfill supplied and placed in accordance with this Specification, as measured by a certified weigh scale and accepted by the Contract Administrator.
- (b) The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets which are not supplied at the time of delivery, or which are lost.

E18.8.2 Remove, Stockpile, and Reinstall Existing Rockfill Riprap

- (a) The removal, stockpiling, and reinstallation of the existing rockfill riprap in the location of the shear key shall be measured on a volume basis and paid for at the Unit Price for "Remove, Stockpile, and Reinstall Existing Rockfill Riprap" The volume paid will be the number of cubic meter stockpiled as measured by the Contract Administrator.

E19. ROCKFILL COLUMNS

E19.1 Description

- (a) This Specification shall cover the installation of the rockfill columns, including the auger drilling, sleeving, cuttings removal, supply, placement, placement and vibratory compaction of rockfill, supply, backfill and compaction of clay cap, and provisions for handling groundwater infiltration.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for an incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E19.2 Materials

E19.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

E19.2.2 Rockfill Column Backfill

- (a) The rockfill material for use as backfill shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.
- (b) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.
- (c) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.
- (d) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

- (e) Rockfill column backfill shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%
25	0-5%

E19.2.3 Clay Cap

- (a) The impervious clay cap at the top of the rockfill columns shall consist of a high plasticity clay material, with a liquid limit in excess of 50%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E19.2.4 Rockfill Column Sleeves

- (a) During auguring of the rockfill columns, it may be necessary to use steel sleeves to prevent the sidewalls of the columns from caving. The sleeves shall be of a length suitable to extend from ground surface down to a minimum of 0.6 metres into the underlying till material.
- (b) The Contract Administrator will make no payment for excess rockfill material that is used because the Contractor used a sleeve with a diameter larger than that selected by the Contractor in its bid.

E19.2.5 Equipment

E19.2.6 General

- (a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.

E19.2.7 Vibratory Compaction Equipment

E19.2.8 Vibratory Compaction Equipment shall be a vibro-compaction lance capable of being inserted through the full depth of the rockfill and into the underlying glacial till and capable of increasing the rockfill density a minimum of 15% versus the uncompacted material. Submittals

- (a) The Contractor shall submit the proposed supplier(s) and location of quarry sites for supply of rockfill backfill.

E19.2.9 Quarry Sites

- (a) Contractors supplying rockfill riprap shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material specifications contained herein.

E19.2.10 Testing and Approval

- (a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.
- (b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of rockfill backfill.
- (c) No supply and placement of rockfill backfill will be permitted prior to the Contract Administrator reviewing the source.
- (d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the rockfill backfill that will be used, subject to the acceptance of the Contract Administrator.
- (e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E19.3 Construction Methods

E19.3.1 General

- (a) The excavation shall be supervised at all times, and open shafts shall be adequately guarded or covered for safety.

E19.3.2 Construction Timing and Sequence

- (a) The Contractor shall submit their rock column installation sequence to the Contract Administrator for review a minimum of one (1) week prior to the start of construction. The Contractor will not start to install rockfill columns other than those used for rockfill column compaction tests until the Contract Administrator has reviewed the construction sequence and has provided written approval.

E19.3.3 Excavation

- (a) The rock column shafts shall be excavated by drill rig augers to the depth as shown on the Drawings. Note that the glacial till and/or bedrock contact elevation may vary and the depth of excavation may differ from that shown on the Drawings.
- (b) Drilling shall not commence until the rockfill is on Site to backfill the shaft.
- (c) Any deleterious or sloughed material shall be removed from the rock column shaft prior to backfilling.
- (d) Discharge of water contained within the auger hole from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction Work or cause excessive erosion of the native riverbank soils. The control of the water shall be considered incidental to the Work.
- (e) The construction of the rock columns shall be a continuous operation with backfilling immediately following excavation.
- (f) The Contractor must complete backfilling of each rock column before commencing to excavate adjacent rock columns.

- (g) Excavated material shall be removed from the riverbank area immediately upon excavation and disposed of offsite. Stockpiling of excavated material on the riverbank area will not be permitted.

E19.3.4 Sleeving Rock Column Shafts

- (a) The Contractor shall install steel sleeving as required to control sloughing and caving of the shafts.
- (b) Shafts shall only be sleeved where it is not possible to advance and maintain an open hole during the excavating, backfilling and compacting procedures, and the Contractor shall only be paid for sleeving approved by the Contract Administrator. If the Contractor uses sleeves that do not extend from ground surface to the bottom of the hole, a pro-rated payment for the sleeve will be made based upon the actual length of the sleeve used.

E19.3.5 Backfilling and Compaction

- (a) Excavated rock column shafts shall be backfilled immediately upon excavation. No hole shall remain without backfill overnight, or for a period beyond four (4) hours.
- (b) After placement of the rockfill to the required dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 200 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undisturbed native material surrounding the caisson approximately at the base of the existing parking lot fill. Care shall be taken to ensure that an effective seal results between the wall of the shaft excavation and the clay material placed, to protect against water infiltration into the shaft, as approved by the Contract Administrator.
- (c) Compacting of rockfill shall be by the vibro-compaction utilizing a vibro-compaction lance capable of being inserted through the full depth of the rockfill and into the underlying glacial till and capable of increasing the rockfill density a minimum of 15% versus the uncompacted material. Vibro-compaction shall be completed over the entire length of the shear key. After insertion through the rockfill the lance will be held stationary at the bottom of the excavation and vibrated for a period of 1 minute. The lance will then be raised in 1 metre increments with a minimum of 1 minute of vibration while being held at each increment. Deviations from the specified procedure shall not be permitted without prior written approval from the Contract Administrator. Rockfill compaction will be considered incidental to the Supply and Placement of Shear Key Rockfill and no separate payment for compaction will be made.

E19.3.6 Supply of Rockfill Column Backfill

- (a) The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling operations are not delayed.

E19.3.7 Stockpiling of Rockfill Material

- (a) Stockpiling of rockfill material will not be permitted on the riverbank except at locations where existing rockfill columns are in place, subject to the approval of the Contract Administrator.

E19.3.8 Contaminated Rockfill Material

- (a) Where crushed limestone has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of crushed limestone measured for payment.

E19.4 Method of Measurement

E19.4.1 Shaft Drilling

- (a) The drilling of shafts for the rockfill columns will be measured on a length basis. The length to be paid for shall be the total number of vertical metres of shaft drilled, measured from the ground surface at the time of the rockfill column installation carried out in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.
- (b) Drilling of the rockfill column shafts will be paid for at the Contract Unit Price for "Shaft Drilling", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described, and all other items incidental to the Work included in this Specification.

E19.4.2 Rockfill Column Backfill and Compaction

- (a) The supply, placement and compaction of the Rockfill Backfill will be measured on a weight basis. The weight to be paid for shall be the total number of metric tonnes of Rockfill Backfill material, supplied and placed and vibratory compacted in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.
- (b) The supply, placement and compaction of the Rockfill Backfill in the Rockfill Columns will be paid for at the Contract Unit Price for "Rockfill Backfill and Compaction", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described, and all other items incidental to the Work included in this Specification.

E19.4.3 Sleeving

- (a) Sleeving of the rockfill caissons will be measured on a unit basis. The Contractor shall be paid for the total number of sleeves used in accordance with this Specification, as measured by the Contract Administrator. Only the sleeved holes that are approved by the Contract Administrator will be paid for.
- (b) Sleeving of the Rockfill Column shafts will be paid for at the Contract Unit Price for "Sleeving", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described, and all other items incidental to the Work included in this Specification.

E19.4.4 Clay Cap

No pay item is specified for clay caps. The costs associated with the clay caps is considered incidental to the work associated with the rockfill columns and shall be included in the costs for "Rockfill Backfill and Compaction".

E20. ROCKFILL TRENCH SHEAR KEY

E20.1 Description

- (a) This Specification shall cover the installation of the rockfill trench shear key, including the excavation and disposal of waste material, the supply, placement and vibratory compaction of rockfill, the supply, placement and compaction of clay cap, and provisions for handling groundwater infiltration.
- (b) The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for an incidental to the satisfactory performance and completion of all Work as hereinafter specified.

E20.2 Materials

E20.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

E20.2.2 Rockfill Backfill

- (a) The rockfill material for use as backfill shall consist of a clean free draining, sound, dense, durable, crushed rock. The material shall be free from organics, roots, silts, sand, clay, snow, ice or any other material that would detract from the strength and drainage characteristics of clean rockfill.
- (b) Individual particles shall be shaped such that no dimension is greater than two times the smallest dimension. Flat, elongated, or platy particle shapes will not be accepted.
- (c) Should the Contractor choose to use limestone, it shall be durable white crystalline limestone. Softer buff to yellow dolomite or dolostone will not be accepted.
- (d) The rockfill material shall meet the following requirements:

Parameter	Test Method	Specified Limit
Bulk Specific Gravity	ASTM C127	2.6 minimum
Absorption	ASTM C127	2.5 % maximum
LA Abrasion Loss	ASTM C131	32% maximum
Soundness	ASTM C88	13% maximum
Gradation	ASTM D5519	See below

- (e) Rockfill riprap shall be well graded having a full range and even distribution of sizes and shall conform to the following gradation:

Canadian Metric Sieve Size (millimeters)	Percent of Total Dry Weight Passing Each Sieve
150	100%
75	40-70%
25	0-5%

E20.3 Clay Cap

- (a) The impervious clay cap at the top of the rockfill shear key shall consist of a high plasticity clay material, with a liquid limit in excess of 50%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E20.4 Equipment

E20.4.1 General

- (a) All equipment, implements, tools and facilities used shall be of a size and type as required to complete the work in a reasonable time, approved by the Contract Administrator. The Contractor shall keep all equipment in good working order, and have sufficient standby equipment available at all times, as required.
- (b) The Contractor shall use vibratory equipment that can be directly inserted to the bottom of the rockfill shear key to densify the rockfill backfill throughout the entire depth of the rockfill shear key.

E20.5 Submittals

- (a) The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of rockfill backfill.

E20.6 Quarry Sites

- (a) Contractors supplying rockfill riprap shall be responsible for demonstrating that the material is of adequate quality and volume to meet the material Specifications contained herein.

E20.7 Testing and Approval

- (a) All materials set forth in this Specification shall be subject to inspection and testing by the Contract Administrator or by the testing laboratory designated by the Contract Administrator. There shall be no charge for any materials taken by the Contract Administrator for testing purposes.
- (b) The Contract Administrator will visit proposed quarry Sites for inspection of the proposed rockfill material and quarry faces a minimum of fourteen (14) days prior to supply and placement of riprap.
- (c) No supply and placement of riprap will be permitted prior to the Contract Administrator reviewing the source.
- (d) The procedures for preparation of all rockfill samples for use in material inspection and testing shall be subject to review and acceptance by the Contract Administrator for individual tests. The samples may be obtained from crushed and processed material at the sizing necessary for specific tests if the material is deemed to be representative of the riprap that will be used, subject to the acceptance of the Contract Administrator.
- (e) The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.

E20.8 Construction Methods

- (a) The excavation shall be supervised at all times, and open excavations shall be adequately guarded or covered for safety.
- (b) The rockfill shear key shall be excavated to the depth as shown on the Drawings. Note that the glacial till and/or bedrock contact elevation may vary and the depth of excavation may differ from that shown on the Drawings.
- (c) Excavation shall not commence until the rockfill is on Site to backfill the excavation.
- (d) Any deleterious or sloughed material shall be removed from the excavation prior to backfilling.
- (e) Discharge of water contained within the excavation from displacement of the rockfill during backfill will be acceptable. The Contractor shall be responsible to contain and direct any displaced water such that it will not affect other construction Work or cause excessive erosion of the native riverbank soils. The control of the water shall be considered incidental to the Work.
- (f) The construction of the rockfill shear key shall be a continuous operation with backfilling immediately following excavation.
- (g) The Contractor must not excavate more than 2 metres ahead of the backfill placement as measured at the bottom of the excavation.
- (h) Excavated material shall be removed from the riverbank area immediately upon excavation and disposed of offsite. Stockpiling of excavated material on the riverbank area will not be permitted.

- (i) The Contractor shall take all precautions necessary to maintain the excavation geometry to the neat lines shown on the Drawings. If necessary, the excavation shall be subcut and allowed to freeze, in stages, to prevent sloughing of the sidewalls. Such precautions will be considered incidental to the excavation and will not be paid for separately.
- (j) Compacting of rockfill shall be by the vibro-compaction utilizing a vibro-compaction lance capable of being inserted through the full depth of the rockfill and into the underlying glacial till and capable of increasing the rockfill density a minimum of 15% versus the uncompacted material. Vibro-compaction shall be completed over the entire length of the shear key. After insertion through the rockfill the lance will be held stationary at the bottom of the excavation and vibrated for a period of 1 minute. The lance will then be raised in 1 metre increments with a minimum of 1 minute of vibration while being held at each increment. Deviations from the specified procedure shall not be permitted without prior written approval from the Contract Administrator. Rockfill compaction will be considered incidental to the Supply and Placement of Shear Key Rockfill and no separate payment for compaction will be made.
- (k) After placement of the rockfill to the required dimensions shown on the Drawings, the impervious clay cap shall be placed in layers not exceeding 200 millimetres, and compacted to a minimum of 95% of the Standard Proctor Maximum Dry Density. The clay cap shall be located within undisturbed native material surrounding the excavation. Care shall be taken to ensure that an effective seal results between the wall of the excavation and the clay material placed, to protect against water infiltration into the excavation, as approved by the Contract Administrator. Clay cap construction will be considered incidental to the shear key construction. No separate measurement and payment will be made.
- (l) The Contractor shall monitor the supply rate of the rockfill material to ensure that the backfilling operations are not delayed.
- (m) Stockpiling of rockfill material will not be permitted on the riverbank except at locations where existing shear key rockfill is in place, subject to the approval of the Contract Administrator.
- (n) Where crushed limestone has become contaminated with silt, clay, snow, ice or other deleterious material due to the Contractor's method of operation, negligence, failure to backfill in a timely manner, etc. the material shall be classified as rejected backfill and shall be weighed prior to disposal for deduction from the total weight of crushed limestone measured for payment.

E20.9 Method of Measurement

E20.10 Shear Key Excavation

- (a) The excavation for the rockfill shear key will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres of excavation completed, measured from the ground surface at the time of the rockfill shear key construction carried out in accordance with this Specification, acceptable to the Contract Administrator, as computed from measurements made by the Contract Administrator.

E20.11 Shear Key Rockfill

- (a) The supply, placement and compaction of the Shear Key Rockfill will be measured on a weight basis. The weight to be paid for shall be the total number of metric tonnes of Shear Key Rockfill supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale. The Contractor shall provide the weigh tickets to the Contract Administrator for the material supplied to the Site at the time of delivery. No payment will be made for any weigh tickets that are not supplied at the time of delivery.

E20.12 Basis of Payment

E20.13 Excavation

- (a) Excavation of the rockfill shear key will be paid for at the Contract Unit Price for "Shear Key Excavation", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described, and all other items incidental to the Work included in this Specification.

E20.14 Shear Key Rockfill

- (a) The supply, placement and compaction of the Shear Key Rockfill will be paid for at the Contract Unit Price for "Shear Key Rockfill and Compaction", measured as specified herein, which price shall be payment in full for supplying all materials and for performing all operations herein described, and all other items incidental to the Work included in this Specification.

E20.15 Clay Cap

No pay item is specified for clay caps. The costs associated with the clay caps is considered incidental to the work associated with the rockfill columns and shall be included in the costs for "Rockfill Backfill and Compaction".

E21. RIVERBANK REGRADING

E21.1 Description

- E21.1.1 This Specification shall cover the riverbank regrading at the site, including excavation and reworking of excavated material, and impervious clay supply and placement.
- E21.1.2 The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies and all things necessary for an incidental to the satisfactory performance and completion of all work as hereinafter specified.

E21.2 Materials

- E21.2.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.
- E21.2.2 Native Material to be Excavated
 - (a) The materials covered in this Specification consist of the in-situ overburden soils, and may include but not necessarily be limited to organic topsoil, clay, silt, sand, gravel, fill, rubble, roots, riprap, concrete blocks, etc., all of which may be excavated with standard hydraulic excavation equipment.
- E21.2.3 Clay Backfill
 - (a) The impervious clay backfill to be used for riverbank regrading shall consist of a high plasticity clay material, with a liquid limit in excess of 50%. The clay shall be free of deleterious material such as roots, organic material, ice, snow or other unsuitable materials, and may be salvaged from the on-site excavation, as approved by the Contract Administrator. Frozen material will not be accepted.

E21.3 Construction Methods

- E21.3.1 General
 - (a) The riverbank regrading will be completed in the mid and upper bank portions of the bank. The limits of the riverbank regrading will be laid out in the field by the Contract Administrator.
- E21.3.2 Native Material to be Excavated

- (a) All excavated material shall be removed off site immediately upon excavation or stockpiled as directed by the contract administrator.
- (b) No excavated material will be allowed to be stockpiled on the bank slopes or at the top of the bank as this may cause further instability.

E21.3.3 Clay Backfill

- (a) The depressions within the limits of the existing mid and upper bank shall be infilled with clay backfill material. The clay backfill material shall be pushed and kneaded into place to ensure that the entire excavated volume is entirely filled with clay, and that no void spaces remain. The clay backfill shall be compacted to a minimum of 95% of the SPMDD.
- (b) Clay backfill for placement within the limits of the existing mid and upper bank shall not be stockpiled on the riverbank.

E21.4 Measurement and Payment

E21.4.1 Basis of Measurement

- (a) The supply and placement of the riverbank regrading will be measured on a volume basis. The volume to be paid for shall be the total number of cubic metres of "Riverbank Regrading", supplied and placed in accordance with this Specification, as measured in the field and accepted by the Contract Administrator.

E21.4.2 Basis of Payment

- (a) The supply and placement of riverbank regrading will be paid for at the Contract Unit Price per cubic metre for the "Riverbank Regrading", measured as specified herein, which shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the work included in this Specification.

E22. GROUTED RIPRAP

E22.1 Description

E22.1.1 This Specification shall amend and supplement Standard Specification CW 3615.

E22.2 Materials

E22.2.1 Riprap

- (a) Rock for riprap shall consist of hard, dense, durable rock. The rock shall be angular crushed limestone, resistant to the action of air and water and suitable in all other respects for the purpose intended.
- (b) The stones shall range in size from 100mm to 300mm in diameter with 75% by count between 200mm and 300mm and 25% by count between 100mm and 200mm.
- (c) Crushed limestone when subjected to the Los Angeles abrasion test shall have a loss of not more than thirty-two percent (32%).
- (d) Crushed limestone when subjected to the Magnesium Sulphate Soundness test shall have a loss of not more than eighteen percent (13%).
- (e) The sample material shall be crushed to 37.5 mm maximum aggregate size and tested in accordance with ASTM C131 – Resistance to Degradation of Small size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine and ASTM C88 – Soundness of Aggregates by Use of Magnesium Sulphate.
- (f) The rock for riprap shall be approved by the Contract Administrator prior to riprap installation.

E22.2.2 Geotextile

- (a) Geotextile shall be as indicated by this Specification.

E22.2.3 Grout

- (a) Grout shall be as per CW 3615.

E22.3 Construction Methods

E22.3.1 Riprap

- (a) Installation of 300mm grouted riprap shall be as per Clause 9.3 of CW 3615. Total depth of concrete and riprap to be as shown on the drawings.
- (b) Riprap shall not be dropped onto the geotextile from a height greater than 300mm.
- (c) Any geotextile damaged during placement of the riprap shall be replaced as directed by the Contract Administrator at the Contractors expense.

E22.4 Method of Measurement and Payment

E22.4.1 Grouted Riprap

- (a) As per Clauses 12.2 and 13.2 of CW 3615.

E23. GEOTEXTILE

E23.1 Description

- (a) This Specification shall cover the supply and placement of the geotextile fabric below the outfall pipe foundation and various other areas as required within the Specifications.

E23.2 Materials

- (a) Each geotextile roll to be used shall be tagged to provide product identification for inventory and quality control purposes.
- (b) Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended exposure from the sun, and contamination from dirt, dust, and any other deleterious materials. The geotextile shall remain wrapped in a protective covering until it is used.
- (c) Non-woven geotextile fabric shall meet or exceed the following requirements:

Parameter	Test Method	Minimum Criteria
Grab Tensile Strength	ASTM D4632	900 N
Mullen Burst	ASTM D3786	2600 kPa
Puncture	ASTM D4833	550 N
Trapezoidal Tear	ASTM D4533	350 N
Apparent Opening Size	ASTM D4751	1.2 mm
Permittivity	ASTM D4491	1.2 sec ⁻¹
Flow Rate	ASTM D4491	60 L/sec/m ²

- (a) Suitable products shall be Amoco 4553, Layfield LP 8, Emco R080, Geotex 801, Terrafix 600R, Armtec 250, Mirafi 180 N, Trevira 011/250, or approved equivalent in accordance with B7.

E23.3 Construction Methods

- (a) Geotextiles shall consist of non-woven fabric.

- (b) All Work related to the geotextile storage, handling, and installation shall comply with the procedures and recommendations of the manufacturers, and as accepted by the Contract Administrator.
- (c) Snow and ice shall be cleared from the riverbank in accordance with E10.3.6 prior to placement of geotextile.
- (d) The fabric shall be loosely laid in order to allow conformity to the bedding surface. Folds and wrinkles in the fabric shall be avoided. Pins, nails or weights shall be installed to hold the fabric in place such that placement of fill material will not excessively stretch or tear the fabric and seam overlaps will be maintained.
- (e) The fabric shall be overlapped in a downstream direction (upstream panel overtop of downstream panel) at all joints a minimum of 600 mm. The overlap shall be pinned or secured as approved by the Contract Administrator.
- (f) A minimum of 300 mm of material shall be placed over the fabric prior to equipment passage.
- (g) Riprap shall be placed on the geotextile in such a manner that the geotextile is not damaged, torn, excessively stretched, or punctured.
- (h) Any damaged geotextile, as identified by the Contract Administrator, shall be repaired immediately at the Contractors own cost. All fill material shall be cleared a minimum of 1 m around the damaged area. The damaged area shall be covered with a geotextile patch that shall be large enough to be sewn or overlapped a minimum of 600 mm onto the undamaged geotextile.

E23.4 Measurement and Payment

- (a) The supply and placement of geotextile, and related Work specified herein will be measured on an area basis and paid for at the Contract Unit Price for "Geotextile". The area to be paid for shall be the total number of square metres of ground covered by geotextile, placed in accordance with this Specification, accepted and measured by the Contract Administrator.
- (b) Overlap at all joints shall be considered a single layer of geotextile for measure and payment purposes.
- (c) Geotextile used for repairs will be excluded from the quantity paid.

E24. CAST-IN-PLACE CONCRETE CONSTRUCTION

E24.1 Description

E24.1.1 This specification shall cover construction of cast-in-place concrete and shall supplement, revise and amend CW 2160.

E24.2 Materials

- (a) Concrete Mix Design
 - (i) Concrete mix design shall be as indicated in the Construction Notes on the Drawings.
- (b) Lean-Mix Concrete Design
 - (i) Proportioning of fine aggregate, coarse aggregate, cement, and water for lean mix concrete shall be as follows:
 - Cement: Type 50
 - Minimum Compressive Strength @ 28 days: 15 MPa
 - Slump: 80 mm
 - Air Content: nil
 - Minimum Cement Content = 240 kg/m³

- Maximum Water/Cement Ratio = 0.49
- (c) Grout
 - (i) Grout shall be Sika Grout 212 SR or approved equal.
- (d) Reinforcing Steel
 - (i) Bar accessories:
 - To be made from a non-corroding material.
 - Shall not stain, blemish or spall the concrete surface for the life of the concrete.
 - Shall be approved by the Contract Administrator.
 - Bar chairs shall be PVC.
- (e) Bonding Agent shall be Sika Latex R or approved equal.
- (f) Cast Iron Slide Gates, Cast iron Flap Gates, wall thimbles, mechanical lift operator, stems and accessories shall be in accordance with this Specification.
- (g) Miscellaneous Metals and Accessories in accordance with this Specification and as shown on the Drawings.
- (h) Shop Drawings
 - (i) Provide shop drawings in accordance with this Specification.
 - (ii) Submit shop drawings for reinforcing steel a minimum of two (2) weeks prior to the fabrication of any reinforcing steel.
- (i) Backfill
 - (i) In accordance with CW 2030. Class of backfill to be as shown on the Drawings.

E24.3 Construction Methods

E24.3.1 Construction Method Submission

- (a) No Work shall commence on construction of cast-in-place concrete until after the Contract Administrator's review of the Contractor's Construction Method submission.
- (b) Excavation for the construction of subsurface concrete shall be by the shored excavation method.
- (c) The Contractor shall prepare for the Contract Administrator's review a Construction Method submission detailing:
 - (i) Construction sequence to be followed including all methods to be employed to ensure no damage occurs to existing structures or adjacent properties within or adjacent to an excavation.
 - (ii) Shoring system to be used.
 - (iii) Proposed method of chamber construction.
 - (iv) Specialized equipment to be used.
 - (v) Any design revisions proposed to accommodate the Contractor's proposed construction method.
 - (vi) Water control considerations including details on the Contractor's proposed method of groundwater and surface runoff control.
- (d) The Contractor shall respond to any concerns that may be raised by the Contract Administrator after review of Construction Method submission.

E24.3.2 Cast in place Concrete Chamber Construction

- (a) Construct cast in place concrete chambers in accordance with CW 2160, except as supplemented, revised or amended in this Specification and as indicated in the construction notes on the Drawings.
- (b) Adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.

- (c) Do not use welded splices for reinforcing steel.
- (d) Order all wall reinforcing steel in lengths to best suit the spacing of walers so that reinforcing bars will not be bent or misformed in order to remove the walers.

E24.3.3 Backfill

- (a) Place and compact backfill material as indicated on the Drawings and in accordance with CW 2030.
- (b) Do not place backfill material in a frozen state.
- (c) Supply heating and hoarding in accordance with CW 2160 if required to ensure material does not freeze before compaction is complete.
- (d) Notify the Contract Administrator at least one (1) full Working Day in advance of any backfilling operation. No Backfill shall be placed against concrete until approved by the Contract Administrator and in no case before field cured test cylinders show the concrete strength to be 75% of that specified.

E24.3.4 Grout

- (a) Mix and apply grout in accordance with the manufacturer's instructions. Consistency to be suitable for the intended application.

E24.3.5 Slide Gate Installation

- (a) Install slide gate, wall thimble, mechanical lift operator, stem and accessories as shown on the Drawings and in accordance with E28 of this specification.
- (b) Slide gates shall be left in the open position at all times except when on Site Working on the gate.

E24.3.6 Flap Gate Installation

- (a) Install flap gate, wall thimble and lifting cable as shown on the Drawings and in accordance with this Specification.

E24.3.7 Miscellaneous Metal Fabrications

- (a) Install miscellaneous metal fabrications as shown on the Drawings and in accordance with this Specification.

E24.4 Measurement and Payment

E24.4.1 Construction of the cast-in-place concrete gate chamber floor slab will be measured on a unit basis and paid for at the Contract Unit Price for "Gate Chamber Floor Slab". Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work.

E24.4.2 Construction of the cast-in-place concrete gate chamber walls will be measured on a unit basis and paid for at the Contract Unit Price for "Gate Chamber Walls". Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this specification except installation of control gates and installation of miscellaneous metals and control gate thimbles and accessories which shall be paid for separately.

E24.4.3 Construction of the cast-in-place concrete gate chamber roof slab will be measured on a unit basis and paid for at the Contract Unit Price for "Gate Chamber Roof Slab". Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification except installation of miscellaneous metal and slide gate accessories which shall be paid for separately.

E25. COLD WEATHER REQUIREMENTS

E25.1 Description

- (a) Should any concrete Work be required to be carried out when the mean daily temperature is below 5 °C or anticipated to be below 5 °C within the next 24 hours, cold weather requirements will be required as specified herein.
- (b) All freshly placed concrete shall be protected from the elements and from defacements due to construction operations.

E25.2 Construction Methods

- (a) The following are minimum requirements for protecting concrete during and after placement during freezing weather, but mere adherence to these requirements will not relieve the Contractor of the necessity for producing concrete which has not been weakened or injured by frost of freezing, or replacing such damaged Work at no additional expense to the City;
 - (i) Before any concrete is placed, all ice, snow, and frost shall be completely removed from all formwork, and other surfaces against which concrete temperatures of such surfaces raised above 7 °C for twenty-four (24) hours minimum prior to concreting. Where concrete Work is to come in contact with the earth, the surface of the earth shall be completely free of frost when concrete is placed thereon.
 - (ii) Concrete aggregates and water shall be heated to not over 80 °C. Concrete shall be not less than 20 °C or more than 30 °C in temperature when deposited. Concrete when placed during freezing weather, or if freezing is anticipated during curing period, shall be fully enclosed and the temperature of same maintained at not less than 20 °C for five (5) days nor less than 5 °C for an additional five (5) days.
 - (iii) Heating enclosures shall be strong and wind-proof, well ventilated with heating units so located as to prevent local overheating or drying of the concrete or damage from combustion gases. Only indirect fired heaters will be accepted. Units must be vented outside the enclosure. No direct fired units will be accepted.
 - (iv) The Contractor shall inform the Contract Administrator well in advance as to the methods of enclosure and frost protection they propose to employ.

E25.3 Measurement and Payment

- E25.3.1 Cold weather requirements shall be considered incidental to the construction of cast-in-place concrete and no measurement or payment will be made for this item.

E26. CAST IRON SLIDE GATE

E26.1 Description

- (a) This Specification shall cover the installation and testing of cast iron slide gates, wall thimbles, mechanical lift operator, stems, wall brackets, and accessories.
- (b) **The City of Winnipeg has procured these items under a separate Tender. Delivery of the thimble is expected on December 15, 2013. Delivery of the gate, mechanical lift operator, stems and miscellaneous hardware is expected on February 1st, 2014. The contractor will be responsible for picking up these materials and transporting them to site. Materials will be stored at 360 McPhillips Street (beside the Wastewater Collection Building).**

E26.2 Construction Methods

- E26.2.1 Installation
 - (b) Install cast iron slide gates, wall thimbles, mechanical lift operator, stems, wall brackets and accessories as shown on the Drawings and in accordance with the manufacturer's recommendations.
 - (c) Make arrangements to have a qualified field representative of the slide gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator.

- (d) Field Testing
- (e) Perform leakage tests in the Contract Administrator's presence once slide gates have been installed to ensure compliance with the allowable leakage rate indicated in AWWA C560.
- (f) Arrange for a qualified field representative of the slide gate supplier/manufacturer to be present during field testing.
- (g) The leakage test for unseating head will be performed by closing the sluice gate and filling the flap gate chamber to the specified design unseating head and measuring the leakage rate through the slide gate. The leakage test shall be completed concurrently with the flap gate leakage test.
- (h) The leakage test for seating head cannot be performed in the gate chamber
- (i) Water used for testing purposes must be chlorine free. Potable drinking water shall be de-chlorinated if used for testing purposes.
- (j) The Contractor will be responsible to pump river water or supply water from a hydrant into the chamber for testing purposes.
- (k) If a gate fails the field leakage test, the Contractor shall undertake adjustments, replacements or other modifications recommended by the slide gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes no more than the allowable leakage rate.

E26.3 Measurement and Payment

- (a) Installation and testing of the cast iron slide gate, wall thimble, mechanical lift operator, stem, wall bracket and accessories will be paid for at the Contract Unit Price for "Installation and Field Testing of Slide Gate, Thimbles and Operator".
- (b) 85% of the Installation and Field Testing of Slide Gate, Thimbles and Operator will be paid on upon installation.
- (c) The remaining 15% of the Installation and Field Testing of Slide Gate, Thimbles and Operator will be paid on the successful field testing of the gate.

E27. CAST IRON FLAP GATE

E27.1 Description

- (a) This Specification shall cover the installation and testing of cast iron flap gates and wall thimbles.
- (b) **The City of Winnipeg has procured these items under a separate Tender. Delivery of the thimble is expected on December 15, 2013. Delivery of the gate and miscellaneous hardware is expected on February 1st, 2014. The contractor will be responsible for picking up these materials and transporting them to site. Materials will be stored at 360 McPhillips Street (beside the Wastewater Collection Building).**

E27.2 Construction Methods

E27.2.1 Installation

- (b) Install cast iron flap gates and wall thimbles as shown on the Drawings and in accordance with the manufacturer's recommendations.
- (c) Make arrangements to have a qualified field representative of the flap gate supplier/manufacturer inspect the installation during and after completion and provide a Certificate of Satisfactory Installation to the Contract Administrator
- (d) Field Testing
- (e) Perform leakage tests in the Contract Administrator's presence once flap gates have been installed to ensure compliance with the allowable leakage rate of 1.24L/min per metre of seated perimeter at any head.

- (f) Arrange for a qualified field representative of the flap gate supplier/manufacturer to be present during field testing.
- (g) The test for seating head will be performed by closing the flap gate and existing slide gate, filling the chamber between the gates with water to the specified head and measuring the leakage rate through the gates. The leakage test shall be completed concurrently with the slide gate leakage test.
- (h) Water used for testing purposes must be chlorine free. Potable drinking water shall be de-chlorinated if used for testing purposes.
- (i) The Contractor will be responsible to pump river water or supply water from a hydrant into the chamber for testing purposes.
- (j) If a gate fails the field leakage test, the Contractor shall undertake adjustments, replacements or other modifications recommended by the flap gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes no more than the allowable leakage rate.

E27.3 Measurement and Payment

- (a) Installation and testing of the cast iron flap gate and associated wall thimble will be paid for at the Contract Unit Price for "Installation and Field Testing of Flap Gates and Thimbles".
- (b) 85% of the Installation and Field Testing of Flap Gate and Thimbles will be paid on upon installation.
- (c) The remaining 15% of the Installation and Field Testing of Flap Gate and Thimbles will be paid on the successful field testing of the gate.

E28. METAL FABRICATIONS

E28.1 Description

E28.1.1 General

- (a) This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of metal fabrications.

E28.2 Materials

- E28.2.1 All materials shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contractor Administrator.
- E28.2.2 Material intended for use in the various assemblies shall be new, straight, clean, and with sharply defined profiles.
- E28.2.3 Steel Sections and Plates: to CAN/CSA G40.20/G40.21, Grade 300 W, except W, HP and HSS sections, which shall be Grade 350 W.
- E28.2.4 Steel Pipe: to ASTM A53/A53M, seamless, galvanized, as specified on the Drawings
- E28.2.5 Welding materials: to CSA W59.
- E28.2.6 Hot dipped galvanized steel repair material: Galvalloy and Gal-Viz
- E28.2.7 Stud Anchors: to ASTM A108, Grade 1020.
- E28.2.8 Aluminum: to CAN/CSA S157 and the Aluminum Association 'Specifications for Aluminum Structures'. Aluminum for plates shall be Type 6061-T651. Aluminum plate shall have an approved raised oval or multi-grip pattern.
- E28.2.9 Isolating sleeves shall be "Nylite" – headed sleeve as manufactured by SPAE-Naur, or approved equal in Accordance with B7.

E28.2.10 Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they will be subjected.

E28.3 Construction Methods

E28.3.1 Submittals

- (a) The Contractor shall submit the qualifications of the fabricator and welders to the Contractor Administrator for acceptance. Submit shop drawings in accordance with this Specification clearly indicating materials, core thickness, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details and accessories. Indicate field measurements on shop drawings.

E28.3.2 Fabrication

- (a) Fabricate Work square, true, straight and accurate to required size, with joints closely fitted and properly secured. Assemble Work in such a way that no disfigurements will show in the finished Work, or impair the strength.
- (b) Confirm measurements for all fabrications before fabricating.
- (c) Cut aluminum plate with edges straight and true, and as far as practical, maintain continuity of the pattern at abutting edges.
- (d) Pieces shall be of the sizes indicated on the Drawings and shall not be built up from scrap pieces. Confirm sizes with field measurements.
- (e) Where possible, fit Work and shop assemble, ready for erection.
- (f) Angle frames shall be of the same material as the cover plate (except for existing frames designated on the Drawings for re-use), and cover plates shall be hinged and be supplied with lifting handles, as shown on the Drawings. Exterior covers shall be supplied with a hasp for a padlock.
- (g) Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potentially harmful installations as directed by Contract Administrator.
- (h) All steel welding shall conform to CSA Standard W.59. Fabricator shall be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding shall be done by currently licensed welders only.
- (i) All aluminum welding shall be in accordance with the requirements of CSA W59.2. The fabricator shall be fully certified in conformance with CSA Standard W47.2. All welding shall be done in a licensed welding shop, and no field welding will be permitted unless approved in writing, in advance, by the Contract Administrator.
- (j) Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.
- (k) All steel shall be hot-dip galvanizing after fabrication, in accordance with CAN/CSA G164, to a minimum net retention of 600 gm/m².
- (l) Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.
- (m) Use self-tapping shake-proof flat-headed screws on items requiring assembly by screws.

E28.3.3 Erection

- (a) Do steel welding Work in accordance with CSA W59 and aluminum welding Work in accordance with CSA W59.2
- (b) Erect metal Work in accordance with reviewed shop drawings, square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

- (c) Provide suitable means of anchorage acceptable to Contract Administrator such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles where not specifically indicated on the Drawings.
- (d) Provide components for building in accordance with shop drawings and schedule.
- (e) Make field connections with bolts to CAN/CSA-S16, or weld.
- (f) Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.
- (g) Repair damaged galvanized surfaces and field welds with self-fluxing, low temperature, zinc-based alloy rods in accordance with ASTM A780, Repair of Damaged Hot Dip Galvanizing Coatings. The general procedure shall be to allow a small amount of the repair alloy to flow then spread by brushing briskly with a wire brush. Brushing shall be sufficient to obtain a bright finish. Repeat process three times to ensure a proper thickness is achieved. Temperatures shall be kept below 177°C (350°F) at all times. All heating of structural steel. Work shall be done in the presence of the Contract Administrator.
- (h) Install access hatch frames square and level at the locations show on the Drawings. Embed anchors in concrete as shown on the Drawings. Install covers and adjust hardware to proper function.
- (i) All aluminum surfaces in contact with concrete shall be isolated using alkali resistant bituminous paint meeting the requirements of CGSB 31-GP-3M.
- (j) Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

E28.4 Measurement and Payment

- (a) Supply, fabrication, transportation, handling, delivery and installation of metal fabrications will be paid for at the Contract Unit Price for "Supply and Installation of Miscellaneous Metals".

E29. SUPPLY AND INSTALLATION OF TEMPORARY SHORING

E29.1 Description

- (a) This Specification shall cover shoring requirements for the Works related to the installation of the new Outfall and the construction of the new Gate Chamber, as shown on the Drawings.

E29.2 Construction Methods

E29.2.1 Excavation

- (a) Remove excavated material from the Site immediately. Excavated material shall not be stockpiled on-site unless it will be used as backfill the same day it is excavated.
- (b) All Working areas below grade shall be kept adequately and securely supported during and after excavation until the shoring and bracing is in place to prevent loss of ground or injury to any person from falling material.

E29.2.2 Excavation Security Fence

- (a) Further to Clause 3.1 of CW 1130, completely cover the excavation and provide a security fence to completely surround the excavation when unattended generally in accordance with the following.
- (b) Security fence shall be chain link fence or approved equal, a minimum 1.80 metres high with metal support posts embedded far enough into the ground and spaced close enough together so the fence will not sag or collapse.
- (c) Attach fencing securely to posts.

- (d) Secure the gate or end of the fencing to a post with chain and a padlock.
- (e) Provide alternate security fence proposal to Contract Administrator for approval.

E29.2.3 Shoring

- (a) The type, strength, and amount of shoring and bracing shall be such as the nature of the ground and attendance conditions may require, taking into account property lines, existing slopes, utilities and roadways.
- (b) Shoring and bracing shall be so spaced and dimensioned as to prevent caving, loss of ground, surface settlement, or squeezing of the soil beyond the neat lines of excavation. It shall be free from defects that might impair its strength or suitability for the Work. Sheeting/shoring and bracing shall conform to the latest revisions of the "Construction Safety Act" of the Department of Labour of the Government of Manitoba and in accordance with Province of Manitoba "W210 The Workplace Safety and Health Act" and "Guidelines for Excavation Work".
- (c) Supporting design calculations as required to facilitate review of the submission for conformance with the Contract Documents.
- (d) Submit AutoCAD Shop Drawings and design calculations for the shoring/excavation system designed and sealed by a Professional Engineer registered or licensed to practice in the Province of Manitoba and experienced in the structural design of shoring systems. The designer of the shoring system shall inspect the system during construction and certify, in writing to the Contract Administrator, that construction is in conformance with the approved design.
- (e) Shoring and bracing shall be installed such that the structure size and wall thickness shown on the shop drawings can be obtained subsequent to installation of the shoring system.
- (f) Shoring and bracing shall remain in place until concrete has attained 75% of the design strength.

E29.2.4 Monitoring Movement of Shoring

The Contractor shall submit to the Contract Administrator a plan for monitoring the movement of trench shoring during construction a minimum of two (2) Working Days prior to the installation of trench shoring. The monitoring plan shall be performed by approved survey methods for vertical or horizontal movement of the shoring, acceptable to the Contract Administrator. Costs for monitoring shall be incidental to the installation of the temporary shoring.

E29.3 Measurement and Payment

E29.3.1 Temporary Trench Shoring for Outfall

Shoring will be paid for at the contract unit price for "Temporary Shoring for Outfall". Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

E29.3.2 Temporary Trench Shoring for Gate Chamber

Shoring will be paid for at the contract unit price for "Temporary Shoring For Gate Chamber". Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this Specification.

E30. NEW ACCESS GATE

E30.1 Description

- (a) This Specification shall cover the installation of a new access gate for the maintenance entrance to the gate chamber.

- (b) The installation of the new access gate includes the following:
 - (i) Removal of the existing wood fence post and chain to accommodate the new access gate.
 - (ii) Supply and Installation of two new wood fence posts to be installed within 450 mm of the new access gate posts and connected to the existing chain linking the next wood post.
 - (iii) Supply and installation of concrete for bedding of fence posts.
 - (iv) Supply, fabrication, and installation of all materials related to the gate.

E30.2 Construction Methods

- (a) Install new access gate in the location and to the dimensions shown on the Drawings.
- (b) Ensure all utilities are clear before drilling for the installation of the metal and wood fence posts.

E30.3 Measurement and Payment

- (a) The New Access Gate will be measured and paid for at the Contract Lump Sum Price for "New Access Gate", which price shall be payment in full for supplying all materials and for performing all operations herein described and all other items incidental to the Work included in this Specification.

E31. NATIVE GRASSES AND TREES REVEGETATION

E31.1 Description

This Specification shall cover the installation of native grasses and trees within the lower and mid bank areas.

The work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead labour, materials, and all other things necessary for and incidental to the satisfactory performance and completion of all work as hereinafter specified.

The Contractor shall be responsible for the supply, safe storage and handling of all materials set forth in this Specification.

E31.2 Materials

E31.2.1 Lower and Mid Bank Revegetation

- (a) Seed Mixture

Grass seed shall consist of a Canada common native seed mix as follows:

- 20% Slender Wheatgrass
- 20% Switchgrass
- 20% Big Bluestem
- 20% Canada Wildrye
- 10% Fringed Brome
- 10% Canada Milkvetch

Grass species that may be substituted in varying percentages (no greater than 20%) as alternatives to those listed above include;

- Prairie Cordgrass
- Streambank Wheatgrass
- Western Wheatgrass
- Northern Wheatgrass

Oats shall be Canada No. 1 Grade.

(b) Trees

- (i) The trees to be placed as part of the lower and mid bank revegetation shall consist of native species approximately 75 mm in diameter. The number and species of trees to be planted will be based on the number and species of trees removed during construction and will be determined by the Contract Administrator.

Tree species specific to the Site include :

- Manitoba Maples
- Green Ash
- American Elm
- Basswood
- Cottonwood

- (ii) Trees placed as part of the Toilers Park Architectural Upgrades shall consist of trees having a minimum trunk diameter of 75 mm. The number and location of these trees will be directed by the Contract Administrator.

Tree species specific to the Site include :

- Amur Macckii (Amur Cherry)

(c) Shrubs

- (i) Shrubs planted as part of the Toilers Park Architectural Upgrades have a minimum diameter of 0.6m. The number and location of these Shrubs will be directed by the Contract Administrator.

Shrub species specific to the Site include :

- Juniperus Sabina (Savin Juniper)

E31.3 Construction Methods

E31.3.1 Seeding

- (a) Grass seed shall be sown at a rate of 0.22 kg per 100 square metres.
- (b) Oats shall be sown at a rate of 0.38 kg per 100 square metres.
- (c) Oats and grass seed may be mixed and sown together or they may be sown separately.

E31.3.2 Trees

The trees replanted in the lower and mid bank areas shall be planted in the general vicinity of where trees were removed prior to the commencement of works or as directed by the Contract Administrator.

E31.3.3 Maintenance of Seeded Area

Areas seeded with native grasses shall be mowed during the first growing season to control pioneering weeds and other competition. For the purposes of this project a weed is defined as any plant not included in the seed mix. Mowing should be done before the general height is 150 to 250 mm, or when the weedy foliar cover reaches 50 percent of the seeded area, or when the weed species begin to flower. The first mowing shall be set at a height of 75 mm with the following mowings to be set at a height of 100 to 200 mm. Rotary, flail, or sickle bar type mowing equipment is acceptable.

E31.3.4 Quality Control

- (a) Inspection

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection by the Contract Administrator including all operations from the selection of materials through the final acceptance of the specified work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection of approval that may have been previously given.

(b) Access

The Contract Administrator shall be afforded full access for the inspection of materials at the site to determine whether the material is being selected and placed in accordance with this Specification.

E31.4 Method of Measurement

E31.4.1 Topsoil and Seeding

The supply and placement of the native grass seeding within the lower and mid bank areas will be measured on an area basis. The area to be paid for shall be the total number of square metres seeded in accordance with this Specification and as measured by the Contract Administrator.

E31.4.2 Tree Planting

The supply and planting of trees will be measured on a unit basis for the type of tree planted. The Contractor shall be paid for the total number of trees in accordance with this Specification and as measured by the Contract Administrator.

E31.4.3 Shrub Planting

The supply and planting of will be measured on a unit basis for the type of tree planted. The Contractor shall be paid for the total number of shrubs planted in accordance with this Specification and as measured by the Contract Administrator.

E31.5 Basis of Payment

E31.5.1 Topsoil and Seeding (Native Grass Seed Mix)

The supply and placement of the native grass seeding within the lower and mid bank areas will be paid for at the Contract Unit Price per square metre of seeding for the "Topsoil and Seeding (Native Grass Seed Mix)" measured as specified, herein, which price shall be payment in full supplying all materials and performing all operations herein described, and all other items incidental to the work included in this Specification.

E31.5.2 Tree Planting

The supply and planting of trees within the lower and mid bank areas will be paid for at the Contract Unit Price per tree for the specific tree species listed under "Tree Planting", measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations herein described, and all other items incidental to the work included in this Specification.

E32. SEWER INSPECTION

E32.1 Description

E32.1.1 This Specification shall amend and supplement Standard Specifications CW 2145.

E32.1.2 This Specification covers inspection of sewers and manholes using internal video equipment for the purposes of assessing thoroughness of cleaning, observing and recording structural and service defects and construction features and to verify new sewer construction prior to acceptance.

E32.2 Construction Methods

E32.2.1 Sewer Condition Coding

Sewer pipes shall be coded according to the Standard Specifications CW 2145.

E32.3 Measurement and Payment

E32.3.1 Amend Section 4.4 of specification 2145 to read:

- (a) Sewer Inspection or reverse set up-inspection will be measured on a lump sum basis for each size and type of sewer and paid for at the Contract Unit Price for "Sewer inspection".
- (b) Payment will not be made until the required report submissions are accepted by the Contract Administrator.

E32.3.2 Delete Section 4.6 of Specification 2145.

E33. POROUS FLEXIBLE PAVING

E33.1 General

E33.1.1 Description

This specification describes the supply and installation of the porous flexible paving system to provide vehicular and pedestrian load support for grass areas, while protecting grass roots from harmful effects of traffic

E33.1.2 References

- (a) ASTM F 1951-08 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.
- (b) ASTM D 638-10 Standard Test Method for Tensile Properties of Plastics
- (c) ASTM C 33 Standard Specification for Concrete Aggregates
- (d) AASHTO M6 Standard Specification for Fine Aggregate for Hydraulic Cement Concrete
- (e) Major Components of the Complete System
 - Porous Flexible Paving units, assembled in rolls.
 - Engineered sand and gravel base course.
 - Seed soil amendment and fertilizer.
 - Sand fill.
 - Selected grass from seed, hydroseeding/hydro-mulching, or sod.
 - Selected topsoil (only for seeded installation).
 - Mulch (needed only for seeded or hydroseeded installations).
- (f) The porous flexible paving units, sand, and base course work together to support imposed loading.
- (g) The porous flexible paving units, Hydrogrow, and sand fill contribute to vegetation support.

E33.2 Materials

E33.2.1 Submittals

- (a) Installation Instructions: Manufacturer's printed installation instructions. Include methods for maintaining installed products.
- (b) Manufacturer's Material Certification: Product manufacturers shall provide certification of compliance with all applicable testing procedures and related specifications upon written request. Request for certification shall be submitted by the purchasing agency no later than the date of order placement.

E33.2.2 Acceptable Product for porous flexible paving unit

Trade name: **Grasspave2**
Manufacturer: Invisible Structures, Inc.

- (a) The Contractor may elect to use an alternative product upon review and approval by the Contract Administrator in accordance with B7. The Contractor shall request the Manufacturer to directly submit written information to the Contract Administrator on the preparation, materials, design, performance, references, and use of proposed products.

E33.2.3 Composition:

- (a) High density polyethylene (HDPE)
(b) Color: black
(c) Color Uniformity: Uniform color throughout all units rolls.
(d) Carbon Black for ultraviolet light stabilization.

E33.2.4 Performance Properties:

- (a) Maximum Loading Capability: 5721 psi (39,273 kPA) when filled with sand.
(b) Wheelchair Access testing for ADA Compliance: Passing ASTM F 1951-08.
(c) Wheelchair Access testing for ADA Compliance: Passing Rotational Penetrometer testing.
(d) Tensile strength, pull-apart testing: 458 lbf/in from ASTM D638 Modified.
(e) System Permeability (Grasspave2, sand, base course): 2.63 to 38.55 inches of water per hour.
(f) Effective Imperviousness (E.I.): 10%.

E33.2.5 Base Course

- (a) Sandy gravel material from local sources commonly used for road base construction (recycled materials such as crushed concrete or crushed asphalt are NOT acceptable).
(b) Conforming to the following sieve analysis and requirements:
 - 100 percent passing sieve size 1 inch (25 mm).
 - 90-100 percent passing sieve size 3/4 inch (19 mm).
 - 70-80 percent passing sieve size 3/8 inch (9 mm).
 - 55-70 percent passing sieve size #4.
 - 45-55 percent passing sieve size #10.
 - 25-35 percent passing sieve size #40.
 - 3-8 percent passing sieve size #200.
- (c) Provide a base course material nearly neutral in pH (range from 6.5 to 7.2) to provide adequate root zone development for turf.
(d) Material may be either "pit run" or "crusher run." Avoid using clay based crusher run/pit run. Crusher run material will generally require coarse, well-draining sand conforming to AASHTO M6 or ASTM C 33 to be added to mixture (20 to 30 percent by volume) to ensure long-term porosity.
(e) Alternative materials such as crushed shell, limerock, or crushed lava may be used for base course use, provided they are mixed with sharp sand (20 to 30 percent) to ensure long-term porosity, and are brought to proper compaction. Without added sand, crushed shell and limerock set up like concrete and become impervious.
(f) Alternative size and/or composition of base course materials should be submitted to Invisible Structures, Inc. (Manufacturer) for approval.

E33.2.6 Sand Fill for Rings and Spaces Between Rings: Clean sharp sand (washed concrete sand). Choose one of the following:

- (a) Coarse, well-draining sand, such as washed concrete sand conforming to AASHTO M6 or ASTM C-33.

- (b) United States Golf Association (USGA) greens, section - sand mix "The Root Zone Mixture."

E33.3 Construction Methods

E33.3.1 Subgrade Preparation:

- (a) Prepare subgrade as specified in CW 3110. Verify subgrade in accordance with porous
- (b) Provide adequate drainage from excavated area if area has potential to collect water, when working with in-place soils that have poor permeability.
- (c) Ensure in-place soil is relatively dry and free from standing water.
- (d) Uniformly grade base.
- (e) Level and clear base of large objects, such as rocks and pieces of wood.

E33.3.2 Base Preparation:

- (a) Install Base as specified in CW 3110 and as shown on the Drawings
- (b) Place a geotextile separation layer between the natural ground and the 'engineered base'.
- (c) Place engineered base in lifts not to exceed 6 inches (150 mm), compacting each lift separately to 100 percent Modified Proctor.
- (d) Leave 1 inch (2.5 cm) of depth below final grade for porous paver unit and sand fill and 0.5 inch (1.25 cm) for depth of sod root zone or topsoil germination area (when applicable).

E33.3.3 Seed Mix

- (a) Spread seed mix (spreader rate = 4.53 kg per 100 m² (10 lbs per 1076 ft²) evenly over the surface of the base course with a hand-held, or wheeled, rotary spreader.
- (b) The seed mix should be placed immediately before installing the flexible porous pavement.

E33.3.4 Flexible Porous Paving Units

- (a) Install the flexible porous paving units by placing units with rings facing up, and using snap-fit connectors, pegs and holes, provided to maintain proper spacing and interlock the units. Units can be easily shaped with pruning shears or knife. Units placed on curves, slopes, and high traffic areas shall be anchored to the base course, using 40d common nails with fender washer, as required to secure units in place. Tops of rings shall be between 6 mm to 13 mm (0.25" to 0.5") below the surface of adjacent hard-surface pavements.
- (b) Install sand in rings as they are laid in sections by "back-dumping" directly from a dump truck, or from buckets mounted on tractors, which then exit the site by driving over rings already filled with sand. The sand is then spread laterally from the pile using flat bottomed shovels and/or wide "asphalt rakes" to fill the rings. A stiff bristled broom should be used for final "finishing" of the sand. The sand must be "compacted" by using water from hose, irrigation heads, or rainfall, with the finish grade no less than the top of rings and no more than 6 mm (0.25") above top of rings.

E33.3.5 Grass

- (a) Grass coverage on the sand-filled rings must be completed within one week. Sand must be re-installed and leveled and flexible porous paving units checked for integrity if rings become exposed due to wind, rain, traffic, or other factors. (Choose one paragraph below to meet grass installation method desired.)
- (b) Install thin sod directly over sand filled rings, filled no higher than the top of the rings. Sod strips should be placed with very tight joints. Sodded areas must be fertilized and kept moist during root establishment (minimum of 3 weeks). **DO NOT DRIVE ON SYSTEM:** Sodded areas must be protected from any traffic, other than emergency vehicles, for a period of 3 to 4 weeks, or until the root system has penetrated and established well below the flexible porous paving units units.
- (c) Adequately water sod or grass seed to assure germination of seed and growth of root system.

E33.3.6 Protection

Sodded areas must be protected from any traffic, other than emergency vehicles, for a period of 3 to 4 weeks, or until the root system has penetrated below the flexible porous paving units.

E33.3.7 Quality Control

- (a) Remove and replace segments of flexible porous paving units where three or more adjacent rings are broken or damaged, reinstalling as specified, so no evidence of replacement is apparent.
- (b) Perform cleaning during the installation of work and upon completion of the work. Remove all excess materials, debris, and equipment from site. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

E33.4 Measurement and Payment

- (a) Supply, placement and maintenance of porous flexible pavement will be measured on an area basis. The area to be paid for shall be the total number of square metres placed and maintained in accordance with this Specification and accepted by the Contract Administrator, as computed from measurements made by the Contract Administrator. No payment will be made for porous flexible pavement placed outside of the limits of placement as directed by the Contract Administrator

E34. SUPPLY AND INSTALL BENCH

E34.1 General

E34.1.1 This specification covers the supply and installation of Tache Style park benches.

E34.2 Materials

E34.2.1 Materials shall be as per City of Winnipeg Drawing SCD -120A

E34.3 Construction Methods

E34.3.1 The Construction of the Tache Benches shall be in the locations shown on the Drawing and as shown on City of Winnipeg Drawing SCD -120A

E34.4 Measurement and Payment

E34.4.1 Benches

E34.4.2 The supplying and installation of Benches will be measured on a unit basis. The number of Benches to be paid for shall be the total number of Benches supplied and installed in accordance with this Specification and Contract Drawings and accepted by the Contract Administrator. Bench support brackets will be incidental to the cost of the bench.

E35. PLANTERS

E35.1 General

E35.1.1 This specification shall cover the construction of planters including planting bed preparation.

E35.1.2 Concrete works for the planters shall follow CW 3310 where applicable.

E35.2 Materials

E35.3 General

E35.3.1 The concrete materials shall be supplied in accordance with CW 3310.

- E35.3.2 All materials supplied under this Specification shall be of a type acceptable to the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.
- E35.3.3 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.
- E35.3.4 **Planting Soil**
Planting Soil shall consist of black top soil, a fertile friable natural loam containing by volume not less than 4% and no more than 25% of organic matter for clay loams, and not less than 2% and no more than 25% for sandy loams, with an acidity value ranging from pH 6.0 to 8.0 and capable of sustaining vigorous plant growth. Topsoil is to be free of any mixture of subsoil, clay lumps and free of stones and other extraneous matter. It is not to contain couch or crab grass rhizomes.
- E35.3.5 **Bark Mulch**
Bark Mulch shall be wood chip mulch free of small branches and leaves and ranging in size from 5mm to 75mm long and 5mm to 20mm thick. Submit sample of mulch for approval by the contract Administrator prior to shipping to site.
- E35.3.6 **Water**
Water shall be potable and free of minerals which may be detrimental to plant growth.
- E35.3.7 **Insulation**
Planter Insulation shall be 37mm thick rigid styrofoam.
- E35.3.8 **Waterproofing**
Planter waterproofing shall be "bituthene 3000" membrane.
- E35.3.9 **Filter Cloth**
Filter cloth to be Terra Fix 270R.
- E35.3.10 **Granular**
Granular shall be clean and washed granite aggregate free of fines and small particles. Aggregate sizes to be no less than 25mm and no greater than 38mm diameter. Sample of granular material to be provided to Contract Administrator for approval prior to shipment to site.

E35.4 Construction Methods

- E35.4.1 The Contractor shall co-ordinate the installation in accordance with the Drawings and as specified herein.
- E35.4.2 **Planting Bed Preparation**
- (a) Contractor shall install waterproofing, granular material, filter cloth, and styrofoam insulation in the planters as described in this specification.
 - (b) Planting bed areas, shall be filled with soil mixture. After filling top of bed shall be set to levels shown on drawings. Soil should be lightly compacted and indicated soil depths shall be depths after light compaction.
 - (c) Bark mulch shall be spread to a consistent depth over entire planting bed area, taking care not to damage the plants.
 - (d) Sub-grade shall be scarified to a minimum depth of 200mm.
 - (e) Excavation shall be filled with soil mixture. After filling top of soil shall be level with surrounding grade and base of structural void form, as determined by the Contract Administrator. Soil should be lightly compacted and indicated soil depths shall be depths after light compaction.

E35.5 Measurement and Payment

- E35.5.1 The supplying and installation of Planters will be measured on a lump sum unit price basis and shall be paid for at the Contract Unit Price for "Concrete Planter", installed in accordance with this Specification, accepted by the Contract Administrator.

E36. ALLOWANCE FOR SITE INSTRUMENTATION

- E36.1.1 The Contractor is advised that geotechnical instrumentation may be installed by a drilling contractor concurrently with this contract. The costs for the instrumentation will be paid for under the item "Allowance for Site Instrumentation". The Contractor shall make an allowance in his schedule for co-ordinating his Work with, and maintaining access for, the forces of the Contract Administrator and a drilling contractor. The geotechnical instrumentation referred to in this specification is separate from any instrumentation the Contractor may install for monitoring movement of trench shoring Work. The Work is anticipated to take approximately 2 days. No extra payment will be made for the co-ordination or access requirements describe above.

E37. ALLOWANCE FOR VIBRATION MONITORING

- E37.1.1 The Contractor is advised that vibration monitors will be installed by a testing contractor concurrently with this Contract. These instruments will be set up next to selected private residences immediately adjacent to Sites involving slope stabilization. The cost for the monitoring and all required supplies will be paid for under the item "Allowance for Vibration Monitoring". The associated work should not interfere with the construction Contract and will be overseen by the Contract Administrator

E38. ALLOWANCE FOR SUPPLY AND INSTALLATION OF PERFORATED STEEL PARK SIGNAGE

- E38.1.1 The Contractor is advised that public consultation will be on- going during the course of the Contract to determine the content for the perforated steel park signs shown on the Drawings. The public consultation will be conducted by the City of Winnipeg and the Contract Administrator. Upon selection of the content, the Contractor will be provided with the required documentation to procure the signage. Supply and installation of the signs will be the Contractor's responsibility. The Contract Administrator will work with the Contractor to select a design within the cash allowance shown on Form B.