



THE CITY OF WINNIPEG

BID OPPORTUNITY

BID OPPORTUNITY NO. 79-2013

**BISHOP GRANDIN BLVD/SHOREHILL DR TO BEAVERHILL BLVD: MULTI-USE
PATH AND NAVIN DRAIN CAST-IN-PLACE CONCRETE CULVERT**

TABLE OF CONTENTS

PART A - BID SUBMISSION

Form A: Bid	1
Form B: Prices	4
Form G1: Bid Bond and Agreement to Bond	7
Form G2: Irrevocable Standby Letter of Credit and Undertaking	9

PART B - BIDDING PROCEDURES

B1. Contract Title	1
B2. Submission Deadline	1
B3. Site Investigation	1
B4. Enquiries	1
B5. Addenda	1
B6. Substitutes	2
B7. Bid Components	3
B8. Bid	3
B9. Prices	4
B10. Qualification	4
B11. Bid Security	5
B12. Opening of Bids and Release of Information	6
B13. Irrevocable Bid	6
B14. Withdrawal of Bids	6
B15. Evaluation of Bids	7
B16. Award of Contract	8

PART C - GENERAL CONDITIONS

C0. General Conditions	1
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PART D - SUPPLEMENTAL CONDITIONS

General

D1. General Conditions	1
D2. Scope of Work	1
D3. Contract Administrator	1
D4. Contractor's Supervisor	2
D5. Ownership of Information, Confidentiality and Non Disclosure	2
D6. Notices	2
D7. Furnishing of Documents	2

Submissions

D8. Authority to Carry on Business	3
D9. Safe Work Plan	3
D10. Insurance	3
D11. Performance Security	3
D12. Subcontractor List	4
D13. Equipment List	4
D14. Detailed Work Schedule	4

Schedule of Work

D15. Commencement	4
D16. Restricted Work Hours	5
D17. Work By Others	5
D18. Critical Stages	5
D19. Substantial Performance	5
D20. Total Performance	6
D21. Liquidated Damages	6
D22. Scheduled Maintenance	6

Control of Work

D23. Job Meetings	7
D24. Prime Contractor – The Workplace Safety and Health Act (Manitoba)	7

Measurement and Payment

D25. Payment	7
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Warranty

D26. Warranty	7
Form H1: Performance Bond	8
Form H2: Irrevocable Standby Letter of Credit	10
Form J: Subcontractor List	12
Form K: Equipment	14
Form L: Detailed Work Schedule	15

PART E - SPECIFICATIONS

General

E1. Applicable Specifications and Drawings	1
E2. Geotechnical Report	1
E3. Protection Of Existing Trees	1
E4. Traffic Control	2
E5. Traffic Management	2
E6. Pedestrian Safety	2
E7. Water Obtained From the City	3
E8. Infrastructure Signs	3
E9. Operating Constraints for Work in Close Proximity to the Dakota Extension Feedermain and The Second Branch Aqueduct	3
E10. Removal of Trees, Pruning of Trees and Removal of Shrubs	5
E11. Protection of Fibre Optic Cables	7
E12. Removable Bollards	7
E13. Installation of Silt Fence	8
E14. Mobilization and Demobilization	9
E15. Creek Flow Maintainance	10
E16. Excavation	12
E17. Supply and Place Reinforcing Steel	13
E18. Structural Concrete	15
E19. Backfill	27
E20. Rockfill Riprap	29
E21. Chain Link Fencing	31
E22. Erosion Control Blanket	31
E23. Sub-Grade Construction in Test Section Areas	33

Appendix 'A' - Geotechnical Report

Appendix 'B' – Hydraulic Report

Appendix 'C' – Pipeline Loading Assessment

PART B - BIDDING PROCEDURES

B1. CONTRACT TITLE

- B1.1 Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place Concrete Culvert

B2. SUBMISSION DEADLINE

- B2.1 The Submission Deadline is 12:00 noon Winnipeg time, February 8, 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. ADDENDA

- B5.1 The Contract Administrator may, at any time prior to the Submission deadline, issue addenda correcting errors, discrepancies or omissions in the Bid Opportunity, or clarifying the meaning or intent of any provision therein.
- B5.2 The Contract Administrator will issue each addendum at least two (2) Business Days prior to the Submission Deadline, or provide at least two (2) Business Days by extending the Submission Deadline.
- B5.2.1 Addenda will be available on the Bid Opportunities page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/bidopp.asp>
- B5.2.2 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.

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

B6. SUBSTITUTES

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

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

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

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

- (a) provide sufficient information and details to enable the Contract Administrator to determine the acceptability of the Plant, Material or method as either an approved equal or alternative;
- (b) identify any and all changes required in the applicable Work, and all changes to any other Work, which would become necessary to accommodate the substitute;
- (c) identify any anticipated cost or time savings that may be associated with the substitute;
- (d) certify that, in the case of a request for approval as an approved equal, the substitute will fully perform the functions called for by the general design, be of equal or superior substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance;
- (e) certify that, in the case of a request for approval as an approved alternative, the substitute will adequately perform the functions called for by the general design, be similar in substance to that specified, is suited to the same use and capable of performing the same function as that specified and can be incorporated into the Work, strictly in accordance with the proposed work schedule and the dates specified in the Supplemental Conditions for Substantial Performance and Total Performance.

B6.5 The Contract Administrator, after assessing the request for approval of a substitute, may in his/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.

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

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

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

B6.8 If the Contract Administrator approves a substitute as an "approved alternative", any Bidder bidding that approved alternative 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 B15.

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

B6.10 Notwithstanding B6.2 to B6.9, in accordance with B7.6, deviations inconsistent with the Bid Opportunity document shall be evaluated in accordance with B15.1(a).

B7. BID COMPONENTS

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

- (a) Form A: Bid;
- (b) Form B: Prices, hard copy;
- (c) Bid Security;
 - (i) Form G1: Bid Bond and Agreement to Bond, or
 - (ii) Form G2: Irrevocable Standby Letter of Credit and Undertaking, or a certified cheque or draft;

B7.2 Further to B7.1, the Bidder should include the written correspondence from the Contract Administrator approving a substitute in accordance with B6.

B7.3 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.

B7.4 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.

B7.4.1 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.

B7.4.2 A hard copy of Form B: Prices must be submitted with the Bid. If there is any discrepancy between the Adobe PDF version of Form B: Prices and the Microsoft Excel version of Form B: Prices, the PDF version shall take precedence.

B7.5 Bidders are advised not to include any information/literature except as requested in accordance with B7.1.

B7.6 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 B15.1(a).

B7.7 Bids submitted by facsimile transmission (fax) or internet electronic mail (e-mail) will not be accepted.

B7.8 Bids shall be submitted to:

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

B8. BID

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

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

- (a) if the Bidder is a sole proprietor carrying on business in his/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.

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

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

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

- (a) if the Bidder is a sole proprietor carrying on business in his/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, shall 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.

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

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

B9. PRICES

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

B9.1.1 For the convenience of Bidders, and pursuant to B7.4.2 and B15.4.3, an electronic spreadsheet Form B: Prices in Microsoft Excel (.xls) format is available along with the Adobe PDF documents for this Bid Opportunity on the Bid Opportunities page at the Materials Management Division website at <http://www.winnipeg.ca/matmgt/>

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

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

B9.4 Payments to Non-Resident Contractors are subject to Non-Resident Withholding Tax pursuant to the Income Tax Act (Canada).

B10. QUALIFICATION

B10.1 The Bidder shall:

- (a) undertake to be in good standing under The Corporations Act (Manitoba), or properly registered under The Business Names Registration Act (Manitoba), or otherwise properly registered, licensed or permitted by law to carry on business in Manitoba; and
- (b) be financially capable of carrying out the terms of the Contract; and
- (c) have all the necessary experience, capital, organization, and equipment to perform the Work in strict accordance with the terms and provisions of the Contract.

- B10.2 The Bidder and 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>
- B10.3 The Bidder and/or any proposed Subcontractor (for the portion of the Work proposed to be subcontracted to them) shall:
- (a) have successfully carried out work similar in nature, scope and value to the Work; and
 - (b) be fully capable of performing the Work required to be in strict accordance with the terms and provisions of the Contract; and
 - (c) have a written workplace safety and health program if required pursuant to The Workplace Safety and Health Act (Manitoba);
- B10.4 Further to B10.3(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 Manitoba Construction Safety Association or by the Manitoba Heavy Construction Association's Safety, Health and Environment Program; or
 - (b) a report or letter to that effect from an independent reviewer acceptable to the City. (A list of acceptable reviewers and the review template are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>
- B10.5 The Bidder shall submit, within three (3) Business Days of a request by the Contract Administrator, proof satisfactory to the Contract Administrator of the qualifications of the Bidder and of any proposed Subcontractor.
- B10.6 The Bidder shall provide, on the request of the Contract Administrator, full access to any of the Bidder's equipment and facilities to confirm, to the Contract Administrator's satisfaction, that the Bidder's equipment and facilities are adequate to perform the Work.

B11. BID SECURITY

- B11.1 The Bidder shall provide bid security in the form of:
- (a) a bid bond, in the amount of at least ten percent (10%) of the Total Bid Price, and agreement to bond of a company registered to conduct the business of a surety in Manitoba, in the form included in the Bid Submission (Form G1: Bid Bond and Agreement to Bond); or
 - (b) an irrevocable standby letter of credit, in the amount of at least ten percent (10%) of the Total Bid Price, and undertaking issued by a bank or other financial institution registered to conduct business in Manitoba and drawn on a branch located in Winnipeg, in the form included in the Bid Submission (Form G2: Irrevocable Standby Letter of Credit and Undertaking); or
 - (c) a certified cheque or draft payable to "The City of Winnipeg", in the amount of at least fifty percent (50%) of the Total Bid Price, drawn on a bank or other financial institution registered to conduct business in Manitoba.
- B11.1.1 If the Bidder submits alternative bids, the bid security shall be in the amount of the specified percentage of the highest Total Bid Price submitted.
- B11.1.2 All signatures on bid securities shall be original.
- B11.1.3 The Bidder shall sign the Bid Bond.

- B11.1.4 The Surety shall sign and affix its corporate seal on the Bid Bond and the Agreement to Bond.
- B11.2 The bid security of the successful Bidder and the next two lowest evaluated responsive and responsible Bidders will be released by the City when a Contract for the Work has been duly executed by the successful Bidder and the performance security furnished as provided herein. The bid securities of all other Bidders will be released when a Contract is awarded.
- B11.2.1 Where the bid security provided by the successful Bidder is in the form of a certified cheque or draft pursuant to B11.1(c), it will be deposited and retained by the City as the performance security and no further submission is required.
- B11.2.2 The City will not pay any interest on certified cheques or drafts furnished as bid security or subsequently retained as performance security.
- B11.3 The bid securities of all Bidders will be released by the City as soon as practicable following notification by the Contract Administrator to the Bidders that no award of Contract will be made pursuant to the Bid Opportunity.

B12. OPENING OF BIDS AND RELEASE OF INFORMATION

- B12.1 Bids will be opened publicly, after the Submission Deadline has elapsed, in the office of the Corporate Finance Department, Materials Management Division, or in such other office as may be designated by the Manager of Materials.
- B12.1.1 Bidders or their representatives may attend.
- B12.1.2 Bids determined by the Manager of Materials, or his/her designate, to not include the bid security specified in B11 will not be read out.
- B12.2 Following the submission deadline, the names of the Bidders and their Total Bid Prices (unevaluated, and pending review and verification of conformance with requirements) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>
- B12.3 After award of Contract, the name(s) of the successful Bidder(s) and the Contract amount(s) will be available on the Closed Bid Opportunities (or Public/Posted Opening & Award Results) page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/>
- B12.4 The Bidder is advised that any information contained in any Bid may be released if required by City policy or procedures, by The Freedom of Information and Protection of Privacy Act (Manitoba), by other authorities having jurisdiction, or by law.

B13. IRREVOCABLE BID

- B13.1 The Bid(s) submitted by the Bidder shall be irrevocable for the time period specified in Paragraph 11 of Form A: Bid.
- B13.2 The acceptance by the City of any Bid shall not release the Bids of the next two lowest evaluated responsive Bidders and these Bidders shall be bound by their Bids on such Work until a Contract for the Work has been duly executed and the performance security furnished as herein provided, but any Bid shall be deemed to have lapsed unless accepted within the time period specified in Paragraph 11 of Form A: Bid.

B14. WITHDRAWAL OF BIDS

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

- B14.1.1 Notwithstanding C23.3, the time and date of receipt of any notice withdrawing a Bid shall be the time and date of receipt as determined by the Manager of Materials.
- B14.1.2 The City will assume that any one of the contact persons named in Paragraph 3 of Form A: Bid or the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid, and only such person, has authority to give notice of withdrawal.
- B14.1.3 If a Bidder gives notice of withdrawal prior to the Submission Deadline, the Manager of Materials will:
- (a) retain the Bid until after the Submission Deadline has elapsed;
 - (b) open the Bid to identify the contact person named in Paragraph 3 of Form A: Bid and the Bidder's authorized representatives named in Paragraph 12 of Form A: Bid; and
 - (c) if the notice has been given by any one of the persons specified in B14.1.3(b), declare the Bid withdrawn.
- B14.2 A Bidder who withdraws his/her Bid after the Submission Deadline but before his/her Bid has been released or has lapsed as provided for in B13.2 shall be liable for such damages as are imposed upon the Bidder by law and subject to such sanctions as the Chief Administrative Officer considers appropriate in the circumstances. The City, in such event, shall be entitled to all rights and remedies available to it at law, including the right to retain the Bidder's bid security.

B15. EVALUATION OF BIDS

- B15.1 Award of the Contract shall be based on the following bid evaluation criteria:
- (a) compliance by the Bidder with the requirements of the Bid Opportunity, or acceptable deviation therefrom (pass/fail);
 - (b) qualifications of the Bidder and the Subcontractors, if any, pursuant to B10 (pass/fail);
 - (c) Total Bid Price;
 - (d) economic analysis of any approved alternative pursuant to B6.
- B15.2 Further to B15.1(a), the Award Authority may reject a Bid as being non-responsive if the Bid is incomplete, obscure or conditional, or contains additions, deletions, alterations or other irregularities. The Award Authority may reject all or any part of any Bid, or waive technical requirements or minor informalities or irregularities, if the interests of the City so require.
- B15.3 Further to B15.1(b), the Award Authority shall reject any Bid submitted by a Bidder who does not demonstrate, in his/her Bid or in other information required to be submitted, that he/she is responsible and qualified.
- B15.4 Further to B15.1(c), the Total Bid Price shall be the sum of the quantities multiplied by the unit prices for each item shown on Form B: Prices.
- B15.4.1 If there is any discrepancy between the Total Bid Price written in figures, the Total Bid Price written in words and the sum of the quantities multiplied by the unit prices for each item, the sum of the quantities multiplied by the unit prices for each item shall take precedence.
- B15.4.2 Further to B15.1(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.
- B15.4.3 The electronic Form B: Prices and the formulas imbedded in that spreadsheet are only provided for the convenience of Bidders. The City makes no representations or warranties as to the correctness of the imbedded formulas. It is the Bidder's responsibility to ensure the extensions of the unit prices and the sum of Total Bid Price performed as a function of the formulas within the electronic Form B: Prices are correct.

B16. AWARD OF CONTRACT

- B16.1 The City will give notice of the award of the Contract or will give notice that no award will be made.
- B16.2 The City will have no obligation to award a Contract to a Bidder, even though one or all of the Bidders are determined to be responsible and qualified, and the Bids are determined to be responsive.
- B16.2.1 Without limiting the generality of B16.2, the City will have no obligation to award a Contract where:
- (a) the prices exceed the available City funds for the Work;
 - (b) the prices are materially in excess of the prices received for similar work in the past;
 - (c) the prices are materially in excess of the City's cost to perform the Work, or a significant portion thereof, with its own forces;
 - (d) only one Bid is received; or
 - (e) in the judgment of the Award Authority, the interests of the City would best be served by not awarding a Contract.
- B16.3 Where an award of Contract is made by the City, the award shall be made to the responsible and qualified Bidder submitting the lowest evaluated responsive Bid, in accordance with B15.
- B16.3.1 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

C0. GENERAL CONDITIONS

- C0.1 The *General Conditions for Construction* (Revision 2006 12 15) are applicable to the Work of the Contract.
- C0.1.1 The *General Conditions for Construction* are available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at http://www.winnipeg.ca/matmgt/gen_cond.stm
- C0.2 A reference in the Bid Opportunity to a section, clause or subclause with the prefix “**C**” designates a section, clause or subclause in the *General Conditions for Construction*.

PART D - SUPPLEMENTAL CONDITIONS

GENERAL

D1. GENERAL CONDITIONS

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

D2. SCOPE OF WORK

D2.1 The Work to be done under the Contract shall consist of:

- (a) Multi-Use Pathway Construction.
 - (i) Bishop Grandin Boulevard/Shorehill Drive to Beaverhill Boulevard
- (b) Cast-in-Place Concrete Culvert
 - (i) Navin Drain

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

- (a) Multi-Use Pathway Construction
 - (i) Tree Removal, tree pruning and shrub removal
 - (ii) Excavation
 - (iii) Compaction of existing sub-grade
 - (iv) Installation of separation geotextile fabric
 - (v) Placement of sub-base and base course materials
 - (vi) Installation of culverts
 - (vii) Adjustment of existing water valves
 - (viii) Construction of concrete sidewalk
 - (ix) Placement of asphalt pavement (average thickness – 75mm)
 - (x) Ditch re-grading and sod
 - (xi) Boulevard Restoration
- (b) Cast-in-Place Concrete Culvert
 - (i) Excavation and backfill
 - (ii) Construction of reinforced cast-in-place concrete
 - (iii) Erosion control
 - (iv) Riprap
 - (v) Chain link fencing

D3. CONTRACT ADMINISTRATOR

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

Craig Rowbotham, P. Eng.
Project Manager
3rd Floor – 865 Waverley Street
Winnipeg MB R3T 5P4

Telephone No. (204) 896-1209
Facsimile No. (204) 896-0754

D3.2 At the pre-construction meeting, Craig Rowbotham, P. Eng. 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 B7.8

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.

D4.2 At least two (2) business days prior to the commencement of any Work on the site, the Contractor shall provide the Contract Administrator with a phone number where the supervisor identified in D4.1 or an alternate can be contacted twenty-four (24) hours a day to respond to an emergency.

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 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 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 shall be prepared and submitted in the format shown in the City's template which is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division 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 the 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 B11.1(c), the Contractor shall provide the City Solicitor with the required performance security within seven (7) Calendar Days of notification of the award of the Contract by way of letter of intent and prior to the commencement of any Work on the Site and in no event later than the date specified in the 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 or prior to a pre-construction meeting, or 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 C4.1 for the return of the executed Contract.

D13. EQUIPMENT LIST

D13.1 The Contractor shall provide the Contract Administrator with a complete list of the equipment which the Contractor proposes to utilize (Form K: Equipment List) at or prior to a pre-construction meeting, or 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 C4.1 for the return of the executed Contract.

D14. DETAILED WORK SCHEDULE

D14.1 The Contractor shall provide the Contract Administrator with a detailed work schedule (Form L: 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.

SCHEDULE OF WORK

D15. COMMENCEMENT

D15.1 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.

D15.2 The Contractor shall not commence any Work on the Site until:

- (a) the Contract Administrator has confirmed receipt and approval of:
 - (i) evidence of authority to carry on business specified in D8;
 - (ii) evidence of the workers compensation coverage specified in C6.15;
 - (iii) the twenty-four (24) hour emergency response phone number specified in D4.2.
 - (iv) the Safe Work Plan specified in D9;
 - (v) evidence of the insurance specified in D10;
 - (vi) the performance security specified in D11;

- (vii) the subcontractor list specified in D12;
 - (viii) the equipment list specified in D13; and
 - (ix) the detailed work schedule specified in D14.
- (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.

D15.3 The Contractor shall commence the Work on the Site within seven (7) Working Days of receipt of the letter of intent.

D15.4 The City intends to award this Contract by February 15, 2013.

D16. RESTRICTED WORK HOURS

D16.1 Further to clause 3.10 of CW 1130, the Contractor shall require written permission forty-eight (48) hours in advance from the Contract Administrator for any work to be performed between 2000 hours and 0700 hours, or on Saturdays, Sundays, Statutory Holidays and or Civic Holidays.

D16.2 Further to clause 3.10 of CW 1130, the Contractor shall not Work within the Navin Drain from April 1, 2013 to June 15, 2013. All Works following June 15, 2013 within the Navin Drain are to be in the dry.

D17. WORK BY OTHERS

D17.1 Work by others on or near the Site will include but not necessarily be limited to:

- (a) Manitoba Hydro (Power) – Underground utilities to be relocated along pathway at the cast-in-place concrete culvert section. Expected to be completed by February 1, 2013;
- (b) Antex Western (Soil Stabilization) – A test section of a soil stabilizing product will be installed from Station 2+00 to 3+00. Supply and installation of product will be done by Antex Western prior to sub-grade compaction activities.

D18. CRITICAL STAGES

D18.1 The Contractor shall achieve critical stages of the Work in accordance with the following requirements:

- (a) Cast-in-Place Concrete Culvert
 - (i) To be completed by April 1, 2013.
 - (ii) Once the Cast-in-Place Culvert is completed, the project will be shut down until spring start up.

D18.2 When the Contractor considers the Work associated with Cast-in-Place Concrete Culvert to be completed, the Contractor shall arrange, attend and assist in the inspection of the Work with the Contract Administrator for purposes of verifying Completion. 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 re-inspected.

D18.3 The date on which the Cast-in-Place Concrete Culvert Work has been accepted by the Contract Administrator as being completed to the requirements of the Contract is the date on which completion of Cast-in-Place Concrete Culvert has been achieved.

D19. SUBSTANTIAL PERFORMANCE

D19.1 The Contractor shall achieve Substantial Performance by June 7, 2013.

D19.2 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 re-inspected.

- D19.3 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.

D20. TOTAL PERFORMANCE

- D20.1 The Contractor shall achieve Total Performance by June 14, 2013.
- D20.2 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 re-inspected.
- D20.3 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.

D21. LIQUIDATED DAMAGES

- D21.1 If the Contractor fails to achieve Critical Stages, Substantial Performance or Total Performance in accordance with the Contract by the days fixed herein for same, the Contractor shall pay the City the following amounts per Working Day for each and every Working Day following the days fixed herein for same during which such failure continues:
- (a) Cast-In-Place Concrete Culvert – five hundred dollars (\$500);
 - (b) Substantial Performance – two thousand dollars (\$2,000);
 - (c) Total Performance – five hundred dollars (\$500).
- D21.2 The amounts specified for liquidated damages in D21.1 are based on a genuine pre-estimate of the City's losses in the event that the Contractor does not achieve critical stages, Substantial Performance or Total Performance by the days fixed herein for same.
- D21.3 The City may reduce any payment to the Contractor by the amount of any liquidated damages assessed.

D22. SCHEDULED MAINTENANCE

- D22.1 The Contractor shall perform the following scheduled maintenance in the manner and within the time periods required by the Specifications:
- (a) Reflective Crack Maintenance as specified in CW 3250-R7;
 - (b) Sodding (maintenance period) as specified in CW 3510-R9;
 - (c) Seeding (maintenance period) as specified in CW 3520-R7.
- D22.2 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

D23. JOB MEETINGS

- D23.1 Regular weekly job meetings will be held on 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.
- D23.2 The Contract Administrator reserves the right to cancel any job meeting or call additional job meetings whenever he/she deems it necessary.

D24. PRIME CONTRACTOR – THE WORKPLACE SAFETY AND HEALTH ACT (MANITOBA)

- D24.1 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).

MEASUREMENT AND PAYMENT

D25. PAYMENT

- D25.1 Further to C12, the City may at its option pay the Contractor by direct deposit to the Contractor's banking institution.

WARRANTY

D26. WARRANTY

- D26.1 Notwithstanding C13.2, the warranty period shall begin on the date of Total Performance and shall expire two (2) years thereafter unless extended pursuant to C13.2.1 or C13.2.2, in which case it shall expire when provided for thereunder.

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. 79-2013

Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place Concrete Culvert

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. 79-2013

Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place Concrete Culvert

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

(Name of Contractor)

(Address of Contractor)

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

_____ Canadian dollars.

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

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

Partial drawings are permitted.

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

(Address)

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

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

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

(Date)

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

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

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

(Name of bank or financial institution)

Per: _____
(Authorized Signing Officer)

Per: _____
(Authorized Signing Officer)

FORM J: SUBCONTRACTOR LIST
(See D12)

Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place
Concrete Culvert

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
MULTI-USE PATHWAY CONSTRUCTION:		
Supply of Materials:		
Base Course and Sub-base		
Concrete		
Asphalt		
Sod/Seed		
Removable Bollards		
Installation/Placement:		
Base Course and Sub-base		
Concrete		
Asphalt		
Sod/Seed		
Removable Bollards		
CAST-IN-PLACE CONCRETE CULVERT CONSTRUCTION		
Supply of Materials:		
Reinforcing Steel		
Concrete		
Base Course and Sub-base		
Rockfill Riprap		
Chain Link Fencing		
Erosion Control Blanket/Silt Fence		
Installation/Placement:		
Reinforcing Steel		
Concrete		
Base Course and Sub-base		

FORM J: SUBCONTRACTOR LIST
(See D12)

Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place
Concrete Culvert

<u>Portion of the Work</u>	<u>Name</u>	<u>Address</u>
Rockfill Riprap		
Chain Link Fencing		
Erosion Control Blanket/Silt Fence		

FORM K: EQUIPMENT
(See D13)

Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd: Multi-Use Path and Navin Drain Cast-In-Place Concrete Culvert

1. Category/type: All Equipment Working in Vicinity of the Dakota Extension Feedermain and the Second Branch Aqueduct

List all significant equipment (backhoes, typical haul trucks, concrete or asphalt pavers, etc.) that will be used in the vicinity of the pipelines. Additional sheets or equipment diagrams can be used to supplement.

Equipment Type: _____ Make/Model: _____

Tare (Operating) Weight: _____ Payload Weight: _____

Equipment axle and load configuration (text or diagram):

Equipment Type: _____ Make/Model: _____

Tare (Operating) Weight: _____ Payload Weight: _____

Equipment axle and load configuration (text or diagram):

Equipment Type: _____ Make/Model: _____

Tare (Operating) Weight: _____ Payload Weight: _____

Equipment axle and load configuration (text or diagram):

Equipment Type: _____ Make/Model: _____

Tare (Operating) Weight: _____ Payload Weight: _____

Equipment axle and load configuration (text or diagram):

Equipment Type: _____ Make/Model: _____

Tare (Operating) Weight: _____ Payload Weight: _____

Equipment axle and load configuration (text or diagram):

PART E - SPECIFICATIONS

GENERAL

E1. APPLICABLE SPECIFICATIONS AND DRAWINGS

- E1.1 These Specifications shall apply to the Work.
- E1.2 *The City of Winnipeg Standard Construction Specifications* in its entirety, whether or not specifically listed on Form B: Prices, shall apply to the Work.
- E1.2.1 *The City of Winnipeg Standard Construction Specifications* is available on the Information Connection page at The City of Winnipeg, Corporate Finance, Materials Management Division website at <http://www.winnipeg.ca/matmgt/Spec/Default.stm>
- E1.2.2 The version in effect three (3) Business Days before the Submission Deadline shall apply.
- E1.2.3 Further to C2.4(d), Specifications included in the Bid Opportunity shall govern over *The City of Winnipeg Standard Construction Specifications*.
- E1.3 The following are applicable to the Work:

<u>Drawing No.</u>	<u>Drawing Name/Title</u>	<u>Drawing (Original) Sheet Size</u>
	Cover Sheet	A3
C-01	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Plan and Profile	A3
C-02	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Miscellaneous Details	A3
C380-13-01	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Box Culvert Plan	A3
C380-13-02	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Box Culvert Elevation & Date Detail	A3
C380-13-03	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Box Culvert Section	A3
C380-13-04	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Box Culvert & Chain Link Fence Plan	A3
C380-13-05	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Box Culvert Sections and Detail	A3
G-01	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Bank Stabilization Plan	A3
G-02	Bishop Grandin Blvd/Shorehill Dr to Beaverhill Blvd Bank Stabilization Sections	A3
SCD-105C	Removable Steel Bollard	Letter

E2. GEOTECHNICAL REPORT

- E2.1 Further to C3.1, the geotechnical report is provided to aid the Contractor's evaluation of the pavement structure and/or existing soil conditions. The geotechnical report is contained in Appendix 'A'.

E3. PROTECTION OF EXISTING TREES

- E3.1 The Contractor shall take the following precautionary steps to prevent damage from construction activities to existing boulevard trees within the limits of the construction area:
- The Contractor shall not stockpile materials and soil or park vehicles and equipment on boulevards within 2 metres of trees.

- (b) Trees identified to be at risk by the Contract Administrator are to be strapped with 25 x 100 x 2400mm wood planks, or suitably protected as approved by the Contract Administrator.
- (c) Excavation shall be performed in a manner that minimizes damage to the existing root systems. Where possible, excavation shall be carried out such that the edge of the excavation shall be a minimum of 1.5 times the diameter (measured in inches), with the outcome read in feet, from the closest edge of the trunk. Where roots must be cut to facilitate excavation, they shall be pruned neatly at the face of excavation.
- (d) Operation of equipment within the dripline of the trees shall be kept to the minimum required to perform the work required. Equipment shall not be parked, repaired, refuelled; construction materials shall not be stored, and earth materials shall not be stockpiled within the driplines of trees. The dripline of a tree shall be considered to be the ground surface directly beneath the tips of its outermost branches. The Contractor shall ensure that the operations do not cause flooding or sediment deposition on areas where trees are located.
- (e) Work on-site shall be carried out in such a manner so as to minimize damage to existing tree branches. Where damage to branches does occur, they shall be neatly pruned.

E3.2 All damage to existing trees caused by the Contractor's activities shall be repaired to the requirements and satisfaction of the Contract Administrator and the City Forester or his/her designate.

E3.3 No separate measurement or payment will be made for the protection of trees.

E3.4 Except as required in clause E3.1(c) and E3.1(e), Elm trees shall not be pruned at any time between April 1 and July 31.

E4. TRAFFIC CONTROL

E4.1 Further to clauses 3.6 and 3.7 of CW 1130:

- (a) Where directed, the Contractor shall construct and maintain temporary asphalt ramps to alleviate vertical pavement obstructions such as manholes and planing drop-offs to the satisfaction of the Contract Administrator. Payment shall be in accordance with CW3410.
- (b) In accordance with the Manual of Temporary Traffic Control in Work Areas on City Streets, the Contractor ("Agency" in the manual) shall make arrangements with the Traffic Services Branch of the City of Winnipeg to place all temporary regulatory signs. The Contractor shall bear all costs associated with the placement of temporary traffic control devices by the Traffic Services Branch of the City of Winnipeg in connection with the works undertaken by the Contractor.

E5. TRAFFIC MANAGEMENT

E5.1 Further to clause 3.7 of CW 1130:

- E5.1.1 Intersecting street and private approach access shall be maintained at all times.
- E5.1.2 Should the Contractor be unable to maintain pedestrian or vehicular access to a residence or business, he/she 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.
- E5.1.3 Pedestrian and ambulance/emergency vehicle access must be maintained at all times.

E6. PEDESTRIAN SAFETY

E6.1 During the project, a temporary snow fence shall be installed adjacent to existing and temporary sidewalks as necessary to prevent access to the construction area. The Contractor shall be responsible for maintaining the snow fence in a proper working condition. No measurement for payment shall be made for this work.

E7. WATER OBTAINED FROM THE CITY

- E7.1 Further to clause 3.7 of CW 1120, the Contractor shall pay for all costs, including sewer charges, associated with obtaining water from the City in accordance with the Waterworks and Sewer By-laws.

E8. INFRASTRUCTURE SIGNS

- E8.1 The Contractor shall obtain infrastructure signs from the Traffic Services Sign Shop at 421 Osborne Street. The Contractor shall mount each sign securely to a rigid backing material approved by the Contract Administrator. The Contractor shall fasten each sign to a suitable support and erect and maintain one sign at each street as directed by the Contract Administrator. When the Contract Administrator considers the Work on the street complete, the Contractor shall remove and dispose of the signs and supports. No measurement for payment will be made for performing all operations herein described and all other items incidental to the work described

E9. OPERATING CONSTRAINTS FOR WORK IN CLOSE PROXIMITY TO THE DAKOTA EXTENSION FEEDERMAIN AND THE SECOND BRANCH AQUEDUCT

E9.1 Description

- E9.1.1 This Specification details operating constraints for all Work to be carried out in close proximity to the Dakota Extension Feedermain and the Second Branch Aqueduct. Close proximity shall be deemed to be any construction activity within a 5 m offset from the centreline of the pipelines.

E9.2 General Considerations for Work in Close Proximity to the Dakota Extension Feedermain and the Second Branch Aqueduct

- E9.2.1 The Dakota Extension Feedermain and the Second Branch Aqueduct are a critical component of the City of Winnipeg Regional Water Supply System and Work in close proximity to the pipelines shall be undertaken with an abundance of caution. The pipes cannot be taken out of service to facilitate construction and inadvertent damage caused to the pipes would likely have catastrophic consequences.
- E9.2.2 Work around the Feedermain and Aqueduct shall be planned and implemented to minimize the time period that Work is carried out in close proximity to it and to ensure that the pipeline is not subjected to excessive construction related loads, including excessive vibrations and/or concentrated or asymmetrical lateral loads during backfill placement
- E9.2.3 The 600mm Dakota Extension Feedermain is constructed of "Hyperscon" Prestressed Concrete Cylinder Pipe conforming to AWWA Standard C301-58. This section of the pipeline was installed in approximately 1965.
- E9.2.4 The 1650mm Second Branch Aqueduct is constructed of Prestressed Embedded Cylinder Concrete Pressure Pipe conforming to AWWA Standard C301-55T. This section of the pipeline was installed in approximately 1960.
- E9.2.5 Loading limitations and calculated loads associated with typical construction equipment are attached to this Specification as Appendix C. The loading calculations shall be interpreted with caution, however, as many factors can cause applied loads to increase considerably, such as unbalanced loading, variations in wheel base or track width, payload, impact factors due to excessive speed or vibration, etc.
- E9.2.6 Generally, loading conforming to legal highway loading for adjacent roadways or AASHTO HS 20 loading will be permitted, subject to review as outlined in Submittals section below.

E9.3 Submittals

- E9.3.1 Submit proposed construction equipment specifications to the Contract Administrator for review seven (7) days prior to construction. Submittal shall include:

- (a) Equipment operating weight and dimensions including wheel or track base, track length or axle spacing, track widths or wheel configurations;
- (b) Payload weights; and
- (c) Load distributions in the intended operating configuration.

E9.3.2 Submit a Construction Method Statement with proposed construction plan including material haul routes, excavation equipment locations, loading positioning and base construction sequencing to the Contract Administrator for review seven (7) days prior to construction. Do not commence construction until the Construction Method Statement has been reviewed and accepted by the Contract Administrator.

E9.3.3 The Contract Administrator will review the equipment and construction method statement in light of the Dakota Extension Feedermain and the Second Branch Aqueduct loading limitations.

E9.4 Protection of the Dakota Extension Feedermain and the Second Branch Aqueduct During Construction

E9.4.1 Pipe locations noted on the Drawings are based on the original record drawings. At the request of the Contract Administrator the Contractor shall verify the Feedermain and Aqueduct locations and obvert elevations by soft excavation methods (hydrovac or hand digging) at locations identified by the Contract Administrator.

E9.4.2 Contractors carrying out repair Work or Working in close proximity to the Feedermain and Aqueduct shall meet the following conditions and technical requirements:

- (a) Pre-Work, Planning and General Execution
 - (i) No Work shall commence at the site until the Construction Method Statement has been accepted and the Feedermain and Aqueduct locations have been clearly delineated in the field.
 - (ii) Work shall only be carried out with equipment that has been reviewed and quantified in terms of its loading implications by the Contract Administrator.
 - (iii) For transverse crossings of the Feedermain and Aqueduct in support of pathway construction activities, designate crossing locations and confine equipment crossing the pipe(s) to these locations. Reduce equipment speeds to levels that minimize the impacts of impact loading.
 - (iv) For construction Work activities either longitudinally or transverse to the alignment of the Feedermain and Aqueduct, work only with equipment and in the manner stipulated in the accepted Construction Method Statement and the supplemental requirements noted herein.
 - (v) Subgrade, subbase and base construction shall be kept in a rut free condition at all times. Construction equipment is prohibited from crossing pipelines if the grade is insufficient to support the equipment without rutting.
 - (vi) Granular material, construction material, soil or other material shall not stockpiled on the pipelines or within 5 metres of the pipe centerline.
 - (vii) Stage construction such that the Feedermain and Aqueduct are not subjected to significant asymmetrical loading at any time.
 - (viii) Where Work is in proximity to the Feedermain and Aqueduct, utilize construction practices and procedures that do not impart excessive vibration loads on the Feedermain and Aqueduct or that would cause settlement of the subgrade below the Feedermain and Aqueduct.
- (b) Excavation
 - (i) Where there is less than 2.5 m of cover over the Feedermain or Aqueduct, offset backhoe from the Feedermain or Aqueduct, a minimum of 2.5 m from the Feedermain or Aqueduct centerline, to carry out excavation.
 - (ii) Where there is less than 1.5 metres of earth cover over the Feedermain or Aqueduct and further excavation is required either adjacent to or over the

- Feedermain or Aqueduct, utilize only smooth edged excavation buckets, soft excavation or hand excavation techniques and continue offset excavation.
- (iii) Excavated materials intended for reuse shall not be dumped directly on pipelines but shall be carefully bladed in place.

(c) Subgrade Construction

- (i) Subgrade compaction shall be limited to static compaction methods and only with equipment that are well within the rated loading superimposed loading capacity of the Feedermain or Aqueduct.
- (ii) Stage Work activities to minimize the time period that unprotected subgrade is exposed to the environment and protect the subgrade against the impacts of adverse weather if subbase/ base course construction activities are not sequential with excavation.

(d) Subbase, Base and Asphalt Construction

- (i) Subbase or base course materials shall not be dumped directly on pipelines but shall be carefully bladed in-place.
- (ii) Subbase, base or asphaltic concrete compaction shall be either carried out by static methods without vibration or with smaller approved equipment such as hand held plate packers or smaller roller equipment that do not exceed 20 000 pounds.

E9.5 Compliance With the Specification

E9.5.1 The Contractor shall ensure that all Work crew members understand and observe the requirements of this specification. Prior to commencement of on-site Work, the Contractor shall jointly conduct an orientation meeting with the Contractor Administrator with all superintendents, foremen and heavy equipment operators to make all Workers on site are fully cognizant of the limitations of altered loading on the Feedermain or Aqueduct, the ramifications of inadvertent damage to the pipelines, the constraints associated with Work in close proximity to the Feedermain or Aqueduct and the specific details of the Construction Method Statement in instances where a Construction Method Statement is in effect.

E9.5.2 Employees of the Contractor or any Subcontractor that fail to comply with the conditions for Working in close proximity to the Feedermain or Aqueduct shall be promptly removed from the Site.

E9.6 Measurement and Payment

E9.6.1 Soft Excavation shall be paid for at the Contract Unit Price per hour for "Soft Excavation". The units to be paid for will be the total number of hours for soft dig excavation in accordance with this Specification, accepted and measured by the Contract Administrator.

E10. REMOVAL OF TREES, PRUNING OF TREES AND REMOVAL OF SHRUBS

DESCRIPTION

E10.1 General

E10.1.1 This specification covers the pruning and removal of existing trees and shrubs.

CONSTRUCTION METHODS

E10.2 Tree Removal

E10.2.1 The work shall be completed by a Contractor that has been qualified for pruning and removal work by the City of Winnipeg.

E10.2.2 Contractor shall remove designated trees as directed by the Contract Administrator on an "as required" basis in accordance with the requirements hereinafter specified.

- E10.2.3 The Contractor shall not complete a tree removal unless they receive authorization from the Contract Administrator.
- E10.2.4 The Contractor shall remove trees in a manner satisfactory to the Contract Administrator or designate and agrees that the Work may be inspected by City personnel.
- E10.2.5 The Contractor shall cut down designated trees and grub out the stumps and rootballs.
- E10.2.6 The Contractor shall remove and/or dispose of all material resulting from the Work immediately by removing to a landfill site, or by chipping and removing material to an appropriate location.
- E10.2.7 The Contractor shall repair any damage resulting from the Work to adjacent trees and shall report all damage immediately to the Contract Administrator.

E10.3 Tree Pruning

- E10.3.1 The work shall be completed by a Contractor that has been qualified for pruning and removal work by the City of Winnipeg.
- E10.3.2 Trees are to be pruned in accordance with the "ANSI A300 (Part 1)-2001 Pruning standards entitled, "Tree Care Operations – Tree, Shrub and Other Woody Plant Maintenance – Standard Practices (Pruning)" (revision and re-designation of ANSI A300-1995) (includes supplements) or most recent versions as available and in accordance with "Best Management Practices: Tree Pruning" (2002), which is a companion publication to the ANSI A300, or more recent version as available".
- E10.3.3 Contractor shall prune designated trees as directed by the Contract Administrator on an "as required" basis in accordance with the requirements hereinafter specified.
- E10.3.4 The Contractor shall not complete a tree pruning unless they receive authorization from the Contract Administrator.
- E10.3.5 The Contractor shall prune trees in a manner satisfactory to the Contract Administrator or designate and agrees that the Work may be inspected by City personnel.
- E10.3.6 The Contractor shall remove and/or dispose of all material resulting from the Work immediately by removing to a landfill site, or by chipping and removing material to an appropriate location.
- E10.3.7 The Contractor shall repair any damage resulting from the Work to adjacent trees and shall report all damage immediately to the Contract Administrator.

E10.4 Shrub Removal

- E10.4.1 The work shall be completed by a Contractor that has been qualified for pruning and removal work by the City of Winnipeg.
- E10.4.2 Contractor shall remove designated shrubs as directed by the Contract Administrator on an "as required" basis in accordance with the requirements hereinafter specified.
- E10.4.3 The Contractor shall not complete a tree removal unless they receive authorization from the Contract Administrator.
- E10.4.4 The Contractor shall remove trees in a manner satisfactory to the Contract Administrator or designate and agrees that the Work may be inspected by City personnel.
- E10.4.5 The Contractor shall cut down designated shrubs and grub out the stumps and rootballs.
- E10.4.6 The Contractor shall remove and/or dispose of all material resulting from the Work immediately by removing to a landfill site, or by chipping and removing material to an appropriate location.
- E10.4.7 The Contractor shall repair any damage resulting from the Work to adjacent shrubs and shall report all damage immediately to the Contract Administrator.

MEASUREMENT AND PAYMENT

- E10.5 Tree Removal will be measured on a unit basis and paid for at the Contract Unit Price per tree and associated stump/roots for "Removal of Trees". The number to be paid for will be the total number of trees and associated stump/roots removed and disposed of in accordance with this specification and accepted by the Contract Administrator.
- E10.6 Tree Pruning will be measured on a unit basis and paid for at the Contract Unit Price per tree for "Pruning of Trees". The number to be paid for will be the total number of trees pruned and disposed of in accordance with this specification and accepted by the Contract Administrator.
- E10.7 Shrub Removal will be measured on a unit basis and paid for at the Contract Unit Price per shrub and associated stump/roots for "Removal of Shrubs". The number to be paid for will be the total number of trees and associated stump/roots removed and disposed of in accordance with this specification and accepted by the Contract Administrator.

E11. PROTECTION OF FIBRE OPTIC CABLES

- E11.1 Further to CW 1120, the Contractor shall verify the location of fibre optic cables by exposing the cables using soft excavation methods (hydrovac or hand digging). The Contractor shall perform soft excavation at the locations required to verify the location, as determined by the Contract Administrator.
- E11.2 No separate or payment will be made for soft dig excavations for verifying locations of fibre optic cables. All costs associated with this work is considered incidental to the Work.

E12. REMOVABLE BOLLARDS

- E12.1 Description
- E12.1.1 This specification covers the supply and installation of removable bollards.
- E12.2 Referenced Standard Details
- E12.2.1 SCD-105C Removable Steel Bollard
- E12.3 Materials
- E12.3.1 All materials supplied under this Specification shall be of a type approved by the Contract Administrator, and shall be subject to inspection and testing by the Contract Administrator.
- E12.3.2 Removable Bollards – The Contractor shall supply and install removable steel bollards in accordance with the requirements hereinafter specified.
- (a) See SCD-105C Removable Steel Bollard
 - (b) Reflective Tape
 - (i) Shall be 100 mm wide white reflective tape. Engineer grade traffic, reflective tape. Provide Contract Administrator with product type for approval, prior to installing.
 - (c) Concrete pile as per Contract Drawings and CW 2160.
- E12.4 Construction Methods
- E12.4.1 General
- (a) New bollard installation as per detail in Contract Drawings, and including the following steps:
 - (i) Sawcut and remove asphalt;
 - (ii) Excavate to required depth for granular fill and bollard;
 - (iii) Place bollards centered in excavated area;

- (iv) Install compact granular fill to achieve required Proctor densities for sidewalk; and
 - (v) Ensure bollards are set plum prior to installation of surfacing.
- (b) Contractor shall repair any damage done during construction.

E12.5 Measurement and Payment

E12.5.1 Bollard placement and related activities will be measured and paid for at the Contract Unit Price for “Removable Bollards”, 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.

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 of Work included in this specification is as follows:

- (a) 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.
- (b) 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 B6.

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. 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. If silt fence is found to be loose or torn, repair or replace as necessary to comply with this Specification.
- (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.

E13.4 Method of Measurement

- (a) Installation of Silt Fence will be measured on a linear basis. The length to be paid shall be the total number of metres of Silt Fence installed, maintained and removed in accordance with this Specification, acceptable to the Contract Administrator.

E13.5 Basis of Payment

- (a) Installation of Silt Fence will be paid for at the Contract Unit Price for "Supply and Installation of Silt Fence", measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the Work included in this Specification.

E14. MOBILIZATION AND DEMOBILIZATION

E14.1 Description

E14.1.1 This Specification shall cover all operations relating to the mobilization and demobilization of the Contractor to the Site, as specified herein.

E14.1.2 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 works as hereinafter specified.

E14.2 Materials

- E14.2.1 The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification.
- E14.2.2 Construction fencing shall be constructed of orange wood lath or plastic and be 1200 mm high.

E14.3 Construction Methods

- E14.3.1 Site fencing shall be provided in the form of an orange plastic or wood snow fence to delineate the construction from the non-construction area. The Contractor shall maintain the fence for the duration of the construction and remove it when construction is complete.
- E14.3.2 Contractor's Site supervisor is required to carry, at all times, a cellular telephone, with voice mail.
- E14.3.3 This section also includes travel and accommodation, set-up and demobilization of Site offices, storage conveniences and other temporary facilities, construction plant, and other items not required to form part of the permanent works and not covered by other prices.

E14.4 Access Routes To Site

- E14.4.1 Installation equipment for the proposed works shall not cross or travel along either side of the Feedermain and/or Aqueduct within a lateral distance of 5.0 meters from the centre line of the Feedermain and/or Aqueduct.
- E14.4.2 The Feedermain runs along the North side of the Navin Drain as shown on the drawings.
- E14.4.3 The Aqueduct runs along the South side of the Navin Drain as shown on the drawings.
- E14.4.4 Access to the site for construction equipment shall be on the south side of the Navin Drain.
- E14.4.5 Access to the site shall be from existing approaches only.

E14.5 Measurement and Payment

- E14.5.1 Mobilization and Demobilization will not be measured. This item of work will be paid for at the Contract Lump Sum Price for "Mobilization and Demobilization" performed in accordance with this Specification and accepted by the Contract Administrator.

E15. CREEK FLOW MAINTAINANCE

E15.1 Description

- E15.1.1 This Specification shall cover the maintaining of flows in Navin Drain at the Bishop Grandin Blvd/Shorehill Dr Multi-Use Path crossing for the duration of the construction Works.
- E15.1.2 A hydraulic investigation has been carried out for the Navin Drain Crossing at the Bishop Grandin Blvd/Shorehill Dr Multi-Use Path by KGS Group. The Hydraulic Report is included in Appendix B at the end of these Specifications for the convenience of Bidders.
- E15.1.3 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 works as hereinafter specified.

E15.2 Materials

- E15.2.1 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.

E15.3 Construction Methods

- E15.3.1 In general, the Work shall include, but not necessarily be limited to:

- (a) Planning the work to identify when and how the in-stream work will be carried out. The Works may be constructed in the Winter when flows are minimal and provisions to maintain stream flow are less.
- (b) Design of the creek flow maintenance methods. The preparation and submission for review and approval by the Contract Administrator of a Water Management Plan comprised of detailed drawings and/or description of the maintenance methods.
- (c) Maintenance of creek flows for the duration of construction.
- (d) Removal of materials and/or equipment needed to maintain creek flows at the end of their use.
- (e) Confinement of suspended matter in the creek water generated at the Site through excavation, etc. to the area of the Site. This may require the construction of a downstream cofferdam and floating turbidity barrier through the creek to confine that suspended matter.

E15.3.2 At least five (5) days prior to the commencement of any scheduled Work on the Site, the Contractor shall submit to the Contract Administrator for review and approval a Creek Flow Maintenance Plan showing how the Contractor will undertake dewatering activities and maintain creek flow at the Site during construction.

E15.3.3 Further to GC:3.1, the geotechnical report is included in Appendix A to aid with the Contractor's evaluation of the existing soil conditions and design of temporary measures associated with the installation of the new culvert.

E15.3.4 The Contractor must comply with all regulatory provisions including the requirements stated in any applicable Rivers and Streams, and Department of Fisheries and Oceans Permits.

E15.3.5 Silt fences, as approved by the Contract Administrator, shall be installed and maintained parallel to the creek as required to prevent and debris from entering the waterway. An additional silt fence, as approved by the Contract Administrator, shall be installed and maintained in Winter months during frozen conditions across the creek at the downstream extent of the work area.

E15.3.6 The Contractor's Water Management Plan shall be designed to meet the following additional conditions and requirements:

- (a) Cofferdam(s) may be constructed on either or both of the upstream or downstream ends of the Site provided natural flow quantities are maintained.
- (b) Cofferdams, if used, shall be constructed of non-erodible material such as sandbags.
- (c) Between the date of April 1 and June 15, fish shall be afforded full access through the Site via a naturally flowing channel. In this time period, no construction activity impacting upon the creek affecting fish mobility or habitat will be permitted.
- (d) Construction activities within the drain shall not take place between April 1 and June 15 of any given year.

E15.3.7 If Work is undertaken during unfrozen conditions, the Contractor will be required to maintain the flow and appropriately isolate the work area from the stream.

E15.3.8 If Work is undertaken in the Winter months of 2013 during frozen conditions, freezing conditions will exist and the flow in the drain will be minimal. As such, it is conceived that the Contractor may install a berm at the upstream limit of the work area and install and maintain temporary by-pass diversion pumps to handle any flows. The Contractor shall be required to supply and operate at least 1 – 100 mm diameter flood pump that may be required. To fairly mitigate anticipated costs, if the flows encountered during the period from December 1, 2012 up to and including March 15, 2013 exceed the capacity of 1 – 100 mm diameter flood pump, the Contractor will be reimbursed for any additional diversion works, as approved by the Contract Administrator.

E15.3.9 Disturbed areas shall be restored. Erosion control blankets, as approved by the Contract Administrator, shall be used to control potential erosion of areas where vegetation has been damaged up to when vegetation can be re-established.

E15.3.10 The Contractor's Creek Flow Maintenance Plan shall be designed to meet the following additional conditions and requirements:

- (a) Measures to isolate the work area from the stream with measures in place not to cause any disruption to fish passage or release of sedimentation in the drain.
- (b) Cofferdams, if used, shall be constructed of non-erodible material such as sandbags. Earthen berms shall not be used as cofferdams.
- (c) Between the dates of April 1 and June 15 of any given year, fish shall be afforded full access through the Site via a naturally flowing channel. In this time period, no construction activity impacting upon the creek affecting fish mobility or habitat will be permitted.

E15.4 Measurement and Payment

E15.4.1 The maintenance of creek flows will not be measured. This item of work will be paid for at the Contract Lump Sum Price for "Creek Flow Maintenance" performed in accordance with this Specification and accepted by the Contract Administrator.

E16. EXCAVATION

E16.1 Description

E16.1.1 Specification shall cover all operations relating to the excavation for the new culvert construction works, channel riprap, surface erosion control during construction, drain bed and embankment sloping as noted on the Drawings.

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 works as hereinafter specified.

E16.2 Materials

E16.2.1 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.

E16.2.2 Excavated material shall be unclassified excavation and shall include the excavation and satisfactory disposal of all surplus earth, gravel, sandstone, loose detached rock, cemented gravel or hard pan, disintegrated stone, rock in ledge or mass formation, and dry or all other material of whatever character that may be encountered.

E16.2.3 The erosion control blanket shall be as per E22.

E16.3 Construction Methods

E16.3.1 In general, the Work shall comprise of:

- (a) The design of the excavation for the new box culvert to conform to the requirements of the Manitoba Department of Labour and Immigration, Workplace Safety and Health Division.
- (b) Design, installation and subsequent removal of sheeting, shoring, and other temporary protective work as may be required.
- (c) The excavation of material of whatever nature, to the limits shown on the Drawings for the box culvert, riprap, drain bed and embankment trimming.
- (d) Prevention of frost incursion into the sidewalls or base of the excavation for the duration of the Works.

- (e) Surface erosion protection and rough grading.
- (f) Excavation construction sequence shall commence at the top of the bank and proceed downslope for both banks.
- (g) No material shall be stockpiled within 50 m of the top of bank.
- (h) The off-site disposal of surplus and unsuitable material.

E16.3.2 Requirements related to the excavation for the box culvert structure include:

- (a) The excavation shall be such that the structure may be properly constructed to the required depths and without reduction of dimensions as shown on the Drawings.
- (b) The dimensions of the excavation shall be such as to give sufficient clearances for the construction of forms and their subsequent removal and the construction of cut-off trenches and/or sumps, if required, to permit the pumping of water.
- (c) The excavation shall be dewatered and maintained dewatered so that the material is excavated in its natural state. The bottom of the excavation shall be kept free from excessive moisture of free-flowing water.
- (d) The level of any water inside the excavation shall be below the bottom of the footing elevation so that the concrete may be placed in dry conditions. Pumping water from inside the foundation enclosure shall be continued until the substructure unit is completed and backfilled or as otherwise directed by the Contract Administrator.

E16.3.3 The Contractor shall be required to maintain the excavation sidewalls and base in a frost-free condition for the duration of the construction until the box culvert has been totally backfilled. This is required so that there will be no backfill placed on frozen earth and cause subsequent subsidence once thawed. This requirement does not apply to the area upstream and downstream of the culvert on which riprap will be placed.

E16.3.4 The Contractor shall provide rough grading to all disturbed surfaces within the construction area to the requirements of the "Preparation of Existing Grade" of Specification CW 3450. The Contractor shall be responsible to cover all unvegetated surfaces of the embankments with an erosion control blanket, erect silt fences or use other suitable methods to prevent soil erosion into the drain, both during and after construction of the culvert up until the time of final landscaping restoration to be done by others. Landscaping by others will be done once the Works of this Contract on the drain embankment has been completed. The erosion control blanket is to be supplied, placed, measured and paid for in accordance with E22 and silt fences are to be supplied, placed, measured and paid for in accordance with E13.

E16.3.5 Excavated material that is unsuitable for or surplus to, the backfill requirements shall become the property of the Contractor and shall be removed from the Site. Excavated material shall not be disposed of in a manner that will obstruct the flow of watercourses. During freezing weather, the excess material shall be disposed of before it freezes.

E16.4 Measurement and Payment

E16.4.1 Excavation will be measured on a cubic metre basis. Excavation will be paid for at the Contract Unit Price for "Excavation", measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the Work included in this Specification.

E17. SUPPLY AND PLACE REINFORCING STEEL

E17.1 Description

E17.1.1 Specification shall cover the supply, fabrication and placement of plain reinforcing steel.

E17.1.2 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 works as hereinafter specified.

E17.2 Materials

E17.2.1 General

- (a) The Contractor shall be responsible for the supply, safe storage and handling of all materials as set forth in this Specification.
- (b) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with the latest edition of CSA Standard CAN3-A23.1, Storage of Materials, except as otherwise specified herein.

E17.2.2 Reinforcing Steel

- (a) All reinforcing steel shall be galvanized to conform to the requirements of CSA Standard G30.18, Grade 400W, Billet-Steel Bars for concrete reinforcement. If, in the opinion of the Contract Administrator, any reinforcing steel provided for the concrete works exhibits flaws in manufacture or fabrication, such material shall be immediately removed from the Site and replaced with acceptable reinforcing steel.
- (b) All reinforcing steel shall be straight and free from paint, oil, mill-scale, and injurious defects. Surface seams or surface irregularities will not be cause for rejection, provided that the minimum dimensions, cross section area, and tensile properties of a hand wire-brushed specimen are not less than the requirements of CSA Standard G30.18.

E17.2.3 Bar Accessories

- (a) Bar accessories shall be of a type approved by the Contract Administrator. They shall be made from a non-rusting material, and shall not stain, blemish, or spall the concreted surface for the life of the concrete.
- (b) Bar accessories shall include bar chairs, spacers, clips, wire ties, wire (18 gauge minimum), or other similar devices that may be approved by the Contract Administrator.

E17.2.4 Reinforcing Steel Shop Drawings

- (a) Shop drawings are to be submitted by the Contractor not less than 5 days prior to construction for review and approval by the Contract Administrator.
- (b) Reinforcing steel shall be detailed in accordance with the latest ACI Detailing Manual.

E17.3 Construction Methods

E17.3.1 Fabrication of Reinforcing Steel

- (a) Reinforcing steel shall be fabricated in accordance with CSA Standard S6 to the lengths and shapes as shown on the Drawings.

E17.3.2 Placing of Reinforcing Steel

- (a) Reinforcing steel shall be placed accurately in the positions shown on the Drawings and shall be retained in such positions by means of a sufficient number of bar accessories to that the bars shall not be moved out of alignment during or after the depositing of concrete. The Contract Administrator's decision in this matter shall be final.
- (b) Reinforcing steel shall be free of all foreign material in order to ensure a positive bond between the concrete and steel. The Contractor shall also remove any dry concrete, which may have been deposited on the steel from previous concrete placement, before additional concrete may be placed. Intersecting bars shall be tied positively at each intersection.
- (c) Splices in reinforcing steel shall be made only where indicated on the Drawings. Prior approval of the Contract Administrator shall be obtained where other splices are to be made. Welded splices shall conform to CSA Standard W186, and are subject to prior written approval of the Contract Administrator.

- (d) Reinforcing steel shall not be straightened or re-bent in a manner that will injure the metal. Bars with bends not shown on the Drawings shall not be used. Heating of reinforcing steel will not be permitted without the prior approval of the Contract Administrator. A minimum of twenty-four (24) hours advance notice shall be given to the Contract Administrator prior to placing of any concrete to allow for inspection of the reinforcement.
- (e) Concrete cover to reinforcing steel shall be in accordance with CSA A23.1-04, Table 17 and as indicated on drawings.

E17.4 Quality Control

E17.4.1 Inspection

- (a) All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator including all operations; from the selection and production of materials, through to 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. The Contract Administrator reserves the right to reject any materials or works that are not in accordance with the requirements of this Specification.

E17.4.2 Access

- (a) The Contract Administrator shall be afforded full access for the inspection and quality control testing of reinforcing steel; both at the Site of Work and at any plant used for fabrication of the reinforcing steel, to determine whether the reinforcing steel is being supplied in accordance with this Specification.

E17.4.3 Quality Testing

- (a) Quality control testing will be used to determine the acceptability of the reinforcing steel supplied by the Contractor.
- (b) The Contractor shall provide, without charge, the samples of reinforcing steel required for quality control tests and provide such assistance and use of tools and construction equipment, as is required.

E17.5 Measurement and Payment

- E17.5.1 Supplying and placing reinforcing steel will be considered incidental to the supply and placement of concrete. No separate measurement and payment will be made for reinforcing steel.

E18. STRUCTURAL CONCRETE

E18.1 Description

- E18.1.1 This Specification shall cover the preparation of Portland Cement Structural Concrete for, and all concreting operations related to, the construction of Portland Cement Structural Concrete Works as specified herein.
- E18.1.2 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 works as hereinafter specified.

E18.2 Materials

E18.2.1 General

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

E18.2.2 Handling and Storage of Materials

- (a) All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Contract Administrator. Storage of materials shall be in accordance with GSA Standard GAN/GSA-A23.1.

E18.2.3 Testing and Approval

- (a) 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 taken by the Contract Administrator for testing purposes.
- (b) All materials shall be approved by the Contract Administrator at least seven (7) days before any construction is undertaken. If, in the opinion of the Contract Administrator, such materials in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such materials shall be rejected by the Contract Administrator and replaced by the Contractor at his own expense.

E18.2.4 Bonding Agents

- (a) The Contractor shall identify the product(s) and submit product information to the Contract Administrator for review and approval.

E18.2.5 Curing Compound

- (a) If permitted for use, curing compound shall be liquid membrane-forming and conform to the requirements of ASTM Standard C309.

E18.2.6 Patching Mortar

- (a) The patching mortar shall be made of the same cementitious material as used for concrete and one part sand with sufficient water to produce a stiff mortar-like consistency.

E18.2.7 Non-Shrink Cementitious Grout

- (a) Where non-shrink cementitious grout is used, it shall be Sternson M-bed Standard, Specialty Construction Products CPO Non-Shrink Grout, Sika 212 Non-Shrink Grout, Meadows CG-86, or equal as accepted by the Contract Administrator. The minimum compressive strength of the grout at 28 days shall be 40 MPa.

E18.2.8 Formwork

- (a) Formwork materials shall conform to CSA Standard CAN/CSA-A23.1, and CSA 5269.3.
- (b) No "stay-in-place" formwork or falsework is permitted.
- (c) Form sheeting plywood to be covered with form liner or to be directly in contact with soil shall be exterior Douglas Fir, concrete form grade, conforming to CSA Standard O121, a minimum of 20 mm thick.
- (d) Where form liner is not being used, form sheeting shall be Douglas Fir, overlay form liner type conforming to CSA Standard O121. Approved manufacturers are "Evans" and "C-Z".
- (e) Boards used for formwork shall be fully seasoned and free from defects such as knots, warps, cracks, etc., which may mark the concrete surface.
- (f) No formwork accessories will be allowed to be left in place within 50 mm of the surface following form removal. Items to be left in place, must be made from a non-rusting material or galvanized steel; and they shall not stain, blemish, or spall the concrete surface for the life of the concrete.
- (g) Forms for exposed concrete surfaces that do not require a form liner may be either new plywood or steel as authorized by the Contract Administrator.

- (h) Studding shall be spruce or pine and shall have such dimensions and spacing that they shall withstand distortion from all the forces to which the forms will be subjected. Minimum dimensions shall be 50 mm x 150 mm.
- (i) Walers shall be spruce or pine, with minimum dimensions of 100 mm x 150 mm.
- (j) All forms are incidental to these Works and must be removed by the Contractor once adequate strength and curing of the concrete has been achieved.

E18.2.9 Permeable Formliner

- (a) Formliner shall be Hydroform, Texel Drainform or equal as approved in accordance with B6.

E18.2.10 Concrete Mix Design

- (a) The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this Specification. Concrete shall be supplied in accordance with the requirements of CSA A23.1-04, with the minimum properties as provided below:

Class of Exposure	S-2
Maximum Size of Aggregate (mm)	20 mm
Cement Type	Type HS or HSb
Maximum Water/Cementing Materials Ratio	0.45
Compressive Strength at 56 Days	32 MPa
Slump/Flow	80 +/- 20 mm
Air Content	4-7%

- (b) Provide a "Mix Design Statement" for each type of concrete to be used certifying constituent materials and mix proportions to the Contract Administrator at least 2 weeks before delivery of concrete to the Site. Supply reasonable evidence to the Contract Administrator that mix proportions selected will produce concrete meeting the specified strength, workability and yield.
- (c) The workability of each concrete mix shall be consistent with the Contractor's placement operations.
- (d) Any concrete repair material shall be compatible with the concrete substrate.
- (e) The temperature of all type of concrete shall be between 15°C and 25°C at discharge. Temperature requirements for concrete containing silica fume shall be between 10°C and 18°C at discharge unless otherwise approved by the Contract Administrator.
- (f) Concrete materials susceptible to frost damage shall be protected from freezing.

E18.2.11 Aggregates

- (a) The Contractor shall be responsible for testing the fine and coarse aggregates to establish conformance to these Specifications, and the results of these tests shall be provided to the Contract Administrator if requested. All aggregates shall comply with CSAA23.1.
- (b) Coarse Aggregate
 - (i) The maximum nominal size of coarse aggregate shall be sized to suit the Contractor's mix design. Gradation shall be in accordance with CSA A23.1, Table 11, Group 1. The coarse aggregate shall satisfy the Standard Requirements specified in CSA A23.1, Table 12, "Concrete Exposed to Freezing and Thawing".
 - (ii) Coarse aggregate shall consist of crushed stone or gravel or a combination thereof, having hard, strong, durable particles free from elongation, dust, shale, earth, vegetable matter or other injurious substances. Coarse aggregate shall be clean and free from alkali, organic or other deleterious matter; and shall have an absorption not exceeding 2.25%.

- (iii) The aggregate retained on the 5 mm sieve shall consist of clean, hard, tough, durable, angular particles with a rough surface texture, and shall be free from organic material, adherent coatings of clay, clay balls, and excess of thin particles or any other extraneous material.
 - (iv) Coarse aggregate when tested for abrasion in accordance with ASTM C131 shall not have a loss greater than 30%.
 - (v) Tests of the coarse aggregate shall not exceed the limits for standard for requirements prescribed in CSA A23.1, Table 12, for concrete exposed to freezing and thawing.
- (c) Fine Aggregate
- (i) Fine aggregate shall meet the grading requirements of CSA A23.1, Table 10, Gradation FA1.
 - (ii) Fine aggregate shall consist of sand, stone, screenings, other inert materials with similar characteristics or a combination thereof, having clean, hard, strong, durable, uncoated grains free from injurious amounts of dust, lumps, shale, alkali, organic matter, loam, or other deleterious substances.
 - (iii) Tests of the fine aggregate shall not exceed the limits for standard requirements prescribed in CSAA23.1, Table 12.

E18.2.12 Cementing Materials

- (a) Cementing materials shall conform to the requirements of CSA A3001.
- (b) Silica Fume
 - (i) Should the Contractor choose to include silica fume in the concrete mix design, it shall not exceed 8% by mass of cement.
- (c) Fly Ash
 - (i) Fly ash shall be Type CI or Type F and shall not exceed 25% by mass of cement.
- (d) Cementitious materials shall be stored in a suitable weather-tight building that shall protect these materials from dampness and other destructive agents. Cementitious materials that have been stored for a length of time resulting in the hardening or formation of lumps shall not be used in the Work.

E18.2.13 Admixtures

- (a) Air entraining admixtures shall conform to the requirements of ASTM C260.
- (b) Chemical admixtures shall conform to the requirements of ASTM C494 or C1017 for flowing concrete.
- (c) All admixtures shall be compatible with all other constituents. The addition of calcium chloride, accelerators, and air-reducing agents will not be permitted, unless otherwise approved by the Contract Administrator.
- (d) Appropriate low range water reducing and/or superplasticizing admixtures shall be used in concrete containing silica fume. Approved retarders or set controlling admixtures may be used for concrete containing silica fume.
- (e) An aminocarboxylate based migrating corrosion inhibitor admixture shall be used in concrete that will be used as a repair material that will either be in contact with or adjacent to reinforcing steel in existing concrete. Proposed admixtures shall be subject to the approval of the Contract Administrator.

E18.2.14 Water

- (a) Water to be used for mixing and curing concrete or grout and saturating substrate shall conform to the requirements of CSA A23.1 and shall be free of oil, alkali, acidic, organic materials or deleterious substances.

E18.2.15 Concrete Supply

- (a) Concrete shall be proportioned, mixed, and delivered in accordance with the requirements of CSA A23.1, except that the transporting of ready mixed concrete in non-agitating equipment will not be permitted unless prior written approval is received from the Contract Administrator.
- (b) Unless otherwise directed by the Contract Administrator, the discharge of ready mixed concrete shall be completed within 120 minutes after the introduction of the mixing water to the cementing materials and aggregates.
- (c) The contractor shall maintain all equipment used for handling and transporting the concrete in a clean condition and proper working order.

E18.2.16 Flexible Joint Sealant

- (a) Flexible joint sealant for all horizontal, vertical, and sloping joints shall be as shown on drawings (PVC Durajoint Waterstop) or approved equal as approved by the Contract Administrator and applied in strict accordance with the manufacturer's instructions.

E18.2.17 Fibre Joint Filler

- (a) Fibre joint filler shall be rot-proof and of the preformed, non-extruding, resilient-type, made with a bituminous fibre such as "Flexcell," and shall conform to the requirements of ASTM Standard D1751, or equal in accordance with B6.

E18.2.18 Expanding Joint Filler

- (a) Expanding joint filler shall be compressed to 20 percent of its expanded width and be a polyurethane foam, impregnated throughout with a latex modified asphalt. An approved product is "Emseal," by Emseal Corporation. Expanding joint filler to be installed as per Manufacturer's instructions.

E18.2.19 Miscellaneous Materials

- (a) The Contractor shall supply all materials, as approved by the Contract Administrator, to ensure the satisfactory completion of the concrete repair works.

E18.3 Equipment

E18.3.1 General

- (a) All equipment shall be of a type accepted by the Contract Administrator. The equipment shall be in good working order, kept free from hardened concrete or foreign materials, and shall be cleaned at frequent intervals.
- (b) The Contractor shall have sufficient standby equipment available on short notice at all times.

E18.3.2 Vibrators

- (a) The Contractor shall have sufficient numbers of internal concrete vibrators and experienced operators on-site to properly consolidate all concrete in accordance with ACI 309. The type and size of vibrators shall be appropriate for the particular application, the size of the pour, and the amount of reinforcing and shall conform to standard construction procedures.
- (b) The Contractor shall use rubber coated vibrators for consolidating concrete containing epoxy-coated reinforcing steel.
- (c) The Contractor shall have standby vibrators available at all times during the pour.

E18.3.3 Miscellaneous Equipment

- (a) The Contractor shall provide all miscellaneous equipment as required to properly and thoroughly execute and complete all operations related to the supply and placement of structural concrete.

E18.4 Construction Methods

E18.4.1 General

- (a) The Works involving Structural Concrete include the construction of:
 - (i) Culverts
 - (ii) Headwalls
 - (iii) Cut-off Wall
 - (iv) Wingwalls
 - (v) Retaining Walls

E18.4.2 Concrete Working Base

- (a) Upon completion of all excavation, the bottom of the excavation shall be inspected by the Contract Administrator. Concrete working base shall be installed where shown on the Drawings. Under no circumstances shall the Contractor place the concrete working base without the prior approval from the Contract Administrator.
- (b) Working base shall be Class S-2 Concrete of minimum compressive strength of 20 MPa.
- (c) The supply and installation of working base will be considered incidental to the work of backfilling, and no separate payment will be made.

E18.4.3 Form Work and Shoring

- (a) Formwork shall be designed, erected, braced, and maintained to safely support all vertical and lateral loads until such loads can be supported by the concrete.
- (b) As a maximum, the following spacings shall apply, for studding and whaling:
 - (i) 20 mm plywood: studding - 450 mm centre to centre
 - (ii) walers -760 mm centre to centre
- (c) Forms shall be clean before use. Plywood and other wood surfaces shall be sealed against adsorption of moisture from the concrete by a field-applied form coating or a factory-applied liner.
- (d) Form accessories to be partially or wholly embedded in the concrete, such as ties and hangers, shall be a commercially manufactured type. The portion remaining within the concrete shall leave no metal within 50 mm of the surface when the concrete is exposed to view. Spreader cones on ties shall not exceed 25 mm in diameter.
- (e) All exposed edges shall be chamfered 25 mm unless otherwise noted on the Drawings.
- (f) Slots, recesses, chases, sleeves, inserts, bolts, hangers, and other items shall be formed or set in coordination and cooperation with the trade concerned. No openings shall be made in structural members that are not shown on the structural drawings without the prior approval of the Contract Administrator.
- (g) Shores shall be provided with positive means of adjustment (jacks or wedges). All settlement shall be taken up before or during concreting as required.
- (h) Mud sills of suitable size shall be provided beneath shores, bedded in sand or stone, where they would otherwise bear on soil. The soil below shores must be adequately prepared to avoid settlements during or after concreting. Shores must not be placed on frozen ground.
- (i) Brace shores horizontally in two directions and diagonally in the same two vertical planes so that they can safely withstand all dead and moving loads to which they will be subjected.
- (j) Formwork shall have sufficient strengths and rigidity so that the resultant finished concrete conforms to the shapes, lines, and dimensions of the members shown on the Drawings.
- (k) Formwork shall be constructed to permit easy dismantling and stripping and such that removal will not damage the concrete. Provision shall be made in the formwork for shores to remain undisturbed during stripping where required.

- (l) Forms shall be constructed and maintained so that the completed Work is within minus 3 mm or plus 6 mm of the dimensions shown on the Drawings.
- (m) Formwork shall be cambered, where necessary to maintain the specified tolerances, to compensate for anticipated deflections in the formwork due to the weight and pressure of the fresh concrete and due to construction loads.
- (n) Forms shall be sufficiently tight to prevent leakage of grout or cement paste.
- (o) Form panels shall be constructed so that the contact edges are kept flush and aligned.
- (p) All form lumber, studding, etc. becomes the property of the Contractor when the Work is finished, and it shall be removed from the concrete and the Site by the Contractor after the concrete is set, free of extra charge, and the entire Site left in a neat and clean condition.
- (q) It shall be permissible to use the forms over again where possible, provided they are thoroughly cleaned and in good condition after being removed from the former portions of the Work. The Contract Administrator shall be the sole judge of their condition and his decision shall be final regarding the use of them again.

E18.4.4 Formliner

- (a) Formliners shall be used on all exposed formed surfaces, except soffit surfaces.

E18.4.5 General Curing

- (a) The use of curing compound will not be allowed on concrete areas that are to receive additional concrete or waterproofing.
- (b) Unformed concrete surfaces shall be covered and kept moist by means of wet polyester blankets for seven (7) consecutive days immediately following finishing operations or otherwise approved by the Contract Administrator and shall be maintained at above 10°C for at least seven (7) consecutive days thereafter. Construction joints shall only be covered and kept saturated by means of wet polyester curing blankets for the curing period.
- (c) If permitted for use, curing compounds shall be applied uniformly by roller. Spraying of the compound will not be permitted.
- (d) Concrete shall be protected from the harmful effects of sunshine, drying winds, surface dripping, or running water, vibration, and mechanical shock. Concrete shall be protected from freezing until at least twenty-four hours after the end of the curing period.
- (e) Changes in temperature of the concrete shall be uniform and gradual and shall not exceed 3°C in anyone hour period or 20°C in any two nty-four hour period.
- (f) Formed surfaces shall receive, immediately after stripping and patching, the same application of curing compound as finished surfaces.
- (g) After completing the finishing of unformed surfaces, where curing compound is not permitted, the surfaces shall be promptly covered with a minimum of a single layer of clean, damp polyester curing blanket and 6 mil polyethylene.
- (h) Care shall be exercised to ensure that the polyester curing blanket is well drained and that it is placed as soon as the surface will support it without deformation. The Contractor shall ensure that water from the polyester curing blankets does not run into areas where concrete placement and finishing operations are underway. If this occurs, concrete placement shall stop until the problem is corrected satisfactory to the Contract Administrator.

E18.4.6 Placing Concrete

- (a) The Contract Administrator must be notified at least 24 hours prior to concrete placement so that an adequate inspection may be made of formwork, shoring, reinforcement, expansion joints, and related works. Placement without required prior notification will not be allowed.

- (b) Equipment for mixing or conveying concrete shall be thoroughly flushed with clean water before and after each pour. Water used for this purpose shall be discharged outside the forms.
- (c) Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent segregation and a marked change in consistency.
- (d) Before depositing any concrete, all debris shall be removed from the space to be occupied by the concrete and any mortar splashed upon the reinforcement or forms shall be removed.
- (e) Placing of concrete, when started, shall be continuous. No concrete shall be placed against concrete that has sufficiently hardened to cause the formation of seams or "cold joints" within the section. If placing must be interrupted, construction joints shall be located where shown on the Drawings or as approved.
- (f) Concrete shall be placed as nearly as possible to its finish position. Rakes or mechanical vibrators shall not be used to transport concrete.
- (g) The maximum drop of free concrete into the forms shall not be greater than 1.5 m; otherwise, rubber tubes or pouring ports spaced not more than 1.5 m vertically and 2.5 m horizontally shall be used.
- (h) All concrete, during and immediately after deposition, shall be consolidated by mechanical vibrators so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into the corners of the forms; eliminating all air or stone pockets that may cause honeycombing, pitting or planes of weakness. Mechanical vibrators, when immersed, shall have a minimum frequency of 7,000 revolutions per minute.
- (i) Vibrators shall be inserted systematically into the concrete at intervals such that the zones of influence of the vibrator overlap (generally 300 to 900 mm). Apply the vibrator at any point until the concrete is sufficiently compacted (5 to 15 seconds) but not long enough for segregation to occur. Spare vibrators in working condition shall be kept on the job Site during all placing operations.
- (j) Concrete shall not be placed in rain or snow, unless adequate protection is provided for formwork and concrete surfaces.

E18.4.7 Finishing of Unformed Surfaces

- (a) Screeding of all unformed concrete surfaces shall be performed by the sawing movement of a straight edge along wood or metal strips or form edges that have been accurately set at required elevations.
- (b) Screeding shall be done on all concrete surfaces as a first step in other finishing operations. Screeding shall be done immediately after the concrete has been vibrated.
- (c) After screeding, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared. The surface shall then be consolidated with hand floats. Concrete surfaces after floating shall have a uniform, smooth, granular texture.
- (d) The surface of the roadway shall be given a transverse broom finish.

E18.4.8 Form Removal

- (a) All forms shall remain in place for a minimum of seven (7) days, unless otherwise accepted by the Contract Administrator. The Contract Administrator must be notified at least 24 hours prior to any form removal. The Contractor must receive approval from the Contract Administrator prior to beginning Work.
- (b) The minimum strength of concrete in place for safe removal of soffit forms for horizontal or inclined members, as well as vertical forms shall be 25 MPa, with the added provisions that the member shall be of sufficient strength to carry safely its own weight, together with superimposed construction loads, and that the forms shall stay in place a minimum of three days unless otherwise approved by the Contract Administrator.

- (c) Field-cured test specimens, representative of the in-place concrete being stripped, may be tested to verify the concrete strength.

E18.4.9 Patching of Formed Surfaces

- (a) Immediately after forms have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Contract Administrator. Any repairing or surface finishing started before this inspection may be rejected and required to be removed.
- (b) All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.
- (c) Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement, shall be thoroughly brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the adjacent surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Contract Administrator. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.
- (d) All objectionable fins, projections, offsets, streaks, or other surface imperfections shall be removed by approved means to the Contract Administrator's satisfaction. Cement washes of any kind shall not be used.
- (e) Concrete shall be cast against forms that will produce plane surfaces with no bulges, indentations, or protuberances other than those shown on the Drawings. The arrangement of panel joints shall be kept to a minimum. Panels containing worn edges, patches, or other defects that will impair the texture of concrete surfaces shall not be used. All fins on the concrete surfaces shall be removed.

E18.4.10 Cold Weather Concreting

- (a) The requirements of this section shall be applied to all concreting operations during cold weather; i.e., if the mean daily temperature falls below 5°C during placing or curing.
- (b) Supplementary equipment, as required below, shall be at the job Site if concrete is likely to be placed in cold weather.
- (c) Formwork and reinforcing steel shall be heated to at least 5°C before concrete is placed.
- (d) The temperature of the concrete shall be maintained at not less than 10°C for seven days or 15°C for five days or 20°C for three days after placing. The concrete shall be kept above freezing temperature for at least a period of seven days. In no case shall the heating be removed until the concrete has reached a minimum compressive strength, which will be specified by the Contract Administrator for Work under construction, and as determined from compressive strength tests for specimens secured under the same conditions as the concrete works in question.
- (e) Aggregates shall be heated to a temperature of not less than 20°C and not more than 55°C. Water shall be heated to a temperature between 20°C and 55°C. The temperature of the concrete at the time of placement shall be within the range specified in CSA Standard CAN/CSA-A23.1 for the thickness of the section being placed.
- (f) When the mean daily temperature may fall below 5°C, a complete hoarding of the Work, together with supplementary heat, shall be provided.
- (g) When the ambient temperature is below -15°C, the hoarding shall be constructed so as to allow the concrete to be placed without the hoarding having to be opened. If the mixing is done outside of the hoarding, the concrete shall be placed by means of

hoppers installed through the hoarding. The hoppers are to be plugged when not in use.

- (h) When the ambient temperature is equal to or above -15°C , the Contractor will be permitted to open small portions of the hoarding for a limited time to facilitate the placing of the concrete.
- (i) Before depositing any of the concrete, the Contractor shall show that enough heating equipment is available to keep the air temperature surrounding the forms within the specified range. This shall be accomplished by bringing the temperature inside of the hoarding to the specified 20°C , at least 12 hours prior to the start of the concrete placing.
- (j) The Contractor shall supply all required heating apparatus and the necessary fuel. When dry heat is used, a means of maintaining atmospheric moisture shall be provided. The relative humidity within the heated enclosure shall be maintained at a minimum of 40 percent during concrete placing and finishing operations. Following finishing operations, exposed concrete surfaces shall be protected from excessive drying by applying curing compound, covering the surfaces with polyethylene, or providing water curing.
- (k) Sufficient standby heating equipment must be available to allow for any sudden drop in outside temperatures and any breakdowns that may occur in the equipment.
- (l) Combustion-type heaters may be used if their exhaust gases are vented outside the enclosures and not allowed to come into contact with concrete surfaces. Fire extinguishers must be readily at hand wherever combustion-type heaters are used.
- (m) The Contractor shall keep a curing record of each concrete pour. The curing record shall include: date and location of the pour, mean daily temperature, hoarding relative humidity, temperatures above and below the concrete surface at several points, and notes regarding the type of heating, enclosure, unusual weather conditions, etc. This record shall be available for inspection by the Contract Administrator at the end of the concrete operations.

E18.4.11 Hot Weather Concreting

- (a) General
 - (i) The requirements of this section shall be applied during hot weather; i.e. air temperatures above 25°C during placing.
 - (ii) Concrete shall be placed at as low a temperature as possible, preferably below 15°C , but not above 22°C . Aggregate stockpiles may be cooled by watersprays and sunshades.
 - (iii) Ice may be substituted for a portion of the mixing water, providing it has melted by the time mixing is completed.
 - (iv) Form and conveying equipment shall be kept as cool as possible before concreting, by shading them from the sun, painting their surfaces White, and/or the use of watersprays.
 - (v) Sunshades and wind breaks shall be used as required during placing and finishing.
 - (vi) Work shall be planned so that concrete can be placed as quickly as possible to avoid "cold joints."
 - (vii) The Contract Administrator's approval is necessary before the Contractor may use admixtures, such as retardants, to delay setting or water-reducing agents to maintain workability and strength, and these must then appear in the Mix Design Statement submitted to the Contract Administrator.
 - (viii) Curing shall follow immediately after the finishing operations.
- (b) Hot Weather Curing
 - (i) When the air temperature is at or above 25°C , curing shall be accomplished by water spray or by using saturated absorptive fabric, in order to achieve cooling by evaporation. Mass concrete shall be water cured for the basic curing period

when the air temperature is at or above 20°C, in order to minimize the temperature rise of the concrete.

- (c) Job Preparation
 - (i) When the air temperature is at or above 25°C, or when there is a probability of its rising to 25°C during the placing period, facilities shall be provided for protection of the concrete in place from the effects of hot and/or drying weather conditions.
- (d) Concrete Temperature
 - (i) The temperature of the concrete as placed shall be as low as practicable and in no case greater than that shown below for the indicated size of the concrete section.

Thickness of Section (m)	Temperatures, °C	
	Minimum	Maximum
Less than 0.3	10	35
0.3 to 1.0	10	30
1.0 to 2.0	5	25

E18.4.12 Construction Joints

- (a) Construction joints shall be located only where shown on the Drawings or as otherwise approved in writing by the Contract Administrator. Construction joints shall be at right angles to the direction of the main reinforcing steel. All reinforcing steel shall be continuous across the joints. Bevelled shear keys, as shown on the Drawings or approved by the Contract Administrator, shall be provided at all joints.

E18.4.13 Structure Identification

- (a) Structure Identification Date
 - (i) The Contractor shall indent into the exposed concrete a structure identification date at the location shown on the Drawings in accordance with the detail shown on the Drawings or as otherwise directed by the Contract Administrator, all incidentally to the Work of this Specification.

E18.4.14 Clean Up

- (a) The Contractor shall maintain the Sites of Work in a tidy condition and free from the accumulation of waste and debris.

E18.5 Quality Control

E18.5.1 Inspection

- (a) All workmanship and materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Contract Administrator, including all operations, from the selection and production of the Work, through to 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. The Contract Administrator reserves the right to reject any materials or Works which are not in accordance with the requirements of this Specification.

E18.5.2 Access

- (a) The Contract Administrator shall be afforded full access for the inspection and control of testing of concrete and constituent materials, both at the Site of Work and at any plant used for the production of concrete, to determine whether the concrete is being supplied in accordance with this Specification.

E18.5.3 Materials

- (a) All materials supplied under this Specification shall be subject to testing and approval by the Contract Administrator.

E18.5.4 Concrete Quality

- (a) Quality control tests will be used to determine the acceptability of the concrete supplied by the Contractor.
- (b) The Contractor shall provide, without charge, the samples of concrete and the constituent materials required for quality control tests and provide such assistance and use of tools and construction equipment as is required.
- (c) The frequency and number of concrete quality control tests shall be in accordance with the requirements of CSA Standard CAN/CSA-A23.1.
- (d) Compressive strength tests on specimens cured under the same conditions as the concrete works will be made to check the strength of the in-place concrete and the adequacy of curing. Backfilling or subsequent concreting operations will not be allowed until the in-place concrete has achieved a compressive strength of 25 MPa.

E18.5.5 Corrective Action

- (a) If the results of the tests indicate that the concrete is not of the specified quality, the Contract Administrator shall have the right to implement additional testing, as required, to further evaluate the concrete at the Contractor's expense.
- (b) The Contractor shall, at his own expense, correct such work or replace such materials found to be defective under this Specification in an approved manner to the satisfaction of the Contract Administrator.

E18.6 Measurement and Payment

E18.6.1 Structural Concrete

- (a) Supplying and placing structural concrete will be measured on a volume basis. The volume to be measured shall be the total number of cubic metres of structural concrete supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from the Drawing dimensions. No deductions will be made for chamfers, reinforcing steel, structural steel, bolts or voids of seventy-five (75) mm in diameter or less. Reinforcing steel and all accessories like inserts are incidental to the supply and placement of structural concrete and no payment will be made for this work. This item of work will be paid for at the Contract Unit Price per cubic metre for "Structural Concrete" performed in accordance with this Specification and accepted by the Contract Administrator.
- (b) Supplying and placing structural concrete will be measured on a volume basis. The volume to be measured shall be the total number of cubic metres of structural concrete supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from the Drawing dimensions. No deductions will be made for chamfers, reinforcing steel, structural steel, bolts or voids of seventy-five (75) mm in diameter or less. Reinforcing steel and all accessories like inserts are incidental to the supply and placement of structural concrete and no payment will be made for this work. This item of work will be paid for at the Contract Unit Price per cubic metre for "Working Base" performed in accordance with this Specification and accepted by the Contract Administrator.

E18.6.2 Cold Weather Concreting

- (a) Cold Weather Concreting will not be measured. This item of work will be paid for at the Contract lump Sum Price for "Cold Weather Concreting", performed in accordance with this Specification and accepted by the Contract Administrator.

E19. BACKFILL

E19.1 Description

E19.1.1 This Specification shall cover all operations related to supply, placement and compaction of backfill materials as herein specified.

E19.1.2 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 works 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 as set forth in this Specification. All materials shall be handled in a careful and workmanlike manner, to the satisfaction of the Contract Administrator.

E19.2.2 Suitable Site Backfill

(a) Suitable Site backfill material shall be of a type approved by the Contract Administrator.

E19.2.3 Granular Backfill

(a) Granular backfill material shall be sound, free from organic material, and meet the following gradation requirements:

Canadian Metric Sieve Size	Percent Total Dry Weight Passing
50,000	100%
20,000	75% - 100%
5,000	45% - 85%
2,500	35% - 55%
315	15% - 35%
160	5% - 20%
80	0% - 7%

(b) In lieu of the above granular backfill, in the winter, crushed limestone of 50 mm maximum aggregate size conforming to CW 3110-R16, may be used.

E19.2.4 Crushed Limestone Sub-Base Course Material

(a) Crushed limestone base course material shall be supplied in accordance with City of Winnipeg Specification CW 3110-R16 with maximum 50 mm size.

(b) Place in lifts of no more than 150mm and compact to a minimum of 95% Standard Proctor Density.

E19.2.5 Crushed Limestone Base Course Material

(a) Crushed limestone base course material shall be supplied in accordance with City of Winnipeg Specification CW 3110-R16 with maximum 20 mm size.

E19.2.6 Clay Borrow Material

(a) Clay borrow material shall be of a type approved by the Contract Administrator.

E19.2.7 Low Density Foam Board

(a) Low density foam board shall be constructed of expanded foam

E19.3 Construction Methods

E19.3.1 General

- (a) The Work shall comprise of supply and placement of:
 - (i) A 600 thick granular base for the culvert.
 - (ii) A 75 mm thick concrete working base.
 - (iii) Granular backfill of the culvert.
 - (iv) Backfill as required to produce embankment slopes as shown on the Drawings.
- (b) The Work shall also include:
 - (i) Erosion control.

E19.3.2 Granular Culvert Base

- (a) Supply and place a 600mm thick layer of granular material below the working base of the culvert, consisting of a 300mm thick layer of Crushed Limestone Base Course Material on a 300 thick layer of Crushed Limestone Sub-Base Course Material.
- (b) Place to a minimum of one hundred percent (100%) Maximum Standard Proctor Density.

E19.3.3 Working Base Concrete

- (a) Following approval of the granular culvert base, place a 75 mm thick concrete working base.

E19.3.4 Culvert Backfill

- (a) All backfill of the culvert is to be unfrozen granular backfill and placed on unfrozen base. Place the backfill in accordance with the preparation of sub-base in Specification CW 3110-R16. That is in layers not exceeding 150 mm in compacted thickness and to a minimum of 100% Maximum Standard Proctor Density.
- (b) Place the backfill up to the elevation of the underside of the base course for the asphalt pavement or to the underside of topsoil, as applicable.

E19.3.5 Embankment Slope Backfill

- (a) Backfill the embankment slopes where required producing the embankment grades shown on the Drawings. Use Granular Backfill compacted to a minimum of 98% Maximum Standard Proctor Density.
- (b) Embankment slope backfill shall include a 150mm thick clay cap as directed by the Contract administrator.

E19.3.6 Erosion Control

- (a) The Contractor shall perform the following erosion control works:
 - (i) Exposure of soils along drain slopes shall be kept to a minimum practical amount, acceptable to the Contract Administrator.
 - (ii) Areas that are heavily disturbed and vulnerable to erosion or gullyng shall be diked to redirect runoff around the area prior to spring runoff.
 - (iii) Sediment control fencing, or other such erosion control structures, shall be employed whenever construction activity increases the potential for runoff to carry sediment into a drainage channel or other watercourse. Sediment control fencing shall be supplied, placed, measured and paid for as per E13 Silt Fence Barrier. The Contractor shall inspect all such structures daily during heavy construction activity in the areas of the structures and after heavy rainfall to ensure their continued integrity.
 - (iv) The loss of topsoil and the creation of excessive dust by wind during construction shall be prevented by the addition of temporary cover crop, water or tackifier, if conditions so warrant.
 - (v) Within the limits of construction and where slopes are bare and erodible, the surface water runoff into the drain is to be intercepted by cut-off trenches

- constructed near the drain's edge to reduce the deposition of sediments in the drain.
- (vi) All drain work including placement of riprap shall be undertaken in the winter when the ground is frozen, where possible, to reduce the impact from erosion to a minimum.
 - (vii) All erosion control necessary due to runoff from the roadway/sidewalk and embankment areas.

E19.4 Measurement and Payment

E19.4.1 Supplying and placing Backfill will be measured on a cubic metre basis. This item of work will be paid for at the Contract Unit Price for "Backfill" performed in accordance with this Specification and accepted by the Contract Administrator.

E20. ROCKFILL RIPRAP

E20.1 Description

E20.1.1 This Specification shall cover the supply and placement of rockfill riprap.

E20.2 Materials

E20.2.1 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.

E20.2.2 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.

E20.2.3 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.

E20.2.4 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

E20.2.5 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
350	100%
200	15-50%
100	0-15%

E20.3 Submittals

E20.3.1 The Contractor shall submit the proposed supplier(s) and location of quarry Sites for supply of riprap.

- E20.3.2 Representative samples of the rockfill riprap submitted for material testing purposes shall be completed as specified herein.
- E20.4 Quarry Sites
- E20.4.1 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.
- E20.5 Testing and Approval
- E20.5.1 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.
- E20.5.2 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.
- E20.5.3 No supply and placement of riprap will be permitted prior to the Contract Administrator reviewing the source.
- E20.5.4 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.
- E20.5.5 The testing frequency necessary to confirm the material quality will be specified at the discretion of the Contract Administrator.
- E20.6 Construction Methods
- E20.6.1 Rockfill Riprap shall be placed at all locations as shown on the Drawings.
- E20.6.2 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.
- E20.6.3 Sufficient levelling shall be done to produce a neat and uniform surface, conforming to the shape and dimensions shown on the Drawings.
- E20.6.4 The allowable fill tolerances shall be within ± 50 mm of the grades and thickness shown on the Drawings, provided positive downslope grading is achieved.
- E20.6.5 Provide a smooth uniform surface from the existing grade and new riprap when placing outside edges or transitions, as accepted by the Contract Administrator.
- E20.6.6 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.
- E20.7 Method of Measurement
- E20.7.1 The supply and placement of the Rockfill Riprap will be measured on a weight basis. The weight to be paid shall be the total number of metric tonnes of Rockfill Riprap material, supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as measured on a certified weigh scale.
- E20.7.2 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.
- E20.8 Basis of Payment

E20.8.1 Rockfill Riprap will be paid for at the Contract Unit Price for "Rockfill Riprap", measured as specified herein, which price shall be payment in full for performing all operations and providing all other items incidental to the Work included in this Specification

E21. CHAIN LINK FENCING

E21.1 Description

E21.1.1 The Work covered under this item shall include all operations relating to supply and installation of new chain link fencing as specified herein.

E21.1.2 The Work to be done by the Contractor under this Section 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 the Work as hereinafter specified.

E21.2 Materials

E21.2.1 Chain Link Fence

(a) Chain link fencing to be supplied in accordance with CW 3550 and in accordance with project drawings.

E21.3 Construction Methods

E21.3.1 Fence Posts

(a) Fence posts are to be anchored to the top of the concrete wall as indicated on structural drawings.

E21.3.2 Chain Link Fence

(a) New chain link fence to be installed to the limits shown on the Drawings in accordance with CW 3550.

E21.4 Measurement and Payment

E21.4.1 Chain Link Fencing will be measured in linear metres. This item of work will be paid for at the Contract Unit Price for "Chain Link Fencing" performed in accordance with this Specification and accepted by the Contract Administrator.

E22. EROSION CONTROL BLANKET

E22.1 DESCRIPTION

E22.1.1 This Specification covers the supply, installation, and maintenance of erosion control blanket to be installed on areas disturbed during construction and as directed by the Contract Administrator.

E22.2 MATERIALS

E22.2.1 Erosion Control Blanket

(a) Erosion Control Blanket shall be a machine-produced mat of 70% agricultural straw and 30% coconut blanket with a functional longevity of up to 24 months. Suitable products include SC 150 Extended Term manufactured by North American Green, or approved equivalent.

(b) The blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the mat. The blanket shall be covered on the topside with heavyweight photodegradable polypropylene netting having ultraviolet additives to delay breakdown and a maximum 159mm x 159mm mesh and on the bottom side with a lightweight photodegradable polypropylene netting with a maximum 127mm x 127mm mesh. The blanket shall be sewn together on 361mm centres (maximum) with degradable thread.

- (c) The Erosion Control Blanket shall have the following properties:
 - (i) Matrix 70% Straw Fibre (0.19kg/m²) and 30% Coconut Fibre (0.08kg/m²)
 - (ii) Netting top side heavyweight photodegradable with UV additives (1.47kg/100 m²).
 - (iii) Bottom side lightweight photodegradable minimum netting weight (0.73 kg/100 m²).
 - (iv) Degradable thread.

E22.2.2 Submittals

E22.2.3 The Contractor shall submit all manufacturers' product specifications and recommended installation methods for the proposed erosion control blankets and associated materials to the contract administrator a minimum of 14 days before construction.

E22.2.4 Construction Methods

E22.2.5 The Contractor shall supply all Erosion Control Blanket materials required and store them on site. The installation and maintenance of all ECM will be as directed by the Contract Administrator. The installation will be required only if the outer coffer dam upstream of the culvert is going to be over lopped.

E22.2.6 Actual alignment and location of the Erosion Control Blanket may be adjusted in the field by the Contract Administrator.

E22.2.7 Erosion Control Blanket - Drainage Channel Installation

- (a) In general excavate a trench 150mm deep by 150mm wide at the upstream end of the drainage channel and leave 300mm of Erosion Control Blanket beyond the upslope portion of the trench. Anchor blanket with 200mm long staples in trench as shown on the Drawings. Staples shall be a minimum of 300mm apart. Backfill trench with soil and compact. Apply seed to compacted soil. Fold remaining portion of blanket over sodded soil and secure with staples spaced 300mm (minimum) apart across width of blanket. Starting with the blanket on bottom of drainage channel, roll blanket out in direction of water flow. Securely fasten blanket against soil surface with staples. There shall be a minimum of 0.6 staples per square metre. Place blankets end over end in the downstream direction and secure overlaps with a double row of staples, staggered 100 mm (minimum) apart. There shall be a minimum 100mm to 150mm overlap between blankets in the downstream direction.
- (b) Repeat with blankets along the side slopes of the drainage channel. The overlap between adjacent blankets in the channel side slope direction shall be 50mm to 125mm (depending of blanket type). At the top of the side slope the full length edge of the blanket shall be anchored into a 150mm deep by 150mm wide anchor trench with staples spaced 300mm apart (minimum). The anchor trench shall be backfilled and compacted upon completion of stapling.
- (c) Secure downstream edges of Erosion Control Blanket as per manufacturer's specifications and detail drawings.

E22.3 Maintenance

E22.3.1 The areas covered with Erosion Control Blanket shall be regularly inspected especially after severe rainfall or storm events, to check for blanket separation or breakage.

E22.3.2 Any damaged or poorly performing areas as the result of storm events shall be replaced/repared immediately. Re-grading of the slope by hand methods may be required in the event of rill or gully erosion.

E22.3.3 Should the Contract Administrator determine that the Contractor has not maintained the erosion control blankets properly or has damaged the blankets from construction activities resulting in sediment releases beyond the work area, the Contractor shall retrieve all sediment that has left the construction area, to the fullest extent possible, at his own cost. As a minimum, the Contractor shall remove all deltas and sediment deposited in drainage ways and re-grade and/or reseed the areas where sediment removal results in exposed

soil. The removal and restoration shall take place within 5 working days of discovery unless precluded by legal, regulatory, or physical access restraints. If precluded, removal and restoration must take place within 5 working days of obtaining access. The Contractor is responsible for contacting all local, regional, provincial, and federal authorities before working in surface waters and for obtaining applicable permits. The Contractor's restoration work to restore property outside of the designated work area shall be at his own cost.

E22.4 Measurement and Payment

E22.4.1 Supplying and placing Erosion Control Blanket will be measured on a square metre basis. The area to be measured shall be the total number of square metres of Erosion Control Blanket supplied and placed in accordance with this Specification, acceptable to the Contract Administrator, as computed from the Drawing dimensions. This item of work will be paid for at the Contract Unit Price per square metre for "Supply and Install Erosion Control Blanket" performed in accordance with this Specification and accepted by the Contract Administrator.

E23. SUB-GRADE CONSTRUCTION IN TEST SECTION AREAS

E23.1 General

E23.1.1 This specification covers preparation of sub-grade in soil stabilizing test section area (Station 2+00-3+00).

E23.2 Construction Methods

E23.2.1 Complete excavation in accordance with CW 3110-R17.

E23.3 Coordination of Construction Works

E23.3.1 Following the completion of the excavation, transfer worksite to Antex Western. Remove all equipment and personnel from the test section area.

E23.3.2 Antex Western will supply and place soil stabilizing product within the test section area.

E23.3.3 Placement of the soil stabilizing product will take place over a 3 day period. During this time, the Contractor cannot work within the test section area, unless requested by Antex Western (for sub-grade compaction).

E23.3.4 Antex Western to provide 24 hour notice to Contractor to provide sub-grade compaction equipment and personnel.

E23.3.5 Contractor to provide standard stand-by rates to Antex Western for sub-grade compaction equipment.

E23.3.6 Sub-grade compaction to be completed over length of project excavation (approximately Station 1+00 to 2+90), ensuring equivalent compaction energy throughout.

E23.4 Measurement and Payment

E23.4.1 Stand-by time to be paid directly by Antex Western. Stand-by time will be measured as the difference between the start time, defined during the 24 hour notice, and the actual start of sub-grade compaction.

E23.4.2 Sub-grade compaction measurement and payment to follow CW 3110-R17.